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ENVIRONMENTAL ASSESSMENT
FOR THE
SURVEILLANCE TOWED ARRAY SENSOR SYSTEM
(SURTASS)
SUPPORT CENTER AND PIER PROJECTS
AT PEARL CITY PENINSULA
OAHU, HAWAII

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AT PEARL CITY PENINSULA
OAHU, HAWAII

PREPARED FOR:
Department of the Navy
Space and Naval Warfare Systems Command

COORDINATING AGENCY:
Pacific Division
Naval Facilities Engineering Command
Pearl Harbor, Hawaii

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Honolulu, Hawaii
Contract N62742-89-D-0007

APRIL 1992

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EXECUTIVE SUMMARY

This environmental assessment (EA) is prepared for an administrative action pursuant to the National Environmental Policy Act (NEPA), to address the potential environmental impacts of the proposed construction of new facilities and the relocation of the Surveillance Towed Array Sensor System (SURTASS) support operations from Bishop Point, Pearl Harbor, Oahu, Hawaii, to the Pearl City Peninsula Pearl Harbor, Oahu, Hawaii. This project proposes to build administrative and operational space to support the addition of larger ships with deeper drafts, new longer arrays, and more support personnel. The project site is on the eastern shore of the Pearl City Peninsula, between Pearl Harbor's Middle and East Lochs. Access is via Lehua Avenue and a Naval Supply Center (NSC) Pearl Harbor road.

Commander Space and Naval Warfare Systems Command (COMSPAWARSYSCOM) plans to expand the surveillance ship fleet operated by the T-AGOS Support Unit Pacific. COMSPAWARSYSCOM will increase the number of ships from the current nine to a possible total of 14 by 1996. The expanded fleet may include nine T-AGOS Class ships and five Small Waterplane Area Twin Hull (SWATH) Class ships. If support facilities are inadequate, the level of ocean surveillance cannot be improved and would compromise the readiness and mission of SURTASS.

This project is needed because the existing facilities at Bishop Point, Oahu, Hawaii are inadequate to meet the planned increase up to 14 ships. The maintenance and administrative facilities were designed to support six SURTASS ships and would not be capable of supporting 14 ships. The current facilities, designed for 170-foot modules, are not capable of supporting the new reduced diameter array, consisting of 250-foot sensor modules. In addition, these facilities would have insufficient berthing space at Alpha Docks 5, 6 and 7 to support both the expanded mission of SURTASS and the Commander Service Squadron V, which currently shares Alpha Dock 7 at Bishop Point.

The alternatives to the proposed action include no action, the construction of new facilities on Ford Island, and expansion of facilities at Bishop Point.

The facility at Bishop Point would remain unchanged with the no-action alternative and would not be able to support the expanded mission; therefore, no action is not a feasible alternative.

The Ford Island alternative would include replacement of the existing pier F-10 for the SURTASS pier and would have the potential to affect the nearby U.S.S. Utah Memorial. In addition, there would be more traffic on the ferry transporting SURTASS support personnel to the site until the Ford Island bridge plan is built.

The Bishop Point alternative could potentially interfere with on-going SURTASS operations during the construction of new dockside facilities and dredging operations. The pier improvements and an increase in SURTASS activities in the surrounding waters could potentially impede entry to Pearl Harbor.

No significant adverse effects as a result of this proposed project were identified. Construction impacts can be mitigated through the use of proper and approved construction techniques. The only archaeological site in the proposed project area is a fish pond that has been entirely reclaimed by hydraulic fill in the 1940s. Data recovery will be done via soil borings. Should any other historic or culturally important finds be identified during the construction phase, work would stop until such finds could be thoroughly examined and their significance determined. Traffic conditions on Kamehameha Highway will not be significantly affected by the project.

ENVIRONMENTAL ASSESSMENT FOR THE SURVEILLANCE TOWED ARRAY SENSOR SYSTEM (SURTASS) SUPPORT CENTER AND PIER PROJECTS AT PEARL CITY PENINSULA OAHU, HAWAII

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INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 TITLE OF ACTION

Environmental Assessment for the Surveillance Towed Array Sensor System (SURTASS) Support Facilities Relocation. This document has been prepared for an administrative action pursuant to the National Environmental Policy Act (NEPA).

1.2 BRIEF DESCRIPTION OF ACTION

Commander Space and Naval Warfare Systems Command (COMSPAWARSYSCOM) plans to increase the number of surveillance ships operated by the T-AGOS Support Unit Pacific from the current nine to a possible total of 14 by 1996. The expanded fleet may include nine T-AGOS Class ships and five Small Waterplane Area Twin Hull (SWATH) Class ships.

The existing facilities at Bishop Point, Oahu, Hawaii are inadequate to meet the expanded mission. The maintenance and administrative facilities were designed to support six SURTASS ships and would not be capable of supporting 14 ships. The current facilities, designed for 170-foot modules, are not capable of supporting the length of the new reduced diameter array, consisting of 250-foot length sensor modules. In addition, the currently constrained land area for waterfront operations would be insufficient berthing space to support both the expanded mission of the SURTASS program and the Commander Service Squadron (COMSERVRON) V, which currently shares Alpha Dock 7 at Bishop Point.

In conclusion, a new SURTASS Support Center and associated pier facilities are needed to accommodate the administrative and operational space to support 14 surveillance ships. Without the additional facilities, the SURTASS Support Center will lack the space to support the expanded mission. If support facilities are inadequate, the level of ocean surveillance cannot be improved and would compromise the readiness and mission of SURTASS. The proposed project site is on the eastern shore of the Pearl City Peninsula, between Pearl Harbor's Middle and East Lochs. Access is via Lehua Avenue and a Naval Supply Center (NSC) Pearl Harbor road.

1.3 LIST OF AGENCIES AND PERSONS CONSULTED

- Phil Baltch, St. Francis Medical Center West, Ewa Beach
- Chief Attilio Leonardi, Honolulu Fire Department Administrative Services, Honolulu
- Sergeant Sol Ano, Honolulu Police Department
- Assistant Chief of Police Van Kitagawa, Naval Station Security Department, Pearl Harbor Police Division, Pearl Harbor
- Chief Gonzalez, Federal Fire Department, Headquarters, Pearl Harbor
- Captain Kaauwai, Federal Fire Department, Station 5, Pearl City

CHAPTER 2

PURPOSE AND NEED

CHAPTER 2

PURPOSE AND NEED

2.1 BACKGROUND

The Surveillance Towed Array Sensor System (SURTASS) is a passive surveillance system used to collect and process undersea acoustic data for detection of submarines. For data collection, the system uses a hydrophone array towed by a civilian-manned Auxiliary Ocean Surveillance Ship (T-AGOS). The acoustic data is transmitted from the ship and relayed by satellite to a shore facility for processing, display, and evaluation. The T-AGOS ships and the SURTASS system are operated and maintained by civilian personnel employed by Military Sealift Command (MSC) and Space and Naval Warfare Systems Command (SPAWARS), respectively. The shore processing and evaluation sites are staffed by military personnel. The SURTASS ships are home ported at Naval Amphibious Base (NAB), Little Creek, Virginia for Atlantic operations and at Naval Station (NAVSTA) Pearl Harbor for Pacific operations.

In February 1981, a decision memorandum for the Secretary of the Navy from the Deputy Secretary of Defense gave approval for the production and deployment of the SURTASS program. The Integrated Undersea Surveillance Systems project office of the Naval Warfare Systems Command under sponsorship of the office of the Chief of Naval Operations was tasked to develop a SURTASS system which would be compatible with and integrated into other existing Navy anti-submarine warfare (ASW) systems. The SURTASS engineering development model (EDM) operated from 1978 to mid-1983. The EDM platform, the R/V Moana Wave, was home ported at NAB, Little Creek, Virginia where it successfully completed its pre-production testing in 1982.

In 1982, Congress authorized construction of 12 mono-hull T-AGOS class ships; a Naval Sea System Command construction contract was awarded to Tacoma Boatbuilding Company in Tacoma, Washington where the first of twelve T-AGOS ships, United States Naval Ship (USNS) *Stalwart*, was launched in 1983. Construction of an additional six ships, designated the T-13 class, was contracted by Naval Sea System Command to Halter Marine Inc. at Moss Point, Mississippi. The first ship of this class, *USNS Adventurous*, was launched in 1987. The latest addition to the SURTASS fleet is the Small Waterplane Area Twin Hull (SWATH) T-19 class. Presently, construction of four SWATH ships is contracted to McDermott Shipyard, in Amelia, Louisiana. The first ship of this class, *USNS Victorious*, was launched on 5 May 1990. It is scheduled to arrive at its home port of Pearl Harbor in November 1992.

2.2 CURRENT SITUATION

2.2.1 SURTASS ORGANIZATION

The SURTASS Support Center represents a collective effort of three separate organizational chains of command: the Commander Space and Naval Warfare Systems Command (COMSPAWARSYSCOM); T-AGOS Support Unit Pacific, under the Commander Military Sealift Command (COMSC) Pacific; and Commander Undersea Surveillance, U.S. Pacific Fleet (COMUNDERSEASURVPAC). These chains of command jointly manage the scheduling, logistics, repair, and crew allocation concerns of the SURTASS Program in the Pacific in support of the Operational Commander, COMUNDERSEASURVPAC.

The SPAWARSYSCOM Integrated Undersea Surveillance System Operations Support Detachment Manager oversees the proper operation of SURTASS support functions, which are described below in general terms.

1. **Array Maintenance Facility (AMF).** The AMF completes array maintenance /repair work and stocks spare modules.

2. **Logistic Support Facility (LSF).** The LSF stocks parts and other related equipment for SURTASS shipboard and shorebased sites.

3. **Field Support Team (FST).** The FST conducts ship support during Mission Readiness Availability (MRA) periods and assists the ship personnel in loading and repairing payload equipment.

4. **Field Communication Team (FCT).** The FCT provides technical assistance and training for communications operation of SURTASS equipment.

5. **Contractor Manning Agent (CMA).** The CMAs operate the mission's technical equipment aboard the ships.

6. **Field Logistic Agent (FLA).** The FLA provides logistic support including remote operations, shipyard/industrial requirements, material procurement and Public Works Center assistance.

The Military Sealift Command (MSC) oversees the operation of the ships through a contract operator while the COMUNDERSEASURVPAC is responsible for setting the tempo of SURTASS operations.

2.2.2 OPERATIONS

SURTASS Support Center operations revolve exclusively around maintenance requirements for Surveillance Towed Array Sensor System (SURTASS) equipment and appurtenances. The T-AGOS class ships which contain these equipment are considered USNS vessels, or Navy-owned and contractor operated. The ships have a maximum crew of 26. To inspect and maintain the surveillance equipment, the ships dock for fifteen (15) days after every 75-day mission period. Tasks involved during this 15-day inspection and maintenance period include:

- Hull maintenance
- Machinery repair
- Preventive maintenance
- Array maintenance
- Electronic systems repair
- Crew changes
- Training
- Resupply of stores/fuel
- Casualty report (CASREP) repairs
- System testing
- Field changes/system modifications

2.2.2.1 Waterfront Operations

SURTASS waterfront operations are conducted from two exclusively used docks at Bishop Point, Alpha Docks 5 and 6, and one dock shared with Commander Service Squadron (COMSERVRON) V, Alpha Dock 7. These docks, together with the SURTASS Support Center were designed to accommodate six T-AGOS ships. At present, nine T-AGOS Class ships utilize the SURTASS Support Center. Only three ships can be accommodated concurrently.

The ship's surveillance array equipment is a towed cable consisting of 35 modules, each approximately 170 feet long. The array is filled with a "denatured diesel" fluid referred to as "NORPAR/ISOPAR." Inspection of this cable requires the ship to be docked perpendicular to the wharf and approximately 100 feet away to allow the cable to float on the water to reduce the stress on the cable during reeling operations.

Removing the array from the ship requires about three 8-hour shifts, replacing it takes about two 8-hour days. The remaining dockside time is used to perform other necessary maintenance and tasks, including refueling of the ships at the Naval Supply Center (NCS) Pearl Harbor Hotel piers prior to departure. Maintenance of SURTASS surveillance equipment onboard each vessel is required four times a year.

The cable is reeled onto the wharf by a dockside reeler (DSR) and inspected for damage. Those segments, referred to as "modules", which require repair are removed and replaced. The damaged or worn modules are then reeled onto a smaller spool and transported to the maintenance building for repair.

The DSR is an 8-foot diameter by 31-foot long reel. When fully loaded, its maximum weight is approximately 35 tons. The reel weighs approximately 11 tons, the array weighs 18 tons, and the trailer which transport the reeler weighs 6 tons. The trailer is normally located about 25 feet from the face of the wharf to permit module inspection prior to reeling onto the DSR. Previous studies have indicated that portions of Alpha Docks 5 and 6 cannot safely accommodate this load. The Public Works Center (PWC) Pearl Harbor has identified and marked specific locations on the wharf where siting the DSR is permitted.

2.2.2.2 Maintenance Facilities

The existing SURTASS Support Center, Pacific, is located at Bishop Point, near the entrance to Pearl Harbor, on land under control of Naval Station Pearl Harbor. It includes a 30,480 square foot (SF) pre-engineered building (Building 54) which provides administrative space (6,600 SF) and operational space (23,880 SF) for storage, repair,

maintenance, and testing of the array modules used for ocean surveillance. Three temporary pre-engineered metal buildings are also situated at the Support Center; the first is 40 feet by 60 feet and the other two are both 24 feet by 60 feet.

Building 54 contains the AMF. This facility provides space for two 172-foot long work benches used to repair and test the array modules, which are each 170 feet long. The Logistics Supply Facility (LSF) warehouse provides space for receiving, inspecting, packing, and storing supplies needed for SURTASS operations. A MSC facility is provided for overseeing the operations of the ships.

A significant maintenance-related feature in Building 54 is the handling of NORPAR/ISOPAR fluid used in the array modules. Use of the NORPAR/ISOPAR fluids requires special handling due to its ignitability property (it has a flash point of 156 degrees Fahrenheit and is therefore classified by the U.S. Department of Transportation and the Department of Labor as a combustible liquid). In consideration of potential fire and vapor hazards, the maintenance building requires two 24-inch radius exhaust fans (which provide sixty FPM face velocity of air change during NORPAR/ISOPAR operations) located in the fluid handling area for ventilation.

The current Support Facility also includes a tank farm with two 6,000 gallon storage tanks and one 4,000 gallon waste tank, and associated parking areas for privately-owned vehicles.

2.3 NEED FOR THE PROJECT

COMSPAWARSYSCOM plans to increase the number of surveillance ships operated by T-AGOS Support Unit Pacific, under the Military Sealift Command Pacific, from the current nine to a possible total of 14 by 1996. The expanded fleet may include nine T-AGOS Class ships and five SWATH Class ships (which have a maximum crew of 45).

The existing facilities at Bishop Point, Oahu, Hawaii are inadequate to meet the expanded mission. The maintenance and administrative facilities were designed to support six SURTASS ships and would not be capable of supporting 14 ships. The current facilities, designed for 170-foot nodules, are not capable of supporting the new reduced diameter array, consisting of 250-foot length sensor modules. In addition, the currently constrained land area for waterfront operations would provide insufficient berthing space to support both the expanded mission of SURTASS and the Commander Service Squadron V, which currently shares Alpha Dock 7 at Bishop Point.

A depth of 35 feet (31 feet plus 4 feet clearance) Mean Lower Low Water (MLLW) will be required to accommodate the deeper draft of SWATH ships. The existing 22-foot harbor depth is inadequate for SWATH berthing at Bishop Point. An additional 13 feet, or approximately 50,000 cubic yards, of dredging would be necessary.

A 450-foot-long by 35-foot-wide pier will be required to berth the larger SWATH ships. The SWATH class ships also require piers that have foam-filled fenders that aid the ship in

berthing. The current site, Bishop Point, would not be capable of berthing SWATH class ships without modifications to the facilities.

In conclusion, a new SURTASS Support Center and associated pier facilities is needed to accommodate the administrative and operational space needed to support 14 surveillance ships. Without the additional facilities, the SURTASS Support Center will lack the space to support the expanded mission. If support facilities are inadequate, the level of ocean surveillance will decrease and compromise the readiness and mission of SURTASS.

CHAPTER 3

DESCRIPTION OF PROJECT REQUIREMENTS AND ALTERNATIVES CONSIDERED

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DESCRIPTION OF PROJECT REQUIREMENTS AND ALTERNATIVES CONSIDERED

3.1 INTRODUCTION

The need to provide additional facilities has been created by the COMSPAWARSYSCOM's decision to increase the number of supported surveillance ships from the current nine to a total of 14 by 1996 and to establish a T-AGOS Support Unit Pacific.

To meet the needs of the planned growth of the surveillance mission, the proposed project includes a SURTASS Support Center and associated pier facilities. The SURTASS Support Center and associated facilities will be located at the Pearl City Peninsula, situated between Pearl Harbor's Middle and East Lochs. The Pearl City Peninsula site is situated along the eastern shore of the peninsula with access via a Naval Supply Center (NSC) Pearl Harbor road. See Figures 3-1 and 3-2 for site and project locations.

Section 3.2 describes the required Military Construction Program (MILCON) landside and dockside projects necessary to support the expanding SURTASS mission in the Pacific Ocean region. Subsequent sections discuss the proposed action and the alternatives available to meet the facility requirements for relocating or modifying the existing SURTASS Support Center.

3.2 MILCON PROJECTS REQUIRED TO SUPPORT EXPANDING SURTASS MISSION

3.2.1 MILCON PROJECT P-417, SURTASS SUPPORT CENTER

MILCON Program Project P-417, SURTASS Support Center, will provide a new 87,760 square foot facility, replacing operations currently based at Building 54, Bishop Point, Pearl Harbor. This project is required to increase SURTASS maintenance, supply, and administrative capabilities in conjunction with planned growth of this surveillance mission.

The expanded fleet will consist of nine mono-hull T-AGOS Class ships as well as five new, larger, twin-hull SWATH Class craft. In addition, state-of-the-art surveillance equipment will be introduced into the program. New reduced diameter arrays (RDA), consisting of 250-foot length sensor modules, will replace the presently utilized 170-foot modules for surveillance operations. Each array contains 35 modules. The proposed project will provide a facility of sufficient size and functional capability to accommodate the new sensor modules.

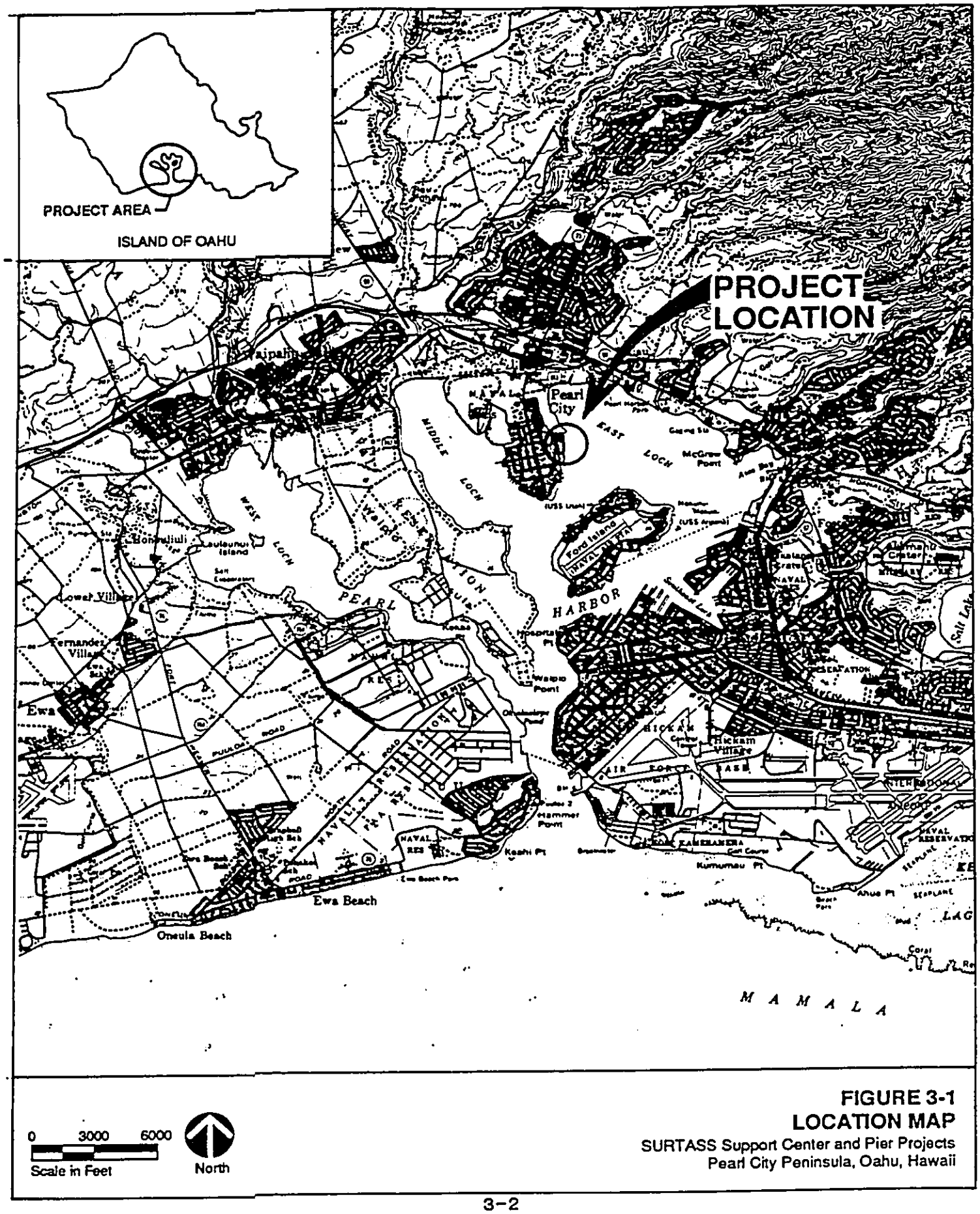


FIGURE 3-1
LOCATION MAP
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

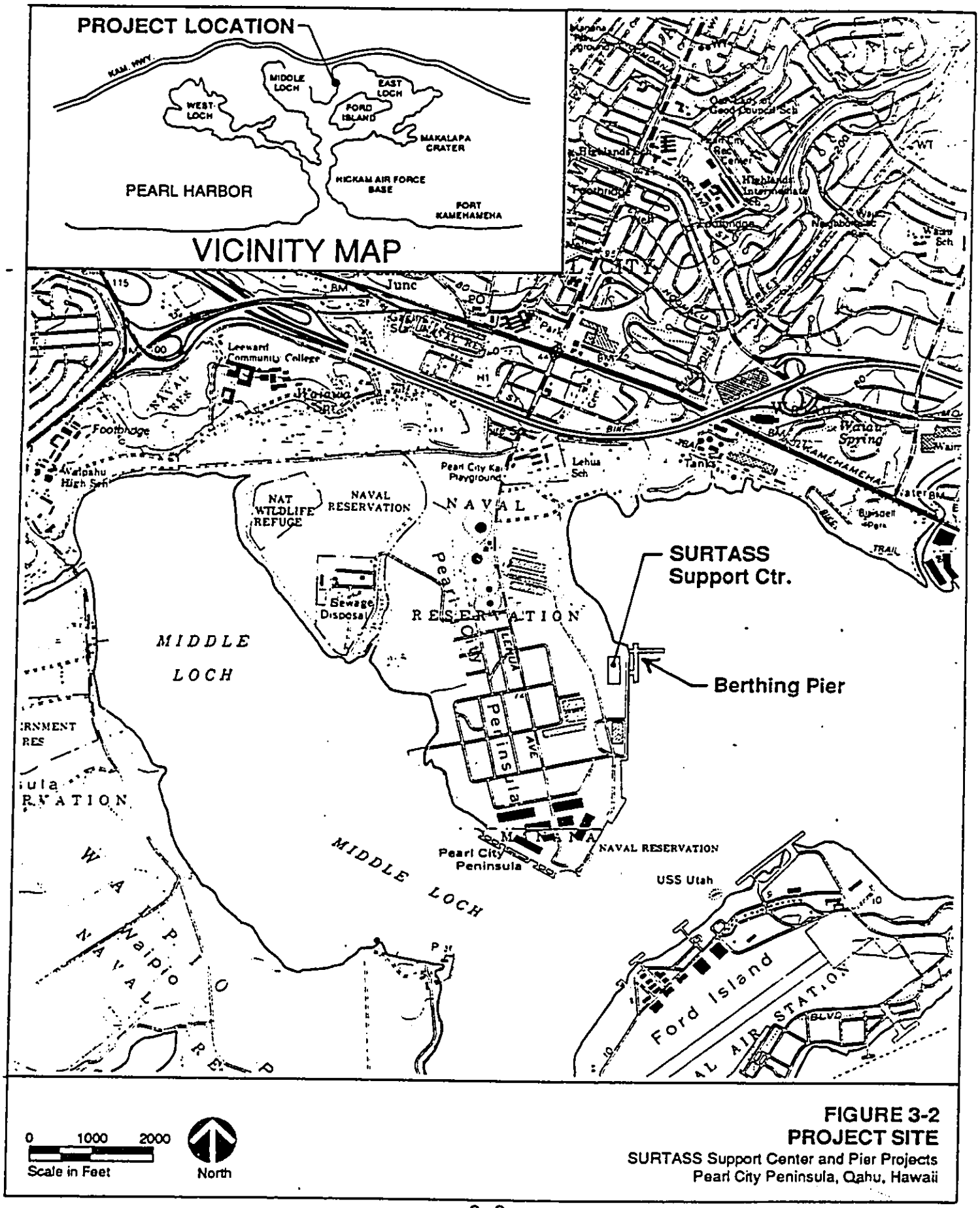


FIGURE 3-2
PROJECT SITE
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

3.2.1.1 MILCON P-417 Facility Requirements

The following are the landside improvements necessary to support the expanding SURTASS mission:

1. A 87,760 square foot (SF), two-story pre-engineered building will be required with primarily maintenance functions on the ground floor encompassing 67,600 SF and administrative areas on the second deck totalling 20,160 SF.

2. Two 10,000 gallon NORPAR/ISOPAR storage tanks will be required above-ground with spill containment diking. (NORPAR/ISOPAR is a denatured diesel fluid, which is inserted into the modules to establish the necessary specific gravity characteristics for the array.) One 10,000 gallon underground waste storage tank will also be provided.

3. A 90-foot-wide paved trailer maneuvering and turn-around area will be required adjacent to the building, enabling transporting of dockside reelers (DSR) from the ship to the array maintenance area within the facility.

4. A parking area for approximately 100 organizational and non-organizational vehicles will be required.

3.2.2 MILCON PROJECT P-422, PIER FACILITY FOR SURTASS SUPPORT CENTER

MILCON P-422, Pier Facility for SURTASS Support Center, will provide for the construction of a new pier facility and related dockside improvements to complement the SURTASS Support Center. Pier design will be sufficient to provide concurrent docking of three ships. The Army's use permit for the boat ramp and adjacent staging area will need to be revised to allow for SURTASS landside and dockside improvements. As an option, the area adjacent to Building 710 could be considered for use by the Army. Relocation of the boat ramp to the area adjacent to Building 710 is included in MILCON P-422.

3.2.2.1 MILCON P-422 Facility Requirements

The following are the dockside improvements necessary to support the expanding SURTASS mission:

1. A depth of 35 feet Mean Lower Low Water (MLLW) (31 feet draft plus four feet clearance) will be required to accommodate the deeper draft of SWATH ships.

2. A 450-foot long pier will be required to berth the longer SWATH ships (300 feet length plus 100 feet array cable reeling distance plus 50 feet additional clearance.) The pier shall be 35 feet wide (25-foot crane operating width plus 10 feet additional clearance) and capable of supporting a 60-ton crane for loading and unloading of Special Project equipment aboard the SWATH ship. The pier should be attached to a wharf or approach trestle structure.

3. Dockside space for the DSR will be required with proper alignment to the stern of the ship to facilitate cable reeling operations. Adjacent trailer maneuvering space is also required to allow transporting of DSRs to the array maintenance area. Dockside space can be accommodated by a wharf or an approach trestle, capable of supporting a DSR and trailer combined load of 35 tons.

Supporting utilities, consisting of water, sewer, drainage, power, and telephone systems, will be required to meet demands of landside and dockside facilities. Offsite utility system upgrade, if required, should be included as part of project development costs.

Access roadways at the pier and maintenance facilities will be required to achieve efficient traffic flow.

3.2.3 INTERIM PROVISIONS TO SUSTAIN ONGOING SURTASS OPERATIONS

The first SWATH class ships, Japanese surveillance auxiliary ocean ships (J-AGOS) arrived in August 1991 and remained in port for two months. The first US Navy SWATH T-19 class ship is scheduled to arrive in May 1992. Until MILCON P-422 is complete, Naval Supply Center K-6 and K-7 docks were modified to support these ships with a deeper draft in the interim. Work on the pile foundation and batterboard was done at K-7 to accommodate SWATH berthing, and leveling off a portion of the pier at K-6 was done for positioning of the dockside reeler.

The 60-ton crane requirement for loading/unloading of Special Project equipment is associated with the second generation of US Navy SWATH-A 23 class ships, which will be introduced approximately January 1994. K-7 is structurally incapable of supporting such loads. Should MILCON P-422, pier facility for SURTASS Support Center, not be completed in time of SWATH-A 23 arrival, other alternate berthing arrangements will need to be coordinated.

The reduced diameter arrays are scheduled to arrive during August 1992. These 250-foot array modules will require an array maintenance facility of greater length than that presently at the Bishop Point complex. Should MILCON P-417 not be completed by RDA delivery, interim accommodations will need to be made.

3.3 DESCRIPTION OF PROPOSED ACTION

To meet the needs of the planned growth of the surveillance mission, the proposed project includes a SURTASS Support Center and associated pier facilities. As seen in Figures 3-1 and 3-2, the facilities will be located along the eastern shore of the Pearl City Peninsula, with access via a NSC road. The site measures approximately 1000 feet by 600 feet. Staffing at the SURTASS facility during an average work day is estimated at 178 persons on one shift. It is anticipated that these employees would arrive at the facility between 0700 and 0730, and depart between 1630 and 1700. The site plan for the SURTASS Support Center is shown in Figure 3-3; the berthing pier site plan is shown in Figure 3-4.

3.3.1 BACKGROUND

The Pearl City Peninsula site is an open, relatively flat area with a mangrove shoreline wetland area to the north and a warehouse structure utilized by the Army at its southern extent (Building 710).

An existing boat ramp and two adjacent parcels of land (measuring 275 feet by 475 feet and 200 feet by 475 feet), located at the north side of the site, are presently utilized under a Memorandum of Understanding (MOU) by the Army Heavy Boat Company. Water depth fronting the boat ramp is approximately 36 feet MLW (Mean Low Water) with shallow shoal areas to the north and west of four to five feet.

The existing utilities consist of the following:

1. Two connecting drain lines traverse the site with several drainage inlets.

2. A 12-inch water main follows the NSC road. Connecting eight and six inch laterals traverse the site.

3. A six-inch sewer force main is located at the NSC road and eventually connects to the City and County of Honolulu sewage system.

4. One existing 11.5 kilovolt (KV) electrical feeder services the entire Pearl City Peninsula area.

5. Existing telephone cables service the Pearl City Peninsula area.

3.3.2 SITE DEVELOPMENT

3.3.2.1 Siting Constraints

An existing explosive safety quantity distance (ESQD) clear zone encumbers waters fronting this site. The distance from the shoreline to the outer limits of the ESQD varies from 300 feet to 700 feet. The SURTASS pier facility and ship berthing is sited with respect to this constraint.

The Army's use permit for the boat ramp and adjacent staging area would be revised to allow for SURTASS landside and dockside improvements. As an option, the area adjacent to Building 710 is being considered for use by the Army. Relocation of the boat ramp to this area is included in the proposed project and shown on Figure 3-4.

The site development avoids the wetland area to the north.

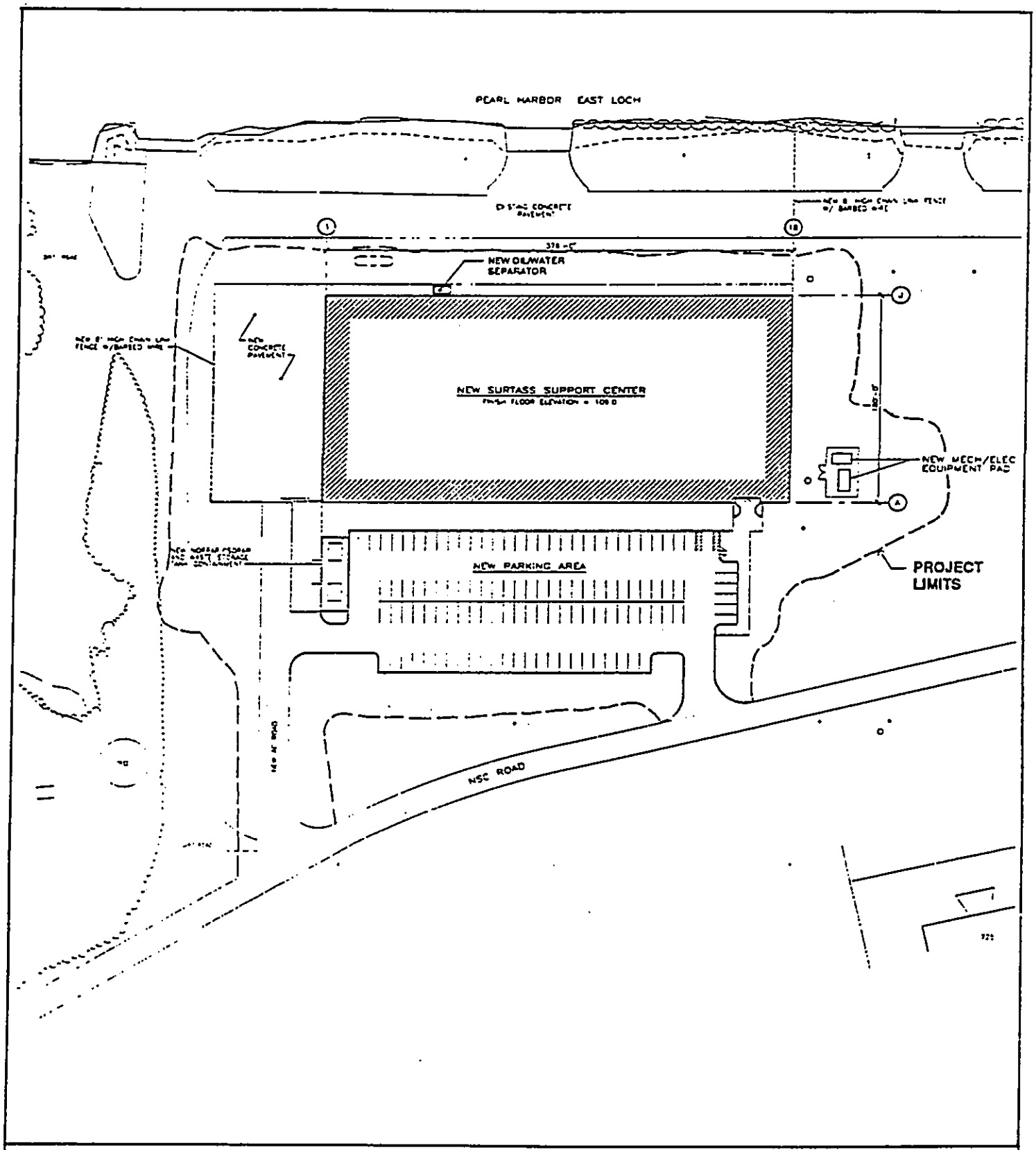
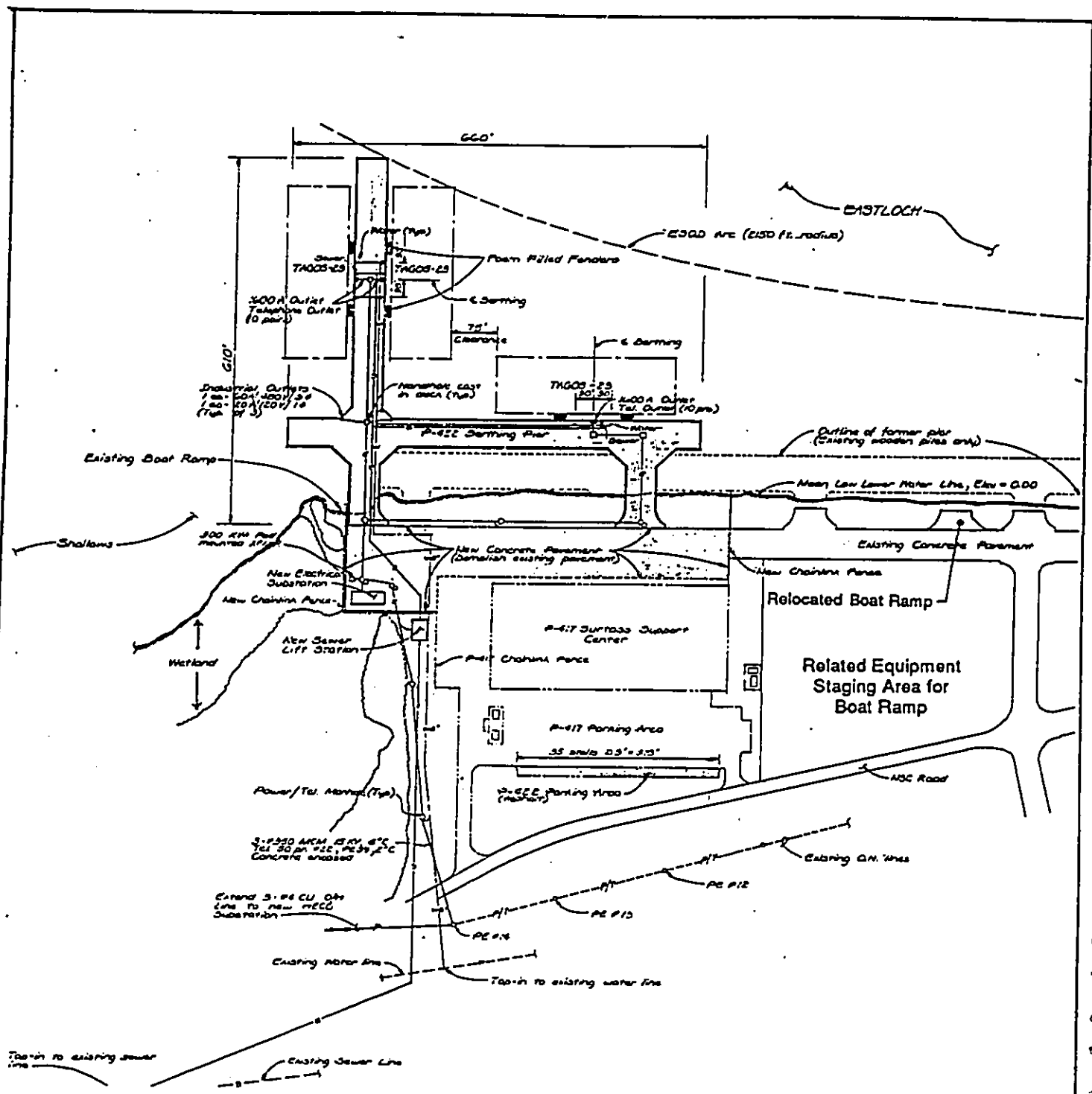


FIGURE 3-3
SURTASS SUPPORT CENTER SITE PLAN
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii



0 100 200
Scale in Feet

North

FIGURE 3-4
SURTASS BERTHING PIER SITE PLAN
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

3.3.2.2 Landside Improvements

The proposed SURTASS Support Center will occupy the north portion of the Pearl City Peninsula site with a NORPAR/ISOPAR storage area and parking situated in the area between the building structure and the NSC road. Adjacent open areas are utilized by NSC Pearl Harbor and the Army for open storage and staging operations during tri-service deployment exercises. The building is sited to permit convenient access to the proposed pier.

