DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4432 • FAX: (808) 527-6743
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MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
ACTING DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2005/ED-1(GU)

March 4, 2005

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
State Office Tower, Room 702
235 South Beretania Street
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Chapter 343, Hawaii Revised Statutes
Final Environmental Assessment (EA) Determination
Papipi Road Drainage Improvements
Finding of No Significant Impact

Applicant	:	Haseko (Ewa) Inc.
Agent	:	Planning Solutions, Inc.
Landowner	:	City and County of Honolulu and Haseko (Ewa) Inc.
Location	:	Papipi Road and Ocean Pointe - Ewa
Tax Map Keys	:	9-1-011: 1 & 2; and 9-1-012: 3, 8, 9, 11, 12, & 48
Proposal	:	Construction of a new underground storm drainage system and ocean outlet
Determination	:	A Finding of No Significant Impact (FONSI) is Issued

Attached and incorporated by reference is the Final EA prepared by the applicant for the project. Based on the significance criteria outlined in Title 11, Chapter 200, Hawaii Administrative Rules, we have determined that preparation of an Environmental Impact Statement is not required.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the Final EA. Should you have any questions, please contact Geri Ung of our staff at 527-6044.

Sincerely yours,

HENRY ENG, FAICP
Acting Director of Planning
and Permitting

HE:pl
Encls.

Doc. 355217

2005-03-23 FONSI
PAPIPI ROAD DRAINAGE IMPROVEMENT

MAR 2 3 2005

Final Environmental Assessment &
Finding of No Significant Impact

PĀPIPI ROAD DRAINAGE IMPROVEMENTS

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FEB 28 2005
DEPT OF PLANNING AND PERMITTING
650 S KING ST • HONOLULU, HI 96813

PREPARED FOR:
HASEKO (Ewa), Inc.

DEC. OF ENVIRONMENTAL
QUALITY CONTROL

'05 MAR -9 P1:03

RECEIVED

PREPARED BY:
PLANNING SOLUTIONS

FEBRUARY 2005

Final Environmental Assessment &
Finding of No Significant Impact

PĀPIPI ROAD DRAINAGE IMPROVEMENTS

PREPARED FOR:
HASEKO (Ewa), Inc.

PREPARED BY:
PLANNING SOLUTIONS

FEBRUARY 2005

PROJECT SUMMARY

Project:	Pāpipi Road Drainage Improvements
Applicant	HASEKO (Ewa), Inc. 91-1001 Kaimalie Street, Suite 205 'Ewa Beach, HI 96706-5005 Contact: Raymond Kanna (808) 689-7772)
Approving Agency	Department of Planning and Permitting City and County of Honolulu 650 South King Street Honolulu, HI 96813 Contact: Ardis Shaw-Kim (808) 527-5349
Location	Pāpipi Road, 'Ewa District, Island of O'ahu
Tax Map Keys	Pāpipi Road is a city-owned public right-of-way. Private TMKs where construction will occur include TMK 9-1-011: Parcels 1 & 2 and TMK 9-1-012: Parcels 3, 8, 9, 11, 12, & 48.
State Land Use District	Urban, Conservation
County Zoning	R-5 Residential District, A-1 Low Density Apartment
SMA/ Shoreline Setback	Special Management Area/Shoreline Setback Area
Proposed Action	Construction of a new underground storm drainage system and ocean outlet to improve existing drainage.
Parties Consulted	Organizations and individuals listed in Chapter 6.0
Possible Required Permits & Approvals	Special Management Area Use Permit, Shoreline Setback Variance, Conservation District Use Permit, NPDES Construction Permit, NPDES Municipal Separate Storm Sewer System Coordination with the City and County of Honolulu, Community Noise Control (DOH), Grading, Grubbing, Excavation & Stockpiling Permit (DDC), Street Usage Permit (DPP), Drainage Connection License
Associated Actions Requiring Environmental Assessment	Use of state and county lands, Construction within the Special Management Area, Shoreline Setback Area and State Conservation District, use of a nationally registered Historic Site
Determination	Finding of No Significant Impact
Consultant	Planning Solutions, Inc. 210 Ward Ave, Suite 330 Honolulu, HI 96814 Contact: Perry White (808) 550-4483

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION AND OVERVIEW

The topography of 'Ewa is comprised of a broad and relatively level plain. In the absence of well-defined drainageways, runoff tends to pond in low-lying areas during periods of heavy rainfall. The Pāpipi Road corridor in 'Ewa Beach is one such area (see Figure 1-1 and Figure 1-2). It, like many of the older subdivisions in 'Ewa Beach, was constructed utilizing rural subdivision standards; it has unpaved shoulders with surface drainage instead of the urban-standard curbs-and-gutters that have been used in newer developments such as Ocean Pointe. The poor drainage along Pāpipi Road is mainly attributable to limitations in this existing drainage system, although the situation has been exacerbated somewhat by the alterations that adjoining homeowners have made that obstruct surface flow along roadside swales.

Originally, HASEKO (Ewa), Inc.'s plans for the Ocean Pointe project on the *mauka* side of Pāpipi Road called for it to add virtually no additional stormwater runoff to the roadway. This was accomplished through emplacement of extensive fill within its property and the use of a tall, tiered retaining wall along the *makai* edge of its land, resulting in virtually all drainage from the property being channeled away from 'Ewa Beach and into the Kalo'i Gulch .

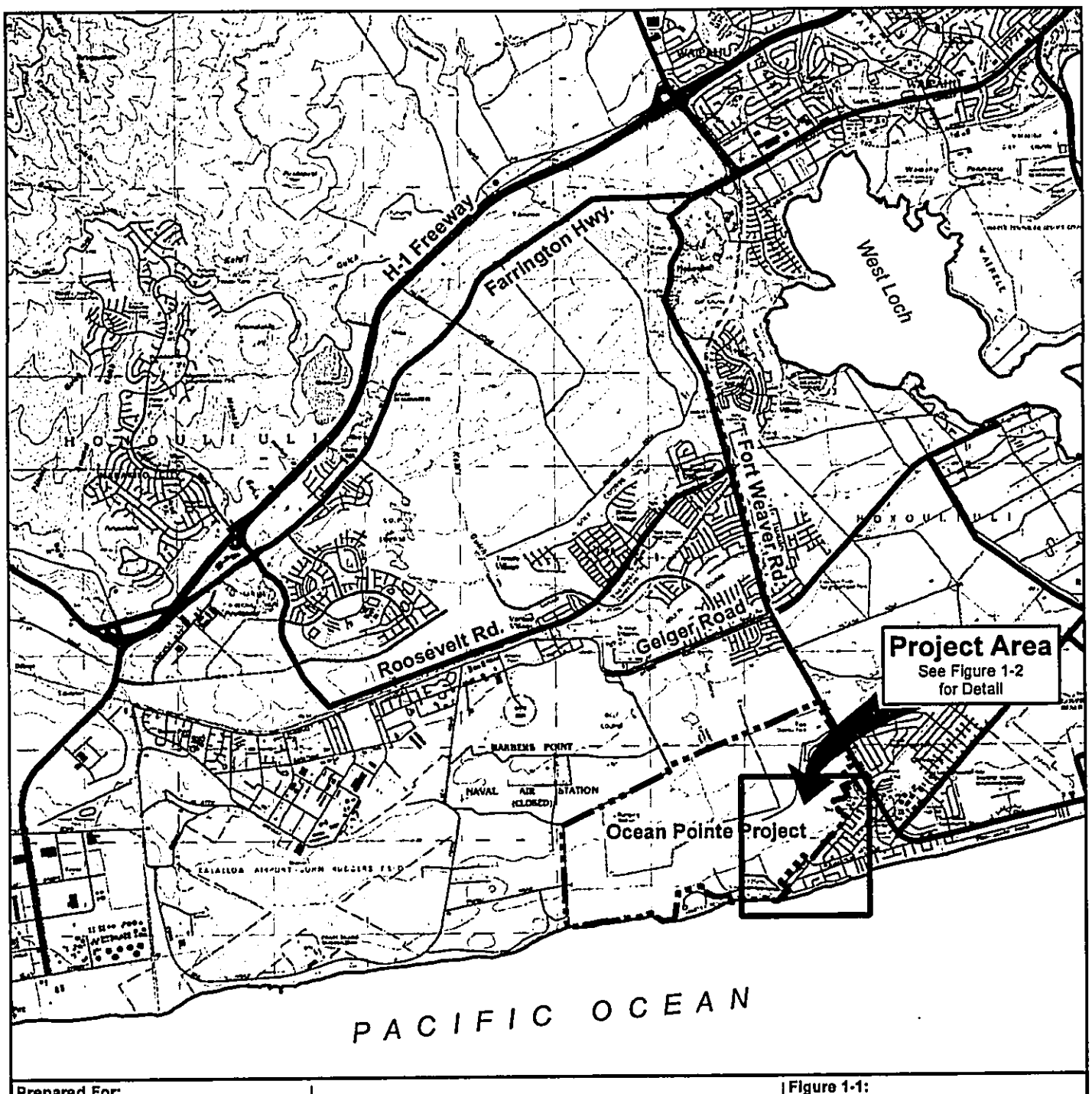
However, in response to community concerns about the retaining wall, HASEKO agreed to redesign the structure. The modified design calls for a 6-foot retaining wall (one-third the height of the original) and landscaped slope and therefore provides greater clearance between the road right-of-way and the upper portions of the structure than did the original proposal. As a consequence of the decreased wall slope, the modified design allows more storm runoff to reach Pāpipi Road than did the design originally proposed (but less than before HASEKO began developing the Ocean Pointe project). In order to accommodate this increase and to provide additional public benefit to the existing Pāpipi Road community, HASEKO agreed to construct drainage improvements (including a new stormwater drainage outlet to the ocean) that would substantially decrease the ponding that presently occurs along the *mauka* side of Pāpipi Road. The adjacent homeowners, who participated in a mediation effort with HASEKO, have expressed their support for the plans.

This chapter summarizes the purpose and need for the proposed stormwater drainage facilities. It is divided into the following major parts:

- Section 1.2 introduces the project area and its existing uses.
- Section 1.3 presents an overview of existing stormwater drainage facilities in the area.
- Section 1.4 discusses the need for additional stormwater drainage facilities. The need is predicated upon the decreased shoulder space for drainage anticipated upon completion of the retaining wall *mauka* of Pāpipi Road.
- Section 1.5 lists the objectives of the proposed project.
- Section 1.6 discusses the organization of the EA.

1.2 LOCATION AND EXISTING USE

Pāpipi Road is a two-lane roadway located in 'Ewa Beach, O'ahu, Hawai'i. Originating at Fort Weaver Road and terminating just west of Pūpū Street, Pāpipi Road provides access to the 'Ewa Beach Shopping Center, 'Ewa Beach Elementary School, and 'Ewa Beach Estates Subdivision. It also connects to the existing access road to One'ula Beach Park. The City and County of Honolulu owns and maintains Pāpipi Road east of Pūpū Street. West of that point the road becomes the One'ula Beach Park access road, and is located within an easement on HASEKO property.



Prepared For:

HASEKO (Ewa) Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

--City & County of Honolulu GIS
--USGS 7.5' Quad Map 'Ewa

Figure 1-1:

Location Map

Pāpipi Road Drainage Improvements Project

Figure 1-1 Location Map 2005-01-10.mxd

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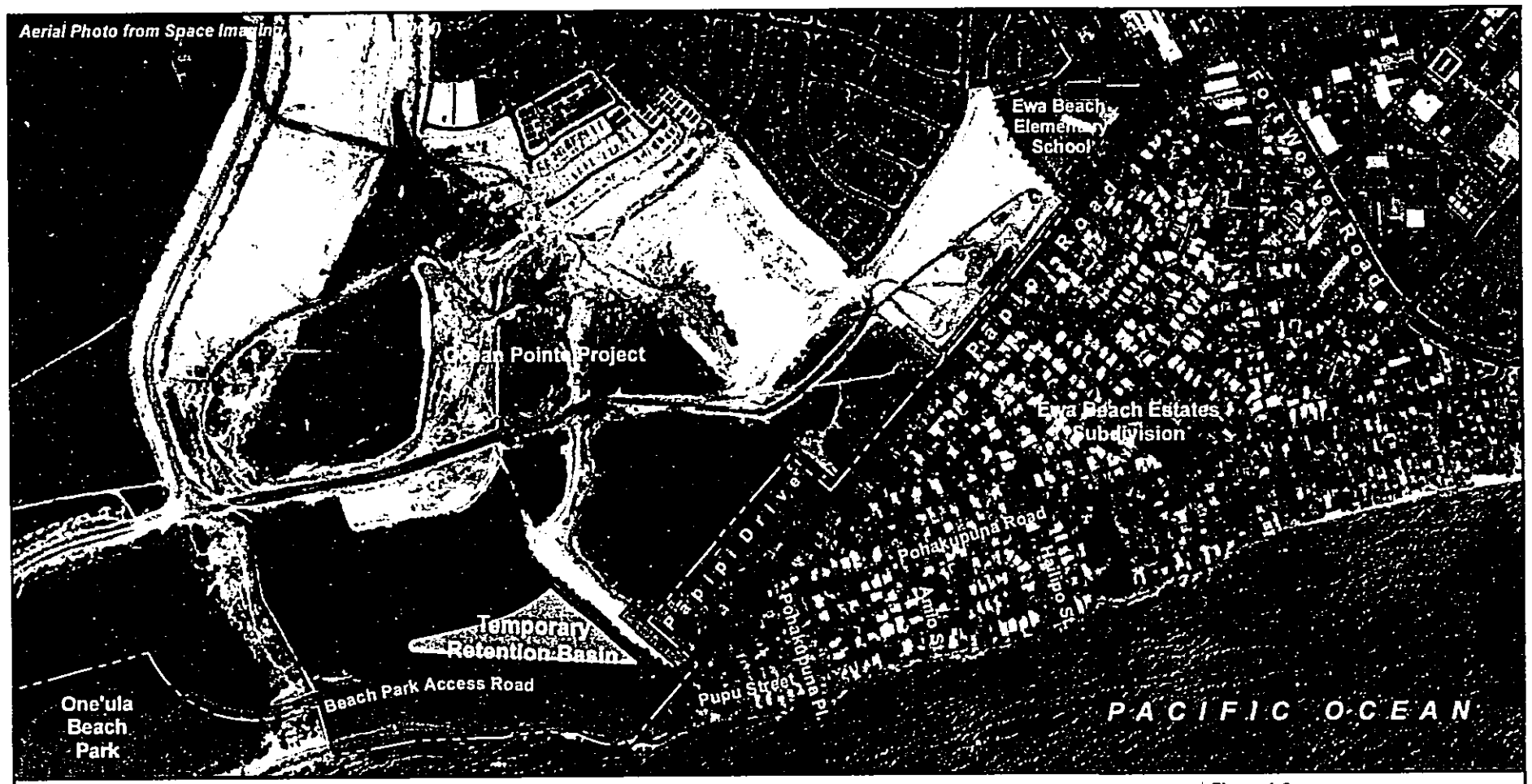

Prepared For:

HASEKO (Ewa) Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

–R.M Towill Corp.
–City & County of Honolulu GIS

Legend:

Ocean Pointe Property Boundary

Tributary Drainage Area

0 500 1,000 2,000
Feet

Figure 1-2:

Project Area

Pāpipi Road Drainage Improvements Project

Figure 1-2 Project Site 2001-01-10.mxd

Pāpipi Drive, which is owned and maintained by the City and County of Honolulu, is a closed loop road with both access points along Pāpipi Road. Figure 1-2 shows the relationship of the roads to surrounding development. 'Ewa Beach Estates subdivision is situated along the *makai* side of the Pāpipi Road.

1.3 EXISTING STORMWATER DRAINAGE SYSTEM

Pāpipi Road is a two-lane, two-way, rural-standard roadway (see Figure 1-3 for photographs). The asphaltic concrete pavement varies from 20 to 22 feet in width. Its shoulders are unpaved, there is a narrow asphaltic concrete sidewalk along the makai edge of the roadway, and there is no underground storm drain system, except for inlets at Hailipo and Aikanaka Streets. The right-of-way width is 64 feet between Fort Weaver Road and Hailipo Street and 74 feet between Hailipo Street and Pūpū Street. The roadway pavement is offset within the right-of-way and has a *makai* shoulder width of approximately 36 feet and a *mauka* shoulder that varies from 7 to 14 feet. Pāpipi Road slopes gently downward from northeast to southwest. From a high point in front of the 'Ewa Beach Elementary School to a low point at Pūpū Street the longitudinal slope ranges from flat to 0.2%, averaging about 0.1%. There is a slight crown in the road. Because of this, runoff from the two sides remains separated under low rainfall conditions.[1]

Runoff from the *mauka* half of the roadway flows off the roadway along the shallow swale in the unimproved *mauka* shoulder in a westerly direction toward low-lying areas *mauka* of the Pāpipi Subdivision. Off-site runoff from lands *mauka* of Pāpipi Road sheetflows down to the roadway where it is diverted westward along the swale to the low-lying areas. Runoff from the *makai* side of Pāpipi Road flows into a roadside swale. The longitudinal slope along Pāpipi Road is very mild and ponding is common along the *makai* side between driveways that have been constructed across this swale. Some of the runoff from this *makai* area eventually enters the 'Ewa Beach Estates drainage system. In the absence of a drainage outlet to the ocean, the ponded water remains until it evaporates or percolates into the ground. Photographs of the area following rainstorms on December 1, 2003, and February 28, 2004, are reproduced in Figure 1-4.

The homes along the *makai* side of Pāpipi Road are served by two drainage systems utilizing 18- to 42-inch pipe culverts. One system runs along Hailipo Street and the other runs along Aikanaka and Amio Streets: both systems exit to the ocean through separate outfalls. In addition to these, stormwater runoff from the 'Ewa Beach Estates Subdivision enters the ocean through several other outfalls located along the shoreline. The locations of these discharge points are shown on Figure 1-5. These systems were designed to accommodate runoff from a storm event with a 20-year recurrence interval.

1.4 NEED FOR ADDITIONAL STORM DRAINAGE FACILITIES

Flooding has long been a problem for the homes adjacent to Pāpipi Road. Ponding on the roadway slows vehicle access as well. The two existing 'Ewa Beach Estates drainage systems cannot accept additional runoff. Hence, it is not possible to resolve the problem by diverting runoff from the mauka side of the roadway into those systems. The additional runoff expected to result from the redesign of the retaining wall and new sidewalk that HASEKO has agreed to undertake within Ocean Pointe *mauka* of Pāpipi Road will increase the amount of stormwater reaching the Pāpipi Road corridor. Even with the change, the stormwater runoff volume reaching Pāpipi Road will be less than it was before HASEKO began developing the Ocean Pointe project.

[1] Heavy rains sometime cause enough ponding that the level of the ponded water rises above the elevation of the roadway crown. When that occurs, stormwater can cross from one side of the road to the other.

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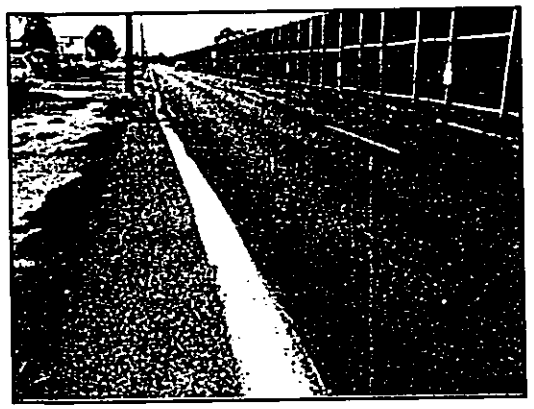

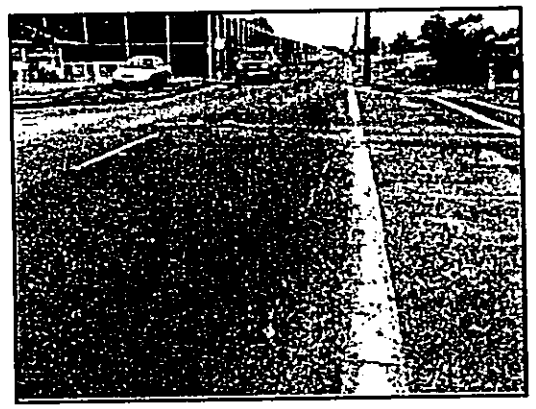

Prepared For:
Haseko (Ewa), Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
Planning Solutions, Inc. (2004)

Figure 1-3:

Photographs of the Project Area

Pāpipi Road Drainage Improvements Project

Figure 1-3 Photographs of the Project Area 2005-01-10.cdr

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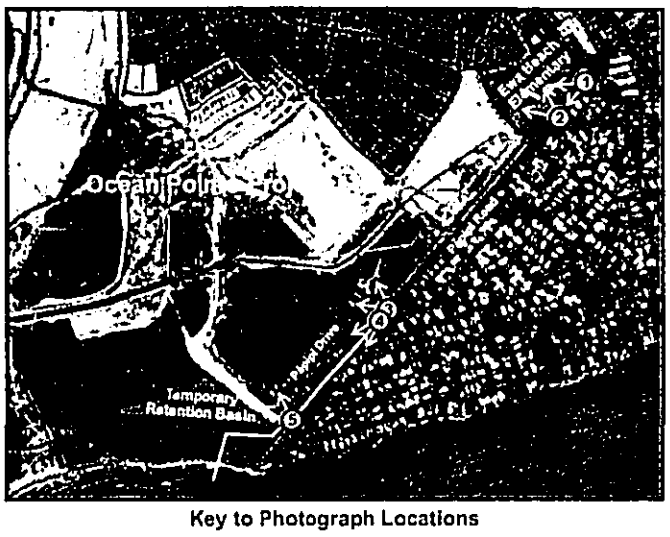
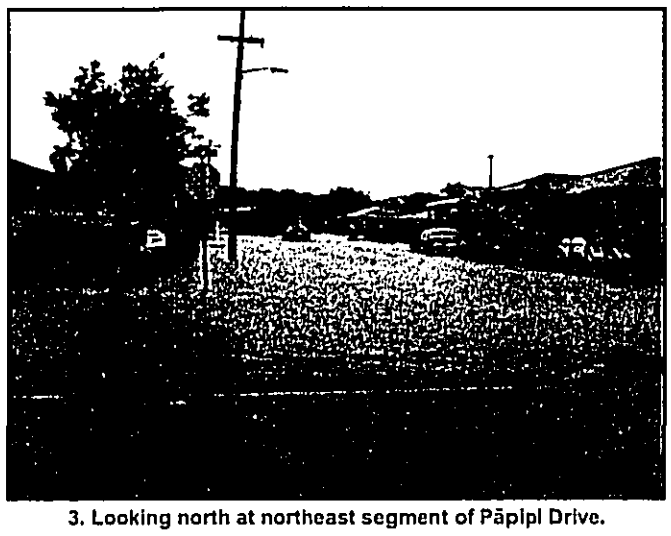
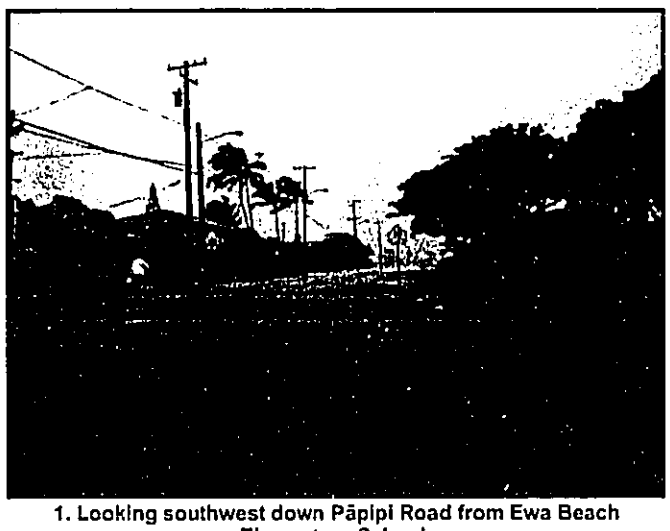


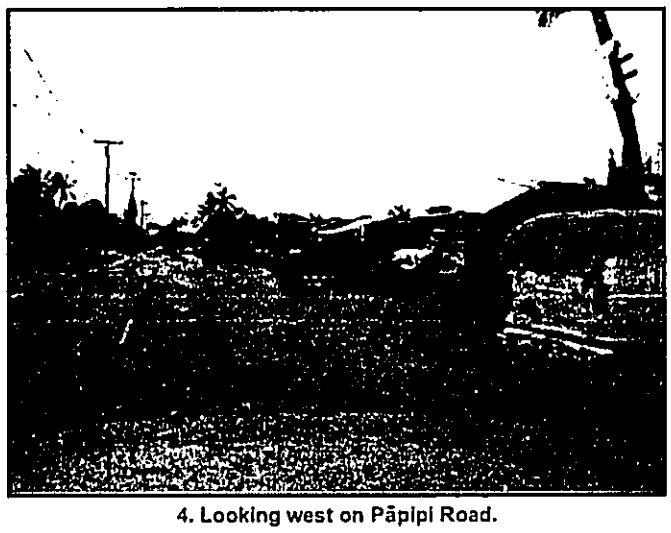
Key to Photograph Locations



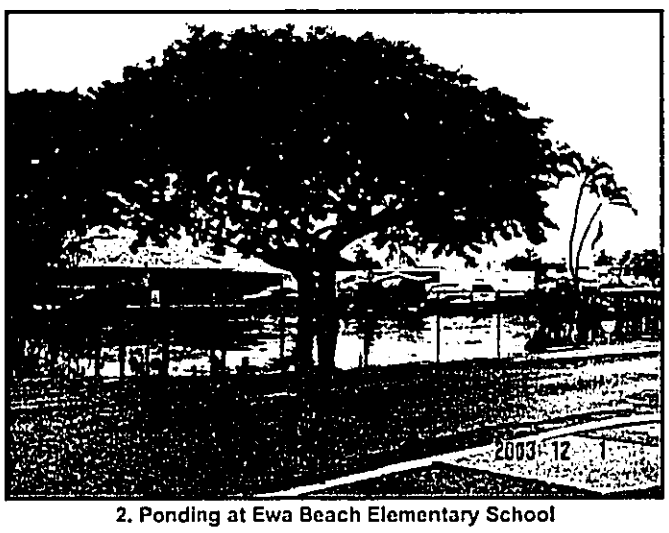
3. Looking north at northeast segment of Pāpipi Drive.



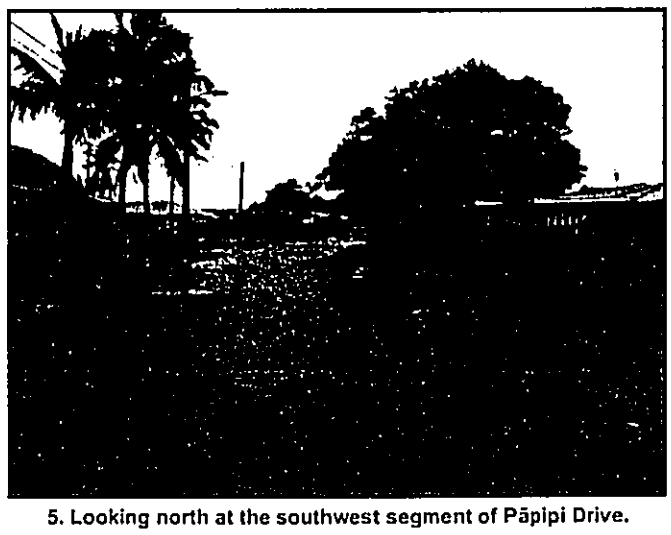
1. Looking southwest down Pāpipi Road from Ewa Beach Elementary School.



4. Looking west on Pāpipi Road.



2. Ponding at Ewa Beach Elementary School



5. Looking north at the southwest segment of Pāpipi Drive.

Prepared For:
HASEKO (Ewa), Inc.

Prepared By/Source:
PLANNING SOLUTIONS

Legend:

Figure 1-4:
Ponding Along Pāpipi Road

Pāpipi Road Drainage Improvements Project

RECEIVED AS FOLLOWS

Prepared For:

HASEKO (Ewa) Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

--R.M Towill Corp.
--City & County of Honolulu GIS

Legend:

Existing Stormwater Drain Lines

Ocean Pointe Property Boundary

Figure 1-5:

Existing Stormwater Discharges Along 'Ewa Beach Shoreline

Pāpipi Road Drainage Improvements Project

1.5 OVERALL OBJECTIVES OF THE PROJECT

After reviewing a range of alternatives and in consultation with government agencies and residents of the Pāpipi Road area, HASEKO has established the following objectives for the proposed action:

- Accommodate increased runoff expected to occur with the completion of a new sidewalk and retaining wall *mauka* of Pāpipi Road, the short extension to Pāpipi Road, and the relocated One'ula Beach Park access road.
- Improve drainage and reduce the risks of flooding for existing properties along Pāpipi Road
- Comply with the requirements set out in the *City and County of Honolulu Storm Drainage Standards* (DPP 2000) so that the storm drainage system can be dedicated to the City.
- Design the new system so that it will be compatible with potential future improvements to the system that may be undertaken by the City and County of Honolulu.
- Provide an opportunity to accommodate stormwater runoff from the City and County's proposed One'ula Beach Park expansion.
- Limit the impact that construction and maintenance of the proposed facilities would have on the surrounding environment.
- Maintain overall project costs at an affordable level and utilize a design that can be implemented within a reasonable period of time.

1.6 ORGANIZATION OF THE ENVIRONMENTAL ASSESSMENT

The remainder of the document is organized as follows:

- Chapter 2 provides a detailed description of the proposed action, including the design of the proposed storm drain system, the anticipated stormwater runoff volumes, and the approximate schedule and cost of the construction activities. It also summarizes the alternatives HASEKO considered (including "No Action"), and the reasons why they are no longer being considered.
- Chapter 3 introduces the environmental and social characteristics of the properties affected by the project, discusses the potential impacts of the project on those areas, and where applicable, details mitigation measures that will be used to minimize those impacts.
- Chapter 4 discusses the project's compliance with applicable laws and planning documents at county, state, and federal levels.
- Chapter 5 evaluates the project against the HRS Chapter 343 criteria for determining whether a project has significant environmental impacts.
- Chapters 6 and 7 list the parties and references consulted during the preparation of the EA, respectively. Chapter 6 also includes a list of agencies and individuals who will receive a copy of the FEA.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

Hawai'i Administrative Rules (HAR), §11-200-9 and §11-200-10 (sections in the Department of Health's Environmental Impact Statement Rules) provide the framework for considering alternatives. These sections do not describe the way in which alternatives are to be selected, but HAR §11-200-17, which deals with the content of Environmental Impact Statements, provides guidance useful in determining how to go about identifying alternatives for the purpose of environmental assessments. Specifically, §11-200-17(f) states:

> *(f) The draft EIS shall describe in a separate and distinct section alternatives which could attain the objectives of the action* (emphasis added), *regardless of cost, in sufficient detail to explain why they were rejected. The section shall include a rigorous exploration of the environmental impacts of all such alternative actions. Particular attention shall be given to alternatives that might enhance environmental quality or avoid, reduce, or minimize some or all of the adverse environmental effects, costs, or risks. Examples of alternatives include:*
>
> *(1) The alternative of no action;*
>
> *(2) Alternatives requiring actions of a significantly different nature which could provide similar benefits with different environmental impacts;*
>
> *(3) Alternatives related to different designs or details of the proposed action which would present different environmental impacts;*
>
> *(4) The alternative of postponing action pending further study; and*
>
> *(5) Alternative locations for the proposed project.*
>
> *In each case the analysis shall be sufficiently detailed to allow a comparative evaluation of the environmental benefits, costs, and risks of the proposed action and each reasonable alternative.*

The objectives listed in Section 1.5 of this report were used in identifying the alternatives described below for inclusion in this evaluation. This chapter is organized as follows:

- Section 2.2 describes the proposed action, the installation of the drainage improvements.
- Section 2.3 describes the alternatives that were eliminated from further analysis and the reasons for their exclusion from the impact analysis.
- Section 2.4 describes the "No Action" alternative and why it is not a viable alternative.

2.2 PROPOSED ACTION: PĀPIPI ROAD DRAINAGE IMPROVEMENTS

The proposed drainage system will consist of an underground culvert with curbs, gutters and catch basins along the Ocean Pointe frontage, i.e., along the *mauka* side of the roadway (see Figure 2-1). Curbs and gutters will not be used along the Pāpipi Subdivision area since runoff from the existing house lots would be impeded by a raised curb along the roadway; a grassed swale with grated drain inlets will be used instead. An underground culvert with curbs, gutters, and catch basins will be used to the west of the Pāpipi Subdivision. The upstream end of the drainage system, which will have an underground storm drain similar to the drainage system that will front the Ocean Pointe area, will extend to a low point in front of the 'Ewa Beach Elementary School. In addition to the drainage system along the Pāpipi Road, a drainage system will also extend along the *mauka* side of the Pāpipi Subdivision to drain runoff from the existing lots and future wall.

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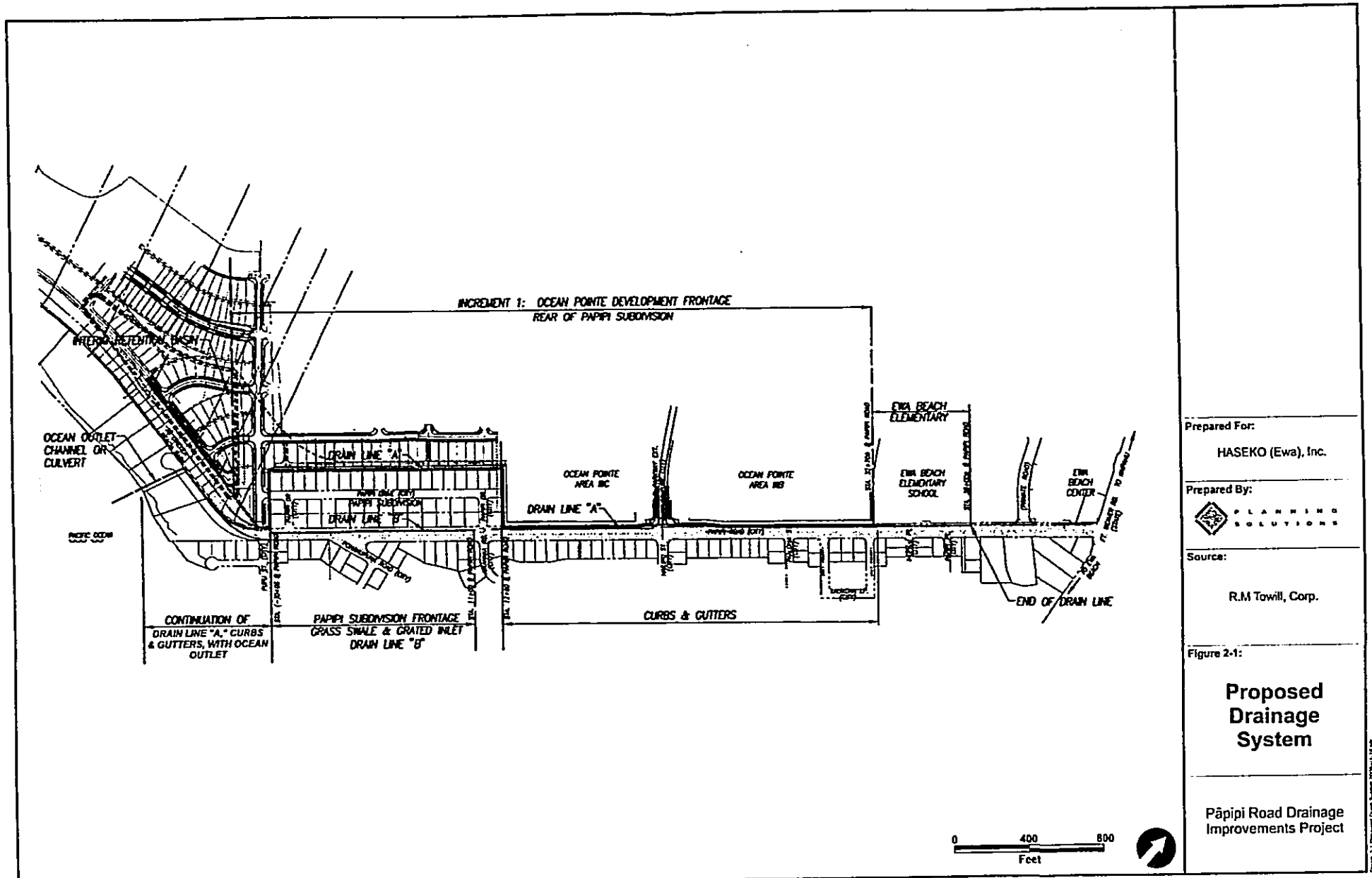


Prepared For:

HASEKO (Ewa), Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

R.M Towill, Corp.

Figure 2-1:

Proposed Drainage System

Pāpipi Road Drainage Improvements Project

The total length of the improvements along Papipi Road is approximately 4,500 feet. A new outlet will be used because the existing 'Ewa Beach Estates systems lack excess capacity. The project will be constructed in two increments, as shown on Figure 2-2, and will be dedicated to the City upon completion. A drainage easement will be created in favor of the City for portions that are outside the City road right-of-way. HASEKO expects to maintain the landscape strip over the easement and will coordinate with the City and County of Honolulu Department of Facilities Maintenance for maintenance of the inlets and silt traps.

2.2.1 INCREMENT 1 IMPROVEMENTS

Increment 1 entails the installation of the majority of the system. This includes the inlets and underground conduits that make up the portion of "Drainline A" that lies to the east of the interim retention basin. Drawings depicting typical cross-sections of the underground pipes and culverts are reproduced in Figure 2-3. Details of the interim retention basin itself are shown on Figure 2-4 and Figure 2-5. Appendix C contains drawings that provide additional design details.

The portion of Drainline "A" that lies between the 'Ewa Beach Elementary School and the eastern side of the Pāpipi Subdivision is within the Pāpipi Road right-of-way. The remainder of the Increment I improvements are on HASEKO property.

Drainline "A" will consist of a box culvert and pipe system located generally along the *mauka* shoulder. A reinforced concrete box culvert will be used between the outlet channel and Kapolei Parkway due to the limited cover available along that segment.[2] The proposed box culvert varies in size from 10 feet wide x 2.5 feet deep to 4 feet wide x 2 feet deep. Upstream of Kapolei Parkway, 30- and 36-inch reinforced concrete pipes are used. A 30-inch stub is provided at the upstream end of the drainline at the 'Ewa Beach Elementary school property line for continuation in Increment 2. Drainline "A" will collect runoff from the *mauka* side of Pāpipi Road. It will also capture runoff from the proposed Ocean Pointe Area 3D wall and slope area and maintain drainage for runoff flowing *mauka* from the back side of Pāpipi Subdivision. Drainline "A" may also pick up overflow from the *makai* frontage of Pāpipi Road along the Ocean Pointe 3B and 3C areas. Additionally, Drainline "A" will be oversized to accommodate flows from areas beyond the Ocean Pointe frontage, including a portion of the school frontage, the lots fronting the *makai* side of Pāpipi Road, and from the entire Pāpipi Subdivision area.[3]

The temporary retention basin that is proposed for the area west of the Pāpipi Subdivision will accommodate the runoff that is collected in Drainline "A" until the permanent ocean outlet can be installed in the second Increment of the project.

The Increment 1 (interim) drainage system is sized to pick up runoff from Pāpipi Road between the 'Ewa Beach Elementary school and the Pāpipi Drive Subdivision as well as runoff from behind the Pāpipi Drive Subdivision.[4] The tributary area is approximately 20.4 acres and has a calculated peak discharge for a 50-year, 1-hour storm of approximately 53 cubic feet per second (cfs). The retention basin will retain approximately 20.2 acre-feet of runoff; this is sufficient to accommodate runoff from a 100-year, 24-hour storm event, as calculated using the Natural Resources Conservation Service curve number method.[5]

---

[2] The box culvert leading to the outlet channel is in Increment 2. Increment 1 box ends at the temporary retention basin.

[3] Due to the flatness of Pāpipi Road and the +1.7 MSL (feet above Mean Sea Level) elevation of the ocean outlet, the drain line will not meet the 2 feet minimum cover per City Drainage Standards beneath roadway sections. Therefore, the drain line will be placed within the shoulder area as much as practicable to minimize traffic loading. Drain lines that do not meet minimum cover depth will be structurally designed for the proper loading.

[4] The interim drainage improvements were sized in accordance with the City and County of Honolulu Storm Drainage Standards.

[5] The temporary retention basin will be designed to retain runoff within an effective storage area above the groundwater table (estimated to be at +2 feet MSL), allowing an effective retention depth of 3.5 feet based on a maximum water surface of 5.5 feet.

RECEIVED AS FOLLOWS

Aerial Photo from Space Imaging, Inc. (August, 2004)

Figure 2-2:

Prepared For:

HASEKO (Ewa) Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

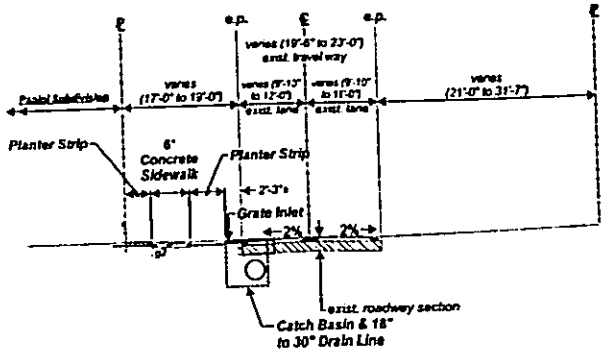
--R.M Towill Corp.
--City & County of Honolulu GIS

Legend:

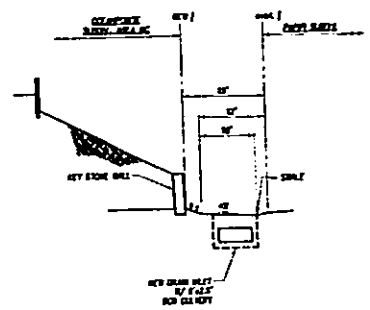
- Pāpipi Road Drain: Increment 1
- Pāpipi Road Drain: Increment 2
- Ocean Pointe Property Boundary
- Tributary Drainage Area

Project Increments

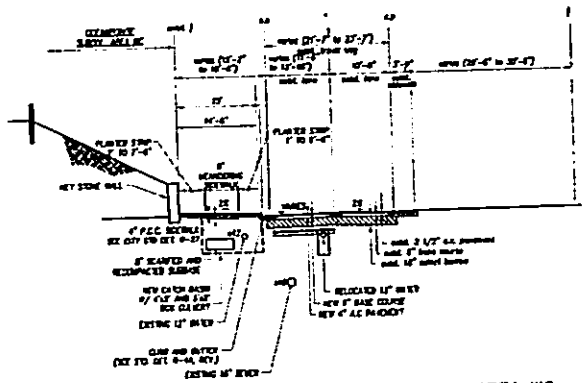
Pāpipi Road Drainage Improvements Project



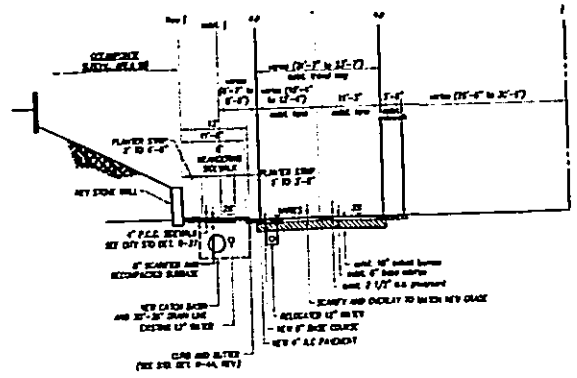
TYPICAL SECTION – PAPIPI SUBDIV.
Makai Side



TYPICAL SECTION – PAPIPI SUBDIV.
Mauka Side



TYPICAL SECTION – OCEAN POINTE SUBDIV., AREA IIIC



TYPICAL SECTION – OCEAN POINTE SUBDIV., AREA IIIB

0 10 20
Feet

Prepared For:
HASEKO (Ewa), Inc.

Prepared By:
PLANNING SOLUTIONS

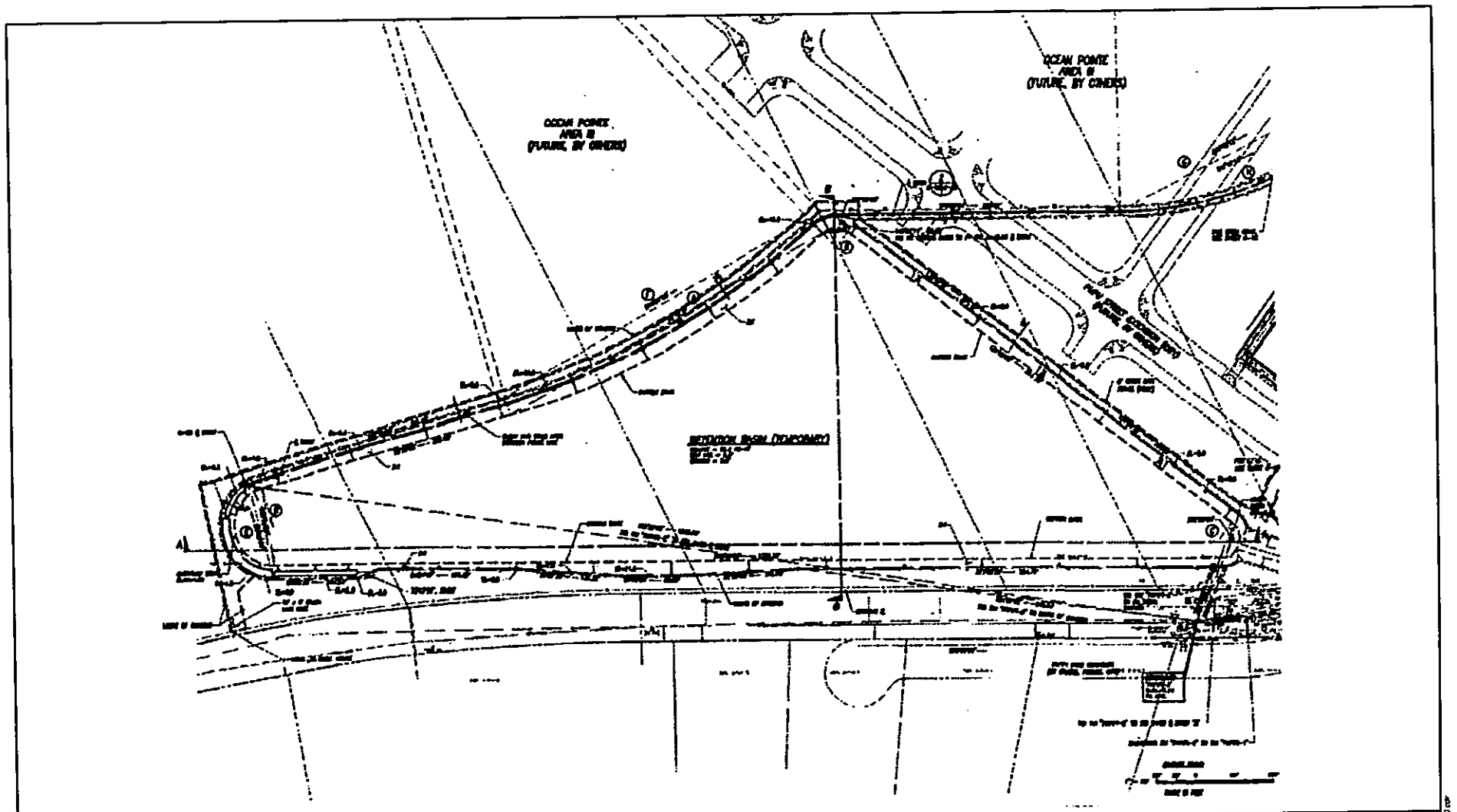
Source:
R.M. Towill, Inc.

Figure 2-3:

Typical Cross-Sections

Pāpipi Road Drainage Improvements Project

Figure 2-3 Typical Cross-Sections 2003-01-10.dgn



Prepared For:
HASEKO (Ewa)

Prepared By:
PLANNING SOLUTIONS

Source:
R.M. Towill, Corp. (2004)

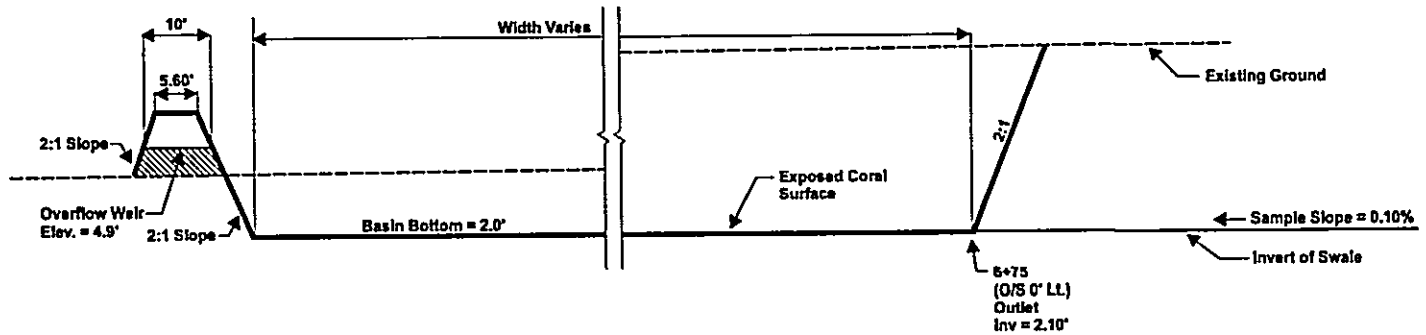
0 50 100 200
Feet

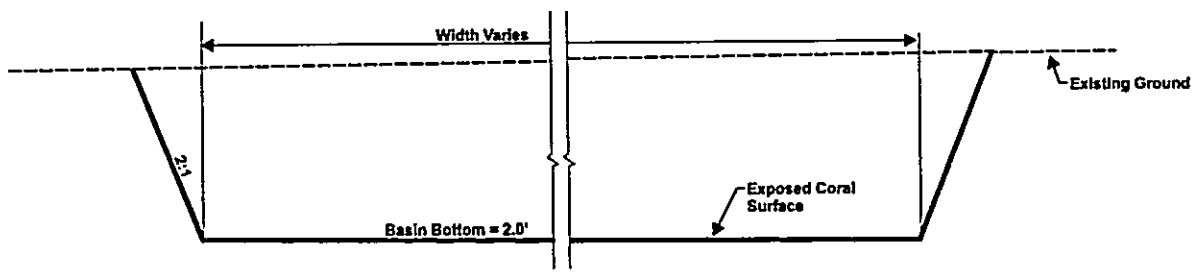
Figure 2-4:

Temporary Retention Basin: Plan View

Pāpipi Road Drainage Improvements Project

Figure 2-4 Temporary Retention Basin Plan View 2005-01-10.cdr





0 5 10 20
Horizontal Feet

0 2 4 8
Vertical Feet

Prepared For:
HASEKO (Ewa)

Prepared By:
PLANNING SOLUTIONS

Source:
R.M. Towill, Corp. (2004)

Figure 2-5:

Temporary Retention Basin: Cross-Section

Pāpipi Road Drainage Improvements Project

Figure 2-5 Temporary Retention Basin Cross Section 2005-01-10.ctf

2.2.2 INCREMENT 2 IMPROVEMENTS

During the second increment of the project, Drainline "A" will be extended from its previous terminus near Pūpū Street to connect to the ocean outlet (within HASEKO property). This will be done in conjunction with roadway improvements needed to connect Pāpipi Road with the realigned One'ula Beach Park access road. Drainline "A" will also be extended towards the 'Ewa Beach Elementary school and Drainline "B" will be installed along the mauka side of Pāpipi Road fronting the Pāpipi Subdivision (both within the road right-of-way). Once the ocean outlet described below is completed, the temporary retention basin will be abandoned. Drainline "A" will connect to a new drain outlet to the ocean that HASEKO proposes to construct at the eastern end of the 9.4-acre parcel that it has agreed to donate to the City as part of its unilateral agreement. The City will use the additional land to expand One'ula Beach Park.

The outlet will consist of a 25 foot-wide rock or coral open channel. The bottom of the channel will be 1.7 feet above mean sea level (MSL) at the shoreline, rising to approximately +1.9 feet MSL at the *makai* side of the relocated park access road where the drainage system transitions to underground conduits via a concrete headwall. A chain link fence will be installed above the headwall as a safety measure. The outlet invert of +1.7 MSL was used to minimize impact to the shoreline and maintain access along the beach. The outlet could not be made higher due to the low-lying condition of the area being drained. The new ocean outlet will be oversized to accommodate portions of One'ula Beach Park that will front future phases of Ocean Pointe Area 3. It is important to note that, because of the low elevation of the outlet of the proposed coral channel (1.7 feet above mean sea level), ocean water will enter it during most high tides.

Increment 2 will also include the installation of Drainline "B" along the *mauka* side of Pāpipi Road fronting the Papipi Subdivision between Aikanaka Street and Pūpū Street. Drainline "B" will consist of a reinforced concrete pipe varying in diameter from 18- to 30-inches. This drain will collect runoff from the *mauka* side of Pāpipi Road and will use a grassed swale with grated drain inlets. This line will also be slightly oversized so that the owners of lots fronting the *makai* side of Pāpipi Road will be able to connect to it in the future.

Upon completion of the drainage system, groundcover and landscaping will be established in unpaved areas. A sidewalk and City-approved landscaping will be installed on the *mauka* side of Pāpipi Road in accordance with HASEKO's 2003 Planned Development Housing Decision and Order for Area 3 (PDH-3). The landscaping design will be finalized through continued cooperation with the City.

2.2.3 CONSTRUCTION SCHEDULE

Major schedule milestones for the proposed project are as follows:

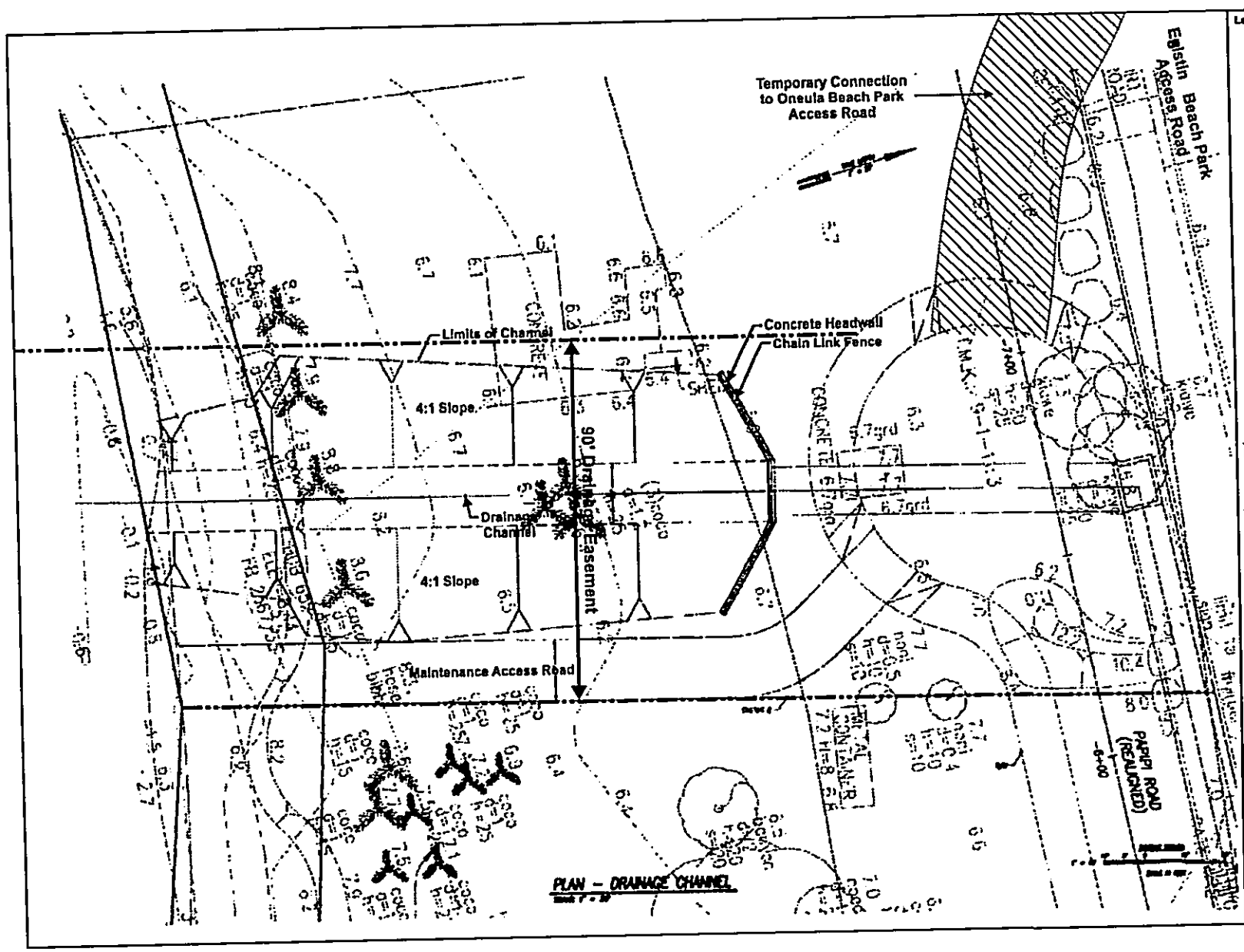
- Complete Chapter 343 Environmental Assessment Process – 2nd Quarter 2005.
- Increment 1 Permits Completed – 2nd Quarter 2005.
- Increment 1 Construction Completed – 4th quarter 2005.
- Ocean Outlet Permits Obtained – 3rd quarter 2005.
- Increment 2 Construction Completed – 2nd quarter 2006.

2.2.4 ANTICIPATED COSTS

The estimated costs of the proposed improvements are summarized in Table 2-1.

Table 2-1. Estimated Costs

Item	*Order-of Magnitude Cost (in million$)*
Increment 1 Construction	4.9
Increment 2 Construction	3.2
TOTAL	**8.1**
Source: R.M. Towill Corporation, personal communication December 29, 2004.	



Legend:

Prepared For:

HASEKO (Ewa), Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

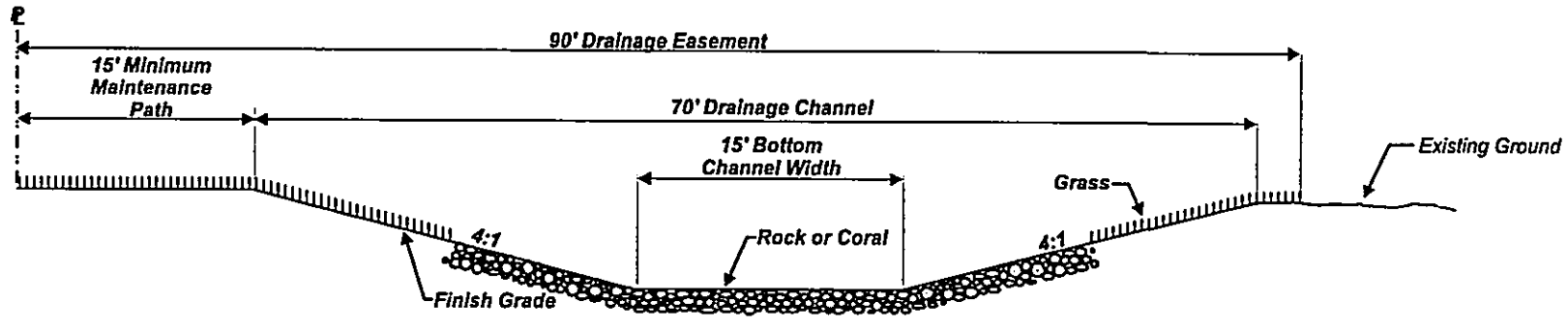
RM Towill, Corp.

Figure 2-6:

Plan View of Ocean Outlet

Pāpipi Road Drainage Improvements Project

Figure 2-6 Plan View of Ocean Outlet 2005-01-10.cdr



Prepared For:
HASEKO (Ewa), Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
RM Towill, Corp. (2004)

Figure 2-7:

Section View of Proposed Ocean Outlet

Pāpipi Road Drainage Improvements Project

Figure 2-7 Section View of Proposed Ocean Outlet 2005-01-10.cdr

2.3 ALTERNATIVES CONSIDERED AND ELIMINATED

HAR §11-200 requires *"consideration of Alternatives related to different designs or details of the proposed action which would present different environmental impacts."* It also requires the consideration of "reduced-scale" or delayed action. HASEKO evaluated these alternative ways of addressing increased risks of flooding on the basis of their effectiveness, reliability, feasibility of implementation, and cost. The reasons why they were judged unacceptable are outlined below.

2.3.1 DELAYED ACTION

Delaying implementation of the proposed drainage improvements would not meet the objectives of the proposed action as outlined in Section 1.5 above. Specifically, delay would:

- Extend the time during which the residents of homes along Pāpipi Road would continue to be exposed to periodic flooding.
- Make it impossible for HASEKO to fulfill its promise to residents of Pāpipi Road to lower the retaining wall that it constructed adjacent to portions of the road and to install a drain system.
- Leave the Pāpipi Road area with a drainage system that does not meet modern drainage design standards.

In view of the foregoing, delay is not a viable alternative to the proposed project.

2.3.2 ALTERNATE LOCATIONS OF DRAINAGE & OUTFALL STRUCTURES

HASEKO believes that the drainage improvement design that it has proposed is the best means of achieving the objectives of the proposed action. The proposed drainage inlets and collection pipes are underground and are sized to accommodate the design flows. The drain culvert location is designed for hydraulic efficiency by aligning the inlets nearly over it. Relocating the drain location would reduce the safety factor in the system. While the exact location of the inlets could be changed, this would have little effect on their environmental impacts.

The proposed location for the temporary retention basin is the only area that is suitable and cannot, therefore, be relocated. The ocean outlet is positioned on the edge of the area that is designated for the expansion of One'ula Beach Park. It could be shifted further into the Park, but this would place it closer to the sandy areas that are most desirable for recreational use and would not have any apparent environmental benefits. The outlet location could also be shifted westward into the two shoreline parcels that HASEKO is retaining for development. Such relocation would move the outfall around the headland of the proposed outfall site and closer to the existing storm drain outfalls in 'Ewa Beach. It would also make it more difficult to accommodate the drainage from the eastern side of the park. For these reasons, no other locations are still being considered.

2.3.3 OTHER DESIGN VARIATIONS

2.3.3.1 Channel Design Variations

HASEKO considered the possibility of using underground conduits instead of an open channel to discharge water into the Pacific Ocean. However, this would require substantial offshore excavation and disturbance to the nearshore area. It would also lack the retention and filtration capacity of the proposed open swale. Because of these factors, it would have greater environmental impacts than the proposed action and has thus been eliminated from consideration.

HASEKO also considered using an artificial lining for the channel such as concrete, as opposed to the proposed natural coral lining. While this would make maintenance of the channel slightly easier, it does not pose significant advantages over the natural coral lining. The natural coral channel offers the advantages of slight permeability, which would allow infiltration of some of the storm water that would otherwise reach the ocean during small storm events. Further, neither lining would be

particularly vulnerable to erosion, as they are both hard substrates and the very slight slope within the channel creates a low energy situation. Finally, a rectangular concrete-lined channel would be visually less pleasant to users of the beach park, particularly because it would require a fence along the sides for safety. Thus, HASEKO favors natural coral as the channel lining.

2.3.3.2 Runoff Disposal Alternatives

HASEKO's agreement to construct the proposed drainage improvements was based in part on the understanding that the system would discharged into an ocean outlet. The retention basin that it has proposed as part of Increment 1 of the project was intended to handle runoff only for the time it takes HASEKO to secure the permits needed for the permanent ocean discharge.

Because it is impossible to be sure that the proposed discharge will ultimately be approved, HASEKO did consider the possibility of using the retention basin as a permanent means of accommodating runoff from the area that would be served by the proposed system. Two different possibilities were evaluated: (1) the same location as the temporary retention basin that will collect runoff during Increment 1 and (2) a location within the 9.4-acre parcel that HASEKO has promised to dedicate to the City and County of Honolulu so that the City could expand and improve One'ula Beach Park. The first location is impractical because it would make it impossible to construct the homes and other improvements that are planned for that area, depriving HASEKO of sales revenue critical to the Ocean Pointe project's economic viability. The second location was eliminated as it would reduce the area of land available for recreational use after HASEKO dedicates the area to the City and County of Honolulu for the future expansion of One'ula Beach Park.

HASEKO also considered using subsurface chambers for disposal of runoff through infiltration. This was the original system proposed, but the City and County of Honolulu indicated that it would not accept dedication of such a non-standard system. Because the principal beneficiary of the drainage improvements are the existing residents of the Pāpipi Road area, HASEKO is unwilling to install a system that would be an ongoing maintenance burden to the Ocean Pointe Homeowners' Association.

2.3.3.3 Drainage System Routing

HASEKO's original drainage concept called for the main drain line to run straight along Pāpipi Road past the Pāpipi Subdivision frontage rather than turning mauka to go behind the subdivision. In this original plan, a smaller drain line was to have been used along the base of the Area III wall adjacent to the Pāpipi Subdivision. That drain line is needed to capture runoff from the rear of the Pāpipi Subdivision lots and runoff from the proposed Area III wall and fill slope.

HASEKO switched to the proposed plan when it became evident that this would reduce impacts to the community during construction along Pāpipi Road fronting the Pāpipi Subdivision. With the primary (larger) drain line routed behind the Papipi Subdivision, the drain fronting the Pāpipi Subdivision is able to be much smaller in size (18- to 30-inch pipe culverts versus the original 8-foot wide by 2.5-foot high box culvert). While the present design will require more area within the Ocean Pointe site around the Pāpipi Subdivision than would alternatives that remain along Pāpipi Road, it will significantly reduce impacts to the community during construction by avoiding utility relocation and roadway reconstruction work that would have been required with the larger box culvert. For example, the existing utility lines fronting the Pāpipi Subdivision would have to be reconstructed if a larger drainline was to occupy that space. Because the proposed design provides the required drainage capacity with reduced construction impacts, the alternative of routing the major drain line within Pāpipi Road is no longer under consideration.

HASEKO also explored the possibility of routing the line within the Pāpipi Drive right-of-way. Because a line in this location would not eliminate the need to locate another drain line between the rear of the existing Pāpipi Subdivision lots and the Area III fill slope, this alternative did not meet the objectives of the proposed action. Consequently, it is no longer being considered

2.4 NO ACTION

HAR, §11-200-17(f)(1) requires an evaluation of "No Action". In the case of HASEKO's proposed drainage improvements, "No Action" consists of failing to install or arrange for the installation of the drainage facilities needed to direct stormwater away from properties along Pāpipi Road and Pāpipi Drive. Failure to provide that drainage would allow these properties to continue to be flooded during large storm events. In either case, the stormwater drainage system would not be consistent with the Storm Drainage Standards of the City and County of Honolulu. The "No Action" alternative would not meet the objectives of the proposed action.

3.0 OVERVIEW OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

This chapter describes existing conditions within the area affected by the proposed action, discusses potential impacts, and describes measures that will be taken to minimize and mitigate those impacts. Most of the potential impacts of the project are associated with the construction Increment and are therefore temporary. The area that would be directly affected by the proposed action includes:

- The *mauka* side of Pāpipi Road from 'Ewa Beach Elementary School to just westward of Pūpū Street;
- Undeveloped lots within Ocean Pointe *mauka* of Pāpipi Drive (TMKs 9-1-012 portions 8, 9, and 48);
- The site of the temporary retention basin to be used during construction Increment 1 (TMK 9-1-012 portions 11 and 12);
- The oceanfront lots within Ocean Pointe located *makai* of Pāpipi Road (TMK 9-1-011 portions 1 and 2);
- A sliver of the State Conservation District immediately seaward of the shoreline fronting the proposed drainage outlet;

These affected areas are depicted on Figure 1-2. The remainder of the chapter is organized by topic (e.g., topography, hydrology, sound levels, etc.). Within each topic, the discussion is broken down into existing conditions, potential impacts, and, where appropriate, proposed mitigation measures.

3.1 PHYSIOGRAPHY AND TOPOGRAPHY

3.1.1 EXISTING CONDITIONS

The area affected by the proposed project is on the *makai* edge of O'ahu's southern coastal plain. Ground elevations along Pāpipi Road range from approximately 11 feet above sea level in front of 'Ewa Beach Elementary School to about 7 feet above sea level at its intersection with Pūpū Street. The ground elevation *mauka* of the Pāpipi Subdivision is slightly higher; the ground elevation of the area that would be crossed by the proposed drainage channel is slightly lower.

The retaining wall that HASEKO (Ewa), Inc. has constructed *mauka* of Pāpipi Road currently extends from 'Ewa Beach Elementary School to the planned Kapolei Parkway. The elevation of the land behind it is approximately +26 feet MSL. The land within the existing Pāpipi Subdivision located *mauka* of Pāpipi Drive actually slopes slightly away from the ocean, explaining the need for additional drainage infrastructure to serve that area. The land *makai* of Pāpipi Road generally slopes gently toward the ocean, with gradients of a few tenths of a percent or less. The shoreline at the location of the proposed drainage outlet consists of an exposed limestone bench that is just a few feet above sea level.

3.1.2 POTENTIAL IMPACTS

Underground Storm Drain System. Installation of the underground storm drain system will not alter the general topography of the area. In some areas the installation of curbs and sidewalks will raise the ground elevation by a few inches. In other areas through which the drain lines will pass the land will be returned to its original elevation after the storm drain has been installed and backfilling completed.

Ocean Outlet. Construction of the proposed ocean outlet will involve cutting a shallow channel through the elevated limestone shelf between the relocated One'ula Beach Park access road and the shoreline, a distance of approximately 200 feet. The excavation will permanently alter the topography of the shoreline. Engineers estimate that excavation for the channel will entail the

RECEIVED AS FOLLOWS

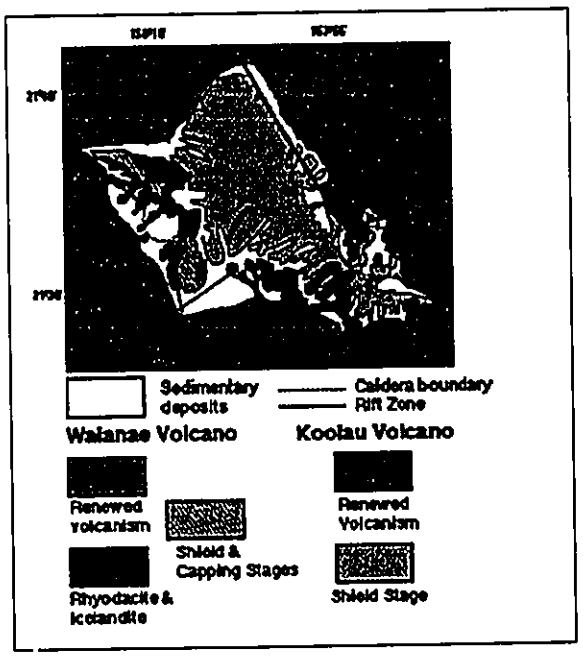
removal of approximately 2,000 cubic yards of material. This will be used as fill elsewhere on HASEKO's property. Because the bottom of the channel (situated at 1.7 feet above MSL) is below the ocean level at high tide, ocean water will be present in the channel on a regular basis. The grade changes that are planned are small and localized. Because the excavation will occur in hard limestone and will be above the active offshore sand cell, it does not have the potential to interfere with littoral processes. The presence of a water-filled channel does have the potential to affect other aspects of the environment (e.g., long-shore access), and these are discussed elsewhere in this report.

Temporary Retention Basin. Figure 2-4 and Figure 2-5 show the layout and cross-section of the temporary retention basin that HASEKO has proposed. The basin would occupy approximately 8 acres immediately inland of the 9.4 acres that HASEKO will dedicate to the City and County of Honolulu Department of Parks and Recreation to be used to expand One'ula Beach Park. The bottom of the temporary basin will be just above the ground water table (approximately +2 feet MSL) and the top will be approximately +6 feet MSL. Engineers estimate that approximately 57,000 cubic yards of material will need to be excavated to construct the basin. The material that is removed will be trucked to another location on the Ocean Pointe site and either used as fill or stored until the temporary retention basin is no longer needed. Once the need for the basin has ended, the area will be used for residential development that is planned as part of the overall Ocean Pointe project.

3.2 GEOLOGY AND SOILS

3.2.1 EXISTING CONDITIONS

O'ahu is the eroded remnant of the Wai'anae and Ko'olau volcanoes (see sketch to the right from Langenheim and Clague 1987). Lava flows from the western flank of the Ko'olau Volcano banked against the eastern flanks of the older Wai'anae Volcano to form the gently sloping surface of the Schofield Plateau between the two. The 'Ewa Plain, on which the new facilities would be constructed, is formed from emerged coral reefs and alluvial deposits that developed along the southern side of the island. The coralline reef deposits include carbonate sinkholes and solution channels; the surface expressions of these karst-like structures have been mostly filled by subsequent sedimentation. The 'Ewa Plain and Pearl Harbor receive the bulk of the sediments eroded from the Schofield Plateau as well as erosional products from the Southern Wai'anae and Ko'olau Ranges.



The soil types within the project area are classified as Coral Outcrop (CR) and fill land (Fd) (Foote et al. 1972). The former underlies Pāpipi Road and Pāpipi Drive and remains exposed in the coastal zone. The latter refers to the Ocean Pointe development *mauka* of Pāpipi Road, which has been filled with material excavated from the planned marina basin and graded in accordance with the Ocean Pointe Master Plan. According to the Agricultural Lands of Importance to the State of Hawai'i (ALISH) map, none of the lands affected by the project are defined as "prime" or "unique" by the State.

3.2.2 POTENTIAL IMPACTS

No important agricultural or mineral resources will be affected by the project. The coralline material through which the excavation will be done is relatively soft. Hence, no hoe-rams or jack-hammering will be needed for the excavation.

Soils engineers conducted subsurface testing along Pāpipi Road between Pūpū Street and the west entrance of Pāpipi Drive in 2003 as part of engineering for a new sewer line. They found that the soils generally consist of very loose to medium dense sands and gravels interbedded between layers of coral limestone. Their studies suggested that special construction techniques were appropriate for the 20-foot-deep trench needed for the sewer line. Because the storm drains that would be installed as part of the proposed Pāpipi Road drainage improvements would be generally above the water table, engineers believe that they can be installed using standard trenching techniques.

Engineers for the proposed improvements estimate that approximately 5,800 cubic yards of soil and sandy material would be permanently displaced during the installation of the underground storm drain system. This material would be used as fill elsewhere on the Ocean Pointe site unless the City wishes to take possession of the material that is excavated from within the road right-of way. An additional 2,000 cubic yards of material would be excavated during construction of the proposed outlet channel across to the shoreline. Most of the excavated material would come from above the water table and will not require special handling. If work is needed below the water table, the excavated material would be dewatered in bermed areas close to the work site before being trucked away and used for the ongoing Ocean Pointe development. No dewatering discharges into State waters will be required for the project. Best management practices will be used to ensure that excavated material is properly contained, treated, and disposed of.

3.3 MICROCLIMATE AND AIR QUALITY

3.3.1 EXISTING CONDITIONS

The Hawaiian Island chain is situated south of the large Eastern Pacific semi-permanent high-pressure cell, the dominant feature affecting air circulation in the region. Over the Hawaiian Islands, this high-pressure cell produces very persistent winds called the northeast trade winds. During the winter months, cold fronts sweep across the north central Pacific Ocean, bringing rain to the island chain and intermittently modifying the trade wind regime. Thunderstorms, which are rare but most frequent in the mountains, also contribute to annual precipitation.

Due to the tempering influence of the Pacific Ocean and their low-latitude location, the Hawaiian Islands experience extremely small diurnal and seasonal variations in ambient temperature. Average temperatures in the coolest and warmest months at Honolulu International Airport are 72.9° (January) and 81.4° (July), respectively. These temperature variations are quite modest compared to those that occur at inland continental locations. Additional temperature data from Honolulu International Airport are summarized in Table 3-1.

As noted above, the northeast trade winds predominate in the project area. Data from the Honolulu International Airport show that they are strongest and most persistent in the summer. During July, for example, winds from the northeast through east are present over 85 percent of the time and winds average just below 13 miles per hour. The trade winds become weaker and less persistent in the winter. During January, for example, winds from the northeast to east are present only 35 percent of the time and their average speed drops to 10.5 miles per hour. The island is also influenced by occasional *kona* storms, which are intense low-pressure centers that pass near the island, bringing moderate to strong southerly winds and rain. When the trade winds or storms do not dominate the wind flows, the winds are typified by land/sea breezes and *kona* winds.

Table 3-1. Average Monthly Temperature, Rainfall, and Humidity

	Normal Ambient Temperature, °Fahrenheit		*Average Monthly Rainfall (inches)*		
Month	*Daily Minimum*	*Daily Maximum*	*Monthly Minimum*	*Monthly Maximum*	*Average Relative Humidity (%)*
January	65.7	80.4	0.18	14.74	71
February	65.4	80.7	0.06	13.68	69
March	66.9	81.7	0.01	20.79	65
April	68.2	83.1	0.01	8.92	62.5
May	69.6	84.9	0.03	7.23	60.5
June	72.1	86.9	T	2.46	59
July	73.8	87.8	0.03	2.33	60
August	74.7	88.9	T	3.08	60
September	74.2	88.9	0.05	2.74	61.5
October	73.2	87.2	0.07	11.15	63.5
November	71.1	84.3	0.03	18.79	67
December	67.8	81.7	0.04	17.29	74.75
Note: "T" signifies a trace amount of rainfall (i.e., less than 0.01 inch).					
Source: DBEDT 2003 (Data from Honolulu International Airport).					

The terrain on O'ahu is influential in determining the amount of rainfall. While rainfall near the top of the Ko'olau Range on the windward side of O'ahu averages nearly 250 inches per year, annual rainfall at the project site averages only about 20 inches, an order-of-magnitude less. Most of the rainfall on the 'Ewa Plain occurs between December and April; from May through September it averages 1 inch per month or less. Although the project area is on the leeward side of the island, the humidity is still moderately high, ranging from the mid-60s to the mid-70s. While average rainfall is relatively low, intense rainfall events do occur. During the first 15 days of November 1996, record-breaking rainfall occurred along the leeward coast of the island. In Waianae, for example, 21 inches fell in an area where the average annual rainfall is 2 inches. In 'Ewa, 12.5 inches fell in 7 hours on the 5th of November, 1996, causing extensive flooding.

The State of Hawai'i Department of Health monitors ambient air quality on O'ahu using a system of 9 monitoring sites. The primary purpose of the monitoring network is to measure ambient air concentrations of the six criteria pollutants regulated by the National Ambient Air Quality Standards, which are particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide (NO_2) sulfur dioxide (SO_2), carbon monoxide, and hydrogen sulfide. Data from the nearby Kapolei Air Quality Monitoring Station, which measures pollution constituents of carbon monoxide, sulfur oxides, nitrogen oxide and particulates, indicate that the air quality in 'Ewa Beach is consistently within State and Federal regulatory limits. The major factor affecting air quality in the immediate project area is vehicular traffic along Pāpipi Road. Dust from construction activity at Ocean Pointe will also have some impact as work intensifies in Areas 3 and 5, located *mauka* of Pāpipi Road and One'ula Beach Park. However, the contractor's Best Management Practices Plan will mitigate the generation of dust by spraying water on disturbed areas as required.

3.3.2 POTENTIAL IMPACTS

The proposed project does not involve activities that have the potential to alter the region's climate or weather patterns. All of the permanent structures except the ocean outlet that are proposed are located underground; none of these have the potential to alter the microclimate. While the open channel that would allow runoff to pass through the future park area would have water in it some of

the time, the surface area is limited. Moreover, any effect its presence might have on the microclimate if it were located in an otherwise dry area would be overwhelmed by the effect of the adjacent Pacific Ocean. Consequently, no mitigation measures are necessary.

Construction activity will generate fugitive dust and other emissions in the immediate area. Measurable pollutants potentially generated by the project include particulate matter (e.g., dust generated by trenching), nitrogen oxide (NO_x) and carbon monoxide (CO) from construction vehicles. All of these pollutants are monitored in the project area by the Kapolei Air Quality Monitoring Station. These impacts will be limited to periods when excavation, temporary stockpiling, and backfilling is underway. The operation of vehicles, heavy equipment, and generators at the project site will temporarily generate pollutants.

The granular nature of the soil and the fact that most of the excavation will involve narrow trenches will limit the potential for adverse effects on air quality. All project actions will comply with DOH Rules Title 11, Chapter 59 and 60, regarding Air Pollution Control. For example, state air pollution control regulations require that there be no visible fugitive dust emissions at the construction site boundary. A dust control plan will be implemented by the project contractor to ensure compliance with state regulations. Fugitive dust emissions can be controlled to a large extent by watering of active work areas, using wind screens, keeping the adjacent portion of Pāpipi Road clean, and by covering open-bodied trucks. In addition, construction-related exhaust emissions will be mitigated by ensuring that project contractors properly maintain their internal combustion engines. Once construction work has ended and the affected areas have been stabilized, the potential for dust will diminish. Over the longer term, particulate levels throughout the entire area are likely to decline as construction activity ends in areas upwind of the project area and vegetation covers the retention basin and trenched areas that are not paved over.

The proposed temporary retention basin is a special situation. As the basin serves its intended function of retaining stormwater runoff, pariculates carried in the runoff will settle out in it. Between rainfall events, when the basin is dry, these sediments will be exposed to wind and will, therefore, be susceptible to becoming airborne. The sediment buildup in the retention pond is a function of the number and magnitude of runoff events, increasing over time. Because HASEKO anticipates that it will complete the ocean outlet and remove the temporary retention basin within one to two years of its creation, the buildup of soil particulates and the potential for the basin to become a significant source of airborne particulates is small.

3.4 HYDROLOGY

3.4.1 EXISTING CONDITIONS

There are no perennial streams, wetlands or other inland water bodies in the vicinity (State of Hawai'i, 1990). Chapter 1 of this report (see especially Section 1.3) describes the existing storm drainage pattern in the project area, noting that there is no pathway through which stormwater runoff from the project area can escape. This situation leads to the localized flooding that has historically occurred along Pāpipi Drive. That flooding is one of the principal reasons the drainage improvements that are the subject of this report have been proposed.

The project site is located over the extreme seaward edge of the Pu'uloa Sector of the 'Ewa (Limestone) Caprock Aquifer.[6] The 'Ewa Caprock aquifer consists of permeable limestone atop a relatively impervious layer of fossil coral reef interspersed with silt and clay. This aquifer is recharged through local rainfall and infiltration from surface water drainage. It is not potable. The water table in the vicinity of the project is typically at an elevation of just under +2 feet above MSL. The project site is seaward of the underground injection control (UIC) line established by the State

[6] Aquifer Code 30209 as designated by the State of Hawai'i Water Use Commission.

Department of Health. Consequently, it is not subject to the Department's UIC regulations (HAR §11-23). There are no active wells near the project. The nearest well feature is a dry disposal well located approximately one mile north of the proposed storm drain.

3.4.2 POTENTIAL IMPACTS

3.4.2.1 Surface Runoff Effects

Estimated Peak Runoff. The proposed drainage improvements are designed to intercept the stormwater runoff from an area totaling approximately 45 acres and convey it to the ocean (see Figure 3-1. Without these improvements, the stormwater will continue to pond and flood homes along Pāpipi Road. Creation of a new ocean outlet will increase the amount of stormwater runoff reaching coastal waters.

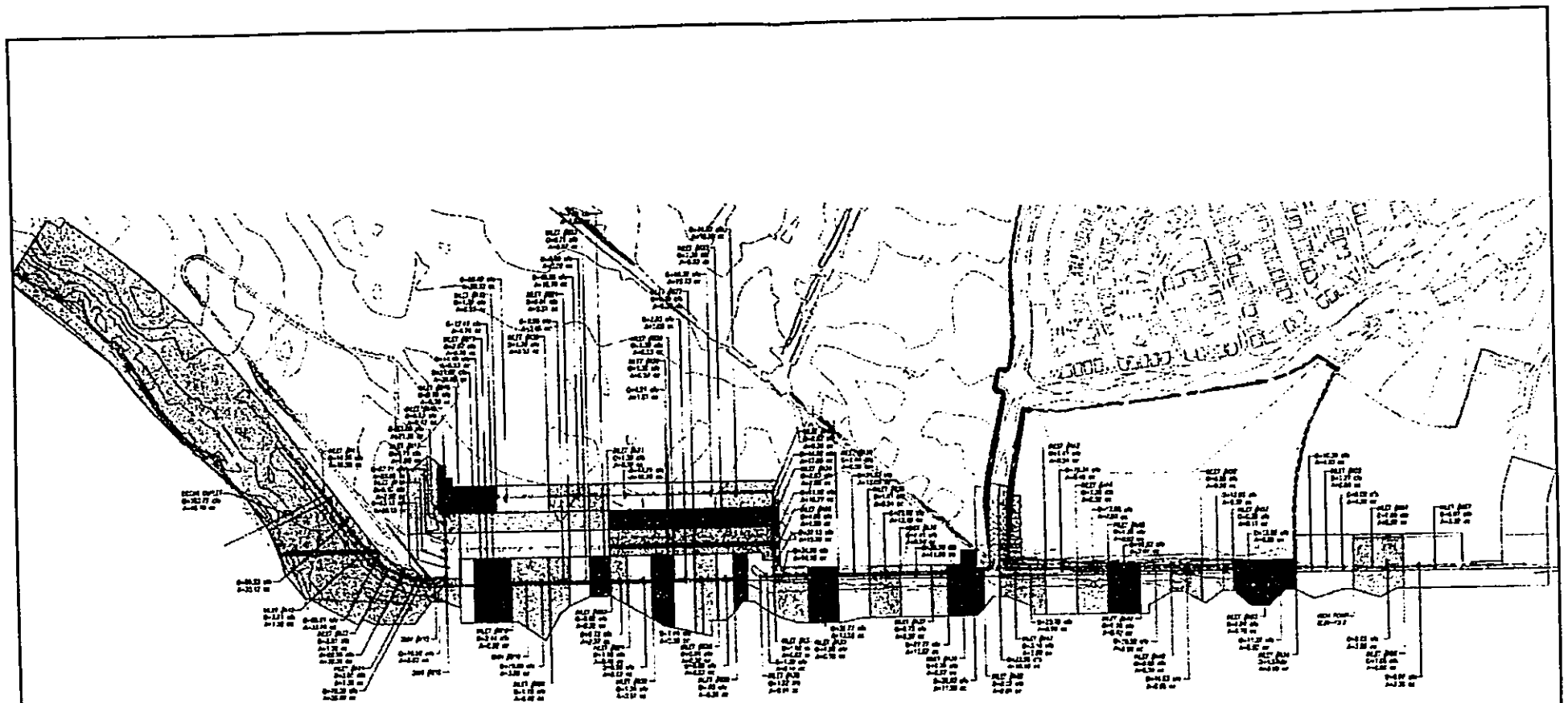
The project engineer has based its design for the ocean outlet on runoff amounts calculated in accordance with the City and County of Honolulu Storm Drainage Standards. The design event for the proposed project is the 50-year, 1-hour storm. The calculations assumed a rainfall depth of 2.2 inches and a runoff coefficient of 0.70. Using these factors and a drainage area of 45.7 acres, the engineer calculated that the peak discharge at the ocean outlet would be 104 cubic feet per second (cfs). Runoff from the area served by Drainline "A" was estimated to account for 74 cfs while runoff from the area served by Drainline "B" was estimated to have a peak discharge of 16 cfs for the 50-year, 1-hour event. The project engineer has also calculated the discharges from both smaller and larger events. It estimates the peak discharge from the 2-year and 10-year 24-hour events would be approximately 24 cfs and 56 cfs, respectively. The 100-year event is estimated to produce a peak discharge rate of 126 cfs.

Temporary Retention Basin. As previously discussed, the ocean outlet will be constructed in the second Increment of work. Until it is complete, runoff will be routed into the temporary retention basin. The interim drainage system is sized to pick up runoff from Pāpipi Road along Ocean Pointe areas 3B and 3C and the runoff generated behind Pāpipi Subdivision. The peak discharge from this 20.4-acre area, which is a subset of the larger area served by the completed system, is estimated at 54 cfs during a 50-year, 1-hour design storm.[7] With a capacity of just over 20 acre-feet, the retention basin can accommodate runoff from a 100-year, 24-hour storm event.

Because the drainage area tributary to the temporary retention basin is a relatively dry one, the basin would be completely dry the great majority of the time. Water could build up in the 3-foot deep basin and remain for brief periods during the rainy season or from discrete storm events at any time of year. The 1-year, 24-hour rainfall event is only a quarter the size of the 100-year event (approximately 3 inches versus 12 inches), and would deliver only about 20 to 25 percent as much runoff to the retention basin as the 100-year design storm. This, in turn would produce less than a foot of water within the basin. In view of the porous nature of the coralline substrate within which the basin would be excavated, engineers expect that at least one foot of water would percolate out the bottom of the basin in a 24-hour period. Hence, the time during which water would be present in the basin would be minimal.

In the extremely unlikely event that an even larger (and rarer) storm event was to occur, the retention basin could overtop. If that happened, water would flow over the *makai* edge at the weir first (because it is slightly lower than the top of the remainder of the basin, and flow overland into the surrounding park. The land there is flat, which means that the water that escapes would pond, remaining within the boundaries of the vacant area until it sinks into the ground or evaporates.

[7] Note that the size of the retention basin was established runoff volumes computed using the Natural Resources Conservation Service curve number method. With a capacity of just over 20 acre-feet, it can accommodate runoff from a 100-year, 24-hour storm event.



Prepared For:
Haseko (Ewa), Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
R.M. Towill, Corp.

Figure 3-1:

Drainage System Runoff

Pāpipi Road Drainage Improvements Project

3.4.2.2 Groundwater Effects

Because the proposed facilities are seaward of the underground injection control line, they do not have the potential to affect potable water sources. While their construction and operation would not substantially alter groundwater conditions in the area, they would cause some minor changes. The most notable of these stems from the fact that rainfall that presently ponds and eventually percolates into the ground would be collected and carried away from the roadway and adjoining lots. As a result, the water table would rise less during rainy periods than is presently the case. Groundwater quality, which is already brackish, would be slightly more saline than it is now during rainy periods. However, the differences would be slight and the changes would not adversely affect any existing use. Between rainfall events, both the water table elevation and groundwater quality would be at or near their present levels.

In most locations, the invert of the storm drainage facilities that are proposed is above the normal water table (approximately +2 feet MSL). However, some excavation beneath the water table will be required, particularly near the shoreline. During construction, contractors will employ best management practices, including groundwater control measures, to prevent flowing ground conditions during excavation. Moreover, the volume of water diverted is tiny compared to the size of the aquifer, and would represent water that could otherwise flood local streets and residences.

3.5 OCEAN WATER QUALITY

3.5.1 EXISTING CONDITIONS

3.5.1.1 Physical Environment

The bathymetry of the shoreline area into which the proposed drainage system would discharge is characterized by a broad fringing reef with water depths less than 23 feet (7 meters). Immediately offshore of the storm drainage outlet, the reef is about 4,000 feet wide. It widens to over 6,000 feet further to the east. Immediately offshore of the drainage outlet (inshore of the -24-foot depth contour), the reef shoals, and a wide surf zone is typically present.

Good current information is available from the project area as a result of measurements made by Sea Engineering in 2003 and 2004. One current meter was installed on the inner reef flat in 10 feet of water, approximately 500 feet offshore, and the other seaward of the reef flat in 23 feet (7 meters) of water, approximately 3,300 feet offshore. The current data at the offshore meter showed that the upper layer flow (0 to 10-foot [3-meter] depth) is predominantly to the west to southwest, driven primarily by prevailing east to northeast trade winds, while flow in the 5 to15 feet (1.5- to 4.5-meter) depth is distinctly more tidal, showing clear current reversals with tides. Flood tidal currents flow to the west, while ebb tide flows to the east. Average current speeds during the measurements were about 0.17 knots; the maximum was a little over 0.9 knots (to the southwest).

Currents near the shore are, on average, much weaker, with speeds averaging about a quarter to a third those measured further offshore. The maximum speed measured at the inshore location was about 0.8 knots (to the east-southeast). The maximum current speeds recorded by both the offshore and nearshore meters occurred during the strong Kona storm on February 27, 2004, which consisted of south to west winds of up to 30 knots, and large waves from the same direction. Field observations indicated that during large wave events, a rip current is driven offshore in the natural channel between the discharge site and One'ula Beach Park.

3.5.1.2 Existing Water Quality

The State of Hawai'i Department of Health has classified the marine waters along the 'Ewa Beach shoreline to a depth of 30 feet as Class A Open Coastal Waters.[8] Table 3-2 lists the water quality standards applicable to those waters. The nearshore waters from the mouth of Pearl Harbor to One'ula Beach Park are also part of the Pearl Harbor Water Quality Limited Segment, that DOH has designated pursuant to the Clean Water Act §303(d) (see Figure 3-2).[9] Nearshore waters in the Pearl Harbor Water Quality Limited Segment periodically exceed maximum acceptable levels for nutrients, turbidity, and suspended solids (DOH 2002). DOH has not established a Total Maximum Daily Loads (TMDL) limitation for this water quality limited segment.

HASEKO has measured marine water quality in the waters off Ocean Pointe and One'ula Beach Park for more than a decade under the terms of the Water Quality Certification that DOH issued for the Ewa Marina project. With the proposed addition of an ocean outlet at One'ula Beach Park as part of the entirely separate Kalo'i Drainage improvements project, HASEKO has expanded the monitoring to include the area off the eastern end of One'ula Beach Park (Marine Research Consultants, August 2004).

Water quality has been measured at seven stations along each transect from the shoreline to approximately 500 meters offshore. Figure 3-3 shows the locations of the long-term sampling stations. The stations are more closely spaced near the shoreline because this area is most likely to show the effects of shoreline modification. With the exception of the shoreline stations, samples are being collected at two depths; a surface sample from within approximately 10 centimeters (cm) of the sea surface, and a bottom sample from within one meter of the sea floor. Water quality parameters evaluated include all of the specific parameters designated by DOH for open coastal waters in HAR, Chapter 11-54, Section 6, Open Coastal Waters. Table 3-3 summarizes the measurements for which long-term data are available. Table 3-4 presents data collected recently along the Pāpipi transect located a short distance to the east of the proposed discharge point.

Several conclusions have been drawn from these data. These are:

- Ocean water quality has not been significantly affected by construction on the Ocean Pointe site. Water quality off the site is comparable to that at the control station. The variability in the input and mixing characteristics of groundwater efflux at the shoreline off the Ocean Pointe site appears to be the principal influence on water chemistry.
- Distinct horizontal gradients are evident for Si, NO_3-, and TN. All three decreased along the transects from the shoreline to the offshore stations. Salinity showed the opposite trend, rising with increasing distance offshore. Vertical stratification between surface and bottom samples was also evident. The sampling site off of Kalo'i Gulch (KA) showed only small horizontal gradients in any water chemistry constituent.
- Other constituents not related to groundwater efflux (NH_4 +, TN and TOP) showed few trends except for slightly higher concentrations of TN and TOP at the shoreline of all five sites. NO_3- measurements were lower in a zone along the shoreline while turbidity and TSS showed a pattern of decreasing values with distance from shore.

[8] The classification extends from the shoreline to a water depth of 30 feet.

[9] Defined as any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitation required by sections 301(b) and 306 of the Clean Water Act. (40 CFR Ch.1 §130.2)

Table 3-2. State Water Quality Standards for Open Coastal Waters

Constituent	*Geometric Mean Not to Exceed the Given Value*	*Not to Exceed the Given Value More Than 10 Percent of the Time*	*Not to Exceed the Given Value More Than 2 Percent of the Time*
Total Nitrogen (µg N/L)	150.00	250.00	350.00
Ammonia Nitrogen (µg NH_4-N/L))	3.50	8.50	15.00
Nitrate + Nitrite Nitrogen (µg $[NO_3+NO_2]$-N/L)	5.00	14.00	25.00
Total Phosphorous (µg P/L)	20.00	40.00	60.00
Light Extinction Coeff. (k units)	0.20	0.50	0.85
Chlorophyll a (µg/L)	0.30	0.90	1.75
Turbidity (N.T.U.)	0.50	1.25	2.00

Note: "Wet" criteria apply when the open coastal waters receive less than three million gallons per day of fresh water discharge per shoreline mile.

pH Units - shall not deviate more than 0.5 units from a value of 8.1, except at coastal locations where and when freshwater from stream, storm drain or groundwater discharge may depress the pH to a minimum level of 7.0.

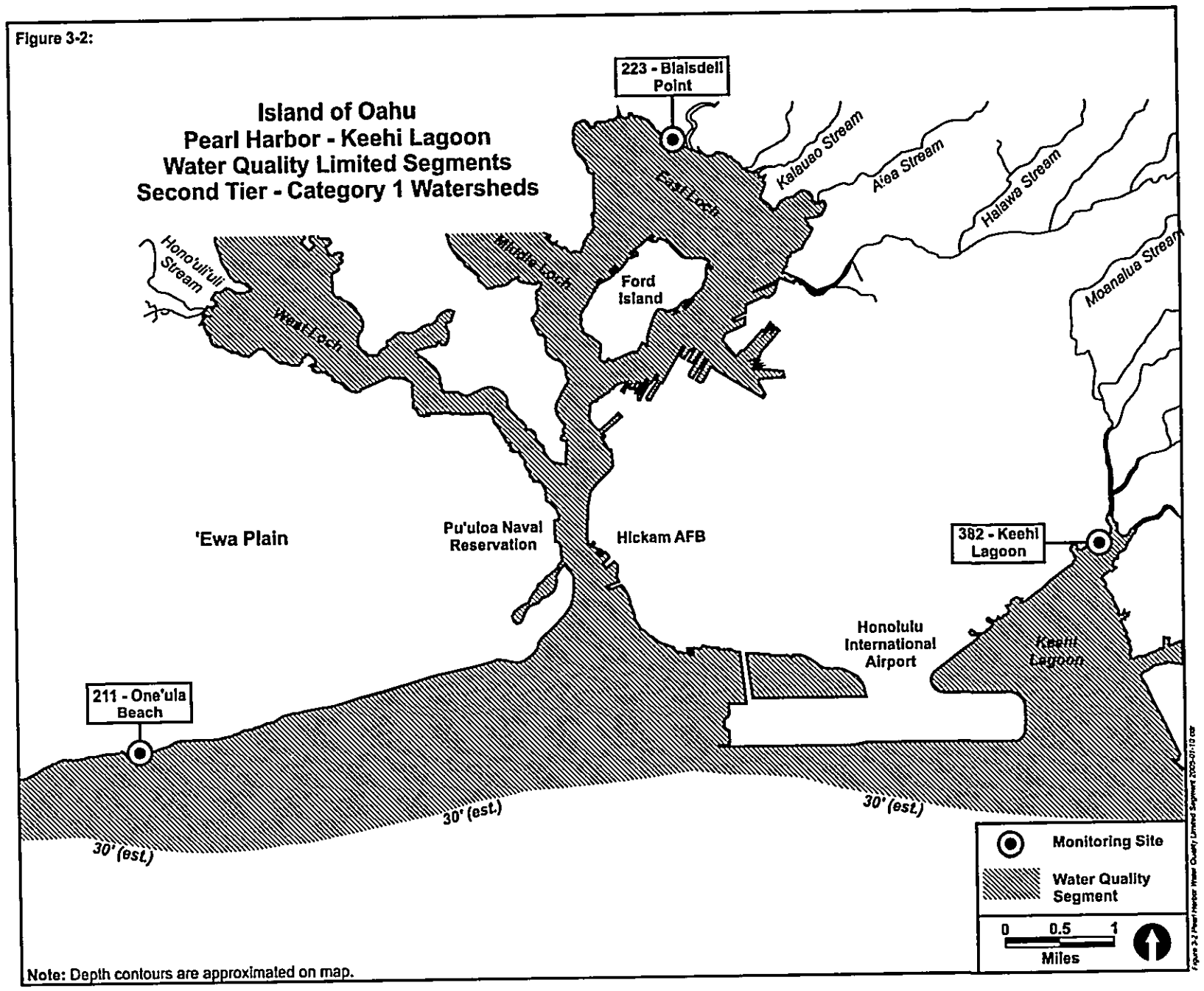
Dissolved Oxygen - Not less than seventy-five per cent saturation, determined as a function of ambient water temperature and salinity.

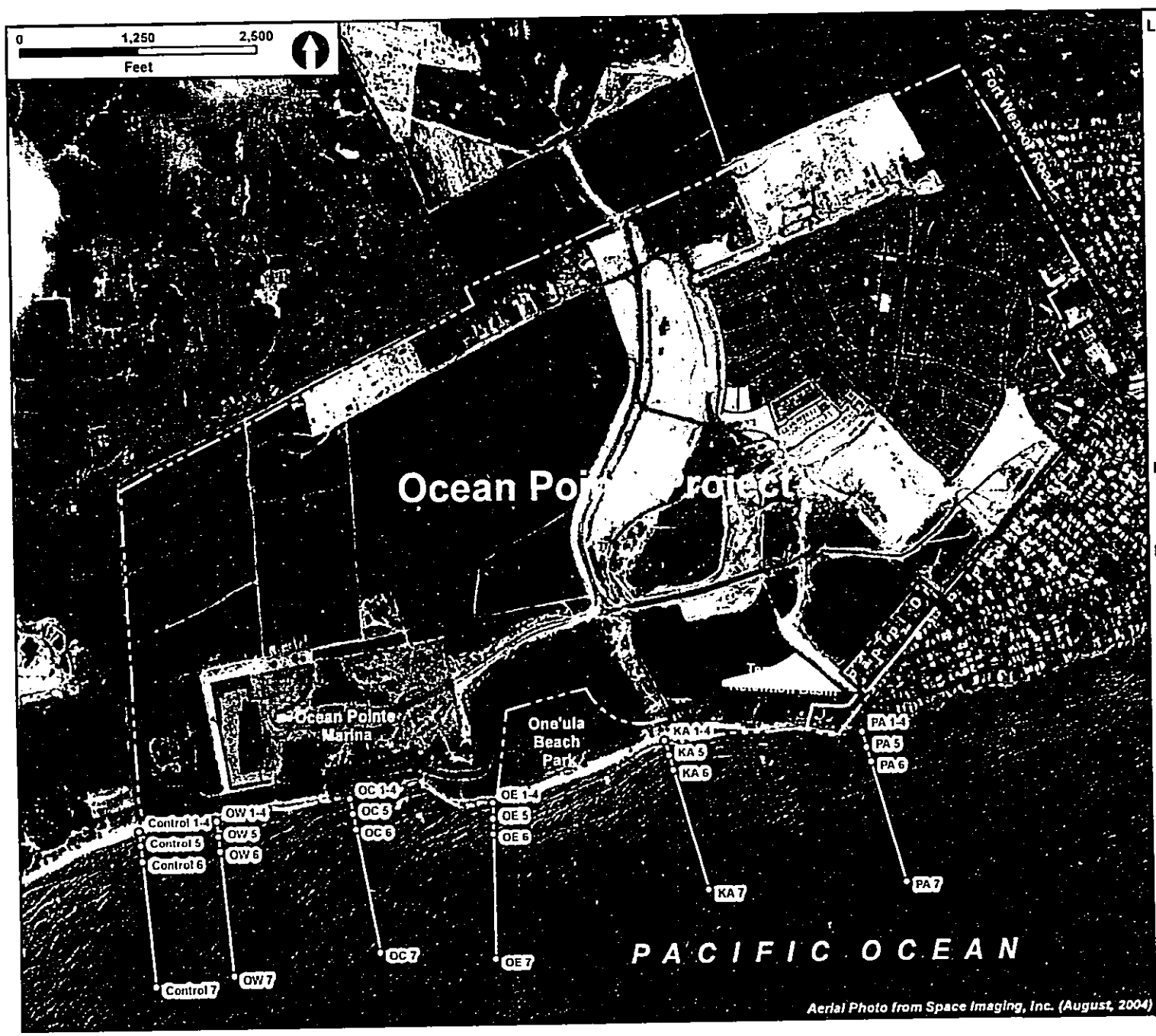
Temperature - Shall not vary more than one degree Celsius from ambient conditions.

Salinity - Shall not vary more than ten per cent from natural or seasonal changes considering hydrologic input and oceanographic factors.

Source: HAR 11-54.6

Figure 3-2:


Island of Oahu
Pearl Harbor - Keehi Lagoon
Water Quality Limited Segments
Second Tier - Category 1 Watersheds
223 - Blaisdell Point
East Loch
Kalauao Stream
Aiea Stream
Halawa Stream
Moanalua Stream
Middle Loch
Ford Island
Honouliuli Stream
West Loch
'Ewa Plain
Pu'uloa Naval Reservation
Hickam AFB
382 - Keehi Lagoon
Honolulu International Airport
Keehi Lagoon
211 - One'ula Beach
30' (est.)
30' (est.)
30' (est.)
Monitoring Site
Water Quality Segment
0 0.5 1
Miles
Note: Depth contours are approximated on map.



Legend:

- Offshore Monitoring Stations
- Offshore Monitoring Transects
- Pāpipi Road Drain: Increment 1
- Pāpipi Road Drain: Increment 2

Prepared For:

HASEKO (Ewa), Inc.

Pepared By:

PLANNING SOLUTIONS

Sources:

--HASEKO (Ewa), Inc.
--R.M Towill, Corp.

Figure 3-3:

Marine Water Quality Monitoring Stations

Pāpipi Road Drainage Improvements Project

Table 3-3. Geometric Means of Samples Ocean Pointe (June 1990-June 2004)

Transect Site ID	NO.	DFS (m)	PO4 (µg/L)	NO3 (µg/L)	NH4 (µg/L)	Si (µg/L)	TOP (µg/L)	TON (µg/L)	TP (µg/L)	TN (µg/L)	TURB (ntu)	SAL (ppt)	CHL a (µg/L)	TEMP (deg C)	pH
Control	1S	0.1	3.41	61.18	2.38	787.08	9.61	124.74	13.95	224.98	1.12	33.59	0.90	25.2	8.07
	2S	1	2.48	40.74	2.52	624.38	8.68	113.54	11.78	180.18	1.01	33.91	0.86	25.2	8.10
	3S	5	2.48	12.18	2.24	370.92	8.37	122.92	12.09	150.78	0.85	34.23	0.64	25.1	8.12
	3D	5	2.17	9.10	2.52	335.23	8.68	122.08	11.47	142.80	0.92	34.28	0.89	25.0	8.11
	4S	10	1.86	4.20	1.82	236.88	8.37	116.20	10.54	126.84	0.79	34.40	0.58	25.1	8.12
	4D	10	1.86	3.22	1.96	230.70	8.68	115.64	11.16	125.30	0.78	34.41	0.68	25.1	8.12
	5S	50	1.86	0.84	1.68	156.24	8.37	112.70	10.54	116.76	0.62	34.56	0.56	25.0	8.11
	5D	50	1.55	0.84	1.68	150.34	8.99	115.64	11.47	119.98	0.66	34.56	0.62	25.0	8.11
	6S	100	2.17	0.70	1.54	116.05	8.06	103.32	10.54	106.96	0.46	34.62	0.46	25.0	8.11
	6D	100	2.17	0.70	1.68	112.40	8.06	104.86	10.85	108.50	0.44	34.63	0.58	25.1	8.11
	7S	500	2.48	0.70	1.54	86.55	7.44	96.18	10.54	99.40	0.25	34.73	0.31	25.1	8.15
	7D	500	2.79	0.84	1.40	86.55	7.44	98.28	10.85	101.64	0.23	34.74	0.31	25.1	8.15
O-W	1S	0.1	2.79	44.94	2.66	686.76	8.99	113.40	12.71	202.16	1.15	33.74	0.92	25.2	8.09
	2S	1	2.48	34.72	3.36	534.18	8.06	123.48	11.16	189.84	0.82	34.00	0.76	25.2	8.12
	3S	5	1.55	7.28	2.10	274.54	8.06	116.20	10.23	141.12	0.70	34.34	0.67	25.1	8.12
	3D	5	1.86	5.88	2.10	267.79	8.37	119.84	10.54	143.78	0.68	34.34	0.78	25.1	8.13
	4S	10	1.55	3.36	2.10	218.06	8.37	116.90	10.54	130.34	0.67	34.42	0.67	25.1	8.12
	4D	10	1.86	3.64	2.10	214.97	8.37	118.30	10.85	130.76	0.66	34.43	0.71	25.1	8.12
	5S	50	1.86	1.68	1.68	146.96	8.37	112.00	10.54	118.16	0.53	34.57	0.52	25.1	8.11
	5D	50	1.86	1.26	1.96	137.69	8.68	113.96	11.16	119.56	0.51	34.59	0.56	25.1	8.11
	6S	100	2.17	0.84	1.68	106.78	7.75	100.38	10.54	104.02	0.37	34.66	0.38	25.1	8.13
	6D	100	2.48	0.84	1.68	101.44	8.06	102.48	10.85	105.98	0.34	34.68	0.46	25.1	8.13
	7S	500	2.79	0.70	1.54	95.26	7.13	97.30	10.54	100.38	0.21	34.73	0.30	25.2	8.15
	7D	500	2.79	0.84	1.54	89.92	7.44	96.74	10.85	99.96	0.21	34.75	0.29	25.1	8.15
O-C	1S	0.1	2.17	22.12	3.64	315.84	8.99	118.44	11.47	158.20	1.05	34.25	0.76	25.2	8.16
	2S	1	1.86	17.50	3.92	296.17	8.68	118.72	11.16	151.06	0.79	34.32	0.69	25.2	8.17
	3S	5	1.55	10.22	3.08	240.82	8.68	115.08	10.54	134.68	0.71	34.41	0.65	25.1	8.17
	3D	5	1.86	10.08	3.22	240.26	8.99	118.86	11.78	139.58	0.68	34.40	0.72	25.2	8.17
	4S	10	1.86	3.08	2.24	163.54	8.68	119.84	11.16	128.66	0.61	34.57	0.55	25.1	8.16
	4D	10	1.86	2.66	2.66	153.15	9.30	118.16	11.78	125.86	0.61	34.58	0.60	25.1	8.15
	5S	50	2.17	0.98	2.10	113.24	8.06	114.52	11.78	118.72	0.41	34.68	0.45	25.0	8.13
	5D	50	2.48	0.84	1.96	105.66	8.99	110.88	12.40	115.64	0.45	34.68	0.50	25.0	8.13
	6S	100	2.79	0.84	2.24	101.72	8.06	107.94	11.16	112.00	0.36	34.69	0.37	25.1	8.14
	6D	100	2.79	0.84	1.96	98.63	8.06	107.66	11.16	111.72	0.35	34.70	0.43	25.1	8.15
	7S	500	2.79	0.84	1.96	89.92	7.75	101.08	10.85	105.14	0.20	34.74	0.31	25.1	8.15
	7D	500	2.79	0.84	1.96	79.24	7.75	99.40	11.47	103.60	0.19	34.79	0.33	25.2	8.16
O-E	1S	0.1	2.48	19.88	3.50	298.98	8.99	117.32	12.09	170.24	1.00	34.18	0.71	25.5	8.19
	2S	1	2.17	15.12	2.94	273.69	8.99	115.92	11.47	161.00	0.84	34.25	0.65	25.4	8.20
	3S	5	1.86	3.50	2.38	183.49	8.68	114.66	11.16	138.46	0.79	34.43	0.58	25.3	8.19
	3D	5	2.17	3.08	2.38	180.68	8.68	120.96	11.16	141.54	0.77	34.47	0.65	25.3	8.19
	4S	10	2.17	1.82	2.24	136.00	8.68	117.88	11.47	127.40	0.72	34.59	0.55	25.2	8.17
	4D	10	2.17	1.96	2.24	137.69	9.30	119.00	11.78	127.82	0.69	34.58	0.56	25.2	8.17
	5S	50	2.48	1.12	1.82	116.33	8.68	115.50	11.78	121.24	0.46	34.65	0.45	25.2	8.15
	5D	50	2.48	1.12	1.54	122.52	9.30	118.58	12.71	124.74	0.50	34.63	0.53	25.2	8.15
	6S	100	2.79	1.12	1.82	105.09	7.75	105.98	11.16	110.18	0.33	34.67	0.37	25.2	8.14
	6D	100	3.10	1.12	1.54	98.91	7.75	107.94	11.47	112.14	0.31	34.68	0.40	25.2	8.15

Transect Site ID	NO.	DFS (m)	PO4 (µg/L)	NO3 (µg/L)	NH4 (µg/L)	Si (µg/L)	TOP (µg/L)	TON (µg/L)	TP (µg/L)	TN (µg/L)	TURB (ntu)	SAL (ppt)	CHL a (µg/L)	TEMP (deg C)	pH
	7S	500	3.10	0.98	1.68	91.33	7.75	98.56	11.47	103.18	0.18	34.72	0.27	25.3	8.15
	7D	500	3.10	0.84	1.40	83.18	7.75	96.46	11.16	99.82	0.17	34.77	0.28	25.3	8.16
KA	1S	0.1	2.72	2.40	5.03	203.08	12.13	165.38	15.04	173.51	1.20	34.38	0.88	25.1	8.21
	2S	1	3.49	1.85	4.24	174.96	13.06	147.60	16.83	155.11	0.73	34.35	0.93	25.1	8.20
	3S	5	2.43	1.91	3.68	166.90	14.37	147.03	16.81	153.93	1.11	34.37	0.95	25.1	8.19
	3D	5	3.37	1.75	2.91	160.72	14.42	152.61	18.21	158.38	0.73	34.37	0.89	25.0	8.19
	4S	10	2.30	3.44	3.66	171.72	12.52	151.23	14.86	161.04	0.74	34.37	1.00	25.0	8.19
	4D	10	4.23	3.24	4.81	163.09	17.51	156.12	22.22	169.48	0.92	34.39	1.04	25.0	8.19
	5S	50	3.28	1.32	4.38	154.32	12.21	144.24	15.48	152.14	0.79	34.40	0.71	25.0	8.19
	5D	50	4.69	1.34	6.19	139.35	17.50	174.60	22.22	189.41	0.64	34.41	1.35	25.0	8.19
	6S	100	2.74	1.41	1.42	83.31	6.33	83.68	9.08	87.31	0.33	34.40	1.02	25.0	8.16
	6D	100	2.53	1.47	1.35	83.29	6.87	84.42	9.41	89.08	0.34	34.44	1.02	24.9	8.18
	7S	500	2.81	1.50	1.31	82.28	5.47	77.33	8.33	81.04	0.21	34.40	0.86	25.2	8.17
	7D	500	2.78	1.32	1.09	70.79	5.84	81.34	8.66	84.57	0.18	34.49	0.76	25.4	8.18
DOH GM STD			5.00	3.50					20.00	150.00	0.50		0.30	*	**

* Shall vary no more than 1°C from "ambient conditions"

** Shall not deviate more than 0.5 units from a value of 8.1

Notes: The results are based on 41 surveys at the O-W, O-E, and Control sites, 36 at the O-C Site, and 3 at the KA site. Shaded values exceeded DOH's geometric mean standards for open coastal waters under "wet" conditions.

Abbreviations: S= surface, D= deep, DFS = Distance from Shore

Source: Marine Research Consultants (June 2004).

Table 3-4. Water Quality Data From Stations on Pāpipi Transect.

Trans ID	NO.	DFS (m)	PO4 (µg/L)	NO3 (µg/L)	NH4 (µg/L)	Si (µg/L)	TOP (µg/L)	TON (µg/L)	TP (µg/L)	TN (µg/L)	TURB (ntu)	TSS (mg/l)	SAL (ppt)	CHL a (µg/L)	TEMP (deg C)	pH
PR	1S	0.1	0.93	6.86	0.98	202.88	12.09	172.20	13.02	180.04	2.23	11.96	34.065	0.52	27.8	8.17
	2S	1	1.24 6	8.26	5.04	205.69	11.78	171.22	13.02	184.52	1.53	18.52	34.068	0.50	27.8	8.15
	3S	5	0.93	2.66	0.56	190.24	13.02	228.90	13.95	232.12	1.00	12.78	34.027	0.51	27.8	8.13
	3D	5	2.17	1.82	0.98	208.78	12.71	325.36	14.88	328.16	1.14	22.73	34.035	1.25	27.8	8.12
	4S	10	0.93	1.40	2.38	137.97	11.47	261.80	12.40	265.58	0.91	22.89	34.088	0.49	27.8	8.12
	4D	10	0.93	1.40	0.70	167.20	10.54	173.46	11.47	175.56	0.23	10.13	34.025	0.25	27.8	8.12
	5S	50	1.55	0.98	2.94	141.06	11.47	172.90	13.02	176.68	0.47	18.40	34.223	0.40	27.8	8.12
	5D	50	2.17	0.98	6.72	136.29	16.74	204.54	18.91	212.38	0.42	63.66	34.224	0.44	27.8	8.12
	6S	100	0.62	1.40	1.26	87.39	8.68	293.02	9.30	295.68	0.57	6.45	34.467	0.43	27.9	8.17
	6D	100	0.62	1.12	0.56	100.04	9.30	276.64	9.92	278.32	0.59	8.35	34.435	0.54	27.9	8.17
	7S	500	0.31	1.68	0.98	87.11	10.54	199.64	10.85	202.30	0.49	11.34	34.671	0.32	28.5	8.17
	7D	500	0.31	1.26	0.56	78.40	7.13	172.20	7.44	174.02	0.38	10.43	34.672	0.32	28.5	8.18

Source: Marine Research Consultants (September 2004).

- Construction dust does not appear to have increased TSS off the Ocean Pointe site.

Calculations of geometric means of water chemistry constituents collected at each station over many years reveal exceedances of geometric mean criteria for NO_3-, NH_4+,TN, turbidity and Chl a on all of the survey transects, including the control transect. All of the samples that exceeded geometric mean limits for NO_3-, NH_4+ and TN were close to shore. The exceedances are not related to activities on the Ocean Pointe site.

3.5.2 POTENTIAL IMPACTS & MITIGATION MEASURES: INCREMENT 1

As explained in Section 2.2.1 the runoff that would be accommodated by the facilities constructed in the first increment of the project will be contained within the proposed temporary retention basin. There will be no stormwater discharge to the ocean during this time. Because of the amount of land area that will be disturbed during construction, an NPDES Construction Permit will be required.

The contractor will incorporate several Best Management Practices (BMPs) into the construction process to minimize or avoid impacts to water quality. These include:

- Using sediment controls to remove sediment from water generated by dewatering (e.g., sediment traps and sediment basins) and empty them regularly through filtration.
- Storing construction materials and waste in designated areas and disposing of wastes promptly at an approved site.
- Providing workers with spill prevention and cleanup information and equipment.
- Ensuring that construction vehicles are free of leaks and conduct refueling and vehicle maintenance either offsite or in a contained area away from drainage courses.

In addition, the following structural BMPs are incorporated into the design of the proposed improvements:

- Catch basin inserts used along the Ocean Pointe frontage where curbs and gutters are to be installed will prevent trash and other debris from entering the ocean.
- Vegetated swales planned for the frontage and rear of Pāpipi Subdivision will encourage groundwater recharge and settling of pollutants, and will minimize visual impacts to the area.

In view of the foregoing, construction, operation, and maintenance of the drainage improvements that would be installed during Increment 1 of the proposed project to not have the potential to affect water quality.

3.5.3 POTENTIAL IMPACTS & MITIGATION MEASURES: INCREMENT 2 CONSTRUCTION

Nearly all of the Increment 2 construction work will occur away from the shoreline. In the absence of a well defined drainage pathway, there is no pathway through which construction-related pollutants could reach the ocean. The only point in the construction process at which that could occur is during the time when the channel is being opened to the ocean. At that time, water will flow into the channel from the ocean during high tide, floating buoyant material and providing a mechanism through which it could reach nearshore waters. Because the time at which the channel is opened is fully controllable, the contractor will remove any accumulated debris from the channel before taking the final step. The contractor will also time the opening to correspond to a period of moderate tide and wave conditions, reducing the forces available to suspend material that could be carried into the ocean. By managing activities in this manner, the potential for significant adverse effect will be avoided.

3.5.4 INCREMENT 2 OPERATIONAL IMPACTS

3.5.4.1 Introduction

The construction of the proposed project will make it possible for the periodic discharges that are expected from the drainage area to enter the ocean. Once there, the fresh water and suspended sediment plume that it would create will persist for a period of time before conditions return to pre-discharge levels. Plume transport and mixing in coastal waters is a complex process that depends on both discharge and ambient characteristics. The discharge plume will be transported and dispersed due to coastal waves and currents, and will also spread due to the buoyancy of the plume itself.

In order to assess the behavior of this plume and the effect that it will have on water quality, Sea Engineering Inc. used a state-of-the-art numerical transport model to forecast and analyze plume transport and dispersion (see Appendix A for Full Report). The model incorporates the effects of wind, tide and wave driven currents, and allows simulation of discharge plume transport under a variety of possible conditions. A separate wave model was used to calculate wave transformation, radiation stresses, and wave energy dissipation for input to the primary transport/circulation model. The remainder of section 3.5.4 is divided into the following parts:

- Section 3.5.4.2 describes the analytical methods that were used to estimate the effect that the proposed discharge is likely to have on ocean water quality.
- Section 3.5.4.3 summarizes the effect that stormwater discharges would have on nearshore water quality for each of three discharge volume/ocean condition scenarios.

3.5.4.2 Analytical Methods Used

Computer modeling was used to evaluate the effect that the proposed discharge would have on water quality. The characteristics of the models that were used, as well as the reason for their selection, are described below.

Wave Model. REF/DIF, the wave propagation model that was used, was developed at the Center for Applied Coastal Research at the University of Delaware. It calculates the change in wave characteristics due to refraction and diffraction as the wave progresses from deepwater to the shoreline. REF/DIF calculates zones of wave breaking, wave heights, wave direction, and wave energy dissipation. These are then used to model the nearshore mixing and transport of a discharge plume.

Transport Model. EFDC (Environmental Fluid Dynamics Code) was used to model circulation and transport. It is an EPA approved, state-of-the-art, three dimensional hydrodynamic model developed at the Virginia Institute of Marine Science by John Hamrick (1996) to simulate hydrodynamics and water quality in rivers, lakes, estuaries, and coastal regions. The EPA describes the model as "one of the most widely used and technically defensible hydrodynamic models in the world." This model:

- is 3-dimensional, which allows for variations in water properties and currents at different depths;
- allows input of nearshore wave radiation stresses and wave energy dissipation for simulation of surf zone circulation and transport;
- permits the effects of numerous alternative discharge control structures such as culverts, weirs and spillways to be considered; and
- allows the evaluation of inputs whose quantity and quality vary over time.

Figure 3-4 shows the bathymetry that was used for the analysis; it was derived from high-resolution lidar data. The figure shows that the area near the discharge point is characterized by a broad fringing reef with water depths less than 23 feet (7 meters). Offshore of the proposed storm drainage outlet, the reef is about 4,000 feet wide; to the east the reef broadens to about 6,500 feet wide. A broad,

shallow channel is present in the reef near the shoreline between the drainage outlet and One'ula Beach Park. A broad embayment is evident in depths between 135 feet and 330 feet.

Current Flow. Current flow into the model is specified as a volume flux in units of cubic meters per second (m^3/s). To create realistic currents in the model, actual currents measured by the offshore current meter were used to apply the boundary flow condition. The current meter record was scanned to select a period with a strong tidal signal, and relatively calm wind and wave conditions and February 12, 2004, was selected. The flood tide flows to the west, and ebb tide flows to the east. The peak current speeds were a little over one-half mile per hour (24 cm/s) to the west, and 0.3 miles per hour (13 cm/s) to the east. This tidal current record was converted into flow volumes, repeated to span three days, and applied to the bottom (east) boundary of the model. The February 12 currents represent relatively strong tidal currents at the project site. Moderate tidal conditions were simulated by reducing the strong tidal boundary flow conditions by 33%.

Wind. As is the case everywhere, wind conditions in the area are highly variable. For the purpose of the analysis, three types of wind conditions were considered: (i) trade winds with average speed of 16 miles per hour (7.2 m/s) and direction of 70 degrees, (ii) Kona winds with average speeds of 10 miles per hour (4.6 m/s) and direction of 215 degrees, and (iii) calm conditions. The easterly trade winds are most common, and occur nearly 70% of the time. Heavy rainfalls on the south shore, however, are most commonly associated with Kona winds or calm conditions. For this reason, Kona winds and calm conditions were used for the modeling analyses.

Waves. Waves are an important factor driving nearshore currents at the project site. The wave model REF/DIF was used to transform the prevailing deep-water waves as they move into the nearshore waters at the project site. REF/DIF computes the nearshore wave direction, wave height, radiation stresses, and energy dissipation at each grid point in the model area. These parameters are then input into EFDC to drive nearshore currents and mixing.

The general Hawaiian wave climate has four primary wave types:

- Tradewind waves can occur throughout the year, but are most frequent between April and September, the summer season, when they usually dominate the Hawaiian wave climate. They result from the strong and steady trade winds blowing from the northeast quadrant over long fetches of open ocean. Deepwater trade wind waves typically have periods of 6 to 8 seconds and heights of 4 feet to 10 feet.
- South swell is generated by southern hemisphere storms and is most prevalent during the months of April through October. These long, low waves approach from the southeast through southwest, with periods of 12 to 20 seconds and deepwater heights of 0.3 to 2 meters.
- North and northwest Pacific swell is produced by severe winter storms in the North Pacific Ocean. North and northwest swell may arrive in the Hawaiian Islands throughout the year but are largest and most frequent during the winter months of October through March. North or northeast swell is sometimes generated by winter storms northeast of the islands. North Pacific swell typically has periods of 12 to 20 seconds and heights of 1.5 to 4.5 meters.

Kona waves are generated by intense winds associated with local fronts or low-pressure systems and typically have periods ranging from 6 to 10 seconds and heights up to 3+ meters. These waves approach from the south to west, with the largest waves usually from the southwest. Deepwater wave heights during a severe Kona storm in 1980 were about 5m with a period of 9 seconds.