Demolition work will consist of removal of existing drain inlets and drain lines, pavement, and shrubbery.

Based upon available data, use of a pile supported foundation system is proposed.

3.3.2.3 Dockside Improvements

The existing 36 foot harbor depth is adequate to accommodate the SWATH ships.

The new pier facility will consist of two approach trestles instead of one so vehicle movement is improved. The approach trestles are located so flow of vehicles to the SURTASS Support Center building will require minimal turns. A wharf just beyond the old wooden pier will provide berthing for one vessel. A finger pier beyond the northern trestle will provide berthing capability for two additional vessels.

A new chainlink fence will surround the SURTASS Support Center and landside pier facilities. The final design of the pier facilities will locate the fence outside the wetland limits and any filling in the wetland will be prohibited per construction specifications.

NSC Victor 3 and 4 (V-3 and V-4) wharves, located on the south side of Pearl City Peninsula, were reviewed as potential alternatives to new pier construction. These docks, however, are presently utilized as NSC fueling wharves to resupply nearby jet fuel storage tanks, and additionally, are structurally inadequate to support combined trailer/DSR loads of 35 tons.

3.3.2.4 Supporting Utilities

Supporting utilities for landside and dockside facilities are indicated as follows:

1. Rerouting of existing drain lines will be required.

2. Water and fire lines will be provided by connection to the existing eight inch water lateral or the existing 12-inch water main which parallels the NSC road, depending upon demand.

3. Two new fire hydrants will be provided to fulfill fire protection requirements.

4. The domestic waste from the proposed SURTASS Support Center will be serviced by a new 6-inch sewer line that will be connected to the existing 6-inch gravity sewer system servicing existing buildings 723 to 725 (south of the new building). The sewer will then be routed by the existing system to the sewer lift station number 783 and be pumped to the closest manhole located on the northwest side of the building. The manhole ties into the City and County of Honolulu Honouliuli Sewage System once off of military property. Berthed ships not capable of treating their effluent will pump sewage to a new lift station, to be located north of the SURTASS Support Building, via a new pierside six-inch line. The new lift station will have a capacity of 200 gpm and will tie into the Honouliuli Sewage System.

5. An existing 11.5 kilovolt (KV) primary feeder from the Hawaiian Electric Company's (HECO) Waiau power plant services the Pearl City Peninsula. HECO is unable to meet the estimated 500 KVA demanded by the SURTASS Support Center and the 4 MVA demanded by SURTASS pierside projects with the existing feeder. HECO will construct a 10 MVA substation at the entrance to the Pearl City Peninsula. HECO's primary feeder to the new 10 MVA substation will be from HECO's 46 kV distribution system. The existing 11.5 kV feeder which is serving the existing Navy load will be disconnected and reconnected to the 10 MVA substation. The 10 MVA substation will be adequate to support the SURTASS projects and the existing Navy loads.

6. The existing telephone cables servicing the Pearl City Peninsula area are adequate to serve the SURTASS Support Center and pier facility.

3.3.3 COSTS

The cost estimates for the Pearl City Peninsula site for MILCON projects P-417 and MILCON P-422 are shown on Table 3-1. Additional costs will also be incurred to provide interim facility modifications for RDA maintenance prior to MILCON P-417 completion. Actual needs and anticipated cost would be developed once siting requirements are determined.

3.4 DESCRIPTION OF ALTERNATIVES

This section describes the alternatives available to meet the facility requirements for relocating or modifying the existing SURTASS Support Center. Other alternatives included No Action, Ford Island and the existing Bishop Point site. See Figure 3-5.

3.4.1 NO ACTION ALTERNATIVE

The existing maintenance and administrative facilities at Bishop Point, which was designed to accommodate only six SURTASS ships, is inadequate to meet the expanded mission of 14 ships by 1996. Without additional facilities, the SURTASS Support Center would lack the administrative and operational space to support the 14 surveillance ships or to maintain the 250-foot array modules. If support facilities are inadequate, the level of ocean surveillance would decrease and compromise the purpose of SURTASS. Therefore, no action is not a feasible alternative.

TABLE 3-1

Proposed Project
Pearl City Peninsula Cost Estimate

SURTASS Support Center (MILCON P-417)	
MILCON P-417 Improvements	$ 10,000,000
Contingency//SIOH (5%/6.5%)	$ 1,182,500
MILCON P-417 Total Project Cost	**$ 11,182,500[1]**
Pier Facility for SURTASS Support Center (MILCON P-422)	
MILCON P-422 Improvements	$ 23,000,000
Contingency/SIOH (5%/6.5%)	$ 2,719,750
MILCON P-422 Total Project Cost	**$ 25,719,750**

1. Does not include costs related to interim facility modifications for RDA maintenance.

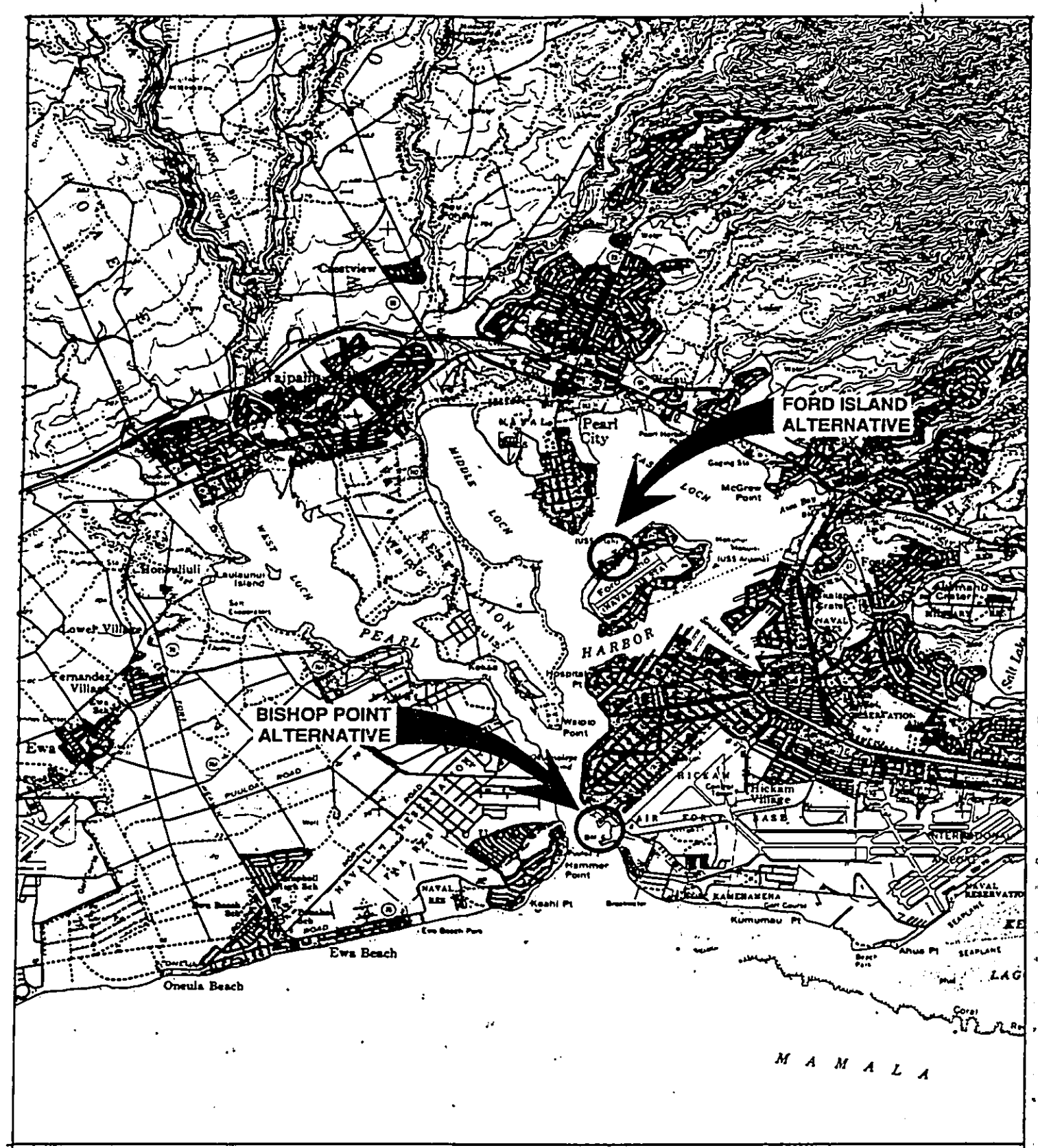


FIGURE 3-5
LOCATION OF ALTERNATIVE SITES
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

3.4.2 FORD ISLAND ALTERNATIVE

The Ford Island site is located on the northwest side of the Island along Wasp Boulevard at the existing Foxtrot 10 (F-10) pier. The site measures approximately 1,000 feet by 350 feet. It is presently vacant with the exception of a tree grouping, an abandoned gasoline utility box with two 6,000-gallon underground storage tanks, and a telephone cable shed. The general topography of the area consists of a gentle 2 to 3 percent cross slope from the shoreline to Wasp Boulevard.

Existing dock facilities at F-10 consist primarily of a T-head pier off of an approach trestle extending from the shoreline. F-10 is presently being utilized under an MOU by the Army's 5th Transportation Company. The original design of dock F-10 was based on a live load of 750 pounds per square foot or 2 to 15 ton trucks. The water depth fronting the pier is approximately 41 feet MLW.

Existing utilities at Ford Island include the following:

1. A 12-inch drain line traverses the site and discharges into Pearl Harbor.
2. A 16-inch water main runs alongside and parallel to Wasp Boulevard.
3. A 10-inch gravity sewer line and a 10 inch sewer force main runs approximately parallel to Wasp Boulevard along the southeast portion of the site.
4. Two existing 11.5 KV electrical feeders are located along Wasp Boulevard.
5. Telephone service is accessible from the existing telephone shed, Building 434.

3.4.2.1 Site Development

Site development issues related to the Ford Island alternative are discussed below. The Ford Island concept development plan with the proposed SURTASS improvements is shown in Figure 3-6.

3.4.2.1.1 Siting Constraints

Two on-site 6,000-gallon underground storage tanks would require removal under this alternative. A leak detection investigation has been conducted for soil and groundwater contamination. Findings showed no detection of contaminants in the groundwater sample and minimal hydrocarbon in the soil sample. As recommended by the study, monitoring for hydrocarbons would be required during the excavation for tank removal. In addition, safety and precautionary measures in compliance with EPA regulations would need to be complied with the removal and disposal of the underground tanks.

The Army's use permit of Pier F-10 would need to be rescinded by NAVSTA Pearl Harbor upon commencement of this proposed project.

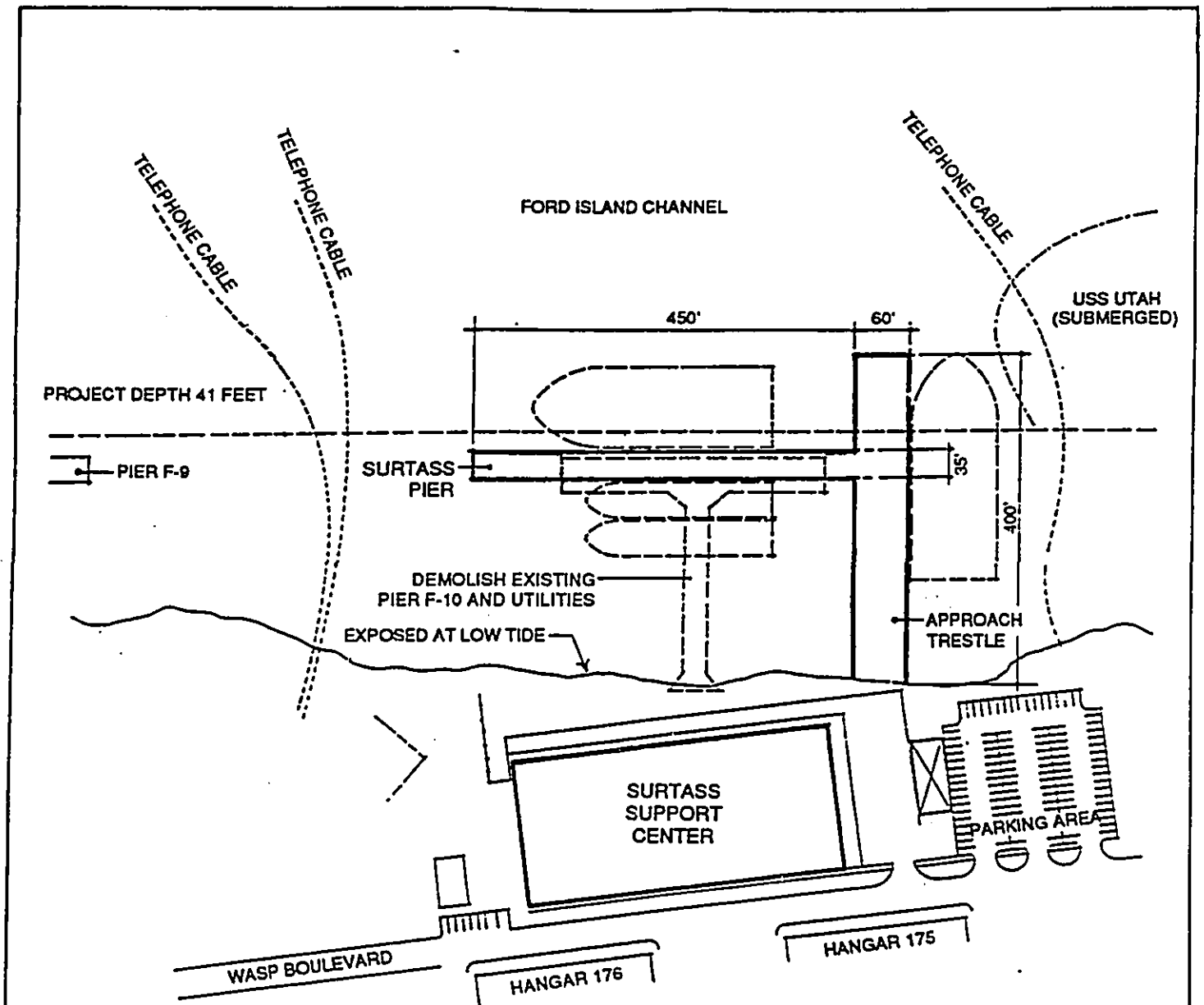


FIGURE 3-6
FORD ISLAND CONCEPT DEVELOPMENT PLAN
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

3.4.2.1.2 Landside Improvements

The SURTASS Support Center would be situated in the middle of the Ford Island site with the NORPAR/ISOPAR storage area and parking northeast of the facility and future expansion capability on the southeast side. Siting relationship of the building, particularly the array maintenance function, to the pier is essential to permit efficient work flow.

Demolition work would consist of the removal of existing pavement, abandoned utility lines, abandoned gasoline utility box with underground tanks and other existing structures.

Based upon onsite soils investigation, the building structure can be founded on individual spread footings. Pile foundation would not be required with this alternative.

Due to grade differential from the shore to Wasp Boulevard, a retaining building wall will be required at the higher side of the site.

3.4.2.1.3 Dockside Improvements

The existing 41-foot water depth is adequate to accommodate the deeper draft of the SWATH ships. Dredging would not be required with this alternative.

The existing F-10 pier structure is inadequate to support the 60-ton crane required for SWATH loading and unloading operations. A new pier facility would be required consisting of a 400-foot-long by 60-foot-wide approach trestle with connecting 450-foot-long by 35-foot-wide pier. This layout would allow for a fully loaded DSR to be moved on and off the pier facility.

3.4.2.1.4 Supporting Utilities

The following are the necessary dockside facilities that would be needed with the Ford Island alternative:

1. A new eight-inch water line would be needed for the pier hook-up to the 16-inch water main along Wasp Boulevard. Also, a new sewage lift station would be required to connect the new eight-inch sewer line from the pier to sewer force main.

2. The two existing 11.5 KV feeders would be inadequate to serve both the SURTASS support center and the pier facility. Two new 11.5 KV feeders would be required from Station TC-1 the pier facility, a run of approximately 4,900 feet.

3. Telephone cables would need to be tapped from the existing telephone shed onsite, Building 434.

The following are the landside facilities that would need improvements with the Ford Island alternative:

1. The existing drain line would need to be replaced with a new 24-inch and 30-inch drain line that would be routed around the building and into the harbor.

2. Potable water would need to be provided by a new four inch lateral connected to the 16-inch water main. In addition, two new eight-inch fire lines would be required.

3. A new eight inch sewer line, connected to the 10-inch gravity sewer system, would service the SURTASS Support facility.

4. The two existing 11.5 KV feeders along Wasp Boulevard have adequate capacity to serve the SURTASS Support facility. The tap from the existing feeder to the building is approximately 200 feet.

5. Telephone cables could be tapped from the existing telephone shed onsite, Building 434.

3.4.2.2 Costs

The cost estimate for the Ford Island alternative is shown on Table 3-2. The MILCON P-417 and P-422 estimates include the logistical expenses associated with transportation via ferry to this remote site.

3.4.3 BISHOP POINT ALTERNATIVE

Bishop Point is located on the eastern side of the entrance channel to Pearl Harbor. The site is relatively flat and measures approximately 800 feet by 550 feet. Much of the shore side of the site has been developed. Major structures include the existing SURTASS Support Center (Building 54) and the adjacent Commander Service Squadron V (COMSERVRON) Building 17. Three storage tanks (two 6,000-gallon NORPAR/ISOPAR and one 4,000-gallon waste oil tanks) with spill containment diking are located north of Building 54. In addition, three temporary trailer facilities have been recently constructed in this area to augment growing SURTASS operations.

Alpha Docks 5 and 6 (A-5 and A-6), currently used by SURTASS ships, are located on a 300-foot-long finger pier built at a 67 degree angle to wharf A-7. Wharf A-7 parallels the shore for a length of approximately 375 feet and is shared by COMSERVRON V and SURTASS ships. The water depth off of these docks is 22 feet MLW.

The existing utilities consist of the following:

1. A 12-inch water main runs parallel to the northeast boundary of the site. A connecting eight-inch lateral, perpendicular to the water main, traverses the site. Another six-inch water line runs adjacent to the wharf.

TABLE 3-2

Ford Island Alternative
Cost Estimate

SURTASS Support Center (MILCON P-417)	
MILCON P-417 Improvements	$ 11,700,000
Contingency//SIOH (5%/6.5%)	$ 1,384,000[1]
MILCON P-417 Total Project Cost	**$ 13,084,000**
Pier Facility for SURTASS Support Center (MILCON P-422)	
MILCON P-422 Improvements	$ 27,800,000
Contingency/SIOH (5%/6.5%)	$ 3,287,000
MILCON P-422 Total Project Cost	**$ 31,087,000**

1. Does not include costs for to interim facility modifications for RDA maintenance prior to MILCON P-417 completion.

2. A 27-inch sewer force main traverses the site from the northwest to southeast side. Another six-inch gravity sewer line runs parallel with the wharf.

3. One existing 11.5 KV electrical feeder, provided from Hickam Air Force Base, is serving the existing SURTASS facility.

4. Existing telephone cable service the Bishop Point area.

3.4.3.1 Site Development Plan

Bishop Point site development issues are discussed in the following sections. The Bishop Point concept development plan with the proposed SURTASS improvements is shown in Figure 3-7.

3.4.3.1.1 Siting Constraints

The northwest portion of the site is presently utilized as a parking area for the Hickam AFB Officer's Club under a real estate license with the Navy. The permit would need to be revoked to accommodate SURTASS improvements.

3.4.3.1.2 Landside Improvements

The proposed SURTASS Support Center would occupy much of the northeast portion of the site. The facility should be sited to permit direct vehicular access to the proposed pier. NORPAR/ISOPAR storage area should be located to the east and a new parking area on the west side of the facility. Future expansion can be accommodated as part of a phasing plan, once COMSERVRON operations are relocated to Building 54 and Building 17 is demolished.

Demolition work under MILCON P-417 would consist of the removal of several small building structures, roadway, pavement, fencing, and a portion of the water line (to be rerouted).

Based upon available data, the need for a pile supported foundation system would be likely. Actual design would be confirmed based upon findings of a soils investigation study.

3.4.3.1.3 Dockside Improvements

The existing 22 foot harbor depth is inadequate for SWATH berthing at Bishop Point. An additional 13 feet, or approximately 50,000 cubic yards, of dredging would be required.

The proposed pier would be sited to avoid encroachment into the Pearl Harbor entrance channel. Consequently, MILCON P-422 would need to replace Docks A-2 and A-3. The new pier facility would consist of a wharf for cable reeling operations and a finger pier for berthing.

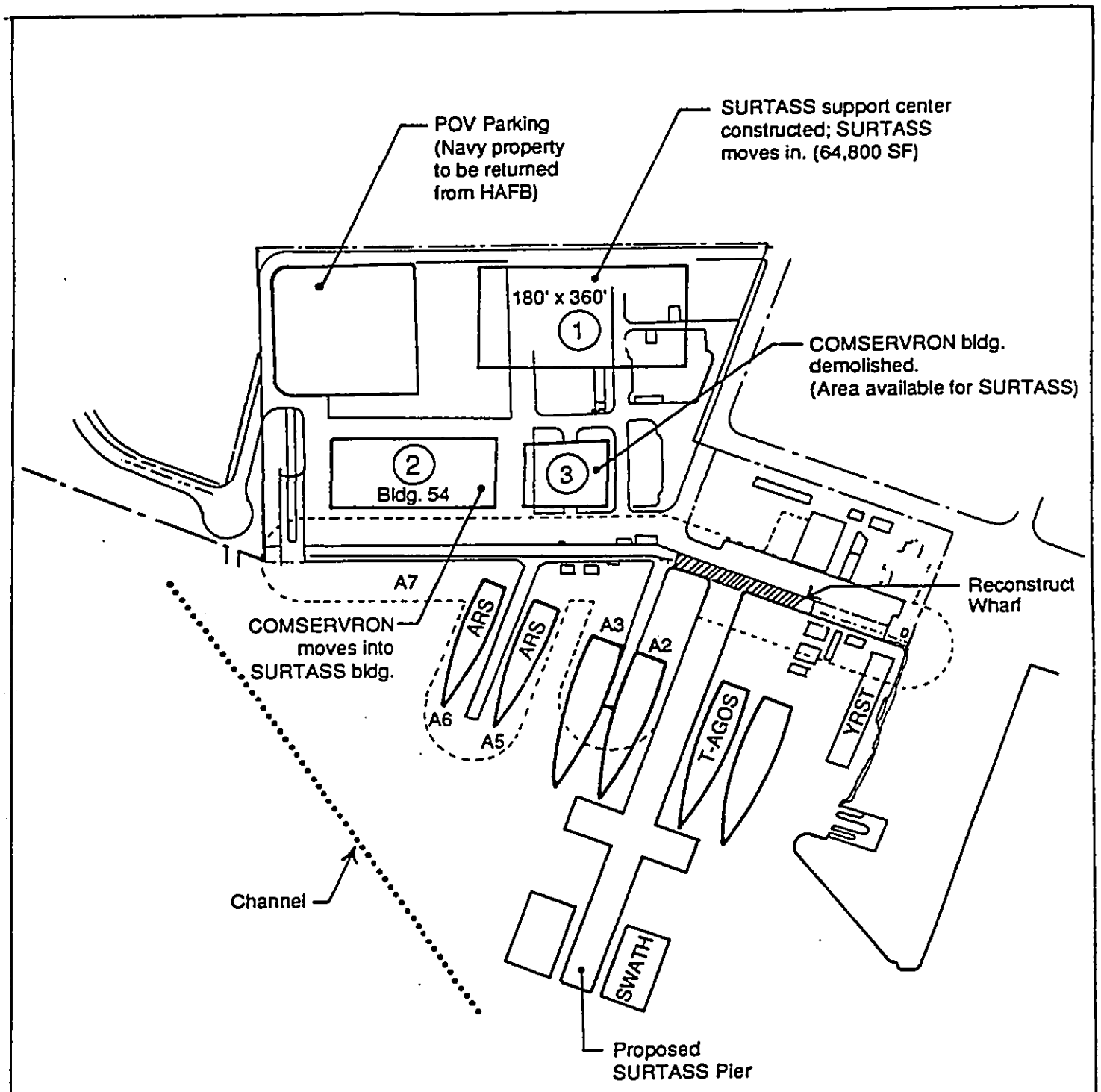


FIGURE 3-7
BISHOP POINT CONCEPT DEVELOPMENT PLAN
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

3.4.3.1.4 Supporting Utilities

1. Drainage would be provided by surface flow of storm water into the ocean as well as drainage inlets and pipes for remote areas.

2. Water and fire lines to the facility would be provided by connection to either the eight-inch water line west of the proposed building or the 12-inch water main north of the building.

3. Sewage would be conveyed by gravity sewer lines form the building to the existing six-inch sewer line south of the existing SURTASS building.

4. The existing 11.5 KV electrical feeder is adequate to serve the MILCON P-417 facility.

5. The existing 11.5 KV feeder is inadequate to meet the MILCON P-422 load demand. Two new 11.5 KV feeders need to be provided to the pier in accordance with military handbook requirements. One feeder would need to be provided from Station "K" and the other from Station "D" in the shipyard area. Approximate distance for the two feeders is 5,700 feet.

6. The existing telephone cable serving Bishop Point is inadequate to serve the P-417 facility. New cables need to be provided from the switching station in the shipyard, approximately 10,000 feet away.

7. The telephone cable for MILCON P-422 can be extended from the cable provided for MILCON P-417.

3.4.3.2 Costs

The cost estimate for the Bishop Point alternative for MILCON projects P-417 and P-422 is shown on Table 3-3. The MILCON P-417 and P-422 estimates include provisions to account for congestion at the project site, i.e., limited contractor laydown/staging areas, disruptions caused by ongoing government operations, and other difficulties.)

Additional costs will also be incurred to provide interim facility modifications for RDA maintenance prior to MILCON P-417 completion.

3.5 COMPARISON OF ALTERNATIVES

The following section includes a comparison of the Pearl City Peninsula site, the Ford Island alternative, and the Bishop Point alternative based on construction impacts to on-going SURTASS operations, cost, future expansion considerations, potential impacts caused by extension of piers, and access to mainside Pearl Harbor.

TABLE 3-3

Bishop Point Alternative
Cost Estimate

SURTASS Support Center (MILCON P-417)	
MILCON P-417 Improvements	$ 11,300,000
Contingency//SIOH (5%/6.5%)	$ 1,336,000
MILCON P-417 Total Project Cost	**$ 12,636,000[1]**
Pier Facility for SURTASS Support Center (MILCON P-422)	
MILCON P-422 Improvements	$ 27,300,000
Contingency/SIOH (5%/6.5%)	$ 3,228,000
MILCON P-422 Total Project Cost	**$ 30,528,000**

1. Does not include costs for interim facility modifications for RDA maintenance prior to MILCON P-417 completion.

3.5.1 CONSTRUCTION IMPACTS TO ON-GOING SURTASS OPERATIONS

3.5.1.1 Proposed Project, Pearl City Peninsula

There are no major problems as existing SURTASS operations can continue at Bishop Point while construction/modification activities occur at the Pearl City Peninsula site.

3.5.1.2 Ford Island Alternative

There are no major problems as existing SURTASS operation can continue at Bishop Point while construction/modifications activities occur at this site.

3.5.1.3 Bishop Point Alternative

Construction of a new pier will require the closure of Pier A-7. There are potential problems with accommodating SURTASS ships and COMSERVRON V ships on A-5 and A-6 during construction of new dockside facilities and dredging operations. These problems include lack of adequate space, interference with on-going SURTASS operations and coordination/scheduling requirements for use of dockside facilities.

3.5.2 COST COMPARISON

Costs related to the execution of the proposed project and each site alternative are compared in Table 3-4. The most significant cost savings is realized by construction of MILCON P-422 at Pearl City Peninsula versus on Ford Island or at Bishop Point. This difference is attributed primarily to the remoteness of the Ford Island site and the combination of limited space and ongoing operations at the Bishop Point site. The cost for MILCON P-417 at Pearl City Peninsula is slightly less that of Ford Island or Bishop Point.

3.5.3 FUTURE EXPANSION CONSIDERATIONS

3.5.3.1 Proposed Project, Pearl City Peninsula

Dockside space is unconstrained. Landside space is constrained.

3.5.3.2 Ford Island Alternative

Both dockside and landside space is somewhat constrained.

3.5.3.3 Bishop Point Alternative

Both dockside and landside space is constrained.

TABLE 3-4

Cost Comparison of Alternatives
(Costs Rounded)

Proposed Project, Pearl City Peninsula	
P-417 Project Cost	$11,200,000
P-422 Project Cost	$25,800,000
TOTAL PROPOSED PROJECT COST[1]	$37,000,000
Ford Island Alternative	
P-417 Project Cost	$13,100,000
P-422 Project Cost	$31,100,000
TOTAL FORD ISLAND ALTERNATIVE COST[1]	$44,200,000
Bishop Point Alternative	
P-417 Project Cost	$12,600,000
P-422 Project Cost	$30,500,000
TOTAL BISHOP POINT ALTERNATIVE COST[1]	$43,100,000

1. Does not include costs for interim facility modifications to accommodate RDA maintenance prior to MILCON P-417 completion.

3.5.4 POTENTIAL NAVIGATIONAL IMPACTS CAUSED BY EXTENSION OF PIERS

3.5.4.1 Proposed Project, Pearl City Peninsula

The extension of the piers to berth a maximum of three SURTASS ships does not appear to pose potential navigational impacts to military vessels traversing in surrounding waters.

3.5.4.2 Ford Island Alternative

An extension of piers does not appear to pose potential navigational impacts to military vessels traversing in surrounding waters.

3.5.4.3 Bishop Point Alternative

Bishop Point is situated near the estimated 1,500-foot-wide passageway of Pearl Harbor. An increase in SURTASS and other Naval ship activities in the surrounding water could conceivably impede entry to Pearl Harbor due to proposed pier improvements.

3.5.5 ACCESS TO MAINSIDE PEARL HARBOR

3.5.5.1 Proposed Project, Pearl City Peninsula

This site does not have direct access to mainside Pearl Harbor. Access by vessel or vehicle (using Kamehameha Highway) would be required.

3.5.5.2 Ford Island Alternative

This site does not have direct access to mainside Pearl Harbor. Access by vessel would be required. Direct access could be made available should the Ford Island Bridge Plan be implemented.

3.5.5.3 Bishop Point Alternative

This site has direct access to mainside Pearl Harbor.

3.6 PREFERRED ALTERNATIVE

The Pearl City Peninsula site is preferred for the new SURTASS Support Center. The following considerations with the Pearl City Peninsula site would enhance the efficiency and mission readiness of current and future SURTASS operations at Pearl Harbor.

- On-going SURTASS operations at Bishop Point will be allowed to continue unimpeded during construction at the Pearl City Peninsula site.
- Extension of piers at the Pearl City Peninsula site is not expected to pose potential navigational impacts to incoming and outgoing military vessels.
- Potential dockside space at the Pearl City Peninsula site is available for future expansion of SURTASS Pier facilities.

CHAPTER 4

EXISTING ENVIRONMENT

CHAPTER 4

EXISTING ENVIRONMENT

4.1 TOPOGRAPHY

The Pearl City Peninsula is located between Pearl Harbor's Middle and East Lochs. The topography of the peninsula is basically flat, with little or no slope. The proposed project site is situated along the eastern shore of the peninsula with access via a NSC road. The site measures approximately 1,000 feet by 600 feet and has been previously leveled and thus is an open, relatively flat area.

4.2 GEOLOGY AND SOILS

4.2.1 GEOLOGY

Pearl Harbor is a true coastal plain estuary with its main channel and lochs formed from the drowned valleys of a river and its tributary streams. The morphology of the harbor has been altered by marine erosion, sedimentation and extensive dredging of channels to depths adequate for passage of large ships. The watershed draining into Pearl Harbor constitutes approximately 20 percent of the land area of the Island of Oahu. The west side of the harbor is composed mostly of limestone reef material and is known as the Ewa Plain. The east side of the harbor consists mainly of volcanic tuff. Volcanic basalt forms the bulk of the rock material to the north. Marine and terrestrial sediments occur around the perimeter of the harbor.

The sedimentary rocks of the upper portion of the Pearl City Peninsula are mostly unconsolidated noncalcareous deposits of alluvium which consist of black to brown coarse detritus only slightly weathered. In some areas, the peninsula consists of black sticky mud called "taro patch clay."

The predominant sedimentary rocks of the lower portion of the peninsula are consolidated or partly consolidated alluvial deposits and noncalcareous marine sediments consisting of stratified siltstones with scattered lenses of gravel.

In June 1991, a geotechnical investigation was done for the proposed SURTASS Support Center on Pearl City Peninsula. The investigation referenced a 1938 geologic and topographic map of the island of Oahu, Hawaii which indicates that the SURTASS building site was formerly a fishpond in East Loch.[1] It was reclaimed by hydraulic filling in the 1940s to form the Victor Dock.

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[1] Stearns, H.T., and Knute N. Vaksvik, 1938, *Record of the drilled wells on the Island of Oahu, Hawaii*, Bulletin 4, U.S. Department of the Interior, Geologic Survey, Division of Hydrography, Territory of Hawaii. Referenced in Harding Lawson Associates, June 7, 1991, *Geotechnical Investigation*, Pearl City Peninsula, Oahu, Hawaii.

The map also indicates a contact between recent alluvium (Ra) and older alluvium on the peninsula adjacent to the site. The recent alluvium often incorporates older alluvium.

Records of drilled wells on Kirkbride Avenue west of the site indicate 7 to 18 feet of clay overlying older alluvium to a depth of about 80 feet. Below 80 feet, the wells encountered "lava Clay" and "gravel" interpreted by Stearns and Vaksvik as Tertiary Koolau basalt (Tkb). The depth to the top of the aquifer in these wells was about 85 feet.[2]

4.2.2 SOILS

According to the US Soil Conservation Service (SCS), the major soil associations for the Pearl City Peninsula are the Kaena-Waialua and Lualualei-Fill land-Ewa associations.

Kaena-Waialua association: This association consists of deep, mainly nearly level and gently sloping, poorly drained to excessively drained soils that have a fine textured to coarse textured subsoil on underlying material. They are found on coastal plains, talus slopes, and in drainageways.

Lualualei-Fill land-Ewa association: This association consists of well-drained, fine textured and moderately fine textured soils on fans and in drainageways on the southern and western coastal plains on the island of Oahu. The soils are nearly level to moderately sloping. They formed in alluvium. The areas of fill land consist of many kinds of material. The natural vegetation is kiawe, koa haole, and fingergrass.

Figure 4-1 shows the occurrence of soils on the Pearl City Peninsula. The dominant soils are Fill land (FL), Pearl Harbor (Ph), Mamala (MnC), and Keaau (JmA). There are also some Honouliuli (HxA) on the upper end of the peninsula. These soil series are described by SCS as follows:

Pearl Harbor series: This series consists of very poorly drained soils on nearly level coastal plains on the island of Oahu. These soils developed in alluvium overlying organic material. Elevations range from nearly sea level to 5 feet. The annual rainfall amounts to 18 to 40 inches.

These soils are suitable for taro, sugarcane, and pasture. The natural vegetation consists of cattails, mangrove trees, California grass, and sedges.

Pearl Harbor clay (Ph) soil is on low coastal plains adjacent to the ocean. It is level or nearly level. Included in mapping were small areas of Kaloko and Keaau soils.

In a representative profile the surface layer is very dark gray mottled clay about 12 inches thick. The subsoil, about 19 inches thick, is very dark gray and very dark grayish-brown, mottled clay that has angular and subangular blocky structure. The substratum is muck or peat. The soil is neutral in the surface layer and mildly to moderately alkaline in the subsoil.

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[2] Ibid.

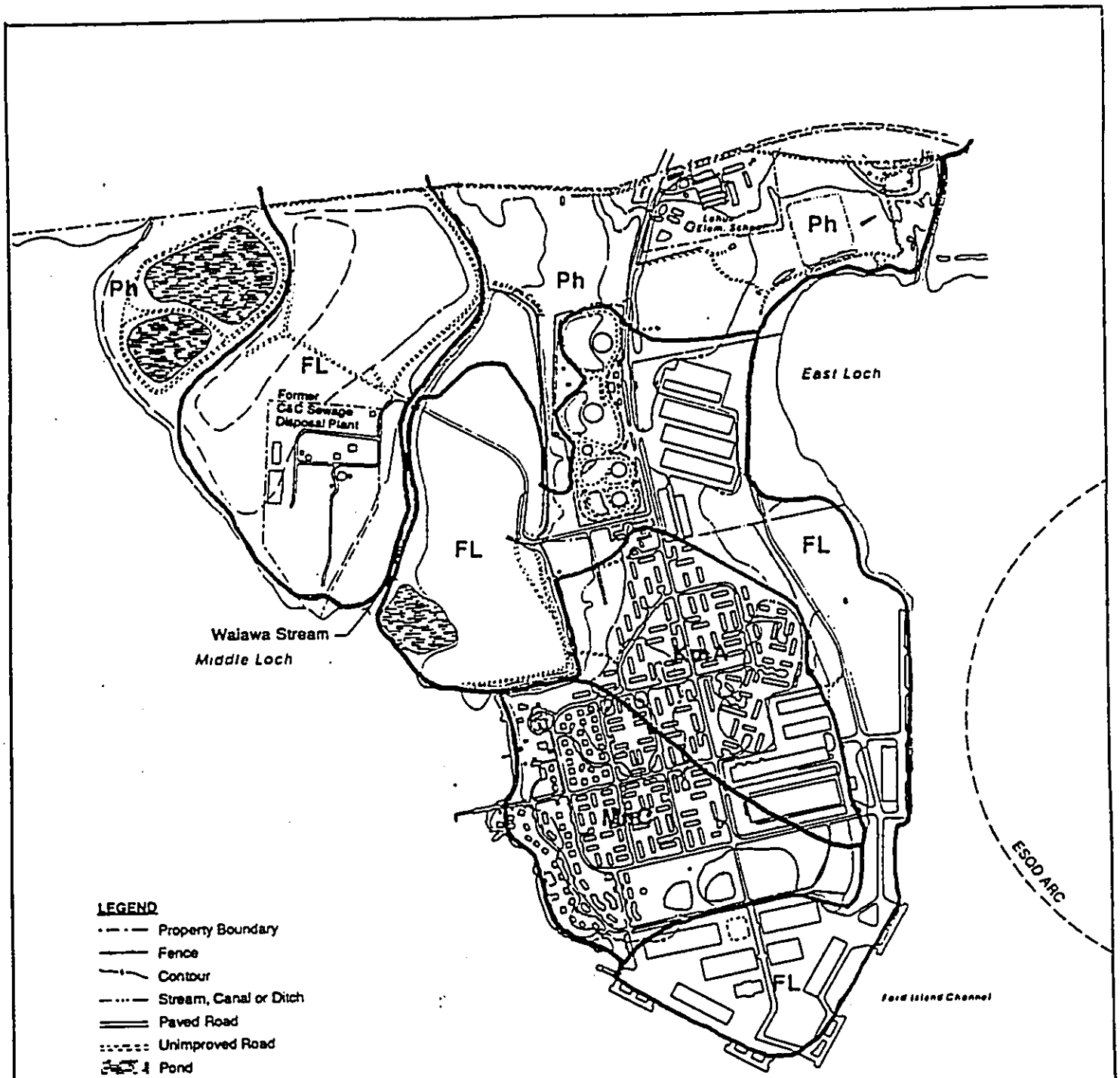


FIGURE 4-1
SOILS MAP
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

Permeability is very slow. Runoff is very slow to ponded, and the erosion hazard is no more than slight. The available water capacity is about 1.4 inches per foot in the surface layer and subsoil. In places roots penetrate to a depth of 2 to 4 feet. Workability is very difficult.

Keaau series: This series consists of poorly-drained soils on coastal plains on the island of Oahu. These soils developed in alluvium deposited over reef limestone or consolidated coral sand. They are nearly level and gently sloping. Elevations range from 5 to 40 feet. The annual rainfall amounts to 20 to 35 inches. Most of the rainfall occurs between November and April.