RECEIVED AS FOLLOWS

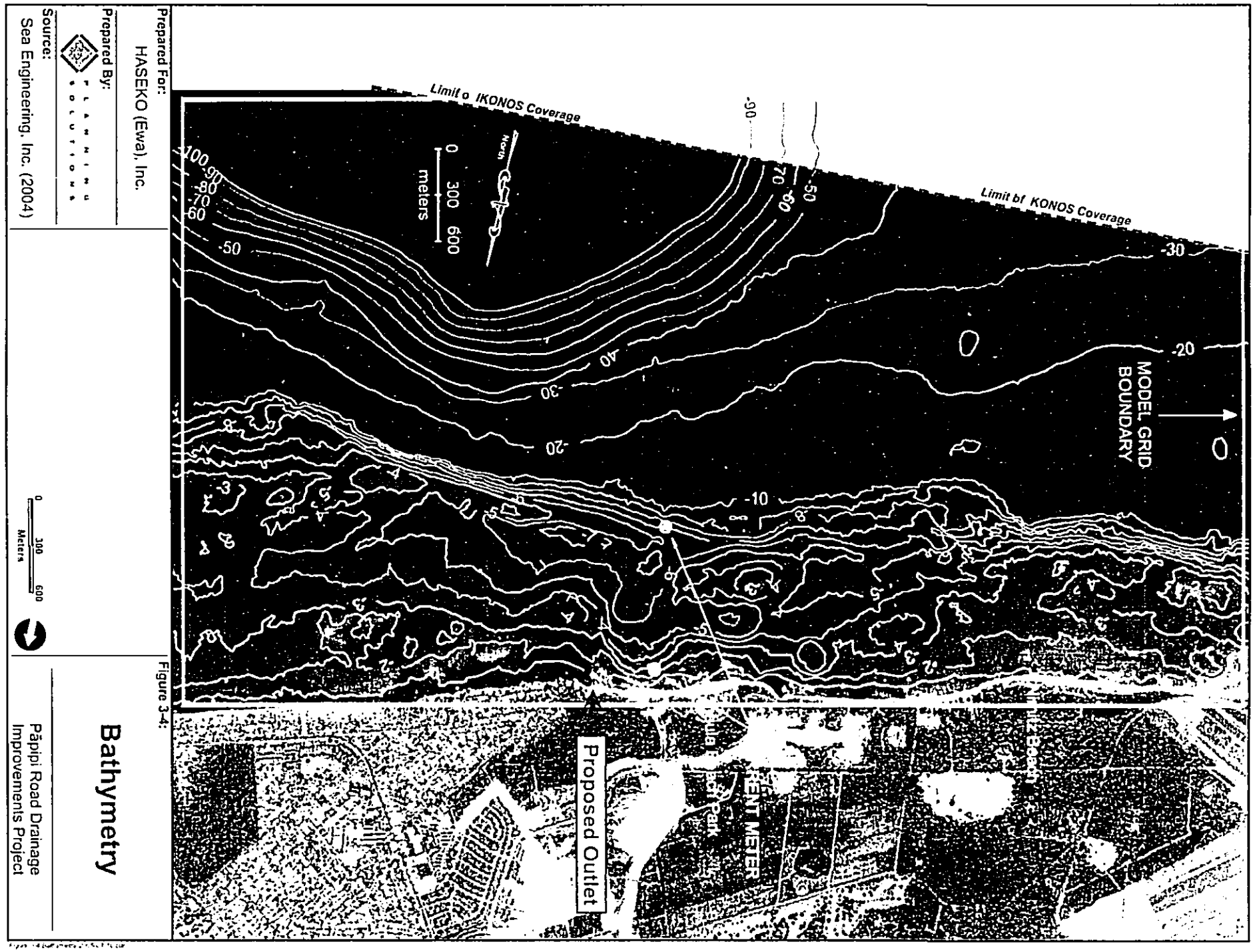


Figure 3-4:

The project site is partially sheltered from North swell, but is directly exposed to south swell and Kona storm waves, and partially exposed to trade wind waves wrapping around the island. Typical wave characteristics for the Ocean Pointe area are shown in Table 3-5. Because heavy rainfalls along this coast are most often associated with Kona winds or calm conditions, modeling was done using calm wave conditions and Kona wind conditions.

Table 3-5. Typical Deepwater Wave Conditions.

Wave Type	*Height (m)*	*Period (sec.)*	*Direction*
Trade-wind Wave	1.8	6	120
South Swell	1.4	14	180
Kona Wave	1.3	9	215

Storm Discharge Events. The model was used to evaluate the potential effects of three storm discharge scenarios using two discharge events (see Figure 3-5).[10]

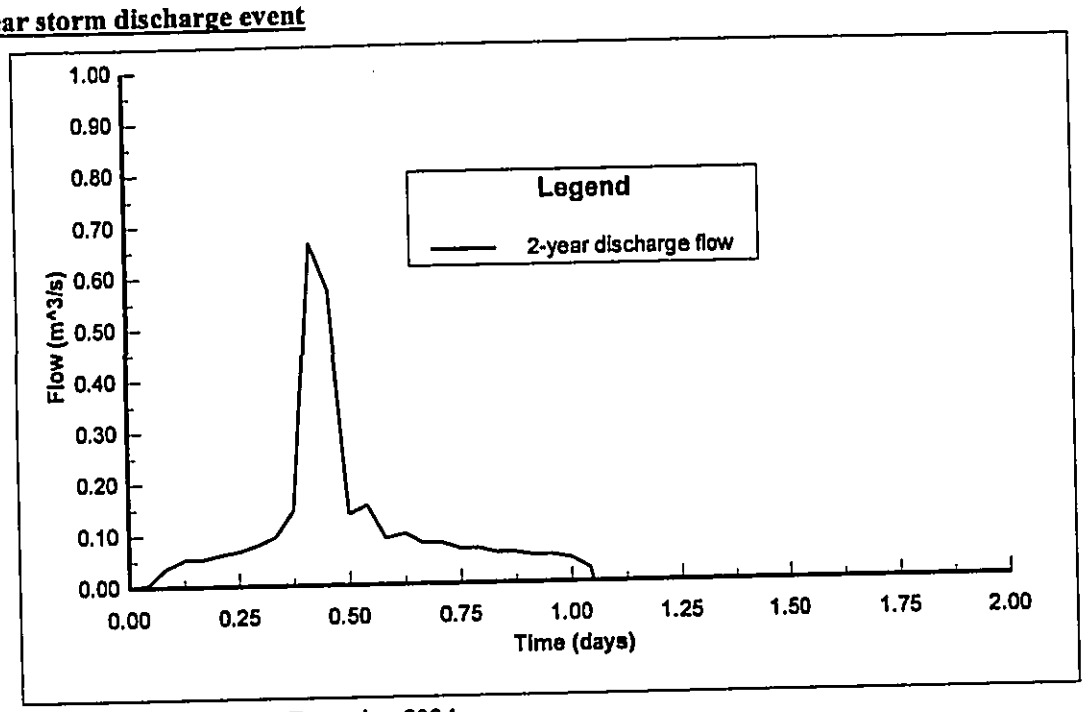
- A 2-year storm event resulting in 5 inches (12.7 cm) of rain in 24 hours. This results in a maximum discharge of 23.5 cubic feet per second [cfs] (0.66 cubic meters per second [cms]). The total discharge from this event is about 370,000 cubic feet (approximately 10,500 cubic meters). The discharge lasts for approximately 24 hours, with the peak occurring after 10 hours.
- A 100-year storm event resulting in 12.7 inches of rain in 24 hours during Kona wind and calm wave conditions. Maximum discharge of 126 cfs (3.57 cms) occurs 10 hours after the start of the rain. Total discharge is 1,622,520 cubic feet (45,944 cubic meters).
- A 100-year storm event resulting in 12.7 inches (322.5 millimeters) of rain in 24 hours during trade wind conditions. Maximum discharge of 126 cfs (3.57 cms) occurs at 0.42 days (10 hours) after the start of the rain. Total discharge is 1,622,520 cubic feet (45,944 cubic meters).

The 2-year storm event represents a situation that, while not present regularly, will recur with sufficient frequency to potentially affect marine biota and water quality. The 100-year storm event represents an extreme discharge situation. By considering two different wind/wave situations into which this discharge could occur, the analysis was able to address true "worst-case" conditions.

[10] The analytical software tool used to create the discharge model is referred to as Hydrologic Simulation Program Fortran (HSPF). The storm hydrographs are based on a standard 24-hour duration storm and Type I rainfall distribution as used by the Natural Resources Conservation Service (NRCS), U. S. Department of Agriculture, for the Hawaiian Islands. Rainfall depths for the 2- and 100-year events were obtained from the 1984 Department of Land and Natural Resources rainfall frequency study of Oahu.

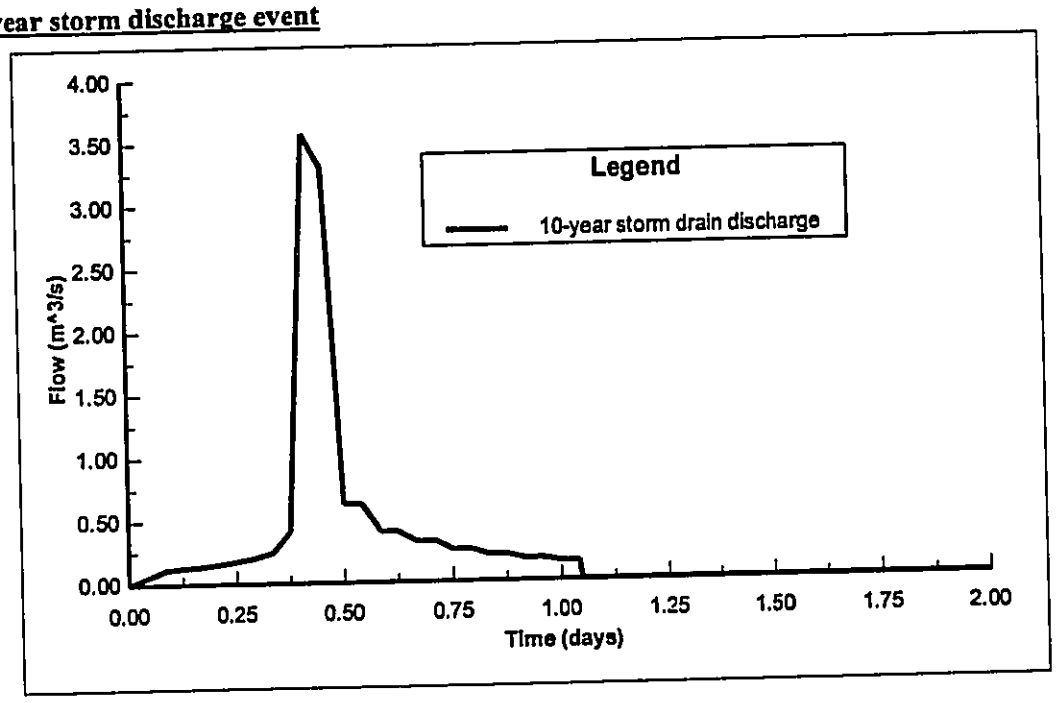
Figure 3-5. Runoff Hydrographs for 2-Year and 100-Year Storm Events.

2-year storm discharge event



Source: Sea Engineering, Inc., December 2004.

100-year storm discharge event



Suspended Sediment Discharge. Total suspended sediment (TSS) loads and compositions corresponding to the storm discharges described in the previous section were also estimated using the HSPF program. These estimates were used to forecast suspended sediment transport and deposition for the two storm events. The suspended sediment loads were assumed to be composed of 55% silt-sized particles and 45% clay-sized particles. The resulting estimates of peak suspended solids concentrations used for the modeling are 444 mg/l silt and 363 mg/l clay (807 mg/l total) for the 2-year event and 597 mg/l silt and 489 mg/l clay (1,086 mg/l total) for the 100-year event. The total sediment discharges for the 100-year and 2-year storms are approximately 85,000 pounds (40,000 kg) and 11,000 pounds (5,310 kg), respectively.[11]

Model Verification. The EFDC model has been successfully used previously to simulate circulation and transport in a multitude of environments, and it has been calibrated and verified with extensive field data sets. The accuracy of the model's output for the project site was verified using the current meter data. The check showed that the model accurately reproduces the tidal phase and current magnitudes. For example, the peak flood tidal current speed to the west computed in the model was .072 feet/sec (22 cm/s), compared to .79 feet/sec (24 cm/s) measured at the current meter. The peak ebb tidal current to the east computed in the model was 0.26 feet/sec (8 cm/s), compared to 0.43 feet/sec (13 cm/s) measured at the current meter.

3.5.4.3 Modeled Impacts

Three different model runs were completed using combinations of the input parameters described in Section 3.5.4.2. These model runs include the 100-year and 2-year discharge events and moderate tidal currents, and the 100-year discharge event with moderate tidal currents and Kona winds and waves. The model runs are listed in Table 3-6.

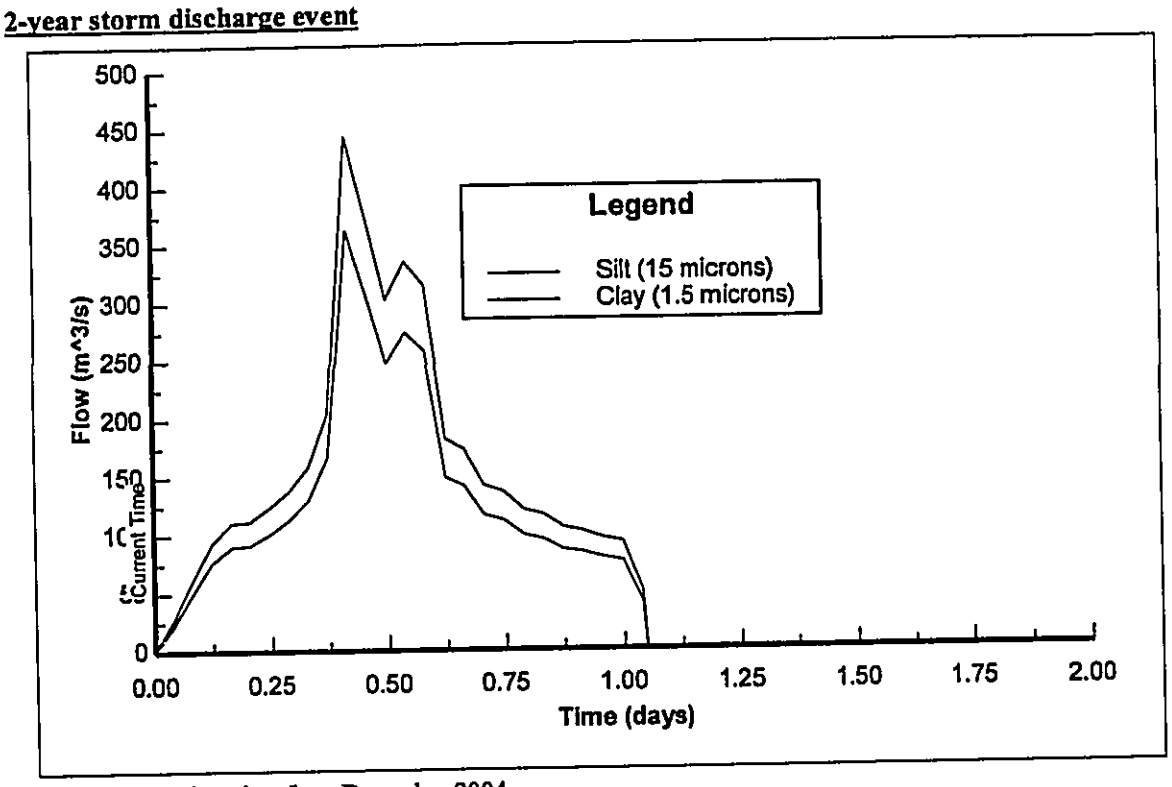
Table 3-6. Model Runs.

Run No.	*Discharge Event*	*Tide*	*Waves*	*Wind*	*Suspended Sediment*
1	100 year	Moderate			Yes
2	2 year	Moderate			Yes
3	100 year	Moderate	Kona	Kona	Yes
Note: Models were run for a time period of 2 days. Model output is referenced to decimal days, beginning at 0 and ending at 2 days.					
Source: Sea Engineering, Inc., December 2004.					

[11] The silt particle size diameter is 15 microns (.015 mm) and the clay particle size diameter is 1.5 microns (.0015 mm). The corresponding settling velocities for these particles are 0.0128 cm/s and 0.000128 cm/s, respectively. The approximate time required for silt and clay particles to settle 1 meter is 2.17 and 217 hours, respectively. This means that clay size particles can remain is suspension for several days.

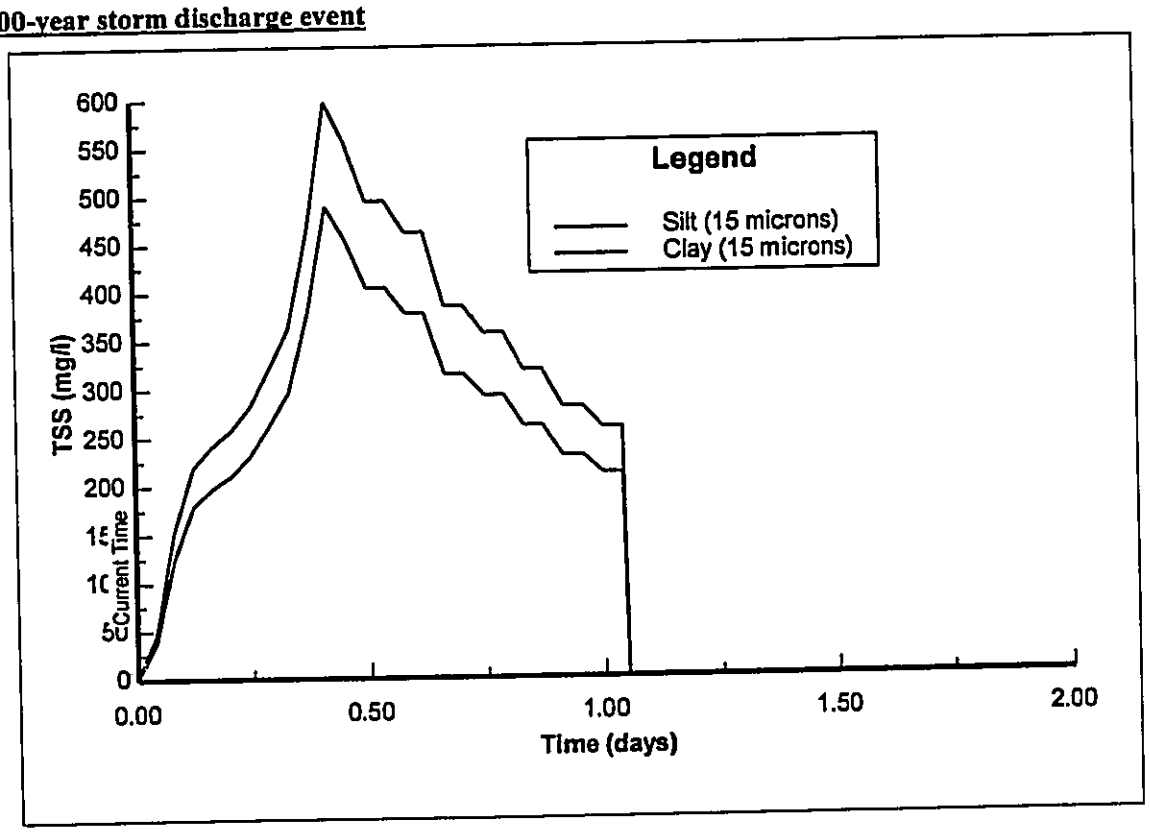
Figure 3-6. Suspended sediment loads for 2-year and 100-year storm discharge event.

2-year storm discharge event



Source: Sea Engineering, Inc., December 2004.

100-year storm discharge event



The model results were examined from several different perspectives:

- *Salinity Contour Plots*. Salinity was used as the primary indicator of plume dilution and possible impacts. Contour plots were prepared showing concentrations of salinity. Because State water quality standards allow salinity to vary up to ten percent from natural conditions, i.e., it is considered normal so long as salinity remains above 31.5 ppt, the discharge plume was modeled to determine how far (in feet) and how long (in time) the plume would have to travel before salinity returned to above 31.5 ppt.[12]
- *Dye Contour Plots*. Conservative water quality constituents (i.e., those that are unaffected by chemical reactions or physical processes while in the water column) were also modeled, using dye as a representative tracer. The results of this modeling showed the extent to which a constituent in the discharge would be diluted over time. Thus, for example, a dye contour of 10 indicates that the dye concentration is 10% of the initial discharge concentration, or conversely, has been diluted 90%.
- *Total Suspended Sediment (TSS)*. Suspended sediments are considered non-conservative because their concentration is altered by settling out of the water column, as well as by advection and diffusion. The peak concentrations of suspended sediment were displayed in contour plots similar to the salinity and dye plots.
- *Salinity and Total Suspended Sediment (TSS) Time Series*. To show how the plume concentrations change with time, graphs were prepared showing how surface salinity and TSS change with time at 3 time series stations in the model area: (i) directly offshore of the discharge site, (ii) 1,600 feet (500 meters) east of the discharge site, and (iii) 1,600 feet (500 meters) west of the discharge site. These graphs indicate how quickly the ocean waters return to ambient conditions following a discharge event.
- *Salinity Water Column Profiles*. To show the thickness of the discharge plume, color-coded salinity concentrations are displayed along a vertical profile of the water column at the discharge site. The vertical profiles extend approximately 2,300 feet (700 meters) offshore to a water depth of about 18 feet (5.5 meters). The profiles are shown for the maximum plume size. They represent snap-shots of the plume at its maximum thickness.

The following subsections discuss the results of these model runs. The discussion begins with the results for Scenario 2, the two-year storm event. This is followed by discussions of Scenario 1 (the 100 Year Event with Moderate Tidal Currents) and Scenario 3 (the 100 Year Event with Moderate Tidal Currents Moderate and Kona winds and waves).

3.5.4.3.1 2-Year Storm Event with Moderate Tidal Currents

This model run deals with the 2-year discharge event occurring during a period of moderate tides. A 2-year event has a 50% probability of occurring in any year. Thus, this event is substantial and reasonably common. Smaller discharges will occur on a more frequent basis, but these have such limited potential for impacting water quality and marine biota that modeling them is unwarranted.

As described above in Section 3.5.4.2, the 2-year discharge event results from a 5-inch rainfall over 24 hours. The discharge peaks 10 hours after the start of the rainfall event. The total discharge volume from this event (i.e., the total amount of water reaching the ocean from the beginning of the rainfall until the last runoff has entered the ocean) is 2.77 million gallons (10,500 cubic meters). The maximum extent of the discharge plume (which is largely confined to the surface water layer) is approximately 900 feet (270 meters) offshore and 2,000 feet (600 meters) alongshore. Plume

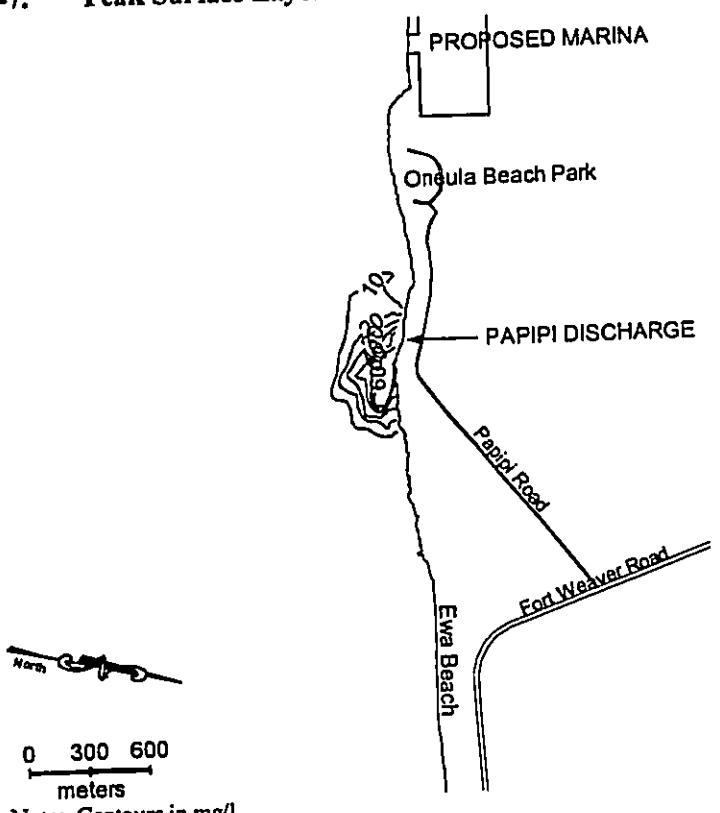
[12] Because research on salinity tolerance of corals has shown that corals generally have a much wider range of tolerance than this (Coles, 1992), the area likely to be significantly impacted by the discharge would be far smaller than that encompassed by the 31.5 ppt contour. Experiments exposing several types of Hawai'i corals to different levels of salinity showed good survivability at salinity levels of 25 ppt and higher for 20 days (Coles, 1992). Corals can tolerate much lower salinity for the short exposure periods that would result from the kind of discharge that is proposed.

salinities below 28 ppt contact the seafloor only within 150 feet (50 meters) directly offshore of the discharge site and only for a brief period of time. The modeled salinity in most of the plume would return above the State standard (31.5 ppt) within a few hours. Even the heart of the plume would return above the State standard (31.5 ppt) within 12 hours of the peak outflow.

Approximately 11,500 pounds (5,200 kg) of suspended sediment would be discharged as a result of the 2-year event. The resulting suspended sediment plume under these conditions is shown in Figure 3-7. At the end of the model run of 2 days, approximately 60 percent of this would have been deposited in the area modeled. About 20 percent of the sediment would have been transported to the west out of the modeled area, and a little less than 20 percent would remain suspended in the water column within the modeled area; currents would eventually carry most of this away. The clay fraction of the sediment (the fine particles) would remain in suspension. As would be expected, the maximum deposition would occur immediately offshore of the drainage outlet; even there, the maximum deposition thickness would be less than 7 one-thousandths of an inch (0.17 millimeter), and that would be limited to a very small area. For example, Sediment thicknesses calculated 330 feet (100 meters) east and west of the discharge site are 0.4 one-thousandths to 2.0 one-thousandths of an inch (0.01 and 0.05 mm), respectively.

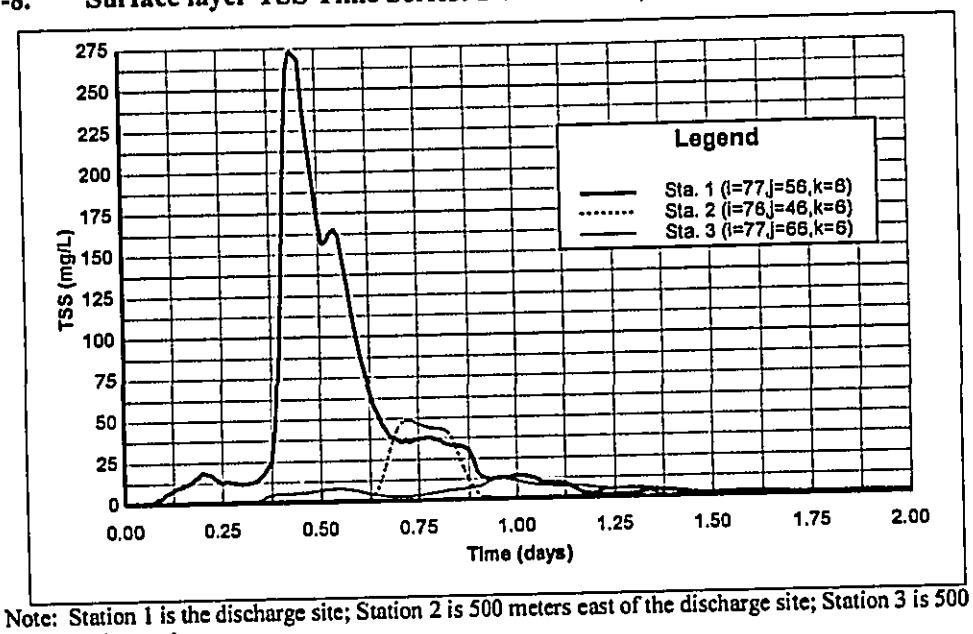
Figure 3-8 depicts suspended sediment concentrations over time. Model results show that the peak TSS levels were 275 mg/l at the discharge site. Only 500 meters to the east (Station 2), the peak had dropped by over 80 percent to 50 mg/l; the same distance to the west (Station 3), the peak was only a fifth of that (12 mg/l). TSS levels approach ambient levels of about 10 mg/l 14 hours after the end of the peak storm discharge.

Figure 3-7. Peak Surface Layer TSS Concentrations: 2-year Event and Moderate Tides.



Note: Contours in mg/l.
Source: Sea Engineering, Inc., Dec. 2004, Figure 6-2C.

Figure 3-8. Surface layer TSS Time Series: 2-Year Event, Moderate Currents.



Note: Station 1 is the discharge site; Station 2 is 500 meters east of the discharge site; Station 3 is 500 meters west of the discharge site.
Source: Sea Engineering, Inc., Dec. 2004, Figure 6-2F.

3.5.4.3.2 100 Year Event with Moderate Tidal Currents

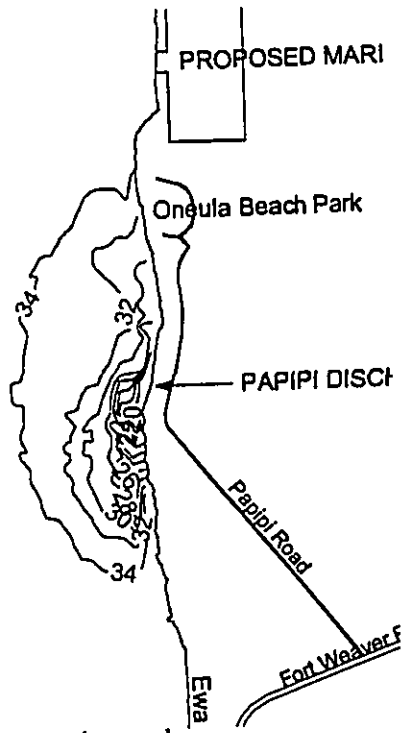
The second plume transport scenario modeled assumed a 100-year discharge event and moderate tidal currents. This represents an extreme worst case for the project site because the discharge event is extreme and mixing conditions are poor because winds and waves are absent. The discharge event occurs over a 24-hour period, with the peak discharge coinciding with the transition from a flooding to ebbing tide. Transport is therefore initially to the west, and then reverses to the east.

The results of the model indicate that the effect of even this extreme discharge event would be small. Peak discharge plume water with salinity below 28 ppt contact the seafloor only within 170 feet (50 meters) of the discharge. Even within this area the depressed salinity levels would persist for no more than a few hours. This is too brief an exposure to adversely affect benthic organisms. Plume waters with a salinity below the water quality standard of 31.5 ppt are confined to the upper 3 feet (1 meter) of the water column and extend approximately 1,300 feet (400 meters) offshore.

Figure 3-9 and Figure 3-10 show that in the surface water layer, the plume (as defined by the 31.5 ppt salinity concentration and 10% dye concentration) extends about 1,300 feet (400 meters) offshore of the shoreline and approximately a mile (1,500 meters) along the shoreline. The extent of plume where the salinity exceeds 28 ppt is much smaller, approximately 700 feet by 3,000 feet (200 meters x 900 meters). More importantly, in both cases the freshwater plume is largely confined to the surface. Time series plots of salinity in the surface layer (Figure 3-11) show that salinity would return to above 31.5 ppt in all areas within 14 hours of the time the discharge peaks.

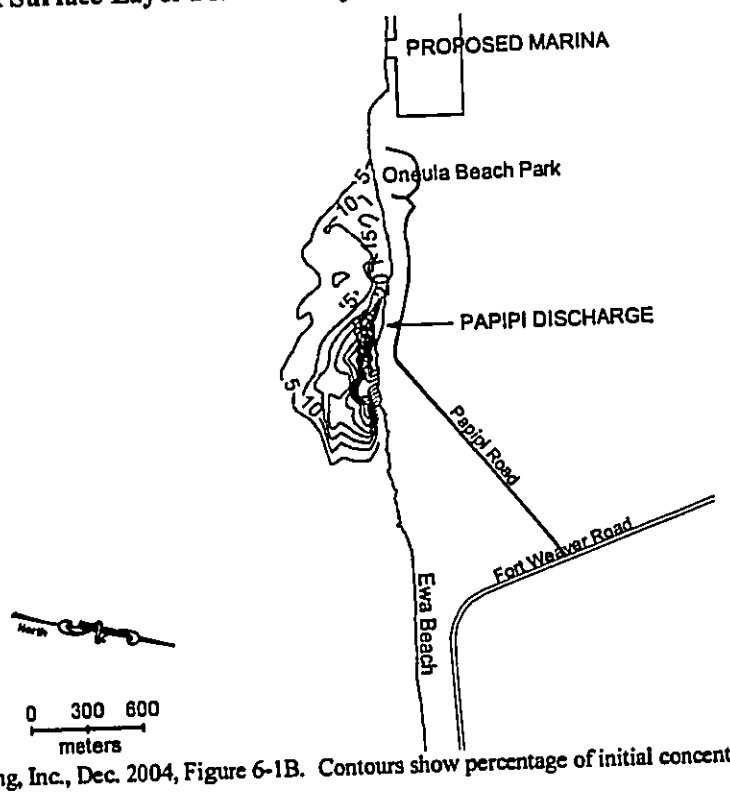
Engineers estimate that the 100-year event would discharge approximately 85,000 pounds (40,000 kg) of suspended sediment. Two days after this event, the model predicts that 50,000 pounds (22,200) kg of sediment would be deposited on the seafloor in the vicinity of the discharge considered in the model. Most of the remainder (a little over 30,000 pounds, or 14,000 kg) would be transported to the west out of this area. The remainder, (7,000 pounds, or 3,300 kg) would remain suspended in the water column within the model domain. The clay fraction remains entirely suspended, while most of the silt fraction is deposited.

Figure 3-9. Minimum Surface Layer Salinity: 100-year Discharge Event & Moderate Tides.



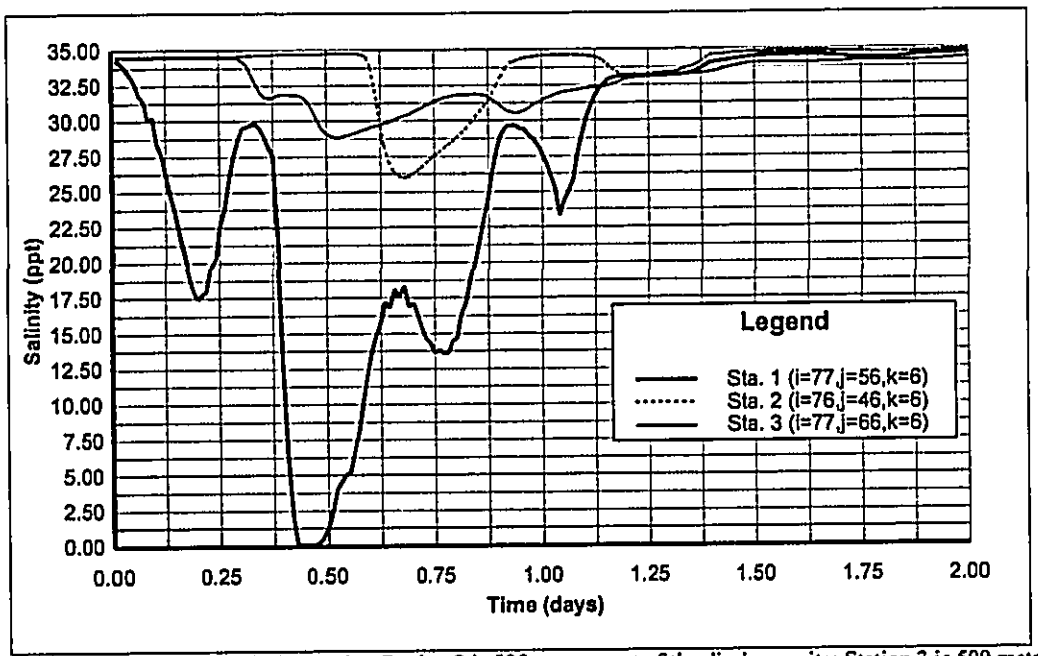
Note: Contours show salinity in parts per thousand.
Source: Sea Engineering, Inc., Dec. 2004, Figure 6-1A

Figure 3-10. Peak Surface Layer Plume: 100-year Discharge Event and Moderate Tides.



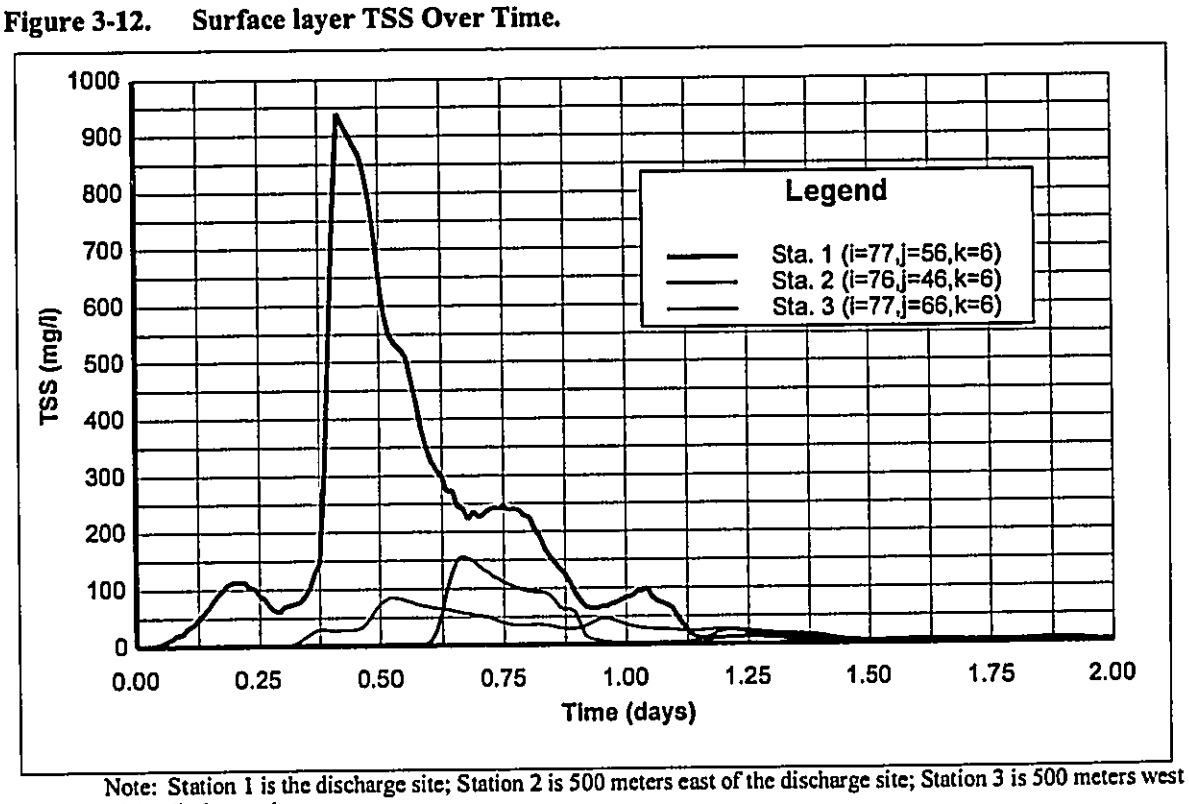
Source: Sea Engineering, Inc., Dec. 2004, Figure 6-1B. Contours show percentage of initial concentration.

Figure 3-11. Surface Layer Salinity Changes Over Time.



Note: Station 1 is the discharge site; Station 2 is 500 meters east of the discharge site; Station 3 is 500 meters west of the discharge site.
Source: Sea Engineering, Inc., Dec. 2004, Figure 6-1D.

Figure 3-12. Surface layer TSS Over Time.



Note: Station 1 is the discharge site; Station 2 is 500 meters east of the discharge site; Station 3 is 500 meters west of the discharge site.
Source: Sea Engineering, Inc., Dec. 2004, Figure 6-1F.

The model indicates that the maximum deposition would occur immediately offshore of the drainage outlet, where approximately three one-thousandths of an inch (0.6 mm) of sediment are calculated to be deposited. Sediment thickness rapidly drops with distance from the discharge site. Three hundred feet to the east and west of the outlet the sediment deposition would be approximately one-tenth and one-fifth of that, respectively; 1,600 feet away the deposition would have dropped to near zero.

Model results show that peak TSS levels were 950 mg/l at the discharge site, 150 mg/l 1,600 feet (500 meters) west of the discharge site, and 85 mg/l 1,600 feet (500 meters) east of the discharge site. Total suspend solids measurements conducted by Marine Research Consultants (2004) for the Ocean Pointe development indicate that ambient nearshore TSS concentrations are about 10 mg/l, far lower than the peak that would be experienced during the 100-year discharge event. The area of the discharge plume where TSS concentrations would exceed 20 mg/l (twice the long-term average) extends about 1,600 feet (500 meters) offshore and one mile (1,700) meters along the shore. TSS levels would approach ambient levels of about 10mg/l approximately 1 day after the end of the storm discharge.

3.5.4.3.3 100-Year Discharge Event with Moderate Tides and Kona Waves and Winds

The third plume transport scenario evaluated using the model assumed the same 100-year discharge event as the second scenario, but assumed that these occurred during the presence of Kona winds and waves. For this scenario the wave input to the wave model REF/DIF consisted of deep-water wave heights of 4 feet (1.3 meters) and periods of 9 seconds from a southwest direction. The wind input assumed a speed of winds of 10 miles per hour (4.6 m/s) from the southwest. The model results indicate that the Kona winds and waves drive nearshore currents to the east at speeds of one-quarter to 1.35 miles per hour (10 to 60cm/s). The model shows that the presence of Kona waves and winds greatly reduces the size and intensity of the surface plume relative to the moderate tidal current only scenario. The maximum plume excursion with water below the State standard of 31.5 ppt is 500 feet (150 meters) offshore and 1,600 feet (500 meters) to the east. This is because the breaking waves efficiently mix and diffuse the plume throughout the water column. At their furthest, bottom water layer salinities below 28 ppt extend only 150 feet (50 meters) offshore. The modeled surface layer salinity everywhere meets the State standard of 31.5 ppt within about 7 hours after the peak discharge outflow; the salinity always remains above 31.5 ppt 1,600 feet (500 meters) from the discharge.

This scenario assumes the same suspended sediment discharge into the ocean as the previous one, and model results indicate that approximately the same amount would be deposited in the model area. However, the higher wave energy assumed for this scenario causes substantially more of the silt fraction to remain in suspension (rather than settling out). Modeled sediment deposition at distances 330 feet 1,650 feet (100 meters and 500 meters) from the discharge point are also nearly the same as those for the non-Kona 100-year recurrence frequency scenario.

Model results show that initial plume concentrations are greatly reduced as compared to the non-Kona wind and wave conditions discussed in Section 3.5.4.3.2. The peak TSS levels were 750 mg/l at the discharge site, and 50 mg/l at Station 2. Since transport was to the east, the suspended sediment plume did not reach Station 3 (which is to the west of the proposed outlet). The modeled TSS levels at the discharge point (the location most impacted by the discharge) return to background levels approximately 0.6 days after the end of the storm discharge. At Station 2, the TSS levels return to background in 3 hours. Thus, the model results show that Kona wave and wind conditions result in greatly reduced sediment deposition and greatly increased suspended sediment mixing and dispersion when compared with the same discharge under non-Kona wind and wave conditions.

3.5.5 SUMMARY AND PROPOSED MITIGATION MEASURES

The modeling examined extreme events because they are the ones that create the greatest change in the quality of the receiving waters and affect the largest areas within the marine environment. The kinds of discharges that would occur as a result of more frequent rainfall events would be very much smaller than those modeled and would, therefore, have very much less effect on the quality of the

receiving waters. Because of the good transport and mixing conditions that exist along the shoreline in the vicinity of the proposed discharge, the perturbations caused by even a relatively large event (such as the two-year storm) would largely disappear within half a day. Smaller (more frequent) events would produce smaller changes that would disappear even more quickly. Even for the largest discharge events changes with the potential to affect the benthic would be Limited to the area immediately adjacent to the discharge.

As a means of reducing the potential for adverse effect to the greatest extent practicable, HASEKO will require the contractor to incorporate several Best Management Practices (BMPs) into the construction process to minimize or avoid impacts to water quality. These include:

- Using sediment controls to remove sediment from water generated by dewatering (e.g., sediment traps and sediment basins) and empty them regularly through filtration.
- Storing construction materials and waste in designated areas and disposing of wastes promptly at an approved site.
- Providing workers with spill prevention and cleanup information and equipment.
- Ensuring that construction vehicles are free of leaks and conduct refueling and vehicle maintenance either offsite or in a contained area away from drainage courses.

In addition, the following structural BMPs are incorporated into the design of the proposed improvements to minimize the effect that discharges from the system will have on water quality and marine biota:

- Catch basin inserts used along the Ocean Pointe frontage where curbs and gutters are to be installed will prevent trash and other debris from entering the ocean.
- Vegetated swales planned for the frontage and rear of Pāpipi Subdivision and the ocean outlet will enhance groundwater recharge and settling of pollutants, and will minimize visual impacts to the area.

3.6 NATURAL HAZARDS

3.6.1 SUSCEPTIBILITY TO FLOODING AND TSUNAMI INUNDATION

The flood hazard ratings of the project area depicted on the Flood Insurance Rate Map (FIRM) are shown on Figure 3-13. The location of the pipe along Pāpipi Road to the proposed outlet is designated Flood Zone AE, or a 100-year flood area with a base flood elevation of 6 to 8 feet. It shows that the portion of Pāpipi Road south of 'Aikanaka Road is within FIRM Flood Zone A, as is the temporary retention basin that would be in place until the ocean outlet can be completed. Flood Zone A signifies an area with a potential for flooding every 100 years, but with no determined base flood elevation. The northern portion of Pāpipi Road and the properties above Pāpipi Drive that would be affected by the project are in Flood Zone D (i.e., an area with possible but as yet undetermined flood hazards). The design of the improvements conforms with the development standards for these flood hazard areas as outlined in the City and County of Honolulu's Land Use Ordinance (LUO) §21-9.10-4.

The only above ground component of the project is the temporary retention basin. It is located within Zone A as depicted on the Figure 3-13. Should a tsunami with a recurrence interval of 100 years occur during the short period when the temporary retention basin is expected to be in place, it could overtop the *makai* berm of that structure. The velocity of the wave is sufficiently low that it is unlikely to breach the thick makai berm. Even if it should do so, the only damage would be to the temporary basin itself, and that damage could be quickly repaired. The presence of the bermed retention basin would not increase the potential for serious damage to adjacent areas, which would continue to be vacant while the retention basin is in place.

The discharge channel that is proposed along the eastern side of the One'ula Beach Park expansion area is below the existing ground level. The force of the wave would not damage the feature itself. Consequently, the only way in which the presence of the shallow channel could adversely affect the surrounding area is if it were to allow flooding to occur in areas that would otherwise not be affected by the tsunami. While this might theoretically occur, the potential is limited to the area immediately adjacent to the channel. The fact that the area to the west of the channel is planned for park open space means that no such potential exists in that direction. The area immediately to the east is planned for residential development, but no structures are present on that area and any structures that might be constructed there in the future would have to be built above the flood level in any rate. The presence of the channel would not substantially alter this requirement.

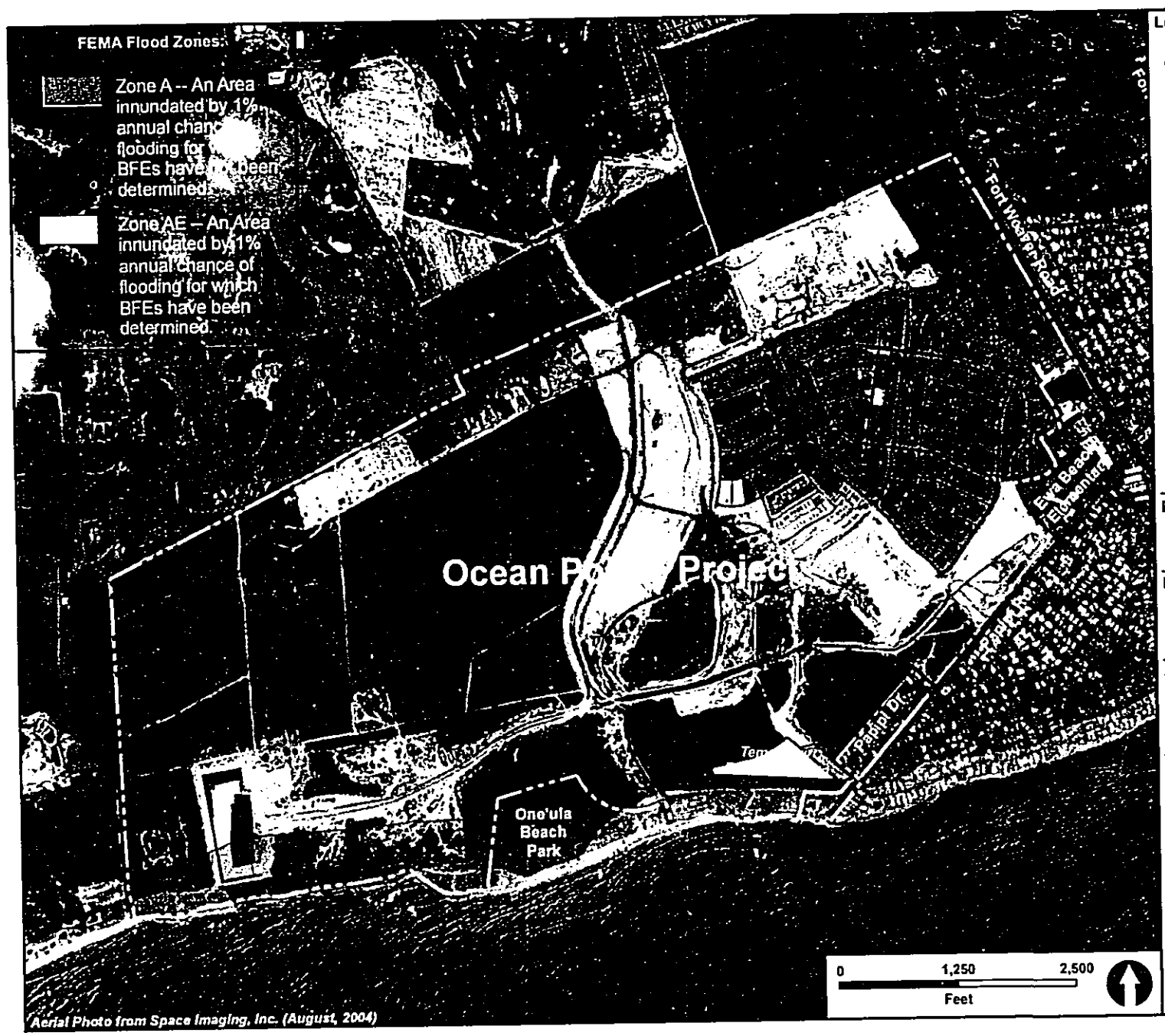
3.6.2 SUSCEPTIBILITY TO HURRICANE DAMAGE

Hurricane season begins in June and lasts through November in the Hawaiian Islands. Most Central Pacific hurricanes originate near the coasts of Central America or southern Mexico and typically subside when they move northwestward over cooler water or encounter unfavorable atmospheric conditions. O'ahu's 'Ewa Coastal Plain is seldom impacted by hurricanes and other severe storm events. In fact, while many hurricanes and tropical storms have passed near O'ahu during the last 50 years, only three have had direct impact. In all three cases, Kaua'i was the hardest hit, although O'ahu suffered significant damages as well. Hurricane 'Iniki in 1992 was by far the most destructive storm to strike Hawaii in recorded history, with widespread wind and water damage exceeding $2.2 billion.

The structures proposed as part of the project are nearly all underground and therefore cannot be directly damaged by hurricane force winds. The exception is the temporary retention basin, but its thick berms protect it from potential damage. The waves that are generated by hurricanes are capable of shifting large amounts of sand about on the ocean floor. However, the fact that the shoreline through which the proposed discharge channel would be constructed is composed of solidified beach rock and coralline material means that it is not susceptible to clogging or other types of disturbance by wind-generated waves.

3.6.3 SUSCEPTIBILITY TO SEISMIC DAMAGE

The Uniform Building Code (UBC) establishes minimum design criteria for structures to address the potential for damages due to seismic disturbances. The scale is from Seismic Zone 0 through Zone 4, with 0 the lowest level for potential seismic induced ground movement. Like all of O'ahu, the project area is designated Seismic Zone 2a (U. S. Geological Survey, 1997). All the structures planned as part of the project will conform to Seismic Zone 2a Building Standards, and will not increase the seismic vulnerability of the project area.



Legend:

Pāpipi Road Drain: Increment 1

Pāpipi Road Drain: Increment 2

Prepared For:

HASEKO (Ewa), Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

--R.M. Towill, Corp.
--HASEKO (Ewa), Inc.

Figure 3-13:

Flood Hazard Zones

Pāpipi Road Drainage Improvements Project

3.7 TERRESTRIAL BIOTA

3.7.1 EXISTING CONDITIONS

Presently, plant communities in the 'Ewa Plain are dominated by introduced species such as kiawe *(Prosopis pallida)*, koa haole *(Leucaena leucocephala)*, garden spurge (*Chamaesyce hirta*), Pluchea spp., tree tobacco (*Nicotiana glauca*), swollen-finger grass *(Chloris inflata)*, and numerous other weedy species. Two indigenous species, 'uhaloa (*Waltheria indica*), and 'ilima (*Sida fallax*) are present in a few low-lying areas. Char & Associates (Char 2004) recently conducted a botanical resources assessment study within Kalo'i Gulch and One'ula Beach Park. None of the plants observed are listed as endangered, threatened or have been proposed for listing under the Endangered Species Act of 1973, as amended (ESA) (Federal Register 1999a, 1999b). A prior botanical study along the adjoining Ocean Pointe development conducted for environmental documentation also concluded that there were no endangered or threatened plant species in the area (Char & Associates, 1989). A walk-through of the area that would be affected by project-related construction that was conducted in December 2004 indicated that no rare plant species are present.

Terrestrial mammalian species found at the project site are probably restricted to introduced species such as mice, rats, mongoose, dogs, and feral cats. A recent survey of avifaunal resources documented 11 species of birds in the vicinity of Kalo'i Gulch, none of which were threatened, endangered, or proposed for listing under the ESA (Rana Productions Ltd., June 2004). Although not encountered it is possible that the endangered Hawaiian endemic sub-species of the Black-necked Stilt *(Himantopus mexicanus knudseni)* may use resources within some low-lying portions of the project area on occasions when water ponds in it during heavy rains. This species is known to be highly opportunistic, rapidly prospecting locations with standing water.

A recent survey centered on the outlet to Kalo'i Gulch, just west of the project area recorded 11 species of birds. All of the species detected are considered to be alien to the Hawaiian Islands. In addition two other species; Wandering Tattler (Heteroscelus incanus) and Ruddy Turnstone (Arenaria interpres) were seen foraging on the karst outcrop immediately inland of the shoreline. These later two species are migratory shorebirds that are commonly seen in Hawai'i between July and May each year. No species listed as endangered or threatened or proposed for listing under either the federal or State of Hawai'i endangered species programs were detected.

3.7.2 POTENTIAL IMPACTS

None of the plant or animal species documented in the project vicinity are endangered, threatened or, or have been proposed for listing under the ESA (Bruner 1990, Char & Associates 1989 & 2004, Rana Productions Ltd. 2004). With one exception, the Pāpipi Road right-of-way and the portions of HASEKO's property that would be affected by the project are all highly disturbed and subject to intensive human use. Construction activities will temporarily displace common exotic vegetation and avifauna species, however the area will be replanted with species suitable for the expected dry and relatively arid conditions of the site upon completion of the project. There will be no permanent loss of terrestrial habitat as a result of this project. The least disturbed area is the kiawe forest within which the proposed temporary retention basin will be constructed, but the Ocean Pointe Master Plan slates this area for intensive residential development, and the environmental surveys and impact statements that were prepared for the overall Ocean Pointe project have confirmed that the loss of vegetation and attendant habitat this area will not be significant.

Although they are not known to use any of the areas that would be directly affected by the proposed drainage improvements at the present time, endangered Black-necked Stilts do fly over the area on a regular basis. The species is very opportunistic and, based on behavior observed at the mouth of the nearby Kalo'i Channel, it is possible they may try to take advantage of the permanent intertidal habitat that would be created when the proposed drainage outlet is constructed across the proposed

extension of One'ula Beach Park. Whether or not this will occur at all, and the nature and frequency of the use will depend upon the extent to which vegetation develops within the channel after it is constructed. In any event, any use of resources within the channel by Black-necked Stilts is likely to be of an incidental nature (i.e., limited to loafing and possibly some foraging if suitable aquatic organisms establish themselves within the intertidal area). Nesting birds are unlikely to be attracted to the area because of the heavy use it will receive, avoiding the potential for adverse interaction between nesting activity and recreational use of the park. Consequently, whatever effect there is will more likely be beneficial (in the form of increased foraging habitat for the birds) than adverse (in the form of increased potential for injury to adults, nests, eggs, and chicks). The intertidal area and surrounding area are unlikely to attract nesting birds which might be adversely affected by nearby uses. Consequently, the effect is likely to be beneficial rather than adverse.

There is also a potential for similar short-term interaction between the proposed improvements and Black-necked Stilts and possibly the endangered Hawaiian Coot (*Fulica alai*) in the area that would be occupied by the temporary retention basin. While the excavation there would stop just above the normal water table, water could appear in the bottom of the basin during extreme high tides and immediately following heavy rains. High tides would produce exposed water for a matter of minutes to an hour or so at a time. Infrequent storm events could result in water remaining for short periods of time within the temporary retention basin. Consequently, it is possible that some organisms that are natural food items for the Black-necked Stilt could grow in the retention basins, attracting foraging stilts. Standing water deep enough for ducks and coots to swim on also attract the endangered Hawaiian Coot, a species which is as opportunistic in seeking out and exploiting ephemeral wetlands, ponds and reservoirs as is the Black-necked Stilt. So long as care is taken to ensure that the bottom of the retention basin remains above the normal water table and that the contractor does not accidentally create protected "islands" within wet areas that might attract nesting pairs of stilts and/or coots, the retention basin would be generally beneficial to these two endangered waterbird species.

It is expected that the mitigation measures that will be employed will prevent the temporary retention basin from becoming attractive habitat for endangered species. Nonetheless, at such time as the temporary retention basin is no longer required, a qualified field ornithologist will conduct a field survey to ensure that no active nesting activity is ongoing by either Black-necked Stilts or Hawaiian Coots. Should such activity be detected, HASEKO will postpone filling until all chicks have fledged, or the nests have failed and been abandoned.

3.8 MARINE BIOTA

3.8.1 EXISTING CONDITIONS

3.8.1.1 Physical Habitat

As noted elsewhere in this report, the shoreline at the point of discharge consists of a jagged vertical scarp of highly pitted beachrock approximately two meters in height. Small patches of white beach sand occur in pockets at the base of the scarp; the remainder of the intertidal area is a solid, flat platform composed of beachrock. From the area immediately off of the beachfront out to the 20 m depth contour, the ocean bottom is composed of a wide, predominantly flat, gradually sloping, calcium carbonate (limestone) platform.

The surface of the reef platform off the drainage site is predominantly barren of most macrobiota. A short algal turf covers most of the flat reef platform. Bound within the algal turf is a layer of sediment composed of sand grains of marine origin. In some areas, shallow sand-filled channels and depressions intersect the reef platform, resulting in a limited groove and ridge system. Some extensive sand deposits are present in deeper areas of the reef platform (water depth of 5 to 20 meters). The bottom composition in the vicinity of the proposed storm drainage discharge is

approximately 35 percent solid limestone bottom, and 65 percent sand and rubble. This is similar to the bottom elsewhere along the 'Ewa Beach shoreline.

3.8.1.2 Biotic Structure

Macroinvertebrate abundance off the Ocean Pointe property, as well adjacent regions, is relatively depleted compared to many other areas of the south coast of O'ahu. The depauperate nature of the area is the result of three factors: (i) the relatively flat bottom provides little shelter for marine organisms; (ii) the near-constant abrasion from shifting sand is harmful to most species, and (iii) the near-constant concussive force of breaking waves continually impacting the broad nearshore platform limits the settlement and growth of benthic organisms.

While comprising less than 5% of bottom cover, scleratinian (reef-building) corals occurred in the offshore area, primarily as small encrustations of low massive colonies primarily of the genera *Porites*, *Montipora* and *Pocillopora* (finely branching corals were virtually absent). Other observed macroinvertebrates were the colonial "soft corals" *Palythoa tuberculosa* and *Anthelia edmondsoni.* The other major group of attached benthos that were ubiquitous throughout the reef zones were encrusting sponges of a variety of species. One species, *Iotrocha protea*, which occurs in a distinct conical growth form, was noted throughout the region of study.

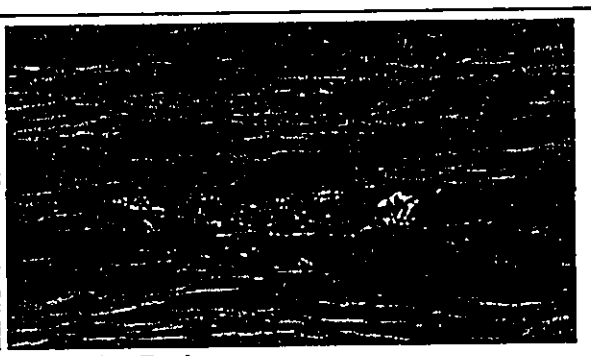
Marine algae (known as limu) is abundant throughout the submerged 'Ewa nearshore region. In general, algal abundance is highest in the nearshore intertidal regions and decreases with increasing distance from the shoreline and depth. However, many of the same species occur across the entire depth regime. While the biomass of algae is high, especially in the intertidal areas, the species diversity is relatively low. Several dominant species occurred in the intertidal area. *Chaetomorpha antennina* occur ubiquitously throughout the area, growing on the shoreline limestone scarp above the low tide mark. In the shallow offshore areas, the dominant algae is *Hypnea* spp. which carpets the bottom in thick mats in many areas. Other common species in the shallow intertidal region are *Acanthophora specifera, Caulerpa racemosa*, C. *sertularoides*, and *Halimeda discoidea.* Dominant alga in the 5- to 10-meter depth range are *Caulerpa* spp., *Halimeda* spp., *Asparagopsis taxiformis*, *Acanthophora spec*ifera, and *Lyngbya majuscula.* While not observed during the survey made for this report, other limu species known to occur in the area include *Codium sp., Garcilaria sp, Dictoyta sp. Dictyopteris sp., Ulva fasciata, Sargassurn sp., Halymenia formosa,* and perhaps others.

RECEIVED AS FOLLOWS

3.8.1.3 Marine Mammals

Marine species which are of particular concern in the Hawaiian Islands include the threatened Hawaiian monk seal *(Monachus schauinslandi)*, green sea turtle (*Chelonia mydas*), various species of whales including the humpback whale *(Megaptera novaeangliae)*, and various species of limu, which is harvested for food along coastal areas of O'ahu including 'Ewa.

Hawaiian Monk Seal



Green Sea Turtle

Hawaiian Monk Seal. The Hawaiian monk seal has not been observed near the shoreline at the project site and is not known to inhabit or frequent waters in the vicinity of nearby One'ula Beach Park. A possible explanation for this may involve the regular presence of humans along the shoreline involved in surfing, swimming, fishing, and picnicking which would serve as a deterrent to use of the area by seals. The regular transit of vessels from the Pearl Harbor Naval Base and may also influence the seals to remain clear of the area.

Humpback Whale. The humpback whale is not known to frequent coastal waters in proximity to the project site. According to prior research on whales in waters surrounding O'ahu, the only area of significant utilization is the sub-region adjoining the northwest coast of the island, from Ka'ena Point to Kahuku (Behavioral Research Consultants, 1992).

Green Sea Turtle. The green sea turtle is regularly present in coastal waters near the project site. HASEKO has commissioned a series of surveys of turtles in the coastal area near the Ocean Pointe project over the past dozen years. The results of the surveys, which were conducted by Marine Research Consultants, are summarized in Table 3-7. The survey results show that turtles are present throughout the year with variations in number of individuals present at any single monitoring period (the long-term average is about a dozen turtles).

The greatest concentration of turtles is in an offshore area of substantial vertical relief fronting the former Barbers Point Naval Air Station which is located approximately 1.5 miles west-southwest of the proposed stormwater discharge. Extensive excavation of the soft limestone substratum suggests that turtles have used the area for a considerable period of time. Turtles have also been observed congregating at a sunken barge resting on the bottom in approximately 30 feet of water nearly three-quarters of a mile seaward of the proposed ocean outlet. The turtle population has resided in the area for a considerable time, and their abundance suggests they are utilizing locally available food sources. The constant presence of the green sea turtle and the consistent population attributes observed suggest that the population is stable. The fact that population characteristics are about the same after the development of the Ocean Pointe project was initiated as they were before, it appears that ongoing construction activities have not negatively influenced the population. The species is not known to utilize the shoreline or coastal areas for nesting, breeding, or other purposes.

Table 3-7. Results of Green Sea Turtle Surveys 1990-2003

Survey	*Date*	*Total Turtles*	*Male*	*Female*	*Unknown Sex*	*>50 cm*	*<50 cm*
1	9/22/1990	0	0	0	0	0	0
2	11/25/1990	13	3	9	1	13	0
3	1/6/1991	13	3	5	5	13	0
4	5/5/1991	12	2	6	4	11	1
5	6/17/1991	12	3	7	2	11	1
6	7/7/1991	22	6	12	4	20	2
7	8/17/1991	10	3	2	5	10	0
8	9/21/1991	6	2	1	3	5	1
9	10/14/1991	6	1	4	1	5	1
10	1/24/1992	14	4	10	0	14	0
11	4/18/1992	12	2	9	1	11	1
12	6/27/1992	6	4	2	0	6	0
13	9/6/1992	12	0	12	0	12	0
14	11/8/1992	17	2	9	6	16	1
15	12/23/1993	18	3	9	6	17	1
16	4/2/1994	14	2	7	5	12	2
17	10/30/1994	13	2	9	2	11	2
18	3/26/1995	10	1	7	2	9	1
19	10/28/1995	14	2	9	3	13	1
20	5/3/1996	17	2	9	6	16	2
21	10/6/1996	16	3	11	2	14	2
22	8/10/1997	14	1	7	6	10	4
23	7/26/1998	14	2	10	2	12	2
24	7/5/1999	17	0	17	0	15	2
25	12/19/1999	11	1	10	0	10	1
26	9/9/2000	16	4	12	0	13	3
27	12/24/2000	9	1	8	0	9	0
28	6/9/2001	13	0	11	2	13	0
29	12/31/2001	14	2	12	0	14	0
30	5/28/2002	22	2	20	0	22	0
31	11/19/2002	12	0	12	0	12	0
32	3/16/2003	12	1	11	0	10	2
33	12/13/2003	8	1	7	0	8	0
	Totals	**419**	**65**	**286**	**68**	**387**	**33**

Note: The >50cm and <50 cm fields refer to the length of the turtle's carapace, an indicator of age.

Source: Marine Research Consultants (March 2003).

3.8.2 POTENTIAL IMPACTS & MITIGATION MEASURES

3.8.2.1 Construction Period Impacts

Construction of the proposed drainage improvements will produce virtually no discharge to the ocean. The only exception to this will occur during the very final stage of construction when heavy equipment will be used to excavate the last few feet of material separating the inland extent of the proposed drainage channel from the water. This final "breakthrough", which can be accomplished in a matter of a few hours, will be done when the tide is at a relatively low stand, minimizing the potential for construction equipment to produce noticeable discharge into the ocean. Consequently, of the marine organisms described above, only those that come ashore (i.e., the green sea turtle and monk seal) stand any chance of being affected during this increment of the project.

The only physical changes associated with construction of the proposed improvements that would occur in areas that are potential habitat for marine organisms are those associated with construction of the drainage outlet. For reasons summarized below, these do not have the potential to significantly affect marine biota.

- Monk Seals haul out for resting and bathing only on sandy beaches. Because of this, the shoreline area where the drainage outlet would be constructed is not suitable Monk Seal habitat.
- Sea turtles come ashore only to lay eggs, and they seek out sandy areas for that purpose. Because the area that would be affected by the construction of the drainage channel consists of hard material, construction of the proposed drainage channel would not interfere with their activities.

3.8.2.2 Potential Effects of the Proposed Discharge on Marine Biota

Once the proposed drainage improvements are in place, stormwater will periodically discharge to the ocean through the new outlet. The nature of the anticipated discharge and the effect that it will have on water quality are discussed in previous sections of this document. The reasons why these changes are likely to have limited effect on marine biota are discussed below. This is done using both the modeling results and the results of an inspection of the nearshore areas surrounding the two existing storm drain outlets that are nearby.

3.8.2.2.1 Modeling Approach

The area into which the discharge would occur is poorly suited for the establishment of well developed coral communities. This is due to both physical concussive force and intense scouring from naturally occurring carbonate sediment (sand). Hence, the only marine biota that occur in the area are species assemblages that can tolerate conditions of both extreme wave forces and sediment scour.

The most pertinent biotic components of the nearshore area that could be affected by such runoff are the algal (limu) communities. Biologists generally agree that marine algae respond positively (i.e., become more abundant) to freshwater inputs, probably because the groundwater has higher nutrient concentrations than the ocean water into which it flows. In many locations around the Hawaiian Islands, including the 'Ewa area, prime limu harvesting grounds occur near freshwater (groundwater) seeps.

Surface water runoff from the Pāpipi drainage system will likely contain lower nutrient concentrations than groundwater that flows to the ocean in the 'Ewa region, but runoff nutrient concentrations are still likely to be elevated compared to those found in open coastal ocean water. Other things being equal, this would tend to increase algal growth marginally. However, because the discharges from the system will be both sporadic (occurring only when rainfall is sufficient to cause surface runoff) and short (typically lasting for no more than a day at a time), their ability to affect limu growth is much more limited than that of the more constant flow of groundwater. Hence, if there is any response at all by the limu communities as a result of storm water discharge, it is likely to

be positive (i.e., increased growth owing to potential increases in plant nutrients within the nearshore zone) and of very limited magnitude.

The other constituent that may be present in stormwater discharge is sediment. There are two situations where increased sediment can be of concern: (i) if it raises suspended sediment concentrations to the point where it adversely affects the existing biota and (ii) if it leads to permanent deposition that smothers benthic fauna. The results of the modeling suggest that neither is problematic with respect to the proposed discharge.

- While stormwater sediment from terrigenous sources may be qualitatively different than marine sediment, the potential effects to marine biota are likely similar. As mentioned above, the existing marine setting is characterized by substantial scouring by suspended sediment, and the limu that occurs in the area are well-adapted to such a high sediment environment.
- Owing to the high energy in the nearshore environment caused by breaking waves, only limited amounts of terrigenous sediments would settle to the bottom. Moreover, of those that do, most would be resuspended and carried away after a relatively short period of time. Intermittent discharges of small amounts of suspended sediment (in comparison to the vast amounts of naturally occurring sediment) are not likely to provide any conditions that would exceed the adaptive capabilities of the existing communities.

3.8.2.2.2 Comparable Discharge Approach

The same conclusions about the low probability of a significant adverse effect from the proposed discharge were reached using the results of surveys of the areas around the two existing storm drainage outlets just to the east of the proposed project.[13] Examination of the receiving environments off these existing drains (which have been present for more than 30 years) indicates that the biotic assemblages present are identical to those present in similar areas not affected by stormwater discharge.

3.8.2.2.3 Summary

In summary, the discharge of stormwater from the proposed Pāpipi Road stormwater system is not likely to have any negative effects to the nearshore environment. The only potential effect of rapid mixing of stormwater discharge with marine water would be an increase in limu growth owing to slightly increased nutrients, although it is not likely that such a response will occur as the nutrient subsidies will be very ephemeral. Sediment loads in the stormwater will not result in qualitative differences in the existing conditions of extreme scour. As a result, biota that can presently inhabit the area will be able to deal with the small and temporary changes to water quality that may occur as a result of discharge from the Papipi Road drainage system.

3.9 NOISE

3.9.1 EXISTING CONDITIONS

Properties adjacent to the project are mostly residential and zoned for R-5 (Single-family Residential) use. The State Department of Health limits noise levels in the R-5 zone to 55 dBA during the daytime and 45 dBA at night.

The most significant existing noise sources affecting the project area are vehicles traveling on Pāpipi Road. Aircraft from Kalaeloa Airport and Honolulu International Airport can also be heard as the project area is approximately one mile from the end of the nearest runway at Kalaeloa Airport (formerly Barbers Point Naval Air Station) and a little farther from one of the main approach paths to Honolulu International Airport. However, aircraft noise is not intrusive. Construction noise from ongoing activities at Ocean Pointe can be heard at times. For the most part that is well in the

[13] The first drains at Amio Street (18 acres, peak flow of 45 cfs) and the second drains Hailipo Street (19 acres, peak flow of 48 cfs).

background, but there is likely to be some temporary increase in construction noise as the still-vacant portions of Ocean Pointe closest to Pāpipi Road are developed.

Measurements of existing noise levels in the area are presented in Table 3-8. At station 1, adjacent to the 'Ewa Beach Elementary School, the loudest sound levels came from passing trucks and the school bell. At station 2, on the current access road to One'ula Beach Park near the future storm drain outfall, noise came mostly from passing cars, ocean waves, and birds. At station 3, in the currently undeveloped area adjacent to Papipi Drive, the most distinct sounds were from people talking in the adjacent houses, birds, and aircraft passing at some distance to the north.

Table 3-8 Existing Noise Levels

Station	*Leq*	*MinL*	*MaxL*	*MaxP*	*Start Time (AM, HST)*
1	60.1	36.4	88.7	104.2	10:52
2	54.8	41.5	75.8	93.8	11:16
3	54.9	35.6	79.0	98.9	11:34

Note: These variables are defined as follows:
- Equivalent Sound Level (Leq). This variable is the root-mean square (RMS) average of the time-varying sound energy measured during the 10-minute measurement interval. Leq correlates reasonably well with the effects of noise on people, even for wide variations in environmental sound levels and time patterns.
- Maximum Sound Level (Lmax). This is the maximum sound level (1-second integrated value) recorded during the measurement interval.
- Minimum Sound Level (Lmin). This is the minimum sound level (1-second integrated value) recorded during the measurement interval.
- Maximum Peak Level (MaxP). This is the instantaneous maximum sound level measured during the measurement interval.

Note: Station 1 is adjacent to the 'Ewa Beach Elementary School. Station 2 is located on the current access road to One'ula Beach Park near the proposed storm drain outfall. Station 3 is located in the currently undeveloped area adjacent to Papipi Drive just inland of the existing house lots.

Source: Measurements collected by Planning Solutions, Inc. on 12/23/04 using Brüel & Kjær Type 2239 Integrating Sound level Meter. Settings: Fast (1-sec. integration), A-weighted, 10-minute integration

3.9.2 POTENTIAL IMPACTS

Construction work will produce noise. Earth moving equipment, including diesel-powered bulldozers, trucks, backhoes, front-end loaders, graders, etc., will probably be the noisiest equipment used during construction. Depending upon the specific machines that are used and the way they are operated, some of the construction equipment can generate noise levels in excess of the DOH noise limits. Hence, the contractor may seek a construction noise permit from the State of Hawai'i Department of Health. The loudest construction noise audible at any one location will occur for a period of no more than a few weeks will be limited to normal working hours. All work that may be a source of noise will comply with the Hawaii Administrative Rules Title 11, Chapter 46 - Community Noise Control. Adverse impacts from construction noise are not expected to pose a hazard to public health and welfare due to the temporary nature of the work, the absence of sensitive land uses in the immediate surrounding area, and mitigation measures that will be employed to minimize noise impacts.

No long-term noise impacts are expected as a result of the proposed action. Maintenance of the vegetation that will be planted along the public right-of-way could require mowing (if grasses are planted), which would be an occasional, short-term noise source but would be no greater than the noises caused by yard maintenance on nearby properties.

3.10 ARCHAEOLOGICAL, HISTORIC, AND CULTURAL RESOURCES

3.10.1 EXISTING CONDITIONS

The project area is located within the Honouliuli ahupua'a, which is the largest and westernmost ahupua'a in the 'Ewa District. The area inland of Pāpipi Road was used extensively for sugarcane cultivation by 'Ewa Sugar Plantation Company and O'ahu Sugar Company from the late 1800's until the 1990's. However, the sugar fields never reached as far *makai* as the project area. Small-scale ranching, pig farming, and other activities are known to have been presented in areas farther to the West, but none is recorded on the land that would be directly affected by the proposed drainage improvements.

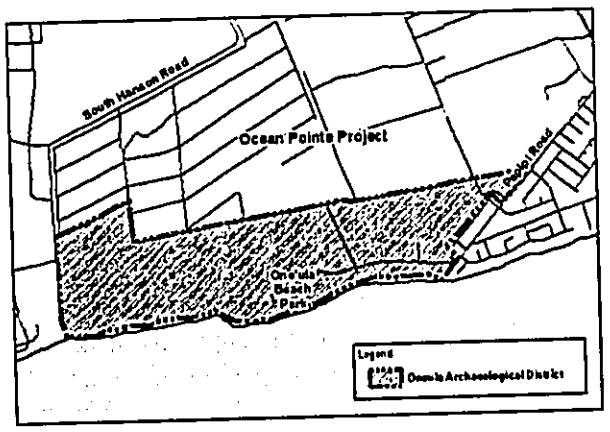


Figure 3-14. One'ula Archaeological District

The site of the temporary retention basin that is proposed as part of the current project, as well as the area that is traversed by the portion of the proposed storm drain pipes around the inland side of the Pāpipi Subdivision, are located within a larger project area that was the focus of intensive archaeological survey and test excavations in 1990, within the One'ula Archaeological District (SHIP Site 50-OA-2873, Dunn and Haun 1991, see Figure 3-14).

Archaeologists have conducted intensive archaeological inventory and data recovery work in the One'ula Archaeological District as part of the development of Ocean Pointe and One'ula Beach Park. A review of previous archaeological work indicates the Interim Retention Basin of the current project and the portion of the proposed drainage improvements that runs around the inland side of the Pāpipi Subdivision has already undergone archaeological study (Dunn and Haun 1991 and Franklin, Goodfellow and Wulzen 1995) and reports for these studies have been through the SHPD review process and have been approved (SHPD letter dated June 27, 1991, from W. Paty, SHPD, to W. Kanai, U.S. Army Corps of Engineers; SHPD letter dated December 22, 1995, from D. Hibbard, SHPD, to P. Rosendahl, PHRI).

In their archaeological inventory survey, Dunn and Haun (1991) identified two archaeological sites in the Interim Retention Basin (Sites 4301 and 4280). Site 4301 was a recent to WWII bunker originally constructed of steel and concrete. The bunker was collapsed and had a plywood roof. Site 4280 was a possibly historic habitation platform 2.6 by 1.9 meters. It was rectangular in plan view and faced on four sides, with the southwest side completely collapsed. A 1.0 meter-square excavation unit placed at the feature yielded many glass and metal fragments, and was terminated at 35 cm below datum. Based on the inventory findings, Site 4301 was assessed as requiring no further archaeological work. The inventory survey recommended further data collection (excavation) at Site 4280, after which preservation would not be required. The further excavation was conducted during the subsequent data recovery work (Franklin, Goodfellow, and Wulzen 1995); one excavation unit was placed contiguous with the inventory survey test unit. Portable remains recovered included glass fragments and 15.88 grams of eco-factual remains consisting primarily of non-marine gastropods and bivalves. Based on the unit findings the site was interpreted as a historic to recent temporary habitation probably associated with coastal recreation.

The State Historic Preservation Division (SHPD) has reviewed and accepted the final data recovery report and the Site Preservation Plan for Ocean Pointe's approved Archaeological Mitigation Program. The SHPD has also determined that park improvements called for in the One'ula Beach Park Master Plan would have "no effect" on significant historic sites (DDC 2001).

HASEKO recently commissioned a supplemental archaeological survey to assess the potential for human skeletal and cultural remains to be buried in the sand deposits that make up the *makai* portion of nearby Kalo'i Gulch. Fieldwork was conducted during March and April of 2004 and consisted of excavating 27 test trenches using a backhoe. No human skeletal remains or prehistoric cultural materials were found or identified (Rosendahl 2004). The SHPD recently approved a monitoring plan to be followed when excavating in the sandy deposits found at the proposed Kalo'i Drainage Channel outlet and at the Ocean Pointe Marina entrance channel.

3.10.2 POTENTIAL IMPACTS AND MITIGATION MEASURES

3.10.2.1 Areas of Potential Effect on Physical Remains

None of the surveys that have been conducted, including the recent excavations carried out at the mouth to the Kalo'i Drainage Basin a short distance to the west of the proposed outlet channel, have identified historically or culturally significant sites or remains. However, because it is always possible that subsurface human remains may be encountered during construction, work crews will be instructed to cease work in the event of a find and to notify SHPD immediately.

Areas Within Ocean Pointe Project Boundaries. Based on a review of previous archaeological work in the project area, the only future archaeological work deemed necessary in the Interim Retention Basin area and along the previously surveyed pipeline alignment inland of the Papipi Subdivision is monitoring of subsurface modification (excavation to increase retention capacity). Consequently, HASEKO proposes to have a monitor present during the initial grubbing and grading of this area; after the initial work only on-call monitoring will be provided. The basin excavation will be monitored as described in Section 3.10.2.2 below.

Area within Pāpipi Road Right-of-Way. Because it was constructed before present historic preservation requirements were in effect, no archaeological excavations have been made along the portion of Pāpipi Road within which the drainage facilities would be installed. On the basis of previous archaeological work in the project area, it appears unlikely that any significant archaeological remains are present in the planned excavation area of the road alignment. There are three principal reasons for this. First, the literature does not report any significant sites in this area. Secondly, Pāpipi Road is underlain by shallow soil and coral substrate, materials that are unlikely to yield such remains. Finally, the road right-of-way has been so thoroughly modified that if any significant remains once were present within the area, it is highly likely they were destroyed during modifications.

3.10.2.2 Proposed Mitigation: Archaeological Monitoring Plan

3.10.2.2.1 General

The Archaeological Monitoring Plan that HASEKO has proposed during construction of the proposed drainage facilities is summarized below. The plan was developed with several facts in mind:

- The review of previous archaeological findings suggests that it is extremely unlikely any significant archaeological remains will be identified.
- If they are identified they would likely comprise: (a) human (b) holes and pits used for cultivation, (c) buried midden or artifact deposits, and (d) buried foundations of former structures.

The proposed program of archaeological monitoring will be conducted in general accordance with Chapter 279: Rules Governing Minimal Standards for Archaeological Monitoring Studies and Reports; Hawai'i Administrative Rules; Title 13, Department of Land and Natural Resources; Subtitle

13, State Historic Preservation Division (adopted December 2003). The proposed monitoring plan will be submitted to the SHPD for review and approval prior to beginning work, unless otherwise agreed to by the SHPD.

The proposed monitoring plan covers the entire area within which construction work will be undertaken.[14] Prior to the start of construction HASEKO will conduct a short, on-site pre-construction meeting. The meeting will be used to present archaeological monitoring rules and procedures relating to the observation and identification of inadvertent discoveries. This meeting will be attended, as appropriate, by archaeological monitors, the project construction manager, field supervisors, and construction crewmembers.

3.10.2.2.2 Specific Provisions of the Proposed Monitoring Plan

In accordance with the proposed archaeological monitoring plan, an archaeologist will be present on-site during initial grubbing and grading of the Interim Retention Basin. Following this, monitoring of this area would be on an "on-call" basis. For the Pāpipi Road drainage system area, given the nature of the subsurface in the project area, and the remoteness of encountering any significant archaeological resources, periodic monitoring of initial excavations for the drainlines will be required. After the initial excavations, only on-call monitoring will be provided. The archaeological monitoring will be done by a qualified archaeologist who will inspect soil material as it is removed from excavations. The monitor(s) will take the following actions if any significant cultural remains are encountered:

Intact Cultural Deposits. If intact cultural deposits are discovered during monitoring, the monitor will assess their integrity and significance. If deemed significant, and if the deposit is likely to be further impacted by construction activities, the archaeologist will halt work in the immediate affected area and will develop an appropriate mitigation strategy in consultation with SHPD.

Cultural Features. The archaeologist will fully describe, draw, and photograph any significant cultural features observed during grading and excavations. She or he will also record provenience information, establish the limits of the feature, record any associations with natural or cultural remains (including surrounding soil), and where appropriate, collect samples for further analyses.

Portable Artifacts. The archaeologist will collect and record the general provenience of any portable artifacts observed in the removed soil. She or he will record the precise locations of any items identified in place and document any observed associations.

Human Skeletal Remains. In the unlikely event human skeletal remains are encountered the procedures for the inadvertent discovery of human skeletal remains outlined in the current Hawai'i Administrative Rules for the treatment of burial sites and human remains (DLNR 1996) that were formally approved and adopted by the State of Hawai'i in September 1996 will be followed. All work in the immediate area of the discovery will be halted, the remains stabilized, and the appropriate authorities contacted. If the skeletal remains are determined to be historic or pre-contact (as opposed to recent), PHRI will consult with SHPD regarding how to proceed with the discovery. If the remains are determined to be recent, the archaeologist or the construction supervisor will contact the Honolulu Police Department.

Stratigraphy. To document the depositional history of the project area, a representative sample of excavation unit profiles will be drawn and described. In areas where cultural remains are encountered, in addition to drawings and descriptions, photographs of the stratigraphy will also be taken. The monitor will also record observations about excavation unit profiles that are not formally recorded.

[14] As noted elsewhere in this document, some of the material that is excavated during construction of the drainage facilities will be trucked away from the area and used as fill elsewhere on the Ocean Pointe project. HASEKO (Ewa), Inc. has already obtained historic preservation clearance for the areas where the material may be placed, and the proposed monitoring does not include these areas.

Treatment of Recovered Materials. A secure location will be established on the grounds of the project site to temporarily store all recovered cultural remains. The collected items will be recorded in a field catalog, and, upon completion of monitoring fieldwork, disposed of as follows:

- All cultural remains other than burials will be treated in accordance with the current requirements and specifications contained in the SHPD Hawai'i Administrative Rules (HAR) §13-280 (Rules Governing General Procedures for Inadvertent Discoveries of Historic Properties During a Project Covered by the Historic Preservation Review Process; effective December 11, 2003).
- Portable artifacts recovered during monitoring will be removed to the archaeologist's laboratory. Artifacts from intact contexts will be analyzed; those recovered from fill will simply be cataloged. Analyzed items will be cleaned, weighed, measured, and illustrated (if appropriate). Analyses will include formal description and functional interpretation. Following this, they will be curated by the archaeologist, the SHPD, or the client, as appropriate, depending on the nature of the recovered materials.
- All recovered samples (soil, charcoal, etc.) will be initially processed in the archaeologist's laboratory before being dispersed to the appropriate specialists for detailed analyses.
- If any potentially significant cultural remains such as buried cultural deposits or human skeletal remains are identified during construction work, such remains – which would be designated as "inadvertent discoveries" – will be treated in compliance with the appropriate SHPD rules. Any human skeletal remains would be treated in accordance with the current requirements and specifications contained in the SHPD Hawai'i Administrative Rules (HAR) §13-300:40 (Rules of Practice and Procedure Relating to Burial Sites and Human Remains: Inadvertent discovery of human remains; effective September 1996). If SHPD determines either the removal or the in-place preservation of buried Native Hawaiian human remains to be the appropriate course of action, then a Burial Treatment Plan to guide either disinterment and relocation or in-place preservation will be developed in consultation with SHPD, the Hawai'i Island Burial Council, and any recognized lineal and cultural descendents. If osteological analysis is deemed appropriate, the analysis will comply with the current Hawai'i Administrative Rules for the treatment of burial sites and human remains (DLNR 1996).

Reporting. A Final Monitoring Report covering both the on-site and off-sites activities will be prepared and submitted to the SHPD for review within 180 days of completion of all archaeological monitoring fieldwork and appropriate post-field data analyses. This report will follow the specifications outlined in the Hawai'i Administrative Rules, Rules Governing Minimal Standards for Archaeological Monitoring Studies and Reports (adopted December 2003).

3.10.3 CULTURAL RESOURCES AND TRADITIONAL CULTURAL PRACTICES

3.10.3.1 Existing Conditions

There are no documented cultural uses of the project area along Pāpipi Road or behind Pāpipi Drive. Native Hawaiians, as well as others, historically and presently utilize the 'Ewa shoreline and nearshore areas for gathering marine resources, including limu, fish, lobster, and other shellfish. Oral histories associated with use of the Honouliuli-Pu'uloa area were conducted by Kepa Maly in May 1997, to record cultural use of, and sites associated with the area as part of the Archaeological Preservation Plan for the Ocean Pointe project. Subsequent interviews with Kupuna knowledgeable of the shoreline and nearshore resources at One'ula Beach Park were conducted by R.M. Towill in July 2004 (Rosendahl 2004). None of these indicated the presence of any significant cultural uses resources that might be affected by the proposed project.

3.10.3.2 Potential Effects on Cultural Resources

The proposed project's potential effects on Hawai'i's culture, and traditional and customary rights were assessed in compliance with the requirements of Chapter 343 (Haw. Rev. Stat.), as amended by

Act 50 on April 26, 2000.[15] While both Act 50 and the OEQC Guidelines for Assessing Cultural Impacts mandate consideration of all the different groups comprising the multi-ethnic community of Hawai'i, the focus of the requirement is primarily upon aspects of Native Hawaiian culture, particularly traditional and customary access and use rights. The assessment concluded that there is no indication of any kind that the project area has resources necessary to or currently being used by either Native Hawaiian cultural practitioners exercising traditional and customary access and use rights for any purposes or by individuals of any other cultural affiliation for any traditional cultural purposes except for coastal resources.

Dunn and Haun (1991) and Franklin et al. (1995) extensive historical and cultural background research found no practices or beliefs associated with the area that would be affected by the proposed project, other than the fact that prehistoric Hawaiians exploited the coastal region for resources. Over the many years that HASEKO (Ewa), Inc., has been working in the area it has made a conscientious effort to contact individuals with cultural knowledge of the specific project area. The results of these contacts have been incorporated into previous environmental documentation. Because of the extensive previous consultation, including consultation recently undertaken for the nearby Kalo'i Drainage Basin Outlet project, the potential for further informant knowledge of specific cultural use of the current project area is extremely low. Finally, the very extensive modifications that have occurred in the areas that would be affected by the proposed project (e.g., bulldozing, road and house lot construction, WWII training activities, use for animal husbandry, and recreational use) mean that anything that might once have been present is unlikely to remain.

In view of the absence of any on-land resources or activities, the only manner in which the proposed action could adversely affect traditional cultural uses and resources would be by impairing the nearshore environment in such a way as to reduce its value or suitability for those purposes. For reasons discussed in previous sections of this document, the proposed construction and operation of the stormwater discharge outlet would not have a substantial adverse effect on marine resources. Potential effects on public access are discussed in Section 3.11 below.

3.11 RECREATION & PUBLIC SHORELINE ACCESS

3.11.1 EXISTING CONDITIONS

There are no existing recreational uses of most of the area through which drainage improvements would be made. The land through which the proposed Pāpipi Road drainage outlet passes is still owned by HASEKO, and there are limited private recreational activities conducted there (e.g., by the Lion's Club). Because it is part of approximately 9.4 acres that HASEKO is donating to expand One'ula Beach Park in accordance with the Unilateral Agreement it entered into with the City while seeking overall development approval for the Ocean Pointe project, recreational use of the area is expected to increase in the future.

As discussed previously and shown on the photos in Figure 1-3, the shoreline at the location of the proposed outlet is very rough and craggy. Hence, it is difficult for the public to move laterally along the shoreline in this area. The harsh shoreline conditions mean that there is limited entry into the water and fishing from this segment of the shoreline as well. The nearest sandy beach area begins

[15] The following factors were considered in assessing potential cultural effects:

(a) The probable number and significance of known or suspected cultural properties, features, practices, or beliefs within or associated with the specific project area, and the potential effects to these by the current project;

(b) The potential number of individuals (potential informants) with cultural knowledge of the specific project area;

(c) The availability of historical and cultural information on the specific project area or immediately adjacent lands; and

(d) The physical size, configuration, and natural and human modification history of the specific project area.

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about 150 feet to the west of the proposed ocean outlet and extends further westward into One'ula Beach Park.

3.11.2 POTENTIAL IMPACTS

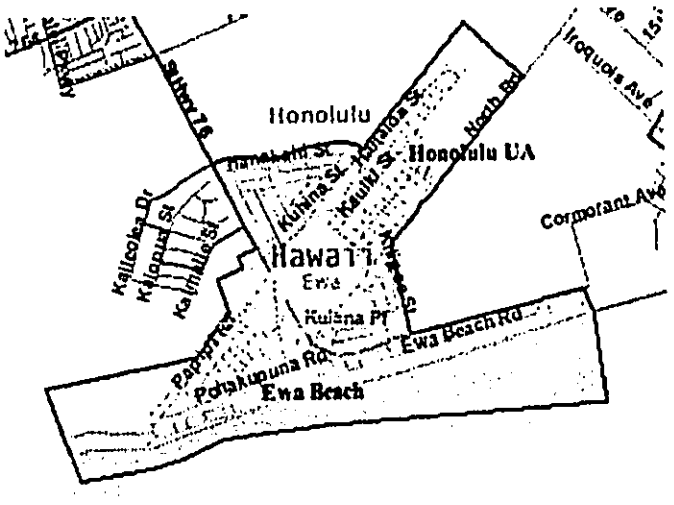
Nearly all of the proposed improvements are underground and are located in areas where even their construction does not have the potential to affect recreational activities or public access to recreational resources. The exception is the swale that would carry stormwater the last 200 feet from the relocated One'ula Beach Park Access Road to the shoreline discharge point, which is about 30 feet *makai* of the shoreline as surveyed in November 2004. That swale would occupy a narrow strip along the eastern boundary of the area that HASEKO is donating for the expansion of One'ula Beach Park.

Use of this strip of land for drainage purposes would not interefere with the park uses that the City and County of Honolulu's *One'ula Beach Park Master Plan* calls for in this area. However, because the drainage swale that would be used for the proposed ocean outlet would have water in it a portion of the time, it would make lateral public access along the shoreline slightly more difficult than it already is. Because the natural roughness of the shoreline in this area makes it difficult to traverse, this would affect few people, and it would not significantly curtail the recreational activities already taking place in the vicinity. It could, however, affect a few adventurous users choosing to traverse the coastline. Consequently, HASEKO is working with the City and County of Honolulu Departments of Parks & Recreation and Planning & Permitting, and with the State of Hawai'i Department of Land and Natural Resources, to determine the best means (e.g., bridge, ford, etc.) to facilitate long-shore public access.

3.12 SOCIOECONOMIC AND DEMOGRAPHIC ENVIRONMENT

3.12.1 EXISTING CONDITIONS

The 'Ewa District, within which the project site is located, encompasses all of the communities on the 'Ewa Plain, as well as Campbell Industrial Park, Kalaeloa, Makakilo, Ko 'Olina, and Honokai Hale. The area is in the *'Ewa Development Plan* (DP) Area, a region which is a major focus of new development on the island of O'ahu. The community of Kapolei was designated O'ahu's Secondary Urban Center by the City and County of Honolulu's 1992 *O'ahu General Plan*, and the Ocean Pointe area where the project is located was designated as urban fringe. The *O'ahu General Plan* estimates that by 2025 the 'Ewa District will comprise thirteen percent of the island's total population.



The majority of house lots along Pāpipi Road and Pāpipi Drive are around 6,500 square feet, with appraised values of approximately $120,000. The homes on these lots were mostly built in the mid to late 1980's, and range in value from $50,000-95,000 (HOLIS 2004). According to current realty listings for the area, asking prices for homes in the immediate area generally range between $350,000-600,000. No homes currently exist within Ocean Pointe immediately adjacent to Pāpipi Road, however based on the listing prices of homes elsewhere in the development, their values can be estimated at around $500,000-$600,000.

Figure 3-15. 'Ewa Beach Census Defined Place (CDP) Area

The project site is within the 'Ewa Beach Census Defined Place (CDP). The 2000 Census indicates that this area, which is depicted on Figure 3-15, is characterized by young families with above-average incomes. The median age in 2000 was 32.5 years, compared to Honolulu County's median age of 35.7 years. Similarly, at $57,000 per year the area's median annual household income was almost 10% higher than the $52,000 per year median for the County. This contrasts with a much lower level of educational attainment, at 11% of residents with a Bachelor's degree or higher compared to 28% for the County. Unemployment was 7% among 'Ewa Beach residents in the labor force, compared to 5.7% countywide.

Major ethnicities reported for the area included Filipino (39%), two or more races (27%), Caucasian (11%), Native Hawaiian/Pacific Islander (10%), and Hispanic/Latino (10%). Noticeable differences include the relative absence of ethnic Japanese compared to the County's 20%, and a much higher proportion of Filipino residents. 36% of 'Ewa Beach residents speak a language other than English at home compared to 29% throughout Honolulu County.

3.12.2 POTENTIAL IMPACTS

The proposed project would not impact the population or economy of the 'Ewa region adversely. The project is intended to relieve existing flooding along Pāpipi Road and Drive. The project will have a positive effect on the value of homes along Pāpipi Road and Pāpipi Drive by decreasing the risk of flooding. Construction jobs will represent a temporary increase in employment, though not necessarily for the adjacent area or 'Ewa region, and not enough to affect the economic environment of the area substantially.

3.13 SCENIC AND AESTHETIC RESOURCES

3.13.1 EXISTING CONDITIONS

An existing retaining wall on the *mauka* side of Pāpipi Road from Kapolei Parkway to 'Ewa Beach Elementary School blocks any northward views along most of the extent of the proposed storm drain. Further to the west, where the storm drain would turn seaward, the lots east and west of the proposed drain are currently mostly open land, with a few small homes and picnic structures. From the shoreline at the site of the proposed outlet, there are views directly facing the Pacific Ocean to the south and westward along the shoreline toward One'ula Beach Park. Views eastward are limited, as many residences exist in that direction.

3.13.2 POTENTIAL IMPACTS

Construction activities will result in temporary obstruction of views by machinery, equipment, and personnel along Pāpipi Road, Pāpipi Drive, and along the shoreline at the proposed outfall location. Some scrub vegetation will also be cleared for the project. Following construction, there will be no negative impacts on views, as all structures will be located at or below ground level and ground cover will be replanted.

3.14 LAND USE AND OWNERSHIP

All of the properties where construction will take place (except for Pāpipi Road itself) are currently undeveloped. As mentioned, Pāpipi Road is a City-owned public road right-of-way. HASEKO owns all of the other properties where the proposed project would be constructed. As mentioned above, the proposed drainage outlet is located on 9.4 acres of land that HASEKO expects to donate to the City for the expansion of One'ula Beach Park. Construction of the proposed drainage outlet across a portion of that land will not alter its ownership. It would, however, require the City to grant a drainage easement in favor of HASEKO at the time of the land transfer.

3.15 CONSISTENCY WITH LAND USE CONTROLS

All of the facilities affected by the project are within the State Urban Land Use District except for a narrow strip of land across the seaward end of the discharge channel, which is in the State Conservation District. HASEKO is applying for a Conservation District Use Permit (CDUP) and land lease from the State Department of Land and Natural Resources that is needed to construct the last few feet of the proposed channel.

The City and County of Honolulu has zoned the project area R-5 Residential. A small portion of the temporary retention basin also crosses into the A-1 Apartment zone. Storm drain systems and outlets are permitted uses for both of these zoning designations.

The outfall and a portion of the proposed storm drain fall within the Special Management Area (SMA), and will require a Special Management Area Use Permit (SMP) prior to construction. The proposed outfall also crosses into the Shoreline Setback Area, and thus its construction would require a Shoreline Setback Variance (SSV) from the City and County of Honolulu. Figure 3-16 shows the project in relation to the boundaries of these specially designated areas.

3.16 PUBLIC SERVICES & INFRASTRUCTURE

3.16.1 TRANSPORTATION FACILITIES

3.16.1.1 Existing Conditions

Roadways & Public Transportation. Pāpipi road is the only roadway that would be directly affected by the proposed project. Pāpipi Drive would not be affected as the drainage facilities would be installed behind existing residences rather than along the road. Bus Route 421 utilizes Pāpipi Road along part of its circuit, traveling along it as far west as its intersection with Pohakupuna Road.

Air Traffic. The project area is approximately 1 mile from the end of the nearest runway at Kalaeloa Airport (formerly Barbers Point Naval Air Station). It is a short distance seaward of one of the approach paths for Honolulu International Airport.

Ocean Navigation. There are no boat launches, ports or harbors near the proposed ocean outlet. The entrance channel of the future Ocean Pointe Marina is located just under a mile to the west.

3.16.1.2 Potential Impacts

Roadways & Public Transportation. Construction of the proposed storm drainage facilities will cause temporary disruptions in traffic along Pāpipi Road. A traffic control plan will be prepared for construction and a notice to motorists concerning expected delays and applicable detour routes will be submitted for publication in the newspaper along with a 24-hour hotline number. The contractor will notify and provide the 24-hour hotline number to the 'Ewa Neighborhood Board, residents along Pāpipi Road, TheBus, the U.S. Postal Service, the City Department of Environmental Services Refuse Division, and the principal of 'Ewa Beach Elementary School prior to beginning construction. The hotline number will also be posted along the roadway during construction. During Increment 1, construction will affect the portion from 'Ewa Beach Elementary School south to near Pāpipi Drive. Increment 2 will affect the small westernmost portion of Pāpipi Drive and the portion of Pāpipi Road from that point south to the location where the drainage turns south to the proposed outfall. The drainage system crosses Pāpipi Road once during this Increment, and will require excavation of the road. A detour road will be used as needed to maintain uninterrupted access to One'ula Beach Park. Traffic impacts will be minimized through enforcement of a traffic control plan by an off-duty police officer or trained construction flagperson. Two-way traffic will be maintained and a minimum of one travel lane will be kept open at all times. Given the low volume of vehicular traffic along Pāpipi Road and the fact that the required trenching generally parallels, rather than crosses, the travel way, it is unlikely that delays would ever exceed 2 to 3 minutes.

Public transportation access will be maintained for the duration of the construction period. The one location where excavation across the road will occur is not along TheBus' Route 421, and thus the only impact to bus service along Route 421 would be some minor delays during peak hours. Operators of TheBus will be kept apprised of the construction schedule for the project. Once construction is completed, existing traffic control devices along the road will be replaced, and normal operation of the proposed facilities will have no effect on transportation and roadways.

Air Traffic. The proposed improvements and outlet will not interfere with airport infrastructure or air traffic, as they are all located at or below ground level.

Ocean Navigation. Construction and operation of the proposed ocean outlet will not interfere with navigation of coastal waters, as there are no areas nearby for boats to dock.

3.16.2 POLICE, FIRE, AND EMERGENCY MEDICAL SERVICES

3.16.2.1 Existing Conditions

The nearest police station is a satellite office at 91-669 Fort Weaver Road. The regional headquarters is located in Kapolei. 'Ewa Beach Fire Station #24 serves the area, and is currently located at 91-832 Pōhakupuna Road. St. Francis Medical Center West is the nearest hospital to the project. It provides emergency medical services (EMS) to the area, as does the Waipahu Fire Station.

3.16.2.2 Potential Impacts

The Police, Fire Department, and Emergency Medical Services will be informed of the project construction schedule and apprised of the emergency vehicle access routes to be used during construction. The contractor will be required to provide ample clearance to emergency medical vehicles at all times.

3.16.3 SEWER SYSTEM, UTILITIES & COMMUNICATION SYSTEMS

3.16.3.1 Existing Conditions

The water, gas and sewer lines serving the project area run underneath the *mauka* side of Pāpipi Road. HASEKO is currently upgrading a portion of the sewer line on Pāpipi Road between Pūpū Street and Pohakupuna Road to a 36-inch pipe (HASEKO 2003). As part of that project, approximately 300 feet of existing water line along that stretch of Pāpipi Road is being relocated from the *mauka* to the *makai* side of the road. Electric and telephone is provided to the area by Hawaiian Electric Company, Inc. (HECO) and Verizon, respectively, via overhead lines that run along Pāpipi Road. Street lights and fiber optic cables are also affixed to these lines.

3.16.3.2 Potential Impacts

Water, gas, electricity, and telephone service may be temporarily disrupted during trenching for safety reasons. The contractor is responsible for protecting all existing utility lines in the area and ensuring that utility services are restored upon completion of the project.

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Aerial Photo from Space Imaging, Inc. (August, 2004)

Prepared For:

HASEKO (Ewa) Inc.

Prepared By:

PLANNING SOLUTIONS

Sources:

--R.M Towill Corp.
--City & County of Honolulu GIS

Legend:

- 60 Ft. Shoreline Setback
- O'ahu Coastline
- Pāpipi Road Drain: Increment 1
- Pāpipi Road Drain: Increment 2
- Special Management Area
- Temporary Retention Basin
- Property Boundary
- Tributary Drainage Area

Figure 3-16:

Special Management Area & Shoreline Setback Area Boundaries

Pāpipi Road Drainage Improvements Project

4.0 RELATIONSHIP TO RELEVANT PLANS, POLICIES, & CONTROLS

Table 4-1 lists the potential permits and approvals required for the project. The remainder of the chapter discusses the compliance and compatibility of the proposed improvements with pertinent plans, policies, and regulations at county, state, and federal levels.

Table 4-1. Required Permits and Approvals

State of Hawai'i	
Conservation District Use Permit	NPDES Construction Permit
Community Noise Control	
City & County of Honolulu	
Grading, Grubbing, Excavation, and Stockpiling Permit	Temporary Construction Dewatering Permit
Shoreline Setback Variance	NPDES MS4 General Permit Coverage (coordination with the City)
Street Usage Permit	Special Management Area Use Permit (Major)
Modification of Area 3 PD-H	Drainage Connection License
Source: Compiled by Planning Solutions, Inc.	

4.1 CITY AND COUNTY OF HONOLULU

4.1.1 CITY AND COUNTY LAND USE ORDINANCE[16]

The project area is zoned R-5 Residential, with the exception of a small portion of the temporary retention basin, which is zoned A-1 Apartment. The proposed improvements are a permitted use within both of those zones.

4.1.2 SPECIAL MANAGEMENT AREA REVIEW

As shown on Figure 3-16, the proposed outlet and a portion of the proposed underground drainage system are within the City and County of Honolulu's Special Management Area (see Figure 3-16). HASEKO is applying for a Special Management Area Use Permit (SMP) to cover that portion of the improvements. The following subsections discuss the project's consistency with the SMA Review Guidelines found in the *Revised Ordinances of Honolulu 1990* (ROH), Chapter 25 (Shoreline Management). Each subsection addresses one of the guidelines listed in this ordinance. For convenience, the guidelines are reproduced in italics.

4.1.2.1 Impacts on Public Access

> *§25-3.2a(1) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas and natural reserves is provided to the extent consistent with sound conservation principles;*

Discussion: There are no existing recreational uses of the area through which drainage improvements would be made (see Section 3.11). The improvements would not impair public access to One'ula Beach Park as provisions are being made for both a permanent connection to the planned

[16] Chapter 21 of the Revised Ordinances of the City and County of Honolulu 1990.

relocated One'ula Beach Park Access Road that is called for in the City and County of Honolulu's One'ula Beach Park Master Plan and for a possible temporary connection with the existing One'ula Beach Park Access Road.

4.1.2.2 Impacts on Recreation Areas and Wildlife Reserves

§25-3.2a(2): Adequate and properly located public recreation areas and wildlife preserves are reserved;

Discussion: As discussed in Section 3.11, the only recreational resource near the project area is One'ula Beach Park, and the improvements would not interfere with the uses for the Park envisioned in the One'ula Beach Park Master Plan. The improvements also would not affect government's ability to reserve adequate and properly located public recreation areas and wildlife preserves.

4.1.2.3 Impacts on Solid and Liquid Waste Treatment Facilities

§25-3.2a(3): Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources;...

Discussion: Construction of the proposed improvements would not generate significant quantities of solid or liquid waste. Earth material removed during excavation of the drainage system, temporary retention basin, and proposed outlet would be used as fill elsewhere on HASEKO's Ocean Pointe property (see Sections 3.1.2 and 3.2.2). Construction waste will be disposed of at an approved location. No liquid waste would be generated during construction or operation that would have adverse effects upon special management area resources.

4.1.2.4 Impacts on Land Forms, Vegetation, and Water Resources

§25-3.2a(4) Alterations to existing land forms and vegetation; except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation or failure in the event of earthquake.

Discussion: The improvements would not adversely affect vegetation over the long term, as discussed in Sections 3.7.2 and 3.8.2.2. Excavation of the ocean outlet would constitute the only permanent effect on topography, and it is not expected to detract from the ecological, scenic, or recreational value of the area (see Section 3.11.2). Similarly, impacts to water resources are expected to be minimal as a result of the mitigation measures outlined in Sections 3.5.5 and 3.4.2.

4.1.2.5 Cumulative Impacts and Impacts on Planning Options

§25-3.2b(1) The development will not have any substantial, adverse environmental or ecological effect except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health and safety, or compelling public interest. Such adverse effect shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect and the elimination of planning options;

Discussion: As discussed in Chapter 3, the proposed action is not expected to have substantial adverse environmental effects. Rather, it is expected to have considerable public benefit, insofar as it will greatly improve drainage along Pāpipi Road.

4.1.2.6 Consistency With CZMP Objectives and Policies and With the State SMA Guidelines

§25-3.2b (2)The development is consistent with the objectives and policies set forth in Section 25-3.1 and area guidelines contained in HRS Section 205A-26;

Discussion: As discussed in Section 4.3.5 below, the improvements are consistent with the Coastal Zone Management Program Objectives. The City and County of Honolulu SMA Review Guidelines,

discussed in this Section, are based upon and consistent with the State of Hawai'i SMA Guidelines. The Planning Office in the State Department of Economic Development and Tourism will be provided with a copy of this Final EA to permit their confirmation of the project's consistency with the Coastal Zone Management Program policies and objectives.

4.1.2.7 Consistency with County General Plan, Development Plans, and Zoning

§25-3.2b(3) The development is consistent with the county general plan, development plans and zoning. Such a finding of consistency does not preclude concurrent processing where a development plan amendment or zone change may also be required.

Discussion: Sections 4.1.1-4.1.4 document the consistency of the entire project with the appropriate County plans and zoning requirements.

4.1.2.8 Minimizing Impacts on Bays, Salt Marshes, River Mouths, Sloughs, or Lagoons

§25-3.2c(1) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;

Discussion: Construction and operation of the improvements would not include any dredging, filling or other modifications to the above-named natural resources.

4.1.2.9 Minimizing Impacts on Beaches and Public Recreation

§25-3.2c(2) Any development which would reduce the size of any beach or other area usable for public recreation;

Discussion: The proposed improvements would have no impact on the size of any beach or other area within the SMA that is usable for public recreation (see Section 3.11.2). The existing shoreline at the proposed outlet site is a rough limestone outcrop.

4.1.2.10 Minimizing Impacts on Other Coastal Resources Within the Special Management Area

§25-3.2c(3) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management area and the mean high tide line where there is no beach;

Discussion: As discussed in Section 3.11.2, the existing shoreline at the location of the proposed outlet is very rough and craggy. Because of this, and the fact that the adjoining land is presently private, there is little public movement along this portion of the shoreline. The shoreline will remain rough following the planned conversion to park use, and the parcels to the east will remain in private ownership. Nevertheless, the number of people present in the area is certain to increase once the planned expansion of One'ula Beach Park is implemented. The manner in which public access will be maintained will be decided in conjunction with the City and the Department of Land and Natural Resources.

4.1.2.11 Minimizing Impacts on Lines of Sight Toward the Sea

§25-3.2c(4) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast;...

Discussion: The proposed project would not lead to substantial modifications to the existing lines of sight toward the sea. The drainage system is underground except for the proposed outlet, which will be an open channel of lower elevation than the current shoreline.

4.1.2.12 Minimizing Impacts on Water Quality, Open Water, Fisheries, Fishing Grounds, Wildlife Habitats & Agricultural Land Use

§25-3.2c(5) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

Discussion: Sections 3.2.2, 3.4.2, 3.5.5, 3.8.2, and 3.13.2 address these topics and conclude that the proposed project would avoid or adequately mitigate potential adverse impacts to the above resources.

4.1.3 SHORELINE SETBACK AREA

The proposed ocean outlet and part of the storm drain system are within the Shoreline Setback Area, defined by Revised Ordinances of Honolulu, §23-1.4 as the area up to 40 feet inland of the certified shoreline. The project is expected to qualify for a shoreline setback variance according to the Public Interest Standard outlined in §23-1.8:

> *Public Interest Standard. A variance may be granted for an activity or structure which is undertaken by a public agency or by a public utility regulated under HRS Chapter 269 or a private facility or improvement which is undertaken by a private entity and is clearly in the public interest;*

Discussion: Sections 1.1, 1.4, and 1.5 discuss the public benefits of the project and Section 2.2 presents the justification for the proposed improvements. This EA will be submitted to the City and County of Honolulu in support of HASEKO's request for a variance.

4.1.4 'EWA DEVELOPMENT PLAN

The current 'Ewa Development Plan outlines goals and priorities for the long-term development of the 'Ewa region. The 'Ewa Development Plan's policies relating to providing adequate public infrastructure for development and for public drainage systems directly apply to the proposed project.

The following sections discuss the consistency of the proposed drainage improvements with the guidelines and goals set forth in the 'Ewa Development Plan.

4.1.4.1 Providing Adequate Infrastructure for Development

A key element of the 'Ewa Development Plan's vision is the need to ensure that adequate infrastructure exists to meet the needs of new and existing development. According to the Plan:

> *Public agencies and private developers will work together to create adequate infrastructure to meet the needs of the residential and working population of the area. Current deficiencies in roads, schools, and parks will be addressed, and new developments will not be approved until availability of key infrastructure can be guaranteed.*

HASEKO is funding the drainage improvements and dedicating them to the City in order to ensure adequate drainage infrastructure for existing neighborhoods as well as the new Ocean Pointe development. As such, the project exemplifies the type of collaborative effort called for in the 'Ewa Development Plan.

4.1.4.2 Drainage Systems

The 'Ewa Development Plan outlines several general policies for drainage systems on the 'Ewa Plain. These are listed below, followed by descriptions of HASEKO's compliance with them.

> *1) Drainage system design should emphasize control and minimization of non-point source pollution and the retention and/or detention of stormwater on-site and in appropriate open space and wetland areas.*

HASEKO has constructed on-site retention basins for the Ocean Pointe Project. Because of the small size of the drainage area being served by this project, HASEKO has concluded that BMPs used during construction and operation of the project (see Section 3.5.5) will be adequate to minimize water pollution.

2) Stormwater should be viewed as a potential irregular source of water for recharge of the aquifer which should be retained for absorption rather than quickly moved to coastal waters.

3) Natural and man-made vegetated drainageways and retention basins should be the preferred solution to drainage problems wherever they could promote water recharge, help control non-point source pollutants, and provide passive recreation benefits.

The use of grassed swales along the frontage and rear of Pāpipi Subdivision will significantly slow stormwater runoff from the system, allowing natural infiltration into groundwater and settling of suspended sediments before the runoff reaches the ocean. Similarly, HASEKO designed the proposed ocean outlet as an open channel rather than a pipe with these benefits in mind (see Sections 3.5 and 3.8).

4.2 STATE OF HAWAI'I LAWS AND REGULATIONS

4.2.1 HAWAII STATE PLANNING ACT

The Hawai'i State Planning Act (Chapter 226, Hawaii Revised Statutes, as amended) outlines themes, goals, guidelines, and policies for statewide planning. The proposed project relates to the following objective stated in §226-104, Population Growth and Land Resources Priority Guidelines:

(a)(3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.

The project fulfills this objective by providing adequate storm drainage facilities to serve both existing and future developments planned for the project area.

4.2.2 STATE LAND USE LAWS

The site is mostly located in the State Urban Land Use District. Hawai'i Administrative Rule §15-15-18 characterizes the Urban district as exhibiting "city-like" concentrations of people, structures, streets, urban level of services and other related land uses. The proposed project is consistent with the land uses envisioned for the State Urban District and with the goal of providing basic services to a highly developed, rapidly growing area.

The proposed ocean outlet is within the State Conservation District, and its construction will require a Conservation District Use Permit as described in Hawai'i Revised Statutes §183C-6. HASEKO will submit the plans for the proposed project to the State Land Use Commission for approval.

4.3 FEDERAL ACTS AND LEGISLATION

4.3.1 ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACTS

As documented in Section 3.10.2, HASEKO has complied fully with the provisions of the Archaeological and Historic Preservation Act (16 U.S.C. § 469a-1) and the National Historic Preservation Act (16 U.S.C. § 470(f)) (Rosendahl 1991b).

4.3.2 CLEAN AIR ACT (42 U.S.C. § 7506(C))

As discussed in Section 3.3, any emissions of fugitive dust related to grading and construction are expected to be temporary and relatively minor. The contractors will employ Best Management Practices (BMPs) to control fugitive dust emissions during the construction phase. Normal operation of the storm drain system will not produce on-site air emissions, will not alter air flow in the vicinity, and will have no other measurable effect on the area's micro-climate.

4.3.3 CLEAN WATER ACT SECTION 401 (33 U.S.C. §1341)

This Act states:

> Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State...

The Department of the Army (DA) has advised HASEKO that construction and operation of the proposed project is not a Federal action, and as such it will not require a Section 401 Water Quality Certification (WQC). The DA's comments are reproduced in Chapter 6.

4.3.4 CLEAN WATER ACT SECTION 402 (33 U.S.C. § 1342)

Section 402 of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) program. Under NPDES, all facilities which discharge pollutants from any point source into waters of the United States are required to obtain a permit. Construction will require an NPDES construction permit, as the affected area is larger than one acre. The contractor will minimize and treat runoff from the construction site by employing several Best Management Practices (BMPs), as described in the *Best Management Practices Manual for Construction Sites in the City and County of Honolulu* (1999).

Once the drainage improvements are completed, they will be incorporated into the City and County of Honolulu's existing storm drainage system, and covered under the provisions of the City's NPDES Municipal Separate Storm Sewer System (MS4) permit. Section 3.5.5 describes the BMPs incorporated into the design and operation of the proposed facilities that will qualify the system for NPDES coverage.

4.3.5 COASTAL ZONE MANAGEMENT ACT (16 U.S.C. § 1456(C) (1))

Enacted as Chapter 205A, HRS, the Hawai'i Coastal Zone Management (CZM) Program was promulgated in 1977 in response to the Federal Coastal Zone Management Act of 1972. The CZM area encompasses the entire state, including all marine waters seaward to the extent of the state's police power and management authority, as well as the 12-mile U.S. territorial sea and all archipelagic waters.

The Hawai'i Coastal Zone Management Program includes ten policy objectives:

- Recreational Resources. To provide coastal recreational opportunities accessible to the public and protect coastal resources uniquely suited for recreational activities that cannot be provided elsewhere.
- Historic Resources. To protect, preserve, and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.
- Scenic and Open Space Resources. To protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.
- Coastal Ecosystems. To protect valuable coastal ecosystems, including reefs, from disruption and to minimize adverse impacts on all coastal ecosystems.
- Economic Uses. To provide public or private facilities and improvements important to the state's economy in suitable locations; and ensure that coastal dependent development such as harbors and ports, energy facilities, and visitor facilities, are located, designed, and constructed to minimize adverse impacts in the coastal zone area.
- Coastal Hazards. To reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

- Managing Development. To improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- Public Participation. To stimulate public awareness, education, and participation in coastal management; and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.
- Beach Protection. To protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion.
- Marine Resources. To implement the state's ocean resources management plan.

A copy of this EA is being sent to the Office of Coastal Zone Management at the State of Hawai'i Department of Business, Economic Development, and Tourism. The Department's response is expected to confirm the consistency of the project with the CZM policies.

4.3.6 ENDANGERED SPECIES ACT (16 U.S.C. 1536(A)(2) AND (4))

The Endangered Species Act (16 U.S.C. §§ 1531-1544, December 28, 1973, as amended 1976-1982, 1984 and 1988) provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the U.S. or elsewhere. The Act mandates that federal agencies seek to conserve endangered and threatened species and use their authorities in furtherance of the Act's purposes. It provides for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The Act outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species, and contains exceptions and exemptions.

Existing biota on and near the project site are discussed in Sections 3.7 and 3.8 of this FEA. The discussion documents the fact that there are no known rare or endangered species on or immediately adjacent to the project site that would be adversely affected by the project.

4.3.7 FLOODPLAIN MANAGEMENT (42 U.S.C. § 4321, EX. ORDER NO. 11988)

As described in Section 3.6.1, the project site lies within Flood Zones A, AE, and D. The flood designations in the project area are reflective of flooding hazards due to rising sea levels rather than stormwater runoff. HASEKO has taken these hazards into account in designing the proposed improvements, which comply with the standards of the National Flood Insurance Program. The improvements would not exacerbate existing flood hazards in the overall area and would reduce the likelihood of flooding along Pāpipi Road during storm events. The outlet channel could have a minor effect on wave run-up, but adjacent land uses would be developed in a way that is compatible with this.

5.0 DETERMINATION

5.1 SIGNIFICANCE CRITERIA

Chapter 343, Hawai'i Revised Statutes (HRS), and Hawai'i Administrative Rules (HAR) §11-200 establish certain categories of action that require the agency processing an applicant's request for approval to prepare an environmental assessment. In this case, the following proposed actions require HASEKO to comply with Chapter 343: 1) use of county and state lands; 2) construction within the Shoreline Setback; 3) construction within the State Conservation District; and 4) use of a nationally registered Historic Site.

Hawai'i Administrative Rules §11-200-11.2 establishes procedures for determining if an environmental impact statement (EIS) should be prepared or if a Finding of No Significant Impact (FONSI) is warranted. §11-200-11.2 (1) provides that applicants should issue an environmental impact statement preparation notice (EISPN) for actions that it determines may have a significant effect on the environment. Hawai'i Administrative Rules §11-200-12 lists the following criteria to be used in making that determination:

In most instances, an action shall be determined to have a significant effect on the environment if it:

1. *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;*
2. *Curtails the range of beneficial uses of the environment;*
3. *Conflicts with the State's long-term environmental policies or goals as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;*
4. *Substantially affects the economic or social welfare of the community or State;*
5. *Substantially affects public health;*
6. *Involves substantial secondary impacts, such as population changes or effects on public facilities;*
7. *Involves a substantial degradation of environmental quality;*
8. *Is individually limited but cumulatively has considerable effect on the environment or involves a commitment for larger actions;*
9. *Substantially affects a rare, threatened, or endangered species, or its habitat;*
10. *Detrimentally affects air or water quality or ambient noise levels;*
11. *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*
12. *Substantially affects scenic vistas and view planes identified in county or state plans or studies; or,*
13. *Requires substantial energy consumption.*

5.2 FINDINGS

During the preparation of this FEA, the potential effects of the proposed project were evaluated using these significance criteria. The findings with respect to each criterion are summarized below:

5.2.1 IRREVOCABLE LOSS OR DESTRUCTION OF VALUABLE RESOURCE

No valuable cultural or natural resources have been found on the site. Consequently, there is no potential for the project to result in loss or destruction of valuable resources.

5.2.2 CURTAILS BENEFICIAL USES

As discussed in Section 3.14, the project is consistent with the planned land use for the area. Thus, construction and operation of the facilities will not curtail the beneficial uses of the site.

5.2.3 CONFLICTS WITH LONG-TERM ENVIRONMENTAL POLICIES OR GOALS

As discussed in Sections 4.1.4 and 4.2.1, the proposed project is consistent with the 'Ewa Development Plan and the Hawai'i State Planning Act. The improvements are intended to ameliorate the existing drainage problems along Pāpipi Road. The analysis conducted during preparation of this document indicates that it would not produce adverse effects that are inconsistent with long-term environmental policies or goals.

5.2.4 SUBSTANTIALLY AFFECTS ECONOMIC OR SOCIAL WELFARE

As discussed in Section 3.12, construction and operation of the proposed improvements will not substantially affect economic or social welfare on either a short-term or a long-term basis. While the construction of the project will provide some temporary employment, those jobs are not expected to affect the economic status or social welfare of the 'Ewa area in any substantial way.

5.2.5 PUBLIC HEALTH EFFECTS

The proposed project will not adversely affect air quality (see Section 3.3). Stormwater runoff from the proposed outfall would increase turbidity in nearshore waters during and immediately following rainfall events. As discussed in Section 3.5, runoff will reach the ocean, but the effect on water quality will be too limited both temporally and spatially to have an adverse effect on public health. Construction noise has the potential to exceed noise standards at the property line, but the potential adverse effects of this will be mitigated by the noise abatement and attenuation measures that the construction contractor will employ to comply with DOH noise limits.

5.2.6 PRODUCE SUBSTANTIAL SECONDARY IMPACTS

The proposed project will not produce substantial secondary impacts. It is not designed to foster population growth or to promote economic development. Instead, it will support the needs of existing residential areas and the Ocean Pointe development.

5.2.7 SUBSTANTIALLY DEGRADE ENVIRONMENTAL QUALITY

As discussed in Chapter 4, the proposed project will not have substantial long-term environmental effects. Noise and fugitive dust from construction activities are the only impacts of note, and they will be of limited duration. So long as adequate measures are taken to control the timing and intensity of the construction noise and reduce the amount of airborne dust, effects on nearby residents will not be substantial.

5.2.8 CUMULATIVE EFFECTS OR COMMITMENT TO A LARGER ACTION

Development of the proposed drainage improvements is not a commitment to a larger action and will not promote substantial population growth. Instead, it is intended principally to help resolve an existing drainage problem and to provide drainage capacity for the proposed expansion of One'ula Beach Park. Only a small fraction of the proposed system's capacity would be used to accommodate storm runoff from the extreme fringe of the already approved Ocean Pointe project.

5.2.9 EFFECTS ON RARE, THREATENED, OR ENDANGERED SPECIES

The proposed project will not utilize or adversely affect a resource needed for the protection of rare, threatened, or endangered species (see Section 3.7).

5.2.10 AFFECTS AIR OR WATER QUALITY OR AMBIENT NOISE LEVELS

As discussed in Sections 3.3, and 3.5, construction and operation of the proposed improvements will not have a measurable long-term effect on air or water quality, although they will allow more runoff to reach the ocean and will, therefore, marginally increase the volume of pollutants reaching the ocean. Neither will it have a long-term effect on noise levels (see Section 3.9.2). The project does have the potential to increase noise levels temporarily during the construction phase. Adequate mitigation measures will be taken to minimize these effects.

5.2.11 ENVIRONMENTALLY SENSITIVE AREAS

The proposed ocean outlet would be constructed within the Special Management Area, Shoreline Setback and State Conservation District. This EA, and particularly Sections 3.5, 3.7, and 3.8, supports HASEKO's permit applications for constructing the project within these areas and documents that the project (with the proposed mitigation measures) would not negatively impact them.

5.2.12 AFFECTS SCENIC VISTAS AND VIEWPLANES

The proposed project is not part of a designated scenic area. It will not significantly alter the visual character of the site or change views across it (see Section 3.13).

5.2.13 REQUIRES SUBSTANTIAL ENERGY CONSUMPTION

Operation of the new storm drain system will not lead to an increase in energy consumption. Electrical power will be utilized only during the construction phase and is not required for operation of the facilities.

5.3 DETERMINATION

In view of the foregoing, the project should not have a significant adverse impact on the environment. Consequently, the Department of Planning and Permitting is issuing a Finding of No Significant Impact for the proposed action.