These soils are suitable for sugarcane and pasture. The natural vegetation consists of kiawe, Bermuda grass, bristly foxtail, and fingergrass.

Keaau clay, 0 to 2 percent slopes (KmA), occurs on lowlands on the coastal plains. Included in mapping were small areas of coral sand and dark-colored, sticky and plastic clay on fans above the Keaau soils.

In a representative profile the surface layer is very thick grayish-brown clay about 15 inches thick. The subsoil, about 19 inches thick, is very dark grayish-brown and dark-brown, mottled clay that has subangular and angular blocky structure. The substratum is white to very pale brown reef limestone or consolidated coral sand. The soil is mildly alkaline in the surface layer and subsoil and moderately alkaline in the substratum. The water table is at a depth of 1 to 3 feet.

Permeability is slow. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.5 inches per foot of soil. Roots are restricted by the consolidated coral sand, reef limestone, and water table. Workability is difficult because the soil is very sticky and very plastic. The shrink/swell potential is high.

Mamala series: This series consists of shallow, well-drained soils along the coastal plains of Oahu. These soils formed in alluvium deposited over coral limestone and consolidated calcareous sand. They are nearly level to moderately sloping. Elevation ranges from 20 to 50 feet. The annual rainfall is 18 inches.

These soils are suitable for sugarcane, truck crops, orchards, and grazing land.

Mamala stony silty clay loam (MnC) has a slope range of 0 to 12 percent, but in most places the slope does not exceed 6 percent. Stones, mostly coral rock fragments, are common in the surface layer and in the profile. Permeability is moderate. Runoff is very slow to medium, and the erosion hazard is slight to moderate.

Honouliuli series: This series consists of well-drained soils on coastal plains on the island of Oahu in the Ewa area. These soils developed in alluvium derived from basic igneous material. They are nearly level and gently sloping. Elevations range from 15 to 125 feet. The annual rainfall amounts to 18 to 30 inches and occurs mainly between November and April.

These soils are suitable for sugarcane, truck crops, orchards, and pasture. The natural vegetation consists of kiawe, koa haole, fingergrass, bristly foxtail, and Bermuda grass.

Honouliuli clay, 0 to 2 percent slopes (HxA), occurs in the lowlands along the coastal plains. Included in mapping were small areas of fine-textured alluvial soils that have a stony subsoil. Also included were small areas of shallow, red, friable soils that are underlain by reef limestone.

In a representative profile the soil is dark reddish-brown, very sticky and very plastic clay throughout. The surface layer is about 15 inches thick. The subsoil and substratum have subangular blocky structure, and they have common to many slicken sides. The soil is neutral to mildly alkaline.

Permeability is moderately slow. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.8 inches per foot of soil. In places roots penetrate to a depth of 5 feet or more. Workability is slightly difficult because of the very sticky and very plastic clay. The shrink-swell potential is high.

Fill land: Fill land mixed (FL) occurs mostly near Pearl Harbor and in Honolulu, adjacent to the ocean. It consists of areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources.

This land type is used for urban development including airports, housing areas, and industrial facilities.

4.2.3 GEOTECHNICAL INTERPRETATION

Most of the soils on the Pearl Harbor Peninsula are rated by SCS as poor for agriculture. The Pearl Harbor and Keaau soils are sticky, plastic and poorly drained. The Mamala soils, on the other hand, have a low water-holding capacity. Topsoil is shallow, with coral below a depth of 8-20 inches. Only the small area of Honouliuli soils at the upper end of the peninsula is considered suitable for agricultural use, with irrigation.

The geotechnical investigation included exploration of subsurface conditions at the project site by drilling 19 test borings and excavating 8 shallow pits at the location shown in Figure 4-2. The borings indicated that the site is underlain by 8 to 10 feet in fill consisting of soft to medium-stiff silt with sand and gravel, and loose silty sand and gravel. When compacted at moisture contents near or slightly above optimum, the near-surface soils from the test pits exhibited a CBR (California Bearing Ratio) greater than 15 and low-expansion potential. In Borings B-4, B-8, B-15, B-17, and B-19, the fill was underlain by a layer of soft silt, ranging from a few feet thick to about 35 feet thick in Boring B-4. In most borings, the fill was underlain by alternating layers of stiff silt and loose to medium-dense silty gravel, with occasional layers of dense gravel or weak rock less than about 5 feet thick. Borings B-1, B-2, B-3 and B-16 encountered layers of stiff organic or peaty soils at depths generally greater than 50 feet. Boring B-4 encountered soft silt with organic matter from 20 to 45 feet deep.

In the building area, soils encountered in the upper 10-15 feet were generally weak and compressible, while underlying soils were relatively strong with low to moderate compressibility.

4.2.4 PHYSIOGRAPHIC STRUCTURE OF THE PEARL HARBOR MARINE ENVIRONMENT

Most of the shoreline and physical composition of the harbor bottom is relatively homogeneous in the vicinity of the proposed project. The shorelines appear to be excavated or dredged, and are formed from concrete buttresses along the southern region of the survey area. The shallowest areas adjacent to the shoreline consists of coarse sand and rubble bottoms littered with aggregations of shell fragments.

The nearshore environment in the vicinity of the proposed site differs significantly than other areas of Pearl Harbor. In regions such as off Ford Island, a shallow nearshore flat borders the shoreline.

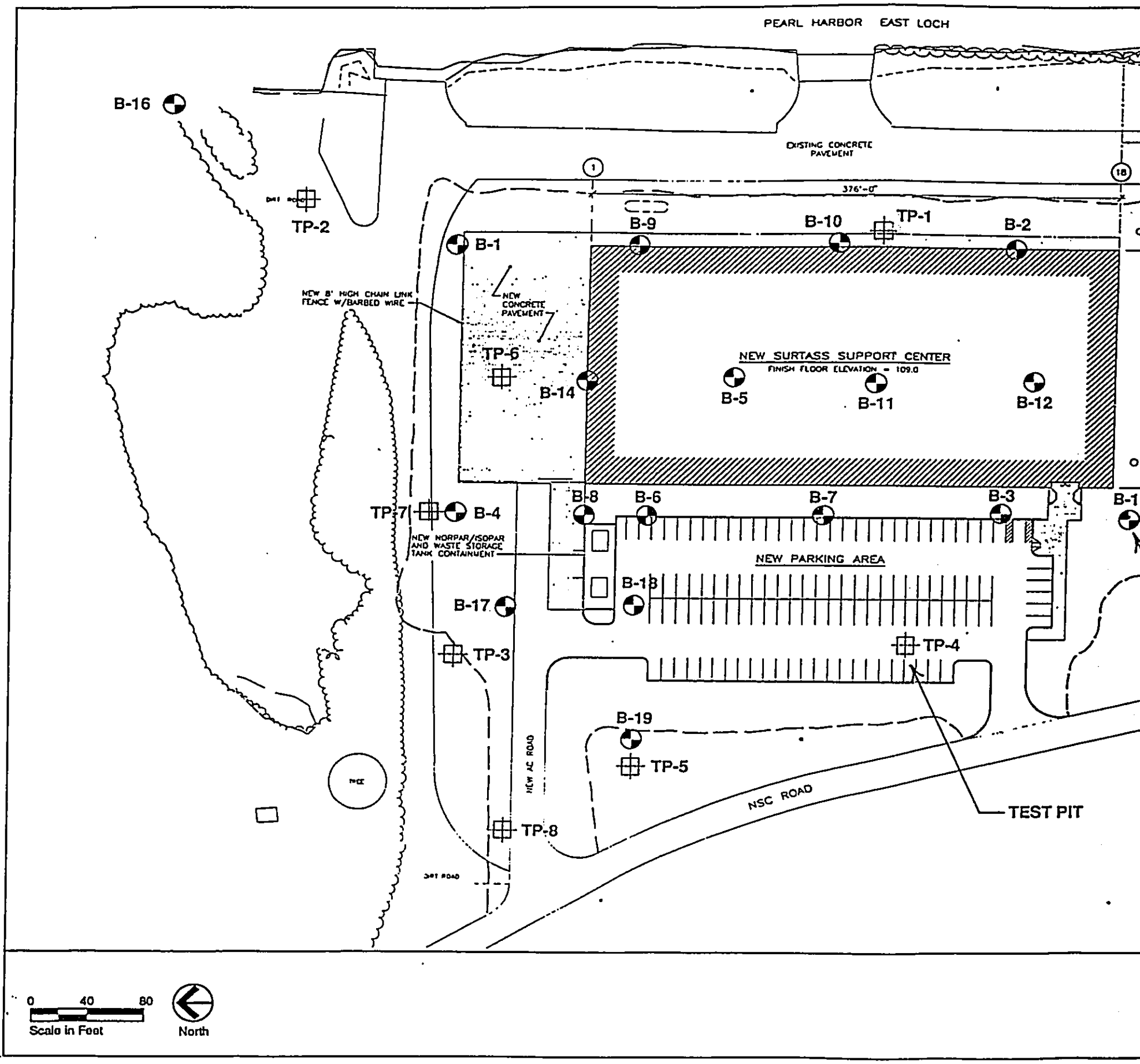
Beyond the shoreline along the entire width of the proposed site, the bottom slopes sharply to a depth of approximately 10 meters to the channel floor. Bottom composition of the channel floor consists of fine mud. This material is primarily of terrigenous origins and is delivered to Pearl Harbor through stream input. Because of the fine sediment size, and relative low water motion on the channel floor, any introduced stirring results in substantial resuspension. The entire mud floor is pock-mocked with burrow openings from various arthropods. Probing for core samples in the mud bottom indicated that the fine-textured mud layer extends at least 6 feet below the sediment surface.

4.3 CLIMATE

Hawaii is located at the edge of the Tropical Zone within the belt of cooling northeasterly tradewinds. The climate is mild throughout the year. Northeasterly tradewinds prevail over Oahu during all months of the year. From November through March, moderate to strong southerly winds associated with Kona frontal passages are dominant. Tradewinds vary greatly in frequency, and experience long periods of virtual absence at some times or constant blowing at others. On the average, however, the tradewinds are more persistent in summer than in winter. At Honolulu, their frequency ranges from a minimum of about 45 percent in January to a maximum of more than 90 percent in July, for an annual frequency of about 70 percent.

In well-exposed areas, the tradewinds average under 15 miles an hour. They are slightly stronger in summer than in winter. A speed of 31 miles an hour is exceeded only about 2 percent of the time by the trades and 3 percent by winds from other directions.

The strongest and most damaging winds are not ordinarily the tradewinds but the winds that accompany winter storms and the infrequent hurricanes. High winds are most likely between November and March and blow from almost any direction.


PEARL HARBOR EAST LOCH
B-16
TP-2
EXISTING CONCRETE PAVEMENT
1
18
376'-0"
B-9
B-10
TP-1
B-2
B-1
NEW 8' HIGH CHAIN LINK FENCE W/BARBED WIRE
NEW CONCRETE PAVEMENT
TP-6
B-14
NEW SURTASS SUPPORT CENTER
FINISH FLOOR ELEVATION = 109.0
B-5
B-11
B-12
TP-7
B-4
B-8
B-6
B-7
B-3
NEW NORPAR/ISOPAR AND WASTE STORAGE TANK CONTAINMENT
NEW PARKING AREA
B-17
B-18
TP-3
TP-4
B-19
TP-5
NEW AC ROAD
NSC ROAD
TEST PIT
TP-8
0
40
80
Scale in Feet
North

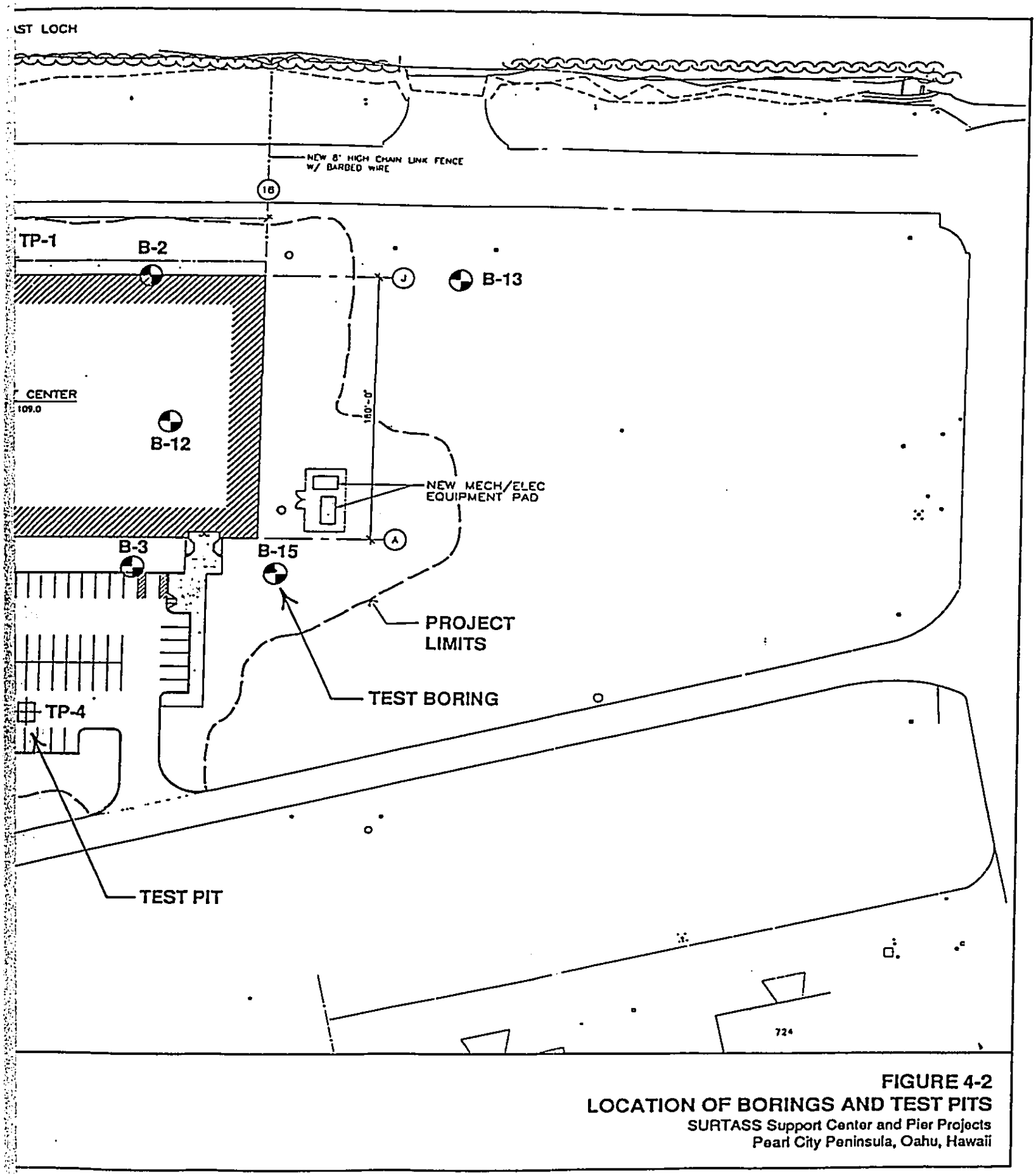


FIGURE 4-2
LOCATION OF BORINGS AND TEST PITS
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

The rainfall of the Pearl Harbor region is generally light and inadequate to sustain lawns and other vegetation for at least nine months of the year. Occasional periods of very heavy precipitation occur when tradewinds are replaced by southerly winds and may cause heavy flooding due to the nature of the soils and the relatively low grades present. These heavy rains are generally islandwide and occur principally during the months from November to April. The mean annual rainfall for the region lies between 20 and 30 inches.

Temperatures vary considerably by season as well as diurnally in the Pearl Harbor region. Highs of 87°F to 89°F are not uncommon during mid afternoon in summer. Night temperatures during the same season fall between 72°F and 76°F. During the winter and early spring daytime highs will fall between 76°F and 78°F and nighttime lows may reach the high 50s or low 60s. The lows are generally caused by a shallow blanket of cold air that pours down from the mountains and spreads out over the low lands during periods of low velocity tradewinds. The low temperatures are almost invariably accompanied by a heavy dewfall which is not normal to the region.

4.4 HYDROLOGY/DRAINAGE

4.4.1 GROUND AND SURFACE WATER

Pearl Harbor receives surface runoff from seven watersheds or parts thereof. The 24.6-square-mile Waiawa Watershed is drained by Waiawa Stream and its tributaries through the Pearl City Peninsula into Middle Loch.

The Pearl City Peninsula is part of the Pearl Harbor aquifer, which extends west from Red Hill to the Waianae Mountains and north from Pearl Harbor to Wahiawa. The total natural groundwater flow passing through Pearl Harbor is estimated to be between 200 and 250 million gallons per day (mgd). In the low areas near the shoreline of Pearl Harbor, this flow is manifested as springs.

The Waiawa spring, located near the National Wildlife Refuge on the western side of the peninsula outside of Navy property, has recorded flows of 0.9 to 13.6 mgd. The combined flows of Waiau and Waimano springs on the eastern side of the peninsula are estimated to equal 32 mgd (Board of Water Supply, 1980). There are no surface water sources present on the site of the proposed project.

The geotechnical investigation found static groundwater levels in the SURTASS building area ranged from 4.6 to 6.3 below existing grade. The recorded levels correspond to elevations ranging from 101.4 to 102.6 feet. Boring B-20, located south of Building 710 near the shoreline, encountered water 3.7 feet below, at Elevation 100.7 feet. (Boring B-20 is not shown on map.) The deep test borings encountered artesian conditions (water flowing out of the hole) starting when the boring was 80 to 90 feet below existing grade.

4.4.2 PHYSICAL OCEANOGRAPHY

The coastal area fronting Pearl Harbor is subjected to three types of waves: northeast tradewind waves, southern swells, and Kona storm waves. The harbor is connected to the open ocean by approximately 15,000 feet of entrance channel and is sheltered from ocean waves. Current and circulation studies show that a two-layer circulation system predominates in Pearl Harbor, and that tides, winds, fresh water inflow, and ship-induced turbulence affect currents.

The currents in the upper water layer generally move seaward in response to the tradewinds and fresh water flow, with a characteristic flow rate of about one foot per second. Typical thickness of this layer is 4 to 6 feet. Lower level circulation is weaker and variable, influenced primarily by tides.

Pearl Harbor is fully protected from ocean waves and swells. Waves propagating through the entrance channel are fully attenuated. Locally generated wind waves within the harbor are constrained by a maximum fetch of approximately 10,000 feet, and a water depth of 35 to 40 feet. Tides in Hawaiian waters are demi-diurnal, with diurnal inequalities which range from 2.5+ feet at extreme spring tides to 0.2 at Mean Low Water (MLW), as measured at the Honolulu Harbor tidal station.

Sedimentation within Pearl Harbor is a natural feature of the estuary, which has been modified by human development activity. Over recent geologic time, up to 800 feet of sediment has been deposited in the Pearl Harbor area. The Pearl Harbor drainage area is the largest on Oahu, with eight streams carrying an estimated 123 million gallons of water a day and an estimated 350 tons of sediment into the harbor.

Relatively high turbidity is associated with the sedimentation. Due to the large volume of fresh water carrying sediment discharges, West and Middle Lochs have the highest turbidity. The combined interaction of domestic wastes, industrial wastes, sedimentation, oil seeps and spills, crop runoff with associated pesticide loads, and other contaminant sources all contribute to make Pearl Harbor a complex, altered ecosystem.

4.4.3 DRAINAGE

The storm drainage system within the Pearl City Peninsula is comprised of a few major networks supplemented by several minor local systems. The drainage system includes open ditches, concrete pipes and box culverts. Portions of the existing systems are inadequate due to the makeshift type of construction during World War II. To date, no major improvements have been made to the system. The site of the proposed project is serviced by two connecting drain lines which traverse the site with several drainage inlets. The two existing drainage outlets for the project site that drain directly into Pearl Harbor are located east of each end of the proposed building.

4.5 AIR QUALITY

The State of Hawaii Department of Health (DOH) maintains a network of air monitoring stations around the state to gather data on the following regulated pollutants:

- total suspended particulates (TSP)
- particulate matter <10 microns (PM-10)
- sulfur dioxide (SO_2)
- carbon monoxide (CO)
- ozone (O_3)
- lead (Pb)

In the case of TSP, PM-10, and SO_2, measurements are made on a 24-hour basis to correspond with the averaging period specified in the standards. Samples are collected once every six days in accordance with US Environmental Protection Agency (EPA) guidelines.

DOH has an air monitoring station located on the Pearl City Peninsula at 860 4th Street, Pearl City. This station is upwind from the proposed project site and would predominantly monitor traffic-related pollution. A review of data collected from that monitoring station indicates that total suspended particulates and sulfur dioxide standards are being met. In fact, much of the time SO_2 concentrations are below the detectable limit of the measurement method being employed. Carbon monoxide levels are also below State standards most of the time with only occasional exceedances.[3]

4.6 WATER QUALITY

On 2 August 1991 an underwater reconnaissance survey was done which included of a quantitative evaluation of water chemistry and macrobiotic community structure, and a qualitative evaluation of the physiographic setting. Appendix A contains the assessment of the marine environment in the proposed project site area. The water quality analysis and physiographic setting is summarized below.

Water quality constituents that were evaluated included the specific criteria for the Pearl Harbor Estuary in Chapter 11-54, Section 05 (Inland Waters) of the State DOH Water Quality Standards. These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen ($NO_3^- + NO_2^-$, hereafter termed NO_3^-), ammonium (NH_4^+), total phosphorus (TP), chlorophyll a (Chl *a*), turbidity, temperature, pH, and salinity. In addition, orthophosphate phosphorus (PO_4^{3-}) and silica (Si) were also reported because these parameters are sensitive indicators of biological activity and the degree of groundwater mixing.

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[3] Department of the Navy, Pacific Division, Naval Facilities Engineering Command, August 1990, *Final Environmental Impact Statement for Proposed Developments at Naval Base Pearl Harbor*, Oahu, Hawaii.

4.6.1 HORIZONTAL STRATIFICATION

In general, water quality within Pearl Harbor cannot be considered typical of oceanic waters; rather, it is influenced by four quantifiable inputs including fluvial inputs from several permanent streams, groundwater seepage, localized pollutants (tailwater overflow from sugarcane irrigation, runoff from urbanized areas, and shipyard operations), and oceanic mixing inward from the mouth of the harbor.

Table 4-1 details the results of all marine water chemistry analyses for samples collected on August 2, 1991. Figure 4-3 shows the locations of water chemistry survey stations and sampling locations in Pearl Harbor at the proposed site. As shown on Table 4-1, several dissolved nutrient constituents in the surface waters (particularly Si, NO_3^-, and PO_4^{3-}) exhibit a decreasing trend moving from the shoreline of the peninsula to a distance of approximately 50 meters offshore. This decrease is particularly evident in NO_3^- concentrations which drop to below detectable limits within 50 meters from shore (Stations 1 and 2) and within 100 meters (Station 3). Total N and total P essentially reflect NO_3^- and PO_4^{3-} concentrations, respectively showing a slight decrease in concentration with increasing distance from the shoreline. Salinity shows the opposite trend; values increase with increasing distance from the shoreline. The pattern of decreasing nutrient concentration and increasing salinity with distance from shore appears to be a result of mixing of low salinity groundwater with oceanic water. In many areas of the Hawaiian Islands, low salinity groundwater, which contains high concentrations of Si, NO_3^-, and PO_4^{3-}, percolates to the ocean near the shoreline, resulting in a distinct nearshore zone of mixing. Although excess rain may also account for such patterns, the silicate concentrations are higher than usually found in rainwater and suggest that rainwater input is not a factor.

Aside from slightly elevated PO_4^{3-} concentrations at Station 1, there is no apparent trend among Station locations with respect to groundwater input. Therefore, it appears that groundwater flux is about equal along the entire shoreline of the proposed site.

Dissolved nutrient constituents that are not associated with groundwater input [NH_4^+, dissolved organic phosphorus (DOP), and dissolved organic nitrogen (DON)] do not show the same strong pattern with respect to distance from the shoreline. Concentrations of NH_4^+ are somewhat randomly scattered with no apparent relationship to distance form shore. NH_4^+ concentrations at Station 1 exhibit the widest fluctuation decreasing to below detectable limits at 50 meters and again at 200 meters from the shore. Concentrations of DON and DOP remain relatively constant over the sampling range, and show no distinguishable difference in distribution with respect to the different transect locations.

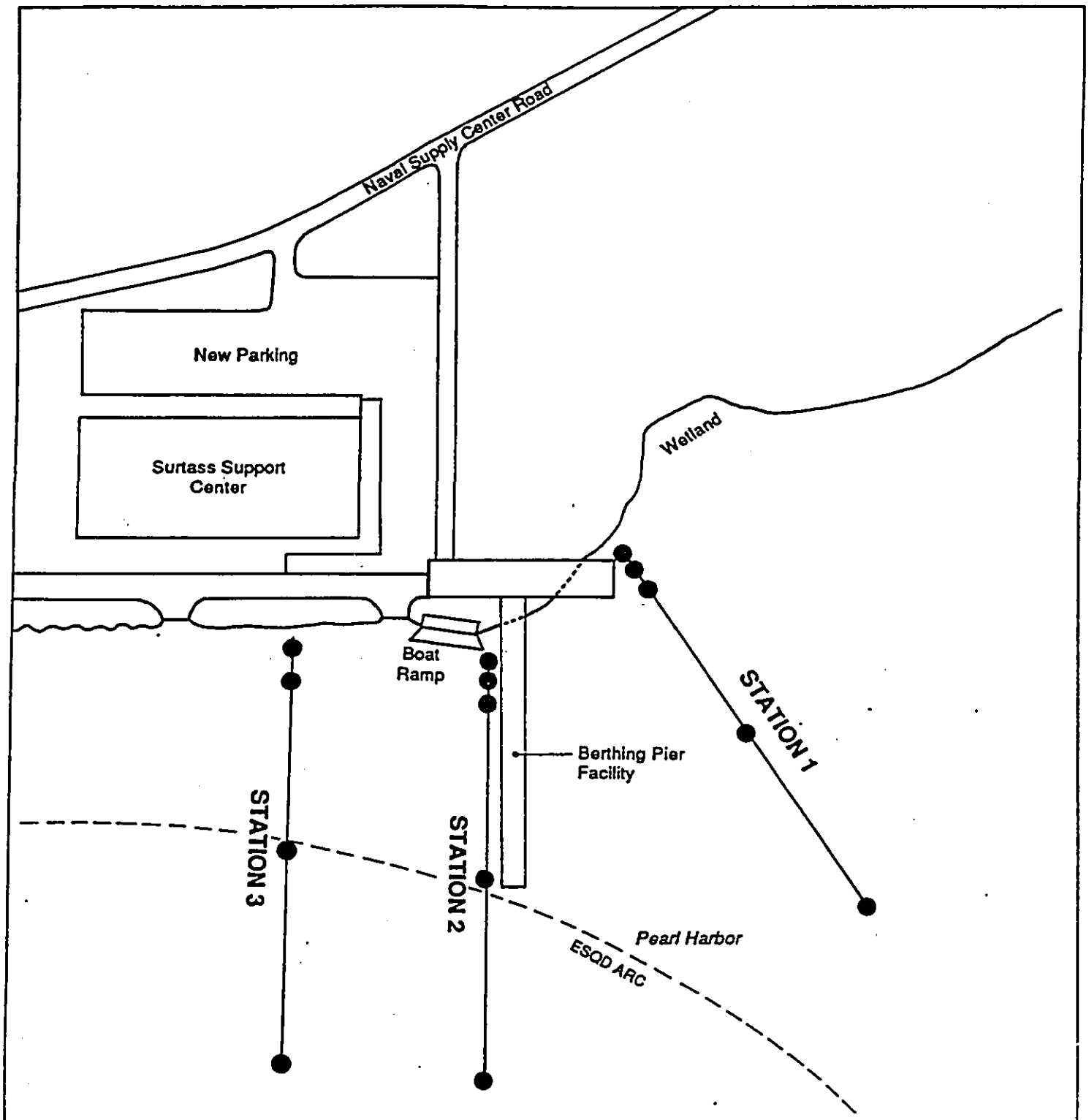
Examinations of other water chemistry constituents reveals no strong patterns. Chlorophyll a, turbidity and temperature values vary inconsistency with distance from shore and among station locations. While waters of Pearl Harbor are typically turbid, most values measured during the present survey indicated that at the time of the survey water clarity was relatively high.

WATER CHEMISTRY PARAMETERS AT PROPOSED SURTASS SITE

STATION NO.		DFS (m)	PO4 (μM)	NO3 (μM)	NH4 (μM)	Si (μM)	DOP (μM)	DON (μM)	TP (μM)	TN (μM)	TURB (ntu)	SALINITY (o/oo)	CHL a (μg/l)	TEMP (deg C)	pH
S-1-	1S	2	0.17	0.48	0.12	45.79	0.19	8.35	0.36	8.95	0.42	32.854	1.00	27.9	8.13
	2S	15	0.17	0.42	0.15	41.27	0.17	6.28	0.34	6.85	0.64	33.120	0.72	27.9	8.19
	2D	15	0.14	0.06	0.21	34.03	0.17	6.30	0.31	6.57	0.61	33.432	1.19	27.9	8.21
	3S	50	0.14	0.20	BDL	33.12	0.17	6.51	0.31	6.71	0.43	33.504	0.45	27.8	8.21
	3D	50	0.10	BDL	BDL	14.12	0.19	6.29	0.29	6.29	0.29	34.337	0.80	26.9	8.23
	4S	100	0.09	BDL	0.06	22.26	0.18	6.37	0.27	6.43	0.38	33.999	0.82	27.5	8.21
	4D	100	0.10	BDL	0.09	13.21	0.20	6.06	0.30	6.15	0.44	34.413	1.00	26.7	8.23
	5S	200	0.04	BDL	BDL	20.45	0.20	6.29	0.24	6.29	0.39	34.123	0.84	27.4	8.23
	5D	200	0.09	BDL	0.09	13.21	0.17	5.92	0.26	6.01	0.37	34.409	1.00	26.8	8.23
S-2-	1S	2	0.10	0.90	0.15	54.48	0.19	6.36	0.29	7.41	0.49	32.489	0.86	27.9	8.19
	1D	2	0.11	0.03	0.18	25.88	0.18	6.64	0.29	6.85	0.69	33.861	1.00	27.5	8.22
	2S	15	0.13	0.20	0.12	34.93	0.17	6.67	0.30	6.99	0.48	33.449	0.94	28.0	8.21
	2D	15	0.09	BDL	0.09	15.57	0.17	6.20	0.26	6.29	0.46	34.338	1.00	26.9	8.23
	3S	50	0.04	BDL	0.15	23.17	0.17	6.00	0.21	6.15	0.41	33.980	0.76	27.5	8.23
	3D	50	0.09	BDL	0.15	14.66	0.18	5.86	0.27	6.01	0.42	34.353	0.94	26.9	8.23
	4S	100	0.06	BDL	0.12	23.17	0.18	6.17	0.24	6.29	0.35	34.033	0.51	27.5	8.24
	4D	100	0.09	BDL	0.12	14.12	0.20	6.31	0.29	6.43	0.34	34.383	0.74	26.8	8.23
	5S	200	0.07	BDL	0.21	23.71	0.20	6.64	0.27	6.85	0.34	34.054	0.74	27.7	8.23
	5D	200	0.11	BDL	0.12	15.93	0.19	7.29	0.30	7.41	0.51	34.334	0.41	26.8	8.23
S-3-	1S	5	0.13	0.56	0.15	44.89	0.17	6.56	0.30	7.27	0.49	32.991	0.51	27.7	8.20
	1D	5	0.11	0.06	0.15	26.79	0.18	6.22	0.29	6.43	0.38	33.871	0.67	27.2	8.22
	2S	50	0.09	BDL	0.15	28.60	0.18	6.00	0.27	6.15	0.32	33.816	0.82	27.7	8.22
	2D	50	0.10	BDL	0.18	15.93	0.20	5.97	0.30	6.15	0.35	34.362	1.00	26.9	8.23
	3S	100	0.07	0.45	0.12	35.48	0.22	6.70	0.29	7.27	0.30	33.815	0.74	27.7	8.23
	3D	100	0.09	BDL	0.12	15.57	0.18	6.31	0.27	6.43	0.41	34.388	0.78	26.8	8.23
	4S	200	0.07	BDL	0.09	25.52	0.19	6.48	0.26	6.57	0.42	34.008	0.55	27.9	8.22
	4D	200	0.10	BDL	0.15	15.02	0.16	6.70	0.26	6.85	0.36	34.393	1.13	26.9	8.23
DOH WATER QUAL. STNDS.															
NOT TO EXCEED 10%				2.86	1.43				4.16	39.29	8.00		10.00		
NOT TO EXCEED 2%				5.00	2.14				6.40	53.57	15.00		20.00		

Abbreviations are as follows: surface = S; deep = d; distance from shore = DFS; below detection limit = BDL. DOH criteria are for Pearl Harbor Estuary. Measured on August 2, 1991.

TABLE 4-1



Map shows locations of water chemistry survey stations and sampling locations in Pearl Harbor at the proposed SURTASS Facility site at Pearl City Peninsula. Also shown is the proposed location of the SURTASS Support Center and Berthing Pier Facility.

FIGURE 4-3
WATER CHEMISTRY SURVEY STATIONS AND SAMPLING LOCATIONS
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

4.6.2 VERTICAL STRATIFICATION

All of the samples which exhibit high concentrations of groundwater nutrients (Si, N, and P) and corresponding low salinities occur at the surface. Input of low salinity groundwater to the ocean creates a distinct buoyant surface lens which is evident through the sampling regime. Nutrient constituents not associated with groundwater (NH_4^+, DOP and DON) do not exhibit any discernible relationship with respect to vertical stratification.

Temperature displays a distinct surface layer of warmer water throughout the sampling regime. In general, Chl a concentrations were higher in the deep samples than in the surface samples. Elevated chlorophyll concentrations at depth may indicate a higher phytoplankton activity as suggested by the very low to undetectable NO_3^- concentrations in the deep water samples.

Continuous vertical profiles of salinity and temperature were measured with an Ocean Sensors Model 100 CTD at each of the sampling sites. These profiles verify the patterns exhibited in the plots of surface and bottom samples. The gradient of salinity at sampling sites 2 meters and 15 meters from the shoreline are greatest. Beyond 50 meters from the shoreline, gradients in salinity are very small, and the water column is essentially homogeneous from the surface to the bottom.

4.6.3 COMPLIANCE WITH DEPARTMENT OF HEALTH (DOH)

The water quality standards for the Pearl Harbor estuary are included in Table 4-1. No chemical constituents measured on 2 August 1991 exceeded the DOH criteria for this area. A comparison of DOH limits and the data indicates that water quality at the proposed site does not even approach the most stringent limits. For example, the highest measured NO_3^- is less than half of the DOH limit, while the highest measured turbidity is an order of magnitude less than the DOH limit.

4.7 EXISTING LAND USE

Most of the land included in the Pearl Harbor Naval Complex on the Pearl Harbor Peninsula is developed and consists mostly of housing, warehousing, and docks. The site of the proposed SURTASS project comprises an area that was once developed as a pier and warehouse area. Remnants of the old pier structures still remain at the site. The project site itself is currently undeveloped and open. The site is occasionally used to stage equipment for loading onto ships during exercises held a couple times a year.

Bordering the southern edge of the project site is a warehouse structure utilized by the Army. An existing boat ramp and two adjacent parcels of land, located at the north side of the site, are also presently utilized by the Army.

The Army boat ramp is an alternate site for the Logistic Support Vessel (LSV) landing craft. This site was occasionally used for special need operations, but was not used on a regular basis. In early 1991, an obstruction to the approach was found, and since that time the ramp

has not been used. The current practice is not to use the Pearl City Peninsula ramp until the obstruction is corrected. The primary site for the LSV is the West Loch ramp at Waipio Point.

4.8 SOCIOECONOMIC ENVIRONMENT

The area known as Central Oahu consists of the plain between the Waianae and Koolau mountain ranges from Pearl Harbor to Wahiawa. The primary land uses in this region have been agricultural, with residential areas concentrated at Mililani, Waipio, Crestview, Waipahu, and Pearl City.

The Central Oahu population is projected to grow at an annual rate of 1.9 percent from 118,600 in 1990 to 130,100 by 1995, as estimated by the City Department of General Planning. The economic activity of this region is primarily in military, agricultural, commercial, and industrial enterprises. The most significant areas of economic activity include the following.

- military facilities in and around Pearl Harbor
- the Naval Shipyard at Pearl Harbor, with over 6,000 workers
- pineapple and sugar cane cultivation in the flat central plains
- the Pearl City industrial area centered near Waihona Street
- the Aiea industrial area concentrated near Iwaena Street
- Mililani commercial areas including the Technology Park
- residential developments in the Mililani, Waikele, and Waipio areas

In terms of future growth, the development of the Naval Base Pearl Harbor, including the Pearl City Peninsula, is anticipated to contribute significantly to the future economic growth in the area while supplementing its existing economic activities.

4.9 FLORA

The present vegetation consists almost exclusively of introduced or alien plant species. Most of the land has been urbanized. Pearl City Peninsula supports a mixture of family housing and industrial development such as fuel tanks, POL operations, and warehousing. A generalized vegetation map is presented in Figure 4-4. Plant cover and distribution have been interpreted through recent colored aerial photographs. Distribution of wetland vegetation, mostly mangrove (*Rhizophora mangle*), is based on the study by Elliott and Hall (1977).

In August 1991, a botanical site inspection was made during the dry season at which time the annual plants had completed their life cycle. It should be noted that during the growing season, a botanical survey would encounter more adventive plants or weeds.

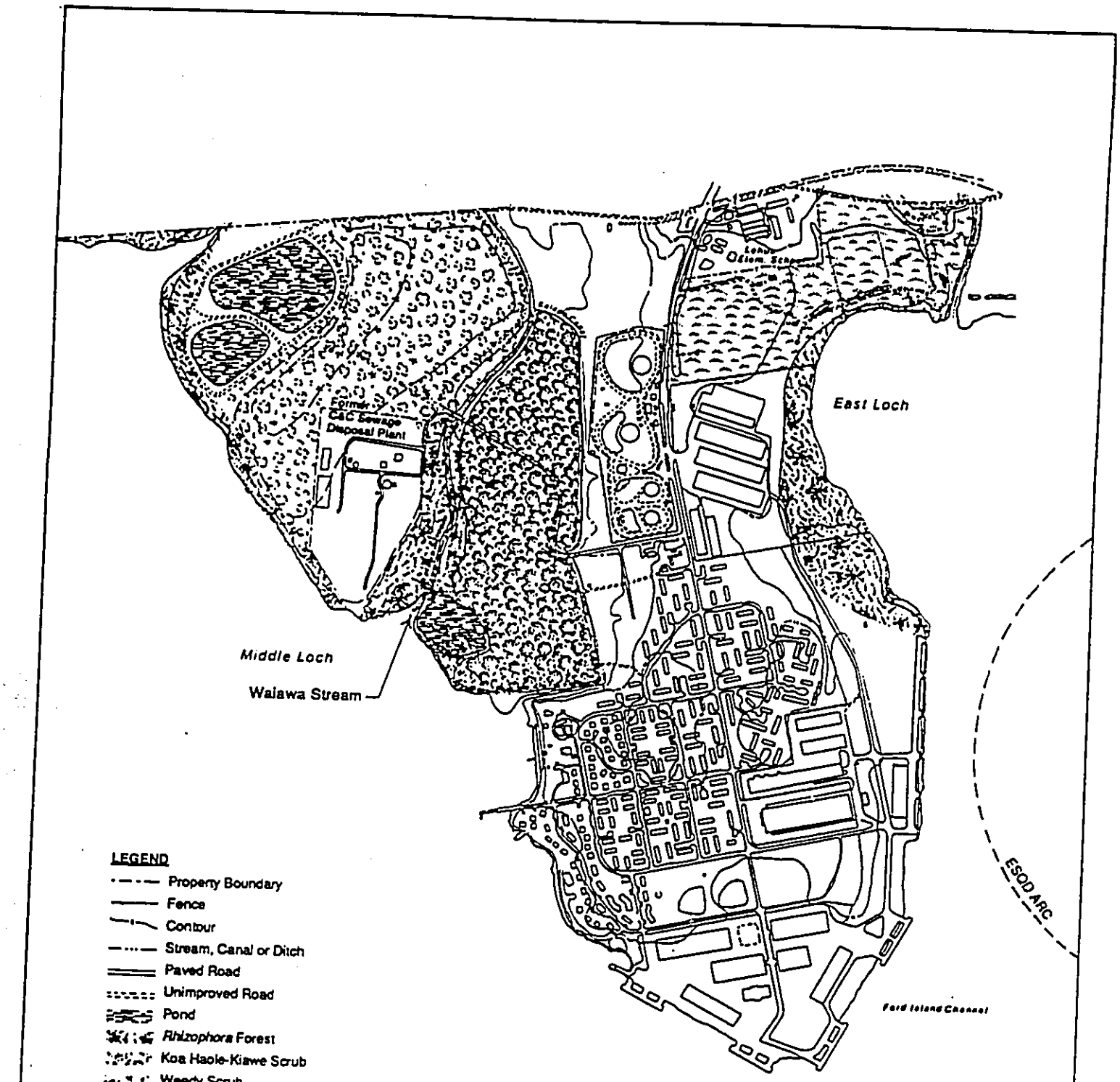


FIGURE 4-4
VEGETATION MAP
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

From a botanical point of view, the area is highly disturbed, i.e., most of the vegetation is introduced and regarded as weeds. Low numbers of a single indigenous species, Pauohiiaka (*Jacquemontia ovalifolia*) were found. No proposed or listed threatened or endangered plant species were found on the site.

Generally, plants encountered were introduced to the Hawaiian Islands after contact with James Cook in 1778. All taxa were found in large numbers. The vegetation consists of very common weedy species. Except for the kiawe, milo and mangrove trees noted, there are no plants more than .5 m (19.7 in) tall.

Monocotyledons growing on the site include buffel grass (*Cenchrus ciliaris*), sandbur grass (*Cenchrus echinatus*), swollen fingergrass (*Chloris barbata*), Bermuda grass (*Cynodon dactylon*), and seashore rushgrass (*Sporobolus virginicus*).

Dicotyledones include Christmas berry (*Schinus terebinthifolius*), ironwood tree (*Casuarina equisetifolia*), Spanish needle (*Bidens pilosa*), Indian pluchea (*Pluchea indica*), Pau'o'hi'iaka (*Jacauemontia sandwicensis*), koa-haole (*Leucaena leucocephala*), kiawe (*Prosopis pallida*), hi'aloa (*Waltheria americana*), and Jamaica vervain (*Stachytarpheta Jamaicensis*). See Appendix B for the complete list of plants found at the site.

4.10 FAUNA

4.10.1 TERRESTRIAL WILDLIFE

The Pearl Harbor National Wildlife Refuge Waiawa Unit is located across the Pearl City Peninsula and to the north of the proposed project. The most important wildlife on the peninsula are the birds that frequent the wildlife refuge. Three endemic and endangered waterbirds are associated with the refuge, the Black-necked Stilt, Common Moorhen, and American Coot. The endemic and endangered Hawaiian Duck (koloa) also occurs within the refuge, and the endemic Hawaiian or Short-eared Owl also hunts in the area. The owl is very rare on Oahu and has been listed as endangered on Oahu by the State of Hawaii.

Considering the developed fuel storage, warehouse, and urban setting which dominates most of the peninsula, there is no significant terrestrial habitat of any consequence. Small tracts of weedy fields and stands of disturbed secondary vegetation, such as are found on the proposed project site, provide limited habitat for exotic birds and rodents.

A brief avifaunal and feral mammal field survey of the SURTASS site was performed on 26 July 1991. The complete survey is presented in Appendix C. In such a limited time frame, not all species will necessarily be observed, and observational information must be coupled with available literature to produce a overall picture. Various factors affect the numbers of species and their abundance: available resources, reproductive success, migratory time frames, and the nature of cyclical number of exotic species populations.

No special or unique habitats were found on the actual site. However, the coastal wetland north of the property may provide some limited foraging habitat for native waterbirds and therefore should not be disturbed or developed.

The avifaunal data are based on eight minute counts taken of all birds seen or heard and observations made between counts. Feral mammal data are from visual sightings and evidence of tracks and scat.

The present environment provides a limited range of habitats which are utilized by the typical array of exotic birds one would expect at this elevation and in this type of environment on Oahu. Population sizes were within the limits of expectation.

No endemic land birds were recorded. The introduced Common Barn Owl (*Tyto alba*) is likely to be seen in the area and may be mistaken for the less common Short-eared Owl or Pueo (*Asio Flammeus sandwichensis*).

No indigenous or endemic waterbirds were observed; however, the Black-crowned Night Heron (*Nycticorax nycticorax*) and the American Coot (*Fulica americana alai*) may utilize the wetland. The Pearl Harbor National Wildlife Refuge - Waiawa located across the peninsula and north of the proposed development supports resident as well as migratory waterbirds. A sizeable buffer of second growth forest and residential habitat separates these two areas.

No resident indigenous seabirds were found during the survey and it is unlikely that any would nest at the site.

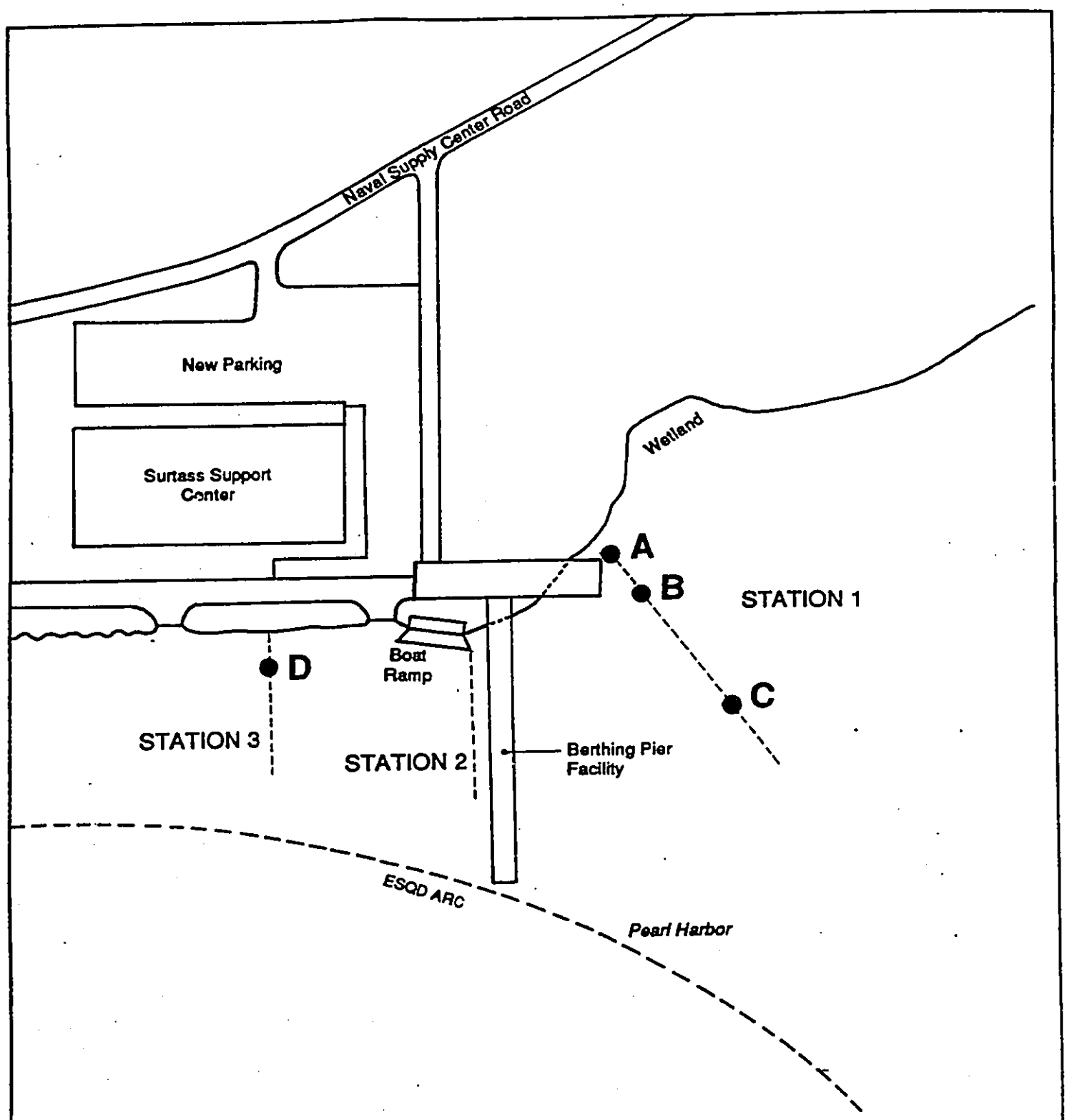
No migratory indigenous shorebirds were recorded most likely because the birds reside in Hawaii only from August to April. It is possible that the Pacific Golden Plover (*Pluvialis fulva*), Ruddy Turnstone (*Arenaria interpres*), and the Wandering Tattler (*Heteroscelus incanus*) may occur in small numbers on or near this site during the winter months.

The most abundant of the 11 species of exotic (introduced) birds found during the survey were Zebra Dove (*Geopelia striata*), Nutmeg Mannikin (*Lonchura punctulata*), and Red-vented Bulbul (*Pycnonotus cafer*). Exotic species which were not recorded but could potentially occur on site include Cattle Egret (*Bubulcus ibis*), Japanese Bush Warbler (*Cettia diphone*), Eurasian Skylark (*Alauda arvensis*), and Barn Owl (*Tyto alba*).

The Small Indian Mongoose (*Herpestes auropunctatus*) was the only feral mammal observed; no rats, mice or cats were recorded but they most likely occur on or near the property. It is not known whether or not the endemic and endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) would likely be found in the area given the present limited knowledge of their movement patterns.

4.10.2 MARINE BIOLOGY

On 2 August 1991 a benthic infauna sampling was taken and later analyzed. The results of this analysis is included in Appendix A. Four locations were sampled as shown in Figure 4-5.



Location of sediment samples A through D in relation to the biological transect Stations 1-3.

FIGURE 4-5
SEDIMENT SAMPLING LOCATIONS
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

The results of sorting the sediment organisms into broad taxonomic groups are shown in Table 4-2.

The nearshore environment in the vicinity of the proposed site differs significantly than other areas of Pearl Harbor. In regions such as off Ford Island, a shallow nearshore flat borders the shoreline. The nearshore flat is covered in large part by a carpet of benthic algae, primarily of the genera *Caulerpa, Acanthophora, Hypnea,* and *Ulva*. Most of the algal mats are covered with a thin layer of silt, which is finer grained than the sediment found in the zone near shore. Predominant fauna include *O. spectabilis*, as well as various sponges. In some areas, the bottom is covered with "reefs" composed of aggregations of bound sand-grain tubes of Sabellid (feather-duster) worms. The algal mud zone extends to a depth of approximately 8 feet. Such structure was not observed at any location near the proposed site.

The only macroinvertebrate observed in the nearshore zone was a occasional gelatinous sea cucumber *Ophiodesoma spectabilis*, a species that is commonly found in areas of high organic particulate input. No benthic algae was observed along any of the shoreline shallows. No fish were observed during the underwater reconnaissance survey.

Some generalizations can be made concerning the samples. The average number of individuals is greater in Samples A and D (see Table 4-2) than in Samples B and C. Also, the average number of species is greater in Samples A and D than in Samples B and C. Samples A and D were located in the shallow water closest to shore and average sediment grain size tended to be coarser than that of Samples B and C.

The paucity of crustaceans in Samples B and C accounts for much of the reduced species richness in the areas represented by these samples. Otherwise, the composition of the infauna is generally similar for all of the locations. The polychaete, *Sternaspis* sp., was found only at Station A, where it was abundant; the opheliid, *Armandia* sp., and the cossurid, *Cossura* sp., are perhaps the most typical representatives of the polychaete fauna.

The organisms found are quite small, falling into the classification of meiofauna in most cases. These organisms would be difficult to see with the naked eye. The largest organism found in the sampling is *Sternaspis* sp., a short, stout worm measuring about 1.5 mm long by 0.8 mm wide (preserved) but reported to grow to 4 or 5 mm. The small annelids and crustaceans are the more abundant forms found in soft sediments (marine sands, silts, and clays) in Hawaii. Larger polychaetes and crustaceans do occur in this environment, but in much lower densities. A comparison of samples would require processing a considerable volume of sediment in order to obtain representative counts.

Most abundant in the sediments are even smaller forms, including the nematodes, protozoans, bacteria, and fungi. However these microscopic forms are difficult to count and identify without resorting to special techniques.

The Naval Undersea Center (NUC) study, completed in 1974, sampled bottom types at ten different stations around Pearl Harbor. The nearest station to the proposed site was BM-07, located around a dolphin piling in Middle Loch just north of the Noise Measurement

NUMBER OF SPECIMENS BY TAXA IN SEDIMENT SAMPLES AT PROPOSED SITE

Station:	1		1		1		3	
Sample:	A		B		C		D	
Replicate:	1	2	1	2	1	2	1	2
Nematoda	2	1	2				3	
Coelenterata				1			1	
Oligochaeta	2	3		1	1	6	1	5
Polychaeta								
Syllidae								
type 1				1				1
(Sphaerosyllis)							1	
Spionidae	1			2				1
Cirratulidae								
(?Tharyx)							1	1
Ophelidae								
(Armandia)	3	5	5		1		32	
Cossuridae								
(Cossura)			2	2	1	1		2
Capitellidae								
(Capitella)	1	1		1			3	
Sternaspidae								
(Sternaspis)	4	14						
Indet (vermiform, non-Annelid)	1						1	
Mollusca								
Macoma sp.		2	1			1	1	
Crustacea								
Ostracoda								
type 1		1		1			9	
type 2		1					4	
type 3							1	
Copepoda								
Herpacticoida	11	11		3	1	3	15	
Cumacea	3						2	
Tanaidacea								
(Leptochelia)		1					4	1
Mysidacea[1?]								1
Amphipoda								
Amphilochidae							1	
Chaetognatha[1]				3				

1- Ordinarily a planktonic organism.

TABLE 4-2

Facility and west of the public fishing pier. A silty mud bottom at a depth of 44 feet was sampled Stations BC-09 and BE-05 were also close to the proposed site. BC-09 was across the channel from the west end of Ford Island and BE-05 was located northeast of Ford Island.

At biostations BE-05 and BC-09, sponges (Porifera) accounted for a majority of the biomass. Most abundant at BM-07 were bryozoans. Polychaetes and crustaceans were very abundant at BE-05, and moderately abundant at BC-09. The infaunal assemblage at Biostation BM-07 was far less developed, with mostly amphipods (*Ericthonius brasiliensis* and others not identified) and the clam, *Hiatella hawaiiensis*, accounting for most of the individuals sorted from the samples. Because the sample areas were larger and a coarser sieve used to used to process the sediment, few of the species encountered off the site were reported from the NUC study. *Leptochelia dubia* were recorded at BE-05 and BC-07, but not at BM-07. The latter biostation actually yielded few benthic crustaceans (except amphipods) or polychaetes.

Meiofauna and macrofauna in sediments from Hickam Basin (near the mouth of Pearl Harbor) and Keehi Lagoon were enumerated in studies for the Honolulu International Airport reef runway construction project (AECOS, 1979). The fine sediment on the bottom of Hickam Basin yielded assemblages very similar to those recorded from the proposed SURTASS pier facility project. The area of the substratum was roughly comparable, although the volume of sediment collected was greater. These silty sediments were dominated by oligochaetes and capitellid polychaetes. On one sampling occasion, *Leptochelia dubia* was abundant; on another, the opheliid, *Armandia* sp., appeared in abundance. As with the samples from inside Pearl Harbor, crustaceans were not as numerous as polychaetes in these fine sediments.

Samples of fine sand from the Kalihi Channel and Circulation Channel "B" in Keehi Lagoon produced far more diverse assemblages of polychaetes and crustaceans than the Hickam Harbor samples (AECOS, 1979) or the proposed SURTASS pier facility project site samples. These results clearly support the generalization that coarser sediments harbor a greater abundance and variety of small organisms. However, other environmental factors, including water motion, pollutant impacts, and water quality tend to differ substantially between the sites. Also, finer sediments would be associated with sites that have more restricted water circulation and generally poorer water quality. The samples collect from the seaplane channel in the back of Keehi Lagoon revealed a fauna of fewer species and fewer individuals than that in Hickam Harbor and resembled some of the proposed project site samples.

A series of sediment samples from inner Keehi Lagoon and extending into the mouths of Moanalua and Kalihi Streams were examined by Environmental Consultants, Inc. (ECI, 1978). Many of the polychaetes found were the same as those recorded from off the proposed SURTASS pier facility project, including *Armandia* and *Cossura*. Spionids accounted for most of the species diversity in the collection, whereas oligochaetes were usually the most abundant component, particularly in samples close to and up into the streams.

In conclusion, the examination of the biota in the area of the proposed SURTASS pier facility indicates that the region is depauperate relative to other locations in Pearl Harbor. Benthic infaunal analysis of the soft sediment indicates that the communities do not represent any unique or rare assemblages, and have lower abundances that other areas of Pearl Harbor.

4.11 HISTORIC/ARCHAEOLOGICAL RESOURCES

Most of the Pearl Harbor Naval Complex has been declared a National Historic Landmark because of the crucial and dramatic role played by Pearl Harbor in World War II. The landmark boundary includes part of the Pearl City Peninsula as indicated in Figure 4-6. None of the structures on the peninsula are on the Pearl Harbor Historic Inventory of Category I facilities (structures to be preserved if possible).

The geotechnical investigation that was done for the proposed SURTASS Support Center on Pearl City Peninsula reported that a 1938 geologic and topographic map of Oahu indicates that the SURTASS building site was formerly the Loko Weloko fishpond.[4]

The Loko Weloko fishpond in Waimano was built off the Honolulu side of the Pearl City Peninsula in what is known as the East Loch. The pond was oval in shape with walls on three sides and it covered about 21 acres. As the ponds were originally owned by the kings and chiefs, it is very probable that most of them were built by the forced labor of the common people. There is a tradition among the natives that Loko Weloko, on Pearl Harbor, Oahu was built about 250 years ago, and that the natives formed a line from the shore to the mountain and passed the lava without once touching the ground in transit. As the distance is considerably over a mile, this is significant of the density of the population at the time.[5]

The fishpond feature has been covered by hydraulic filling in the 1940s to form the Victor Dock. While the support facility itself will be located outside the Pearl Harbor National Historic Landmark, the piers will extend into waters within the landmark. Because construction test borings have demonstrated intact fishpond deposits below the 1940s fill layer, the Navy, in consultation with the State Historic Preservation Officer, has determined that the remnants of Loko Weloko fishpond are eligible for listing in the National Register of Historic Places under 36 CFR Part 800.

4.12 NATURAL HAZARDS AND CONSTRAINTS

4.12.1 SEISMOLOGY

Except for the island of Hawaii itself, the Hawaiian Islands are not a highly seismic area. Even on Hawaii, most of the earthquakes are of volcanic origin and do little or no damage. A few have been quite severe; however, damage on Oahu has been limited to a few broken windows.

Oahu lies in Earthquake Zone 2 on a rising scale of 0 to 4. Zone 0 indicates no damage and Zone 4 means major damage.

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[4] Op. cit. Stearns and Vaksvik 1938; and Sterling, Elspeth P. and Catherine C. Summers, 1978, *Sites of Oahu*, Department of Anthropology, Department of Education, Bernice P. Bishop Museum, Honolulu, Hawaii.

[5] Op. cit. Sterling and Summers.

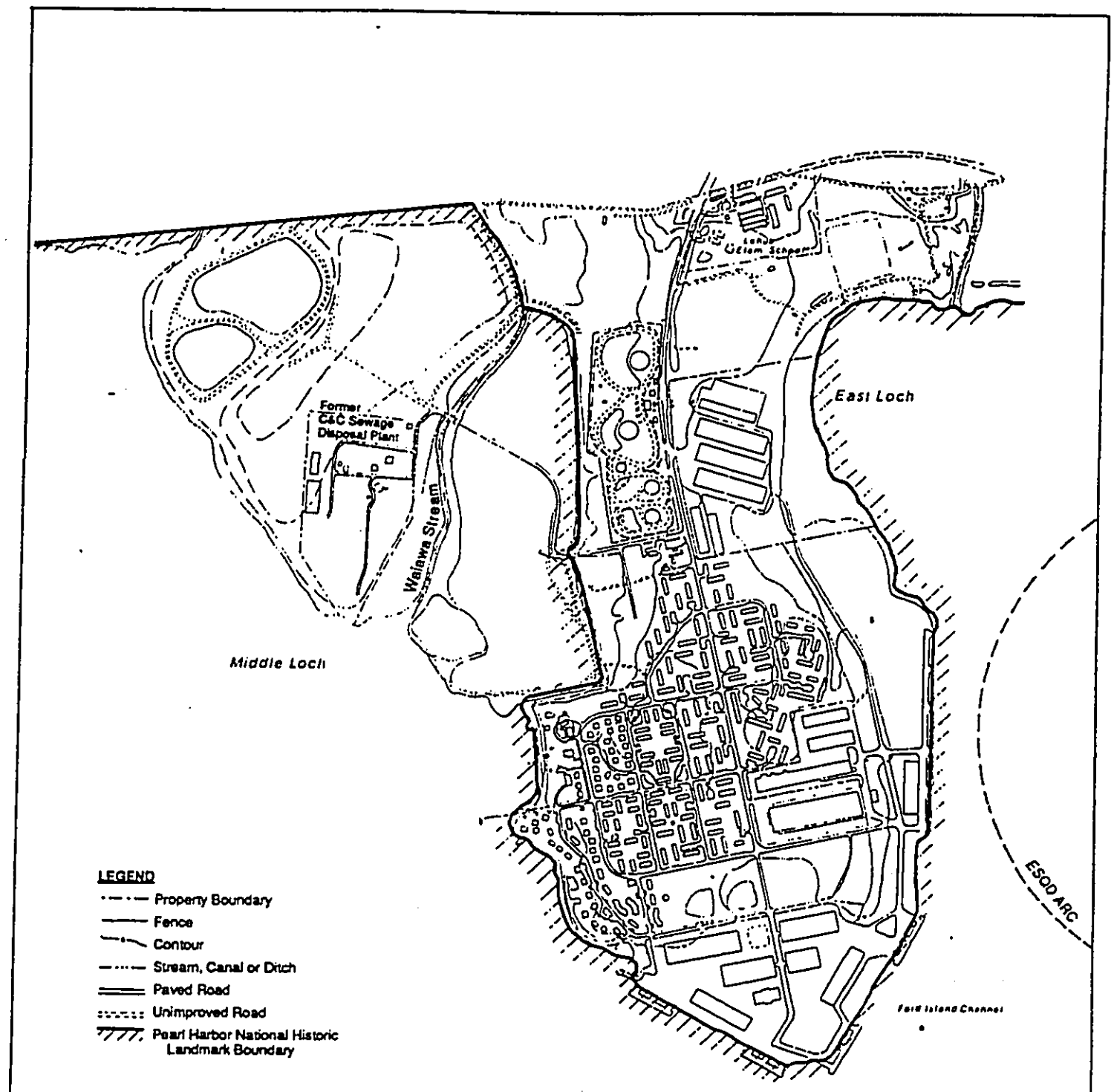

FIGURE 4-6
PEARL HARBOR NATIONAL HISTORIC LANDMARK BOUNDARY
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

4.12.2 WETLANDS

Wetlands on the Pearl City Peninsula which have been delineated and classified by the US Fish and Wildlife Service (FWS) are shown in Figure 4-7. The wetland area on the western side of the peninsula is part of the Pearl Harbor National Wildlife Refuge. The 24.5-acre parcel features a low dike which retains shallow water in two separate ponds and aids in water level control during drought or heavy runoff conditions. The wetland is managed as a freshwater marshland and contains numerous manmade nesting islands, perimeter vegetation, and various emergent plants which, collectively, provide optimal habitat for waterbirds. FWS classifies the refuge as "palustrine, open water/unknown bottom, permanent, nontidal, excavated."

The upper portion of Waiawa Stream is classified as "riverine, lower perennial, open water/unknown bottom, permanent non-tidal, excavated." The southern portion of the estuarine reaches of the Waiawa stream, which roughly separates the developed and undeveloped portions of the peninsula, is classified as "subtidal, open water/unknown bottom." The mangrove stands and associated intertidal reef flats on the north and west side of the peninsula are classified as "estuarine, intertidal, forested, broad-leaved evergreen, regular, tidal." A crescent-shaped stand of mangrove located along the upper northeastern section of the peninsula of approximately 17.5 acres is similarly classified. Aside from their fish and wildlife value, both areas also aid in shoreline stabilization and erosion control.

In addition to Waiawa Stream, there are several wetland areas in the interior of the peninsula. These are classified as "palustrine, emergent, persistent, non-tidal."

Two wetland indicator species occur in low number and limited distribution about 100 meters from the northern boundary of the site, making them of little consequence. They are the Red mangrove (*Rhizophora mangle*) and Pickleweed (*Batis Maritma*). These strand vegetation are located along the southeastern border with Pearl Harbor.

4.12.3 FLOOD PLAINS

Waiawa Stream flows through the Pearl City Peninsula and discharges into Middle Loch. The areas prone to flooding, identified in the Pearl Harbor Complex Master Plan, are shown in Figure 4-8.

The Flood Insurance Rate Map designates the site of the proposed project as Zone D, an area in which flood hazards are undetermined.

4.13 MAN-MADE HAZARDS AND CONSTRAINTS

4.13.1 ELECTROMAGNETIC RADIATION

Electromagnetic Radiation (EMR) zones designated around transmitter sites and tracking radars are required where high density electromagnetic power may constitute a hazard to personnel (HERP), ordnance (HERO), or fuels (HERF), or may interfere with non-military electronic equipment. The SURTASS facilities use hand-held radios to communicate to the SURTASS

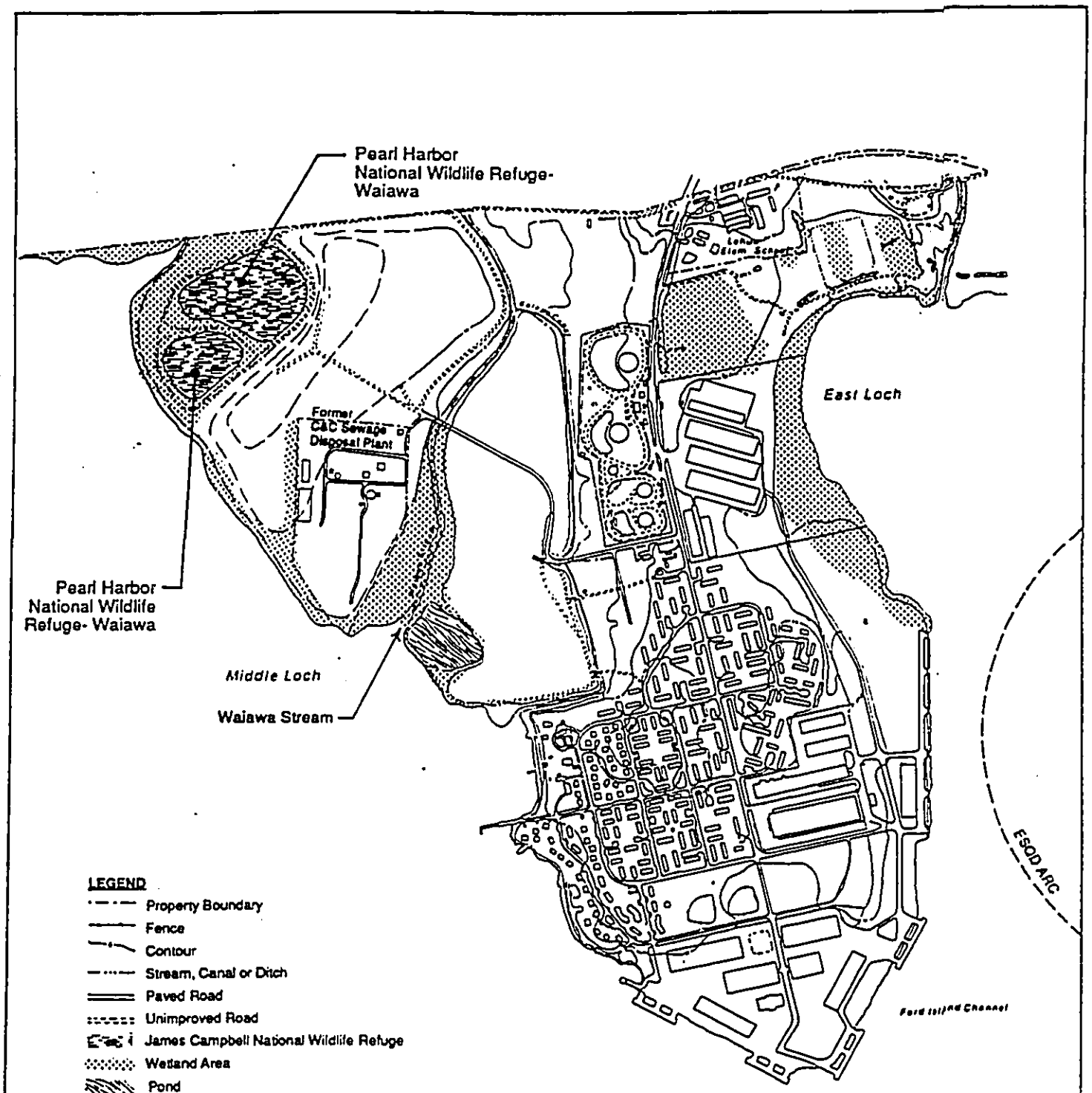

FIGURE 4-7
WETLANDS MAP
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

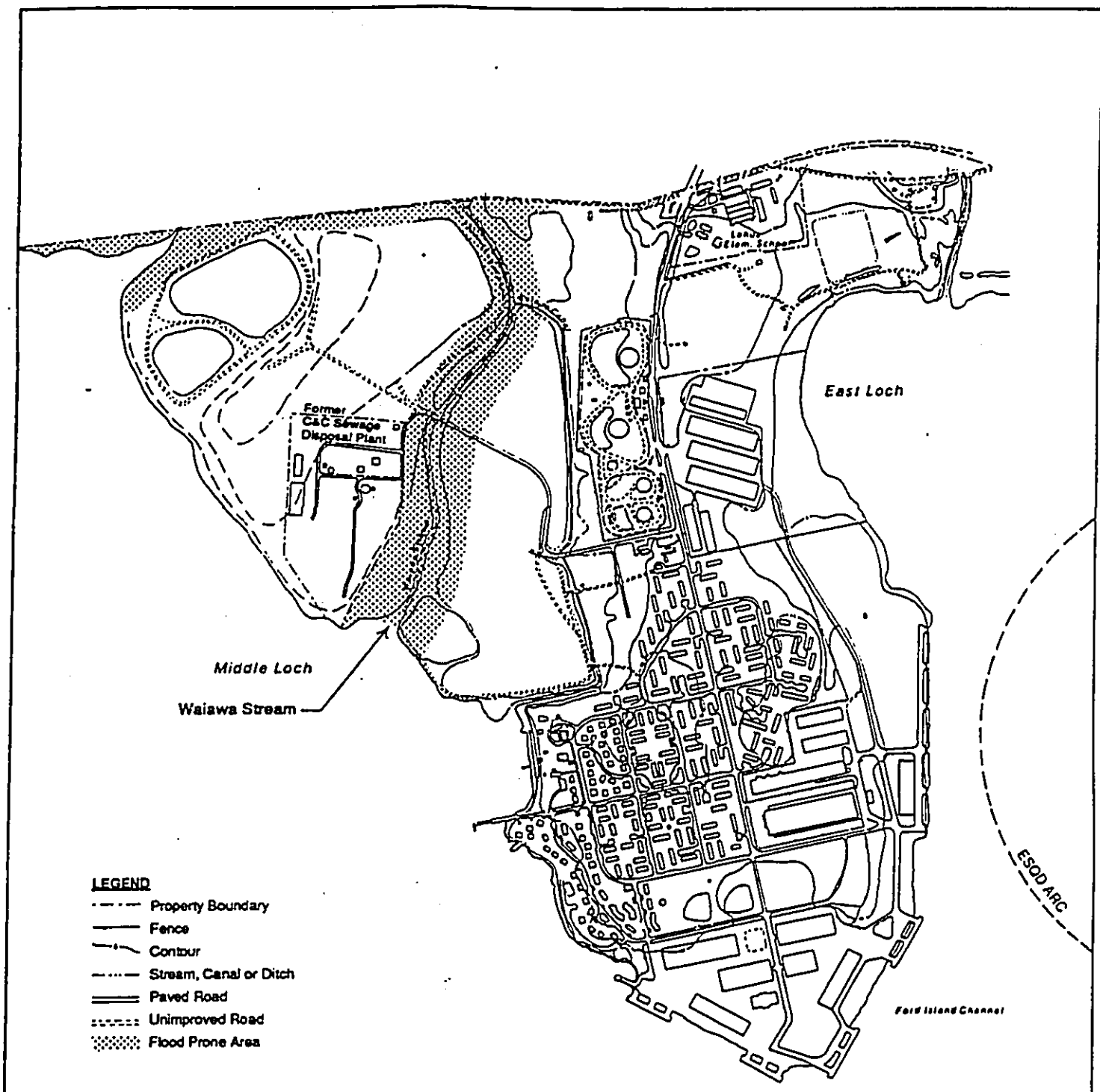

FIGURE 4-8
FLOOD PLAINS MAP
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

ships. Also, the Military Sealift Command will have a VHF radio including an antenna and a tower. The SURTASS facilities will also be equipped with King-Fisher style of fire alarm radio transmitters. Therefore, the proposed project will be required to submit for a project site approval, Part II, Division C "Electromagnetic Radiation Safety" per OPNAVINST 11010.44E.

4.13.2 EXPLOSIVES SAFETY QUANTITY DISTANCE

Explosives Safety Quantity Distance (ESQD) hazard zones have been established by the Department of Defense (DoD) for various quantities and types of explosives. Since these zones increase in size as the TNT-equivalent quantity increases, it is desirable to limit the total quantity of explosives at any one location in order to meet the limits of the available safety areas. Minimum distances are prescribed for separating explosives from inhabited structures, public roads, and other explosives. These distances are called ESQD arcs and are proportional to the cube root of the TNT-equivalent quantity of explosives.

The possibility of accidental detonation of explosives at ordnance operations and storage areas generally precludes the construction of inhabited buildings, standard structures, and recreational facilities within an ESQD arc. The outer portions of the arcs may be used for DoD *runways, highways, open recreation for military personnel, and uninhabited storage facilities.*

An ESQD zone emanates from an ammunition anchorage in East Loch north of Ford Island. This ammunition anchorage, shown in Figure 4-9, is located within a 500 foot radius from the point 21°22'38" N Latitude and 157°57'34" W Longitude, and has an associated 1,650-foot radius ESQD arc. An explosive limit of 70,000 lbs Net Explosive Wet (NEW) is established for this anchorage. This limit applies to the total quantity of ammunition in boats or barges, and on deck of a combatant ship using the anchorage. This limit also applies to the total quantity of ammunition in cargo ships. All classes of ammunition may be handled within this limitation (except commercial dynamite). All ammunition handling transactions at this anchorage must have the written approval of COMNAVBASE Pearl. Intra-ship ammunition movements are authorized at this anchorage.

4.13.3 HAZARDOUS WASTE SITES

No hazardous waste or Installation Restoration (IR) sites have been identified within or adjacent to the proposed project site.

4.14 INFRASTRUCTURE

4.14.1 ROADS

Roads in the vicinity of the proposed project site are characterized by a network of two-lane, asphalt-covered narrow streets servicing the surrounding naval housing facility. Traffic in the immediate area is influenced by the residential nature of the surrounding environment and by the nearby Lehua Elementary School. Access to the naval housing area is controlled at a single point along Lehua Avenue, the main thoroughfare within the housing area. Upon exiting the housing facility, Lehua Avenue becomes a standard urban four-lane street connecting with

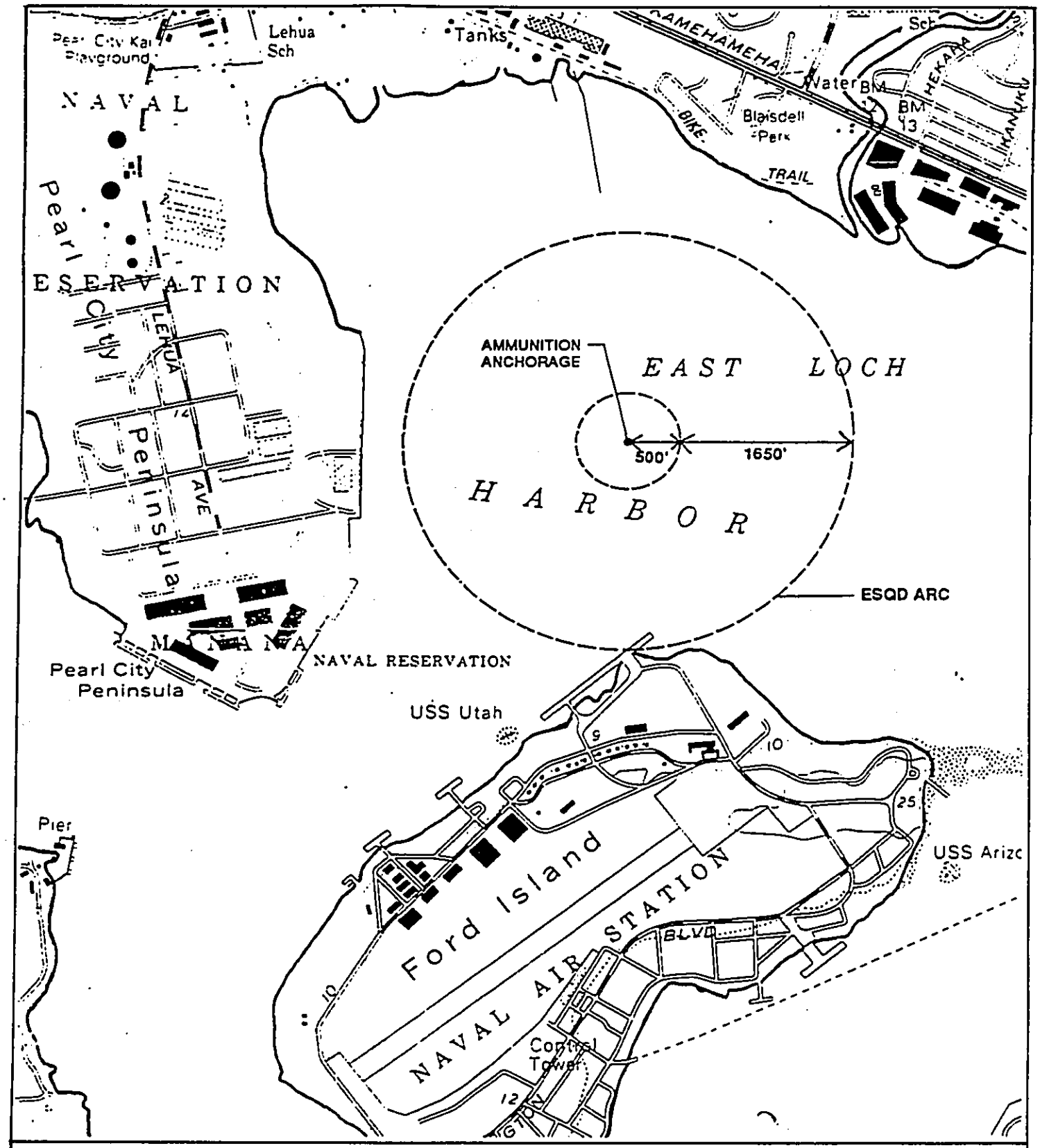

FIGURE 4-9
AMMUNITION ANCHORAGE (ESQD ARC 1650')
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

Kamehameha Highway, the major east-west arterial servicing the Pearl City area. Access to the proposed project site is via a Naval Supply Center road running through the existing warehouse area. The area road network can be seen in Figure 3-2.