6.0 CONSULTATION & DISTRIBUTION

As discussed at the beginning of this environmental assessment, the proposed drainage improvements and related changes are largely the result of extensive consultation that HASEKO has undertaken with government agencies and with residents of thePāpipi Road/Pāpipi Drive area. Presentations were made to the 'Ewa Neighborhood Board as part of this process as well. Mediation took place over the course of three meetings, all during 2004. Nearly 800 area residents were notified of the meetings in writing, 126 of which attended at least one, although not all of them spoke. The names and attendance records of participants who signed in at the meetings are included in Table 6-1.

The names of the other agencies, individuals, and organizations that have been contacted and provided an opportunity to comment on the Draft EA are listed in Table 6-2. The comment period for the Draft EA ended on February 22, 2005. Table 6-3 lists the written comments received on the Draft EA, which are reproduced, along with responses, at the end of this Chapter.

Table 6-1. Mediation Participants and Attendance

Participant		*Meeting 1*	*Meeting 2*	*Meeting 3*
Jeff	Alexander	yes	yes	yes
Solomon	Apio	yes	yes	yes
Donna	Apio	yes	yes	
Maria T.	Apo	yes	yes	yes
Anna	Arakaki	yes	yes	yes
Sandi	Arakaki	yes		
Katherine	Asis		yes	yes
Vera	Bangau		yes	yes
Tony	Becker			yes
Kawika	Benz	yes		
Ruth	Brown	yes		
Perfecto	Cabico			yes
Ed	Cashman		yes	yes
Britton	Cheung	yes		
Deela	Chiti		yes	
Julia A.L.	Chun	yes	yes	yes
Kenneth	Choate		yes	
Joe	Clay	yes	yes	yes
Mel	Clay	yes	yes	
Helen	Cordeiro	yes	yes	
Avies	Corpuz	yes	yes	yes
Peggy	Crowell	yes	yes	yes
Clarence	Demattos	yes	yes	yes
David	DeViney	yes		
Alberto S.	Domingo	yes	yes	
Lynn	Doane			yes
Rita	Doran	yes	yes	
Frank	Doran	yes	yes	yes
Arnold	Dowling	yes		
William	Fernandez	yes		
Mr. William "Magic"	Fernandez		yes	
William	Fernandez		yes	
Mahealani	Finau	yes	yes	yes
Doug	Fosner	yes		
Marvin	Fukugawa			yes
Angel	Gales			yes
Elizabeth	Gales	yes		yes

Janet	Garcia	yes	yes	yes
Dennis	Garcia		yes	yes
Llewellyn N.	Gay	yes	yes	yes
Joseph	Gaynor	yes	yes	yes
Magdalena K.	Gomes-Fernandez	yes	yes	
Clarence M.	Gouveia		yes	yes
Mrs. Keala	Hanawahine	yes		
Mr. Keala	Hanawahine	yes		
Lile	Hanson	yes		
Bill	Hanson	yes		
John	Higgins	yes	yes	yes
Andi	Higgins	yes	yes	yes
Gordan	Jensen	yes		
Leif	Johnson	yes		yes
Paul	Jordan	yes	yes	
I.	Kaneshiro	yes		
James	Katakura	yes	yes	
Edward	Ki	yes		
Toshi	Kiuchi	yes	yes	yes
Roger	Lacuesta	yes	yes	
Celeste	Lacuesta	yes	yes	
Kanani	Langley	yes		
EK	Langley	yes	yes	
Charles	Langley	yes	yes	
Luigi	Langley		yes	
Charley	Larey	yes		yes
Gary	Levitt	yes		
Tom	Logsdon	yes	yes	
Elaine M.	Logsdon	yes	yes	
C M	Lynn	yes		yes
Nancy	Maeda	yes	yes	yes
Tesha	Malama	yes	yes	yes
Stanley	Maria	yes		
Rowena	Martinez		yes	yes
Rep. Romy	Mindo	yes	yes	yes
Gillim	Mitsumore	yes		yes
Henry	Mitsuyasu		yes	
Thelma	Mitsuyasu		yes	
Elaine	Naito	yes	yes	yes
Thomas	Naito	yes	yes	yes
Dee	Oshiro	yes		
Mark	Pettit	yes		
Art	Quiseng	yes		
Chita	Recaido			yes
Nolasco	Recaido			yes
Almario D.	Riealde	yes		
Rock	Riggs			yes
Sylvia	Rio		yes	
Don	Robbins	yes		
Billt Kunika M.	Ruble	yes		
Kuniko M.	Ruble	yes	yes	yes
William	Ruble	yes	yes	yes
Joseph	Ryan	yes		
Tom	Sagawa	yes	yes	yes
Elaine	Saigusa			yes

Bernice	Samante	yes	yes	yes
Sonny	Serrao	yes	yes	yes
Mary	Serrao	yes	yes	yes
Wendy	Seto	yes	yes	
Ewelyn	Sharp		yes	
Don	Shepherd	yes	yes	
Violet	Shiira		yes	
George	Shimabuku	yes	yes	yes
Hiroko	Shimabuku	yes	yes	
Linda	Smallwood	yes	yes	yes
Craig	Smallwood	yes	yes	
Kathy	Sokugawa			yes
Alex	Spillner	yes	yes	
Lisa	Spillner	yes	yes	
Al	Stevens	yes		
Don	Stocking		yes	
Bob	Sumitomo			yes
Sharene	Tam	yes	yes	yes
Curtis P.	Tarnern	yes		
Ian	Thomson	yes		
Kristine	Tillman	yes		
Bruce	Tornquist	yes		
Hank	Tornquist	yes		yes
Mary	Torres	yes	yes	yes
Galas Angel	Ullocan	yes		
Hildegaard	Veroloeger	yes	yes	yes
Susan	Watson	yes		
Dee	White	yes		yes
Jean	Wildern	yes	yes	yes
Art	Wildern	yes	yes	yes
Pam	Witty-Oakland			yes

Source: HASEKO (Ewa), Inc. (2005).

Table 6-2. Draft EA Distribution List

State Agencies	**Libraries and Depositories**
Dept. of Business., Economic Development, & Tourism: Office of Planning (2)	DBEDT Library
Department of Land and Natural Resources (6 copies)	ʻEwa Beach Public & School Library
Department of Health, Clean Water Branch (2 copies)	Hawaiʻi State Library Hawaii Documents Center
Office of Hawaiian Affairs	
Office of Environmental Quality Control	
State Historic Preservation Division	
University of Hawaiʻi Environmental Center	
Federal Agencies	**Elected Officials**
U.S. Dept. of Agriculture, Soil & Water Conserv. Serv.	Honolulu City Council member Todd K. Apo
US Army Corps of Engineers, Honolulu District	State Senator Will C. Espero
US Natural Resources Conservation Service	State Representative Kymberly Pine
US Fish and Wildlife Service	Neighborhood Board No. 23 Chairperson
City and County of Honolulu	**Utilities**
Board of Water Supply	Verizon
Civil Defense	The Gas Company
Department of Design and Construction	Hawaiian Electric Company, Inc.
Department of Environmental Services	**Other Parties**
Department of Facility Maintenance	ʻEwa Beach Community Association
Department of Parks and Recreation	Oneʻula Surf Club
Department of Planning & Permitting (7 copies)	Peter Cole, Surfrider Foundation
Department of Transportation Services	ʻEwa Beach Limu Project
Fire Department	
Police Department	
Source: Compiled by Planning Solutions, Inc.	

Table 6-3. Written Comments Received on the Draft EA

No.	*Name & Title of Commenter*	*Organization*
1	Denis R. Lau, P.E., Chief	Clean Water Branch, State of Hawai'i Department of Health
2	R. Doug Aton, Acting Administrator	O'ahu Civil Defense Agency
3	William D. Balfour, Jr., Director	Dept. of Parks and Recreation, City and County of Honolulu
4	Clifford S. Jamile, Manager and Chief Engineer	Board of Water Supply, City and County of Honolulu
5	Attilio K. Leonardi, Fire Chief	Fire Department, City and County of Honolulu
6	George P. Young, P.E., Chief	Regulatory Branch, Department of the Army
7	Warren F. Wegesend, Jr., Administrator	*Land Division, Department of Land and Natural Resources,* State of Hawai'i
8	Mary Lou Kobayashi, Administrator	Office of Planning, Department of Business, Economic Development, & Tourism, State of Hawai'i
9	Charles E. Calvet, P.E., Manager	Engineering Division, The Gas Company
10	Chief Boisse P. Correa	Police Department, City and County of Honolulu
11	Laverne Higa, P.E., Acting Director and Chief Engineer	Department of Facility Maintenance, City and County of Honolulu
12	Sam Lemmo, Administrator	Office of Conservation & Coastal Lands, DLNR
13	Edward Y. Hirata, Acting Director	Dept. of Transportation Services, City and County of Honolulu
14	Henry Eng, Acting Director	Dept. of Planning & Permitting, City & County of Honolulu
15	Henry Chang-Wo	Individual
16	Wayne Hashiro, P.E., Acting Director	Dept. of Design & Construction, City & County of Honolulu

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

01053PKP.05

January 27, 2005

Mr. Henry Eng
Acting Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Attention: Ms. Ardis Shaw-Kim

Dear Mr. Eng:

Subject: Draft Environmental Assessment, Chapter 343, Hawaii Revised Statutes
Papipi Road Drainage Improvements

The Department of Health, Clean Water Branch (CWB), has reviewed the subject document and offers the following comments:

1. The Army Corps of Engineers should be contacted at 438-9258 to identify whether a Federal license or permit (including a Department of Army permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Control Act (commonly known as the "Clean Water Act"), a Section 401 Water Quality Certification is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters..."

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following activities:

   a. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).

   b. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the commencement of the construction activities.

   c. Discharges of treated effluent from leaking underground storage tank remedial activities.

   d. Discharge of once through cooling water less than one (1) million gallons per day.

   e. Discharges of hydrotesting water.

   f. Discharges of construction dewatering effluent.

   g. Discharges of treated effluent from petroleum bulk stations and terminals.

   h. Discharges of treated effluent from well drilling activities.

   i. Discharges of treated effluent from recycled water distribution systems.

   j. Discharges of storm water from a small municipal separate storm sewer system.

   k. Discharges of circulation water from decorative ponds or tanks.

   The CWB requires that a Notice of Intent (NOI) to be covered by an NPDES general permit for any of the above activities be submitted at least 30 days before the commencement of the respective activities. The NOI forms may be picked up at our office or downloaded from our website at:
   http://www.hawaii.gov/health/environmental/water/cleanwater/index.html

3. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters and/or coverage of the discharge(s) under the NPDES general permit(s) is not permissible (i.e. NPDES general permits do not cover discharges into Class 1 or Class AA State waters). An application for the NPDES permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at:
   http://www.hawaii.gov/health/environmental/water/cleanwater/index.html

4. Hawaii Administrative Rules, Section 11-55-38, also requires the applicant to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD.

If you have any questions, please contact Ms. Kris Poentis of the Engineering Section, CWB, at 586-4309.

Sincerely,

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

KP:lc

PLANNING SOLUTIONS

February 16, 2005
2004-0012-001

Mr. Denis R. Lau, P.E., Chief
Clean Water Branch
Department of Health
State of Hawai'i
P.O. Box 3378
Honolulu, Hawai'i 96801-3378

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Lau:

Thank you for your January 27, 2005 letter to the City and County of Honolulu Department of Planning and Permitting (your reference EMD/CWB 01053PKP.05) commenting on the *Draft Environmental Assessment* (*DEA*): *Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments. Item-by-item responses to your comments (reproduced for your convenience in italics before each response) are provided below.

Comment 1:

"The Army Corps of Engineers should be contacted at 438-9258 to identify whether a Federal license or permit (including a Department of Army permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Control Act (commonly known as the "Clean Water Act"), a Section 401 Water Quality Certification is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters..."

Response: Thank you for the information you provided concerning potential permits required for the proposed stormwater drainage facilities. We have initiated consultation with the Corps of Engineers and DOH regarding the project and will obtain all approvals that are deemed necessary.

Comment 2:

"2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following activities:

a. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(x).

b. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the commencement of the construction activities.

c. Discharges of treated effluent from leaking underground storage tank remedial activities.

Ward Plaza, Suite 220 • 233 Ward Avenue • Honolulu, Hawai'i 96814-4812
Phone: 808 356-4423 • Fax: 808 356-4549 • www.ps-hi.com

d. Discharges of once through cooling water less than one (1) million gallons per day.

e. Discharges of hydrotesting water.

f. Discharges of construction dewatering effluent.

g. Discharges of treated effluent from petroleum bulk stations and terminals.

h. Discharges of treated effluent from well drilling activities.

i. Discharges of treated effluent from recycled water distribution systems.

j. Discharges of storm water from a small municipal separate storm sewer system.

k. Discharges of circulation water from decorative ponds or tanks.

The CWB requires that a Notice of Intent (NOI) to be covered by an NPDES general permit for any of the above activities be submitted at least 30 days before the commencement of the respective activities. The NOI forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/index.html."

Response: Thank you for the comprehensive listing of the activities for which NPDES General Permit coverage is required. At present HASEKO expects coverage will be required under items b. and j., construction activities and discharges of storm water from a small municipal separate storm sewer system.

Comment 3:

"The applicant maybe required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters and/or coverage of the discharge(s) under the NPDES general permit(s) is not permissible (i.e. NPDES general permits do not cover discharges into Class 1 or Class AA State waters). An application for the NPDES permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/index.html"

Response: The proposed discharge would be for stormwater only, and it would discharge into Class A State waters. Hence, it is our understanding that general permit coverage is available.

Comment 4:

Hawaii Administrative Rules, Section 11-55-38, also requires the applicant to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD.

Response: A copy of the Draft EA has been sent to SHPD, and we will consult further with the Division before the end of the Draft EA comment period to make sure that its staff members are able to complete their review. Copies of any NOI's submitted to the Clean Water Branch will also be sent to SHPD.

Thank you again for your comments. If you have any further questions, please call me at 550-4483.

Sincerely,

cc: Ms. Ardis Kim-Shaw, DPP
Mr. Raymond Kamm, HASEKO (Ewa), Inc.

OAHU CIVIL DEFENSE AGENCY
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET HONOLULU, HAWAII 96813
PHONE: (808)523-4121 FAX: (808)524-3430

JAN 28 PM 2 07

January 27, 2005

TO: HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: R. DOUG ATON, ACTING ADMINISTRATOR
OAHU CIVIL DEFENSE AGENCY

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT, PAPIPI ROAD
DRAINAGE IMPROVEMENTS
TAX MAP KEY 9-1-11: 1, 2, & 3 AND 9-1-12:3, 8, 9,
11, 12 & 48
PAPIPI ROAD, EWA, OAHU, HAWAII

Thank you for the opportunity to review the above mentioned project. The Oahu Civil Defense Agency does not have any comments or recommendations at this time.

/ms

PLANNING SOLUTIONS

February 16, 2005
2005-0012-001

Mr. R. Doug Aton
Acting Administrator
O'ahu Civil Defense Agency
City and County of Honolulu
650 South King Street
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Aton:

Thank you for your January 27, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment (DEA): Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document.

We understand that your agency has no comments or recommendations to offer on the project at this time.

If you have any further questions, please call me at 550-4483.

Sincerely,

Perry J. White

cc: Ms. Ardis Kim-Shaw, DPP
Mr. Raymond Kanna, HASEKO (Ewa), Inc.

Ward Plaza, Suite 220 • 219 Ward Avenue • Honolulu, Hawai'i 96814-4013
Phone: 808 550 4483 • Fax: 808 550-4540 • www.psi-hi.com

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU

PETI HANNEMANN
Mayor

05 JAN 26 PM 2 06

CITY

WILLIAM D. BALFOUR, JR.
Director

DANA L. TAKABAYASHI-DEAN
Deputy Director

January 25, 2005

TO: HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: WILLIAM D. BALFOUR, JR., DIRECTOR

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
PAPIPI ROAD DRAINAGE IMPROVEMENTS

Thank you for the opportunity to review and comment on the Draft Environmental Assessment relating to the Papipi Road Drainage Improvements.

The Department of Parks and Recreation has no comment on the environmental impact of this project.

Should you have any questions, please contact Mr. John Reid, Planner, at 692-5454.

WILLIAM D. BALFOUR, JR.
Director

WDB:mk
(90781)

PLANNING SOLUTIONS

February 16, 2005
2005-0812-001

Mr. William D. Balfour, Jr., Director
Department of Parks and Recreation
City and County of Honolulu
1000 Uluohia Street, Suite 309
Kapolei, Hawai'i 96707

Subject: Draft Environmental Assessment (DEA), Papipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Balfour:

Thank you for your January 25, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment (DEA): Papipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document, and understand that the Department of Parks and Recreation presently has no comment on the environmental impact of the project.

If you have any further questions, please call me at 550-4483.

Sincerely,

Barry J. White

cc: Ms. Ardis Kim-Shaw, DPP
Mr. Raymond Kasun, HASEKO (Ewa), Inc.

Ward Plaza, Suite 220 • 216 Ward Avenue • Honolulu, Hawaii 96814-4812
Phone: 808 550-4483 • Fax: 808 550-4540 • www.psi-hi.com

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

2005 JAN 28 PM 1 56

January 24, 2005

KIRK CALDWELL, Mayor

ROSS S. SUMIDA, JR., Chairman
CHARLES A. ESTES, Vice-Chairman
HERBERT S. K. KAOPUA, SR.
DAVID W. K. LEE
RODNEY K. HARAGA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer
DONNA FAY K. WONG
Deputy Manager and Chief Engineer

TO: HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: ARDIS SHAW-KIM

SUBJECT: YOUR LETTER OF JANUARY 14, 2005 ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR PAPIPI ROAD DRAINAGE IMPROVEMENTS, TMK: 9-1-11:1,2,3 AND 9-1-12:3,8,9,11,12,48

The construction drawings should be submitted for our review and approval. The construction schedule should be coordinated to minimize impact to the water system.

If you have any questions, please contact Joseph Kaaua at 748-5442.

PLANNING SOLUTIONS

February 16, 2005
2004-0012-001

Mr. Clifford S. Jamile, Manager & Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment (DEA), Papipi Road Drainage Improvements 'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Jamile:

Thank you for your January 24, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment (DEA): Papipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Item-by-item responses to your comments (reproduced for your convenience in italics before each response) are provided below.

Comment 1:

"The construction drawings should be submitted for our review and approval."

Response:

HASEKO will submit construction drawings to BWS for review.

Comment 2:

"The construction schedule should be coordinated to minimize impact to the water system."

Response:

HASEKO will take care to ensure that interruptions in water service during construction of the improvements are minimized to the maximum extent practicable. As discussed in Section 3.16.3.2 of the DEA, the contractor will be responsible for protecting existing utility lines and ensuring that service is restored.

Thank you again for your comments. If you have any further questions, please call me at 550-4483.

Sincerely,

Barry J. White

cc: Ms. Ardis Kim-Shaw, DPP
Mr. Raymond Kamm, HASEKO (Ewa), Inc.

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Phone: 808 550-4483 • Fax: 808 550-4546 • www.psi-hi.com

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

05 FEB 4 PM 3 29

February 2, 2005

TO: HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: ATTILIO K. LEONARDI, FIRE CHIEF

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES
DRAFT ENVIRONMENTAL ASSESSMENT
PROJECT: PAPIPI ROAD DRAINAGE IMPROVEMENTS
APPLICANT: HASEKO (EWA), INC.
AGENT: PLANNING SOLUTIONS, INC.
LANDOWNERS: CITY AND COUNTY OF HONOLULU
HASEKO (EWA), INC.
LOCATION: PAPIPI ROAD, EWA, OAHU
TAX MAP KEYS: 9-1-011: 001, 002, AND 003
9-1-012: 003, 008, 009, 011, 012, AND 048

We received your memorandum dated January 14, 2005, requesting our review and comments on the above-mentioned project.

The Honolulu Fire Department requires that the following be complied with for the duration of the project:

1. Maintain fire apparatus access throughout the construction site.
2. Maintain access to fire hydrants. Notify the Fire Communication Center at 523-4411 regarding any interruption of the existing fire hydrant system.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 831-7778.

ATTILIO K. LEONARDI
Fire Chief

AKL/SK:bh

PLANNING SOLUTIONS

February 23, 2005

Chief Attilio K. Leonardi
Fire Department
City and County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, Hawai'i 96819-1869

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Chief Leonardi:

Thank you for your February 2, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment (DEA) for Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments. Responses to your comments (reproduced for your convenience in italics) are provided below.

Comment

"The Honolulu Fire Department requires that the following be complied with for the duration of the project:

1. *Maintain fire apparatus access throughout the construction site.*
2. *Maintain access to fire hydrants. Notify the Fire Communication Center at 523-4411 regarding any interruption of the existing fire hydrant system."*

Response:

HASEKO (Ewa), Inc., will ensure that the contractor maintains fire apparatus access throughout the construction site. As mentioned in Section 3.16.2.2 of the DEA, the Fire Department will be informed of the construction schedule and any alternate emergency access routes to be used. HASEKO will require the construction contractor to notify the Fire Department if the fire hydrant system must be interrupted.

Thank you again for your comments. If you have any further questions, please call me at 550-4483.

Sincerely,

Henry T. White

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kasue, HASEKO (Ewa), Inc.

Ward Plaza, Suite 220 • 216 Ward Avenue • Honolulu, Hawai'i 96814-4012
Phone: 808 550-4483 • Fax: 808 550-4540 • www.psi-hi.com

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

February 3, 2005

2005 FEB 7 AM 9 03

Regulatory Branch

Ms. Ardis Shaw-Kim
Planner
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Shaw-Kim:

This responds to your request for comments to the draft Environmental Assessment for the proposed Papipi Road Drainage Improvements Project at Ewa (var. TMKs 9-1-011: por. 1, 2, 3; 9-1-012: 3, 8, 9, 11, 12, 48), Ewa, Oahu Island. Based on the information provided, I have determined that if the proposed improvements at this corridor are confined, as designed, to ground disturbances above Mean Sea Level and does not result in a surface connection below the Ordinary High Water Mark to the ocean, the activity would be outside the limit of our jurisdiction. Consequently, a Department of Army (DA) permit would not be required. However, if construction activities would result in the discharge of dredged or fill material into the adjacent waters of the Pacific Ocean, or be modified to include a surface water connection to the Pacific Ocean, consultation should take place with our office to determine whether a DA permit may be required.

In the future regarding jurisdictional determinations for a DA permit or comments related to regulatory requirements of a DA permit, written correspondence should be directed to Mr. George Young, Chief, Regulatory Program, U.S. Army Engineer District, Honolulu, Building 230, Fort Shafter, Honolulu, Hawaii 96858-5440. File Number POH-2005-47 has been assigned to this proposed project. Please feel free to contact Mr. Farley Watanabe of my staff at 438-7701, if you have additional questions.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

PLANNING SOLUTIONS

February 23, 2005

Mr. George P. Young, P.E., Chief
Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawai'i 96858-5440

Subject: Draft Environmental Assessment, Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Young:

Thank you for your February 3, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment: Pāpipi Road Drainage Improvements* (DA File Number POH-2005-47). We appreciate the time you and your staff spent reviewing the document and providing written comments.

Thank you for confirming that the project as designed will not require a Department of the Army permit. We understand that HASEKO would need to consult with your office regarding permit requirements in the event that the project is changed to include: 1) a discharge of dredged or fill material into the Pacific Ocean, or 2) a surface water connection to the ocean below the Ordinary High Water Mark.

If you have any further questions, please call me at 550-4483.

Sincerely,

Perry J. White

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kanna, HASEKO (Ewa), Inc.

Ward Plaza, Suite 330 • 210 Ward Avenue • Honolulu, Hawai'i 96814-4812
Phone: 808 550-4483 • Fax 808 550-0549 • www.psi-hi.com

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 14, 2005
PAPIPIROADDRAINAGE.RCM

LD-NAV
2005-ED-1(ask)

Henry Eng, FAICP, Acting Director
Department of Planning and Permitting
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Eng:

SUBJECT: File No.: 2005-ED-1(ask)
Proposed: Papipi Road Drainage Improvements
Authority: C&CoH Department of Planning and Permitting
Applicant: Haseko (Ewa) Inc.

Thank you for the opportunity to review and comment on the subject matter

A copy of the document pertaining to the subject matter was transmitted or made available to the following Department of Land and Natural Resources' Divisions for their review and comment:

- Division of Aquatic Resources
- Division of Forestry and Wildlife
- Division of State Parks
- Engineering Division
- Commission on Water Resource Management
- Office of Conservation and Coastal Lands
- Land-Oahu District Land Office

Enclosed please find a copy of the Division of Aquatic Resources and Engineering Division comments.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter.

If you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0384.

Very truly yours,

WARREN F. WESSELMAN Jr.
Administrator

c: OOLO

DEPT OF PLANNING
ED PERMITTING
CITY & COUNTY OF HONOLULU
2005 FEB 16 AM 10 39

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 25, 2005

LD/NAV
PAPIPIROADDRAINAGE.CMT

Suspense Date: 2/2/05

MEMORANDUM:

JAN 27 2005

XXX Engineering Division
XXX Division of Forestry and Wildlife
XXX Commission on Water Resource Management
XXX Division of State Parks
XXX Division of Aquatic Resources
XXX Office of Conservation and Coastal Lands
XXX Land-Oahu District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Papipi Road Drainage Improvements
Island of Oahu, Hawaii
City and County of Honolulu Project
Consultant: HASKEO (Ewa), Inc.

DEPT OF PLANNING
ED PERMITTING
CITY & COUNTY OF HONOLULU
2005 FEB 16 AM 10 39

Please review the DEA pertaining to the subject matter and submit your comment (if any) on Division letterhead signed and dated by the suspense date.

NOTE: One copy of the document is available for your review in the Land Division Office, Room 220.

Should you need more time to review the subject matter, please contact Nicholas A. Vaccaro at 587-0384. If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. (X) Comments attached.

Signed: [signature] Date: 2/2/05

Name: 2-4-05 Division: Aquatic Resources

SUSPENSE DATE: Wednesday February 2, 2005

STATE OF HAWAII
Department of Land and Natural Resources
Division of Aquatic Resources

MEMORANDUM

2005 FEB 16 AM 10 39
DEPT OF PLANNING
AND PERMITTING
CITY & COUNTY OF HONOLULU

To: Francis Oishi, Acting Administrator
From: Richard Sixberry, Aquatic Biologist
Subject: Comments on Draft Environmental Assessment
Comments Requested By: Dierdre Mamiya - Land Division

Date of Request: 1/25/05 Date Received: 1/27/05

Summary of Project

Title: Papipi Road Drainage Improvements

Proj. By: Haseko, Inc.

Location: Ewa Beach, Oahu

Brief Description:

The applicant proposes to improve the drainage along Papipi Road to reduce the risks of flooding to Ewa Beach Estates.
The improvements will consist of a new sidewalk, retaining wall, underground culvert and catch basin extending about 4,500 feet along Papipi Road.

Comments:

Our previous comments on Haseko's One'ula Beach Park drainageway (dated December 21, 2004) are similar to the following comments since these activities appear to be related.
This project site is situated in an area of Ewa Beach which has previously been graded and disturbed. Therefore, significant impacts adverse to aquatic resource values are not expected from the activities proposed.
However, we suggest that construction activities be restricted to periods of minimal rainfall and areas denuded of vegetation which could be susceptible to erosion are appropriately stabilized. Further, precautionary measures should include preventing construction materials, petroleum products, debris and eroded soil from entering coastal waters. The applicant plans to excavate and remove about 20,000 cubic yards of soil and sandy material from One'ula Beach Park which will be used as fill at other Haseko sites.

RECEIVED
2005 FEB -1 A 8:1[illegible]

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 25, 2005

LD/NAV
PAPIPIROADDRAINAGE.CMT

Suspense Date: 2/2/05

MEMORANDUM:

2005 FEB 16 AM 10 40
DEPT OF PLANNING
AND PERMITTING
CITY & COUNTY OF HONOLULU

TO:
XXX Engineering Division
*XXX Division of Forestry and Wildlife
XXX Commission on Water Resource Management
*XXX Division of State Parks
XXX Division of Aquatic Resources
XXX Office of Conservation and Coastal Lands
*XXX Land-Oahu District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Papipi Road Drainage Improvements
Island of Oahu, Hawaii
City and County of Honolulu Project
Consultant: HASEKO (Ewa), Inc.

Please review the DEA pertaining to the subject matter and submit your comment (if any) on Division letterhead signed and dated by the suspense date.

NOTE: One copy of the document is available for your review in the Land Division Office, Room 220.

Should you need more time to review the subject matter, please contact Nicholas A. Vaccaro at 587-0384. If this office does not receive your comments by the suspense date, we will assume there are no comments.

X We have no comments. ( ) Comments attached.

Signed: Paul J. Conry Date: JAN 26 2005

Name: PAUL J. CONRY, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE Division: _____

05 JAN 26 A8:1 | 2005 FEB -1 P 3:2

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 25, 2005

LD/NAV
PAPIPIROADDRAINAGE.CMT

Suspense Date: 2/2/05

MEMORANDUM:

TO:
- XXX Engineering Division
- *XXX Division of Forestry and Wildlife
- XXX Commission on Water Resource Management
- *XXX Division of State Parks
- XXX Division of Aquatic Resources
- XXX Office of Conservation and Coastal Lands
- *XXX Land-Oahu District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Papipi Road Drainage Improvements
Island of Oahu, Hawaii
City and County of Honolulu Project
Consultant: HASEKO (Ewa), Inc.

2005 FEB 16 AM 10 40
DEPT OF PLANNING AND PERMITTING
CITY & COUNTY OF HONOLULU

Please review the DEA pertaining to the subject matter and submit your comment (if any) on Division letterhead signed and dated by the suspense date.

NOTE: One copy of the document is available for your review in the Land Division Office, Room 220.

Should you need more time to review the subject matter, please contact Nicholas A. Vaccaro at 587-0384. If this office does not receive your comments by the suspense date, we will assume there are no comments.

(✓) We have no comments. ( ) Comments attached.

Signed: [signature] Date: 1-31-05

Name: David Hida Division: CWRM

2005 JAN 27 P 3:50

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 25, 2005

LD/NAV
PAPIPIROADDRAINAGE.CMT

Suspense Date: 2/2/05

MEMORANDUM:

TO:
- XXX Engineering Division
- *XXX Division of Forestry and Wildlife
- XXX Commission on Water Resource Management
- *XXX Division of State Parks
- XXX Division of Aquatic Resources
- XXX Office of Conservation and Coastal Lands
- *XXX Land-Oahu District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Papipi Road Drainage Improvements
Island of Oahu, Hawaii
City and County of Honolulu Project
Consultant: HASEKO (Ewa), Inc.

2005 FEB 16 AM 10 40
DEPT OF PLANNING AND PERMITTING
CITY & COUNTY OF HONOLULU

Please review the DEA pertaining to the subject matter and submit your comment (if any) on Division letterhead signed and dated by the suspense date.

NOTE: One copy of the document is available for your review in the Land Division Office, Room 220.

Should you need more time to review the subject matter, please contact Nicholas A. Vaccaro at 587-0384. If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. (✓) Comments attached.

Signed: [signature] Date: 1/27/05

Name: For ERIC T. HIRANO, CHIEF ENGINEER Division: Engineering

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/NAV

Ref.: PAPIPIROADDRAINAGE
Oahu/479

COMMENTS

(X) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zones A, AE and D. The National Flood Insurance Program does not have any regulations for development within Zone D, however, it does regulate development within Zones A and AE as indicated in bold letters below.

( ) Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone ___.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

(X) Please note that the project site must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

(X) Mr. Robert Sumimoto at (808) 523-4254 or Mr. Mario Siu Li at (808) 523-4247 of the City and County of Honolulu, Department of Planning and Permitting.
( ) Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works.
( ) Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning.
( ) Mr. Mario Antonio at (808) 241-6620 of the County of Kauai, Department of Public Works.

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments: _____

( ) Other: _____

Should you have any questions, please call Mr. Andrew Monden of the Planning Branch at 587-0229.

Signed: Andrew M. Monden
for ERIC T. HIRANO, CHIEF ENGINEER
Date: 1/27/05

PLANNING SOLUTIONS

February 23, 2005
2004-8012-001

Mr. Warren F. Wegescod, Jr., Administrator
Land Division
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Wegescod:

Thank you for your February 14, 2005 letter to the City and County of Honolulu Department of Planning and Permitting (your reference 2005-ED-1) commenting on the *Draft Environmental Assessment (DEA): Pāpipi Road Drainage Improvements*. We appreciate the time you and other DLNR staff spent reviewing the document and providing written comments.

Item-by-item responses to the comments by DLNR's various divisions (reproduced for your convenience in italics before each response) are provided below.

Comment 1 (Division of Aquatic Resources):

"This project site is situated in an area of 'Ewa Beach which has previously been graded and disturbed. Therefore, significant impacts adverse to aquatic resource values are not expected from the activities proposed.

However, we suggest that construction activities be restricted to periods of minimal rainfall and areas denuded of vegetation which could be susceptible to erosion are appropriately stabilized. Further, precautionary measures should include preventing construction materials, petroleum products, debris and eroded soil from entering coastal waters. The applicant plans to excavate and remove about 20,000 cubic yards of soil and sandy material from One'ula Beach Park which will be used as fill at other Haseko sites."

Response:

Thank you for confirming that the proposed drainage system would not adversely affect aquatic resources to a significant extent.

We share your concern for preventing discharges of construction materials, sediments, and other pollutants into coastal waters during construction. Scheduling construction during drier periods and stabilizing non-vegetated areas are standard Best Management Practices (BMPs) that HASEKO will follow during construction. Sections 3.2.2, 3.5.2, and 3.5.4.4 of the *DEA* describe some of the additional Best Management Practices that HASEKO will implement to prevent impacts to coastal waters. HASEKO will submit a BMP plan to the State Department of Health in support of its NPDES Construction Permit application for the project.

I do want to correct two small misunderstandings in your comment. First, the amount of excavation that is planned is 2,000 cubic yards, an order of magnitude less than the 20,000 cubic yards cited in your letter. Second, the proposed channel is on land that HASEKO presently owns, not on land in One'ula Beach Park. The 9.4-acre parcel on which the channel is located will not be dedicated to the

Ward Plaza, Suite 220 • 250 Ward Avenue • Honolulu, Hawaii 96814-4812
Phone: 808 568-1483 • Fax: 808 550-4549 • www.psi-hi.com

City and County for inspection into Ota'ula Beach Park until after the drainage improvements described in the *DEA* are completed.

Comment 2 (Endangered Species):

> *"We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zones A, AE and D. The National Flood Insurance Program does not have any regulations for development within Zone D, however, is does regulate development within Zones A and AE as indicated in bold letters below:*
>
> *Please note that the project site must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808)587-0267.*
>
> *Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below: Mr. Robert Sumimoto at (808) 523-4254 or Mr. Mario Siu Li at (808) 523-4247 of the City and County of Honolulu, Department of Planning and Permitting."*

Response: We appreciate the information you provided regarding FIRM flood zones and applicable requirements. The flood hazard zones you identified in the project area match those identified in the *DEA*. Sections 3.6.1 and 4.3.7 of the *DEA* address the project's compliance with the National Flood Insurance Program. The project engineers are working closely with the City and County of Honolulu Department of Planning and Permitting concerning all flood-related issues.

We understand that the Land Division, Division of Forestry and Wildlife, Division of State Parks, Commission on Water Resource Management, Office of Conservation and Coastal Lands, and the Land-Oahu District Land Office have no comments to offer on the project at this time.

If you would like to discuss this response or have any further questions, please call me at 550-4483.

Sincerely,

Perry J. White

cc: Ms. Audie Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kamm, MASEKO (Ewa), Inc.

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

LINDA LINGLE
GOVERNOR

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-10808

February 9, 2005

RECEIVED
FEB 16 2005
DEPT. OF PLANNING AND PERMITTING
650 SOUTH KING ST.
HONOLULU, HI 96813

Mr. Henry Eng, FAICP
Acting Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Eng:

Subject: Draft Environmental Assessment
Papipi Road Drainage Improvements by Hasako (Ewa), Inc.

The Office of Planning has reviewed the Draft Environmental Assessment (DEA) for the Papipi Road Drainage Improvements in Ewa Beach to be undertaken by Hasako (Ewa), Inc.

The project resulted in response to the Ewa community's discontent with the construction of an eighteen-foot concrete retaining wall extending 500 yards along Papipi Road behind Ewa Beach Elementary School. Opposition included complaints that the existing wall blocks ocean and mountain views, does not solve the drainage and flooding problems in the area as it was purported, and separates the older Ewa Community from the newer developments at Ocean Point.

The DEA describes Hasako's plans to demolish portions of the offending wall and replace it with one that would only go as high as 6 feet, and further address the flooding issues through funding the construction of drainage improvements and dedicating them to the City and County of Honolulu.

The project is consistent with Chapter 205A Hawaii Revised Statutes, policy objectives of the Coastal Zone Management Program. With the exception of an area identified for the construction of an ocean outlet that is a component of the drainage improvements, the project is consistent with Chapter 226, the Hawaii State Plan. The 9.4-acre site proposed for the construction of the ocean outlet, is located within the State Land Use Conservation District and will require a Conservation District Use Permit.

Thank you for the opportunity to comment on the subject DEA. Should you have any questions, please call Judith Henry at 587-2803.

Sincerely,

Mary Lou Kobayashi
Administrator

c: Anthony Ching, LUC

PLANNING SOLUTIONS

February 23, 2005
2004-0012-001

Ms. Mary Lou Kobayashi, Administrator
Office of Planning
Department of Business, Economic Development, & Tourism
State of Hawai'i
P.O. Box 2359
Honolulu, Hawai'i 96804

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Ms. Kobayashi:

Thank you for your February 9, 2005 letter to the City and County of Honolulu Department of Planning and Permitting (your reference P-14808) commenting on the *Draft Environmental Assessment (DEA): Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Item-by-item responses to your comments (reproduced for your convenience in italics before each response) are provided below.

Comment 1:

"The project is consistent with Chapter 205A Hawaii Revised Statutes, policy objectives of the Coastal Zone Management Program. With the exception of an area identified for the construction of an ocean outlet that is a component of the drainage improvements, the project is consistent with Chapter 226, the Hawaii State Plan. The 9.4-acre site proposed for the construction of the ocean outlet, is located within the State Land Use Conservation District and will require a Conservation District Use Permit."

Response:

Thank you for confirming that the project is consistent with Chapter 205A Hawaii Revised Statutes, policy objectives of the Coastal Zone Management Program. We also appreciate your confirmation that the project is generally consistent with the provisions of Chapter 226, the *Hawai'i State Plan*. You did note the ocean outlet as a possible exception to this, but did not identify any specific inconsistency. Insofar as we have been able to determine, the proposed drainage improvements are consistent with the intent of the *State Plan*. The design avoids significant adverse effects on shoreline and marine resources. In particular, it reduces the threat to life and property from flooding.

I do want to correct one possible misunderstanding I note in the last sentence of your letter. The ocean outlet does not involve 9.4 acres of construction within the State Conservation District; that is the size of the entire parcel that HASEKO will eventually dedicate to the City and County of Honolulu for expansion of One'ula Beach Park. That acreage is within the State Urban District, not the Conservation District. The only work within the Conservation District is a few feet of the channel that extends makai of the certified shoreline. It amounts to approximately 0.03 acres and is not part of the 9.4 acre parcel. For work within that area, HASEKO will obtain a Conservation District Use Permit, as discussed in Section 3.15 of the DEA.

Ward Plaza, Suite 220 • 233 Ward Avenue • Honolulu, Hawai'i 96814-4012
Phone: 808 550-4483 • Fax 808 596-1549 • www.pa-hi.com

If you have any further questions regarding the project, please call me at 550-4483.

Sincerely,

Perry J. Wahl

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kanna, HASEKO (Ewa), Inc.

THE GAS COMPANY

P.O. Box 3000
Honolulu, Hawaii 96802-3000

February 16, 2005

2005 FEB 17 AM 11:36
DEPT OF PLANNING AND PERMITTING
CITY & COUNTY OF HONOLULU

Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Attention: Mr. Henry Eng, FAICP
Acting Director of Planning and Permitting

Gentlemen:

Subject: Draft Environmental Assessment for
Papipi Road Drainage Improvements

Please be advised that The Gas Company, LLC maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area and is interconnected with the utility network in Ewa. We would appreciate your consideration during the project planning and design process to minimize any potential conflicts with the existing gas facilities in the project area.

Thank you for the opportunity to comment on the Draft Environmental Assessment. Should there be any questions, or if additional information is desired, please call Chris Anderson at 594-5564.

Sincerely,

Charles E. Calvet, P.E.
Manager, Engineering

CEC:lm
05-131

PLANNING SOLUTIONS

February 23, 2005
2004-0012-001

Mr. Charles E. Calvet, P.E., Manager
Engineering Division
The Gas Company
P.O. Box 3000
Honolulu, Hawai'i 96802-3000

Subject: Draft Environmental Assessment (DEA), Papipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Calvet:

Thank you for your February 17, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment (DEA): Papipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments. Our response follows.

Comment:

"Please be advised that The Gas Company, LLC maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area and is interconnected with the utility network in Ewa. We would appreciate your consideration during the project planning and design process to minimize any potential conflicts with the existing gas facilities in the project area."

Response: HASEKO is aware that there are buried utility lines in the vicinity of the proposed drainage improvements. The project design calls for the larger of the two storm drains to be routed behind Papipi Drive rather than along Papipi Road in order to minimize conflicts with existing utility lines. Further, the construction plan will be orchestrated to avoid or minimize interruptions in utility service during trenching. The contractor will be responsible for protecting all existing utility lines in the area and ensuring that utility services are restored upon completion of the project, as stated in Section 3.16.3.2 of the EA.

If you have any further questions concerning the project, please call me at 550-4483.

Sincerely,

Perry J. Walker

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kunco, HASEKO (Ewa), Inc.

Ward Plaza, Suite 220 • 210 Ward Avenue • Honolulu, Hawai'i 96814-4812
Phone: 808 550-4483 • Fax: 808 550-4549 • www.psi-hi.com

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 • AREA CODE (808) 529-3111
http://www.honolulupd.org
www.honolulu.gov

CS-KP

February 16, 2005

TO: HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: BOISSE P. CORREA, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT, PAPIPI ROAD DRAINAGE IMPROVEMENTS, TAX MAP KEYS: PAPIPI ROAD AND 9-1-11: 1 AND 2 AND 9-1-12: 3, 8, 9, 11, 12, AND 48

Thank you for the opportunity to review and comment on the subject project.

Provided that the contractor adheres to the road closure plans as outlined in the subject document, this project should have no significant impact on the services and facilities of the Honolulu Police Department. If there are any changes to the original plans, please discuss them with Captain Mitchell Kiyuna of District 8. He can be reached at 692-4253.

If there are any questions, please call Major Michael Tanashiro at 692-4253 or Ms. Carol Sodetani of the Support Services Bureau at 529-3658.

BOISSE P. CORREA
Chief of Police

By
KARL GODSEY
Assistant Chief of Police
Support Services Bureau

CITY & COUNTY OF HONOLULU
DEPARTMENT OF PLANNING
RECEIVED
2005 FEB 17 PM 12 09

Serving and Protecting with Aloha

PLANNING SOLUTIONS

February 23, 2005
2004-0012-001

Chief Boisse P. Correa
Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Chief Correa:

Thank you for your February 16, 2005 letter to the City and County of Honolulu Department of Planning and Permitting (your reference CS-KP) commenting on the *Draft Environmental Assessment (DEA): Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Our response follows.

Comment:

> *"Provided that the contractor adheres to the road closure plans as outlined in the subject document, this project should have no significant impact on the services and facilities of the Honolulu Police Department. If there are any changes to the original plans, please discuss them with Captain Mitchell Kiyuna of District 8. He can be reached at 692-4253."*

Response: Thank you for confirming that construction of the project as described in the *DEA* would not significantly impact HPD's services and facilities. HASEKO will notify you of any proposed changes to the construction process.

If you have any further questions concerning the project, please call me at 550-4483.

Sincerely,

Peter J. Nakamura

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kamm, HASEKO (Ewa), Inc.

Ward Plaza, Suite 220 • 210 Ward Avenue • Honolulu, Hawaii 96814-4212
Phone: 808 550-4483 • Fax: 808 550-4549 • www.psi-w.com

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 215, KAPOLEI, HAWAII 96707

LAVERNE HIGA, P.E.
ACTING DIRECTOR AND CHIEF ENGINEER

GEORGE "KEOKI" AHUEHUE
DEPUTY DIRECTOR

IN REPLY REFER TO:

February 17, 2005

RECEIVED
FEB 16 2005
DEPT. OF PLANNING AND PERMITTING
650 SOUTH KING ST.
HONOLULU, HI 96813

MEMORANDUM

TO: HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

Laverne Higa

FROM: LAVERNE HIGA, P.E., ACTING DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF FACILITY MAINTENANCE

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
PAPIPI ROAD DRAINAGE IMPROVEMENTS

Thank you for the opportunity to provide comments on the subject DEA.

We are concerned regarding the potential erosion of the proposed coral lined outlet channel to be constructed under Increment 2 of the drainage improvements. An inadequately lined channel will create a maintenance problem and may require channel restoration after heavy rains.

We request the report address this erosion concern and discuss the investigation of other channel linings, such as concrete and large rocks. An evaluation of these linings should be included in the DEA with explanation why a particular lining is or is not recommended.

Returned for your use is the DEA document.

Should you have any questions, please call Charles Pignataro of our Division of Road Maintenance, at 484-7697.

Attachment

PLANNING SOLUTIONS

February 25, 2005
2004-0012-001

Ms. Laverne Higa, P.E., Acting Director and Chief Engineer
Department of Facility Maintenance
City and County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, Hawai'i 96707

Subject: Draft Environmental Assessment (DEA), Papipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Ms. Higa:

Thank you for your February 17, 2005 letter to the City and County of Honolulu Department of Planning and Permitting (your reference DRM 05-094) commenting on the *Draft Environmental Assessment (DEA): Papipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Our response follows.

Comment:

> *We are concerned regarding the potential erosion of the proposed coral lined outlet channel to be constructed under Increment 2 of the drainage improvements. An inadequately lined channel will create a maintenance problem and may require channel restoration after heavy rains.*
>
> *We request the report address this erosion concern and discuss the investigation of other channel linings, such as concrete and large rocks. An evaluation of these linings should be included in the DEA with explanation why a particular lining is or is not recommended."*

Response:

HASEKO shares your desire to minimize the work required to maintain the channel. The engineers responsible for the channel design believe that the swale that HASEKO has proposed will be relatively easy to maintain. However, Section 2.3.3.1 of the Final EA includes a brief description of alternative channel linings, such as concrete, that HASEKO considered during the design process.

Thank you again for your comments and for returning the document to us. If you have any further questions concerning the project, please call me at 550-4483.

Sincerely,

Perry J. White

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kanna, HASEKO (Ewa), Inc.

Ward Plaza, Suite 220 • 233 Ward Avenue • Honolulu, Hawaii 96814-4012
Phone: 808 550-4483 • Fax: 808 550-4549 • www.psi-hi.com

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

FEB 18 2005

Ref: OCCL.: DE

Corr.: OA-05-183

February 11, 2005

Mr. Henry Eng, Acting Director
City and County of Honolulu
Department of Planning and Permitting
650 South King St
Honolulu, HI 96813

Subject: Review and comments on Draft EA for Papipi Rd Drainage Improvements, Ewa, Hawaii.

Dear Mr. Eng:

The State of Hawaii Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands (OCCL) has reviewed the January, 2005 Draft Environmental Assessment (DEA) for a shoreline setback variance, CDUA and application for other related permits for the drainage improvements. We ask for more detailed information on the termination point of the proposed ocean outfall culvert.

Figure 2-6 is difficult to read the termination point of the outlet in relation to the shoreline and the waterline. Please include ground photographs of the area described in the Potential Impacts of Section 3.1.2 and please elaborate in more detail the exact location of the nearest sandy beach resource.

Section 3.11.2 states that the culvert could potentially affect lateral access along the beach and mentions the possibility of building a bridge or walkway over the culvert to mitigate this impact. The OCCL would support this effort to ensure public access along the shoreline is retained, especially as it is developed into a more heavily utilized public resource.

Thank you for the opportunity to comment on this DEA. If you should have any questions, please contact Dolan Eversole, Sea Grant Extension Agent at the Office of Conservation and Coastal Lands at 587-0321.

Thank You,

Sam Dammo, Administrator
Office of Conservation and Coastal Lands

Cc: Oahu Board Member
Land Division
Chairperson's Office
Planning Solutions, Inc 210 Ward Ave Suite 330 Hon, HI 96814

PLANNING SOLUTIONS

February 25, 2005
2004-0012-001

Mr. Sam Lemmo, Administrator
Office of Conservation and Coastal Lands
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, Hawai'i 96809

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Lemmo:

Thank you for your February 11, 2005 letter to the City and County of Honolulu Department of Planning and Permitting (your reference OCCL:DE/CorrOA-05-163) commenting on the *Draft Environmental Assessment* (*DEA*): *Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Item-by-item responses to your comments (reproduced for your convenience in italics before each response) are provided below.

Comment 1:

> *We ask for more detailed information on the termination point of the proposed ocean outfall culvert.*
>
> *Figure 2-6 is difficult to read the termination point of the outlet in relation to the shoreline and the waterline. Please include ground photographs of the area described in the Potential Impacts of Section 3.1.3 and please elaborate to more detail the exact location of the nearest sandy beach resource."*

Response:

As the attached photographs show, the channel would extend approximately 30 feet seaward of the certified shoreline. The nearest sandy beach resource is located approximately 150 feet west of the proposed outlet along the shoreline. We have revised Section 3.11 of the Final EA to include this language.

Comment 2:

> *"Section 3.11.2 states that the culvert could potentially affect lateral access along the beach and mentions the possibility of building a bridge or walkway over the culvert to mitigate this impact. The OCCL would support this effort to ensure public access along the shoreline is retained, especially as it is developed into a more heavily utilized public resource."*

Response:

Thank you for offering your support should HASEKO decide to construct a bridge or walkway over the proposed ocean outlet. This will remain an option as the design process continues. Ultimately, this will be decided by the City when it assumes ownership of the 9.4 acre area dedicated to it for the expansion of One'ula Beach Park.

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Phone: 808 536-9441 • Fax: 808 550-4549 • www.psi-hi.com

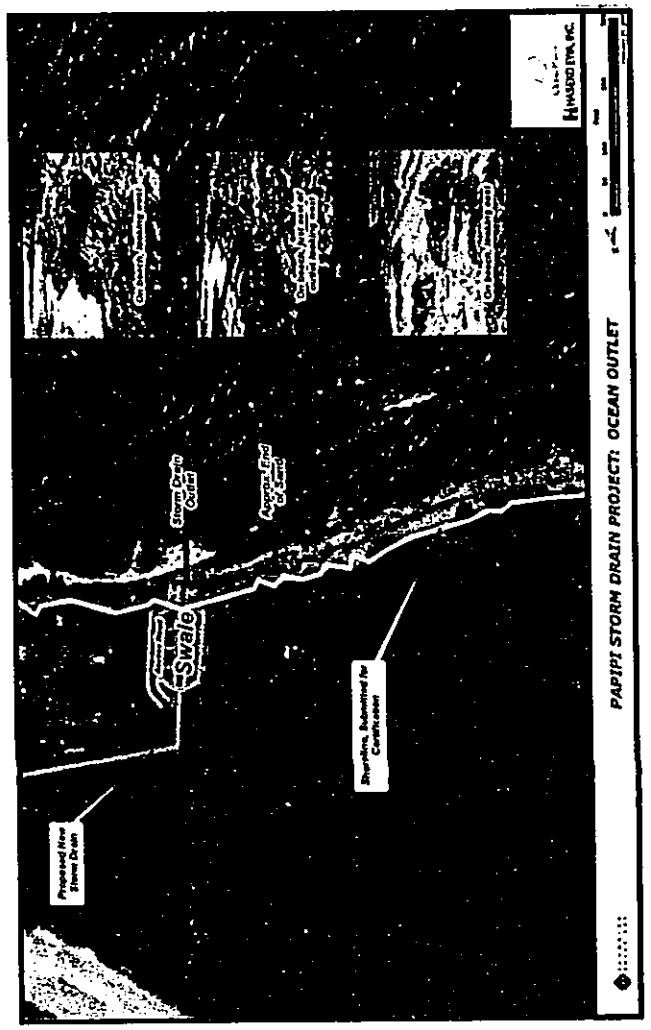
Thank you again for your comments. If you have any further questions, please call me at 550-4483.

Sincerely,

Perry J. White

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kunz, HASEKO (Ewa), Inc.

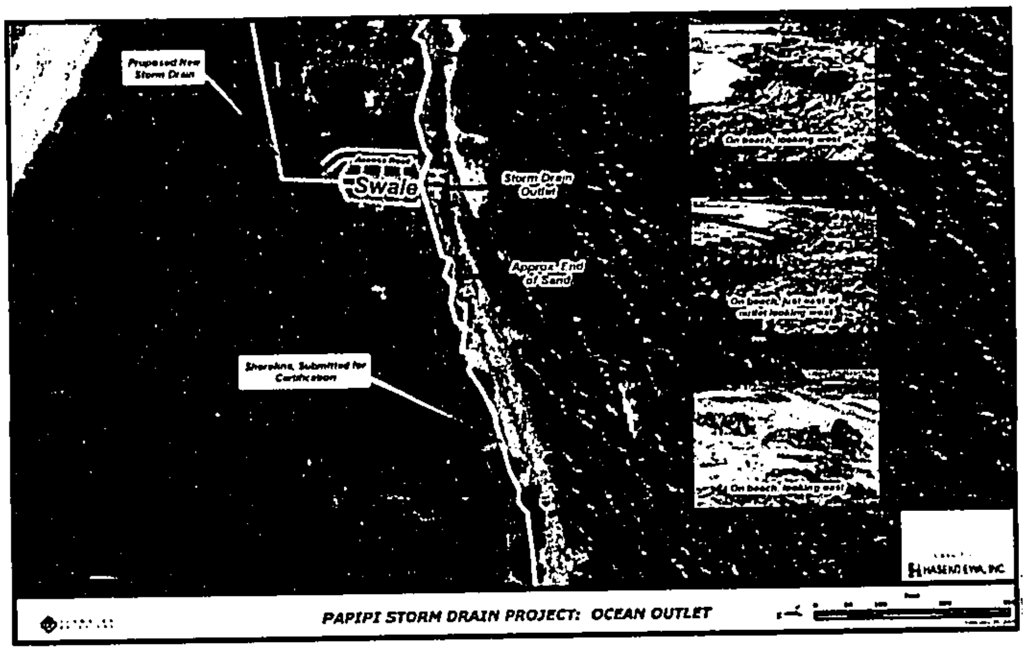
RECEIVED AS FOLLOWS



CORRECTION

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

RECEIVED AS FOLLOWS



DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

2005 FEB 22 PM 3 37
DEPT OF PLANNING and PERMITTING CITY & COUNTY OF HONOLULU

TP1/05-907ZZR

February 17, 2005

MEMORANDUM

TO: HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: EDWARD Y. HIRATA, ACTING DIRECTOR

SUBJECT: PAPIPI ROAD DRAINAGE IMPROVEMENTS – 2005/ED-1(ASK)

In response to your January 14, 2005 letter, we have reviewed the draft environmental assessment (EA) for the subject project. The following comments are the result of this review:

1. TheBus routes and stops will be affected by this project. The EA should discuss the impact of the project on bus operations and any proposed mitigation measures.

2. Figure 1-2 should identify Papa Street because it is referred to in the first paragraph of Page 3-1.

3. Alkanaka Street should be labeled on Figure 1-5.

4. On Page 3-47, Section 3.16.1.2 should address the following comments concerning the potential project impacts on roadways:

   a. The area neighborhood board should be kept apprised of the proposed project. The U.S. Postal Service and the City Department of Environmental Services, Refuse Division should also be informed of impending road closures and detour routes, if required.

   b. A "Notice to Motorists" with a 24-hour project hotline number should be published in the daily newspaper. If roadway closures and/or detour route(s) are required, the notice to motorists should clearly indicate to the motoring public the roadway closures and/or detour route(s) to be taken around the work site.

   c. Flyers should be distributed to ALL affected residents, businesses, and schools adjacent to and surrounding the project site. The flyer should also have a 24-hour project hotline number so that concerns raised by motorists can be quickly and appropriately addressed by the contractor. The flyer should clearly show road closures/suggested detour route(s), if required.

   d. The 24-hour project hotline number should also be posted strategically with temporary traffic control signs.

   e. All existing traffic control devices within the roadway right-of-way shall be replaced after construction is completed.

5. On Page 3-48, Section 3.16.2.2 should state that the emergency medical services should also be informed of the project construction schedule and apprised of the emergency vehicle routes to be used during construction.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at Local 6976.

EDWARD Y. HIRATA

PLANNING SOLUTIONS

February 25, 2005
2004-0012-001

Mr. Edward Y. Hirata, Acting Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, Third Floor
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Hirata:

Thank you for your February 17, 2005 letter to the City and County of Honolulu Department of Planning and Permitting (your reference TP 1/05-907223R) commenting on the *Draft Environmental Assessment (DEA): Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Item-by-item responses to your comments (reproduced for your convenience in Italics before each response) are provided below.

Comment 1:

"TheBus routes and stops will be affected by this project. The EA should discuss the impact of the project on bus operations and any proposed mitigation measures."

Response:

Section 3.16.1.2 of the Draft EA noted that at least one access lane will be maintained along Pāpipi Road (which is used by buses running on Route 421) throughout the construction phase of the project. As such, bus service will not be significantly affected. Given the low volume of vehicular traffic along Pāpipi Road and the fact that the required trenching generally parallels, rather than crosses, the traveling, it is unlikely that these delays would ever exceed 2 to 3 minutes. In most cases they would be less. We have revised the EA to provide additional information on this topic. The revised text is reproduced in our response to Comment 4 below.

Comment 2:

"Figure 1-2 should identify Papa Street because it is referred to in the first paragraph of Page 3-1."

Response:

Thank you for noticing this. Figure 1-2 in the Final EA calls out Papa Street.

Comment 3:

"Aikanaka Street should be labeled on Figure 1-3."

Response:

We have labeled Aikanaka Road in Figure 1-5 in the Final EA; please note that there is no Aikanaka Street in the project area.

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Comment 4:

On Page 3-47, Section 3.16.1.2 should address the following comments concerning the potential project impacts on roadways:

a. The area neighborhood board should be kept apprised of the proposed project. The U.S. Postal Service and the City Department of Environmental Services, Refuse Division should also be informed of impending road closures and detour routes, if required.

b. A "Notice to Motorists" with a 24-hour project hotline number should be published in the daily newspaper. If roadway closures and/or detour route(s) are required, the notice to motorists should clearly indicate to the motoring public the roadway closures and/or detour route(s) to be taken around the work site.

c. Flyers should be distributed to ALL affected residents, businesses, and schools adjacent to and surrounding the project site. The flyer should also have a 24-hour project hotline number so that concerns raised by motorists can be quickly and appropriately addressed by the contractor. The flyer should clearly show road closures/suggested detour route(s), if required.

d. The 24-hour project hotline number should also be posted strategically with temporary traffic control signs.

e. All existing traffic control devices within the roadway right-of-way shall be replaced after construction is completed.

Response:

In response to your comments, Section 3.16.1.2 of the Final EA has been revised to read as follows:

"Roadways & Public Transportation. Construction of the proposed storm drainage facilities will cause temporary disruptions in traffic along Pāpipi Road. A traffic control plan will be prepared for construction and a notice to motorists concerning expected delays and applicable detour routes will be submitted for publication in the newspaper along with a 24-hour hotline number. The contractor will notify and provide the 24-hour hotline number to the 'Ewa Neighborhood Board, residents along Pāpipi Road, TheBus, the U.S. Postal Service, the City Department of Environmental Services Refuse Division, and the principal of 'Ewa Beach Elementary School prior to beginning construction. The hotline number will also be posted along the roadway during construction. During Increment 1, construction will affect the portion from 'Ewa Beach Elementary School south to near Pāpipi Drive. Increment 2 will affect the small westernmost portion of Pāpipi Drive and the portion of Pāpipi Road from that point south to the location where the drainage turns south to the proposed outfall. The drainage system crosses Pāpipi Road once during this increment, and will require excavation of the road. A detour road will be used as needed to maintain uninterrupted access to One'ula Beach Park. Traffic impacts will be minimized through enforcement of a traffic control plan by an off-duty police officer or trained construction flagperson. Two-way traffic will be maintained and a minimum of one travel lane will be kept open at all times. Given the low volume of vehicular traffic along Pāpipi Road and the fact that the required trenching generally parallels, rather than crosses, the traveling, it is unlikely that delays would ever exceed 2 to 3 minutes.

Public transportation access will be maintained for the duration of the construction period. The one location where excavation across the road will occur is not along TheBus' Route 421, and thus the only impact to bus service along Route 421 would be some minor delays during peak hours. Operators of TheBus will be kept apprised of the construction schedule for the project. Once construction is completed, existing traffic control devices along the road will be replaced, and normal operation of the proposed facilities will have no effect on transportation and roadways."

Comment 5:

On Page 3-48, Section 3.16.2.2 should state that the emergency medical services should also be informed of the project construction schedule and apprised of the emergency vehicle routes to be used during construction.

Response:

We have revised section 3.16.2.2 of the Final EA to read:

"The Police, Fire Department, and Emergency Medical Services will be informed of the project construction schedule and apprised of the emergency vehicle access routes to be used during construction. The contractor will be required to provide ample clearance to emergency medical vehicles at all times."

Thank you again for your comments. If you have any further questions, please call me at 550-4483.

Sincerely,

Perry J. White

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kaaua, HASEKO (Ewa), Inc.

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

2005/ED-1(ask)

February 25, 2005

Mr. Perry J. White
Planning Solutions
Ward Plaza, Suite 330
210 Ward Avenue,
Honolulu, Hawaii 96814

Dear Mr. White:

Draft Environmental Assessment (EA) for the Papipi Road Drainage Improvements

We are forwarding copies of all comments we have received relating to the Draft EA for the above-referenced project as well as DPP comments.

In accordance with the provisions of Chapter 343, Hawaii Revised Statutes, you must respond in writing to these and any other comments which were received during the 30-day public comment period which began with the publication of a notice of availability of the Draft EA (EIS) on January 23, 2005. The Final EA must include these comments and responses, as well as revised text, if appropriate.

Project Description

The project description, found in Section 2.2, should describe the proposed headwall, drainage outlet swale, sidewalks and landscaping. A site plan showing all the proposed improvements should be included in the Final EA.

Page 2-11 states Drain line A will also be extended towards Ewa Beach Elementary School. This segment does not appear to be shown on Figure 2-2.

1. Mauka Side of Papipi Subdivision - The Final EA should include specific information about the 15-foot wide area between the existing subdivision and the new key stonewall:

a) Who will own and maintain this area (ensure no structures, fences, or storage of vehicles are placed in this area);

b) Will this area be landscaped, grassed, or graveled, and who will have access?

c) How will area residents be apprised of any restrictions?

d) What is the height of the key stonewall?

e) What were Honolulu Police Department's comments regarding this 15' area?

2. Improvements on Mauka Side of Papipi Road - The Final EA should acknowledge that improvements along the mauka side of Papipi Road, (i.e., meandering sidewalk, landscaping, trees, etc.) are required as a condition of 2003/PDH-3. The Final EA should include a plan of those improvements in conjunction w/the proposed drainage.

Development Plan

The Development Plan (DP) encourages applicants to install canopy trees to shade sidewalks and bike paths, and landscaping that is "appropriate for the natural setting and designed to provide continuity and transition from adjacent developed areas", e.g. blending the Ocean Pointe development and the adjoining existing residential neighborhood.

The first paragraph of Section 2.2 indicates, "the upstream end of the drainage system will extend to a low point..." It would be helpful to describe this improvement, i.e. a drain line and gutter.