Outside traffic travelling to and from the naval housing facility passes through the intersection of Kamehameha Highway with Lehua Avenue and Waimano Home Road. Lehua Avenue constitutes the northbound approach to this intersection and contains three full lanes to facilitate the left, through, and right turning movements. The southbound approach is by Waimano Home Road, also containing three lanes. The east and westbound approaches are by Kamehameha Highway, each with three full through lanes in addition to left-turn bays. All lanes are of standard widths and are typical of a suburban arterial. The intersection is controlled by an actuated signal, with vehicle detectors on all approaches.

Waimano Home Road serves as the access link for traffic wishing to utilize the H-1 Freeway in both the eastbound and westbound directions. Waimano Home Road also links westbound traffic from the H-1 Freeway with westbound Kamehameha Highway.

Currently, the intersection of Kamehameha Highway with Lehua Avenue and Waimano Home Road experiences heavy traffic flows along certain movements during both the morning and afternoon target hours. Traffic volumes and movement counts conducted by Belt Collins & Associates over a two-day period in late July showed that the level-of-service (LOS) for the intersection during the morning target hour (0630-0730) is affected by the heavy eastbound traffic volumes using the left-turning movement from Kamehameha Highway onto Waimano Home Road. (Traffic data was not measured during a massive deployment exercise such as TEAM SPIRIT which has backed up traffic onto Lehua Avenue.) Average delays on this movement were calculated using standard Highway Capacity Manual techniques (TRB, 1985) at approximately 143 seconds per vehicle. Several instances of cars not clearing the intersection (phase failures) during the green light phase were observed. Traffic volumes for the morning target hour can be seen in Figure 4-10.

The remaining approaches experience much lighter morning traffic volumes, with average delays of no more than 52 seconds per vehicle. The average intersection delay during the morning target hour is 46.7 seconds per vehicle, corresponding to LOS E under standards set by the 1985 Highway Capacity Manual. Level of Service is defined as follows:

Level of Service	Description	Stopped Delay per Vehicle (sec)
A	Little or no delay	≤5.0
B	Short traffic delays	5.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 40.0
E	Very long traffic delays	40.1 to 60.0
F	Extreme delays, severe congestion affecting other traffic movements through the intersections	>60.0

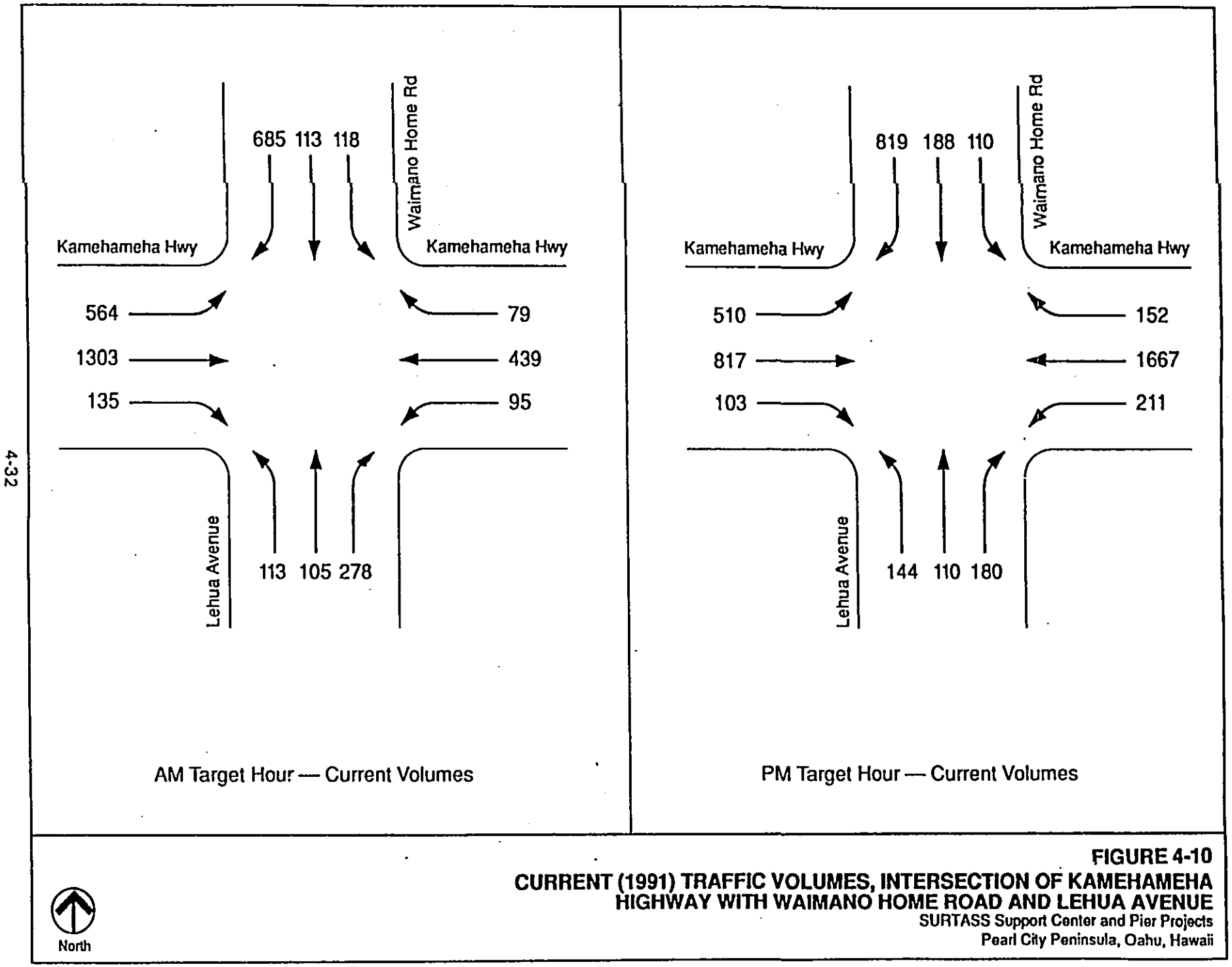

FIGURE 4-10
CURRENT (1991) TRAFFIC VOLUMES, INTERSECTION OF KAMEHAMEHA HIGHWAY WITH WAIMANO HOME ROAD AND LEHUA AVENUE
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

Vehicle to capacity ratios (v/c), average delay by lane group (seconds/vehicle), and the corresponding LOS for the morning target hour are shown in Table 4-3. The afternoon target hour (1600-1700) is heavily influenced by the large westbound traffic volumes along Kamehameha Highway. Over 1,600 vehicles utilized the westbound through movement during the observed target hour (see Figure 4-10). Phase failures occurred with every phase interval, and spillbacks in all three full lanes could be observed into the preceding intersection of Kamehameha Highway at Puu Momi Street, a distance of approximately 900 feet.

Other movements experiencing high delays were both the eastbound and westbound left-turning movements from Kamehameha Highway. Westbound traffic turning onto Lehua Avenue returning to the naval housing facility were delayed on average as much as 115 seconds per vehicle, while left-turning vehicles onto Waimano Home Road traveling towards the H-1 access and Pacific Palisades experienced average delays of over 85 seconds per vehicle.

The overall vehicle to capacity ratio for the subject intersection during the PM target hour is approximately 1.30. At this high level of traffic volume to the processing capability of the lanes, levels-of-service and delay times reach gridlock conditions. Vehicle to capacity ratios, average delay by lane group, and the corresponding LOS for individual lane movements during the afternoon target hour are shown in Table 4-4.

4.14.2 ELECTRICITY

An existing 11.5 KV primary feeder from the Hawaiian Electric Company's Waiau power plant services the Pearl City Peninsula. The power plant is approximately 12,700 feet away from the site of the proposed project. The nearest electrical lines to the proposed project site which could be tapped for power are approximately 1,200 feet away.

4.14.3 WATER

The Pearl City Peninsula receives water from the Waiawa system which also serves other activities in the Pearl Harbor Complex. Waiawa has a maximum effective pumping capacity of 27 MGD. The water lines serving the peninsula are shown in Figure 4-11. A 12-inch water main follows the Naval Supply Center access road through the existing warehouse area. Connecting eight- and six-inch lateral lines traverse the site of the proposed project.

4.14.4 SEWAGE

Currently a six-inch sewer force main is located at the Naval Supply Center Road which connects to the City and County of Honolulu sewage system. Sewage waste is then processed at the Honouliuli Sewage Treatment Plant.

4.14.5 SOLID WASTE

Solid waste pick up and disposal for the Naval facilities on the Pearl City Peninsula is handled through an independent contractor. Waste is disposed of at either the H-Power garbage to energy facility or to the Waimanalo Gulch Sanitary Landfill.

Table 4-3

Current Traffic Conditions - AM Target Hour

Intersection of Kamehameha Highway
with Waimano Home Road and Lehua Avenue

Direction	Lane Group	V/C Ratio	Delay (secs/veh)	LOS	Approach Delay	Approach LOS
Kamehameha Hwy						
Eastbound	Left	1.257	142.8	F	60.4	F
	Thru/Right	0.815	30.3	D		
Westbound	Left	0.517	51.6	E	41.6	E
	Thru/Right	0.495	39.9	D		
Lehua Avenue						
Northbound	Left	0.472	46.8	E	27.9	D
	Thru	0.415	46.1	E		
	Right	0.178	3.8	A		
Waimano Home Road						
Southbound	Left	0.474	46.9	E	19.4	C
	Left/Thru	0.433	46.3	E		
	Right	0.423	5.0	B		
Intersection		1.070	46.7	E		

Table 4-4

Current Traffic Conditions - PM Target Hour

Intersection of Kamehameha Highway
with Waimano Home Road and Lehua Avenue

Direction	Lane Group	V/C Ratio	Delay (secs/veh)	LOS	Approach Delay	Approach LOS
Kamehameha Hwy						
Eastbound	Left	1.042	85.2	F	45.5	E
	Thru/Right	0.472	24.8	C		
Westbound	Left	1.044	115.1	F	*	*
	Thru/Right	1.610	*	*		
Lehua Avenue						
Northbound	Left	0.554	49.0	E	34.6	D
	Thru	0.402	46.3	E		
	Right	0.106	3.6	A		
Waimano Home Road						
Southbound	Left	0.411	46.5	E	22.2	C
	Left/Thru	0.667	51.9	E		
	Right	0.469	5.4	B		
Intersection		1.298	*	*		

* Delays and LOS meaningless with v/c ratios greater than 1.20

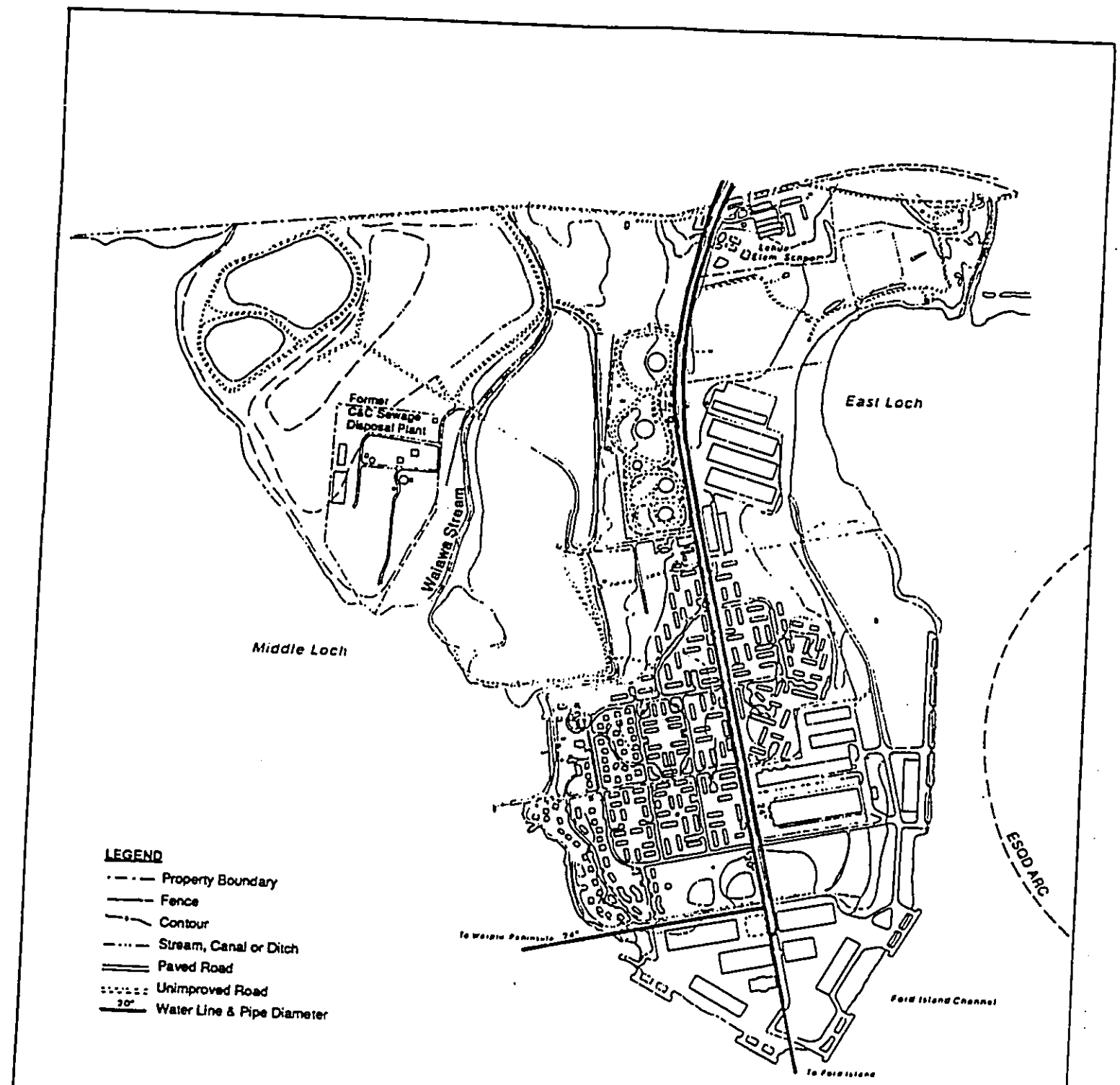

FIGURE 4-11
WATER DISTRIBUTION MAP
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

CHAPTER 5

ENVIRONMENTAL CONSEQUENCES

CHAPTER 5

ENVIRONMENTAL CONSEQUENCES

5.1 CONSTRUCTION IMPACTS

Construction will involve the removal of vegetation, grading, and building of the SURTASS Support Center, piers, and the relocation of the existing boat ramp. Impacts would involve the creation of fugitive dust and noise, and temporary increased turbidity of harbor waters in the vicinity of the pier construction. Existing utility lines on site would be removed and replaced. During construction of the proposed facilities, necessary mitigative measures will be employed to reduce noise and dust. Mufflers will be used on all heavy earthmoving equipment. Dust will be controlled by dust screens and watering of bare or exposed ground. Erosion and sedimentation controls will be employed as necessary.

5.2 CHANGES IN TOPOGRAPHY

Presently the proposed project site is level with little variation in topography. Construction will not significantly alter the current topography of the site.

5.3 HYDROLOGY/DRAINAGE IMPACTS

Currently there are no drainage problems reported at the site of the proposed facility. The open nature of the space and the soil types associated with the fill land do contribute to a small measure of ponding during heavy rainfall.

The existing topography of the project site is mostly flat, but overall, gently slopes toward the harbor. Construction of the proposed SURTASS facility would alter the land from open to paved, thus increasing the runoff potential at the site. Currently several drain lines with drain inlets are located at the site. However, some of the drain inlets are in poor condition and are located within the building and will be removed. Stormwater runoff will be allowed to sheet flow away from the SURTASS Support Center building and paved areas into Pearl Harbor via swales located on the north and south sides of the building. The new drainage outlet for the SURTASS Support Center, MILCON P-417, will be located just east of the concrete slab north of the building.

There will be one parking lot servicing the SURTASS Support Center building. The parking lot will be located west of the building and will provide 116 parking stalls, including two handicap stalls. The will have approximately six area drains for stormwater runoff west of the building.

Section 405 of the Water Quality Act of 1987 requires selected industries to obtain National Pollutant Discharge Elimination System (NPDES) storm water permits for all storm sewers that drain industrial sites into public waterways. However, discharges related to

parking lots and administrative and employee buildings are not discharges associated with industrial activity. Therefore, a NPDES storm water permit is not required.

None of the foundations of the SURTASS Support Center would be adversely affected by the artesian groundwater condition encountered in the test borings below 80 feet deep.

5.4 FLORA IMPACTS

None of the species found on the proposed project site are listed as, or candidates for, endangered or threatened status.

The development of the SURTASS Support Center and pier facilities will not disturb the large Rhizophora/Batis wetland about 100 meters from the northern boundary of the study site.

5.5 FAUNA IMPACTS

None of the birds or mammals found on the proposed project site are listed as, or candidates for, endangered or threatened status.

The amount of suitable shorebird habitat lost to the proposed development is relatively small and would perhaps result in the displacement of 10-15 plover, 5-10 turnstone, and 2 tattler.

The proposed development will alter the present habitats to a more urban environment, resulting in the decline in abundance of introduced open field species such as finches and doves. Numbers of the House Sparrow (*Passer domesticus*) and Common Myna (*Acridotheres tristis*) could increase.

The coastal wetland north of the property may provide some limited foraging habitat for native waterbirds. This habitat will not be disturbed or developed by the project.

On 2 August 1991 a benthic infauna sampling was taken and later analyzed. The results of this analysis is included in Appendix B.

The nearshore flat is covered in large part by a carpet of benthic algae, primarily of the genera *Caulerpa, Acanthophora, Hypnea, and Ulva*. Most of the algal mats are covered with a thin layer of silt, which is finer grained than the sediment found in the zone near shore. Predominant fauna include *O. spectabilis*, as well as various sponges. In some areas, the bottom is covered with "reefs" composed of aggregations of bound sand-grain tubes of Sabellid (feather-duster) worms. The algal mud zone extends to a depth of approximately 8 feet. Such structure was not observed at any location near the proposed site.

The only macroinvertebrate observed in the nearshore zone was a occasional gelatinous sea cucumber *Ophiodesoma spectabilis*, a species that is commonly found in areas of high organic particulate input. No benthic algae was observed along any of the shoreline shallows. Also, no fish were observed during the underwater reconnaissance survey.

The organisms found are quite small, falling into the classification of meiofauna in most cases. These organisms would be difficult to see with the naked eye. The largest organism found in the sampling is Sternaspis sp., a short, stout worm measuring about 1.5 mm long by 0.8 mm wide (preserved) but reported to grow to 4 or 5 mm.[1] The small annelids and crustaceans are the more abundant forms found in soft sediments (marine sands, silts, and clays) in Hawaii. Larger polychaetes and crustaceans do occur in this environment, but in much lower densities. A comparison of samples would require processing a considerable volume of sediment in order to obtain representative counts.

Most abundant in the sediments are even smaller forms, including the nematodes, protozoans, bacteria, and fungi. However these microscopic forms are difficult to count and identify without resorting to special techniques.

The examination of the biota in the area of the proposed SURTASS pier facility indicates that the region is depauperate relative to other locations in Pearl Harbor. There is virtually no macrobenthos in the proposed construction area to be displaced or removed. Benthic infaunal analysis of the soft sediment indicates that the communities do not represent any unique or rare assemblages, and have lower abundances that other areas of Pearl Harbor. Thus, the organisms that are removed during construction are not likely to cause any overall alteration of community structure. It is also likely that all areas that are disturbed will be rapidly recolonized following construction activities.

The proposed project construction will employ prudent construction practices which will prevent large scale qualitative changes to the marine environment. Therefore, it is anticipated that the proposed project will not alter the long-term qualitative marine environment beyond the existing level.

5.6 ARCHAEOLOGICAL, HISTORIC AND CULTURAL IMPACTS

In accordance with Section 106 of the National Historic Preservation Act of 1966, Federal agencies are required to consider the effects of their actions on historic properties. The review process is designed to identify and evaluate historic properties, to assess the effects of the proposed project on the properties, and if applicable, to find ways to mitigate adverse effects. In Hawaii, Section 106 review is carried out by the Historic Preservation Division on behalf of the State Historic Preservation Officer (SHPO), State Department of Land and Natural Resources.

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[1] Marine Research Consultants, August 30, 1991, *Baseline Assessment of the Marine Environment in the Vicinity of the Navy SURTASS Facility Proposed for the Pearl City Peninsula in Pearl Harbor.*

Although the SURTASS Support Center will be located outside the Pearl Harbor National Historic Landmark, the pier project will extend into the waters within the landmark boundaries. No identified features of the Landmark are affected by the pier project. Records show that the proposed shoreline was formerly a fish pond in the East Loch. The entire pond was reclaimed by hydraulic filling in the 1940s to form the Victor Dock. The Navy will, based on formal consultation with the representatives of the State Historic Preservation Officer, conduct data recovery through soil borings taken at 10 feet to 21 feet below the surface. The purpose of the data recovery will be to date the fishpond and obtain other information as may be obtained from the sample. This data recovery plan, formalized through the Section 106 process, is the basis for the no adverse effect determination which was concurred with by the SHPO and the Advisory Council on Historic Preservation.

No other significant archaeological, historical, or cultural sites were identified. However, should any other historic or culturally important finds be identified during the construction phase, work would stop in the immediate area and the State Historic Preservation Officer and Pacific Naval Engineering Command would be notified. The significance of any potential sites would be determined and dealt with in accordance with existing Naval policy. See Appendix E for 1979 Memorandum of Agreement resulting from the Navy's consultations with the Hawaii State Historic Preservation Officer and the Advisory Council on Historic Preservation.

5.7 AESTHETIC/VISUAL IMPACTS

The proposed project site was developed for military use during World War II. Remnants of the former piers still exist under the water surface. The site itself is abandoned and partially covered by secondary grass and weed growth. Much of the lower vegetation is growing over and between asphalt paving. The surrounding environment is comprised of older warehouses.

Construction of the proposed SURTASS Support Center and pier facilities will entail replacing an area currently covered in grass and weeds with a paved environment and, as such, will cause a change in the visual setting of the area. In addition, the construction of the piers will cause a visual change in Pearl Harbor. However, these changes in the visual setting are consistent with the surrounding visual context, which consists of piers and warehouses. There are no public views of any significance in the immediate area that will be impacted by the proposed project. Given the distances involved, views from public access points across the harbor should not be significantly impacted by the operations of the proposed project.

5.8 SOCIOECONOMIC IMPACTS

5.8.1 OPERATIONAL POPULATION IMPACTS

While the SURTASS ships are in port, the crew normally billets on the ships. Therefore, there is no requirement for additional housing for the SURTASS ship's crew. The 178 employees required for the SURTASS Support Center will be relocated from the existing Bishop Point facility to the Pearl City Peninsula and will not require any additional housing.

5.8.2 CONSTRUCTION POPULATION IMPACTS

The cost estimates for the Pearl City Peninsula site for MILCON projects P-417 and MILCON P-422 are shown on Table 3-1. The approximate total cost for the SURTASS Support Center will be between $11 million and $12 million and the approximate total cost for the pier facility will be between $25 million and $26 million. (These costs do not include the costs that will be incurred to provide interim facility modifications for RDA maintenance prior to MILCON P-417 completion.)

Construction employment is estimated assuming labor cost is 50% of total project costs and an average of one construction industry job per $100,000 building value.[2] The SURTASS Support Center is estimated to begin in 1992 and completed within two years. Therefore, the number of full-time equivalent workers required for the two years of construction of the Support Center is approximately 60. The pier facilities project is estimated to begin in 1993 and completed within two years. The number of full-time equivalent workers required for the two years of construction of the pier facilities is approximately 130.

The percentage of construction workers coming from off-island is currently undetermined. However, if construction personnel consisted of workers from outside the State of Hawaii, then temporary housing would be necessary for the workers and possibly their dependents.

5.9 NOISE IMPACTS

Noise impacts of the proposed project would be associated with equipment operation during construction of the proposed facility. Properly muffled equipment should help mitigate this short-term impact.

Noise impacts during the operation of the proposed facility would be associated with the berthing of the ships, the running of motorized equipment, and the running of equipment needed to replace the sonar lines on the ships. Residential housing units are located

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[2] Department of the Navy, Pacific Division, Naval Facilities Engineering Command. August 1990, *Final Environmental Impact Statement for Proposed Developments at Naval Base Pearl Harbor,* Oahu, Hawaii.

approximately 400 feet away from the proposed facility. Given the ambient noise environment and the relatively quiet nature of the operations of the proposed facility, no significant noise impacts are anticipated from the operation of this facility.

5.10 AIR QUALITY IMPACTS

The State Department of Health has an air monitoring station located on the Pearl City Peninsula at 860 4th Street, Pearl City. This station is upwind from the proposed project site and would predominantly monitor traffic-related pollution. A review of data collected from that monitoring station indicates that total suspended particulates and sulfur dioxide standards are being met. In fact, much of the time SO_2 concentrations are below the detectable limit of the measurement method being employed. Carbon monoxide levels are also below State standards most of the time with only occasional exceedances.[3]

The relocation of the vehicular traffic of the employees of the SURTASS Support Center to the proposed Pearl City Peninsula site could result in a minor increase in the amount of carbon monoxide emissions present at the intersection of Lehua Avenue and Kamehameha Highway.

Hawaii Administrative Rules, Title 11, Department of Health, Chapter 60, Air Pollution Control, does not regulate mobile or marine sources. Therefore, any of the emissions from the ships are not regulated by the State. The air pollution emissions will occur only upon arrival and departure of ships to and from the pier. The ships are shutdown while docked at the pier. In conclusion, no significant air pollution impacts from the ships are expected at the Pearl City Peninsula site.

The new SURTASS Support Center will also include storage tanks for the petroleum product, NORPAR/ISOPAR, to be located at the northwest corner of the SURTASS Support building. The NORPAR/ISOPAR will be enclosed in two 10,000 gallon above-ground storage tanks. Venting to the atmosphere will be limited to small ventilation tubes. Therefore, no significant amount of volatiles are expected to be released to the atmosphere.

Currently, there are no known or identified stationary sources associated with the proposed SURTASS facility. Therefore, there is no need to establish another air monitoring station closer to the proposed project.

Other air quality impacts of the proposed project are associated with fugitive dust generated during construction. Proper construction operation techniques would be adequate to mitigate these short-term impacts.

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[3] Department of the Navy, Pacific Division, Naval Facilities Engineering Command, August 1990, *Final Environmental Impact Statement for Proposed Developments at Naval Base Pearl Harbor*, Oahu, Hawaii.

5.11 WATER QUALITY

On August 2, 1991 an underwater reconnaissance surveys was done which consisted of a quantitative evaluation of water chemistry and macrobiotic community structure, and a qualitative evaluation of the physiographic setting. Appendix B contains the water quality analysis which is summarized below.

Table 4-1 shows the water quality standards for the Pearl Harbor estuary. No chemical constituents measured on August 2, 1991 exceeded the Department of Health criteria for this area. Comparing DOH limits and the data indicates that water quality at the proposed site does not even approach the most stringent limits. For example, NO_3^- is less than half of the DOH limit, while the highest measured turbidity is an order of magnitude less than the DOH limit.

The single most dominant factor in Pearl Harbor with respect to the marine environment is the massive alteration to the ecosystem over the decades by the human activities. Extensive dredging and alteration of the shorelines, as well as stream input draining urban and agricultural areas, are the dominant physical factors influencing the marine environment throughout the harbor, including the vicinity of the proposed project. As a result, the existing environment cannot be considered a pristine habitat and has historically been subjected to alterations similar to those encompassed in the proposed project.

The results of the present survey indicate several important points with respect to the proposed project. First, during the period of fieldwork, water chemistry constituents indicated that water quality could be considered "high" with respect to specific criteria established by the Department of Health. It is likely that water quality may change as a result of seasonal events, such as storm runoff during the winter season, but such alterations are likely to be temporary in nature. It appears likely that the proposed activity involving the construction of the SURTASS Support Center and pier facilities will not provide a significant source of further alteration of the chemical nature of the marine environment. Turbidity will undoubtedly increase as a result of construction activity, but such increases appear to already be a common occurrence throughout Pearl Harbor. There does not appear to be any indication that the project would result in conditions that would significantly reduce water quality to levels below acceptable DOH standards.

Examination of the biota in the area of the SURTASS Support Center and pier facilities indicates that the region is depauperate relative to even other locations in Pearl Harbor, much less undisturbed coastal sites in Hawaii. There is virtually no macrobenthos in the proposed construction area to be displaced or removed. Benthic infaunal analysis of the soft sediment indicates that the communities do not represent any unique or rare assemblages, and have lower abundances than other area of Pearl Harbor. Thus, the organisms that are removed during construction are not likely to cause any overall alteration of community structure. It is also likely that all areas that are disturbed will be rapidly recolonized following construction activities.

In summary, as long as prudent construction practices are employed which prevent large scale qualitative changes to the marine environment, it does not appear that the proposed project has the potential to further alter the marine environment beyond the existing level.

5.12 HAZARDOUS SUBSTANCE IMPACTS

5.12.1 NORPAR/ISOPAR Storage

NORPAR/ISOPAR, a petroleum solvent, is a clear colorless liquid which is inserted into the array modules to establish specific gravity characteristics. This product is defined as hazardous in 29 CFR 1910.1200 under the Occupational Safety and Health Administration by virtue of its combustible characteristics. See Appendix F for the NORPAR/ISOPAR Material Safety Data Sheet.

The new SURTASS Support Center will include two above-ground 10,000-gallon storage tanks for the petroleum product NORPAR/ISOPAR. These tanks will include containment protection and concrete diking.

The NORPOR/ISOPAR from the two 10,000-gallon steel above-ground tanks would be pumped from the storage tanks into the building via steel pipes from the tanks to the pumps located outside the concrete dike that surround the tanks. The piping would then go underground as double-wall fiberglass pipes to the facility, and then as steel piping when it reaches the floor of the facility. The NORPAR/ISOPAR goes through a filter then through a quantity control valve, at which point it either goes directly into an 80-gallon storage tank or is pumped into portable 55-gallon drums. The 80-gallon storage tank is used for filling the arrays after maintenance is complete and the portable 55-gallon drums are used for storage on the SURTASS ships. The connection to the 80-gallon tank should be a direct connection with steel piping and the connection to the 55-gallon drums would be a temporary connection. Any spill would primarily be located at the quantity control valve area and would be captured by a floor drain surrounded by a 5-foot by 5-foot depression in the floor with the drain in the middle. The drain flows directly to a 10,000-gallon underground fiberglass storage tank.

5.12.2 FUEL STORAGE

Currently SURTASS ships are refueled at the Naval Supply Center Fuel Pier, in the East Loch, Pearl Harbor. This will not change when the SURTASS Support Center and pier facilities are relocated to Pearl City Peninsula.

5.12.3 DISPOSAL OF WASTE OIL

The current T-AGOS class ships have a 12,000-gallon waste oil storage tank. The new SWATH class ships have two waste oil storage tanks each 1,500 gallons. The ships waste oil is disposed of by pumping the waste into Pearl Harbor Naval Station oil disposal rafts (donuts). There are two types of donuts currently in use in the Pearl Harbor area, the open bottom and closed bottom types. The SURTASS ships primarily use the closed-bottom

type. The donuts are a basic type of gravity oil-water separator. When contaminated bilge water is properly discharged into the donut at a controlled rate, the oil separates from the water and rises to the surface inside the donut. The liquid level within the donut remains constant at approximately six feet below the top of the coaming. In closed-bottom donuts, as contaminated liquid is added and separation occurs, the sea water already present in the donut is displaced and forced out of the donut.

The approximate 26,000 gallon volumetric content of the donut provides a substantial dilution and time retention capability for processing ships bilge waste so that the water that is displaced will have less than 15 parts per million (PPM) oil content. This is the lower limit of oil content which will produce a sheen on adjacent surface waters.

The use of donuts will eventually be phased out. They will be replaced with improved or new infrastructure that will be capable of handling the ships' waste oil. Neither the timing of the donuts' phase-out nor the interim solutions of the ships' waste oil disposal is presently known. The Navy has several on-going studies to address these issues.

The Naval Supply Center Fuel Department would be contacted prior to arranging for offloads of any contaminated petroleum products in excess of 7,500 gallons and any quantity of non-specification products. Fuel Department personnel will determine whether the contaminated products can be used by the Navy locally.

5.12.4 DISPOSAL OF INDUSTRIAL WASTE

The only industrial wastes anticipated from the proposed project will be from the array maintenance area. NORPAR/ISOPAR, the fluid within the array's plastic sheathing used for buoyancy control, is captured via a series of floor drains into a 10,000-gallon underground fiberglass waste storage tank. The underground storage tank will be a double wall fiberglass tank with double wall fiberglass pipes. The tank will have an overfill valve and a liquid level monitor with a high level alarm. Leak sensors will be installed between the fiberglass double walls of the tank and also between the double walls of the fiberglass pipes.

After the NORPAR/ISOPAR is drained from the arrays, only the damaged arrays are rinsed prior to servicing. The rinseate will be directed via a floor drain to an oil/water separator (to be located just east of the SURTASS building) for pretreatment prior to discharge into the City and County sewer system. (See Appendix G for the City and County of Honolulu Department of Public Works Industrial Wastewater Discharge Certificate.)

The oil collected in the oil/water separator will be put into the underground storage tank and that tank will be periodically pumped out as necessary and taken to the Naval Supply Center Fuel Reclamation facility and recycled.

5.12.5 CONSTRUCTION WASTE

Hazardous waste may also be associated with the construction of facilities, and can include such items as paint, hydraulic fluid, or equipment lubricants. Contractors building naval

facilities are contractually responsible for the removal and disposal of all hazardous wastes generated by construction. These wastes must be removed off site and disposed of in a licensed, acceptable manner. There are no unique aspects of the SURTASS project regarding generation of construction wastes.

5.12.6 REGULATIONS AND RESPONSE PROCEDURES

5.12.6.1 Clean Waters Act, Section 311

The Clean Waters Act (Section 311) prohibits discharge of oil or any listed hazardous substances into navigable waters of the United States in reportable quantities that may be harmful. Section 311 (b)(5) states that any person in charge of a facility shall, as soon as he has knowledge of a discharge of oil or a hazardous substance in a harmful quantity, must report it to the federal government.

5.12.6.2 Title 40, Code of Federal Regulations (CFR), Part 112

The Federal Water Pollution Control Act Amendments of 1972 require the Administrator of the Environmental Protection Agency (EPA), with other Federal, State, and interstate agencies, to enter into programs designed to prevent, reduce, or eliminate pollution of the navigable waters of the United States. In 1973 the EPA publishes regulations for the prevention of pollution of waters of the United States by oil emanating from non-transportation related onshore and offshore facilities. The regulations, which became effective in 1974, are identified as Title 40, Code of Federal Regulations, Part 112, (40 CFR, Part 112), "Oil Pollution Prevention--Non-transportation Related Onshore and Offshore Facilities".

Title 40, Code of Federal Regulations, Part 112 requires preparation and implementation of a Spill Prevention Control and Countermeasure (SPCC) Plan for all non-transportation related (onshore and offshore) facilities which have discharged or could reasonably be expected to discharge oil into the navigable waters of the United States or the adjoining shorelines. A SPCC Plan must be prepared by the owner or operator of onshore and offshore nontransportation-related production facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, and consuming oil and oil products. An SPCC Plan must be prepared for those facilities which have an underground petroleum product storage of more than 42,000 gallons or above-ground petroleum product storage of more than 1,320 gallons. A SPCC Plan must be prepared for the new SURTASS Support Center and pier facilities at Pearl City Peninsula.

The objective of 40 CFR, Part 112 is to prevent the discharge of oil in harmful quantities into the navigable waters of the United States or adjoining shorelines. A petroleum or petroleum product discharge is harmful if any amount spilled that reaches navigable waters is sufficient to cause a film or sheen (an iridescent appearance of discoloration of the water or adjoining shoreline) or a sludge under the water. The accomplishment of this objective requires an assessment of each facility for the possibility of any such discharge of oil. Where such potential exists, the regulation urge that: a) employees be adequately trained to reduce the number of human errors that often cause spills; b) inspection procedures

implemented; c) when appropriate, pollution prevention equipment be installed and maintained; and d) secondary containment, if practicable, be provided to contain any oil that may be spilled.

5.12.6.3 Regional And Local Navy Responsibilities and Response Procedures

The Navy's Environmental and Natural Resources Protection Manual, OPNAVINST 5090.1, directs that each Navy Area Coordinator develop an Area Oil and Hazardous Substance Pollution Contingency Plan in support of the National Oil and Hazardous Substance Pollution Contingency Plan Instruction 5090.1B of March 11, 1987.[4]

Oil and hazardous substance spill contingency plans for Pearl Harbor are designed to comply with Federal Law and with OPNAVINST 5090.1A regarding Chief on Naval Operations' policies and procedures for environmental protection. This plan is contained in COMNAVBASEPEARL Oil and Hazardous Substances Contingency Plan Instruction of March 11, 1987.

This contingency plan provides guidelines and specifies responsibilities for the control and cleanup of oil and hazardous substance spills. The plan covers spills in any medium: air, land, surface water, or ground water. Local Oil and Hazardous Substance Pollution Contingency Plans, which support the area-wide plan, are required for individual Navy activities that generate or store significant amounts of hazardous material.[5]

Navy On-Scene Commanders are responsible for developing local contingency plans for the activities in their areas and for establishing permanent On-Scene Operations Teams. These teams are available on a 24-hour-per-day basis, providing equipment, materials, expertise, and labor for rapid response to oil and hazardous substance spills.

The basic hazardous substance spill response is summarized as follows:

Phase I - Discovery and Notification. Discoveries of identified hazardous substance spills in reportable quantities are reported immediately to the Navy On-Scene Coordinator by telephone. This is required whether the release appears to be Navy-caused or not, and whether the discoverer is the releaser or an observer.

Phase II - Initial Actions. The Spiller notifies the appropriate Navy On-Scene Commander, the National Response Center, and any other affected parties. The Navy On-Scene Commander evaluates the magnitude and severity of the hazard, identifies the source and the nature of the release, conducts a preliminary assessment to determine the appropriate response, recommends evacuation if necessary, and activates the On-Scene Operation team of a civilian contractor.

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[4] Department of the Navy, Pacific Division, Naval Facilities Engineering Command, August 1990, *Final Environmental Impact Statement for Proposed Developments at Naval Base Pearl Harbor*. Oahu, Hawaii.

[5] Ibid.

Phase III - Removal Action. An immediate removal action is undertaken, if necessary, to prevent or mitigate significant risk of harm to human life or health, or the environment. Once the immediate risk has been abated, further efforts to decontaminate the area are taken, if necessary.

Phase IV - Disposal of Hazardous Waste. Hazardous wastes or contaminated materials disposed of in accordance with the appropriate Hazardous Waste Management Plan and all state and local regulations.

Phase V - Documentation. The source and circumstances of the spill, the identity of the responsible party, costs incurred, and impacts and potential impacts to public health, welfare, and the environment are documented.

5.13 INFRASTRUCTURE IMPACTS

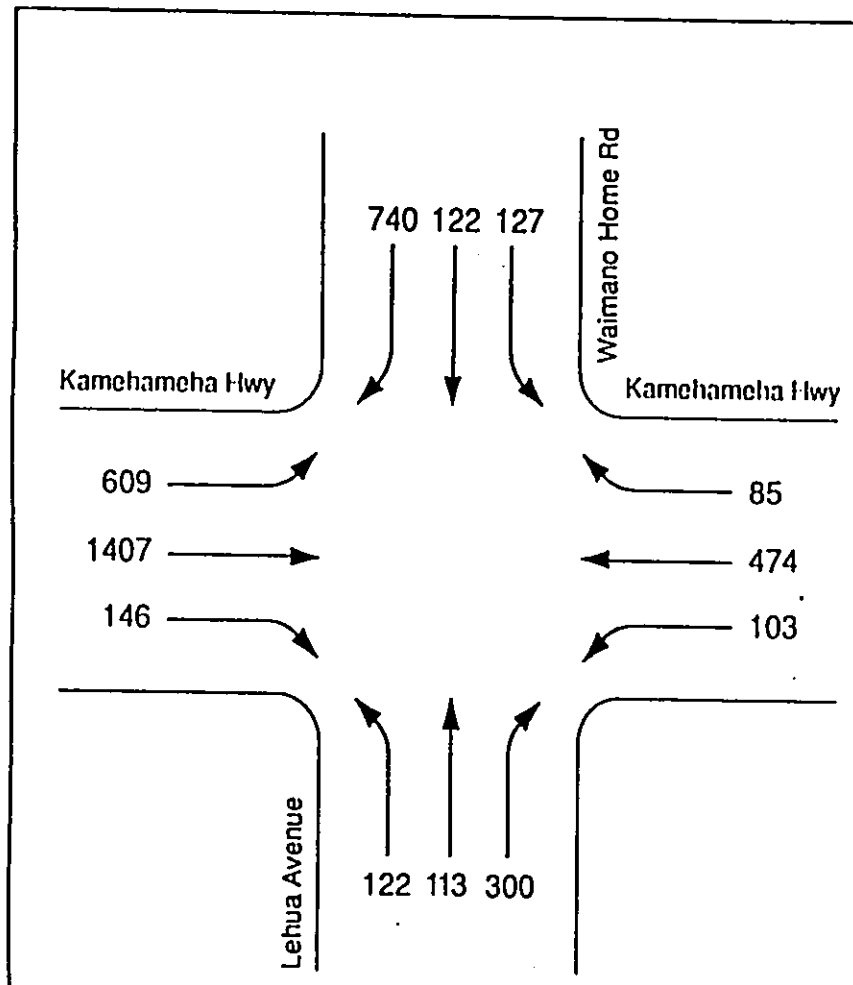
5.13.1 TRAFFIC IMPACTS

5.13.1.1 *Future Conditions Without SURTASS*

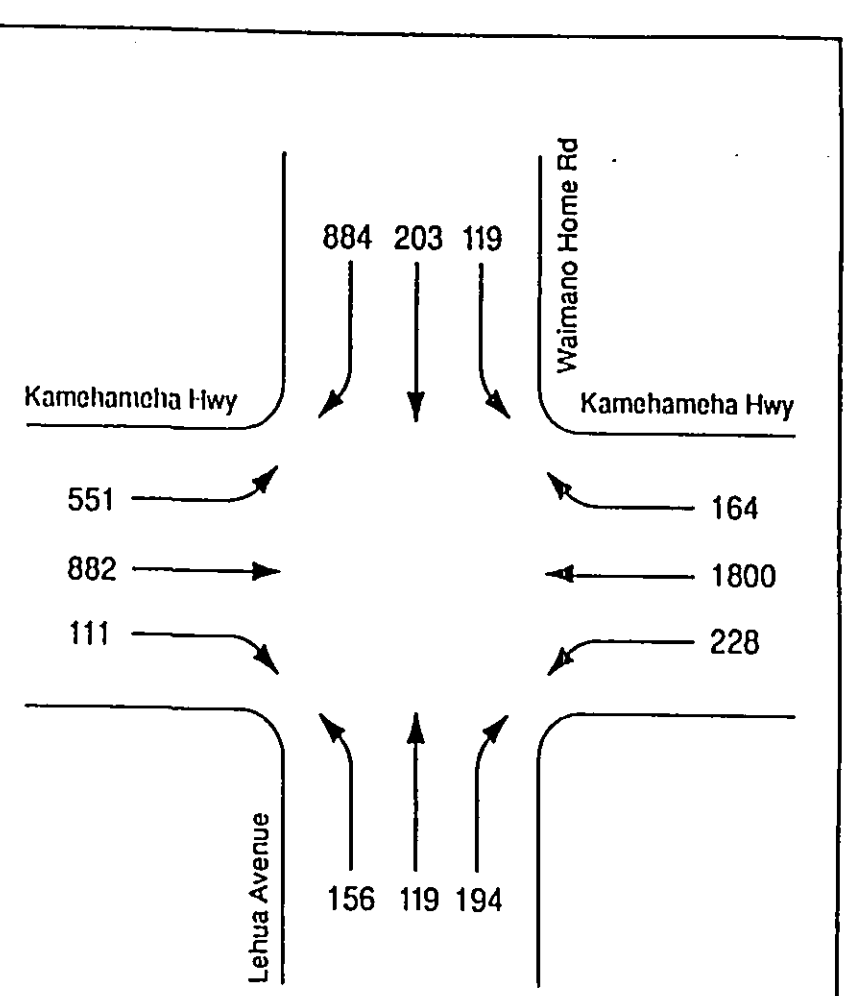
The proposed SURTASS facility is anticipated to be operational in 1993. At that time, traffic volumes in the vicinity are forecast to increase about eight percent from current levels. Future background traffic volumes for both the morning and afternoon target hours can be seen in Figure 5-1 and Figure 5-2.

Using standard 1985 Highway Capacity Manual techniques, average delays during the morning travel time are anticipated to increase only slightly on most movements through Kamehameha Highway/Waimano Home Road-Lehua Avenue intersection. The left-turning movement from Kamehameha Highway onto Waimano Home Road will continue to be congested, with vehicle to capacity (v/c) ratios increasing from 1.16 to 1.26. At this level, cars will queue past the end of the present left-turning bay. The cars towards the end of this queue will require two phase cycles to clear the intersection, a situation seen under the current conditions. Vehicle to capacity ratios, average delay by lane group, and the corresponding LOS for individual lane movements during the 1993 morning target hour are shown in Table 5-1.

During the afternoon target period, overall background traffic congestion along westbound Kamehameha Highway will worsen from current levels. Delays of up to 152 seconds per vehicle are anticipated for drivers wishing to turn left onto Lehua Avenue. Westbound through-movement traffic will remain in its current near gridlock condition. In addition, the left-turning movement from Kamehameha Highway onto Waimano Home Road will experience congestion problems similar to those anticipated during the morning hour.



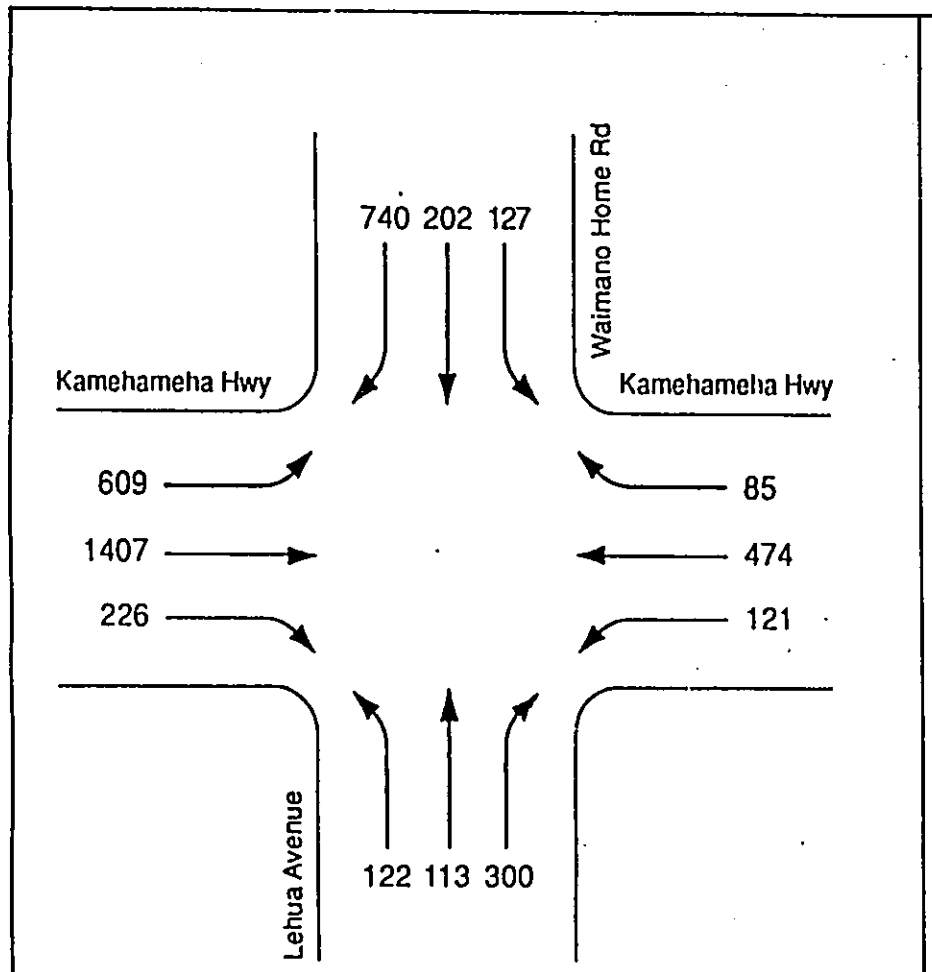
AM Target Hour — 1993 Traffic Volumes,
Without SURTASS Project



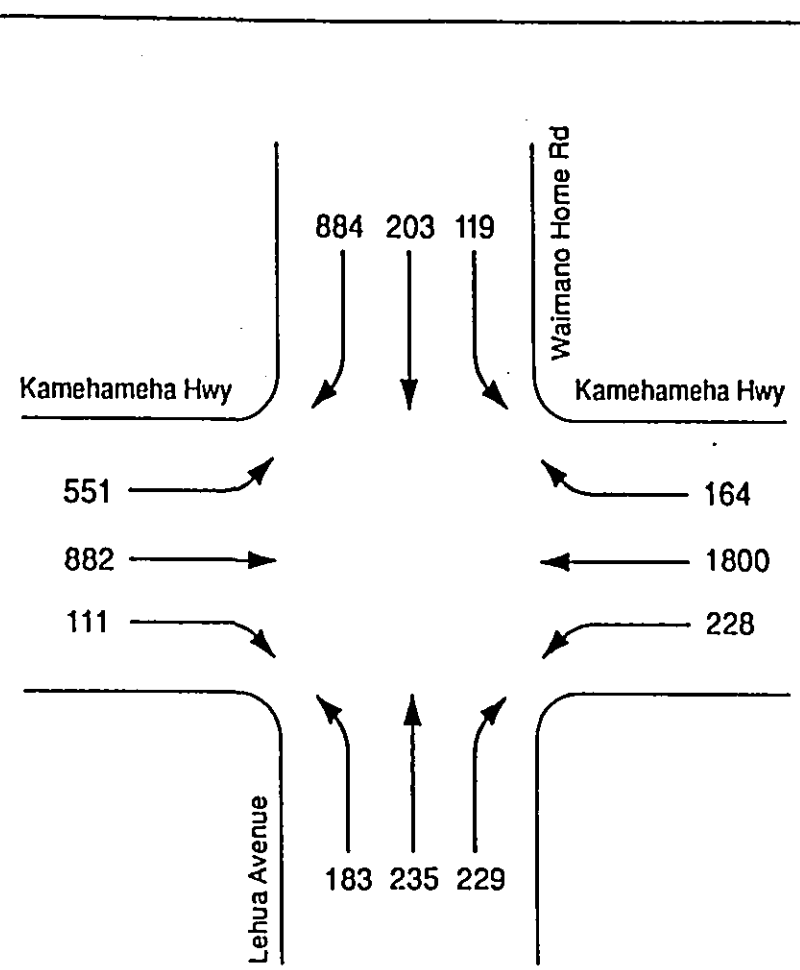
PM Target Hour — 1993 Traffic Volumes,
Without SURTASS Project

North

FIGURE 5-1
1993 TRAFFIC VOLUMES, WITHOUT SURTASS PROJECT, INTERSECTION OF KAMEHAMEHA HIGHWAY WITH WAIMANO HOME ROAD AND LEHUA AVENUE
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii



AM Target Hour — 1993 Traffic Volumes,
With SURTASS Project



PM Target Hour — 1993 Traffic Volumes,
With SURTASS Project

North

FIGURE 5-2
1993 TRAFFIC VOLUMES, WITH SURTASS PROJECT, INTERSECTION OF KAMEHAMEHA HIGHWAY WITH WAIMANO HOME ROAD AND LEHUA AVENUE
SURTASS Support Center and Pier Projects
Pearl City Peninsula, Oahu, Hawaii

Table 5-1

1993 Traffic Conditions - AM Target Hour

Intersection of Kamehameha Highway with Waimano Home Road and Lehua Avenue

Direction	Lane Group	V/C Ratio	Delay (secs/veh)	LOS	Approach Delay	Approach LOS
Kamehameha Hwy						
Eastbound	Left	1.257	*	*	*	*
	Thru/Right	0.815	32.2	D		
Westbound	Left	0.517	52.3	E	41.9	E
	Thru/Right	0.495	40.1	E		
Lehua Avenue						
Northbound	Left	0.472	47.4	E	28.3	D
	Thru	0.415	46.5	E		
	Right	0.178	3.9	A		
Waimano Home Road						
Southbound	Left	0.474	47.4	E	20.2	C
	Left/Thru	0.433	46.7	E		
	Right	0.423	5.1	B		
Intersection		**1.070**	*	*		

* Delays and LOS meaningless with v/c ratios greater than 1.20

Table 5-2

1993 Traffic Conditions - PM Target Hour

Intersection of Kamehameha Highway with Waimano Home Road and Lehua Avenue

Direction	Lane Group	V/C Ratio	Delay (secs/veh)	LOS	Approach Delay	Approach LOS
Kamehameha Hwy						
Eastbound	Left	1.126	121.4	F	58.1	E
	Thru/Right	0.509	25.3	D		
Westbound	Left	1.128	152.1	F	*	*
	Thru/Right	1.739	*	*		
Lehua Avenue						
Northbound	Left	0.601	50.1	E	35.3	D
	Thru	0.435	46.8	E		
	Right	0.114	3.6	A		
Waimano Home Road						
Southbound	Left	0.444	46.9	E	23.0	C
	Left/Thru	0.720	54.1	E		
	Right	0.505	5.8	B		
Intersection		**1.401**	*	*		

* Delays and LOS meaningless with v/c ratios greater than 1.20

Delays for the remaining approaches and movements are not expected to increase significantly. Forecasted 1993 background traffic volumes for the afternoon hour can be seen in Figure 5-1. Vehicle to capacity ratios, average delay by lane group, and the corresponding LOS for individual lane movements during the 1993 afternoon target hour are shown in Table 5-2.

5.13.1.2 Future Conditions With SURTASS

Projected staffing of the SURTASS facility during an average working day is 178 people on one shift. It is anticipated that these employees would arrive at the facility between 0700 and 0730 and depart between 1630 and 1700. For the purposes of traffic analysis, each employee was assumed to drive. As the employees of the current SURTASS facility are dispersed geographically around Oahu, morning project traffic was assigned to the three approaches in the following manner:

- 45% Originating in the Leeward and Central Districts, utilizing eastbound H-1 Freeway and eastbound Kamehameha Highway;
- 45% Originating in the Honolulu and Windward Districts, utilizing westbound H-1 Freeway and Waimano Home Road; and,
- 10% Originating in the Pearl City/Pearlridge area, utilizing westbound Kamehameha Highway.

The 1993 morning traffic volumes, including the additional traffic generated by the proposed SURTASS facility, are shown in Figure 5-2. Results of analyses on these volumes are shown in Table 5-3 and Table 5-4.

As can be seen from the results, the morning traffic generated from the proposed SURTASS facility would flow counter to the major traffic volumes utilizing the subject intersection. The through movement from Waimano Home Road to Lehua Avenue is identified as the most affected by the project. The average delay for this movement is expected to increase from 46.7 seconds per vehicle to 53.9 seconds per vehicle. However, the overall level-of-service for both this movement and for the approach is expected to remain unchanged. The eastbound and westbound turning movements from Kamehameha Highway onto Lehua Avenue would experience no discernable increase in average vehicle delays. Vehicle to capacity ratios, average delay by lane group, and the corresponding LOS for individual lane movements during the morning target hour incorporating additional traffic generated by the proposed SURTASS facility are shown in Table 5-3.

Different network assignment percentages were utilized for the homeward afternoon traffic from the proposed SURTASS facility. As both the eastbound and westbound H-1 Freeway access points can be reached via Waimano Home Road, a majority of the project traffic will utilize the Lehua Avenue through movement. It was also assumed that a small percentage of employees would be diverted from their normal homeward path in order to utilize the services contained in the Pearlridge area. Therefore, the afternoon traffic was assigned to the turning movements on Lehua Avenue in the following manner:

15% Left turn onto Kamehameha Highway to return to Ewa/Waipahu area, H-1 west, and H-2 north;

20% Right turn onto Kamehameha Highway to go to Pearlridge area; and,

65% Through movement to Waimano Home Road to reach H-1 Freeway.

Vehicle to capacity ratios, average delay by lane group, and the corresponding LOS for individual lane movements for afternoon traffic volumes incorporating additional traffic generated by the proposed SURTASS facility are shown in Table 5-4.

The proposed SURTASS facility will have no significant impact upon the overall level-of-service of the subject intersection, although individual movements will experience slightly increased average delays. Specifically, the average delay for the through movement to Waimano Home Road is anticipated to increase from 46.8 seconds per vehicle to 64.8 seconds per vehicle due to the project. However, it must be remembered that the assumptions utilized in this analysis represent the worst possible case, i.e.; every employee driving, and every employee leaving the facility during a short time period. Vehicle to capacity ratios, average delay by lane group, and the corresponding LOS for individual lane movements during the afternoon target hour incorporating the additional traffic generated by the proposed SURTASS facility are shown in Table 5-4.

Within the naval housing facility, the proposed project traffic is not anticipated to significantly impact the level-of-service of Lehua Avenue. Morning hour left turns from Lehua Avenue to the project access road would not be expected to face such large conflicting traffic volumes as to cause queuing along Lehua Avenue. However, some minimal queuing at the sentry point during the morning hour could be expected.

5.13.1.3 Summary

The proposed SURTASS project has the potential to add an additional 178 vehicles to the morning and afternoon work-related traffic volumes. Anticipated levels-of-service along existing internal naval base roads are not expected to be significantly changed; however, some queuing should be expected at the entrance gate in the morning due to security clearance procedures.

Given the contraflow aspects of the traffic generated by the proposed project, no significant impacts to the approaches of the intersection of Kamehameha Highway with Lehua Avenue and Waimano Home Road are projected as a result of this project. However, it should be recognized that the level-of-service along Kamehameha Highway will be generally poor during the peak hours due to non-project related regional traffic. Project-related traffic represents only a 4 percent increase in overall morning traffic volumes traveling through the intersection and only a 3 percent increase in afternoon traffic volumes. With these small increases in overall volumes and only small increases in anticipated average delays, no special mitigation measures to alleviate project-related impacts are considered necessary.

Table 5-3

1993 Traffic Conditions With SURTASS - AM Target Hour

Intersection of Kamehameha Highway
with Waimano Home Road and Lehua Avenue

Direction	Lane Group	V/C Ratio	Delay (secs/veh)	LOS	Approach Delay	Approach LOS
Kamehameha Hwy						
Eastbound	Left	1.257	*	*	*	*
	Thru/Right	0.852	33.7	D		
Westbound	Left	0.608	54.6	E	42.6	E
	Thru/Right	0.495	40.1	E		
Lehua Avenue						
Northbound	Left	0.472	47.4	E	28.3	D
	Thru	0.415	46.5	E		
	Right	0.178	3.9	A		
Waimano Home Road						
Southbound	Left	0.474	47.4	E	24.8	C
	Left/Thru	0.717	53.9	E		
	Right	0.423	5.1	B		
Intersection		1.070	*	*		

* Delays and LOS meaningless with v/c ratios greater than 1.20

Table 5-4

1993 Traffic Conditions With SURTASS - PM Target Hour

Intersection of Kamehameha Highway
with Waimano Home Road and Lehua Avenue

Direction	Lane Group	V/C Ratio	Delay (secs/veh)	LOS	Approach Delay	Approach LOS
Kamehameha Hwy						
Eastbound	Left	1.126	121.4	F	58.1	E
	Thru/Right	0.509	25.3	D		
Westbound	Left	1.128	152.1	F	*	*
	Thru/Right	1.739	*	*		
Lehua Avenue						
Northbound	Left	0.705	53.8	E	46.0	E
	Thru	0.859	64.8	F		
	Right	0.136	3.7	A		
Waimano Home Road						
Southbound	Left	0.444	46.9	E	23.0	C
	Left/Thru	0.720	54.1	E		
	Right	0.505	5.8	B		
Intersection		1.450	*	*		

* Delays and LOS meaningless with v/c ratios greater than 1.20

In addition, the traffic generated from the proposed project is not expected to significantly impact the internal road network of the housing facility. Low existing traffic volumes along Lehua Avenue within the facility would present no conflicts to the morning left-turn or the afternoon right-turn movements to and from the project area. The traffic generated from the proposed project will have no significant impact on school-related activities or safety concerns.

5.13.2 ELECTRICAL SERVICE IMPACTS

An existing 11.5 kilovolt (KV) primary feeder from the Hawaiian Electric Company's (HECO) Waiau power plant services the Pearl City Peninsula. HECO is unable to meet the estimated 500 KVA demanded by the SURTASS Support Center and the 4 MVA demanded by SURTASS pierside projects with the existing feeder. HECO will construct a 10 MVA substation at the entrance to the Pearl City Peninsula. HECO's primary feeder to the new 10 MVA substation will be from HECO's 46 kV distribution system. The existing 11.5 kV feeder which is serving the existing Navy load will be disconnected and reconnected to the 10 MVA substation. The 10 MVA substation will be adequate to support the SURTASS projects and the existing Navy loads.

5.13.3 WATER SERVICE IMPACTS

The water delivery requirements (delivery capacity) for the SURTASS Support Center, MILCON P-417, are 130 gallons per minute (gpm) for domestic use, and 1,175 gpm for fire service.

Water to the SURTASS Support Center site will be provided by connecting a new 10-inch water line to the existing 12-inch water main running parallel to the existing Naval Supply Center road. The new 10-inch waterline will branch off into two 8-inch fire water laterals and one 4-inch potable water lateral which will service the new building. The two fire laterals will be provided to meet fire protection requirements. There are adequate number of fire hydrants to meet the exterior fire protection requirements. A water meter will also be installed with the 4-inch water lateral.

The 10-inch water line will be designed for the fire line flow of 1,175 gallons per minute (gpm) at 48 pounds per square inch (psi). The 4-inch line for potable water will be designed for 130 gpm at 48 psi.

Heaviest water usage for the facility is associated with washing of equipment. However, inasmuch as this facility is a replacement of an existing water consumer, little increase in overall water demand is expected from the proposed project and is not anticipated to have a significant impact upon the existing Navy water system. Flow and pressure tests have been done on the existing Navy water system and the proposed project is not anticipated to have a significant impact on the Navy water supply.

The SURTASS Support Center Berthing Pier, MILCON P-422, is currently in the planning stages and the exact water delivery requirements are not available. The closest existing water line is a 6-inch water main located within the wetland, just north of the proposed

project. A new 8-inch line is planned just south of the wetland and would tie into the existing 12-inch water main that runs parallel to the existing Naval Supply Center road. This 8-inch line would go to the berthing pier site and its capacity would be 1400 gpm.

5.13.4 SEWAGE/SOLID WASTE IMPACTS

Domestic sewage from the proposed SURTASS Support Center building will consist of domestic flows from toilet facilities and an employees lounge. The only industrial flow will be from the array maintenance area. Disposal of industrial waste is discussed under section 5.12.4 of this chapter. The domestic waste will be serviced by a new 6-inch sewer line that will be connected to the existing 6-inch gravity sewer system servicing existing buildings 723 to 725 (south of the new building). The sewer will then be routed by the existing system to the sewer lift station number 783 and be pumped to the closest manhole located on the northwest side of the building. The manhole ties into the Honouliuli Sewage System once it is off military property.

The newer T-AGOS class ships and the new SWATH class ships have a Marine Sanitation Device on board that treats the ships' effluent. The treated effluent can then be dumped into the ocean whether out at sea or in the harbor, in accordance with Coast Guard regulations. If the Marine Sanitation Device is inoperable or is undergoing maintenance, then the ship would hook up to the pier sewage connection. The T-AGOS class ship has a 400-gallon sewage holding tank that can be pumped at 100 gpm at 40 psi. The SWATH class ship has a 700-gallon sewage holding tank that can be pumped at 60 gpm at 50 psi.

The older T-AGOS class ships do not have a Marine Sanitation Device, and must therefore utilize the pier sewage connection. This class ship has a 4,102-gallon capacity holding tank that can be pumped at 100 gpm at 40 psi.

The maximum sewage flow at any time from the berthed ships is estimated at approximately 4,500 gpd. The ships will pump sewage to a new lift station, to be located north of the SURTASS Support Building, via a new pierside six-inch line. The new lift station will have a capacity of 200 gpm and will tie into the Honouliuli Sewage System.

Solid waste associated with the project would be included within the existing pick-up and hauling contract. As this is a replacement facility, no significant amount of additional solid waste generation is anticipated. The proposed project, therefore, would not significantly impact the solid waste disposal services.

Solid waste associated with the project would be included within the existing pick-up and hauling contract. As the SURTASS Support Center is a replacement facility, no significant amount of additional solid waste generation is anticipated. However, solid waste generation from the berthed ships could have a minimal increase over the existing conditions. At the current SURTASS pier facilities, two monohull class ships can berth simultaneously. The new pier facility will allow three SWATH class ships to berth simultaneously. Also, monohull class ships have a maximum crew of 26; SWATH class ships have a maximum crew of 45. At any given time at the new facility, three ships could be berthed with a maximum of 135 crew members. In terms of solid waste generation,

this increase in crew members in port would represent a minor increase in solid waste generation over existing conditions. The proposed project is not expected to significantly impact the solid waste disposal services, based on a maximum personnel loading change of 52 to 135 crew members.

5.14 PUBLIC SERVICES IMPACTS

5.14.1 MEDICAL SERVICES IMPACTS

The military is responsible for providing healthcare services to its personnel and dependents. Navy families receive both inpatient and outpatient care at Tripler Army Medical Center. Services are also provided at Pearl Harbor Naval Base clinics and dispensaries. Active duty personnel are required to use military healthcare facilities. In addition, military dependents have the option of going to private providers and being partially reimbursed for the cost.

Emergency health care services for civilian personnel or contractors are provided by healthcare facilities in the area. St. Francis Medical Center West, located in Ewa Beach, is the largest health care facility in the immediate area of the proposed project capable of handling emergencies from the project area. This facility has an ambulance base station and a helicopter pad, which can transfer patients to Queens Medical Center. Other healthcare facilities in the area include Pali Momi Medical Center, Aiea, and Wahiawa General Hospital, Wahiawa.

The proposed development will have no significant impact upon healthcare services in the project area.

5.14.2 FIRE PROTECTION IMPACTS

Fire protection for the proposed project will be provided by the Federal Fire Department. In the event of an emergency, first response would be from Station 5, 68 Acacia Road, Pearl City. Mutual aid would be provided by the Honolulu City and County Fire Department - Pearl City Fire Station.

5.14.3 POLICE PROTECTION IMPACTS

The proposed project site is under Federal jurisdiction; therefore, Federal authorities are normally responsible for providing all needed police service. According to the Naval Station Security Department, Pearl Harbor Police Division, the proposed development should have no direct impact on the ability to provide police protection to the area.

The City and County of Honolulu Police Department is responsible for traffic control in the areas around the proposed project site. The nearest police station is located in Pearl City.

5.15 INDIRECT EFFECTS AND THEIR SIGNIFICANCE

Construction of the proposed SURTASS project would have no adverse impacts upon the environment. Positive impacts would include additional space to adequately perform the mission of the group and a consequent increase in effectiveness.

5.16 POSSIBLE CONFLICTS BETWEEN PROPOSED ACTION AND THE OBJECTIVES OF FEDERAL AND STATE LAND USE POLICIES, PLANS AND CONTROLS

5.16.1 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

This document has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1972, and the Council of Environmental Quality Regulations.

5.16.2 ARMY CORP OF ENGINEERS PERMIT

The permit program of the Army Corps of Engineers is based on the following Acts of Congress.

- *Section 401 Clean Waters Act*, which requires Water Quality Certification prior to completing the Army Corps of Engineers permit.
- *The River and Harbors Act*, which prohibits any unauthorized construction in the navigable waters of the U.S.
- *The Marine Protection, Research and Sanctuaries Act*, that regulates the transportation of dredged material for the purpose of dumping in ocean waters.
- *The Federal Water Pollution Act*, which governs the disposal of dredged or fill material in waters of the U.S.
- *The National Environmental Policy Act*, which encourages productive and enjoyable harmony between man and his environment.
- *The Fish and Wildlife Act*, which requires the Corps of Engineers to coordinate permit applications with State and Federal wildlife agencies.
- *The National Historic Preservation Act*, which requires Corps of Engineers coordination on matters of historic preservation. The Section 106 regulations of the Act, which were revised in 1986, must be followed (CFR Part 800). This includes reporting to the Advisory Council for Historic Preservation, holding public information meetings, and explicit considerations of alternatives. In addition, *The 1979 Memorandum of Agreement with the Advisory Council on Historic Preservation* requires that State Historic Preservation Officer be consulted on all activities that affect Category 1 structures listed in the Historic Preservation Plan

and on all new construction to mitigate adverse impact. In 1974, Naval Base Pearl Harbor was listed in the National Register of Historic Places. It is also designated as a National Historic Landmark. The Section 106 process, therefore, is applicable to the proposed project.

Section 106 applies not only to those properties listed on the National Register of Historic Places but to properties that meet specified eligibility criteria. This could include properties that have not been listed and even those that have not yet been discovered, especially in the case of archaeology. In Hawaii, Section 106 review is carried out by the Historic Preservation Division on behalf of the Historic Preservation Officer, State Department of Land and Natural Resources.

The only archaeological feature in the proposed project site is a fish pond that was entirely covered by hydraulic filling in the 1940s to form the Victor Dock. Prior to construction of the proposed project, data recovery will be done via soil borings to obtain more information on the fish pond. There are no other archaeological resources or historic properties associated with the proposed project.

- *The Endangered Species Act*, which requires assurance the actions taken do not jeopardize the continued existence of endangered and threatened species.

- *The Coastal Zone Management Act (CZMA)*, requires that all Federal activities directly affecting the coastal zone be conducted in a manner consistent, to the maximum extent practicable, with the State's coastal management program. The CZMA specifically excludes lands held by the federal government from the coastal zone act. The proposed project will be confined to Pearl Harbor which is federal property and will have no affect on any land or water use or natural resource of the State's coastal zone.

The berthing pier project, MILCON P-422, is subject to review for consistency with the above Acts of Congress. Therefore, a permit from the Corps of Engineers will be required for the SURTASS berthing pier.

Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the U.S., including cofferdams, abutments, foundation seals, piers and temporary construction and access fills, are permitted under the Corps nationwide authority, 33 CFR 330.5 (a) (15), provided such discharges have been authorized by the Coast Guard as part of the bridge permit.

5.17 ENVIRONMENTAL EFFECTS OF ALTERNATIVES

Alternatives to the proposed action include no-action, Ford Island site alternative, or the Bishop Point site. (See Chapter 3 for more details.)

The SURTASS facility at Bishop Point would remain unchanged with the no-action alternative. The facility was designed for six SURTASS ships and lacks the administrative

and operational space to support the expanded fleet of 14 surveillance ships or to maintain the new 250-foot array modules. Therefore, no-action is not a feasible alternative.

The proposed action, the Ford Island alternative, and the Bishop Point alternative would all include the same MILCON projects, P-417--SURTASS Support Center and P-422--Pier Facility as described in Section 3.2 of this document; the alternative actions differ only in their locations. Differences in environmental effects include the following points:

- Proposed Action. No significant adverse environmental effects as a result from the proposed action. The only archaeological feature in the proposed project site is a fish pond that has been entirely covered by hydraulic fill deposited in the 1940s. Data recovery will be accomplished by soil borings. Should any other historic or culturally important finds be identified during the construction phase, work would stop until such finds could be thoroughly examined and their significance determined. Nearby wetlands will not be impacted; dredging is not required. There are no unique or endangered flora or fauna.

- Ford Island. The Ford Island alternative would include replacement of the existing pier F-10 for the SURTASS pier and would have the potential to affect the nearby U.S.S. Utah Memorial. In addition, until the Ford Island Bridge Plan is built, there would be more traffic on the ferry transporting SURTASS support personnel to the site. There is no unique or endangered flora or fauna.

- Bishop Point. The Bishop Point alternative could potentially interfere with on-going SURTASS operations during the construction of new dockside facilities and dredging operations. In addition, the pier improvements and an increase in SURTASS activities in the surrounding waters could potentially impede entry to Pearl Harbor. There is no land available at Bishop Point to accommodate the required expansion, without displacing existing land uses.

5.18 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF ALTERNATIVES

Short-term energy requirements would be lowest for the no action alternative and highest for the proposed alternative, because of construction energy requirements. Long-term energy consumption is not anticipated to be affected by the proposed action.

5.19 IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS

The proposed project would involve the irretrievable loss of fiscal resources, as well as labor and materials expended during construction. The site could no longer be used for staging during special military exercises. The vacant site on the Pearl City Peninsula would be lost to future alternative uses.

5.20 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

The site of the proposed project is currently unused and vacant; however, the site is occasionally used to stage equipment for loading onto ships during exercises held a couple times per year. As such, it is productive only in its capacity as a habitat for some common bird and mammal species found in the area and as open space. Construction of the project will cause the site to lose its ability to serve in these capacities.

Bordering the southern edge of the project site is a warehouse structure utilized by the Army. An existing boat ramp and two adjacent parcels of land, located at the north side of the site, are also presently utilized by the Army.

The Army's use permit for the boat ramp and adjacent staging area would be revised to allow for SURTASS landside and dockside improvements. As an option, the area adjacent to Building 710 is being considered for use by the Army. Relocation of the boat ramp to this area is included in the proposed project.

The construction of the proposed SURTASS Support Center and pier facilities will provide the needed facilities to meet the future loading requirements and mission of the group.

The former SURTASS berthing area and support facility at Bishop Point will be turned over to Naval Station Pearl Harbor to accommodate shore facility needs at that time.

5.21 URBAN QUALITY, HISTORIC/CULTURAL RESOURCES, AND THE DESIGN OF THE BUILT ENVIRONMENT

Construction of the proposed SURTASS Support Center and pier facilities would result in the clearing of all natural vegetation on the site and its replacement with pavement and structures. In addition, piers would be constructed into Pearl Harbor.

The only archaeological feature in the proposed project site is a fish pond that was entirely covered by hydraulic filling in the 1940s to form the Victor Dock. Prior to construction of the proposed project, data recovery will be done via soil borings to obtain more information on the fish pond. There are no other archaeological resources or historic properties associated with the proposed project. Resources of the Historic Landmark will not be affected.

5.22 CUMULATIVE IMPACTS

The proposed construction of the proposed landside and dockside SURTASS facilities causes no significant cumulative adverse impacts.

5.22.1 ARCHAEOLOGICAL RESOURCES

The only archaeological feature in the proposed project site is a fish pond that has been entirely covered by hydraulic fill in the 1940s. Prior to construction, data recovery will be done via soil borings.

5.22.2 FLORA AND FAUNA

No plants or animals listed on, or candidates for, threatened or endangered status were identified.

The development of the SURTASS Support Center and pier facilities will not disturb the large Rhizophora/Batis wetland about 100 meters from the northern boundary of the study site.

5.22.3 INFRASTRUCTURE

- Projected project related traffic will slightly aggravate an already unsatisfactory condition on Kamehameha Highway in the area of Lehua Avenue.

- An existing 11.5 kilovolt (KV) primary feeder from the Hawaiian Electric Company's (HECO) Waiau power plant services the Pearl City Peninsula. HECO is unable to meet the estimated 500 KVA demanded by the SURTASS Support Center and the 4 MVA demanded by SURTASS pierside projects with the existing feeder. HECO will construct a 10 MVA substation at the entrance to the Pearl City Peninsula. HECO's primary feeder to the new 10 MVA substation will be from HECO's 46 kV distribution system. The existing 11.5 kV feeder which is serving the existing Navy load will be disconnected and reconnected to the 10 MVA substation. The 10 MVA substation will be adequate to support the SURTASS projects and the existing Navy loads.

- Water to the SURTASS Support Center will be provided by a new line connecting to an existing water main, which runs parallel to an existing NSC road. The new line will branch off into fire water laterals and potable water laterals.

  The SURTASS Support Center Pier Facility is currently in the planning stages and the exact water delivery requirements are not available. The closest existing water line is located within the wetland just north of the proposed project. A new line is planned just south of the wetland and would tie into the existing water main that runs parallel to the existing Naval Supply Center road. This line would go to the berthing pier site and its capacity would be 1400 gpm.

- Domestic sewage from the SURTASS Support Center is estimated at 49,000 gpd. The domestic waste will be serviced by a new line that will connect to the existing gravity sewer system which ties into the Honouliuli Sewage System. When the ships are berthed and are not capable of treating their own effluent,

either because they do not have a Marine Sanitation Device or the Device is inoperable, the ship would hook-up to the pier sewage connection. The ships will pump the sewage to a new lift station to be located north of the Support Center. The new lift station will tie into the Honouliuli Sewage System.

5.22.4 PUBLIC SERVICES

The proposed development will not have any cumulative impacts to the areas' public services including medical, fire, and police protection.

5.23 MEANS OF MITIGATING POTENTIALLY ADVERSE EFFECTS

No significant adverse effects as a result of this proposed project were identified. Construction impacts can be mitigated through the use of proper and approved construction techniques. The only archaeological feature in the proposed project site is a fish pond that has been entirely covered by hydraulic fill in the 1940s. Prior to construction data recovery will be done via soil borings. Should any other historic or culturally important finds be identified during the construction phase, work would stop until such finds could be thoroughly examined and their significance determined. Traffic conditions on Kamehameha Highway would not be significantly affected by the project.

5.24 ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED/UNRESOLVED ISSUES

The proposed construction of either the landside or dockside SURTASS facilities on the Pearl City Peninsula site is not anticipated to produce any adverse environmental effects requiring mitigation. Impacts are anticipated to be short-term in nature, related to construction, and easily mitigated through the use of accepted construction techniques as outlined by City and County of Honolulu and State of Hawaii regulations. No unresolved issues were identified connected with this project.

CHAPTER 6

BIBLIOGRAPHY

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BIBLIOGRAPHY

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CHAPTER 7

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APPENDIX A

WATER QUALITY AND MARINE FAUNA

BASELINE ASSESSMENT OF THE MARINE ENVIRONMENT IN THE VICINITY OF THE NAVY SURTASS FACILITY PROPOSED FOR THE PEARL CITY PENINSULA IN PEARL HARBOR

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August 30, 1991

PURPOSE

The proposed SURTASS Support Center includes construction of a new pier facility and related dockside improvements to complement a new 86,600 square foot shore facility. One proposed project site is on the Pearl City Peninsula located between Pearl Harbor's Middle and East Lochs. The 1,000 foot by 600 foot project site is situated along the eastern shore of the peninsula with an overgrown wetland area to the north and storage structures at its southern extent.