Roadways

Pages 1-8 and 2-11 indicate that a segment of Oneula Beach Park Road will be relocated (to be consistent with the Oneula Beach Park Master Plan). The Final EA should address how park access would be maintained in the event that the remainder of the existing park access road is not relocated at the same time.

Alternatives

The Final EA should include the alternative to retain the drainage basin.

The Final EA should contain a description and possible conceptual plan for the bridge or walkway that could be provided to enhance lateral access along the shoreline.

The Draft EA explains that lateral shoreline access is currently difficult due to the "natural roughness of the shoreline". How would the proposal change this? If possible, the Final EA should indicate what portion of time the lateral access way would be under water.

The Final EA should include an alternative for the Papipi Road drainage system extending entirely along Papipi Road to Onaula Park with justification on why it was not considered. Also include an alternative for the drainage system extending along Papipi Drive with justification on why it was not considered.

Water Quality

The Draft EA discusses existing water quality relative to State regulated constituents for open costal waters. The section on potential impacts discusses salinity and total suspended sediment. The Final EA should relate these elements to each other and explain why these constituents are the exclusive predictors of water quality and ecological impacts. Could the storm water runoff from an urban environment contain other pollutants which might adversely impact the marine environment? If so, the Final EA should provide an analysis of the other pollutants and potential environmental impacts.

Section 3.8.2.2.1 should address potential impacts to coral or other sedentary organisms that are found near shore and those that depend on them for food and shelter.

STORM WATER QUALITY

The last sentence of Section 2.2. of the Draft EA should be revised to read, "HASEKO will maintain the landscape strip over the easement including the private drain inlets with silt traps, which captures surface runoff from the adjacent private properties."

Section 2.2.2 should be revised to indicate the high tide elevation and the extent of the tidal influence.

Permits

A drainage connection license should be added to the list of required permits in the project summary.

Proposed modifications within the Ocean Pointe project site will require approval of the modification to the Planned Development Housing Permit.

Within the Special Management Area, those structures which are not defined as development under Chapter 25-1.3(2), Revised Ordinance of Honolulu, such as the head wall and sidewalks will require a Special Management Area Use Permit. If the valuation of these improvements exceed $125,000 a major SMP will be required. We concur that a shoreline setback variance will be required for the work within the 40-foot shoreline setback.

Shoreline Survey

A certified shoreline survey should be included in the Final EA.

You may contact Geri Ung of our staff at 527-6044, if you have questions regarding the above.

Sincerely yours,

HENRY ENG, FAICP
Acting Director of Planning and Permitting

HE:lm
Enclosure

doc: 353882

PLANNING SOLUTIONS

February 28, 2005
2004-0012-001

Mr. Henry Eng, FAICP, Acting Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Eng:

Thank you for your February 23, 2005 letter commenting on the *Draft Environmental Assessment (DEA): Pāpipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document and providing written comments.

Item-by-item responses to your comments are provided below. For your convenience, we have reproduced the comments in italics immediately before each response.

PROJECT DESCRIPTION

Comment 1:

The project description, found in Section 2.2, should describe the proposed headwall, drainage outlet swale, sidewalks and landscaping. A site plan showing all the proposed improvements should be included in the Final EA.

Response: Figure 2-1 of the Draft EA shows a site plan of the proposed improvements, with Figures 2-2 through 2-6 providing further detail on each project component. Figure 2-6 depicts the proposed drainage swale, concrete headwall and realigned park access road. We have revised the narrative in Section 2.2.2 of the Final EA to include mention of the concrete headwall and chain link fence planned for the mauka end of the drainage channel. Finally, the landscaping has not yet been finalized, but drawings that depict the landscape concept are reproduced in Appendix C of the Final EA. Please note that the landscaping within the proposed drainage easement between the proposed cul-de-sac at the end of Pāpipi Road and the shoreline must be designed in cooperation with the City and County of Honolulu Department of Parks and Recreation, as the land will be dedicated for inclusion into Ouʻalu Beach Park once HASEKO dedicates the land to it. Consequently, final plans for that area are not presently available.

Comment 2:

Page 2-11 states Drain line A will also be extended towards Ewa Beach Elementary School. This segment does not appear to be shown on Figure 2-2.

Response: Thank you for pointing this out. Figure 2-2 in the Final EA correctly depicts this.

Comment 3:

Mauka Side of Papipi Subdivision - The Final EA should include specific information about the 15-foot wide area between the existing subdivision and the new key stonewall:

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a) Who will own and maintain this area (ensure no structures, fences, or storage of vehicles are placed in this area);

b) Will this area be landscaped, grassed, or graveled, and who will have access?

c) How will area residents be apprised of any restrictions?

d) What is the height of the key stonewall?

e) What were Honolulu Police Department's comments regarding this 15' area?

Response:

Answers to the sub-items in this comment are as follows:

a) The Ocean Pointe Homeowners' Association will be responsible for maintaining the fenced-in area. This regular maintenance will ensure the area does not become overgrown.

b) HASEKO intends to plant grass in the easement and on the slope. Concrete running tracks or grasscrete blocks will be used to provide a suitable driving surface for heavy maintenance vehicles. It will plant bougainvillea immediately above the keystone wall, similar to what was shown to the community during mediation. No trees or other plantings that people could hide behind will be placed within the easement.

c) HASEKO will erect signs on the fence at either end of the fenced area apprising the general public that the area is restricted to authorized personnel. HASEKO will include information concerning the easement area in the newsletter that it regularly distributes to area residents. Finally, HASEKO will send letters to owners of properties immediately adjacent to the 15-foot easement informing them of the provisions it is making to secure and improve the area.

d) The keystone wall is 6 feet high.

e) The Honolulu Police Department offered no comments specific to the 15-foot wide area in question. Their only substantive comments, which are also reproduced in the Final EA, read as follows:

"Provided the contractor adheres to the road closure plans as outlined in the subject document, this project should have no impact on the services and facilities of the Honolulu Police Department."

Comment 4:

Improvements on Mauka Side of Papipi Road - The Final EA should acknowledge that improvements along the mauka side of Papipi Road, (i.e., meandering sidewalk, landscaping, trees, etc.) are required as a condition of 2003/PDH-3. The Final EA should include a plan of those improvements in conjunction with the proposed drainage.

Response: Section 2.2.2 of the Final EA includes the following language:

Upon completion of the drainage system, groundcover and landscaping will be established in unpaved areas. A sidewalk and appropriate landscaping will be installed on the mauka side of Pāpipi Road in accordance with HASEKO's 2003 Planned Development Housing Decision and Order for Area 3 (PDH-3). The landscaping design will be finalized through continued cooperation with the City.

DEVELOPMENT PLAN

Comment 1:

The Development Plan (DP) encourages canopy trees to shade sidewalks and bike paths, and landscaping that is "appropriate for the natural setting and designed to provide continuity and transition from adjacent developed areas", e.g. blending the Ocean Pointe development and the adjoining existing residential neighborhood.

Response: The landscaping to be installed as part of the project has not yet been finalized. However, the concept plans that HASEKO has developed are in accord with this guideline. HASEKO is continuing to work closely with the City to ensure that the design is compatible with the standards of the Development Plan.

Comment 2:

The first paragraph of Section 2.2 indicates, "the upstream end of the drainage system will extend to a low point..." It would be helpful to describe this improvement, i.e. a drain line and gutter.

Response: We have revised this sentence in response to this request. The passage in the Final EA reads:

The upstream end of the drainage system, which will have an underground storm drain similar to the drainage system that will front the Ocean Pointe area, will extend to a low point in front of the 'Ewa Beach Elementary School.

ROADWAYS

Comment 1:

Pages 1-8 and 2-11 indicate that a segment of One'ula Beach Park Road will be relocated (to be consistent with the One'ula Beach Park Master Plan). The Final EA should address how park access would be maintained in the event that the remainder of the existing park access road is not relocated at the same time.

Response:

We have revised Figure 2-6 to show the road segment that HASEKO will construct at the western end of the Pāpipi Road extension to provide a temporary connection between the cul-de-sac and the existing One'ula Park Access Road. That connection will remain until the park access road is relocated to within the 9.4-acre area that HASEKO will dedicate to the City for expansion of the Park. Vehicular access to the park will be maintained throughout the construction period.

ALTERNATIVES

Comment 1:

The Final EA should include the alternative to retain the drainage basin.

Response: We have revised Section 2.3.3 of the Final EA to include retention of a permanent drainage basin as an alternative. The third paragraph of the section now reads:

HASEKO's agreement to construct the proposed drainage improvements was based in part on the understanding that the system would discharged into an ocean outlet. The retention basin that it has proposed as part of Increment 1 of the project was intended to handle runoff only for the time it takes HASEKO to secure the permits needed for the permanent ocean discharge.

Because it is impossible to be sure that the proposed discharge will ultimately be approved, HASEKO did consider the possibility of using the retention basin as a permanent means of accommodating runoff from the area that would be served by the proposed system. Two different possibilities were evaluated: (1) the same location as the temporary retention basin that will collect runoff during Increment 1 and (2) a location within the 9.4-acre parcel that HASEKO has promised to dedicate to the City and County of Honolulu so that the City could expand and improve One'ula Beach Park.

The first location is impractical because it would make it impossible to construct the homes and other improvements that are planned for that area. This would deprive HASEKO of sales revenue critical to the Ocean Pointe project's economic viability.

The second location was eliminated as it would reduce the area of land available for recreational use after HASEKO dedicates the 9.4-acre area to the City and County of Honolulu for the future expansion of One'ula Beach Park. HASEKO believes that permanently locating the retention basin in the One'ula Beach Park expansion area would be inconsistent with the terms of its Unilateral Agreement with the City. Hence, it is not a viable alternative.

Comment 2:

The Final EA should contain a description and possible conceptual plan for the bridge or walkway that could be provided to enhance lateral access along the shoreline.

Response:

Because the land through which the proposed drainageway would pass will be dedicated to the City and County of Honolulu for expansion of One'ula Beach Park, HASEKO is not free to commit to the exact design of the bridge or walkway that will be used to assure continued lateral access along the shoreline. However, it is committed to assuring that the ability of the public to move through this area remains as good as or better than it is at present.

Comment 3:

The Draft EA explains that lateral shoreline access is currently difficult due to the "natural roughness of the shoreline". How would the proposal change this? If possible, the Final EA should indicate what portion of the time lateral access way would be underwater.

Response: Lateral access along this shoreline is presently severely restricted by the extremely rough nature of the limestone shoreline. As stated in our preceding response, HASEKO is committed to maintaining or improving pedestrian access to the area, the details of which will be decided with the City's cooperation. If this is done with a bridge or similar structure, lateral access will be possible

except when storm waves overtop the shoreline, making long-shore movement difficult or impossible.

Comment 4:

The Final EA should include an alternative for the Papipi Road drainage system extending entirely along Papipi Road to Ona'ula Park with justification on why it was not considered. Also include an alternative for the drainage system extending along Papipi Drive with justification on why it was not considered.

Response:

HASEKO considered an alternative drainage improvement design that extended entirely along Papipi Road to Ona'ula Beach Park. We have added the following discussion to Section 2.3.3.3 of the Final EA explaining why this alternative was rejected:

HASEKO's original drainage concept called for the main drain line to run straight along Papipi Road past the Papipi Subdivision frontage rather than turning mauka to go behind the subdivision. In this original plan, a smaller drain line was to have been used along the base of the Area III wall adjacent to the Papipi Subdivision. That drain line is needed to capture runoff from the rear of the Papipi Subdivision lots and runoff from the proposed Area III wall and fill slope.

HASEKO switched to the proposed plan when it became evident that this would reduce impacts to the community during construction along Papipi Road fronting the Papipi Subdivision. With the primary (larger) drain line routed behind the Papipi Subdivision, the drain fronting the Papipi Subdivision is able to be much smaller in size (18- to 30-inch pipe culverts versus the original 8-foot wide by 2.5 foot high box culvert). While the present design will require more area within the Ocean Pointe site around the Papipi Subdivision than would alternatives that remained within the existing public road rights-of-way, it will significantly reduce impacts to the community during construction by avoiding utility relocation and roadway reconstruction work that would have been required with the larger box culvert. For example, the existing utility lines fronting the Papipi Subdivision would have to be reconstructed if a larger drainline was to occupy that space. Because the proposed design provides the required drainage capacity with reduced construction impacts, the alternative of routing the major drain line within PapipiRoad is no longer under consideration.

HASEKO also explored the possibility of routing the line within the Papipi Drive right-of-way. Because a line in this location would not eliminate the need to locate another drain line between the rear of the existing Papipi Subdivision lots and the Area III fill slope, this alternative did not meet the objectives of the proposed action. Consequently, it is no longer being considered.

WATER QUALITY

Comment 1:

The Draft EA discusses existing water quality relative to State regulated constituents for open coastal waters. The section on potential impacts discuss salinity and total suspended sediment.

The Final EA should relate these to each other and explain why these constituents are the exclusive predictors of water quality and ecological impacts. Could the storm water runoff from an urban environment contain other pollutants which might adversely impact the marine environment? If so, the Final EA should provide an analysis of these pollutants and potential environmental impacts.

Response:

Salinity and total suspended sediments are used in the impact analysis and Appendix A primarily as indicator variables that track the dispersion of stormwater in the marine environment. The predictions indicate very rapid dilution both of the dissolved and suspended constituents in the turbulent coastal waters off 'Ewa Beach, reducing the concentrations of these indicator variables to very low levels within hours of the discharge event. Therefore the concentrations of minor components, which could occur only in concentrations that are orders of magnitude lower than these indicators, must be similarly diluted. At such low levels, minor pollutants will not pose substantial impacts to the marine environment.

Comment 3:

Section 3.8.2.2.1 should address potential impacts to coral or other sedentary organisms that are found near shore and those that depend on them for food and shelter.

Response: We agree that the EA must address potential impacts to coral or other sedentary organisms that are found near shore and those that depend on them for food and shelter. This section does note that the nearshore environment in the vicinity of the proposed storm drain is poor habitat for coral formation due to the turbulence and normal turbidity, and the general discussion of impacts to benthic fauna included in this section does apply to corals and other sedentary organisms. The conclusion reached is that there will be no substantial impacts on corals or other sedentary organisms that are found near shore and those that depend on them for food and shelter.

STORM WATER QUALITY

Comment 1:

The last sentence of Section 2.2. of the Draft EA should be revise to read, "HASEKO will maintain the landscape strip over the easement including the private drain inlets with silt traps, which captures surface runoff from the adjacent private properties."

Response: The entire box culvert system (including inlets) will be taking other than Ocean Pointe runoff. Consequently, it is intended to be owned and maintained by the City and County of Honolulu. We have revised the last sentence of Section 2.2 to read: "*HASEKO expects to maintain the landscape strip over the easement and will coordinate with the City and County of Honolulu Department of Facilities Maintenance for maintenance of the inlets and silt traps.*"

Comment 2:

Section 2.2.2 should be revised to indicate the high tide elevation and the extent of the tidal influence.

Response: The following sentence has been added to the end of the second paragraph in this section:

It is important to note that, because of the low elevation of the outlet of the proposed canal channel (1.7 feet above mean sea level), ocean water will enter it during most high tides.

PERMITS

Comment 1:

A drainage connection license should be added to the list of required permits in the project summary.

Response: We have added a drainage connection license to the list of approvals that are needed.

Comment 2:

Proposed modifications within the Ocean Pointe project site will require approval of the modification to the Planned Development Housing Permit.

Response: Thank you for noting this requirement. HASEKO will incorporate the parts of the project that are within the Ocean Pointe development into the PD-H.

Comment 3:

Within the Special Management Area, those structures which are not defined as development under Chapter 25-1.3(2), Revised Ordinance of Honolulu, such as the head wall and sidewalks will require a Special Management Area Use Permit. If the valuation of these improvements exceed $125,000 a major SMP will be required. We concur that a shoreline setback variance will be required for the work within the 40-foot shoreline setback.

Response: HASEKO appreciates this information and will be submitting Special Management Area Use Permit and Shoreline Setback Variance applications soon after the Chapter 343 process is completed.

SHORELINE SURVEY

Comment 1:

A certified shoreline survey should be included in the Final EA.

Response: The shoreline survey map was submitted to the State Surveyor on October 29, 2004, and HASEKO anticipates that the shoreline will be certified soon. In any event, the shoreline

certification will be completed before HASEKO files, and the Department accepts, the Special Management Area and Shoreline Setback Variance applications.

Thank you again for your comments. If you have any further questions, please call me at 550-4483.

Sincerely,

Perry J. White

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kanno, HASEKO (Hwa), Inc.

February 18, 2005

Mr. Henry Eng, Acting Director 2005 FEB 22 PM 3 38
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

DEPT OF PLANNING and PERMITTING CITY & COUNTY OF HONOLULU

Dear Mr. Eng:

This letter is intended to comment on the Papipi Road Drainage Improvement Draft EIS statement prepared by Planning Solutions for Hanuka Corporation. After reviewing the draft the following concerns were developed:

1. There is no indication that the drainage channel leading to the ocean will have plants or weeds that will serve to remove sediment and absorb contaminants before the discharge enters the ocean. The proposed drainage way will be a 25 ft. wide rock or open coral channel graded to a height of 1.7 ft above mean sea level at the shoreline. The concern with the proposed plan is that the lack of swales and greenery to slow water and trap sediments will degrade the water quality in the immediate area. The present design presents a serious threat to near shore habitat, specifically limu or seaweed. The drainage outfall will cover one of the last areas in this region still able to support specie of limu having cultural or food value to the local Hawaiian population. (see enhancement 05- 01).

2. The proposal indicates that there were seven sampling stations (page 3- 10) to study water quality in the area impacted by the proposed drainage. However, figure 3-3 presents evidence of here is only evidence of six stations in the report. Additionally, data for sampling station PA is not included in Table 3-3. Lastly the control station is located on west side of the drainage site well removed from the existing drainage (See enhancement 05- 02).

3. The water quality testing at site Ka was performed in March, 2004 at low tide without the occurrence of a rainfall event during or prior to the survey. Although this data is indeed a necessary and valid component of the study it should not be used as the sole criterion for assessment of the potential for an adverse environmental condition introduced by the proposed site (see enhancement 05- 03). A reasonable determination on positive or negative impact to the environment can not be based on the result of a single test performed when non- point discharge from Pearl Harbor and other inland drainage sites is not included. Overlooking the combined effect of the all inland drainage to the ocean does not account for the existing condition created by non- point source other than the proposed drainage.

Secondly, the test was run at low tide when near shore concentrations may have been lowered since contaminants, sediments, etc. are pulled by tidal flow off shore. The ebb flow conditions can be considered a contributing factor to improved coastal water quality leading to a conclusion as stated in the report that there is no negative impact imposed by the proposed project. This is a significant assumption since the testing performed in the study does not account for daily tidal flows. Further investigation is warranted in future studies to confirm the finding that the project will not have a negative impact on coastal water quality.

4. The study does not account for petroleum based or organic constituents or heavy metals that a reasonable and comprehensive study would include to truly assess the environmental impact (see enhancement 05- 04).

5. The study does not adequately quantify the potential adverse effect the discharge will have on the near shore environment stemming from the accumulation of fine (clay) sediment particles originating from the proposed drainage. The particles may increase turbidity causing a shift in the light absorption spectrum of the water leading to a decrease in photosynthetic ability of plant life. The increased turbidity could lead to a die off of specie endemic to the region. To support this scenario, page 3-24 of the proposal states that the clay fraction of the sediment will remain in suspension for an undetermined period of time. The concern is that the suspension will accumulate over time leading to a decrease light penetration and ability of near shore seaweed to sustain itself (see enhancement 05- 05).

6. Section 3.8.1.2 is lacking sufficient data on sea weed commonly found in the discharge area and does not comment on specie of that has significant cultural or food value to the local Hawaiian population. Apparently the study was not a year long analysis and does not account for seasonal growth of certain specie and for sand movement which uncovers beds of limu that visible to an experienced observer during certain seasons. Specie absent from the survey include but is not limited to:

   Codium sp. - commonly known as - wawae'iole & a'ala' ula

   Gracilaria sp. - commonly known as - manauea & ogo

   Laurencia sp. - commonly known as – manoo'ano'o, lipe'epe'e

   Dictyota sp - commonly known as – alani

   Dictyopteris sp. - commonly known as – lipoa

   Ulva fasciata – commonly known as – palahaha

   Sargassum sp. - commonly known as – kala

Halversenia formosa - commonly known as – lepe'ahina or lepe uhi

In closing, I strongly urge all parties concerned to encourage a much more comprehensive and scientific study on the potential environmental impact this project and the Kaloi Gulch project will have on near shore habitat. At the present time the present report is lacking sufficient detail to be deemed a valid study. The Ewa Beach shoreline including the area within the proposed project is indeed a vital habitat for many specie of marine fauna and flora and serves as a spawning ground for many of fish. Unfortunately, human impact is degrading the overall health of coastal habitat and careful consideration and planning should be given to any project that introduces potential hazard to near shore sea life.

I am not at all proposing stopping the project, my only interest is to protect and preserve the marine life. I am sincere in my request that all parties involved to give serious consideration to future health of the marine environment along this coast line and work co-operatively towards that goal.

Sincerely,

Henry Chang - Wo

cc:

Sharene Saito- Tan, Haseko Corporation
June Harrington- Lum, Environmental Planning Office
Genevieve Salmonson, Director, Office of Environmental Quality Control

Enhancements to the Draft Environmental Statement for Papipi Road Drainage Way

(05- 01) Drainage Way Improvements

The proposed drainage way will be constructed using a limestone or coral basin without sufficient greenery and swales to clarify the outfall before discharging into the ocean. It is suggested that the drainage way be modified to incorporate natural mechanisms that will purify and remove sediments from the water. The revised drainage plan should be reviewed by a qualified engineer prior to implementation.

(05- 02) Water Quality Sampling Data

The water quality information provided in the proposal is not considered comprehensive enough to support the conclusion that the project will not a negative impact on the environment. The following suggestions are offered for consideration:

a. Clarification on the number of sampling sites. The report states there are seven but data for five sites is provided in table 3-3.

b. An additional sampling site be added on the eastern border of the proposed drainage. The reasoning is that the water quality on this eastern border of the proposed site may reach unacceptable levels due to the presence of existing drainage as shown in figure 1- 5 of the proposal.

(05- 03) Revision Water Quality Test Condition Criteria

The draft EIS statement uses data from one test conducted March, 2004 for test site Ka to support the conclusion the drainage way does not impact the environment. The test was conducted during a non- rain event at low tide. The conditions of the test are favorable for a false conclusion since non- point run off from other sources is not included. Additionally, an ebb tide (low tide) condition will pull contaminants from the shore line resulting in lowered concentrations for constituents tested and dilution of the same by deeper off shore waters. The study also concluded that the current rate is much faster off shore allowing further dilution of constituents tested.

Therefore, it is suggested that the water chemistry protocol be amended to match the conditions as closely as possible of the Numerical Modeling of Storm Drain Discharge Plume Transport or conditions likely to generate the designed flow rate of the proposed drainage way used in the report. To accomplish this tests should be conducted prior to, during and following heavy rain fall at all tide ranges and include the combined effect of all existing drainage and future planned drainage. The project is planning additional drainage, Papipi Road, which is within a few hundred yards of the proposed drainage fro Kaloi Gulch. Most storms will occur during Kona conditions making the mixing of sediments from both drainage ways likely.

(05- 04) Revision of Water Quality Test Contaminants

The water quality study does not include assessment of concentrations of heavy metals and organic constituents presently in the water known to harm near shore marine flora and fauna. Heavy rain events introduces the potential for chemicals and derivatives found in pesticides, herbicides, fungicides to be washed into the drainage way. Additionally, there is potential for leaching of biocides from bottom paint of watercraft and other sources of point and non- point source pollution originating from the proposed marina.

The proposed remedy is to modify the existing water quality study for this proposal enhanced to include all potential heavy metals and chemicals from these sources.

(05- 05) Cumulative Effect of Sediment Particles on the Photosynthetic Ability of Plant Life

The study does not adequately account for the effect increased turbidity stemming from the accumulation of fine (clay) sediment particles originating from the proposed drainage. A shift in the light absorption spectrum of the water brought about by increased turbidity could decrease photosynthetic ability of plant life leading to a die off of species endemic to the region. The proposal states that the clay fraction of the sediment will remain in suspension for an undetermined period of time (page 3-24). The concern is that the suspension will accumulate over time leading to decrease light penetration and ability its ability to support plant life.

Secondly, the study does not account for the cumulative effect of similar sediment deposit from up current discharges. The combined effect may have significant long term adverse effect on the over all health of the near shore environment.

Therefore it is suggested that a more comprehensive turbidity study be conducted on the potential long term effect of sediment accumulation and the cumulative effect of all neighboring drainage.

(05- 06) Enhancement to Existing Marine Biology Study

Section 3.8.1.2 is lacking sufficient data on sea weed commonly found in the discharge area and does not comment on specie of that has significant cultural or food value to the local Hawaiian population. Given the food and cultural value of limu to local people in Ewa area and island wide a much more comprehensive study is warranted. The need for a more comprehensive study is further braced by the population decline limu having significant cultural or food value. Preservation of this resource should be the primary concern of all parties involved in this project. It is suggested that the study be conducted

through all seasons and involve local people familiar with the area so as to facilitate the research. The research should include a through population analysis in areas deemed important

PLANNING SOLUTIONS

February 28, 2005
2004-0012-001

Mr. Henry Chang – Wo
91-1091 Hanalea Street
'Ewa Beach, HI 96706

Subject: Draft Environmental Assessment (DEA), Pāpipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Chang - Wo:

Thank you for your February 18, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment (DEA): Pāpipi Road Drainage Improvements*. We truly appreciate the time you spent reviewing the document and providing written comments.

Item-by-item responses to your comments are provided below. For your convenience, we have reproduced your comments in italics before each response. In doing so, we have paired the comments with the additional cross-referenced comments contained on the sheets attached to your letter titled "Enhancements to the Draft Environmental Impact Statement for Papipi Drainageway".

Comment 1:

1. *There is no indication that the drainage channel leading to the ocean will have plants or swales that will serve to remove sediment and absorb contaminants before the discharge enters the ocean. The proposed drainage way will be a 25 ft. wide rock or open coral channel graded to a height of 1.7 ft above mean sea level at the shoreline. The concern with the proposed plan is that the lack of swales and greenery to slow water and trap sediments will degrade the water quality in the immediate area. The present design presents a serious threat to near shore habitat, specifically limu or seaweed. The drainage outfall will cover one of the last areas in this region still able to support specie of limu having cultural or food value to the local Hawaiian population. (see enhancement 05- 01)."*

(05- 01) Drainage Way Improvements

The proposed drainage way will be constructed using a limestone or coral basin without sufficient greenery and swales to clarify the outfall before discharging into the ocean. It is suggested that the drainage way be modified to incorporate natural mechanisms that will purify and remove sediments from the water. The revised drainage plan should be reviewed by a qualified engineer prior to implementation.

Response: The engineers who are designing the proposed drainage system are doing their best to minimize effect on nearshore waters and on the marine resources that depend upon that habitat. The slope over the drainage channel is very low (a change of less than 4 inches over 200 feet). The resulting slow speed of the discharge limits its erosive power and maximizes the amount of sediment deposition that will occur during periods of low flow. The sediment will be re-suspended and swept out to the ocean during periodic periods of high discharge. HASEKO would prefer to maintain greenery in the swale for the very reasons you noted, i.e., as natural mechanisms that will purify and remove sediments from the water, and is continuing to explore that as a preferred alternative.

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However, because the invert of the swale is only 1.7 to 2.0 feet above means sea level, high tides will regularly bring ocean water far into it. Consequently, this may not be practical.

We understand that you are concerned that the proposed design might present "... *a serious threat to near shore habitat, specifically limu or seaweed*". In developing the proposal, HASEKO has sought to ensure that the drainage outfall would not "*...cover one of the last areas in this region still able to support specie of limu having cultural or food value to the local Hawaiian population*". For reasons discussed in the Draft EA (see, for example, §3.8.2), the periodic discharge of stormwater from the Pāpipi Road area is unlikely to affect limu growth in any substantial way.

Comment 2:

2. *The proposal indicates that there were seven sampling stations (page 3-10) to study water quality in the area impacted by the proposed drainage. However, figure 3-3 presents evidence of here is only evidence of six stations in the report. Additionally, data for sampling station PA is not included in Table 3-3. Lastly the control station is located on west side of the drainage site well removed from the existing drainage (See enhancement 05-02)."*

(05- 02) Water Quality Sampling Data

The water quality information provided in the proposal is not considered comprehensive enough to support the conclusion that the project will not a (sic) negative impact on the environment. The following suggestions are offered for consideration:

a. *Clarification on the number of sampling sites. The report states there are seven but data for five sites is provided in table 3-3.*

b. *An additional sampling site be added on the eastern border of the proposed drainage. The reasoning is that the water quality on this eastern border of the proposed site may reach unacceptable levels due to the presence of existing drainage as shown in figure 1-3 of the proposal.*

Response:

Number of Sampling Stations. As indicated on page 3-10 of the DEA, there were seven (7) sampling stations along the transect located near the proposed drainage outlet. I believe that if you examine it closely you will see that these are depicted on Figure 3-3 as PA-1 through PA-7.

Clarification of Terminology. There are six (6) transects along which samples are collected. Seven (7) sampling stations are situated along each transect. Because samples are collected from both near-surface and near-bottom depths at five (5) of the seven (7) stations on each transect, there are actually 12 samples that are collected and tested along each transect. This means that over 70 water samples are collected during each field survey, and literally thousands of samples have been tested over the duration of the Ocean Pointe water quality monitoring program.

Pāpipi Transect Data. Table 3-3 in the DEA presented long-term data on coastal water quality that HASEKO has collected over the course of the past decade as part of its Department of Health-approved water quality monitoring program. It does not include data from stations along the Pāpipi transects (stations PA-1 through PA-7) because the stations were only recently established and thus are not directly comparable with the long-term averages shown in Table 3-3. In response to your

comment, we have included a table with data from the Pāpipi stations (PA-1 through PA-7) in the Final EA.

Location of Control Transect. The control transect was established as part of the overall water quality monitoring program for the Ocean Pointe Marina. That is why it is "*...located on west side of the drainage site well removed from the existing drainage.*

Adding Additional Sampling Site at Eastern Border. The Pāpipi transect was purposely located slightly to the east of the proposed outlet. Consequently, it is in precisely the location you suggested. The data that are available from this location do not support the belief that the water quality on this eastern border "*...reach unacceptable levels due to the presence of existing drainage as shown in figure 1-5 of the proposal.*"

Comment 3:

3. *The water quality testing at site Ka was performed in March, 2004 at low tide without the occurrence of a rainfall event during or prior to the survey. Although this data is indeed a necessary and valid component of the study it should not be used as the sole criterion for assessment of the potential for an adverse environmental condition introduced by the proposed site (see enhancement 05-03). A reasonable determination on positive or negative impact to the environment can not be based on the result of a single test performed when non-point discharge from Pearl Harbor and other inland drainage sites is not included. Overlooking the combined effect of all the inland drainage to the ocean does not account for the existing condition created by non- point sources other than the proposed drainage.*

Secondly, the test was run at low tide when near shore concentrations may have been lowered since contaminants, sediments, etc. are pulled by tidal flow off shore. The ebb flow conditions can be considered a contributing factor to improved coastal water quality leading to a conclusion as stated in the report that there is no negative impact imposed by the proposed project. This is a significant assumption since the testing performed in the study does not account for daily tidal flows. Further investigation is warranted in future studies to confirm the finding that the project will not have a negative impact on coastal water quality.)."

(05- 03) Revision Water Quality Test Condition Criteria

The draft EIS statement uses data from one test conducted March, 2004 for test site Ka to support the conclusion the drainage way does not impact the environment. The test was conducted during a non- rain event at low tide. The conditions of the test are favorable for a false conclusion since non-point run off from other sources is not included. Additionally, an ebb tide (low tide) condition will pull contaminants from the shore line resulting in lowered concentrations for constituents tested and dilution of the same by deeper off shore waters. The study also concluded that the current rate is much faster off shore allowing further dilution of constituents tested.

Therefore, it is suggested that the water chemistry protocol be amended to match the conditions as closely as possible of the Numerical Modeling of Storm Drain Discharge Plume Transport or conditions likely to generate the designed flow rate of the proposed drainage way used in the report. To accomplish this tests should be conducted prior to, during and following heavy rain fall at all tide ranges and include

the combined effect of all existing drainage and future planned drainage. The project is planning additional drainage, Papipi Road, which is within a few hundred yards of the proposed drainage from Kaloi Gulch. Most storms will occur during Kona conditions making the mixing of sediments from both drainage ways likely.

Response:

Water Quality Testing at Site KA. You state that "*...the water quality testing at site Ka was performed in March, 2004 at low tide without the occurrence of a rainfall event during or prior to the survey.*" I am not sure of the reason you referenced only the March 2004 testing as the data for transect KA that are presented in Table 3-3 consist of more than that one sample. However, your observation that the sampling was not meant to coincide with a rainfall event is correct. In view of the fact that there is no discharge at the location at the present time, sampling during storm events appeared unlikely to provide useful additional information.

Because there is no storm drain currently at the site and because it is not possible to collect samples during all the relevant conditions of weather and sea state, we rely on modeling of worst-case events and an examination of communities near other existing stormwater discharge points along the 'Ewa Beach shoreline to reach our conclusions. The results of this modeling are included in the DEA and indicate that discharges from a Kalo'i storm drain and the proposed Papipi storm drain during an extreme storm event would be rapidly dispersed in nearshore waters and would not substantially affect the local marine life.

Need for More Extensive Additional Water Quality Measurements. You correctly state that "*...a reasonable determination on positive or negative impact to the environment cannot be based on the result of a single test performed when non-point discharge from Pearl Harbor and other inland drainage sites is not included.*" The water quality data that HASEKO has collected along the shoreline in the vicinity of the proposed project and which are presented in Table 3-3 in the DEA constitute what may be the best time-series data available for any shoreline area on O'ahu. The data from the multiple transects represent over a decade of work and depict conditions under a wide range of weather and sea conditions, including periods when runoff creates a plume out of Pearl Harbor. These data effectively integrate all of the factors that affect coastal water quality. In short, the data in the table account for the combined effect of all the inland drainage to the ocean that affects the project area under existing conditions and adequately characterize existing conditions.

Effect of Ebb-Tide. Tidal flow around the island is typically parallel to the shoreline, not perpendicular to it. A current meter deployed in 24 feet of water about 3,000 feet offshore of the nearby Kalo'i Gulch confirmed that flood tidal currents flow to the west, while ebb tidal currents flow to the east. The water surface is also influenced by wind. In shallow water close to shore (i.e., closest to the proposed discharge point), currents are primarily influenced by the wind and waves. During periods of energetic surf, which are frequent at the site, currents are primarily driven by waves. There is no evidence that contaminants are pulled offshore by tidal flow. Further, it is reasonable to expect that coastal water quality may be worse at low tide because the coastal zone is subject to the large volumes of water from inland basins such as Pearl Harbor which flow out during the ebbing tide prior to low tide.

Biotic Communities Support Modeling Conclusions. The examination of biotic communities in the two existing stormwater discharge points closest to the proposed new discharge provide further evidence that the proposed action is unlikely to have the kind of adverse effect you hypothesize. The following paragraph is copied from Section 3.8.2.2.2 of the DEA:

The same conclusions about the low probability of a significant adverse effect from the proposed discharge were reached using the results of surveys of the areas around the two existing storm drainage outlets just to the east of the proposed project. Examination of the receiving environments off these existing drains (which have been present for more than 30 years) indicates that the biotic assemblages present are identical to those present in similar areas not affected by stormwater discharge.

Modify Sampling Protocol. While we appreciate the intent of your comment, we do not agree with your suggestion that "*...the water chemistry protocol be amended to match the conditions as closely as possible of the Numerical Modeling of Storm Drain Discharge Plume Transport or conditions likely to generate the designed flow rate of the proposed drainage way used in the report.*" Neither do we believe it would be appropriate for HASEKO to conduct tests "*...prior to, during and following heavy rain fall at all tide ranges and include the combined effect of all existing drainage and future planned drainage.*"

There are several reasons we believe that proceeding as you suggested would be inappropriate. The most important is the impracticality of ever collecting samples under every possible combination of tides, waves, and rainfall/runoff; there are simply too many combinations. It was for this reason that the analysis presented in the environmental assessment used a computer model to forecast conditions under a variety of conditions likely to produce the greatest adverse effects and then based the estimate of potential impacts on those results.

Implications of Mixing of Adjacent Discharges. You note that the proposed discharge "...is within a few hundred yards of the proposed drainage from Kalo'i Gulch" and state that "*...most storms will occur during Kona conditions making the mixing of sediments from both drainage ways likely.*"

The significant point here is that a discharge from Kalo'i Gulch is estimated as a one-in-10-year event. In other words, it is very infrequent. Consequently, the opportunity for the two to mix is rare. When conditions are such that mixing is possible, i.e., very large storm events which affect flooding over a broad area, coastal water quality will be heavily influenced by discharges into the Pearl Harbor watershed.

Finally, the modeling of extreme events that is reported in the Draft EA indicates that the discharge plume from Pāpipi is unlikely to interact in a meaningful way with stormwater discharged from the proposed Kalo'i outlet.

The receiving water in the vicinity of the proposed discharge is characterized by good transport and mixing. Numerical modeling was conducted for 2-year and 100-year storm events. The 2-year storm event (5 inches of rain in 24 hours) has a 50% chance of occurrence every year, and therefore represents a sizeable, but relatively common occurrence. Model results indicate that the runoff plume (as delineated by the 10% concentration contour in Figure 6-2C of the modeling report in the EA) would extend 270 meters offshore and 600 meters along shore. Thus the water affected by the discharge would approach ambient conditions by the time it neared the Kalo'i discharge site. For a 2-year rain event, however, the Kalo'i discharge does not flow into the ocean, but is retained inland.

Storms sufficiently large to produce a discharge from the proposed Kalo'i outlet are very rare (i.e. are expected to occur on average once every ten years based on a 24-hour rainfall event). Only when they do occur could the plumes from the two discharge points overlap. However, during a storm of such magnitude, coastal waters would be flooded with runoff from all point and non-point sources around the island, including, most importantly, Pearl Harbor. The stormwater flowing out of Pearl Harbor is of so great a magnitude that it would overshadow the effects of other discharges along the

'Ewa shoreline, including those from existing and proposed stormwater flows entering the ocean along 'Ewa Beach.

Comment 4:

4. *The study does not account for petroleum based or organic constituents or heavy metals that a reasonable and comprehensive study would include to truly assess the environmental impact (see enhancement 05- 04)."*

(05- 04) Revision of Water Quality Test Contaminants

The water quality study does not include assessment of concentrations of heavy metals and organic constituents presently in the water known to harm near shore marine flora and fauna. Heavy rain events introduces the potential for chemicals and derivatives found in pesticides, herbicides, fungicides to be washed into the drainage way. Additionally, there is potential for leaching of biocides from bottom paint of watercraft and other sources of point and non- point source pollution originating from the proposed marina.

The proposed remedy is to modify the existing water quality study for this proposal enhanced to include all potential heavy metals and chemicals from these sources.

Response:

Petroleum Based or Organic Constituents or Heavy Metals. The discussion in the Draft EA focused on salinity and suspended sediment for two reasons. First, in terms of volume and potential impacts these were the constituents deemed most likely to adversely affect nearshore waters and marine biota. Second, because the constituents are "conservative", i.e., they are not reduced by biological processes (as nutrients would be), they provided an effective means of judging the extent of the discharge's effects. When the results of the modeling showed that the water quality perturbations caused by discharge from the proposed outlet would be both short-lived and limited in geographic extent, we were confident that the potential for adverse effect was not great.

The numerical model included results for a conservative dye tracer which can be applied to other contaminants of interest. The initial dye concentration was set to be 100, while the ambient concentration was set to be 0. Model results therefore directly show the extent of dilution of the discharge plume. For example, a dye concentration of 10 computed by the model indicates that the plume has diluted 90%; the corresponding concentration of any conservative contaminant in the discharge can easily be calculated by multiplying 0.10 by the initial concentration of the contaminant. The model results for a 2-year storm discharge show that the plume concentrations fall below 10% about 270m offshore and 600m alongshore (Figure 6-2B). In addition, time series plots produced by the model trace the changes in plume concentration with time at three stations, located at the discharge site and 500m west and east of the discharge site. The time series plot for the 2-year storm event (Figure 6-2D) shows that plume concentrations fall below 1% of initial concentrations within 1 day after the end of the discharge.

Comment 5:

5. *"The study does not adequately quantify the potential adverse effect the discharge will have on the near shore environment stemming from the accumulation of fine (clay) sediment particles originating from the proposed drainage. The particles may increase*

turbidity causing a shift in the light absorption spectrum of the water leading to a decrease in photosynthetic ability of plant life. The increased turbidity could lead to a die off of specie endemic to the region. To support this scenario, page 3-24 of the proposal states that the clay fraction of the sediment will remain in suspension for an undetermined period of time. The concern is that the suspension will accumulate over time leading to a decrease light penetration and ability of near shore seaweed to sustain itself (see enhancement 05- 05).

(05- 05) Cumulative Effect of Sediment Particles on the Photosynthetic Ability of Plant Life

The study does not adequately account for the effect increased turbidity stemming from the accumulation of fine (clay) sediment particles originating from the proposed drainage. A shift in the light absorption spectrum of the water brought about by increased turbidity could decrease photosynthetic ability of plant life leading to a die off of specie endemic to the region. The proposal states that the clay fraction of the sediment will remain in suspension for an undetermined period of time (page 3-24). The concern is that the suspension will accumulate over time leading to decrease light penetration and ability its ability to support plant life.

Secondly, the study does not account for the cumulative effect of similar sediment deposit from up current discharge. The combined effect may have significant long term adverse effect on the over all health of the near shore environment.

Therefore it is suggested that a more comprehensive turbidity study be conducted on the potential long term effect of sediment accumulation and the cumulative effect of all neighboring drainage.

Response:

Turbidity Increase/Photosynthesis Decrease. I understand your concern that a shift in the light absorption spectrum of the water brought about by increased turbidity could decrease photosynthetic ability of plant life. If the discharge were constant and into a confined body of water, this might be a concern. However, because the Pāpipi situation involves an intermittent discharge into receiving waters that have a net current flow carrying the discharge away from the discharge point, there is no potential for a buildup of suspended sediment over time. Consequently, the potential for steadily increasing turbidity/decreasing light penetration that "*...could decrease photosynthetic ability of plant life leading to a die off of specie endemic to the region*" does not exist.

Sediment Accumulation. The numerical model described in the Draft EA calculated the transport and discharge of this sediment load. The suspended sediment concentration is directly related to water turbidity, and can therefore be used to evaluate turbidity impacts. Figure 6-29 shows the time series of suspended sediment concentration at the three stations located at the discharge site and 500m east and west of the discharge site. The figure shows that plume suspended sediment concentrations reach 0 in the project area within about 1 day after the discharge event.

The model results show that the clay fraction remains suspended in the water column and is transported out of the area, eliminating the potential for the build up of this component of the suspended sediment in the discharge. The model results indicate that some of the heavier particles in the sediment load would settle out in the area. It calculates that the maximum sediment thickness resulting from this discharge event is 0.17 millimeters immediately offshore of the drainage outlet. Within 100 meters east and west of the proposed discharge site, these thicknesses fall to 0.01 and 0.05 millimeters, respectively. Because of the high wave energy that is regularly present in the area where the initial settlement would occur, the sediment that is deposited in the area would likely be quickly resuspended and transported out of the area. These findings support the field biological study that showed little evidence of sediment accumulation from the existing discharges in the area.

Comment 6:

6. *Section 3.8.1.2 is lacking sufficient data on sea weed commonly found in the discharge area and does not comment on specie of that has significant cultural or food value to the local Hawaiian population. Apparently the study was not a year long analysis and does not account for seasonal growth of certain specie and for sand movement which uncovers beds of limu that visible to an experienced observer during certain seasons. Specie absent from the survey include but is not limited to:*

   Codium sp. - commonly known as - wawae' ïole & a' ala' ula
   Gorcilaria sp. - commonly known as - manauea & ogo Laurencia sp. - commonly known as -- manoo'ono'o, lipe'epe'e
   Dictyota sp - commonly known as – alani
   Dictyopteris sp - commonly known as – lipoa
   Ulva fasciata - commonly known as – palahlaha
   Sargassum sp. - commonly known as – kala
   Halymenia formosa - commonly known as - lepe'ahina or lepe ula

   (05- 06) Enhancement to Existing Marine Biology Study

   Section 3.8.1.2 is lacking sufficient data on sea weed commonly found in the discharge area and does not comment on specie of that has significant cultural or food value to the local Hawaiian population. Given the food and cultural value of limu to local people in Ewa area and island wide a much more comprehensive study is warranted. The need for a more comprehensive study is further braced by the population decline limu having significant cultural or food value. Preservation of this resource should be the primary concern of all parties involved in this project. It is suggested that the study be conducted through all seasons and involve local people familiar with the area so as to facilitate the research. The research should include a through population analysis in areas deemed important.

Response:

Thank you very much for the information you provided concerning the additional species of algae that are found seasonally in the area. We appreciate that the survey conducted for the EA at a particular time of year could not hope to identify species that were very sparse or absent at that time. We have added references to the species you mentioned to the EA as a means of providing a more complete listing of the algal species that are present.

We believe the Final EA adequately discusses potential impacts on marine algae and that the kind of additional investigations you recommend are not needed to draw valid conclusions in this regard. It notes that biologists generally agree that marine algae respond positively (i.e., become more abundant) to freshwater inputs, probably because the groundwater has higher nutrient concentrations than the ocean water into which it flows. In many locations around the Hawaiian Islands, including the 'Ewa area, prime limu harvesting grounds occur near freshwater (groundwater) seeps. Surface

water runoff from the Pāpipi drainage system will likely contain lower nutrient concentrations than groundwater that flows to the ocean in the 'Ewa region, but runoff nutrient concentrations are still likely to be elevated compared to those found in open coastal ocean water. Other things being equal, this would tend to increase algal growth marginally. However, because the discharges from the system will be both sporadic (occurring only when rainfall is sufficient to cause surface runoff) and short (typically lasting for no more than a day at a time), their ability to affect limu growth is limited. Hence, if there is any response at all by the limu communities as a result of storm water discharge, it is likely to be positive (i.e., increased growth owing to potential increases in plant nutrients within the nearshore zone) and of very limited magnitude. The existing marine setting is characterized by substantial scouring by suspended sediment, and the limu that occurs in the area are well-adapted to such a high sediment environment. Hence, it is unlikely that the proposed discharge would substantially alter the situation.

Thank you again for your comments. If you have any further questions, please call me at 550-4483.

Sincerely,

Peter J. Mills

cc: Ms. Ardis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kasuga, HASEKO (Ewa), Inc.

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
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2005 FEB 23 PM 3 12

DEPT OF PLANNING and PERMITTING CITY & COUNTY OF HONOLULU

MUR HAMMERMAN
MAYOR

WAYNE H. HASHIRO, P.E.
ACTING DIRECTOR

DEPUTY DIRECTOR

CDD-A 05-0035

February 18, 2005

MEMORANDUM

TO: MR. HENRY ENG, FAICP, ACTING DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: WAYNE HASHIRO, P.E., ACTING DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
PAPIPI ROAD DRAINAGE IMPROVEMENT

We reviewed the subject document and have no comments at this time. It is our understanding your department is checking for drainage capacity and the ultimate drainage design.

Should you have any questions, please call Keith Sugihara at Extension 5896.

KS:FK-pto

PLANNING SOLUTIONS

February 28, 2005
2004-0012-001

Mr. Wayne Hashiro, P.E., Acting Director
Department of Design & Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment (DEA), Papipi Road Drainage Improvements
'Ewa Beach, O'ahu, Hawai'i

Dear Mr. Hashiro:

Thank you for your February 18, 2005 letter to the City and County of Honolulu Department of Planning and Permitting commenting on the *Draft Environmental Assessment* (*DEA*): *Papipi Road Drainage Improvements*. We appreciate the time you and your staff spent reviewing the document.

We understand that your department has no comments to offer on the project at this time. If you have any further questions concerning the project, please call me at 550-4483.

Sincerely,

Perry J. Wakida

cc: Ms. Anlis Shaw-Kim, DPP
Office of Environmental Quality Control
Mr. Raymond Kanna, HASEKO (Ewa), Inc.

Ward Plaza, Suite 330 • 215 Ward Avenue • Honolulu, Hawaii 96814-4812
Phone: 808 550-4483 • Fax: 808 550-4649 • www.psi-hi.com

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APPENDIX A. NUMERICAL MODELING

NUMERICAL MODELING OF
PAPIPI STORM DRAIN DISCHARGE
PLUME TRANSPORT
OCEAN POINTE, O'AHU

January 2005

Prepared for:

Planning Solutions, Inc.
210 Ward Avenue, Suite 330
Honolulu, Hawaii 96814

Submitted by:

Sea Engineering, Inc.
Makai Research Pier
Waimanalo, Hawaii 96795

#4-48

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1. INTRODUCTION

The Ocean Pointe development project in 'Ewa, O'ahu will include construction of a drainage outlet along the shoreline about 600 meters east of One'ula Beach Park in 'Ewa, O'ahu, to discharge runoff from the proposed improvements to Papipi Road. The proposed ocean outlet will consist of a 25-foot wide, grass-lined open channel. The outlet is sized to drain a total area of 45.7 acres with a peak discharge of 3.56 cubic meters per second (126 cubic feet per second). This storm drain outlet will result in intermittent storm discharge of a fresh water and suspended sediment plume into the ocean. Plume transport and mixing in coastal waters is a complex process that depends on the characteristics of the storm drain outlet, as well as those of the ambient receiving waters. The discharge plume will be transported and dispersed due to coastal waves and currents, and will also spread due to the buoyancy of the plume itself. To evaluate possible impacts to the environment, Sea Engineering completed a numerical modeling analysis of plume transport and dispersion. This report presents the development, application and results of a state-of-the-art numerical transport model of the site. The model incorporates the effects of wind, tide and wave driven currents, and allows simulation of discharge plume transport under a variety of possible conditions.

2. PROJECT SITE

The proposed discharge is located 600 meters east of One'ula Beach Park in 'Ewa, O'ahu (Figure 2-1). The shoreline transitions from the sand beach fronting the beach park to low, rocky limestone bluffs about 75 meters to the west of the proposed discharge site. Figure 2-1 shows the bathymetry in the project area, derived from high-resolution lidar data. The figure shows that the bathymetry is characterized by a broad fringing reef with water depths less than 7 meters; offshore of the storm drainage outlet the reef is about 1,200 meters wide, to the east the reef broadens to about 2,000 meters wide.

Immediately offshore of the drainage outlet (inshore of the -7 meter depth contour), the reef shoals, and a wide surf zone is typically present. Surfing is common in the area. In a companion project to this modeling effort, Sea Engineering deployed two current meters at the site during summer of 1993 and winter of 2004. One current meter was installed on the inner reef flat in 3 meters of water, approximately 150 meters offshore, and the other seaward of the reef flat in 7 meters of water, approximately 1,000 meters offshore (Figure 2-1). The current data at the offshore meter showed the upper layer flow (0 to 3-meter depth) is predominantly to the west to southwest, driven primarily by prevailing east to northeast tradewinds, while flow in the 1.5- to 4.5-meter depth is distinctly more tidal, showing clear current reversals with tides. Flood tidal currents flow to the west, while ebb tide flows to the east. Average current speeds were 8.0-10.0 cm/sec, and the maximum was 57 cm/s to the southwest. At the nearshore current meter location, currents were, on average, much weaker, driven by a combination of waves and winds. The average speed was 2 to 3 cm/s and the maximum speed was 41.6 cm/s (to the east-southeast). The maximum current speeds recorded by both the offshore and nearshore meters occurred during the strong Kona storm on February 27, 2004, which consisted of south to west winds of up to 30 knots, and large waves from the same direction. Field observations indicated that during large wave events, a rip current is driven offshore in the natural channel between the discharge site and O'neula Beach Park.

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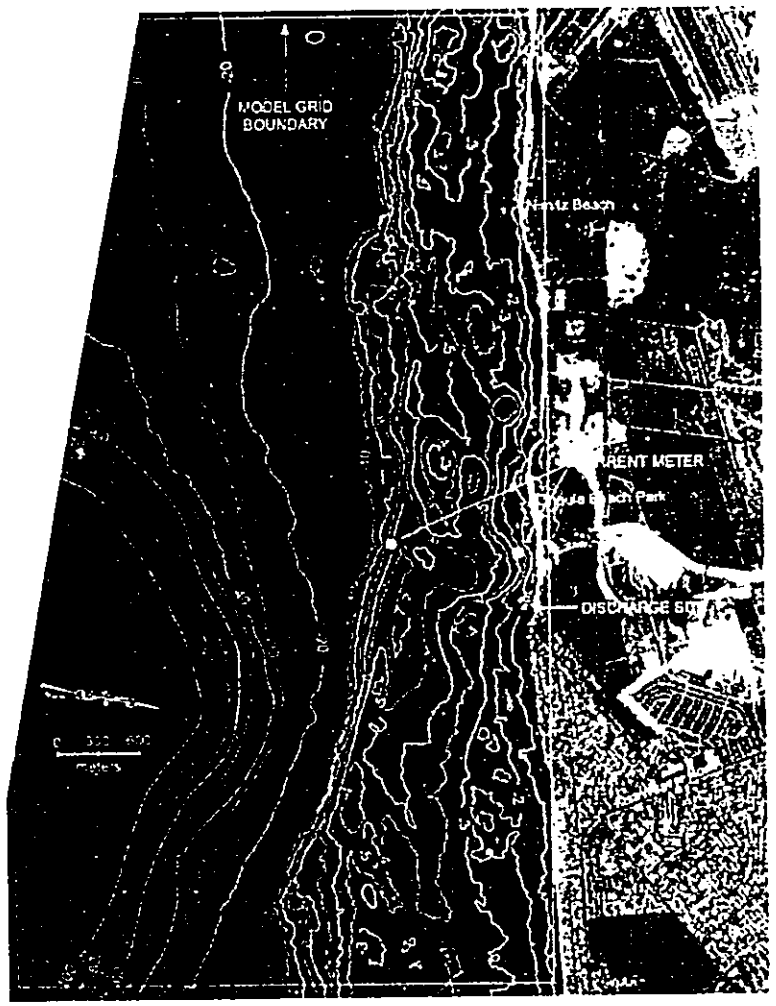

Figure 2-1. Project Site

3. NUMERICAL MODEL

As described above, circulation and mixing in the project site are controlled by a combination of winds, tides and waves. During large wave events, the wave effects can dominate the nearshore currents and mixing. Our modeling approach was therefore structured to capture complex wave induced currents and mixing, as well as tide and wind-driven currents. This required use and integration of both a wave model, and a transport/circulation model. The wave model was used to calculate wave transformation, radiation stresses, and wave energy dissipation for input to the primary transport/circulation model.

3.1 Wave Model

The wave model REF/DIF, developed at the Center for Applied Coastal Research at the University of Delaware, is a wave propagation model that is used to calculate the change in wave characteristics due to refraction and diffraction as the wave progresses from deepwater to the shoreline. REF/DIF calculates zones of wave breaking, wave heights, wave direction, and wave energy dissipation. These are then used to drive nearshore mixing and transport.

3.2 Transport Model

The circulation/transport model used, EFDC (Environmental Fluid Dynamics Code), is an EPA approved, state-of-the-art, three dimensional hydrodynamic model developed at the Virginia Institute of Marine Science by John Hamrick (1996) to simulate hydrodynamics and water quality in rivers, lakes, estuaries, and coastal regions. The EPA describes the model as "one of the most widely used and technically defensible hydrodynamic models in the world." This model was selected because it has the following capabilities:

- The model is 3-dimensional, which allows for variations in water properties and currents at different depths.
- It allows input of nearshore wave radiation stresses and wave energy dissipation for simulation of surf zone circulation and transport.
- There are options for the input of numerous alternative discharge control structures such as culverts, weirs and spillways.
- The model allows input of time varying flows with time varying concentrations of contaminants.

To accurately model the transport of a freshwater plume or fine sediments in the coastal environment, it is critical to describe both the advective and diffusive transport. Currents are responsible for advective transport. The advective flux (q) can be quantitatively calculated by the mass concentration, C, of the substance of interest multiplied by the velocity, u, yielding $q = uC$. The advective flux generally accounts for the majority of transport in coastal systems. The nearshore currents move masses around much more rapidly than diffusive processes. At the project site, EFDC handles advective transport through the water column velocities. These velocities, as previously shown, are a result of tidal forces, wave forces, and wind.

Diffusive transport is due to molecular and turbulent transport processes. The molecular component is dispersion of a dissolved mass caused by the random motion of molecules in the water. The turbulent component of diffusion is the dispersion of mass due to the random motions in the fluid associated with turbulent flow. In coastal systems, turbulent diffusion generally exceeds molecular diffusion rates by many orders of magnitude.

When described mathematically in one dimension, the summation of the advective and diffusive components of mass transport into a mass flux (i.e. transport, q) term is

$$q = uC - K\frac{\partial C}{\partial x}$$

The second term is where the diffusive transport is quantified and K is the coefficient of turbulent diffusivity. The determination of K is a key component of mass transport and must be considered carefully. The diffusivity must be described in both the vertical and horizontal directions.

Horizontal Diffusivity - Turbulent eddies are responsible for mixing fluid in the horizontal, and the larger eddies mix more fluid. The size of these eddies can range from meters to kilometers. In general, the horizontal diffusivity (K_H) responsible for the dispersion of freshwater and/or sediments, is proportional to the velocity in the fluid and the physical size of the eddies. The range of K_H is therefore very large. Observations in the ocean have shown K_H ranges of 1 – 1000 m^2/s (Polzin et al., 1997; Ledwell et al., 1991).

EFDC uses the Smagorinsky (1963) method to calculate the horizontal diffusivity. The magnitude of the diffusivity in the model is proportional to the horizontal current shear. The Smagorinsky model has been well validated in coastal modeling studies over the past three decades. In addition to the diffusivity due to the current shear, wave dissipation plays a role in K_H. As waves move into shallow water regions, they disperse energy in the form of turbulence. This can be calculated as the wave dissipation. The dissipation of wave energy through the generation of turbulence increases as the wave shoals and is at a maximum as the wave breaks. This dissipation is calculated in the REF/DIF model and used as an input to EFDC. The wave dissipation acts as another source of turbulence and is hence added to the K_H determined from the currents in the Smagorinsky model.

Vertical Diffusivity - Vertical mixing is the product of not only current gradients in the vertical, but also buoyancy gradients. The buoyancy gradients, due to differences in density in the water column, can be responsible for stabilizing the water column and dampening vertical mixing. The force of gravity will work to achieve a stable equilibrium with less dense fluid over more dense fluid. Values for the vertical diffusivity, K_v, have been determined through observation to range from $1x10^{-5}$ – $1x10^{-3}$ m^2/s in the open ocean (Polzin et al., 1997; Ledwell et al., 1991). These values are up to 6 orders of magnitude smaller than horizontal mixing.

EFDC implements the Mellor and Yamada (1982) second moment turbulence closure model in the vertical that has been well validated for coastal ocean applications. The model as implemented in EFDC has been improved and further validated by Galperin et al. (1988). The

Mellor and Yamada model relates vertical turbulent diffusivity to turbulent intensity, turbulent length scale, and the Richardson number (a measure of the buoyancy effects in the flow). Once the vertical diffusivity has been calculated through the Mellor and Yamada model, the wave dissipation from the REF/DIF model is added in as a source of turbulence. The wave dissipation has a much larger relative effect in the vertical than the horizontal mixing and is responsible for significant vertical mixing.

Suspended sediment impacts are also assessed using EFDC. A suspended sediment concentration is included in the freshwater plume input. For a given distribution of sediments, the extent of suspended sediment transport is determined from the waves, turbulent diffusion, and offshore currents. Additionally, settling and deposition are calculated. Sediment deposition is evaluated by calculation of the critical shear stress term. Sediments will only deposit onto the bottom when the shear stress exerted by waves and currents on the bottom is less than the critical shear stress for deposition of particular sediment. The bottom shear stresses throughout the region due to waves and currents are calculated in EFDC, and sediment deposition determined. Sediment resuspension is not included in this analysis.

4. MODEL SETUP AND INPUTS

4.1 Model Domain and Grid

Both EFDC and REF/DIF require input of the regional coastal bathymetry. Figure 2-1 shows the bathymetry in the project area, derived from high-resolution lidar data. The figure shows that the bathymetry is characterized by a broad fringing reef with water depths less than 7 meters; offshore of the storm drainage outlet, the reef is about 1,200 meters wide, to the east the reef broadens to about 2,000 meters wide. Between the drainage outlet and One'ula Beach Park (inshore of the -7 meter depth contour), a broad, shallow channel is present in the reef. Between the 40-meter and 100 meter water depths, a broad embayment is evident in the depth contours.

Bathymetry is represented in the numerical model through the creation of a grid and the specification of depth at each grid point. The model grid dimensions are a tradeoff between desired resolution and computer computation capability. Figure 4-1 shows the EFDC model grid. The grid was rotated to be aligned in the alongshore direction. The grid cell size is 50 meters on a side, and the overall grid dimensions are 124 grid cells in the alongshore direction (east to west) and 80 in the onshore-offshore direction (6,200 meters by 4,000 meters). The grid extends 3,300 meters to the west and 2,650 meters to the east of the discharge site. Figure 4-2 shows a color-coded representation of bathymetry overlain on the model grid.

Vertical variability in the water is modeled by dividing the water column into six layers whose thickness is a percentage of the total water depth, as shown in the table below.

Layer	Thickness (percentage of total depth)
6 (surface)	16.67
5	16.67
4	16.67
3	16.67
2	16.67
1 (bottom)	16.67

Figures 4-3 shows the depth variable vertical model grid.

4.2 Flow

Current flow into the model is specified along the bottom (east) boundary of the grid. Figure 4-1 shows these cells marked with an "x". EFDC requires that the flow be specified as a volume flux in units of cubic meters per second (m^3/s). To create realistic currents in the model, actual currents measured by the offshore current meter were used to apply the boundary flow condition. The current meter record was scanned to select a period with a strong tidal signal, and relatively calm wind and wave conditions. February 12, 2004 was selected; the measured currents in the 1.5- to 4.5-meter water depth layer, and the measured water level are shown in Figure 4-4.

Negative currents are directed to the west (Barbers Point), and positive currents flow toward the east (Diamond Head). The figure shows that flood tide flows to the west, and ebb tide flows to the east. The peak current speeds are 24 cm/s to the west, and 13 cm/s to the east. This tidal current record was converted into flow volumes, repeated to span three days, and applied to the bottom (east) boundary of the model. The February 12 currents represent relatively strong tidal currents at the project site. Moderate tidal conditions were simulated by reducing the strong tidal boundary flow conditions by 33%. The tidal flow boundary conditions used in the model are shown in Figure 4-5.

4.3 Wind

Wind conditions at the project site can be categorized into three types: trade winds with average speed of 7.2 m/s and direction of 70 degrees, Kona winds with average speeds of 4.6 m/s and direction of 215 degrees, and calm conditions. The easterly tradewinds are most common, and occur nearly 70% of the time. Heavy rainfalls on the south shore, however, are most commonly associated with Kona winds or calm conditions. For this reason, Kona winds and calm conditions were used for our modeling analyses.

4.4 Waves

Waves are an important factor driving nearshore currents at the project site. The wave model REF/DIF was used to transform the prevailing deep-water waves as they move into the nearshore waters at the project site. REF/DIF computes the nearshore wave direction, wave height, radiation stresses, and energy dissipation at each grid point in the model area. These parameters are then input into EFDC to drive nearshore currents and mixing.