A primary concern in the planning of the project is protection and preservation of the existing environmental quality of the area, particularly the marine environment. In order to identify and mitigate at an early stage any potential problems that may be associated with construction activities a survey was conducted offshore of the project site. The area of investigation included the sites for the new pier and the relocated boat ramp, as well as the areas likely to be dredged in the vicinity of the piers. The survey consisted of a quantitative evaluation of water chemistry and macrobiotic community structure, and a qualitative evaluation of the physiographic setting. Because the predominant substrata consisted of soft sediment, biotic community structure analyses consisted of investigation of benthic infaunal communities. A separate report prepared by the AECOS environmental laboratory describes the infaunal communities at the proposed SURTASS site. The surveys described below were conducted prior to any construction activities and serves as part of the establishment of the preconstruction conditions. These survey are also designed to serve as the initial phase of any ongoing monitoring programs that might be required during future phases of the project.

METHODS

Underwater reconnaissance surveys of the nearshore marine environment were conducted by divers swimming the length of the shoreline shown in Figure 1. Following the reconnaissance, three sampling stations fronting the proposed SURTASS support facility on the Pearl City Peninsula were selected. Station 1 lies closest to the northern edge of the site extending out from the wetlands area; Station 2 lies off the northern edge of the existing boat ramp and at the proposed location of the new pier; Station 3 lies to the south of the proposed pier location and off of the existing warehouse structures (see Figure 1).

Water quality was evaluated at each station on transects that extended from the shoreline to approximately 200 meters (m) offshore. All transects were oriented perpendicular to the shoreline of the peninsula; Transects 2 and 3 were thus parallel to the proposed site of the new pier whereas Transect 1 was at a slight angle to the new pier site. Water samples were collected at five locations along Transects 1 and 2 and at four locations along transect 3. Such a sampling scheme was designed to span the greatest range of variation with respect to material input from shore. With the exception of the 2 m station on Transect 1, samples were collected at two depths; a surface sample was collected within approximately 10 centimeters (cm) of the sea surface, and a bottom sample was collected within approximately 1 m of the sea floor.

All field work was conducted on August 2, 1991, working from a small boat. Water quality constituents that were evaluated included the specific criteria designated for the Pearl Harbor Estuary in Chapter 11-54, Section 05 (Inland waters) of the State of Hawaii, Department of Health (DOH) Water Quality Standards. These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen (NO_3^- + NO_2^-), ammonium (NH_4^+), total phosphorus (TP), chlorophyll a (Chl a), turbidity, temperature, pH, and salinity. In addition, orthophosphate phosphorus (PO_4^{-3}) and silica (Si) were also reported because these parameters are sensitive indicators of biological activity and the degree of groundwater mixing.

Water samples were collected by opening 1-liter polyethylene bottles at the desired depth. Subsamples for nutrient analyses were immediately placed in 125-milliliter (ml) acid-washed, triple rinsed, polyethylene bottles and stored on ice until returned to the laboratory. Analyses for NH_4^+, PO_4^{3-}, and NO_3^- + NO_2^- (hereafter termed NO_3^-) and Si were performed using automated techniques on a Technicon Autoanalyzer. Total nitrogen (TN) and total phosphorus (TP) were analyzed in a similar fashion following digestion. Dissolved organic nitrogen (DON) and dissolved organic phosphorus (DOP) were calculated as the difference between TN and dissolved inorganic N, and TP and dissolved inorganic P, respectively. The chemistry procedures were performed according to standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983).

Water for other analyses was subsampled from 1-liter polyethylene bottles and kept chilled until analysis. Turbidity was determined on 60-ml subsamples fixed with $HgCl_2$ to terminate biological activity. Fixed samples were kept refrigerated until turbidity was measured on a Monitek Model 21 90-degree nephelometer, and reported in nephelometric turbidity units (NTU) . Chl a was measured by filtering 300 ml of water through glass fiber

filters; pigments on filters were extracted in 90% acetone in the dark at -5° C for 12-24 hours, and the fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer. Salinity was determined using an AGE Model 2100 laboratory salinometer with a readability of 0.0001 °/₀₀.

In-situ field measurements included profiles of salinity, temperature, and depth measured with an Ocean Sensors Model 100 CTD. Profiles were acquired at each site where water samples were collected with the exceptions of Station 1 at 2 m and Station 3 at 5 m where water depth was too shallow for the instrumentation. pH was determined in the field with a Cole-Parmer Digisense millivolt meter with a readability of 0.001 pH units.

RESULTS

Physiographic Structure

Pearl Harbor is a true coastal plain estuary with its main channel and lochs formed from the drowned valleys of a river and its tributary streams. The morphology of the Harbor has been altered by marine erosion, sedimentation and extensive dredging of channels to depths adequate for passage of large ships. The watershed draining into Pearl Harbor constitutes approximately 20% of the land area of the Island of Oahu (Morris et al. 1973).

Most of the shoreline and physical composition of the Harbor bottom is relatively homogeneous in the vicinity of the SURTASS site. The shorelines appear to be excavated or dredged, and are formed from concrete buttresses along the southern region of the survey area. The shallowest areas adjacent to the shoreline consists of coarse sand and rubble bottoms littered with aggregations of shell fragments. The only macroinvertebrate observed in the nearshore zone was an occasional gelatinous sea cucumber *Ophiodesoma spectabilis*, a species that is commonly found in areas of high organic particulate input. No benthic algae was observed along any of the shoreline shallows.

It should be noted that the nearshore environment in the vicinity of the SURTASS facility differs significantly than other areas of Pearl Harbor. In regions such as off Ford Island, a shallow nearshore flat borders the shoreline. The nearshore flat is covered in large part by a carpet of benthic algae, primarily of the genera *Caulerpa*, *Acanthophora*, *Hypnea*, and *Ulva*. Most of the algal mats are covered with a thin layer of silt, which is finer grained than the sediment found in the zone near shore. Predominant fauna include *O. spectabilis*, as well as

various sponges. In some areas, the bottom is covered with "reefs" composed of aggregations of bound sand-grain tubes of Sabellid (feather-duster) worms. The algal mud zone extends to a depth of approximately 8 feet. Such structure was not observed at any location near the SURTASS facility.

Beyond the shoreline along the entire width of the SURTASS site, the bottom slopes sharply to a depth of approximately 10 m to the channel floor. Bottom composition of the channel floor consists of fine mud. This material is primarily of terrigenous origins and is delivered to Pearl Harbor through stream input. Because of the fine sediment size, and relative low water motion on the channel floor, any introduced stirring results in substantial resuspension. The entire mud floor is pock-marked with burrow openings from various arthropods. Probing for core samples in the mud bottom indicated that the fine-textured mud layer extends at least 6 feet below the sediment surface.

Water Chemistry

Horizontal Stratification

In general, water quality within Pearl Harbor cannot be considered typical of oceanic waters; rather it is influenced by four quantifiable inputs including fluvial inputs from several permanent streams, groundwater seepage, localized pollutants (tailwater overflow from sugarcane irrigation, runoff from urbanized areas, and shipyard operations), and oceanic mixing inward from the mouth of the Harbor.

Table 1 shows results of all marine water chemistry analyses for samples collected on August 2, 1991. Concentrations of eight dissolved nutrient constituents in surface and deep water samples are plotted as functions of distance from the shoreline in Figures 2. Values for salinity, turbidity, Chl a and temperature are shown in Figure 3.

It can be seen that several dissolved nutrient constituents in the surface waters (particularly Si, NO_3^-, and PO_4^{3-}) exhibit a decreasing trend moving from the shoreline of the Peninsula to a distance of approximately 50 m offshore (Figure 2). This decrease is particularly evident in NO_3^- concentrations which drop to below detectable limits within 50 m from shore (Stations 1 and 2) and within 100 m (Station 3). Total N and total P essentially reflect NO_3^- and PO_4^{3-} concentrations, respectively showing a slight decrease in concentration with increasing distance from the shoreline. Salinity shows the opposite trend; values increase with increasing distance from the shoreline (Figure 3). The pattern

of decreasing nutrient concentration and increasing salinity with distance from shore appears to be a result of mixing of low salinity groundwater with oceanic water. In many areas of the Hawaiian Islands low salinity groundwater, which contains high concentrations of Si, NO_3^-, and PO_4^{3-}, percolates to the ocean near the shoreline, resulting in a distinct nearshore zone of mixing. Although excess rain may also account for such patterns, the silicate concentrations are higher than usually found in rainwater and suggest that rainwater input is not a factor.

Aside from slightly elevated PO_4^{3-} concentrations at Station 1, there is no apparent trend among Station locations with respect to groundwater input. Therefore, it appears that groundwater flux is about equal along the entire shoreline of the proposed site.

Dissolved nutrient constituents that are not associated with groundwater input (NH_4^+, DON, DOP) do not show the same strong pattern with respect to distance from the shoreline (Figure 2). Concentrations of NH_4^+ are somewhat randomly scattered with no apparent relationship to distance from shore. NH_4^+ concentrations at Station 1 exhibit the widest fluctuation decreasing to below detectable limits at 50 m and again at 200 m from shore. DON and DOP concentrations remain relatively constant over the entire sampling range, and show no distinguishable difference in distribution with respect to the different transect locations.

Examination of other water chemistry constituents reveals no strong patterns. Chlorophyll a, turbidity and temperature values vary inconsistently with distance from shore and among station locations. While waters of Pearl Harbor are typically turbid, most values measured during the present survey were below 0.5 n.t.u., indicating that at the time of the survey water clarity was relatively high.

Vertical Stratification

Figures 2 and 3 also show concentrations of water chemistry parameters as functions of distance from the shoreline with respect to vertical stratification. It can be seen in Figure 2 that all of the samples which exhibit high concentrations of groundwater nutrients (Si, N, and P) and corresponding low salinities occur at the surface (Figure 3). Input of low salinity groundwater to the ocean creates a distinct buoyant surface lens which is evident throughout the sampling regime. Nutrient constituents not associated with groundwater (NH_4^+, DOP and DONI do not exhibit any discernible relationship with respect to vertical

stratification (Figure 3).

Temperature displays a distinct surface layer of warmer water throughout the sampling regime. In general, Chl a concentrations were higher in the deep samples than in the surface samples. Elevated chlorophyll concentrations at depth may indicate a higher phytoplankton activity as suggested by the very low to nondetectable NO_3^- concentrations in the deep water samples.

Continuous vertical profiles of salinity and temperature measured with a CTD at each of the sampling sites are shown in Figures 4 and 5, respectively. These profiles verify the patterns exhibited in the plots of surface and bottom samples (Figures 2 and 3). It can be seen in Figure 4 that the gradient of salinity at sampling sites 2 m and 15 m from the shoreline are greatest. Beyond 50 m from the shoreline, gradients in salinity are very small, and the water column is essentially homogeneous from the surface to the bottom (Figure 4).

Within the upper 4 m, temperatures at most sampling sites are elevated by 0.5° C or greater over the rest of the water column (Figure 5). The surface temperature elevation is likely a result of solar warming of the estuarine waters. At Station 1, the temperature gradient between surface and deep water follows a trend of a decreasing gradient with increasing distance form shore. At Stations 2 and 3 this trend is not as pronounced although the sampling sites farthest from shore generally have less surface temperature elevation than do sites located closer to shore. The decrease in the gradient with distance offshore is likely a result of mixing of surface and deep water by wind stress. With increasing depth in the water column, there is a gradual decrease in temperature at all sampling sites (Figure 5).

Compliance with DOH Criteria

Also shown in Table 1 are DOH water quality standards for the Pearl Harbor estuary. No chemical constituents measured on August 2, 1991 exceeded the DOH criteria for this area. Comparing the DOH limits and the data indicates that water quality at the SURTASS site does not even approach the most stringent limits. For instance, the highest measured NO_3^- (0.9 μM) is less than half the DOH limit (2.86 μM), while the highest measured turbidity (0.69 ntu) is an order of magnitude less than the DOH limit (8.0 ntu).

Evaluation of Potential Impacts

The single most dominant factor in Pearl Harbor with respect to the marine environment is the massive alteration to the ecosystem over the decades by the activities of man. Extensive dredging and alteration of the shorelines, as well as stream input draining urban and agricultural areas are the dominant physical factors influencing the marine environment throughout the harbor, including the vicinity of the SURTASS site. As a result, the existing environment cannot be considered a pristine habitat, and has historically been subjected to alterations similar to those encompassed in the proposed project.

The results of the present survey indicate several important points with respect to the proposed project. First, during the period of fieldwork, water chemistry constituents indicated that water quality could be considered "high" with respect to specific criteria established by the Department of Health. It is likely that water quality may change as a result of seasonal events, such as storm runoff during the winter season, but such alterations are likely to be temporary in nature. It appears likely that the proposed activity involving the construction of the SURTASS facility will not provide a significant source of further alteration of the chemical nature of the marine environment. Turbidity will undoubtedly increase as a result of construction activity, but such increases appear to already be an common occurrence throughout Pearl Harbor. There does not appear to be any indication that the project would result in conditions that would significantly reduce water quality to levels below acceptable DOH standards.

Examination of the biota in the area of the SURTASS facility indicates that the region is depauperate relative to even other locations in Pearl Harbor, much less undisturbed coastal sites in Hawaii. There is virtually no macrobenthos in the proposed construction area to be displaced or removed. Benthic infaunal analysis of the soft sediment indicates that the communities do not represent any unique or rare assemblages, and have lower abundances than other area of Pearl Harbor (see following report by AECOS). Thus, the organisms that are removed during dredging and construction are not likely to cause any overall alteration of community structure. It is also likely that all areas that are disturbed will be rapidly recolonized following construction activities.

In summary, as long as prudent construction practices are employed which prevent large scale qualitative changes to the marine environment, it does not appear that the proposed project has the potential to further alter the marine environment beyond the existing level.

SUMMARY

1. A baseline survey was conducted in August, 1991 at the proposed site of the Navy SURTASS support facility on the Pearl City Peninsula in Pearl Harbor. An underwater reconnaissance survey of the marine area fronting the site provided a description of the physiographic conditions of the underwater habitat. Twenty-seven ocean samples from three stations spanning the length of the proposed site, were analyzed for chemical criteria specified by DOH water quality standards. Benthic infauna were also evaluated at four locations as a component of the predominant substrata in the area.

2. Water chemistry constituents found in high concentrations in naturally occurring groundwater (NO_3^-, Si, PO_4^{-3}), and salinity exhibit patterns of both vertical and horizontal zonation throughout the sampling regime. These patterns indicate input of groundwater at the shoreline which forms a buoyant surface layer overlying a deeper layer of water with characteristics more typical of oceanic water.

3. Water chemistry parameters not directly associated with groundwater input exhibit various trends. Chl a and temperature showed no definite pattern with respect to horizontal zonation. Temperature was consistently higher in surface relative to deep samples presumably as a result of solar warming. Chl a was greater in the deep samples suggesting increased phytoplankton populations. Turbidity did not exhibit any significant patterns, and was consistently low throughout the site.

4. Vertical profiles reveal the distinct layering of surface water owing to input of groundwater (salinity) and solar warming (temperature). Gradients are strongest nearest to shore and decrease with distance from shore.

5. None of the measurements of chemical constituents exceeded, or are even near State DOH water quality standards. Based on these comparisons, water quality in the SURTASS site during the baseline study can be considered relatively high for Pearl Harbor.

6. There are no abundant macrobiotic assemblages in the nearshore environment fronting the project site. Infaunal analyses of the soft sediment of the harbor floor reveal no unique or unusual assemblages of meifauna. Abundance of benthic infauna species and individuals appears to be lower than other representative areas of Pearl Harbor.

7. On an overall basis, the marine environment of Pearl Harbor has been considerably influenced on a long-term basis by activities such as dredging and inputs from land. Based on the evaluations of water chemistry and biotic community structure, it appears that there are no marine environmental factors which are be likely to be further altered by the proposed project.

TABLE 1. Water chemistry parameters measured at the Suntass site on 8-2-91. Abbreviatio ns are as follows: surface = S; deep = D; distance from shore = DFS; below detection limit = BDL. DOH criteria are for Pea rl Harbor Estuary. For station locations, see Figure 1.

STATION NO.		DFS (m)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	DOP (µM)	DON (µM)	TP (µM)	TN (µM)	TURB (ntu)	SALINITY (o/oo)	CHL a (µg/l)	TEMP (deg C)	pH
S-1-	1S	2	0.17	0.48	0.12	45.79	0.19	8.35	0.36	8.95	0.42	32.854	1.00	27.9	8.13
	2S	15	0.17	0.42	0.15	41.27	0.17	6.28	0.34	6.85	0.64	33.120	0.72	27.9	8.19
	2D	15	0.14	0.06	0.21	34.03	0.17	6.30	0.31	6.57	0.61	33.432	1.19	27.9	8.21
	3S	50	0.14	0.20	BDL	33.12	0.17	6.51	0.31	6.71	0.43	33.504	0.45	27.8	8.21
	3D	50	0.10	BDL	BDL	14.12	0.19	6.29	0.29	6.29	0.29	34.337	0.80	26.9	8.23
	4S	100	0.09	BDL	0.06	22.26	0.18	6.37	0.27	6.43	0.38	33.999	0.82	27.5	8.21
	4D	100	0.10	BDL	0.09	13.21	0.20	6.06	0.30	6.15	0.44	34.413	1.00	26.7	8.23
	5S	200	0.04	BDL	BDL	20.45	0.20	6.29	0.24	6.29	0.39	34.123	0.84	27.4	8.23
	5D	200	0.09	BDL	0.09	13.21	0.17	5.92	0.26	6.01	0.37	34.409	1.00	26.8	8.23
S-2-	1S	2	0.10	0.90	0.15	54.48	0.19	6.36	0.29	7.41	0.49	32.489	0.86	27.9	8.19
	1D	2	0.11	0.03	0.18	25.88	0.18	6.64	0.29	6.85	0.69	33.861	1.00	27.5	8.22
	2S	15	0.13	0.20	0.12	34.93	0.17	6.67	0.30	6.99	0.48	33.449	0.94	28.0	8.21
	2D	15	0.09	BDL	0.09	15.57	0.17	6.20	0.26	6.29	0.46	34.338	1.00	26.9	8.23
	3S	*50*	*0.04*	*BDL*	*0.15*	23.17	0.17	6.00	0.21	6.15	0.41	33.980	0.76	27.5	8.23
	3D	50	0.09	BDL	0.15	14.66	0.18	5.86	0.27	6.01	0.42	34.353	0.94	26.9	8.23
	4S	100	0.06	BDL	0.12	23.17	0.18	6.17	0.24	6.29	0.35	34.033	0.51	27.5	8.24
	4D	100	0.09	BDL	0.12	14.12	0.20	6.31	0.29	6.43	0.34	34.383	0.74	26.8	8.23
	5S	200	0.07	BDL	0.21	23.71	0.20	6.64	0.27	6.85	0.34	34.054	0.74	27.7	8.23
	5D	200	0.11	BDL	0.12	15.93	0.19	7.29	0.30	7.41	0.51	34.334	0.41	26.8	8.23
S-3-	1S	5	0.13	0.56	0.15	44.89	0.17	6.56	0.30	7.27	0.49	32.991	0.51	27.7	8.20
	1D	5	0.11	0.06	0.15	26.79	0.18	6.22	0.29	6.43	0.38	33.871	0.67	27.2	8.22
	2S	50	0.09	BDL	0.15	28.60	0.18	6.00	0.27	6.15	0.32	33.816	0.82	27.7	8.22
	2D	50	0.10	BDL	0.18	15.93	0.20	5.97	0.30	6.15	0.35	34.362	1.00	26.9	8.23
	3S	100	0.07	0.45	0.12	35.48	0.22	6.70	0.29	7.27	0.30	33.815	0.74	27.7	8.23
	3D	100	0.09	BDL	0.12	15.57	0.18	6.31	0.27	6.43	0.41	34.388	0.78	26.8	8.23
	4S	200	0.07	BDL	0.09	25.52	0.19	6.48	0.26	6.57	0.42	34.008	0.55	27.9	8.22
	4D	200	0.10	BDL	0.15	15.02	0.16	6.70	0.26	6.85	0.36	34.393	1.13	26.9	8.23
DOH WATER QUAL. STNDS.															
NOT TO EXCEED 10%				2.86	1.43				4.16	39.29	8.00		10.00		
NOT TO EXCEED 2%				5.00	2.14				6.40	53.57	15.00		20.00		

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Strickland J. D. H. and T. R. Parsons. 1968. A practical handbook of sea-water analysis. Fisheries Research Bd. of Canada, Bull. 167. 311 p.

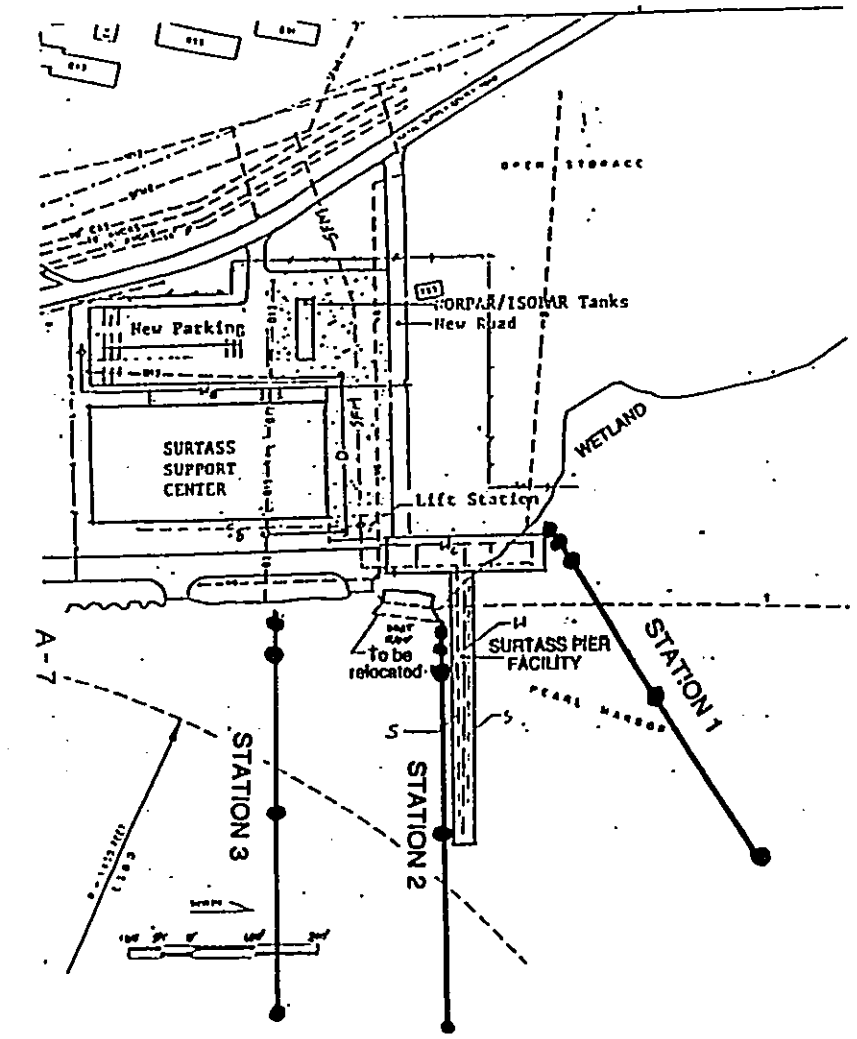

FIGURE 1. Map showing locations of water chemistry survey stations and sampling locations in Pearl Harbor at the Navy SURTASS Facility site. Also shown is the proposed location of new pier and relocation of boat ramp.

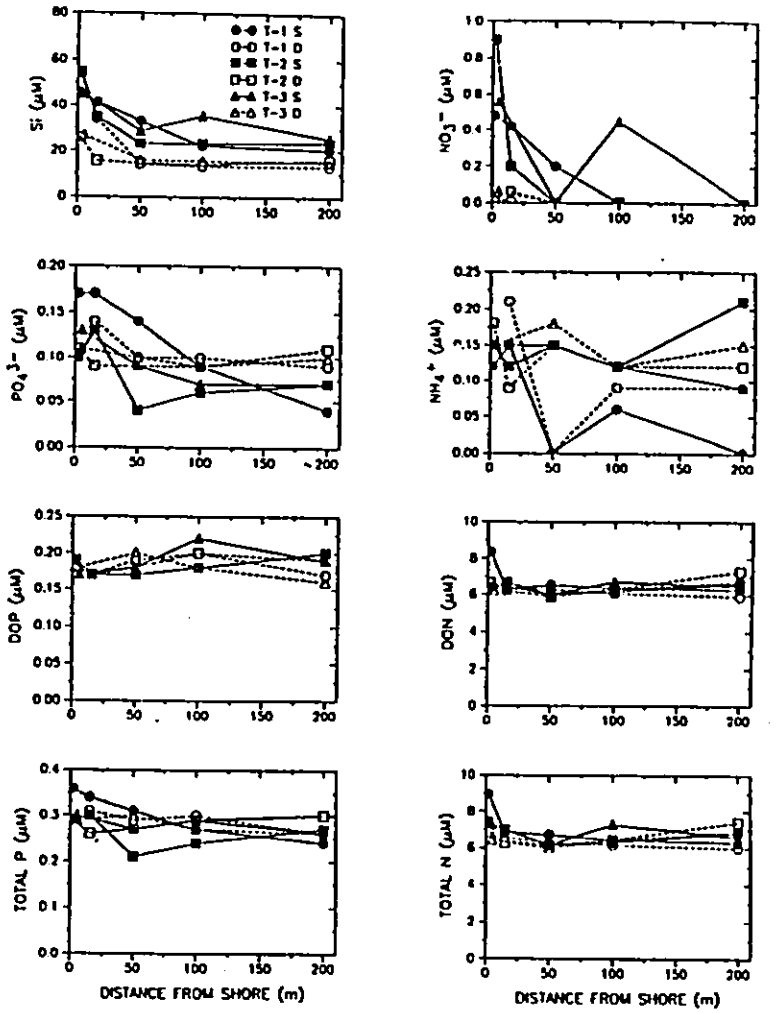

FIGURE 2. Plots of dissolved nutrient constituents at each station as functions of distance from the shoreline of the Pearl City Peninsula. "S" indicates surface sample; "D" indicates deep sample. For station locations, see Figure 1.

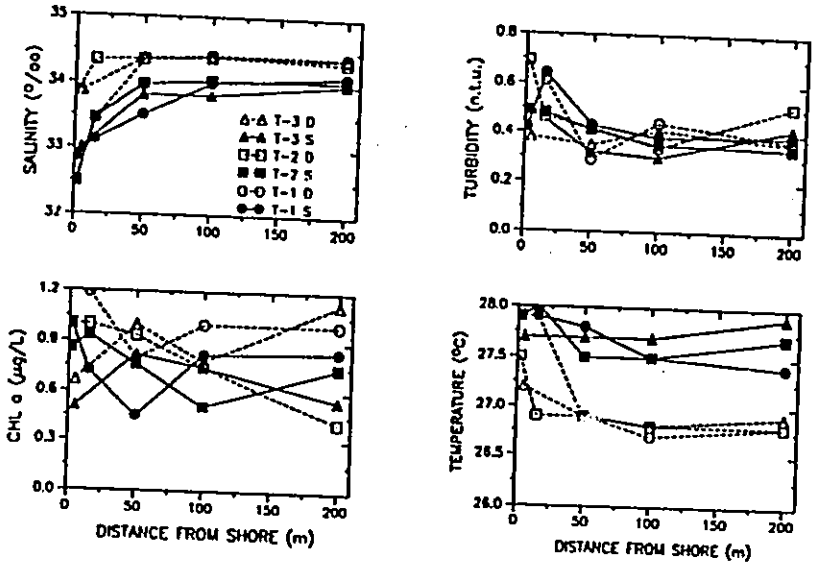

FIGURE 3. Plots of water chemistry constituents at each station as functions of distance from the shoreline of the Pearl City Peninsula. "S" indicates surface sample; "D" indicates deep sample. For station locations, see Figure 1.

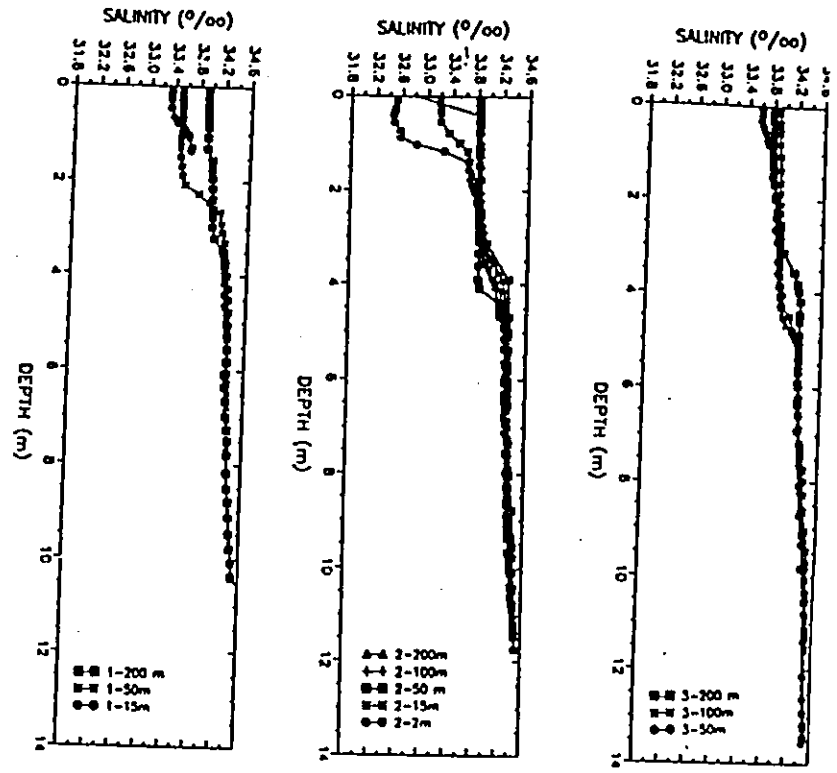

FIGURE 4. Vertical profiles of salinity at sampling sites 2 to 200 m from shore at Stations 1, 2, and 3. For station locations, see Figure 1.

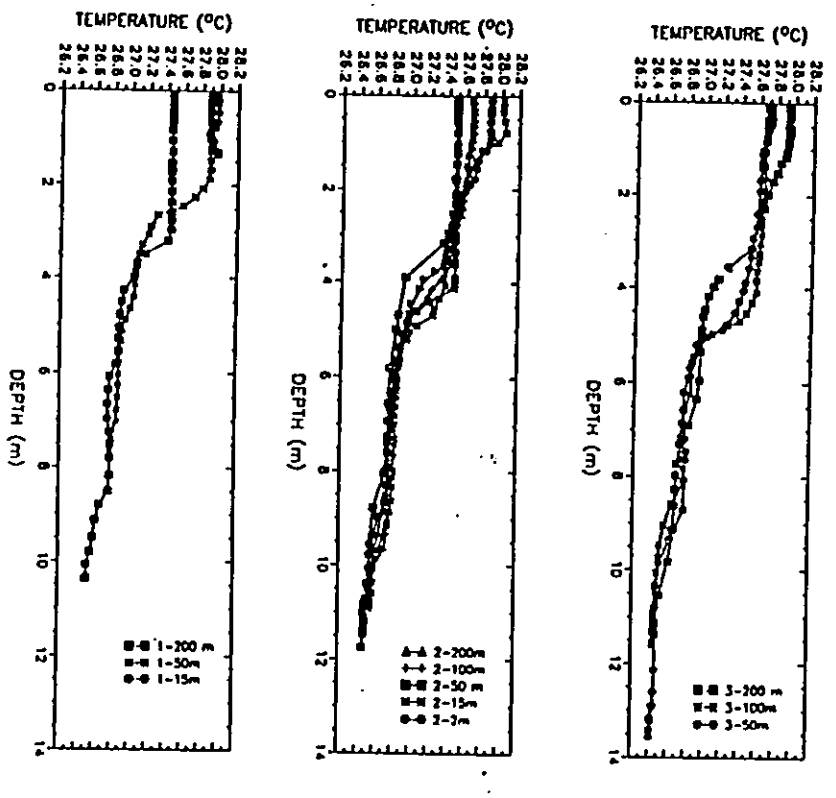

FIGURE 5. Vertical profiles of temperature at sampling sites 2 to 200 m from shore at Stations 1, 2, and 3. For station locations, see Figure 1.

AECOS No. 652

Benthic Infauna Sampling and Analysis off the Waiawa Peninsula in Pearl Harbor

A-10

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METHODS

Four locations were sampled in East Loch, Pearl Harbor along the east shoreline of the Waiawa Peninsula on August 2, 1991. Sampling locations are shown in Figure 1. At each location (labeled "A", "B", "C", and "D"), three sediment samples were obtained using a cylindrical coring device that was pushed by a diver into the bottom. The corer was then capped and brought to the surface, where the contents were immediately emptied into a container and wet sieved in the field through a 250 u (0.25 mm) mesh sieve. Care was taken to bring water into the sieve from below. Dilute formalin was added to the sediment and organisms retained on the screen, and the samples were returned to the laboratory for further processing. The coring device measured 6.5 cm in diameter and was pushed 10 cm into the sediment. Each sample thus covered 33.3 cm^2 of surface and captured about 330 cc of bottom material; the total volume obtained in the triplicate samples at each station was about 1000 cc.

In the laboratory, the samples were again sieved and washed through 500 and 250 u mesh screens, and all material retained in each size fraction inspected under a binocular microscope at 6 and 12 power. All organisms found were removed and transferred to vials containing 70 % isopropyl alcohol. This process was completed for two of the three samples collected at each station. The third sample was retained for future grain-size analysis and/or biological sorting.

The samples in each vial were later inspected at 25 to 50 power on the dissecting scope and/or wet-mounted for inspection at higher powers with a compound microscope. Identification or differentiation of each specimen encountered was made to a taxonomic group. Familiarity of the biologist with some groups, such as the polychaetes, allowed identification to genus in some cases. Specimens were retained for further taxonomic examination if requested.

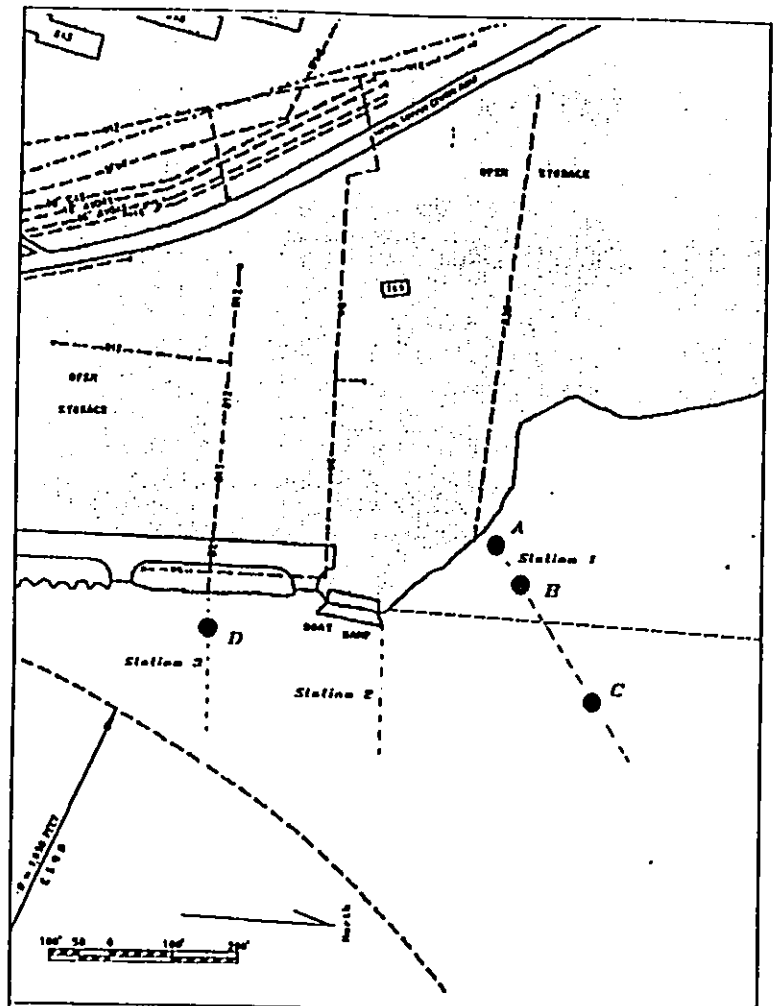

Figure 1. Location of sediment samples A through D in relation to the biological transect Stations 1-3.

RESULTS

The results of sorting the sediment organisms into broad taxonomic groups are given in Table 1 and summarized in Table 2. Note that the planktonic organisms (Chaetognatha in Sample B2) were not included in the summary. It is unknown how these became incorporated into the sample.

Some generalizations can be made concerning these samples. The average number of individuals (density of organisms) is greater in Samples A and D than in Samples B and C. Also, the average number of species is greater in Samples A and D than in Samples B and C. Samples A and D were located in the shallow water closest to shore and average sediment grain size (based on volume retained on the 0.250 mm mesh sieve) tended to be coarser than that of Samples B and C.

The paucity of crustaceans in Samples B and C accounts for much of the reduced species richness in the areas represented by these samples. Otherwise, the composition of the infauna is generally similar for all of the locations. The polychaete, Sternaspis sp., was found only at Station A, where it was abundant; the opheliid, Armandia sp., and the cossurid, Cossura sp., are perhaps the most typical representatives of the polychaete fauna.

If sample diversity is calculated using the formula

$$H' = -\sum p_i \ln p_i$$

where $p_i = N_i / N$ (Pielou, 1969),

for the each sample (the replicates combined), Sample B yields the highest calculated diversity (see Table 2). Although the number of species is one measure of diversity, the Shannon-Weiner index (H') combines species richness with a measure of the evenness of the distribution of individuals among the species based on information theory. Thus, the diversity by Shannon-Weiner index of Samples A and D is reduced in comparison with Sample B because a few species are particularly abundant in the former.

Table 1. Number of specimens by taxa in the sediment samples from East Loch, Pearl Harbor.

STATION:	1		1		1		3	
SAMPLE:	A		B		C		D	
REPLICATE:	1	2	1	2	1	2	1	2
NEMATODA	2	1	2				3	
COELENTERATA				1			1	
OLIGOCHAETA	2	3		1	1	6	1	5
POLYCHAETA								
Syllidae type 1 (Sphaerosyllis)				1				1
Spionidae	1			2			1	
Cirratulidae (?Tharyx)								1
Opheliidae (Armandia)	3	5	5		1		1	1
Cossuridae (Cossura)			2	2	1	1	32	
Capitellidae (Capitella)	1	1		1				2
Sternaspidae (Sternaspis)	4	14					3	
Indet (vermiform, non-Annelid)	1						1	
MOLLUSCA								
Macoma sp.		2	1			1	1	
CRUSTACEA								
OSTRACODA								
type 1		1		1			9	
type 2		1					4	
type 3							1	
COPEPODA								
Herpacticoida	11	11		3	1	3	15	
CUMACEA	3						2	
TANAIDACEA								
(Leptochelia)		1					4	1
MYSIDACEA[1]								1
AMPHIPODA								
Amphilochidae							1	
CHAETOGNATHA[1]				3				

1 - Ordinarily a planktonic organism.

Table 2. Summary of infauna populations from the proposed SURTASS site samples.

Sample:	A		B		C		D	
Replicate:	1	2	1	2	1	2	1	2
No. of individuals	28	40	10	12	4	11	80	11
Average count	34		11		8		46	
Individuals/m^2	10,200		3,300		2,400		13,800	
No. of "species"	9	10	4	8	4	4	16	6
Average number	10		6		4		11	
Diversity[1]	0.826		2.869		0.568		0.888	
Sediment remainder[2]	48	29	18	2	3	5	32	1
Percent silt/clay[3]	86	91	95	99	99	98	90	100
Average percent[3]	88		97		98		95	

1 - Shannon-Weiner diversity index calculated from combined replicates data.
2 - Volume of sediment remaining on 0.25 mm sieve in cc.
3 - Estimated from sediment remainder volume, assuming that the sample volume was 330 cc.

DISCUSSION

The organisms described here are quite small, falling into the classification of meiofauna in most cases. These organisms would be difficult to see with the naked eye. Largest in the present collection is Sternaspis sp., a short, stout worm measuring about 1.5 mm long by 0.8 mm wide (preserved) but reported (Baily-Brock and Hartman, 1987) to grow to 4 or 5 mm (less than 1/4 inch). The small annelids and crustaceans are the more abundant forms found in soft sediments (marine sands, silts, and clays) in Hawaii. Larger polychaetes and crustaceans do occur in this environment, but in much lower densities (numbers per unit area). A comparison of samples would require processing a considerable volume of sediment in order to obtain representative counts.

Of course, most abundant in these sediments are even smaller forms, including the nematodes, protozoans, bacteria, and fungi. However, these microscopic forms are difficult to count and identify without resorting to special techniques.

Studies of the small infauna found in Pearl Harbor sediments have been previously undertaken; more so in that embayment than almost anywhere else in Hawaii (NUC, 1974). The Naval Undersea Center (NUC) study used a 0.3 ft^2 box sampler (12 x 12 inch surface area) to sample different bottom types at 10 different stations around Pearl Harbor. Samples were processed by sieving through a 0.8 mm sieve and separating the biota with a carbon tetrachloride flotation technique.

The nearest station to the proposed SURTASS site was BM-07, located around a dolphin piling in Middle Loch just north of the Noise Measurement Facility and west of the public fishing pier. A silty mud bottom at a depth of 44 feet was sampled. Stations BC-09 and BE-05 were next nearest the proposed SURTASS site: BC-09 was across the channel from the west end of Ford Island; BE-05 was located northeast of Mokunui Island (northeast of Ford Island).

Table 3 summarizes some of the results obtained at these three stations. At biostations BE-05 and BC-09, sponges (Porifera) accounted for a majority of the biomass. Most abundant at BM-07 were bryozoans. Polychaetes and crustaceans were very abundant at BE-05, and moderately abundant at BC-09. The infaunal assemblage at Biostation BM-07 was far less developed, with mostly amphipods (Erichthonius brasiliensis and others not identified) and the clam, Hiatella hawaiiensis, accounting for most of the individuals sorted from the samples. Because the sample areas were larger and a coarser sieve used to process the sediment, few of the species encountered off the site were reported from the NUC study. Leptochelia dubia were recorded at BE-05 and BC-07, but not at

BM-07. The latter biostation actually yielded few benthic crustaceans (except amphipods) or polychetes.

Table 3. Summary of benthic faunal sampling at three of ten biostations in Pearl Harbor (NUC, 1974).

	Biostation BE-05	BM-07	BC-09
Depth (feet)	5 - 42	30 - 44	1 - 38
Substratum	silt, mud	silty mud	shell rubble
Distance (feet)[1]	6600	3500	4700 ft
Direction[1]	E	WNW	WSW
Ranking[2]	2	7	3
No. of samples	9	6	9
No. of species (minimum)	51	21	70
Total individuals	5256	155	3945
Mean ind/sample	584	26	438
Total weight (gms)	698	21.4	2288
Mean weight/sample	77.6	3.6	234.3

1 - From the proposed SURTASS site to the 1974 biostation.
2 - Out of ten biostations; highest ranked station was at the mouth of Pearl Harbor, lowest ranked station was in Southeast Loch

Meio- and macrofauna in sediments from Hickam Basin (near the mouth of Pearl Harbor) and Keehi Lagoon (see Table 4) were enumerated in studies for the reef runway construction project (AECOS, 1979). These samples were sorted from 0.5 mm screened samples. The fine sediment on the bottom of Hickam Basin yielded assemblages very similar to those recorded from off the proposed SURTASS site. The area of the substratum (about 45 cm^2) was roughly comparable, although the volume of sediment collected (0.75 cc) was greater. These silty sediments were dominated by oligochaetes and capitellid polychaetes. On one sampling occasion, Leptochelia dubia was abundant; on another, the opheliid, Armandia sp., appeared in abundance. As with the samples from inside Pearl Harbor, crustaceans were not as numerous as polychaetes in these fine sediments.

Samples of fine sand from the Kalihi Channel and Circulation Channel "B" in Keehi Lagoon produced far more diverse assemblages of polychetes and crustaceans than the Hickam Harbor samples (AECOS, 1979) or the SURTASS site samples. These results clearly support the generalization that coarser sediments harbor a greater abundance and variety of small organisms. However, other environmental factors, including

water motion, pollutant impacts, and water quality tend to differ substantially between the sites; and finer sediments would be associated with sites that have more restricted water circulation and generally poorer water quality. The samples collected from the seaplane channel in the back of Keehi Lagoon revealed a fauna of fewer species and fewer individuals than that in Hickam Harbor. and resembling the SURTASS site samples A and D. However, the inner Keehi lagoon infauna might appear more diverse had the fauna retained on a 0.25 mm screen been examined, as was the case with the SURTASS site samples.

Table 4. Summary of benthic faunal sampling at four stations around the Honolulu International Airport reef runway (AECOS, 1979).

	HICKAM HARBOR	KALIHI CHANNEL	KEEHI CIRC. "B"	INNER KEEHI
Substratum	silt	med sand	sand	silty-sand
Approx. Depth (ft)	20	10-20	30	18
No. of samples[1]	4	2	4	4
Average number of species	7.5	22	23	5.75
Average number of individuals	46.8	308	326	29

1 - Samples were collected over a one year period, except for the Kalihi Channel Station.

A series of sediment samples from inner Keehi Lagoon and extending into the mouths of Moanalua and Kalihi Streams were examined by Environmental Consultants (ECI, 1978). The sampler area was a 10 by 10 cm box, pushed 12 cm into the bottom (1200 cc volume). Sediment samples were sieved on a 0.25 mm screen and sorting included perchloroethylene flotation of the retained material. Many of the polychaetes found were the same as those recorded from off the SURTASS site, including Armandia and Cossura. Spionids accounted for most of the species diversity in the collection, whereas oligochaetes were usually the most abundant component, particularly in samples close to and up into the streams. Oligochaete density exceeded 22,000/m2 in one sample from the mouth of Kalihi Stream. The species richness of the oligochaete fauna is not known, however, because of the difficulty of differentiating and indentifying these small worms.

Other areas on Oahu subjected to sediment analyses for small infaunal organisms (meio- and macrofauna) are the studies

conducted off the Honolulu, Waianae, and Honouliuli WWTP outfalls (most recently in reports by Russo, et al., 1989; Bailey-Brock, et al., 1991; and Nelson, et al., 1991). These studies, which are on-going, use a sampler that is 7.6 cm in diameter and penetrates 5 cm deep into the substratum. Sediments are screened on a 0.5 mm sieve.

The locations of these studies are offshore along the leeward O'ahu coast and at depths between 33 and 81 meters (108 to 266 feet). Sediments tend to be fine and course sand with no or very little silt/clay. Thus, the fauna at these sites cannot be expected to resemble that found at the SURTASS site inside Pearl Harbor. Abundance of forms is substantially greater at the offshore sites, as is species richness (number of species). Diversity (H') excluding mollusks generally exceeds 2 (or 3 at the Barbers Point outfall). Mean abundance of individuals per sample (excluding mollusks) at stations around the Barbers Point outfall ranged from 42 to 82 in 1990; mean species richness from 16 to 22 (Nelson, et al., 1991). At the Sand Island outfall site, mean abundance (again excluding mollusks) ranged from 84 to 302; mean species numbers from 21 to 33 (Bailey-Brock, et al., 1991).

In comparison with surveys from other parts of the Island of O'ahu, the project site sediments harbor a relatively sparse assemblage of small annelids and polychaetes. Specimens identified from the samples appear typical for the inner harbor location and silty sediment bottom when compared with Hickam Harbor (AECOS, 1979) and the innermost parts of Keehi Lagoon (ECI, 1978; AECOS, 1979). Although quite different sample collecting and processing techniques were used in a previous study by the U.S. Navy which included a station near the proposed SURTASS site (NUC, 1974), this earlier study also produced evidence of a depressed biota in this part of Pearl Harbor.

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APPENDIX B

BOTANICAL SURVEY

BOTANICAL CONSULTANTS

*Botanical * Environmental * Wetland * Studies*

P.O. Box 90765
Honolulu, Hawaii 96835
(808) - 923-4193

August 14, 1991

Mr. John Goody
c/o Belt Collins and Associates
680 Ala Moana Blvd.
Honolulu, Hawaii 96813

Re: Surtass Center and Pier Project Sites Vegetation

Dear Mr. Goody,

On August 13, 1991 we conducted an on site inspection of the vegetation of the proposed sites for the Surtass Center and Piers on Pearl City Peninsula, Hawaii. The area in which the proposed sites are located is, from a botanical point of view, highly disturbed. Only a single indigenous taxon, Pa'uohi'iaka (*Jacquemontia ovalifolia* (Choisy) H. Hallier) was found in low numbers, the remaining vegetation is all introduced and most are regarded as weeds.

There is some strand vegetation along the south-eastern boundry where the site is bounded by Pearl Harbor. There are about twelve individuals of Red mangrove (*Rhizophora mangle* L.) and three small patches of Pickleweed (*Batis maritima* L.). Although both are wetland indicator species, their low numbers and limited distribution on this site, make them of little consequence.

Just north of the northern-most parcel, there is a large Rhizophora/Batis wetland. It is about 100 m from the northern boundry of the study site, but care should be taken to protect this area from spills or filling.

No proposed or listed, threatened or endangered plant species were found on the site (USFWS 1991).

The following is a list of the plant taxa which make up the scant vegetation of the area. It must be noted that this field study was conducted during the dry season when the annual plants had completed their life cycle. A botanical survey carried out during the growing season would result in a more extensive list of adventives or weeds.

An asterisk before the plant name indicates a species introduced to the Hawaiian Islands after Cook (1776). In addition, the scientific name and the common name are given. All taxa were found in large numbers.

The plant families are arranged alphabetically in two groups, the Monocotyledons and the Dicotyledons. The genera and species are arranged alphabetically within families. The taxonomy and nomenclature follow that of Wagner, Herbst & Sohmer 1990, St. John 1973, and Neal 1965.

MONOCOTYLEDONS

Poaceae - Grass Family

**Bothrichloa pertusa* (L.) A. Camus	Pitted beardgrass
**Cenchrus ciliaris* L.	Buffelgrass
**Cenchrus echinatus* L.	Sandbur grass
**Chloris barbata* Swartz	Swollen fingergrass
**Cynodon dactylon* (L.) Pers.	Bermuda grass
**Digitaria ciliaris* (Retz.) Koeler	Henry's crabgrass
**Eragrostis tenella* (L.)Beauv.R.6S.	Japanese lovegrass
**Rhynchelytrum repens* C.E.Hubb	Natal redtop
**Sporobolus virginicus* (L.) Kunth	Seashore rushgrass

DICOTYLEDONES

ACANTHACEAE - Acanthus Family

**Asystasia gangetica* (L.) T. Anders	Chinese violet

ANACARDIACEAE - Mango Family

**Schinus terebinthifolius* Raddi	Christmas berry

BATACEAE - Saltwort Family

**Batis maritima* L.	Pickleweed

BORAGINACEAE - Heliotrope Family

**Heliotropium procumbens* Mill.	No common name

CASUARINACEAE - Ironwood Family

**Casuarina equisetifolia* Stickm.	Ironwood tree

CHENOPODIACEAE - Goosefoot Family

**Atriplex semibaccata* R. Br.	Australian saltbush

COMPOSITAE - Sunflower Family

**Bidens pilosa* L.	Spanish needle
**Conyza canadensis* Cronq.	Canadian fleabane
**Emilia sonchifolia* (L.) DC	Emilia
**Flaveria trinervia* (Spreng.) C. Mohr.	

COMPOSITAE - Sunflower Family con't

**Heterotheca grandiflora* Nutt.	No common name
**Pluchea indica* (L.) Less.	Indian pluchea
**Pluchea odorata* (L.) Cass.	Pluchea
**Sonchus oleraceus* L.	Spiny sow thistle
**Tridax procumbens* L.	Coat buttons

CONVOLVULACEAE - Moringglory Family

Jacquemontia sandwicensis Gray	Pau'o'hi'iaka
**Ipomoea imperati* (Vahl) Griseb.	Hunakai

EUPHORBIACEAE - Spurge Family

**Chamaesyce hypericifolia* (L.) Millsp.	Graceful spurge
**Chamaesyce hirta* (L.) Millsp.	Hairy spurge

LEGUMINOSAE - Bean Family

**Asyscarpus vaginalis* (L.) DC	One leafed clover
**Desmodium triflorum* (L.) DC	No common name
**Desmanthus virgatus* Willd.	Virgate mimosa
**Indigofera spicata* Forssk.	Creeping indigo
**Leucaena leucocephala* deWit	Koa-haole
**Macroptilium lathyroides* (L.) Urb.	Wild bean
**Prosopis pallida* HBK	Kiawe, algaroba

MALVACEAE - Hibiscus Family

**Abutilon grandifolium* (Willd.) Sweet	Hairy abutilon
**Malvastrum coromandelianum* Garcke	False marrow
**Sida rhombifolia* L.	Cuba jute
**Sida spinosa* L.	Prickly sida
**Thespesia populnea* (L.) Sol. ex Correa	Milo

NYCTAGINACEAE - Four o'clock Family

Boerhavia repens L.	Alena

PASSIFLORACEAE - Passionflower Family

**Passiflora foetida* L.	Love-in-a-mist

PORTULACACEAE - Purslane Family

**Portulaca oleracea* L.	Pig weed
**Portulaca pilosa* L.	Akulikuli

STERCULIACEAE - Stink tree Family

**Waltheria americana* L.	Hi'aloa, uha-loa

VERBENACEAE - Verbena Family

**Stachytarpheta jamaicensis* (L.) Vahl	Jamaica vervain
**Stachytarpheta urticifolia* (Salisb.) Sims	No common name

As you can see, the vegetation is made up of very common weedy species and except for the kiawe, milo, and mangrove trees there were no plants more than .5 m in height.

Sincerely yours,

Evangeline J. Funk Ph.D. - Botanist

APPENDIX C

AVIFAUNAL AND FERAL MAMMALS

SURVEY OF THE AVIFAUNA AND FERAL MAMMALS AT THE PROPOSED US NAVY SURTASS SITE, PEARL CITY PENINSULA, OAHU

Prepared for
Belt Collins & Associates
by

Phillip L. Bruner
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Environmental Consultant - Faunal (Birds & Mammals) Surveys
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29 July 1991

INTRODUCTION

The purpose of this report is to summarize the findings of a one day (26 July 1991) bird and mammal field survey of property proposed for a US Navy SURTASS Project, at Pearl City Peninsula, Oahu (Fig.1). Also included are references to pertinent literature as well as unpublished reports.

The objectives of the field survey were to:

1- Document what bird and mammal species occur on the property or may likely to be found there given the range of habitats available.

2- Provide some baseline data on the relative abundance of each species.

3- Supplement these findings with published and/or unpublished data.

4- Evaluate the possible changes that might occur in the bird and mammal populations following the proposed development of the property.

5- Identify any special or unique habitats important to birds and mammals.

GENERAL SITE DESCRIPTION

The proposed project property is located on the eastern shore of Pearl City Peninsula, Oahu (Fig.1). The site presently contains open grass/weed covered fields and exotic second growth coastal vegetation. The dominant trees in the area are: Kiawe (Prosopis pallida), Koa Haole (Leucaena leucocephala) and Red Mangrove (Rhizophora mangle). Wetland habitat in the form of mangrove and Pickleweed (Batis maritima) occur along the shoreline north of the property. A dense Kiawe forest lies immediately inland of this coastal wetland.

Weather during the field survey was partly cloudy and warm. Winds were NE trades at 10-20 mph.

C-2

STUDY METHODS

Field observations were made with binoculars and by listening for vocalizations. Attention was also paid to the presence of tracks and scats as indicators of bird and mammal activity.

At various locations (see Fig.1) eight minute counts were taken of all birds seen or heard. Between these count stations noteworthy observations were also kept. The data from these

sources provide the basis for the population estimates given in this report.

Observations of feral mammals were limited to visual sightings and evidence in the form of scats and tracks. No attempts were made to trap mammals in order to obtain data on their relative abundance and distribution.

Scientific names used herein follow those given in Hawaii's Birds (Hawaii Audubon Society 1989); Field Guide to the Birds of Hawaii and the Tropical Pacific (Pratt et al. 1987); Mammal Species of the World (Honacki et al. 1982) and Hawaiian Coastal Plants (Merlin 1980).

RESULTS AND DISCUSSION

Resident Endemic (Native) Land Birds:

No endemic land birds were recorded. On rare occasions the Short-eared Owl or Pueo (Asio flammeus sandwichensis) may forage in this area. The State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife lists the Pueo as endangered on Oahu. The introduced Common Barn Owl (Tyto alba) is likely to be seen more frequently in this area and may be mistaken for the native Pueo.

Resident Indigenous and Endemic Waterbirds:

No indigenous or endemic waterbirds were observed on the survey. The Black-crowned Night Heron (Nycticorax nycticorax) may forage and roost in the mangrove to the north of the property. The American Coot (Fulica americana alai) may also utilize the edge of this coastal wetland. The James Campbell National Wildlife Refuge - Pearl Harbor Unit is located across the Peninsula and to the north of the proposed development. This refuge supports resident as well as migratory waterbirds.

Resident Indigenous (Native) Seabirds:

Seabirds typically nest on offshore islands which are free from disturbance by dogs, cats, mongooses and rats. However, there are areas on the main islands were predators lack access and nesting can be successful (Bruner 1988). No seabirds were found during the survey and it is unlikely any would nest at this site due to the presence of predators. Terns may forage offshore of this site in Pearl Harbor (Bruner 1989).

Migratory Indigenous (Native) Birds:

No migratory shorebirds were recorded during the survey. Given the time of year it is unlikely that many would be found since the spring migration had already taken place in late April and they do not return to Hawaii until August. The Pacific Golden Plover (Pluvialis fulva) and Ruddy Turnstone (Arenaria

interpres) are common migrants which can be found on lawns and fields as well as along the intertidal zone. The Wandering Tattler (Heteroscelus incanus) is a common winter migrant seen along rocky shorelines. It is possible that all three of these species may occur in small numbers on or near this site during the "winter" (August-April).

Exotic (Introduced) Birds:

A total of 11 species of exotic birds were found during the field survey. Table One shows the birds recorded and their relative abundance. The most abundant species were Zebra Dove (Geopelia striata), Nutmeg Mannikin (Lonchura punctulata) and Red-vented Bulbul (Pycnonotus cafer). Exotic species not recorded on the actual survey but which potentially could occur given the types of habitats available at this locality include: Cattle Egret (Bubulcus ibis), Northern Mockingbird (Mimus polyglottos), Japanese Bush-warbler (Cettia diphone), Chestnut Mannikin (Lonchura malacca), Common Waxbill (Estrilda astrild), Java Sparrow (Padda oryzivora), Eurasian Skylark (Alauda arvensis) and Barn owl (Tyto alba) (Pratt et al. 1987); Bruner 1989; Hawaii Audubon Society 1989).

Feral Mammals:

The only feral mammal observed during the survey was the Small Indian Mongoose (Herpestes auropunctatus). No rats, mice

or cats were recorded but they undoubtedly do occur on or near the property. Without a trapping program it is difficult to conclude much about the relative abundance of mammals at this site. It is likely, however, that their numbers are typical of what one would find elsewhere in similar habitat on Oahu.

Records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) are sketchy but the species has been reported from Oahu (Tomich 1986; Kepler and Scott 1990). None were observed on this field survey. Whether or not this species would likely be found in this area is unknown given the present limited knowledge of their movement patterns.

CONCLUSION

A brief field survey can provide only a limited perspective of the wildlife present in any given area. Not all species will necessarily be observed and information on their use of the site must be sketched together from brief observations and the available literature. The number of species and the relative abundance of each species may vary throughout the year due to available resources and reproductive success. Species which are migratory will quite obviously be a part of the ecological picture only at certain times during the year. Exotic species sometimes

prosper for a time only to later disappear or become a less significant part of the ecosystem (Williams 1987; Moulton et al. 1990). Thus only long term studies can provide the insights necessary to acquire a complete understanding of the bird and mammal populations in a particular area. However, when brief studies are coupled with data gathered from other similar sites the value of the conclusions drawn are significantly increased.

The following are some broad conclusions related to bird and mammal activity on this property:

1- The present environment provides a limited range of habitats which are utilized by the typical array of exotic birds one would expect at this elevation and in this type of environment on Oahu. Population sizes of these species were within the limits of expectation for this area. Some species were unaccounted for but this may have been due to the limited time frame of the survey and the fact that some species typically have localized populations that may or may not actually occur on this exact site.

2- No migratory shorebirds were observed on the survey but this was due to the time of year. Pacific Golden Plover and Ruddy Turnstone are common in open short-grass fields and cleared areas in the months of August through April and would be undoubtedly be recorded at this site during that time. Wandering Tattler should also be expected along the

rocky shoreline fronting the site. The amount of suitable shorebird habitat lost to the proposed development is relatively small and would likely result in the displacement of perhaps 10-15 plover, 5-10 turnstone and two tattler.

3- No native resident birds were recorded, however, Black-crowned Night Heron and American Coot may utilize the mangrove and pickleweed coastal wetland north of the project site. The James Campbell National Wildlife Refuge - Pearl City Unit is located across the peninsula and would not likely be affected by activities at this site. A sizeable buffer of second growth forest and residential habitat separates these two areas.

4- A trapping program would be required to obtain more data on mammals. The brief observations of this survey did not reveal any unusual mammal activity. No endangered species were recorded.

5- The proposed development will result in the alteration of the present habitats to a more urban environment. These changes will result in the decline in abundance of introduced open field species such as finches and doves. Species like House Sparrow (Passer domesticus) and Common Myna (Acridotheres tristis) could increase in number.

6- No special or unique habitats were found on the actual site. The coastal wetland north of the property may provide some limited foraging habitat for native waterbirds and therefore should not be disturbed or developed.

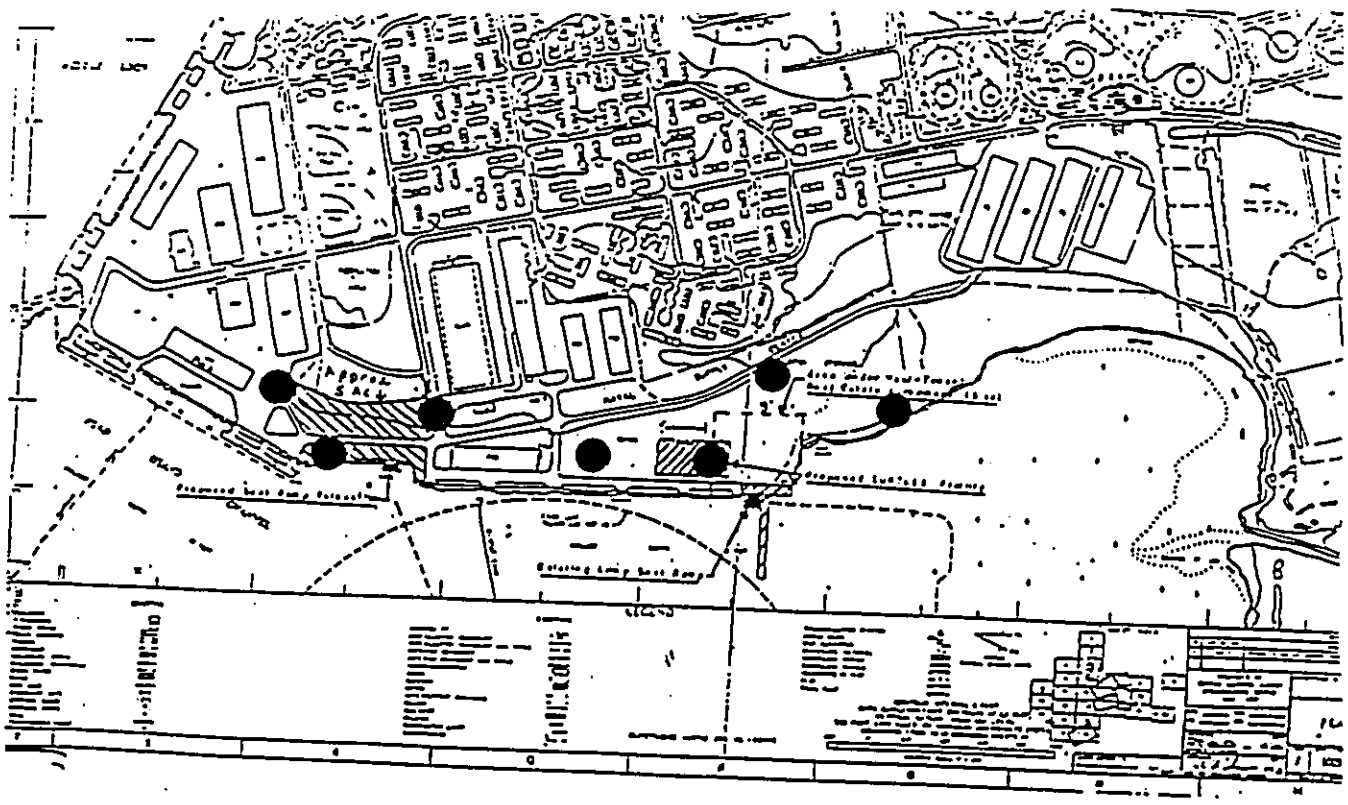

Fig. 1. Location of proposed SURTASS site with faunal census stations shown as solid circles.

TABLE 1

Relative abundance of exotic birds at the proposed US Navy SURTASS Site, Pearl City Peninsula, Oahu.

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE*
Spotted Dove	Streptopelia chinensis	U = 2
Zebra Dove	Geopelia striata	A = 11
Common Myna	Acridotheres tristis	U = 4
Red-vented Bulbul	Pycnonotus cafer	A = 10
Northern Cardinal	Cardinalis cardinalis	R = 2
Red-crested Cardinal	Paroaria coronata	R = 4
Japanese White-eye	Zosteropss japonicus	U = 4
House Sparrow	Passer domesticus	R = 5
House Finch	Carpodacus mexicanus	U = 4
Nutmeg Mannikin	Lonchura punctulata	A = 15
Red Avadavat	Amandava amandava	R = 6

*(see page 12 for key to symbols)

KEY TO TABLE 1

Relative abundance = number of individuals observed during walking survey or frequency on eight minute counts in appropriate habitat.

A = abundant (10+) on 8 min. counts

C = common (5-10) on 8 min. counts

U = uncommon (less than 5) on 8 min. counts

R = recorded but not on 8 min. counts (number which follows is the total recorded over the course of the entire survey).

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APPENDIX D

NORPAR MATERIAL SAFETY DATA SHEET

EXXON CHEMICAL

MATERIAL SAFETY DATA SHEET

EXXON CHEMICAL AMERICAS • P.O. BOX 3272, HOUSTON, TEXAS 77001
A Division of EXXON CHEMICAL COMPANY, A Division of EXXON CORPORATION

05/08/90

NO. 928625

SECTION 1 PRODUCT IDENTIFICATION & EMERGENCY INFORMATION

PRODUCT NAME
NORPAR 12

CHEMICAL NAME
Petroleum Solvent

CAS 64771-72-8

CHEMICAL FAMILY
Aliphatic Hydrocarbon

PRODUCT APPEARANCE/DESCRIPTION
Clear colorless liquid.

EMERGENCY TELEPHONE NUMBERS: EXXON CHEMICAL AMERICAS 713-870-6000
CHEMTREC 800-424-9300

SECTION 2 HAZARDOUS INGREDIENT INFORMATION

This product is hazardous as defined in 29 CFR1910.1200.
OSHA HAZARD
Combustible

For additional information see Section 3.

SECTION 3 HEALTH INFORMATION & PROTECTION

NATURE OF HAZARD

EYE CONTACT:
Slightly irritating but does not injure eye tissue.

SKIN CONTACT:
Low order of toxicity.
Frequent or prolonged contact may irritate and cause dermatitis.

INHALATION:
High vapor concentrations are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.

INGESTION:
Minimal toxicity.
Small amounts of the liquid aspirated into the respiratory system during ingestion, or from vomiting, may cause bronchiopneumonia or pulmonary edema.

FIRST AID

EYE CONTACT:
Flush eyes with large amounts of water until irritation subsides. If irritation persists, get medical attention.

SKIN CONTACT:
Flush with large amounts of water; use soap if available.
Remove grossly contaminated clothing, including shoes, and launder before reuse.

INHALATION:
Using proper respiratory protection, immediately remove the affected victim from exposure. Administer artificial respiration if breathing is stopped. Keep at rest. Call for prompt medical attention.

INGESTION:
If swallowed, DO NOT induce vomiting. Keep at rest. Get prompt medical attention.

ACUTE TOXICITY DATA IS AVAILABLE UPON REQUEST.

WORKPLACE EXPOSURE LIMITS

OSHA REGULATION 29CFR1910.1000 REQUIRES THE FOLLOWING PERMISSIBLE EXPOSURE LIMITS:
A TWA of 5 mg/m3 for Oil Mists, mineral.

THE ACGIH RECOMMENDS THE FOLLOWING THRESHOLD LIMIT VALUES:
5 mg/m3 based on the ACGIH TLV for Oil Mists.

EXXON RECOMMENDS THE FOLLOWING OCCUPATIONAL EXPOSURE LIMITS:
300 ppm total hydrocarbon based on composition.

PRECAUTIONS

PERSONAL PROTECTION
For open systems where contact is likely, wear safety glasses with side shields, long sleeves, and chemical resistant gloves.
Where contact may occur, wear safety glasses with side shields.
Where concentrations in air may exceed the limits given in this Section and engineering, work practice or other means of exposure reduction are not adequate, NIOSH/MSHA approved respirators may be necessary to prevent overexposure by inhalation.

VENTILATION
The use of mechanical dilution ventilation is recommended whenever this product is used in a confined space, is heated above ambient temperatures, or is agitated.

SECTION 4 FIRE & EXPLOSION HAZARD

FLASHPOINT: 150 Deg F. METHOD: PMCC
FLAMMABLE LIMITS: LEL: 0.6 UEL: 7.0
AUTOIGNITION TEMPERATURE: 392 Deg F. NOTE: Minimum

GENERAL HAZARD
Combustible Liquid, can form combustible mixtures at temperatures at or above the flashpoint.
Toxic gases will form upon combustion.
Static Discharge, material can accumulate static charges which can cause an incendiary electrical discharge .
"Empty" containers retain product residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.
Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed of.

FIRE FIGHTING
Use water spray to cool fire exposed surfaces and to protect personnel.
Isolate "fuel" supply from fire.
Use foam, dry chemical, or water spray to extinguish fire.
Respiratory and eye protection required for fire fighting personnel.
Avoid spraying water directly into storage containers due to danger of boilover.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
Fumes, smoke and carbon monoxide

SECTION 5 SPILL CONTROL PROCEDURE

LAND SPILL
Eliminate sources of ignition. Prevent additional discharge of material, if possible to do so without hazard. For small spills implement cleanup procedures; for large spills implement cleanup procedures and, if in public area, keep public away and advise authorities. Also, if this product is subject to CERCLA reporting (see Section 7) notify the National Response Center.
Prevent liquid from entering sewers, watercourses, or low areas. Contain spilled liquid with sand or earth. Do not use combustible materials such as sawdust.
Recover by pumping (use an explosion proof or hand pump) or with a suitable absorbent.
Consult an expert on disposal of recovered material and ensure conformity to local disposal regulations.

WATER SPILL
Remove from surface by skimming or with suitable adsorbents. If allowed by local authorities and environmental agencies, sinking and/or suitable dispersants may be used in non-confined waters.
Consult an expert on disposal of recovered material and ensure conformity to local disposal regulations.

SECTION 6 NOTES

No notes applicable.

SECTION 7 REGULATORY INFORMATION

DEPARTMENT OF TRANSPORTATION (DOT):
DOT PROPER SHIPPING NAME:
PETROLEUM NAPHTHA, Combustible Liquid UN 1255
DOT HAZARD CLASS: Combustible Liquid
DOT IDENTIFICATION NUMBER: UN 1255
NAME: Naphtha, petroleum

TSCA:
This product is listed on the TSCA Inventory at CAS Registry Number 64771-72-8

CERCLA:
If this product is accidentally spilled, it is not subject to any special reporting under the requirements of the Comprehensive Response, Compensation, and Liability Act (CERCLA). We recommend you contact local authorities to determine if there may be other local reporting requirements.

SARA TITLE III:
Under the provisions of Title III, Sections 311/312 of the Superfund Amendments and Reauthorization Act, this product is classified into the following hazard categories:
Fire.

SECTION 8 TYPICAL PHYSICAL & CHEMICAL PROPERTIES

SPECIFIC GRAVITY:
0.75 at 59

Density: 6.3 lbs/gal at 59

SOLUBILITY IN WATER, WT. % AT °F:
Less Than 0.10 at 68

SP. GRAV. OF VAPOR, at 1 atm (Air=1):
Greater than 1.00

EVAPORATION RATE, n-Bu Acetate=1:
0.0

VAPOR PRESSURE, mmHg at °F:
2 at 100
75 at 122

VISCOSITY OF LIQUID, CST AT °F:
2 at 77

FREEZING/MELTING POINT, °F:
Less than 32

BOILING POINT, °F:
365 to 430 Approximate

SECTION 9 REACTIVITY DATA

STABILITY:
Stable

CONDITIONS TO AVOID INSTABILITY:
Not Applicable

HAZARDOUS POLYMERIZATION:
Will not occur

COND. TO AVOID HAZARDOUS POLYMERIZATION:
Not Applicable

MATERIALS AND CONDITIONS TO AVOID INCOMPATIBILITY:
Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS:
None

SECTION 10 STORAGE AND HANDLING

ELECTROSTATIC ACCUMULATION HAZARD:
Yes, use proper grounding procedure

STORAGE TEMPERATURE, °F:
Ambient

STORAGE/TRANSPORT PRESSURE, mmHg:
Atmospheric

LOADING/UNLOADING TEMPERATURE, °F:
Ambient

VISC. AT LOADING/UNLOADING TEMP., cST:
1

REVISION SUMMARY:
Since FEBRUARY 7,1990 this MSDS has been revised in Section(s):
7

REFERENCE NUMBER:	DATE PREPARED:	SUPERCEDES ISSUE DATE:
HDHA-C-25043	May 8,1990	February 7,1990

FOR ADDITIONAL PRODUCT INFORMATION, CONTACT YOUR TECHNICAL SALES REPRESENTATIVE
FOR ADDITIONAL HEALTH/SAFETY INFORMATION, CALL 713-870-6885

APPENDIX E

MEMORANDUM OF AGREEMENT

Advisory
Council On
Historic
Preservation

1659

1522 K Street N.W.
Washington D.C.
20005

SEP 6 1979

Captain L. H. Ruff, CEC
Facilities Engineer, Headquarters
Naval Base Pearl Harbor
U.S. Department of the Navy
Box 110
Pearl Harbor, Hawaii 96860

Dear Captain Ruff:

COPY

The Memorandum of Agreement for the assigned missions of the U.S. Naval Base, Pearl Harbor, Hawaii, affecting the Base has been ratified by the Chairman of the Council. This document constitutes the comments of the Council required by Section 106 of the National Historic Preservation Act, Section 2(b) of Executive Order 11593, "Protection and Enhancement of the Cultural Environment", and completes compliance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800). A copy of the Agreement is enclosed.

In accordance with Section 800.6(c)(2) and 800.9(e) of the regulations, a copy of this Memorandum of Agreement should be included in any environmental assessment or statement prepared for this undertaking to meet requirements of the National Environmental Policy Act and should be retained in your records as evidence of compliance with Section 106 of the National Historic Preservation Act and Section 2(b) of Executive Order 11593.

The Council appreciates your cooperation in reaching a satisfactory resolution of this matter.

Sincerely,

B.A. Casey

Acting

Louis S. Wall
Chief, Western Division
of Project Review

Enclosures

Advisory
Council On
Historic
Preservation

1522 K Street N.W.
Washington D.C.
20005

MEMORANDUM OF AGREEMENT

WHEREAS, the U.S. Department of the Navy proposes to carry out its assigned missions at the U.S. Naval Base, Pearl Harbor, Hawaii; and,

WHEREAS, the Navy, in consultation with the Hawaii State Historic Preservation Officer (SHPO), has determined that this undertaking as proposed could have an adverse effect upon Naval Base Pearl Harbor, a property included in the National Register of Historic Places; and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320), Section 2(b) of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," and Section 800.4(d) of the regulations of the Advisory Council on Historic Preservation (Council), "Protection of Historic and Cultural Properties" (36 CFR Part 800), the Navy has requested the comments of the Council; and,

WHEREAS, pursuant to Section 800.6 of the Council's regulations, representatives of the Council, the Navy, and the Hawaii SHPO have consulted and reviewed the undertaking to consider feasible and prudent alternatives to avoid or satisfactorily mitigate the adverse effect;

NOW, THEREFORE, it is mutually agreed that the undertaking will be implemented in accordance with the attached proposal from Captain L. H. Ruff, CEC, USN, Facilities Engineer, to satisfactorily mitigate adverse effects on the above-mentioned property.

Robert M. Utley 8/29/79 (date)
Robert M. Utley
Deputy Executive Director
Advisory Council on Historic Preservation

Robert R. Garvey 9/4/79 (date)
Chairman
Advisory Council on Historic Preservation

APPENDIX F

ABBREVIATIONS

APPENDIX F
ABBREVIATIONS

AMF - Array Maintenance Facility
ASW - Anti-Submarine Warfare
CASREP - Casualty Report
CMA - Contractor Manning Agent
COMOCEANSYSPAC - Commander Oceanographic System, Pacific
COMSC - Commander Military Sealift Command
COMSERVRON - Commander Service Squadron
COMSPAWARSYSCOM - Commander Space and Naval Warfare Systems Command
DoD - Department of Defense
DSR - *Dockside Reeler*
EDM - Engineering Development Model
EMR - Electromagnetic Radiation
ESQD - Explosive Safety Quantity Distance
FCT - Field Communication Team
FLA - Field Logistic Agent
FST - Field Support Team
HERF - Hazards of Electromagnetic Radiation to Fuel
HERO - Hazards of Electromagnetic Radiation to Ordnance
HERP - Hazards of Electromagnetic Radiation to Personnel
IR - Installation Restoration
LOS - level-of-service
LSF - Logistics Supply Facility
MILCON - Military Construction Program
MLW - Mean Low Water
MOU - Memorandum of Understanding
MSC - Military Sealift Command
NAB - Naval Base
NEW - Net Explosive Weight
NSC - Naval Supply Center
PMR - Program Manager Representative
RDA - Reduced Diameter Arrays
SPAWARS - Space and Naval Warfare Systems Command
SURTASS - Surveillance Towed Array Sensor System
SWATH - Small Waterplane Area Twin Hull
T-AGOS - Auxiliary Ocean Surveillance Ship Classification
TSP - Total Suspended Particulates
US SCS - Soil Conservation Service
US FWS - United States Fish and Wildlife Service
US NS - United States Naval Service

APPENDIX G

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF PUBLIC WORKS
INDUSTRIAL WASTEWATER
DISCHARGE CERTIFICATE

City and County of Honolulu
Department of Public Works

INDUSTRIAL WASTEWATER DISCHARGE CERTIFICATE

This is to certify that SURTASS SUPPORT CENTER
has complied with Chapter 11 of the Revised Ordinances of Honolulu.

Discharge Classification 9711 - Navy

Discharge Location Pearl City Peninsula

Restrictions Oil and grease < 100 mg/L, Toluene < 10 mg/L, Xylene < 5 mg/L
Benzene < 10 mg/L, Ethyl Benzene < 2 mg/L

Pretreatment Requirements Filtration to remove petroleum contaminants

Monitoring Requirements Submit monthly analyses of restricted parameters

This certificate is valid until September 11, 1996 *unless revoked sooner.*

Issued under my hand at Honolulu, Hawaii this 10th *day of* September, 1991

Certificate No. 19910208

Director and Chief Engineer

G-1

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

City and County of Honolulu
Department of Public Works

INDUSTRIAL WASTEWATER DISCHARGE CERTIFICATE

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G-1