The general Hawaiian wave climate can be described by four primary wave types; northeast tradewind waves, south swell, North Pacific swell, and Kona waves. Tradewind waves may be present in Hawaiian water throughout most of the year, but are most frequent between April and September, the summer season, when they usually dominate the Hawaiian wave climate. They result from the strong and steady tradewinds blowing from the northeast quadrant over long fetches of open ocean. The deepwater tradewind waves typically have periods of 6 to 8 seconds and heights of 1.2 to 3 meters.

South swell is generated by southern hemisphere storms and is most prevalent during the months of April through October. These long, low waves approach from the southeast through southwest, with periods of 12 to 20 seconds and deepwater heights of 0.3 to 2 meters. North and northwest Pacific swell is produced by severe winter storms in the North Pacific Ocean. North and northwest swell may arrive in the Hawaiian Islands throughout the year but are largest and most frequent during the winter months of October through March. North or northeast swell is sometimes generated by winter storms northeast of the islands. North Pacific swell typically has periods of 12 to 20 seconds and heights of 1.5 to 4.5 meters.

Kona waves are generated by intense winds associated with local fronts or low-pressure systems and typically have periods ranging from 6 to 10 seconds and heights up to 3+ meters. These waves approach from the south to west, with the largest waves usually from the southwest.

Deepwater wave heights during a severe Kona storm in January 1980 were about 5 meters with a period of 9 seconds.

The project site is partially sheltered from North swell, but is directly exposed to south swell and Kona storm waves, and partially exposed to tradewind waves wrapping around the island. The table below shows typical wave characteristics for the Ocean Pointe area. This data is derived from NOAA wave buoy 51027, which recorded directional wave data for a one-year period in 1995. The buoy was located about 24 miles south of Lanai, and has similar wave exposure as the south coast of O'ahu. Typical deepwater wave conditions for the project site are listed below.

Wave Type	Height (m)	Period (sec.)	Direction
Trade-wind Wave	1.8	6	120
South Swell	1.4	14	180
Kona Wave	1.3	9	215

As mentioned previously, heavy rainfalls along this coast are most often associated with Kona winds or calm conditions. Model runs were therefore completed using Kona wave conditions, and calm wave conditions.

4.6 Storm Discharge

The storm discharge scenarios were developed by the project hydraulic engineer – R.M. Towill Corporation – and included the following events:

- A 2-year storm event resulting in 5 inches (12.7 cm) of rain in 24 hours. This results in a maximum discharge of 0.66 cubic meters per second (cms) (23.5 cubic feet per second – cfs). Total discharge is 10,520 cubic meters (371,520 cubic feet). The discharge lasts 1 day, and peaks at 0.42 days (10 hours).
- A 100-year storm event resulting in 12.7 inches of rain in 24 hours. Maximum discharge of 3.57 cms (126 cfs) occurs at 0.42 days (10 hours) after the start of the rain. Total discharge is 45,944 cubic meters (1,622,520 cubic feet).
-

Figure 4-6 shows the discharge hydrographs for these storms.

4.7 Suspended Sediment Discharge

Total suspended sediment (TSS) loads and compositions corresponding to the storm discharges described in the previous section were also provided by R. M. Towill Corporation, the project hydraulic engineer. Suspended sediment transport and deposition were calculated for the 100-year and 2-year discharge events. Figure 4-7 shows the suspended sediment loads corresponding to these storms. The suspended sediment loads are assumed to be composed of 55% silt sized particles and 45% clay sized particles. Peak suspended solids concentrations are 597 mg/L silt and 489 mg/L clay (1086 mg/L total) for the 100-year event, and 444 mg/L silt and 363 mg/L clay (807 mg/L total) for the 2-year event (Figure 4-7). The total sediment discharges for the 100-year and 2-year storms are approximately 40,000 kg and 5,310 kg, respectively.

The silt particle size diameter is 15 microns (.015 mm) and the clay particle size diameter is 1.5 microns (.0015 mm). The corresponding settling velocities for these particles are 0.0128 cm/s and 0.000128 cm/s, respectively. The approximate time required for silt and clay particles to settle 1 meter is 2.17 and 217 hours, respectively. This means that clay size particles can remain is suspension for several days.

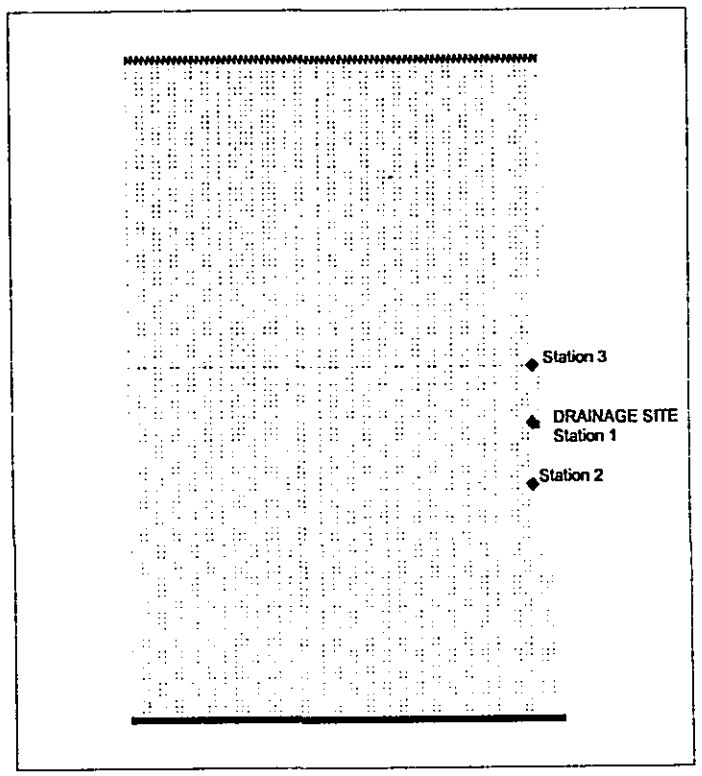

Figure 4-1. Model Grid with 80x124 cells. The cell size is 50x50 meters. Marked cells indicate boundary inputs. Diamond symbols indicate time series Stations 1 to 3.

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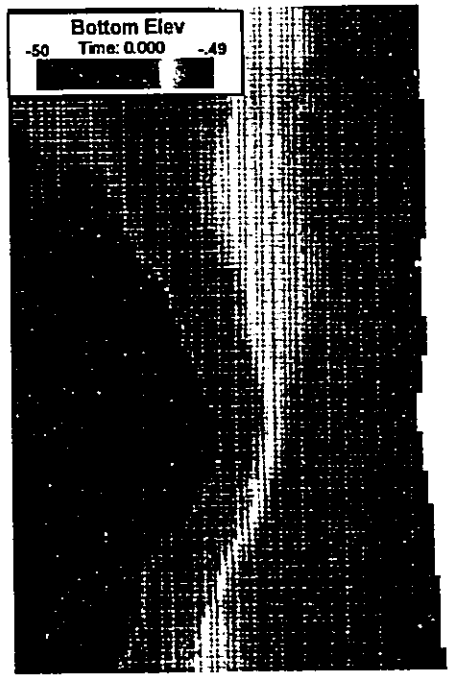


Figure 4-2. Color-coded model bathymetry (in meters) overlain on model grid.

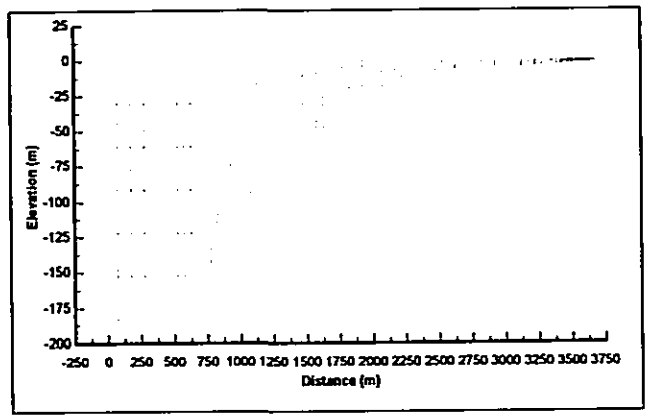


Figure 4-3. Vertical Layers in Model

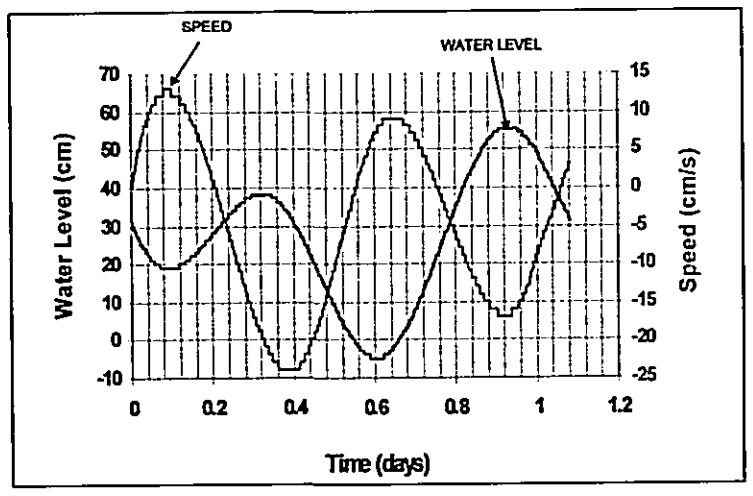


Figure 4-4. Water Level and Currents (1.5- to 4.5-meter water depth) measured at the offshore current meter on February 12, 2004. Positive speed indicates flow to the east, while negative values indicate flow to the west.

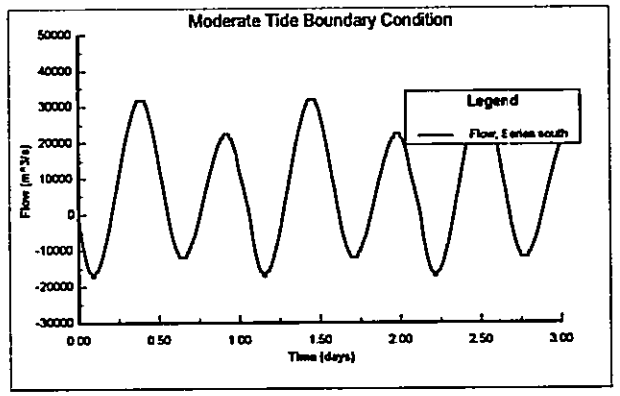
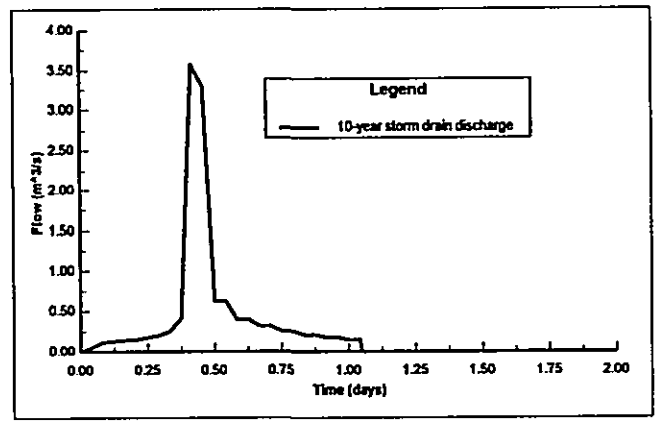


Figure 4-5. Moderate tidal boundary flow.



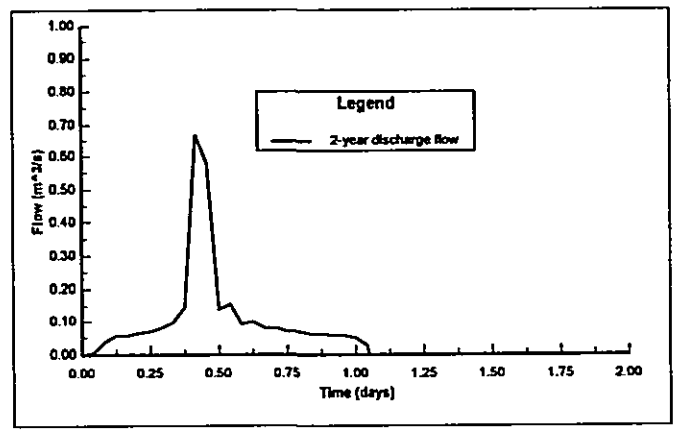
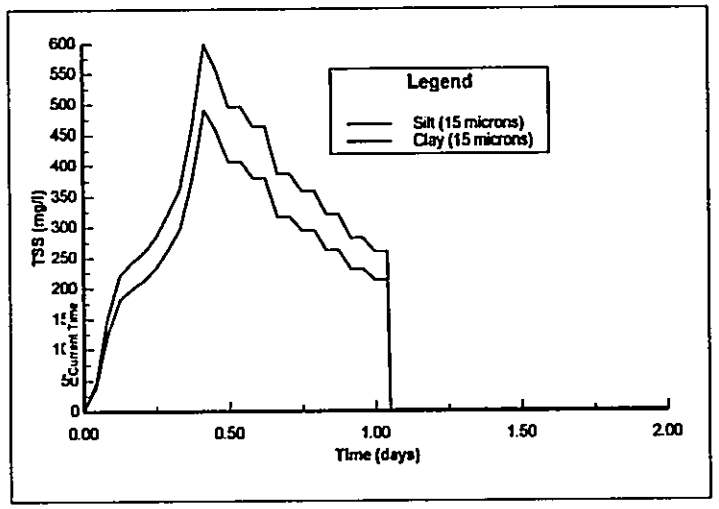


Figure 4-6. 100-Year Storm Discharge Hydrograph (top) and 2-Year Storm Discharge Hydrograph (bottom)



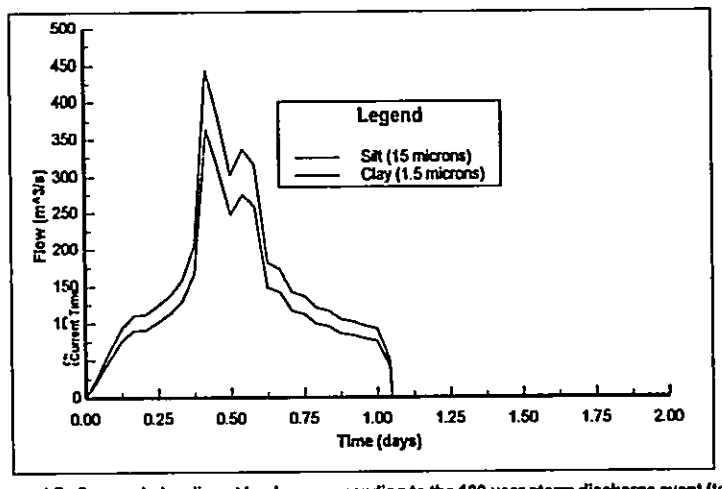


Figure 4-7. Suspended sediment loads corresponding to the 100-year storm discharge event (top) and 2-year discharge event (bottom).

5. MODEL VERIFICATION

EFDC has been successfully used previously to simulate circulation and transport in a multitude of environments, including the Chesapeake Bay, the Florida Everglades, the James and York River Estuaries, the Potomac River, San Francisco Bay, and Puget Sound. It has been calibrated and verified with extensive field data sets (Tetra Tech, 2002; www.epa.gov/athens/research/modeling/efdc.html). Model verification for the project site using the current meter data was presented in a previous report (Sea Engineering, 2004), and showed that the model accurately reproduces the tidal phase and current magnitudes. The peak flood tidal current speed to the west computed in the model was 22 cm/s, compared to 24 cm/s measured at the current meter. The peak ebb tidal current to the east computed in the model was 8 cm/s, compared to 13 cm/s measured at the current meter.

6. MODEL RESULTS

Three different model runs were completed using combinations of the input parameters described in Section 3 above. These model runs include the 100-year and 2-year discharge events and moderate tidal currents, and the 100-year discharge event with moderate tidal currents and Kona winds and waves. The model runs are listed in Table 6-1. At every time step for the specified duration of the model run, EFDC calculates currents and water properties at each model grid point. These values can be output at specified times and locations during the model run. Models were run for a time period of 2 days. Model output is referenced to decimal days, beginning at 0 and ending at 2 days.

The model results were presented in several different formats:

1. Salinity Contour Plots – Salinity is used as the primary indicator of plume dilution and possible impacts. Contour plots were prepared showing concentrations of salinity, plotted in parts per thousand (ppt). Typical oceanic water has a salinity of approximately 35 ppt, while fresh water has a salinity of 0. These values were used in the model. State water quality standards indicate that salinity shall not vary more than ten percent from natural conditions, i.e. fall below approximately 31.5 ppt (State of Hawaii, Department of Health, 1992). In the modeling analysis and discussion of results, the plume boundary is therefore defined by the 31.5 ppt salinity contour (or 10% dye contour); measurements of plume size refer to these contours, unless otherwise stated. Research on salinity tolerance of corals, however, has shown that corals generally have a much wider range of tolerance than this (Coles, 1992). Experiments exposing several types of Hawaii corals to different levels of salinity for 20 days showed high mortality at salinity levels of 20 ppt and below, but good survivability at salinity levels of 25 ppt and higher (Coles, 1992). The salinity contour plots were prepared showing the maximum plume excursion for the surface water layers. These figures show a snapshot of the plume at its maximum size.

2. Dye Contour Plots - Conservative water quality constituents were also modeled, using dye as a representative tracer. Conservative constituents are defined as those constituents whose concentration can be altered only by advection and diffusion; by contrast, the

concentration of non-conservative constituents can be changed by chemical processes such as photosynthesis, or physical processes such as abrasion and settling. Dye plots were included to show conservative constituent concentrations because determining this from the salinity contour plots is not straightforward. For the model runs, the ocean waters were set to have dye concentration of 0, while a concentration of 100 was applied to the discharge. The dye contours therefore indicate directly the extent of dilution of the plume and conservative constituents in the plume. For example, a dye contour of 10 indicates that the dye concentration is 10% of the initial discharge concentration, or conversely, has been diluted 90%.

3. Total Suspended Sediment (TSS) - Suspended sediments are considered non-conservative because their concentration is altered by settling out of the water column, as well as by advection and diffusion. The peak concentrations of suspended sediment are displayed in contour plots similar to the salinity and dye plots.

4. Salinity and Total Suspended Sediment (TSS) Time Series – To show how the plume concentrations change with time, graphs were prepared showing how surface salinity and TSS change with time at 3 time series station in the model area: directly offshore of the discharge site (Station 1, grid cell i=77,j=56), 500 meters east of the discharge site (Station 2, grid cell i=76,j=46), and 500 meters west of the discharge site (Station 3, grid cell i=76,j=66). The location of the time series stations is shown in Figure 4-1. These graphs indicate how quickly the ocean waters return to ambient conditions following a discharge event.

5. Salinity Water Column Profiles – To show the thickness of the discharge plume, color-coded salinity concentrations are displayed along a vertical profile of the water column at the discharge site. The vertical profiles extend approximately 700 meters offshore to a water depth of about 5.5 meters. The profiles are shown for the maximum plume size. They represent snap-shots of the plume at its maximum thickness.

Table 6.1. Model Runs

Run No.	Discharge Event	Tide	Waves	Wind	Suspended Sediment
1	100 year	Moderate			yes
2	2 year	Moderate			Yes
3	100 year	Moderate	Kona	Kona	Yes

6.1 Run 1 – 100-year storm discharge event with moderate tides

Run 1 is a calculation of plume transport assuming a moderate tide and a 100-year discharge event. Results are shown in Figures 6-1A to F. This represents a worst case for the project site because the discharge event is extreme, yet mixing conditions are poor because winds and waves are absent. A 100-year event has only a 1% chance of occurring in any year. The discharge event

occurs over a 24-hour period, with the peak discharge coinciding with the transition from a flooding to ebbing tide. Transport is therefore initially to the west, and then reverses to the east. Moderate tides produce maximum currents of 22 cm/s at the offshore current meter site. Figures 6-1A and B show that in the surface water layer, the plume (as defined by the 31.5 ppt salinity concentration, and 10% dye concentration) extends about 400 meters offshore of the shoreline and 1500 meters along the shoreline. The extent of plume where the salinity exceeds 28 ppt is approximately 200 meters x 900 meters. Figure 6-1E, however, shows that the plume is largely confined to the surface. Peak plume waters with salinity below 28 ppt contact the seafloor only within 50 meters of the discharge. Plume waters with a salinity below the water quality standard of 31.5 ppt are confined to the upper 1 meter of the water column and extend approximately 400 meters offshore.

Time series plots of salinity in the surface layer (Figure 6-1D) show that at the discharge site the salinity drops to a minimum of 0 ppt during the peak discharge flow, and reaches the State water quality standard of 31.5 ppt at time 1.12, only 14 hours (0.6 days) after the discharge peak. 500 meters east of the discharge (Station 2), the salinity drops to a minimum of 26 ppt and reaches 31.5 ppt at 0.8 days. At Station 3, 500 meters west of the discharge, a minimum surface salinity of 29 ppt occurs shortly after the peak discharge, and reaches 31.5 ppt at 1.12 days. In summary, the model calculates that within approximately 14 hours (0.6 days) of the peak discharge (0.5 days), the plume salinity in the project area would once again meet the State water quality standard of 31.5 ppt.

Suspended sediment transport and deposition were also calculated. During the storm discharge, approximately 40,000 kg of suspended sediment are discharged. At the end of the model run of 2 days, approximately 22,200 kg of sediment are deposited in the model area, 14,000 kg of suspended sediments are transported to the west out of the model area, and 3,300 kg remain suspended in the water column within the model domain. The clay fraction remains entirely suspended, while most of the silt fraction is deposited. Maximum deposition occurs immediately offshore of the drainage outlet, where approximately 0.6 mm of sediment are calculated to be deposited. Sediment thickness rapidly drops with distance from the discharge site. Sediment thicknesses calculated 100 meters east and west of the discharge are 0.07 and 0.18 mm, respectively. Sediment thicknesses calculated at the time series stations located 500 meters east and west of the discharge site are 0.00004 and 0.004 mm, respectively.

Peak surface layer suspended sediment concentrations are shown in Figure 6-1C. A time series of suspended sediment concentrations is presented in Figure 6-1F. Total suspend solids measurements conducted by Marine Research Consultants (2004) for the Ocean Pointe development indicate that ambient nearshore TSS concentrations are about 10 mg/L. Model results show that initial plume concentrations greatly exceed these levels; the peak TSS levels were 950 mg/L at the discharge site, 150 mg/L 500 meters west of the discharge site, and 85 mg/L 500 meters east of the discharge site. The TSS plume exceeding 20 mg/L extends about 500 meters offshore and 1700 meters along the shore. Figure 6-1F shows that TSS levels approach ambient levels of about 10mg/L at 1.5 days, approximately 1 day after the end of the storm discharge. TSS requires more time than salinity to reach ambient levels because much greater dilution is required to reduce TSS levels from 950 mg/L to about 10 mg/L.

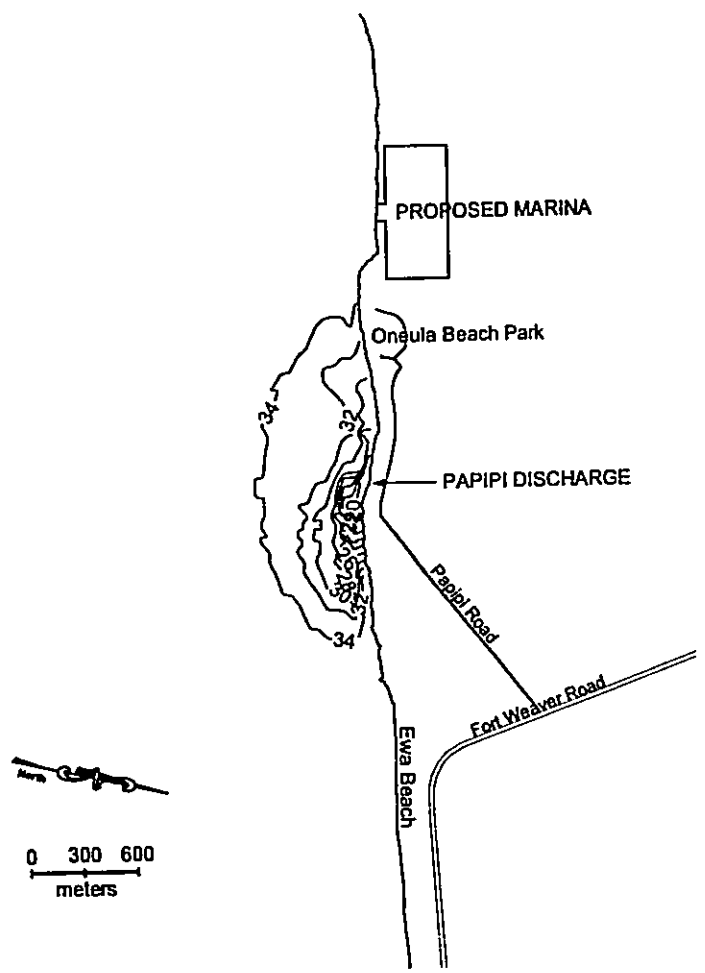


Figure 6-1A. Minimum Surface Layer Salinity for 100-year Discharge Event and Moderate Tides.

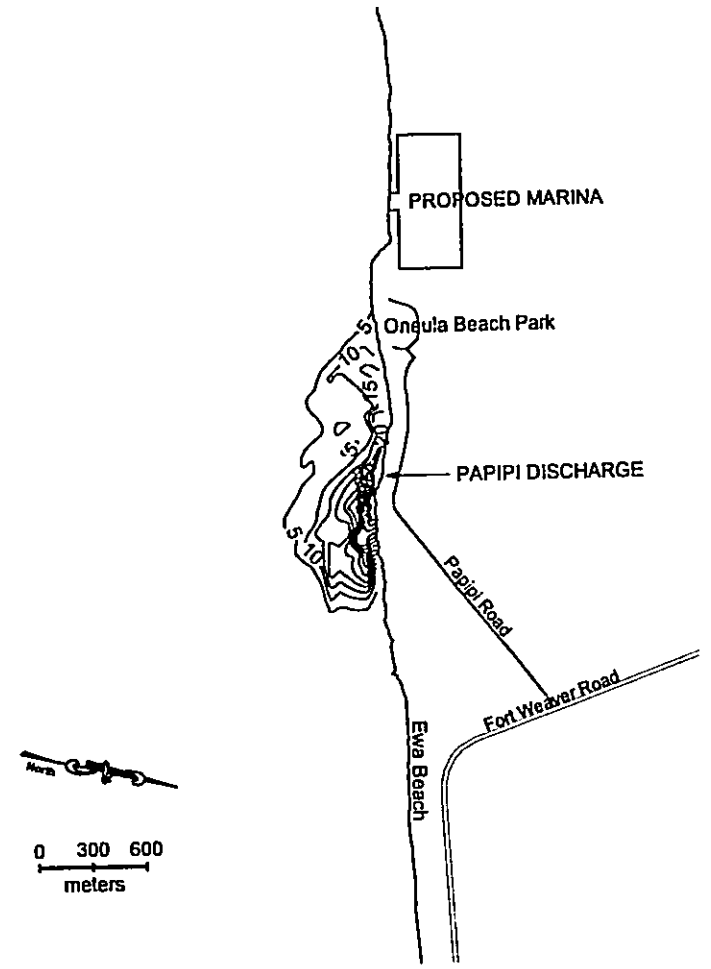


Figure 6-1B. Peak Surface Layer Plume (dye) Concentrations for a 100-year Discharge Event and Moderate Tides. Contours show percentage of initial concentration.

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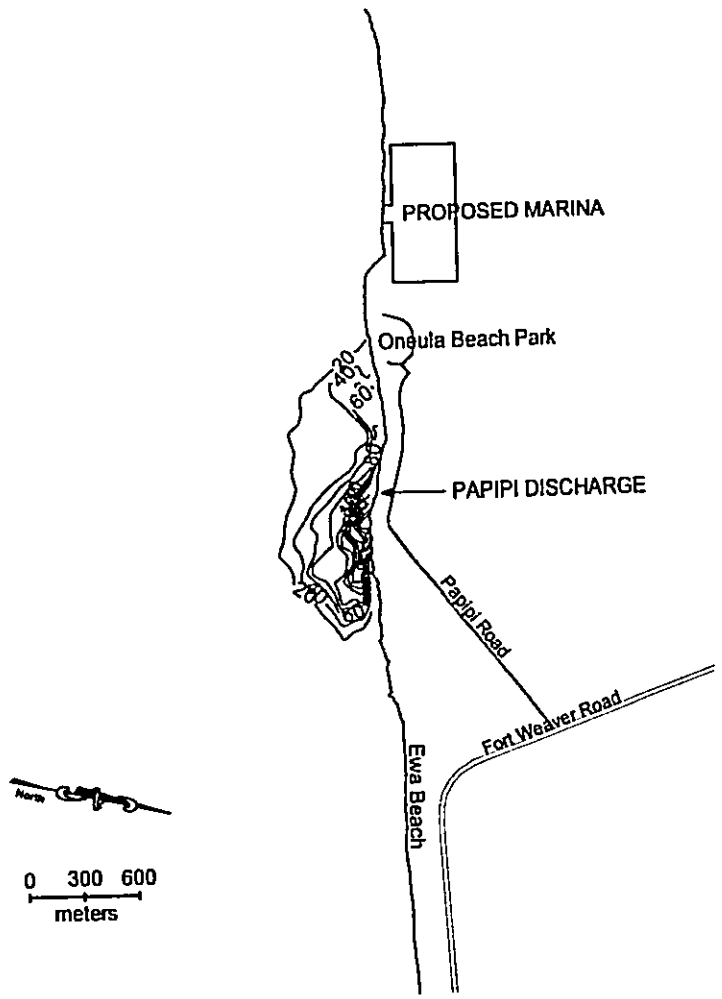

Figure 6-1C. Peak Surface Layer Suspended Sediment (TSS) Concentrations for a 100-year Discharge Event and Moderate Tides. Contours in mg/l.

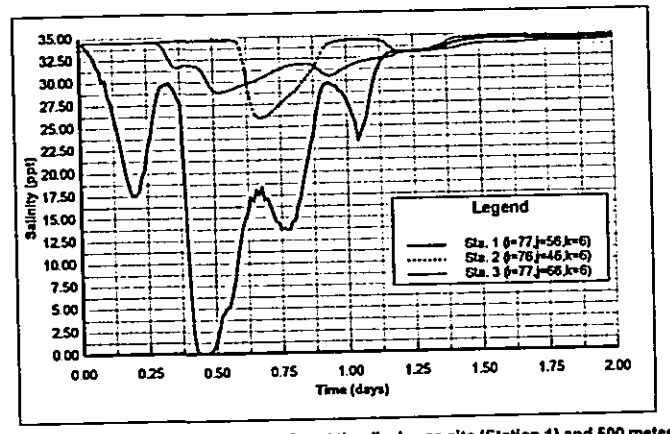

Figure 6-1D. Surface layer salinity time series at the discharge site (Station 1) and 500 meters east and west of the discharge site (Stations 2 and 3)

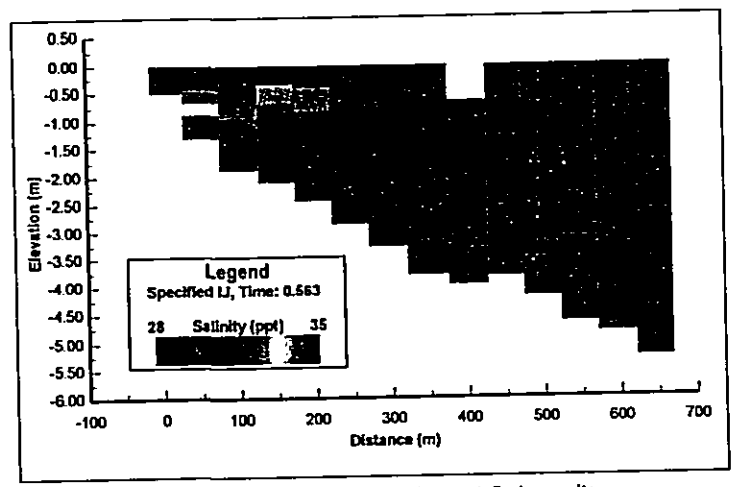

Figure 6-1E. Maximum plume thickness at discharge site

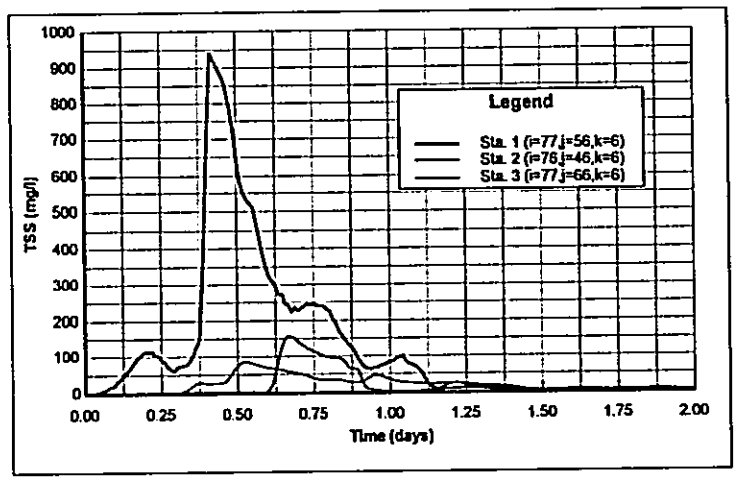

Figure 6-1F. Surface layer TSS time series at the discharge site (Station 1) and 500 meters east and west of the discharge site (Stations 2 and 3)

6.2 Run 2 – 2-year discharge event and moderate tides

Run 2 presents results for a 2-year discharge event, and moderate tides. A 2-year event has a 50% probability of occurring in any year. Thus, this event is large but relatively common. As described in Section 4.6, the discharge results from a 5-inch rainfall over 24 hours. The discharge peaks at time 0.416 days (Figure 4-6). The total discharge volume is 10,500 cubic meters. Figures 6-2A and B show that the maximum plume excursion is approximately 270 meters offshore and 600 meters alongshore. The plume is largely confined to the surface water layer (Figure 6-2E). Plume salinities below 28 ppt contact the seafloor only within 50 meters directly offshore of the discharge site. The minimum salinities reached at the time series stations are 18 ppt at the discharge site (Station 1), 31.5 at Station 2 which is 500 meters east of the discharge site, and 32.5 at Station 3 which is 500 meters west of the discharge site. Plume salinities meet the State standard of 31.5 ppt within approximately 12 hours (0.5 days) of the peak outflow.

The suspended sediment plume is shown in Figure 6-2C and F. During the storm discharge, approximately 5,200 kg of suspended sediment are discharged, less than 20% of the quantity discharged during the 100-year event. At the end of the model run of 2 days, approximately 2,900 kg of sediment are deposited in the model area, 1,200 kg of suspended sediment are transported to the west out of the model area, and 1000 kg remain suspended in the water column within the model domain. Similar to Run 1, the clay fraction remains entirely suspended, while most of the silt fraction is deposited. Maximum deposition occurs immediately offshore of the drainage outlet, where only 0.17 mm of sediment is deposited. Sediment thicknesses calculated 100 meters east and west of the discharge site are 0.01 and 0.05 mm, respectively. Sediment thicknesses calculated at time series Stations 2 and 3 are 0.0001 and 0.0006 mm, respectively.

A time series of suspended sediment concentrations is presented in Figure 6-2F. Model results show that the peak TSS levels were 275 mg/L at the discharge site, 50 mg/L at Station 2 and 12 mg/L at Station 3. TSS levels approach ambient levels of about 10mg/L, approximately 0.6 days (14 hours) after the end of the peak storm discharge.

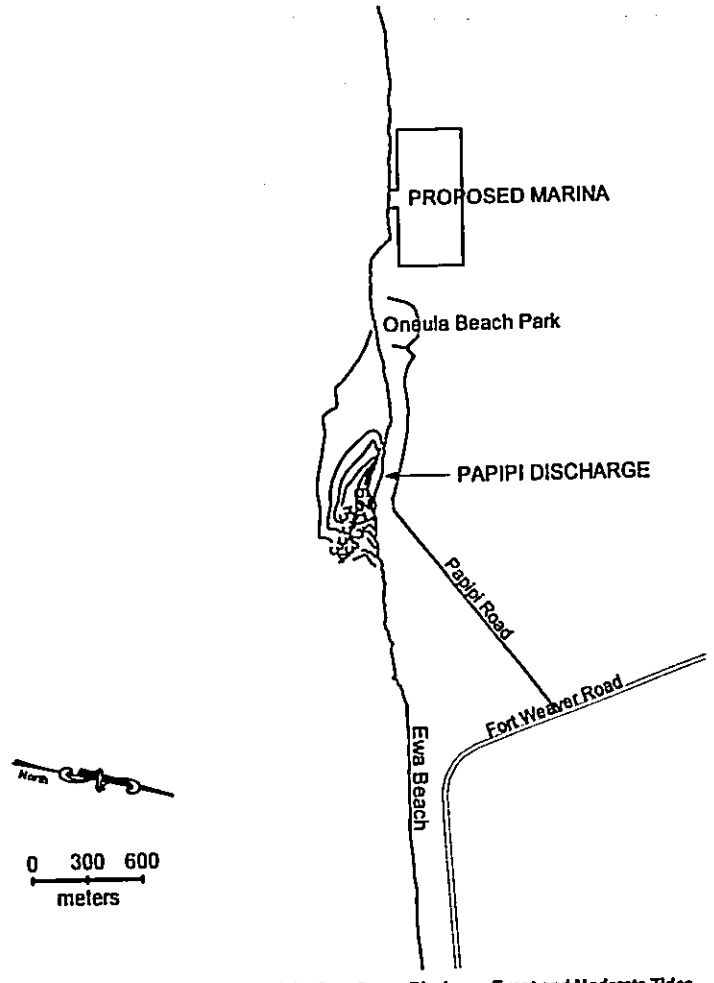

Figure 6-2A. Minimum Surface Layer Salinity for a 2-year Discharge Event and Moderate Tides.

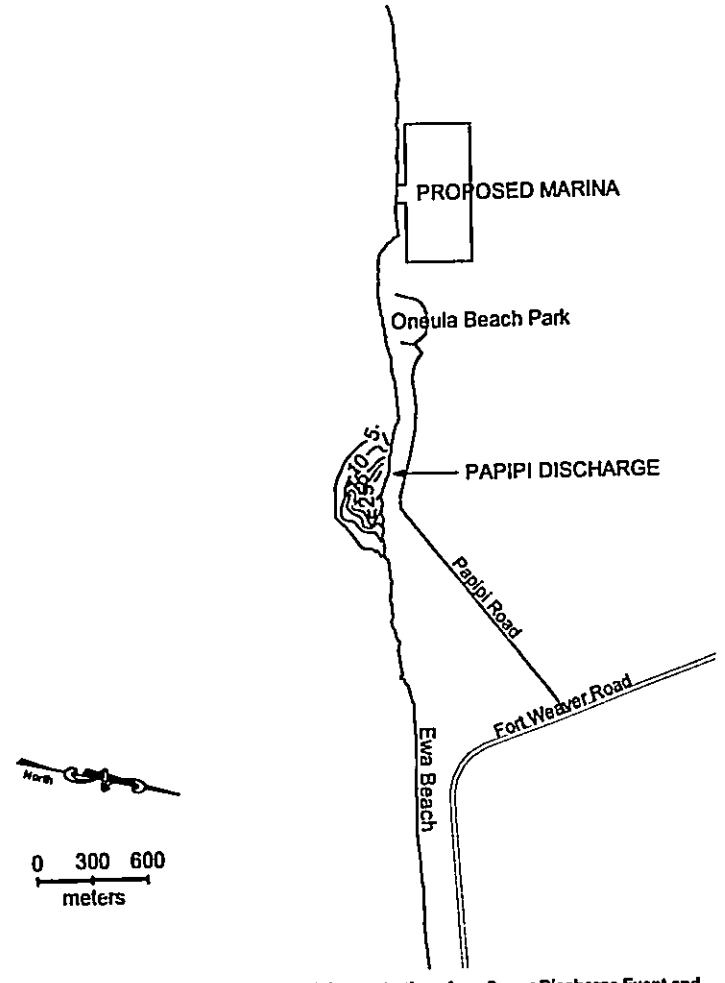

Figure 6-2B. Peak Surface Layer Plume (dye) Concentrations for a 2-year Discharge Event and Moderate Tides. Contours show percentage of initial concentration.

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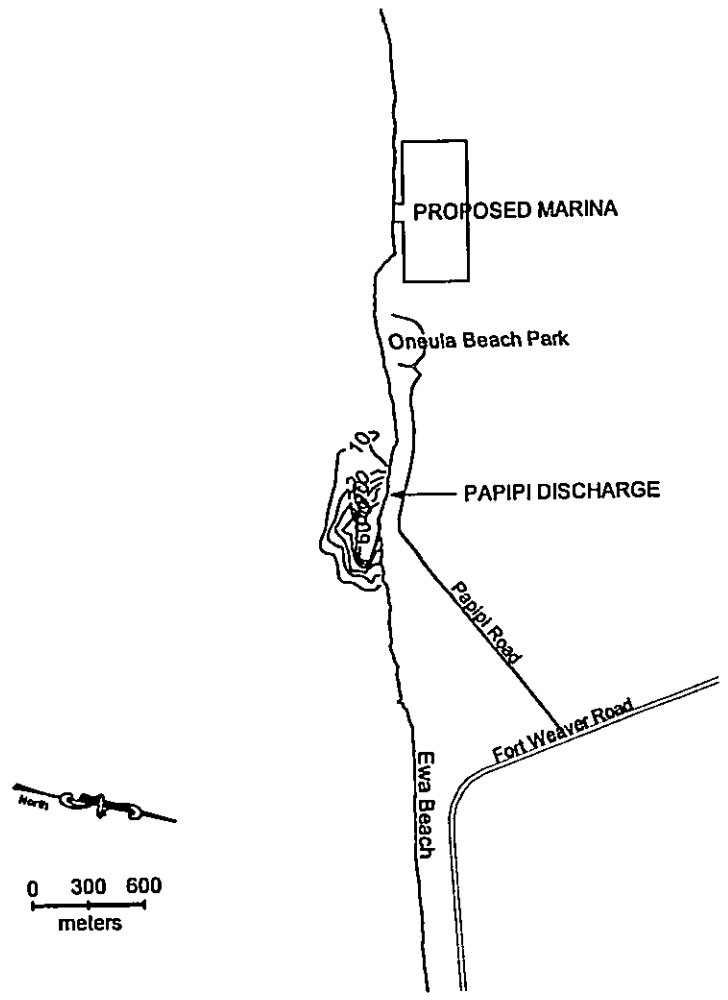

Figure 6-2C. Peak Surface Layer Suspended Sediment (TSS) Concentrations for a 2-year Discharge Event and Moderate Tides. Contours in mg/l.

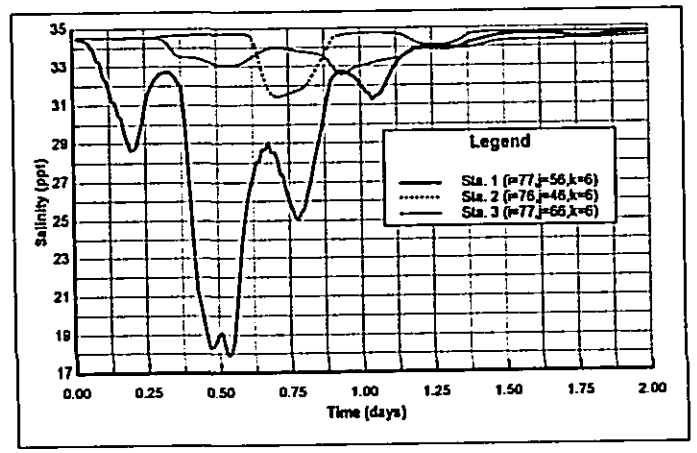

Figure 6-2D. Surface layer salinity time series at the discharge site (Station 1) and 500 meters east and west of the discharge site (Stations 2 and 3)

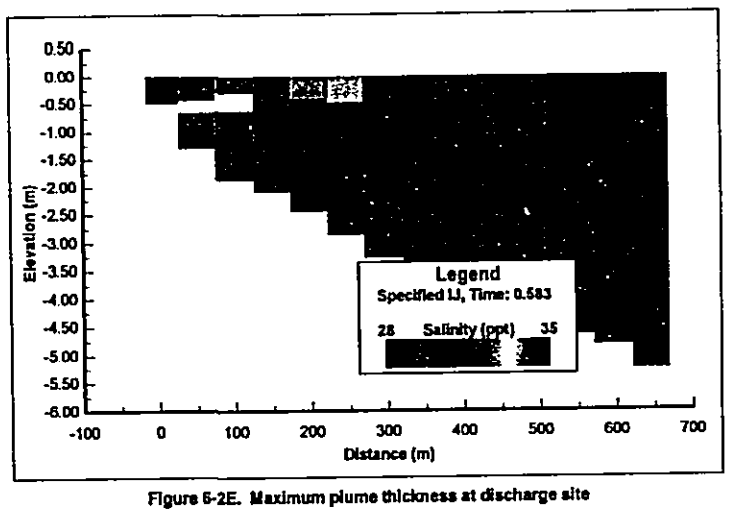

Figure 6-2E. Maximum plume thickness at discharge site

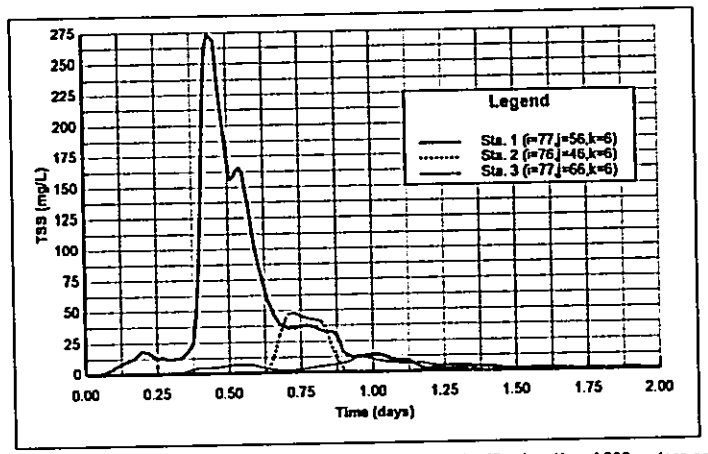

Figure 6-2F. Surface layer TSS time series at the discharge site (Station 1) and 500 meters east and west of the discharge site (Stations 2 and 3)

6.3 Run 3 – 100-year discharge event with moderate tides and Kona waves and winds

This run utilizes the same input parameters as Run 1, but additionally incorporates the effects of Kona winds and waves. As mentioned previously, EFDC utilizes as input the wave height, dissipation and radiation stresses computed by the wave model REF/DIF. The Kona wave input consists of deep-water wave heights of 1.3 meters and periods of 9 seconds from a southwest direction. The Kona wind input is winds of 4.6 m/s from the southwest. The model results indicate that the Kona winds and waves drive nearshore currents to the east at speeds of 10 to 60cm/s. The plume is rapidly diluted in both time and space. Figures 6-3A, B and C show the maximum plume size and shape at time 0.5 days, shortly after the peak discharge. The surface plume is greatly reduced in size and concentration relative to the results with no wave input. The maximum plume excursion with water below the State standard of 31.5 ppt is 150 meters offshore of the shoreline, and 500 meters to the east. By comparison, the plume in Run 1 extended 400 meters offshore and 1,500 meters alongshore. This is because the breaking waves efficiently mix and diffuse the plume throughout the water column. This is clearly shown in Figure 6-3E, the salinity profile plot. The water column is vertically mixed to a distance of 150 meters offshore. Bottom water layer salinities below 28 extend only 50 meters offshore. When wave effects are not included (Run 1), the plume is almost entirely confined to the surface layer. The salinity time series (Figure 6-3D) shows how rapidly the plume is diffused and diluted. The minimum surface layer salinity reached at the discharge site is 7.5 ppt. The surface layer salinity meets the State standard of 31.5 ppt within about 7 hours after the peak discharge outflow. The salinity never exceeds water quality standards at Station 2 and 3, located 500 meters from the discharge.

Results of the suspended sediment modeling are presented in Figures 6-5F. During the storm discharge, approximately 40,000 kg of suspended sediment is discharged. At the end of the model run of 2 days, approximately 14,700 kg of sediment are deposited in the model area. A significant portion of the silt fraction remains suspended by the wave energy in this run as compared to Run 1. Maximum deposition occurs immediately offshore of the drainage outlet, where approximately 0.4 mm of sediment are calculated to be deposited. Sediment thickness rapidly drops with distance from the discharge site. Sediment thicknesses calculated 100 meters east of the discharge and at Station 2 were 0.07 and 0.02 respectively.

The time series of suspended sediment concentrations is presented in Figure 6-3F. Model results show that initial plume concentrations are greatly reduced as compared to Run 1; the peak TSS levels were 750 mg/L at the discharge site, and 50 mg/L at Station 2. Since transport was to the east, the suspended sediment plume did not reach Station 3. Approximately 0.6 days after the end of the storm discharge, the TSS levels at the discharge return to background levels. At Station 2, the tss levels return to background in 3 hours. Thus, the model results show that Kona wave and wind conditions result in greatly increased suspended sediment mixing and dispersion.

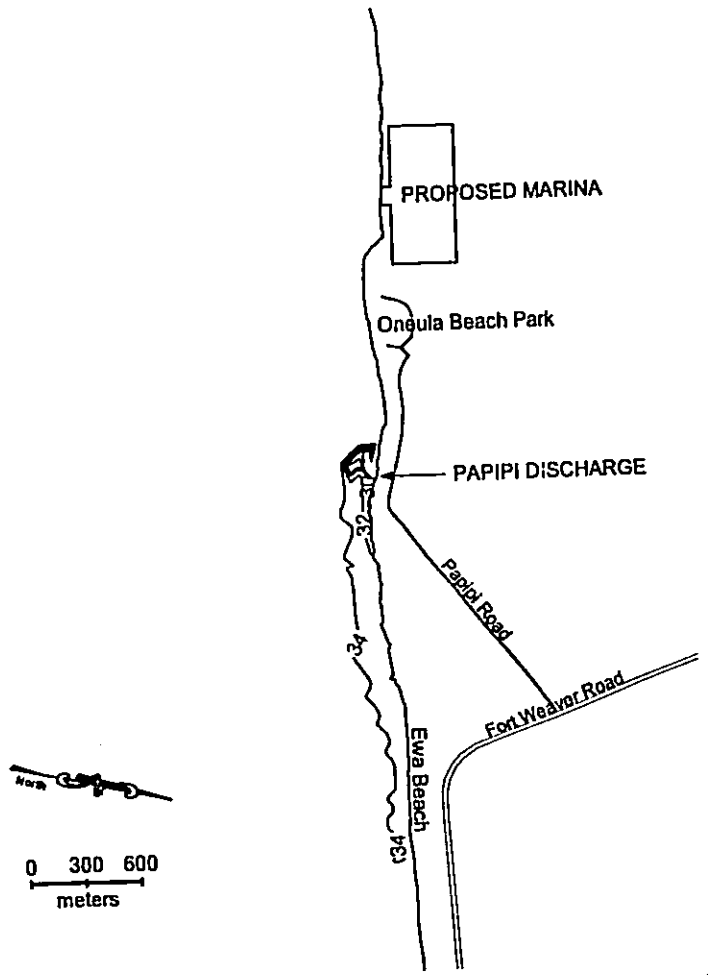

Figure 6-3A. Minimum Surface Layer Salinity for a 100-year Discharge Event, Moderate Tides and Kona Winds and Waves.

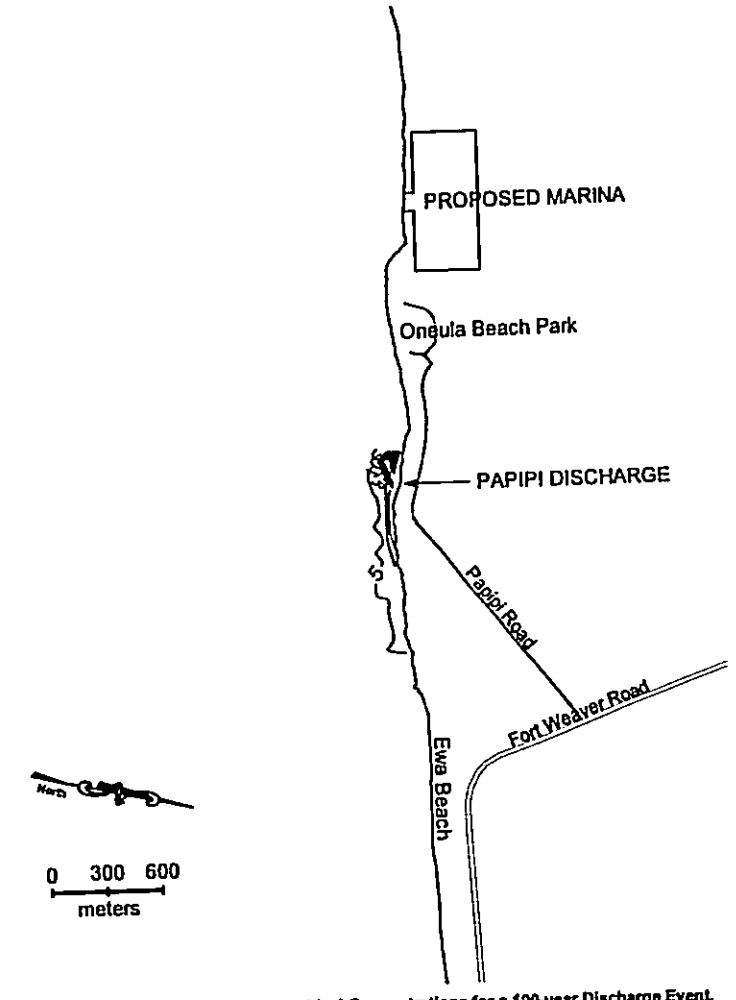

Figure 6-2B. Peak Surface Layer Plume (dye) Concentrations for a 100-year Discharge Event, Moderate Tides and Kona Winds and Waves. Contours show percentage of initial concentration.

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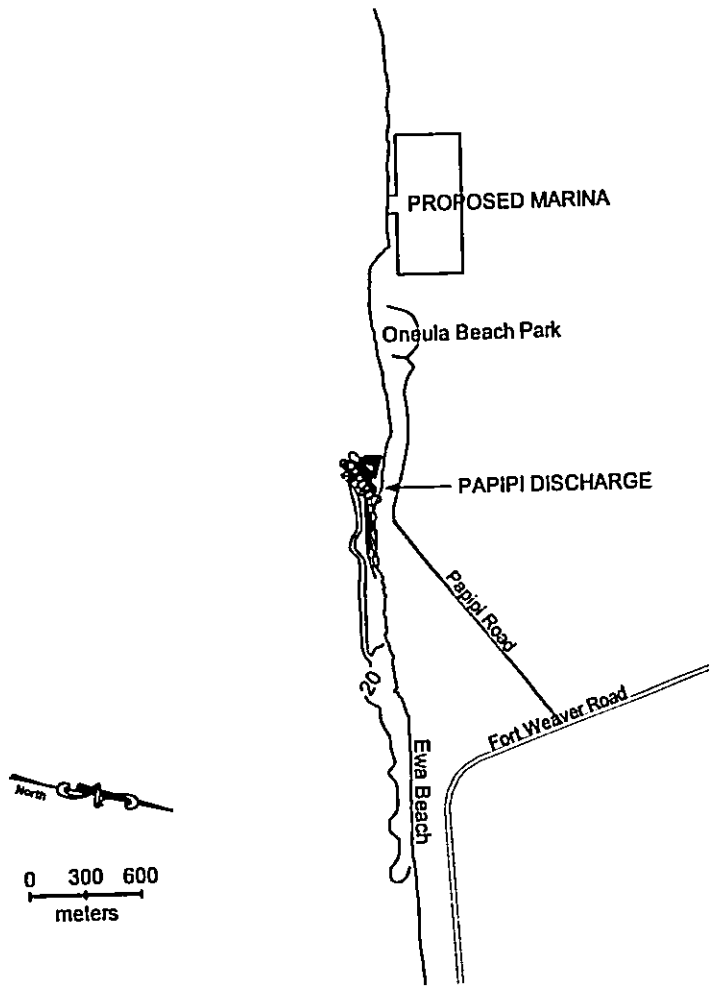

Figure 6-2C. Peak Surface Layer Suspended Sediment (TSS) Concentrations for a 100-year Discharge Event, Moderate Tides and Kona Winds and Waves. Contours in mg/l.

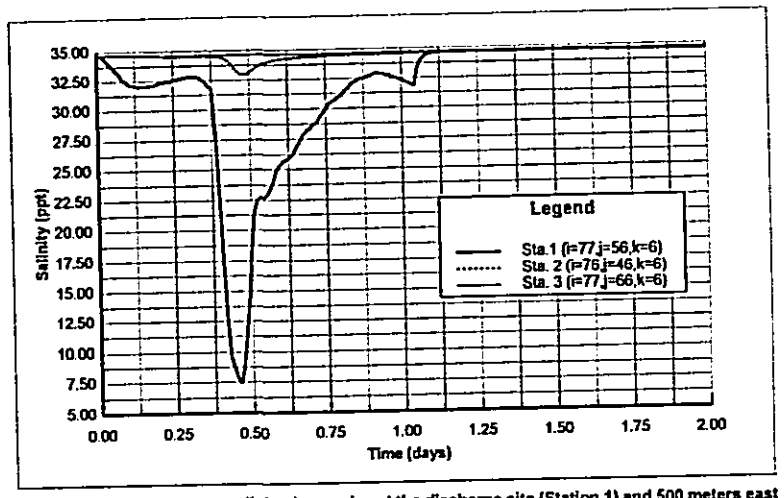

Figure 6-3D. Surface layer salinity time series at the discharge site (Station 1) and 500 meters east and west of the discharge site (Stations 2 and 3)

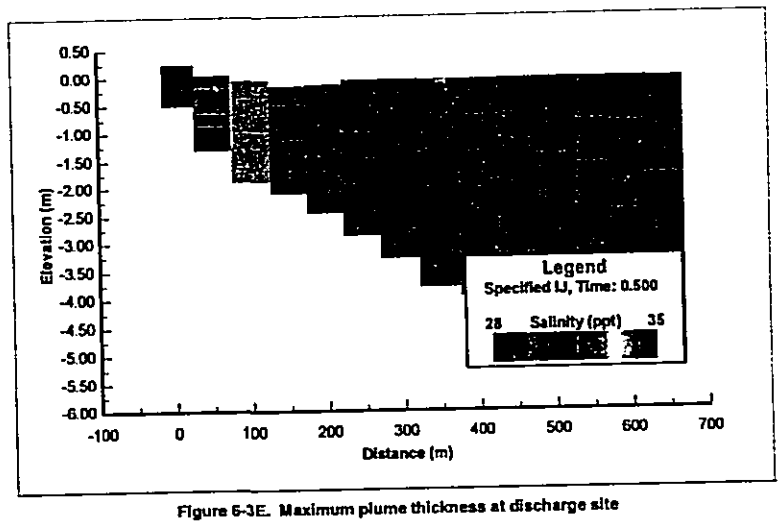

Figure 6-3E. Maximum plume thickness at discharge site

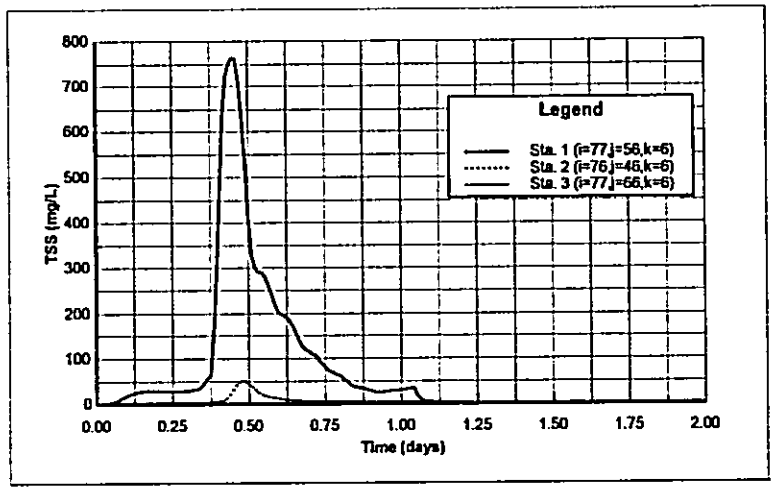

Figure 6-3F. Surface layer TSS time series at the discharge site (Station 1) and 500 meters east and west of the discharge site (Stations 2 and 3)

7.0 CONCLUSIONS

The proposed site of the Papipi storm drain is characterized by good transport and mixing. In general, the plume generated by storm runoff discharge at the discharge site hugs the shoreline, and is transported initially either to the east or west. The initial transport direction depends on the timing of the discharge outflow with respect to the tidal flow. During ebb tide, currents flow to the east, while during flood tide, currents flow to the west. The current meter data indicated that flow to the west and southwest is predominant; currents flowing to the west and southwest are stronger and last longer than the ebb flows to the east and northeast. Thus, the bulk of the discharge plume transport is to the west to southwest. However, episodes of predominantly flow to the east infrequently occur, and could result in net plume transport to the east. Kona winds and waves also drive transport to the east.

The proposed Papipi storm drain is intended to drain a small area associated with improvements to Papipi road. Discharge volumes are therefore relatively small. A significant discharge event is represented by the 2-year storm event, which has a 50% chance of occurring every year. A 2-year event would have a maximum flow of 0.66 cubic meters per second (23.5 cfs), and result in a total discharge of 10,520 cubic meters (371,520 cubic feet) of water and 5,300 kg of sediment. The resulting plume would extend 270 meters offshore and 600 meters alongshore. Plume waters would meet the State standard of 31.5 ppt within 12 hours of the peak outflow. The suspended sediment load (TSS) in the discharge results in deposition of 0.17 mm of sediment at the point of greatest deposition immediately offshore of the outlet. Sediment resuspension is not calculated by the model. Any sediment deposited in this area would likely be resuspended and transported away during the numerous surf events that impact the area. Suspended solids concentrations in the water in the project area are calculated to approach ambient levels of about 10 mg/l only 14 hours after the end of the storm discharge.

Worst-case conditions at the site are represented by the 100-year discharge event occurring when there are no waves or wind to promote mixing and dispersion The 100-year design flow event would have a peak flow of 3.57 cubic meters per second (126 cfs), and result in a total discharge of about 46,000 cubic meters of water and 40,000 kg of sediment. The resulting discharge plume is calculated to extend about 400 meters offshore of the shoreline and 1500 meters along the shoreline. The time required for the plume-affected waters to meet the State DOH salinity standard of 31.5 ppt is a maximum of 14 hours after the peak discharge outflow. The suspended sediment load (TSS) in the discharge results in deposition of 0.6 mm of sediment at the point of greatest deposition immediately offshore of the outlet. Deposition rapidly diminishes with distance from the discharge. Suspended solids concentrations in the water in the project area are calculated to approach ambient levels of about 10 mg/l approximately 1 day after the end of the storm discharge.

Perfectly calm conditions are rare at the project site. Incorporation of Kona waves and wind into the model results in transport to the east and an increase in mixing. Kona waves during the 100-year event reduce the maximum plume dimensions to about 150 x 500 meters. Water salinity falls below State water quality standards only for a 7-hour period. Similarly, suspended sediment concentrations in the water return to ambient levels within 14 hours of the peak discharge.

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Report 2477-120204

Archaeological Resources Assessment and Archaeological Monitoring Plan

Ocean Pointe/Papipi Road Drainage Improvements Project

Ocean Pointe Project

Land of Honouliuli, 'Ewa District, Island of O'ahu

PHRI
Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services

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Ocean Pointe/Papipi Road Drainage Improvements Project

Ocean Pointe Project

Land of Honouliuli, 'Ewa District
Island of O'ahu (TMK:9-1-35,36)

BY

PHRI (Paul H. Rosendahl, Ph.D., Inc.)

PREPARED FOR

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DECEMBER 2004

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APPENDIX B. HISTORIC AND CULTURAL RESEARCH

Contents

Illustrations

INTRODUCTION

BACKGROUND

Paul H. Rosendahl, Ph.D., Inc. (PHRI) has prepared this report at the request Mr. Perry White of Planning Solutions, Inc., on behalf of his client, HASEKO (Ewa), Inc. This report comprises (a) an Archaeological Resources Assessment, and (b) an Archaeological Monitoring Plan, both in connection with the Ocean Pointe/Papipi Road Drainage Improvements Project. That project is located on and immediately adjacent to the Ocean Pointe Project (formerly the Ewa Marina Project). Land of Honolulil, 'Ewa District, Island of Oahu (TMK 9-1-55,56)(*Figure 1*). The basic purpose of PHRI's current effort is to provide appropriate historic preservation information in support of an environmental review, permitting, and implementation of planned infrastructure development in accordance with the general standards and requirements of the Hawai'i State Historic Preservation Division (SHPD), as contained in the recently approved SHPD Administrative Rules (effective December 11, 2003). Specifically, it follows Chapter 13-284: *Rules Governing Procedures for Historic Preservation Review to Comment on Chapter 6E-42*, HRS, Projects, and Chapter 13-279: *Rules Governing Standards for Archaeological Monitoring Studies and Reports*, and more generally follows all current historic preservation requirements of the SHPD and the Department of Planning and Permitting of the City and County of Honolulu (DPP-CCHONO).

SCOPE OF WORK

PHRI's general scope of work consists of two historic preservation elements.

- An assessment of the nature and distribution of archaeological resources likely to be affected by the proposed project;
- A monitoring plan for the recognition and mitigation of any potentially adverse effects.

Based on (a) preliminary review of available reports on prior archaeological work done in the general area, (b) consultation with Dr. Sara L. Collins, SHPD Archaeology Branch Chief and Oahu Island Archaeologist (October 10, 2005), (c) discussions of project scope and requirements with the client, and (d) PHRI's familiarity with both the general project area and the current regulatory review requirements of the SHPD and the DPP-CCHONO, the following tasks were determined to constitute an adequate scope of work for the overall current project, which will eventually include the implementation of the monitoring plan:

1. Conduct appropriate background research and review;
2. Prepare an archaeological assessment study report that would function as a technical document in support of Chapter 343 (HRS) Environmental Impact Statement;
3. Prepare an archaeological monitoring plan that meets current SHPD standards and requirements;
4. Pre-construction meeting – attend project pre-construction meeting and make short presentation regarding archaeological monitoring rules and procedures relating to the observation and identification of inadvertent discoveries;

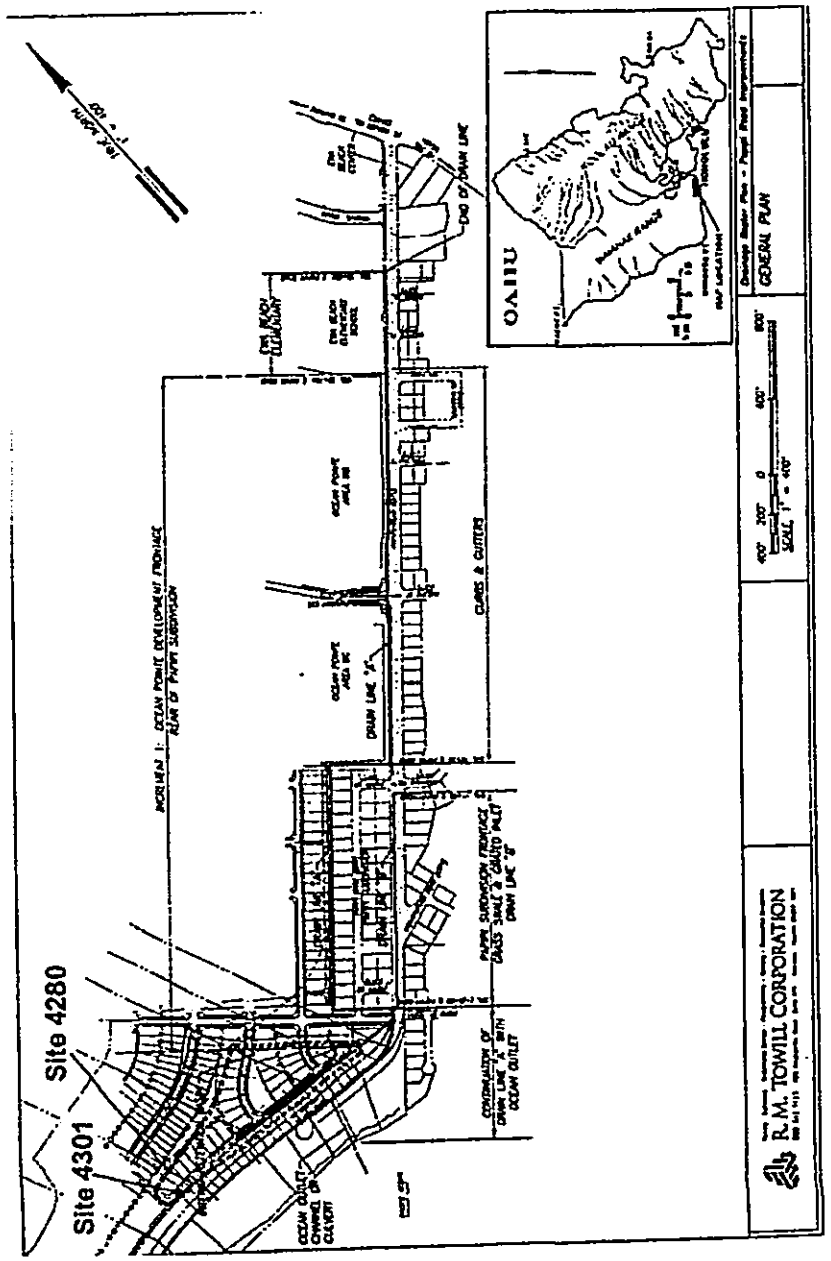

Figure 1. Project Area (Modified R.M. Towill Map)

5. Conduct fieldwork – periodic inspection of improvements work in progress, including monitoring of initial trenching along Papipi Road and excavation of temporary drainage basin;

6. Conduct fieldwork – on-call basis, to inspect and assess any potentially significant remains encountered during project work;

7. Conduct fieldwork – carry out any data recovery work that might be appropriate and/or required by SHPD;

8. Conduct any appropriate post-field analyses of field and other data;

9. Prepare appropriate draft and final assessment and monitoring reports, and

10 Coordinate and consult with client, client representatives, regulatory agency staff, etc.

PROJECT AREA DESCRIPTION

The project area consists of generally flat coralline lowlands located along the coastal portion of the east-central segment of the Ewa Coral Plain. The Ewa Plain is a Pleistocene elevated coralline reef that forms the leeward coastal lowlands of southwestern Oahu, and extends five km south from the Waianae mountains and 8 km south from the adjacent Central Plateau. Pearl Harbor lies at the east end of the plain, while West Beach marks the approximate western end of the feature. There is a thin alluvial soil mantle in areas; coral substrate remains largely exposed at the surface. The restricted sedimentation and soil development in the project area is due in part to the attenuated surface flow.

Ewa is general is a semiarid region of intense sunshine, warm dry trade winds, and little rainfall. Seasonally shifting wind patterns account for the low annual rainfall, which typically ranges from 300-500 mm. Easterly to northeasterly trade winds of 10-15 knots prevail c. 75-85 percent of the time during an average year. The vegetation in the vicinity of the project area is typically xeric, and is dominated by hardy exotics. The mean annual temperature in the region is 74-75 degrees F.

Papipi Road extends from Fort Weaver Road to the access road that serves Oneula Beach Park (*Figure 1*). The road passes residences, a school, and a commercial area. Papipi Road consists of two 10- to 11-foot-wide travel lanes and has unpaved shoulders. It is underlain with calcareous coral and algal reef deposits with the predominant material being silty coralline, algal sand, and gravel (R.M. Towill Corporation 2004). The Interim Retention Basin is a temporary drainage area for the Papipi Road drainage runoff. It will be temporarily used until the ocean outlet for the project is operative.

PROPOSED IMPROVEMENTS

It is proposed that a new drainage system be installed along Papipi Road. The system will extend along the front of the Ocean Pointe project and along the existing residential lots fronting Papipi Road in the Papipi Drive area as well as a drainage along the back side of the Papipi Subdivision area (*Figure 1*). The work will include a new sidewalk and landscaping along the mauka shoulder of the road, from near Fort Weaver Road to the end of Papipi Road (approximately 4,600 feet). Improvements will also include a *mauka*-bound right turn at the intersection of Papipi Road and the proposed Kapolei Parkway (R.M. Towill Corporation 2004).

ARCHAEOLOGICAL RESOURCES ASSESSMENT

A review of previous archaeological work conducted in the vicinity of the project area is necessary in order to project what types of archaeological features might be found during the current project. The following is a brief review of relevant projects, adapted largely from Dunn and Haun (1991) and Franklin et al. (1995). For the sake of simplicity, the name "Ewa Marina Project" is used in lieu of "Ocean Pointe Project" where it appears in the source document.

PREVIOUS ARCHAEOLOGICAL WORK IN THE GENERAL VICINITY

A number of archaeological projects have been conducted on the Ewa coral plain, extending from West Loch through Ewa Beach, around Barber's Point, and to the West Beach area near Kahe Point. The most substantial recent projects include those by Lewis (1970), Davis (1980a, 1980b, 1981, 1988), Davis and Griffin (1978), Hammatt and Folk (1981), and Barrera (1975, 1986, 1985, 1990)

The earliest reference to archaeological remains in the area (Thrum 1907:46) mentions the earlier presence of a *heiau* situated on Kapolei hill in Ewa. The site was apparently destroyed for its stones, either for use in constructing fences, or to be crushed for building material (McAllister 1933), and nothing is known concerning its original size or type.

McAllister (1933) listed many sites in Honolulu; however, most are located at Pearl Harbor or high on the ridges of the Waianae Range. The Barber's Point area and much of the Ewa coral plain are subsumed under his Site 146. Concerning this site area he states:

> Ewa coral plains, throughout which are the remains of many sites. The great extent of old stone walls, particularly near the Puuloa Salt Works, belongs to the ranching period of about 75 years ago. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation and even today one comes upon bananas and Hawaiian sugarcane still growing in them (McAllister 1933:109).

McAllister also identified a rock shelter located on the same hill (Kapolei) as the *heiau* noted by Thrum, where the pig-god, Kamapua'a, is said to have resided with his grandmother (McAllister 1933:108). A well-preserved house site and possible *heiau* located on the western part of the Ewa Plain, adjacent to Kalaeloa Boulevard, were examined by Emory (Bishop Museum Site Files [1933]). Both structures had been constructed of stacked limestone slabs and uprights, but Emory found them destroyed by sugarcane planting.

In 1959, William Kikuchi removed 14 to 16 incomplete human burials from a limestone sink (Site 50-Oa-B6-10) prior to the construction of the Standard Oil refinery (Oahu Sites Folder 01.1 and Site Card in Dept. Anthropology, Bishop Museum).

In 1962, Lloyd Soehren recorded a burial at the Naval Air Station (Bishop Museum Files). The burial, a secondary interment, was found in a sinkhole located near house sites and modified pits.

In 1966, Soehren recorded and excavated a possible fishing shrine that was to be destroyed by the construction of a barge harbor (Site 50-Oa-B6-15; Oahu Sites Folder 01.1 and Site Card in Dept. Anthropology, Bishop Museum). Excavation revealed a pre-construction layer containing large amounts of fish scales. Dog, fish, and shellfish remains, and a one-piece rotating fishhook were recovered from the layer.

A beach midden site (50-Oa-B6-16), south of the barge harbor in Camp Malakole, was recorded by Roger Green for the Bishop Museum in 1969. The site was discovered during construction of a pipeline that cut through the site, and Green collected surface artifacts, including a bone awl, a coral file, a one-piece fishhook point fragment, and a piece of cut bone. The site was subsequently tested by Davis (Davis and Griffin 1978), revealing two components, both characterized by charcoal-stained sand, charcoal, fire-cracked rocks, burned coral, and artifacts. The upper layer exhibited ash and charcoal pits.

Lewis (1970) has summarized the available historical data for the Ewa coral plain. The data indicates there was a sparse population at European contact, which was further reduced shortly thereafter. Early travelers made few comments about the region, and many native Hawaiians avoided the area, apparently preferring to use trails farther inland. In 1969 and 1970, Lewis also conducted the first extensive archaeological survey and excavations in an area inland of Malakole Road. Lewis summarized his archaeological research, as follows:

> For our area we find many kinds of sites – houses and house compounds; cairns mounds, ahus of myriad size and shape; pits that may have had cultural uses, walls of several types. It is obvious that the people at some time adapted themselves to life on this near-barren coral expanse. Though much of the land has been put under cane or concrete, there is yet a large area in which we may expect to find many additional sites to the few we have. Thus there is hope that we can define something of the past life of the Hawaiians who lived in such a seemingly un-Hawaiian place (Lewis 1970:42).

Lewis considered the area to be so marginal that it would only have been settled after more desirable locations had been occupied, and that one should not ascribe patterns of adaptation, known from other parts of the islands, to west Ewa. The primary food source was thought to be the sea and reef. The possibility of raising fish (mullet) in brackish-water ponds, and limited agriculture associated with pits and mounds are also noted, as is trade, as a potential means for obtaining non-marine foods and other resources.

The Department of Anthropology of the Bishop Museum conducted a reconnaissance of c. 600 acres at Barber's Point in 1975 (Barrera 1975). Inland areas were examined to relocate sites recorded by Lewis in 1969 and 1970 (Lewis 1970) and to locate additional sites. Seaward areas were examined to determine the extent and density of surface remains. A total of 24 sites was located, and historic sources were researched. Nine of Lewis's sites were relocated within the survey area, three were probably relocated, and one could not be found. At least five of Lewis' sites had been destroyed. Twelve new sites were recorded. Site types included limestone sinks, house sites, walls, cairns, enclosures, shelters, a terrace, a midden deposit, a paved area, a burial cave, and many mounds, the latter are typically constructed of unalline limestone boulders and cobbles. A triangular basalt adze was found on the surface within an enclosure.

Barrera (1975) concluded that prehistoric occupation of the Barber's Point area was demonstrated by the presence of midden and artifacts. Fishing was considered to be the primary prehistoric use of the area, and was evidenced by fish bones and scales, fishhooks, and sinkers. No evidence of agricultural activities were present, but Barrera suggested that some of the mounds may have been used for cultivation of *ti* (*Cordyline terminalis* [L.] Kunth) and sweet potato (*Ipomoea batatas* [L.] Lam.), and recommended further survey and excavations to document this possibility. The settlement pattern was described as "dispersed clusters of

residences, surrounded by a relatively open and little-inhabited area" (Barrera 1975:18). The Barber's Point locality was considered potentially important for archaeological research, because it represented "the prehistoric Hawaiian adaptation to a unique set of ecological circumstances (raised reef, low rainfall, and immediate proximity to deep ocean)" (Barrera 1975:18)

Sinoto (1970) provided a list of sites and features recorded for Barber's Point; the sites/features were in four survey areas designated A through D. A total of 97 sites was identified, including 17 previously recorded by Lewis (1970) and 58 reported by Barrera (1975). All sites were assigned Bishop Museum site numbers (50-0a-B6-82 through 137; B6-58 through 137 added by A. Sinoto). The most common features recorded were unmodified limestone sinks (80 total), walled sinks (17), rectangular enclosures (19), C-shape enclosures (12), wall segments (14), and *ahu* (15+). Other infrequent sites/features included cairns, complexes of walls and enclosures, an L-shape wall, a ramp associated with a sink, a filled sink, railroad tracks, a cyst, a trail, platforms (2), and culturally modified caves (3). Sinoto (1976) undertook excavation at a total of 87 sites. An important result of the excavations was the discovery of six fossil bird bones in some of the limestone sinks; the bones were assessed as potentially important for paleontological research.

In 1977 an archaeological and paleontological salvage project was conducted by the Department of Anthropology, Bishop Museum, to mitigate the impacts of constructing the deep-draft harbor at Barber's Point (Sinoto 1978). Five archaeological and 13 paleontological sites were excavated. The excavations at the five archaeological sites produced portable artifacts (25), and midden, soil, and land snail samples (Sinoto 1978). In general, the excavations evidence a high degree of disturbance at project area sites. Sinoto noted only a single component, or cultural stratum, among all of the excavated sites. Basaltic glass from one site (Site B6-70) was hydration-rind dated to the 17th century (AD 1618-1650). Artifacts consisted of single specimens of the following artifact categories: adze, adze chip, basalt flake, basalt hammerstone, coral abrader, coral file, fishhook fragment (Type S-1A/B-1T + after Emory, Bonk, and Sinoto 1959), modified bird bone, and polished hematite. Ten pieces of basaltic glass and three unmodified basalt flakes were also recovered from the excavations. Midden recovered consisted primarily of molluscs, echinodermata, and crustaceans, which commonly are present in nearby shallow water, near reefs and surge zones. Fish and bird bones were scarce and unidentified, except for tuna (*Scombridae* sp.). Mammal bones were primarily those of rodent, with minor amounts of human bone.

Several trends in prehistoric utilization of the area, as evidenced by the archaeological remains, were discussed by Sinoto (1978). Construction of surface architectural features incorporated natural features such as outcrops surrounding low lying areas. Habitation related structures were oriented in a manner that offered protection from the prevailing winds (i.e., highest walls along the northeast side of habitation areas). Sinkholes, when sufficiently large, evidenced habitation, and were often modified and incorporated into clusters of surface structures. The prehistoric utilization of the area was interpreted as short term, temporary, or seasonal and/or specialized. This interpretation was based on consistently thin cultural stratigraphic units, the absence of internal features such as fireplaces, and low artifact and midden densities. The stratigraphic consistency and ranges of dates from Sites B6-58 and B6-70 suggested that regional sites represent a "coeval occupation." The artifacts, midden, and the presence of *ahu* considered to be fishing shrines were interpreted as evidence for that fishing was emphasized.

In 1978, Davis and Griffin (1978) discussed previous research in the Barber's Point area. They recognized the tentative nature of some of the earlier hypotheses advanced by Lewis (1970) and Sinoto (1976), particularly the hypotheses suggesting permanent occupation of the area and the comments regarding plant cultivation. Davis and Griffin, on the contrary, suggested another plausible interpretation of the existing data. Their suggestion was that these sites simply represented use and re-visitation over an extended period of time. Furthermore, contrary to Lewis' earlier assertion, Davis and Griffin suggested that for techniques

cultivating atoll environments could have been readily applied to the more or less equivalent environmental context at Barber's Point. Intensive labor practices, involving mulching and tapping the subterranean brackish water lens, for example, would have permitted small-scale food production within this area.

Sinoto (1979) conducted survey and test excavations in an 80-acre parcel adjacent to the area he previously surveyed in 1976. No new architectural types were present, but Sinoto (1979:54) did note variation in the "intensity in the exploitation of the two areas." Sinoto's research also focused on continued evaluation of paleontological significance. In addition to locating over 200 testable limestone sinks using a systematic quadrant sampling design, 24 sinks were actually evaluated. Sixteen percent of the excavated sinks were found to contain avifaunal remains of extinct species, and Sinoto (1979:54) outlined four categories of significance or potential significance for the avifaunal remains he inventoried:

1. Species of birds that are totally extinct in the Hawaiian Islands, with no historic record of extinction;
2. Species of birds that still exist today in the Hawaiian Islands but occupy a totally different type of habitat from that of Barbers Point;
3. Species of birds that are extinct on O'ahu Island; and
4. Species of birds that are totally extinct in the Hawaiian Islands today, with a historic record of extinction

In the mid-1980s, resort, commercial, residential community, and public recreation developments were proposed for a 640-acre parcel situated at the far west end of the Ewa coral plain. Known as West Beach, the area was subjected to intensive inventory survey and test excavation work, which resulted in identifying 181 component features at 48 separate sites (Davis and Haun 1987). Sites included habitation complexes with and without architectural features, gardening areas, and both primary and secondary human burials. Typical features included trash dumps, large cairns and isolated examples, and numerous modified sinkholes, some containing cultural refuse.

Dating results confirmed that most of the occupation likely dated to the latter centuries of the prehistoric sequence. However, samples from some rockshelter sites and cultural deposits identified near an old buried marshland suggested initial use/occupation as early as the period of initial Polynesian settlement of Oahu, and possibly during the period of initial Polynesian settlement of the Hawaiian Islands overall. The West Beach project thus yielded the first clear evidence of early occupation within the leeward zone of O'ahu.

Recommendations for additional data collection work and data recovery excavations for the West Beach project area were formalized in the fall of 1986 in a Data Recovery Plan (Davis, Haun, and Rosendahl 1986). The fieldwork portion of this work was completed before the end of 1987, and laboratory and other analyses were undertaken during the subsequent three years. Overall, the findings of the data recovery excavations at West Beach provide a picture of the overall spatial patterning of settlement on the west end of the Ewa coastal plain. It appears that the western Ewa plain had a long initial settlement period and that initial settlement was based on a high degree of marine-oriented task specialization. Marine task specialization continued into later settlements, but it seems that in later settlements terrestrially oriented activities increased. This shift in activities suggests a concomitant shift from a very dispersed temporary occupation to a loosely nucleated one involving extended periods of residence. This nucleation apparently depended upon a functionally (task) integrated household where membership was both kin- and task-based.

CORRECTION

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

ARCHAEOLOGICAL RESOURCES ASSESSMENT

A review of previous archaeological work conducted in the vicinity of the project area is necessary in order to project what types of archaeological features might be found during the current project. The following is a brief review of relevant projects, adapted largely from Dunn and Haun (1991) and Franklin et al. (1995). For the sake of simplicity, the name "Ewa Marina Project" is used in lieu of "Ocean Pointe Project" where it appears in the source document.

PREVIOUS ARCHAEOLOGICAL WORK IN THE GENERAL VICINITY

A number of archaeological projects have been conducted on the Ewa coral plain, extending from West Loch through Ewa Beach, around Barber's Point, and to the West Beach area near Kahe Point. The most substantial recent projects include those by Lewis (1970), Davis (1980a, 1980b, 1981, 1988), Davis and Griffin (1978), Hammatt and Folk (1981), and Barrera (1975, 1986, 1985, 1990)

The earliest reference to archaeological remains in the area (Thrum 1907:46) mentions the earlier presence of a *heiau* situated on Kapolei hill in Ewa. The site was apparently destroyed for its stones, either for use in constructing fences, or to be crushed for building material (McAllister 1933), and nothing is known concerning its original size or type.

McAllister (1933) listed many sites in Honouliuli; however, most are located at Pearl Harbor or high on the ridges of the Waianae Range. The Barber's Point area and much of the Ewa coral plain are subsumed under his Site 146. Concerning this site area he states:

> Ewa coral plains, throughout which are the remains of many sites. The great extent of old stone walls, particularly near the Puuloa Salt Works, belongs to the ranching period of about 75 years ago. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation and even today one comes upon bananas and Hawaiian sugarcane still growing in them (McAllister 1933:109).

McAllister also identified a rock shelter located on the same hill (Kapolei) as the *heiau* noted by Thrum, where the pig-god, Kamapua'a, is said to have resided with his grandmother (McAllister 1933:109). A well-preserved house site and possible *heiau* located on the western part of the Ewa Plain, adjacent to Kalaeloa Boulevard, were examined by Emory (Bishop Museum Site Files [1933]). Both structures had been constructed of stacked limestone slabs and uprights, but Emory found them destroyed by sugarcane planting

In 1939, William Kikuchi removed 12 to 16 incomplete burials from a limestone sink (Site 50-Oa-B6-10) prior to the construction of the Standard Oil refinery (Oahu Sites Folder 01.1 and Site Card in Dept. Anthropology, Bishop Museum).

In 1962, Lloyd Soehren recorded a burial at the Naval Air Station (Bishop Museum Files). The burial, a secondary interment, was found in a sinkhole located near house sites and modified pits.

In 1966, Soehren recorded and excavated a possible fishing shrine that was to be destroyed by the construction of a barge harbor (Site 50-Oa16-13, Oahu Sites Folder 01.1 and Site Card in Dept. Anthropology, Bishop Museum). Excavation revealed a pre-construction layer containing large amounts of fish scales. Dog, fish, and shellfish remains, and a one-piece rotating fishhook were recovered from the layer.

A beach midden site (50-Oa-B6-14), south of the barge harbor in Camp Malakole, was recorded by Roger Green for the Bishop Museum in 1969. The site was discovered during construction of a pipeline that cut through the site, and Green collected surface artifacts, including a bone awl, a coral file, a one-piece fishhook point fragment, and a piece of cut bone. The site was subsequently tested by Davis (Davis and Griffin 1978), revealing two components, both characterized by charcoal-stained sand, charcoal, fire-cracked rocks, burned coral, and artifacts. The upper layer exhibited ash and charcoal pits.

Lewis (1970) has summarized the available historical data for the Ewa coral plain. The data indicates there was a sparse population at European contact, which was further reduced shortly thereafter. Early travelers made few comments about the region, and many native Hawaiians avoided the area, apparently preferring to use trails further inland. In 1969 and 1970, Lewis also conducted the first extensive archaeological survey and excavations in an area inland of Malakole Road. Lewis summarized his archaeological research, as follows:

> For our area we find many kinds of sites – houses and house compounds; cairns mounds, shus of myriad size and shape; pits that may have had cultural uses, walls of several types. It is obvious that the people at some time adapted themselves to life on this near-barren coral expanse. Though much of the land has been put under cane or concrete, there is yet a large area in which we may expect to find many additional sites to the few we have. Thus there is hope that we can define something of the past life of the Hawaiians who lived in such a seemingly un-Hawaiian place (Lewis 1970:48).

Lewis considered the area to be so marginal that it would only have been settled after more desirable locations had been occupied, and that one should not ascribe patterns of adaptation, known from other parts of the islands, to west Ewa. The primary food source was thought to be the sea and reef. The possibility of raising fish (mullet) in brackish-water ponds, and limited agriculture associated with pits and mounds are also noted, as is trade, as a potential means for obtaining non-marine foods and other resources.

The Department of Anthropology of the Bishop Museum conducted a reconnaissance of c. 000 acres at Barber's Point in 1975 (Barrera 1975). Inland areas were examined to relocate sites recorded by Lewis in 1969 and 1970 (Lewis 1970) and to locate additional sites. Seaward areas were examined to determine the extent and density of surface remains. A total of 24 sites was located, and historic sources were researched. Nine of Lewis's sites were relocated within the survey area, three were probably relocated, and one could not be found. At least five of Lewis' sites had been destroyed. Twelve new sites were recorded. Site types included limestone sinks, house sites, walls, cairns, enclosures, shelters, a terrace, a midden deposit, a paved area, a burial cave, and many mounds, the latter are typically constructed of coralline limestone boulders and cobbles. A triangular basalt adze was found on the surface within an enclosure.

Barrera (1975) concluded that prehistoric occupation of the Barber's Point area was demonstrated by the presence of midden and artifacts. Fishing was considered to be the primary prehistoric use of the area, and was evidenced by fish bones and scales, fishhooks, and sinkers. No evidence of agricultural activities were present, but Barrera suggested that some of the mounds may have been used for cultivation of *ti* (*Cordyline terminalis* [L.] Kunth) and sweet potato (*Ipomoea batatas* [L.] Lam.), and recommended further survey and excavations to document this possibility. The settlement pattern was described as "dispersed clusters of

residences, surrounded by a relatively open and little-inhabited area" (Barrera 1975:18). The Barber's Point locality was considered potentially important for archaeological research, because it represented "the prehistoric Hawaiian adaptation to a unique set of ecological circumstances (raised reef, low rainfall, and immediate proximity to deep ocean)" (Barrera 1975:18).

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Concurrently with implementation of the West Beach Project, PHRI undertook additional inventory survey work above Pearl Harbor's West Loch (Dicks, Haun, and Rosendahl 1987). The City and County of Honolulu proposed residential community and golf course developments on c. 916 acres located within the lower and upper valley segments of Honouliuli Gulch. Although agriculture and other disturbances to the project area were extensive, seven sites were identified during the fieldwork. These sites include both historic and prehistoric habitation and burial sites situated on Hoaeae Point and on the slopes and uplands surrounding the Honouliuli Stream floodplain. Included among the recorded features were the remnants of a once extensive agricultural system which combined aquiculture in fishponds situated on the shores of West Loch, irrigated pondfield cropping of the floodplain, and dryland cultivation of the surrounding slopes and uplands. Initial findings and radiocarbon dating results from these features suggested that the cultural sequence in the West Loch area spanned the past 1,000 years, and included a variety of agricultural and habitation activities.

In 1988 and 1989, additional data collection was recommended for six of the seven West Loch Estates and Golf Course project area sites. As with the early project, these sites included both historic and prehistoric habitation and burial sites situated in Hoaeae Point and on the slopes and uplands surrounding the Honouliuli Stream floodplain. Sites also included the remnants of a once extensive agricultural system which combined aquaculture in fishponds situated on the shores of West Loch, irrigated pondfield cropping of the floodplain, and dryland cultivation of the surrounding slopes and uplands. The historic and prehistoric sites consist of both surface and sub-surface deposits containing artifacts and midden. Initial dates on the lower valley pondfield systems range from c. AD 1100-1400, with dates from the upper valley pondfields suggesting cultivation of that portion of the project area beginning c. AD 1400-1500. Intensification of agriculture thus appears to coincide temporally with similar events documented at numerous other sites on Oahu and elsewhere in the Hawaiian Island chain. Pondfield cultivation in some areas may have continued into the early twentieth century, with rice crops replacing the earlier taro cultivation in historic times. Modern intensive sugarcane cultivation has since largely obliterated the earlier pondfield system in much of the middle and upper portions of the valley (Dunn and Haun 1991).

The initial testing results also indicate that habitation sites in the West Loch area appear to represent a similarly long time span, with Site 5321, located at the edge of the upper valley segment floodplain, occupied as early as the mid-8th to the mid-9th centuries. Subsequent use of the site is documented for the periods between the 1500s and 1900s, and between the late 1700s and early 1900s. Additionally, Site 5318, located on Hoaeae Point, appears to date to the historic period, while Sites 5319 and 5320, situated on ridges overlooking West Loch and Hoaeae Point, respectively, span late-prehistoric to early-historic times.

PREVIOUS ARCHAEOLOGICAL WORK IN THE EWA MARINA COMMUNITY PROJECT AREA

Within the Ewa Marina Community Project Area, which the Interim Retention Basin is within (*Figure 1*), initial archaeological research was undertaken by the Bishop Museum (Jourdane 1979), who conducted a reconnaissance survey of a portion of land to the north of the present project area. Jourdane found eight sites within this parcel. Shortly after Jourdane's survey, Hawaii Marine Research, Inc. was contracted to perform a survey of all of the proposed Ewa Marina Community Lands (Davis 1979b). The level of this work may be described as "intensive reconnaissance." While most archaeological sites were identified, Davis admitted that due to vegetation cover and budgetary constraints, features were probably missed. Davis broke the project up into four survey zones. Zone I included the wetlands and cluster of sites immediately east of the BPNAS boundary (64 features); Zone II extended east from Zone I to the now-defunct chicken farm north of 'One'ula Park (54 features); Jourdane's reconnaissance lands were designated Zone III (0 features), and the disturbed sugar cane lands to the north were designated Zone IV. Altogether, Davis identified 107 features in the portions of the project area not in sugar cane cultivation. Consistent with Jourdane's observations, Davis found that Zone II was extremely disturbed, containing old roads, a functioning pig farm, and modern gardens.

Hommon and Ahlo (1985) conducted a subsurface reconnaissance of the portions of the Ewa Marina Community project area that had been planted in sugar cane, with negative findings. In 1986, because five years had elapsed and the integrity of the features may have been altered, Cultural Surveys of Hawaii (CSH) was contracted to perform a reconnaissance and updated assessment of the lands surveyed by Davis (Hammatt 1986). The purpose of the survey was to relocate a sample of Davis' features and evaluate their significance in order to make mitigation recommendations for the project area. Hammatt evaluated the research potential of the area in light of the archaeological research that had taken place in the previous years at the Deep Draft harbor. CSH relocated 33 of Davis' features (eight sites), finding these features in relatively unaltered condition. Hammatt recommended further study for those features that would be impacted by the development.

Five years later, CSH returned to the Ewa Marina Community locale to prepare an assessment of the Phase II development lands (Hammatt and Shideler 1989), in the north and northwest portions of the proposed development. These lands include portions of the present project area. Hammatt and Shideler reexamined the features identified by Davis (1979b) in the Phase II lands, recommending intensive survey and testing of the area.

The Interim Retention Basin of the current project area, as well as the area that is traversed by the portion of the proposed storm drain pipes around the inland side of the Papipi Sub-division, is encompassed by a larger project area that was the focus of intensive archaeological survey and test excavations in 1990, within the One'ula Archaeological District (SIHP Site 50-OA-2873) (Dunn and Haun 1991). During the fieldwork, 53 sites consisting of 318 features were identified. The sites ranged in physical condition from poor to good and consisted of both single and multiple features. The features consisted of the following formal types: adjoining C-shape structures, adjoining enclosures, alignment (C-shape, linear, L-shape, rubble, and U-shape), cairn, concrete slab, concrete structure, C-shape structure, cupboard, enclosure (w/adjoining C-shape, w/adjoining platform, U-shape), incomplete structure, midden scatter, modified bedrock, modified sinkhole, mound, platform, rubble concentration, terrace, wall. Functional types present included agriculture, animal husbandry, bunker, ceremonial, footing, foundation, garden plot, habitation, incinerator, indeterminate, marker, temporary habitation, and well. Sixty one test units, 188 informal shovel tests, and 25 backhoe trenches were excavated during the course of this fieldwork, and 86 auger holes were also placed along the coastal area. No substantial cultural deposits were identified during the auger hole testing. A total of 176 out of 227 sinkholes were tested, and they yielded bird bone, and occasionally, midden and charcoal. No cultural deposits were uncovered in any of the trenches. The combined units contained portable artifacts, midden and dating samples. The dating samples ranged from AD 1250 to recent times. The portable artifacts consisted of indigenous artifact types such as fishhooks, octopus lures, a hammerstone, an adze fragment, and flaked stone. Non-indigenous artifacts were of recent age and included glassware, metal items, plastic items and ceramics (Dunn and Haun 1991).

During the Phase II(a) data recovery program (Franklin et al. 1995), within the same project area, an additional 98 units were excavated, primarily on sites previously tested during the intensive archaeological survey and test excavations in 1990. During these excavations, ecofactual remains recovered consisted of marine shell, fish bone, bird bone, mammal bone, and botanical remains. Marine shell remains represent a wide variety of species, comparable to those found in the testing phase. Artifacts included stone debitage (exotic basalt and volcanic glass, and locally available limestone), bone and shell fishhooks and gorgets, bone awls, coral abraders, modified shell fishhook tabs, and shaped basalt. Historic artifacts include bottles, pottery (earthenware, stoneware, and porcelain-some hand-painted), spent military ammunition, glass, can fragments, nails, barbed wire, and gate parts (Franklin et al. 1995).

Recently, PHRI conducted a supplemental archaeological survey within two coastal areas of the Ocean Pointe Project (proposed Marina Channel [5,885 sq m] and the Kalo'i Drainage Channel [4,350 sq m]), in the Land of Honouliuli, Ewa District, Island of O'ahu (TMK:9-1-018:8,9,11-13,16,17). During the project, 27 backhoe trenches were placed in the Kalo'i Drainage Channel area, and 26 backhoe trenches were placed

in the proposed Marina Channel area. In addition, three hand excavation units were placed within the immediate vicinity of the location of a burial initially identified in the Marina Channel area in 2001. No human skeletal remains or prehistoric cultural materials of any kind were identified during the trenching and excavations. The trenches and units yielded primarily recent historic trash, such as fragments of plastic, glass, paper, metal, and ceramics.

ASSESSMENT AND RECOMMENDATIONS

A review of previous archaeological work indicates the Interim Retention Basin of the current project and the portion of the proposed drainage improvements that runs around the inland side of the Papipi SubDivision has already undergone archaeological study (Dunn and Haun 1991 and Franklin, Goodfellow and Wolfen 1995) and reports for these studies have been through the SHPD review process and have been approved (SHPD letter dated June 27, 1991, from W. Paty, SHPD, to W. Kanai, U.S. Army Corps of Engineers, SHPD letter dated December 22, 1995, from D. Hibbard, SHPD, to P. Rosendahl, PHRI). During the previous archaeological inventory survey (Dunn and Haun 1991) two archaeological sites were identified in the Interim Retention Basin (Sites 4301 and 4280, *Figure 1*). Site 4301 was a recent to WWII bunker originally constructed of steel and concrete. The bunker was collapsed and had a plywood roof. Site 4280 was a possibly historic habitation platform 2.0 by 1.5 meters. It was rectangular in plan view and faced on four sides, with the southwest side completely collapsed. A 1.0 m square excavation unit placed at the feature yielded many glass and metal fragments, and was terminated at 55 cm below datum. Based on the inventory findings, Site 4301 was assessed as requiring no further archaeological work, and Site 4280 was recommended for further data collection (excavation), after the further data collection took place, no further work would be required. The further excavation was conducted during the subsequent data recovery work (Franklin, Goodfellow, and Wolfen 1995), one excavation unit was placed contiguous with the inventory survey test unit. Portable remains recovered included glass fragments and 15.88 grams of comfactual remains consisting primarily of non-marine gastropods and bivalves. Based on the unit findings the site was interpreted as a historic to recent temporary habitation probably associated with coastal recreation.

Based on a review of previous archaeological work in the project area, the only future archaeological work deemed necessary in the Interim Retention Basin area and along the previously surveyed pipeline alignment inland of the Papipi Subdivision is monitoring of subsurface modification (excavation to increase retention capacity). Initial grubbing and grading of this area should be monitored, and after the initial work only on-call monitoring would be necessary. The basin excavation will need to be monitored per the guidelines in the Archaeological Monitoring Plan, included within this report.

The Papipi Road portion of the project area has not yet undergone archeological work. Based on limited research, Papipi Road was already in existence in the 1950s and therefore at that time was not subject to historic preservation requirements. The road is a conventional blacktop road with unpaved shoulders. It is underlain with calcareous coral and algal reef deposits, with the predominant materials being gravel and silty, coralline, algal sand (R.M. Towill Corporation 2004). Portions of the road include installed drainage systems, but these do not function efficiently due to the growing population and concurrent accelerated urban development in the vicinity.

The examination of the previous archaeological work in the project area and vicinity indicates that, on the basis of number of previously identified archeological sites alone, there is only a small chance that any significant archaeological remains will be found in the planned excavation area of the road alignment. As can be seen on the map of the Ewa Marina Community project area (*Figure 2*), only a few sites were identified in the area near Papipi Road, and these are not subsurface sites. Two other factors make it extremely unlikely

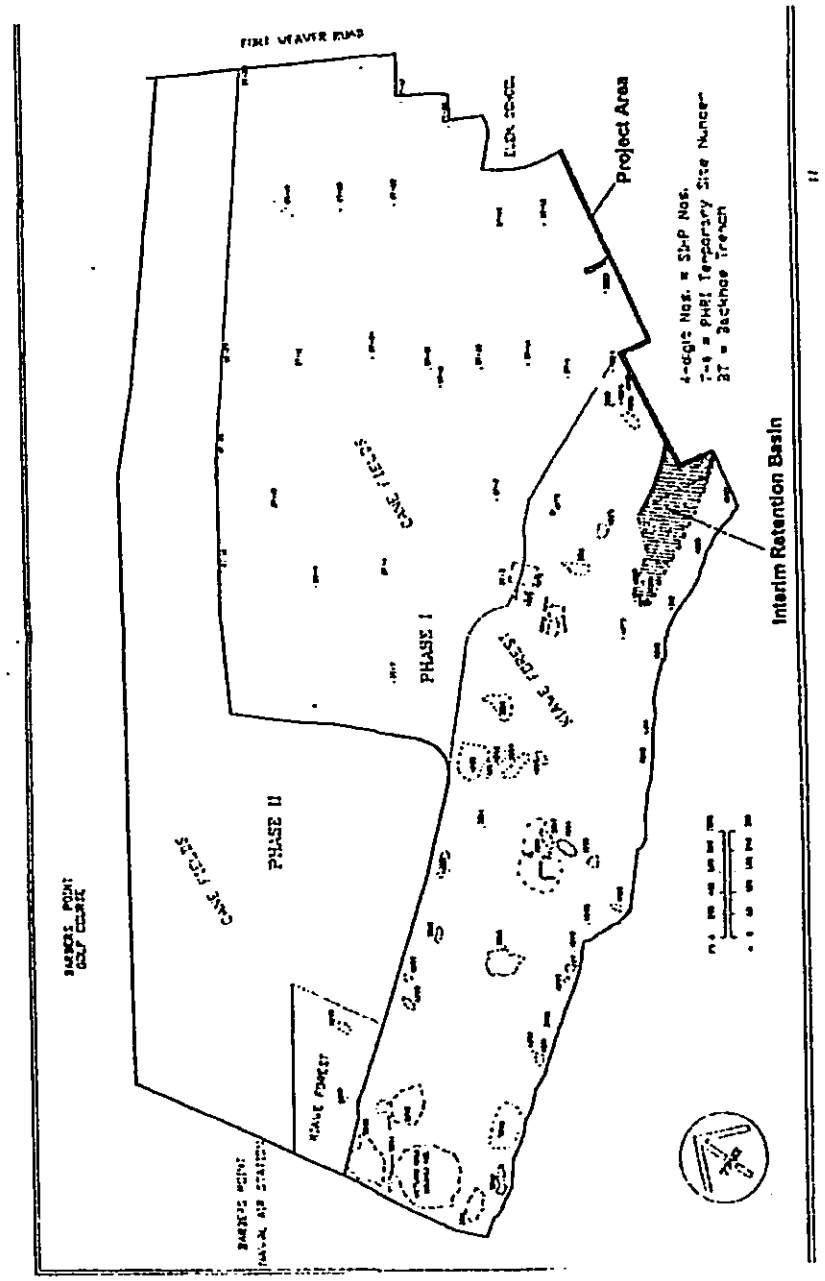

Figure 2. Overall Ewa Marina Community Project Area (from Dunn and Haun 1991)

that any significant archaeological resources would be identified. One is that Papipi Road is not underlain by soils that would likely yield such remains; the road is underlain by shallow soil and coral substrate. The second factor is the amount of modification that the roadbed has already undergone during its building. If any significant remains once were present within the area, it is highly likely they were destroyed during modifications.

Based on the above findings, it is recommended that periodic monitoring of the initial Papipi Road drainage excavations be conducted followed by on-call monitoring. The Archaeological Monitoring Plan to guide such work is presented in the following pages. The review of previous archaeological findings suggests that it is extremely unlikely any significant archaeological remains will be identified; however, if they are identified they would likely comprise: (a) human burials [Rikuchi for Bishop Museum in 1959 identified human burials in limestone sinks on the Ewa plain; Soehren identified a burial in a sinkhole near house sites], (b) holes and pits used for cultivation, (c) buried midden or artifact deposits, and (d) buried foundations of former structures.

ARCHAEOLOGICAL MONITORING PLAN

This plan details the procedures that will be followed during the monitoring of construction work for the proposed drainage improvements. This program of archaeological monitoring will be conducted in general accordance with Chapter 279: *Rules Governing Minimal Standards for Archaeological Monitoring Studies and Reports*; Hawai'i Administrative Rules, Title 13, Department of Land and Natural Resources; Subtitle 13, State Historic Preservation Division (adopted December 2005). This monitoring plan shall be reviewed and approved by the SHPD prior to the monitoring project, unless otherwise agreed to by the SHPD, and the SHPD shall be notified via facsimile upon the onset and completion of the proposed undertaking.

MONITORING AREA

As detailed in the Drainage Master Plan, Papipi Road Improvements (R.M. Towill 2004) the drainage system will be along the frontage of the Ocean Pointe project and along the existing residential lots fronting Papipi Road in the Papipi Drive area, as well as a drainage along the back side of the Papipi Subdivision area. The drainage system will include a new ocean outlet located near the Oneula Beach Park area. The system will consist of an underground culvert with curbs, gutters, and catch basins along the Ocean Pointe frontage. Curbs and gutters will not be used along the frontage of Papipi Subdivision since runoff from the existing houselots would be impeded by a raised curb along the roadway. Instead, a grassed swale with grated drain inlets will be used along the frontage and rear of Papipi Subdivision (R.M. Towill 2004). A new Drainline "A" will be installed along the *mauka* side of Papipi Road starting at a naturally occurring sag point in front of Ewa Beach Elementary School. The line will run along the Ocean Pointe 5B and 8C areas and behind Papipi Subdivision. It will run back toward Papipi Road, near the intersection with Papu Street, and continue along the Papipi Road extension toward Oneula Beach Park. From there it will turn and exit into a grassed swale flowing to the ocean. Drainline "B" will be constructed along the frontage of Papipi Subdivision and will extend along Papipi Road from the intersection with Papu Street to the east intersection with Papipi Drive. This drain will serve the lots fronting Papipi Road between the two intersections with Papipi Drive and utilize grate inlets and a grass swale along the edge of Papipi Road to capture runoff. The drainlines will be placed within the shoulder area as much as practicable to minimize traffic "loading" (R.M. Towill 2004).

PRE-CONSTRUCTION ACTIONS

A short, on-site pre-construction meeting will be held and will include a presentation regarding archaeological monitoring rules and procedures relating to the observation and identification of inadvertent discoveries. This meeting will be attended, as appropriate, by archaeological monitors, the project construction manager, field supervisors, and construction crewmembers.

METHOD OF MONITORING

It is recommended that initial grubbing and grading of the Interim Retention Basin be subject to archaeological monitoring. Following this, monitoring could be on an "on-call" basis. For the Papipi Road drainage system area, given the nature of the subsurface in the project area, and the remoteness of encountering any significant archaeological resources (see *Assessment and Recommendations* section, page ten, fourth and fifth paragraphs), periodic monitoring of initial excavations for the drainlines would be required. After the initial excavations, only on-call monitoring would be necessary.

The archaeological monitoring would be done by a qualified archaeologist who will inspect soil material as it is removed from excavations. If any significant cultural remains are encountered, the monitor(s) will initiate the following procedures.

Intact Cultural Deposits

If intact cultural deposits are discovered during monitoring, an assessment will be made as to their integrity and significance. If deemed significant, and the deposit is likely to be further impacted by construction activities, work in the immediate affected area will be halted, and an appropriate mitigation strategy developed in consultation with SHPD.

Cultural Features

Any significant cultural features observed during grading and excavations will be fully described, drawn, and photographed. Provenience information will be recorded and related to an established project datum ensuring accurate horizontal and vertical placement. The limits of the feature will be defined, if possible without further excavation, and any associations natural or cultural remains (including surrounding soil) will be noted. Where appropriate, samples for further analyses will be collected.

Portable Artifacts

Portable artifacts observed in the removed soil will be collected and general provenience recorded. The precise locations of any items identified in place will be recorded and the items collected. Any observed associations will also be documented.

Human Skeletal Remains

In the unlikely event human skeletal remains are encountered the procedures for the inadvertent discovery of human skeletal remains outlined in the current Hawai'i Administrative Rules for the treatment of burial sites and human remains (DLNR 1990) that were formally approved and adopted by the State of Hawai'i in September 1990 will be followed. All work in the immediate area of the discovery will be halted, the remains stabilized, and the appropriate authorities contacted. If the skeletal remains are determined to be historic or pre-contact (as opposed to recent), PHRI will consult with SHPD regarding how to proceed with the discovery. If the remains are determined to be recent, the Hawai'i County Police Department will be contacted.

Stratigraphy

To document the depositional history of the project area, a representative sample of excavation unit profiles will be drawn and described. In areas where cultural remains are encountered, in addition to drawings and descriptions, photographs of the stratigraphy will also be taken. The monitor will also record observations about excavation unit profiles that are not formally recorded.

TREATMENT OF RECOVERED REMAINS

A secure location will be established on the grounds of the project site to temporarily store all recovered cultural remains. The collected items will be recorded in a field catalog, and, upon completion of monitoring fieldwork, the disposition of the items will be as follows.

Cultural Material

All cultural remains other than burials would need to be treated in accordance with the current requirements and specifications contained in the SHPD Hawai'i Administrative Rules (HAR) §13-280 (*Rules Governing General Procedures for Inadvertent Discoveries of Historic Properties During a Project Covered by the Historic Preservation Review Process*; effective December 11, 1995).

Portable artifacts recovered during monitoring will be removed to the PHRI laboratory. Artifacts from intact contexts will be analyzed, those recovered from fill will simply be cataloged. Analyzed items will be cleaned, weighed, measured, and illustrated (if appropriate). Analyses will include formal description and functional interpretation. Following this, they will be curated by PHRI, the SHPD, or the client, as appropriate, depending on the nature of the recovered materials.

Recovered Samples

All recovered samples (soil, charcoal, etc.) will be initially processed in the PHRI laboratory before being dispersed to the appropriate specialists for detailed analyses.

Human Skeletal Remains

If any potentially significant cultural remains such as buried cultural deposits or human skeletal remains were to be identified during construction work, such remains – which would be designated as "inadvertent discoveries" – would be treated in compliance with the appropriate SHPD rules. Any human skeletal remains would be treated in accordance with the current requirements and specifications contained in the SHPD Hawai'i Administrative Rules (HAR) §13-300-40 (*Rules of Practice and Procedure Relating to Burial Sites and Human Remains: Inadvertent discovery of human*; effective September 1990). If SHPD determines either the removal or the in-place preservation of buried Native Hawaiian human remains to be the appropriate course of action, then a Burial Treatment Plan to guide either disinterment and relocation or in-place preservation will be developed in consultation with SHPD, the Hawai'i Island Burial Council, and any recognized lineal and cultural descendents. If osteological analysis is deemed appropriate, the analysis will comply with the current Hawai'i Administrative Rules for the treatment of burial sites and human remains (DLNR 1990).

REPORTING

Upon completion of all archaeological monitoring fieldwork and appropriate post-field data analyses, within 180 days of completion of the proposed undertaking, a Final Monitoring Report covering both the on-site and off-sites activities will be prepared and submitted to the SHPD for review. This report will follow the specifications outlined in the Hawai'i Administrative Rules, *Rules Governing Minimal Standards for Archaeological Monitoring Studies and Reports* (adopted December 2003). If any human skeletal remains are recovered and analyzed as part of the monitoring project they will be addressed in the final monitoring report following procedures contained in the current administrative rules for the treatment of burial sites and human remains (DLNR 1990).

CURATION OF RECOVERED ITEMS

PHRI maintains an SHPD-approved curation facility. Any material recovered during the project will be temporarily stored at the PHRI curation facility in Hilo for a period of no more than one year following submission of the Final Monitoring Report, during which time arrangements will be made for permanent curation in consultation with the property owner and/or lease holder and SHPD. It is the developer's responsibility to secure permanent curation in an acceptable facility; included in this responsibility are the costs associated with long-term curation.

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PHRI Report #177-121004 December 2004

CULTURAL IMPACT ASSESSMENT FOR DRAFT ENVIRONMENTAL ASSESSMENT

OCEAN POINTE/PAPIPI ROAD DRAINAGE IMPROVEMENTS PROJECT

OCEAN POINTE PROJECT

Land of Honouliuli, 'Ewa District, Island of O'ahu (TMK:9-1-55,56)

Prepared by
Paul H. Rosendahl, Ph.D., Inc. (PHRI)

The purpose of this cultural impact assessment is to comply with the requirements of Chapter 343 (Haw. Rev. Stat.), as amended by H.B. No.2895 H.D. 1 of the Hawai'i State Legislature (2000) and approved by the Governor as Act 50 on April 26, 2000, and which among other things requires that environmental assessments (EA) and environmental impact statements (EIS) identify and assess the potential effects of any proposed project upon the "...cultural practices of the community and State..." Chapter 343 (Haw.Rev.Stat.) was amended by the State legislature because of the perceived need to assure that the environmental review process explicitly addressed the potential effects of any proposed project upon "...Hawai'i's culture, and traditional and customary rights." Guidelines previously prepared and adopted by the State Office of Environmental Quality Control (OEQC 1997) provide compliance guidance. Both Act 50 and the OEQC Guidelines for Assessing Cultural Impacts mandate consideration of all the different groups comprising the multi-ethnic community of Hawai'i. This inclusiveness, however, is generally understated, and the emphasis—as indicated by the intent and evolution of both the legislative action and the guidelines—is clearly meant to be primarily upon aspects of Native Hawaiian culture—particularly traditional and customary access and use rights.

In assessing the cultural impacts for the current project area, several factors were considered:

(a) The probable number and significance of known or suspected cultural properties, features, practices, or beliefs within or associated with the specific project area, and the potential effects to these by the current project;

(b) The potential number of individuals (potential informants) with cultural knowledge of the specific project area;

(c) The availability of historical and cultural information on the specific project area or immediately adjacent lands; and

(d) The physical size, configuration, and natural and human modification history of the specific project area.

Concerning Items (a) and (c), based on the findings of previous archaeological work (Dunn and Haun 1991; Franklin et al 1995) only two archaeological sites were identified in the project area. Site 4301 was a WWII/recent bunker. Site 4280 was a possible historic habitation platform. Dunn and Haun (1991) assessed Site 4301 as requiring no further archaeological work. Site 4280 was recommended for excavation, after which no further work was required. Based on the excavation findings the site was interpreted as a historic to recent temporary habitation probably associated with coastal recreation. Dunn and Haun (1991) and Franklin et al. (1995), during their extensive historical and cultural background research, did not identified any practices or beliefs that would be associated with the current project area, other than the fact that prehistoric Hawaiians exploited the coastal region for resources.

Concerning Item (b), the vicinity of the project area has undergone extensive background research during the course of the many previous archaeological and other scientific studies in the area, and this has been done over decades. For this reason it is believed that the potential for further informants is low, and the potential for further informant knowledge of specific cultural use of the current project area is extremely low.

Item (d) concerns the size of the project area and its status regarding modifications. The area of the current project area is small (PHRI 2004: Figure 1) and the area and its vicinity has been heavily modified over decades. The Papipi Road drainline portion of the project area has been, of course, heavily modified during construction of the existing roadbed. Information in Dunn and Haun (1991) and Franklin et al. (1995) indicates the remaining portions of the current project area have generally been subject to bulldozing and extensive historic use, including use during WWII, use for animal husbandry, and use for modern agriculture (sugarcane and other crops). The area has also seen heavy use as a recreational area (fishing, camping, picnicking, vehicular use).

Based on the above, this study assumes that: (a) potential cultural impact assessment issues would be highly unlikely; (b) the results of the previous archaeological studies confirm both the greatly altered physical nature of the project area and the absence of cultural resources within or related to the project area; and (c) in the unlikely instance that any legitimate cultural impact assessment issues should arise during the environmental review period, they could be addressed adequately within the framework of the review process (i.e., from Draft to Final Environmental Assessment).

Furthermore, there is no indication of any kind that the project area has resources necessary to or currently being used by either Native Hawaiian cultural practitioners exercising traditional and customary access and use rights for any purposes or by individuals of any other cultural affiliation for any traditional cultural purposes except for coastal resources.

Based on the lack of any evidence that the project area is currently being used for legitimate traditional cultural purposes by either Native Hawaiian cultural practitioners or individuals of any other cultural affiliation, it can be concluded that the proposed Ocean Pointe/Papipi Road Drainage Improvements Project should have no significant effects— much less any adverse impacts—upon any cultural resources, and that no mitigation measures of any kind are needed.

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APPENDIX C. TYPICAL SECTIONS

Typical Section – 'Ewa Beach Center

Typical Section – 'Ewa Beach Elem. "A"

Typical Section – 'Ewa Beach Elem. "B"

Typical Section – 'Papipi Road (Fronting Area IIIB)

Typical Section – Pāpipi Road (Fronting Area IIIC)

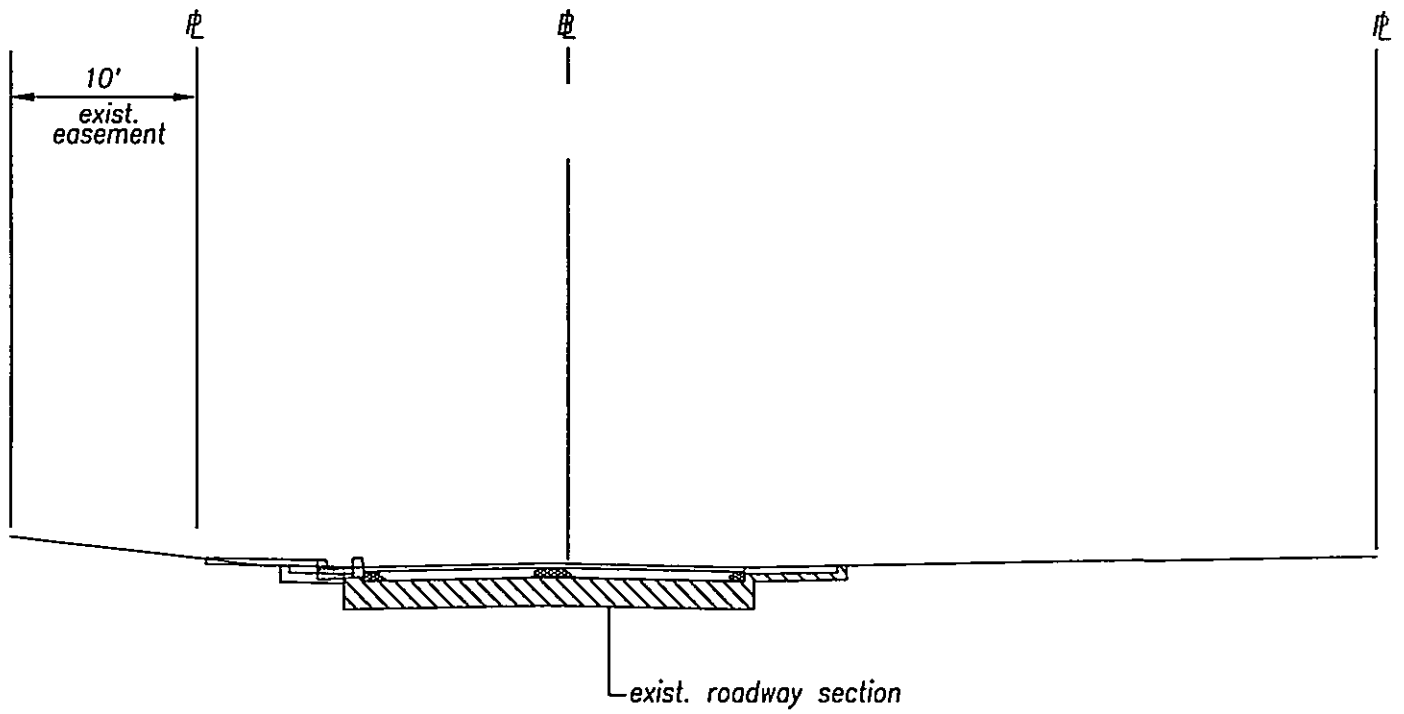
Typical Section – Pāpipi Road One'ula Beach Park Extension

Typical Section – Pāpipi Subdivision

Street Tree Plan – 1

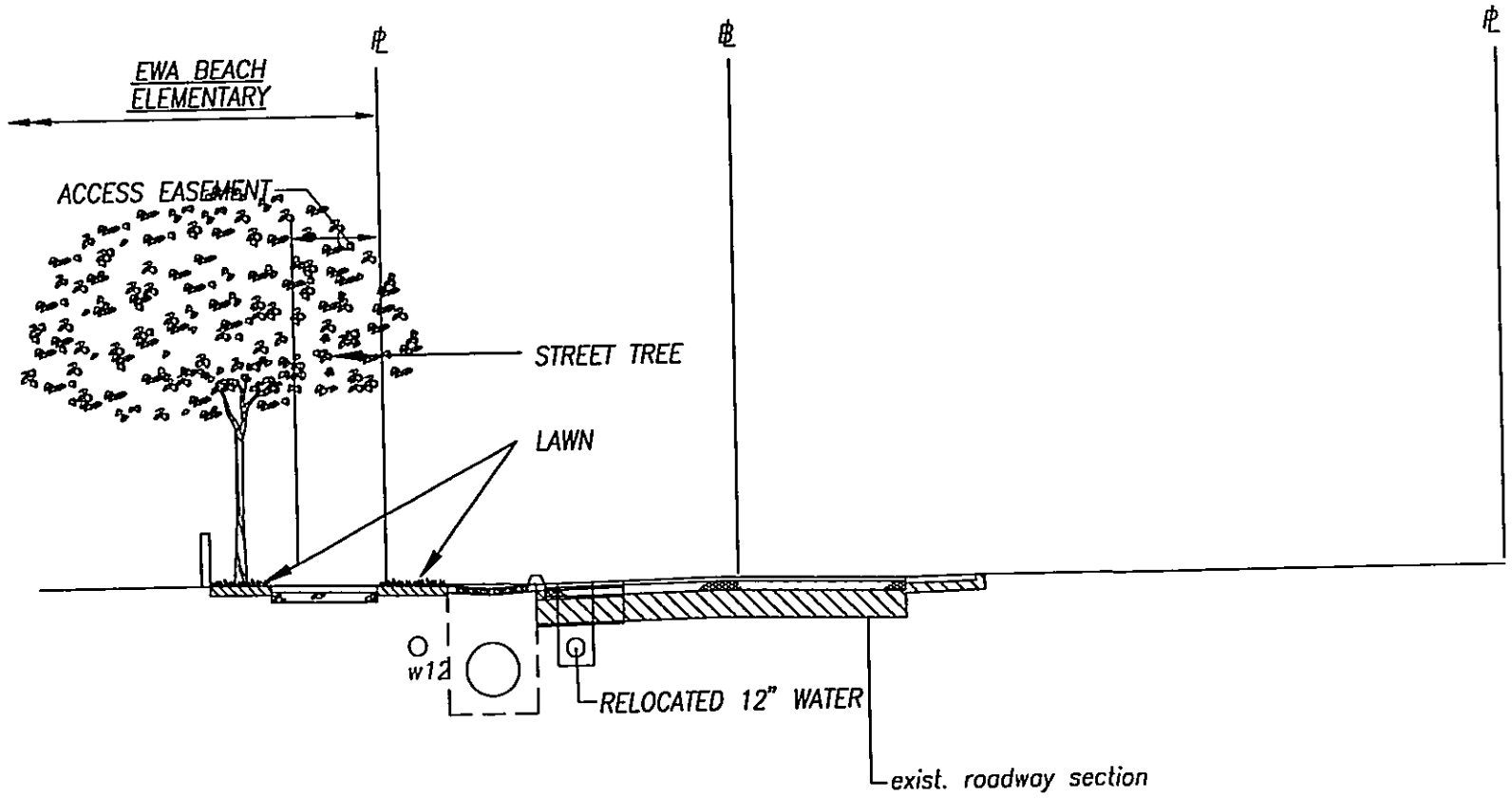
Street Tree Plan – 2

Plant List & Details



TYPICAL SECTION – EWA BEACH CENTER

SCALE: 1" = 10'



TYPICAL SECTION – EWA BEACH ELEM. "A"

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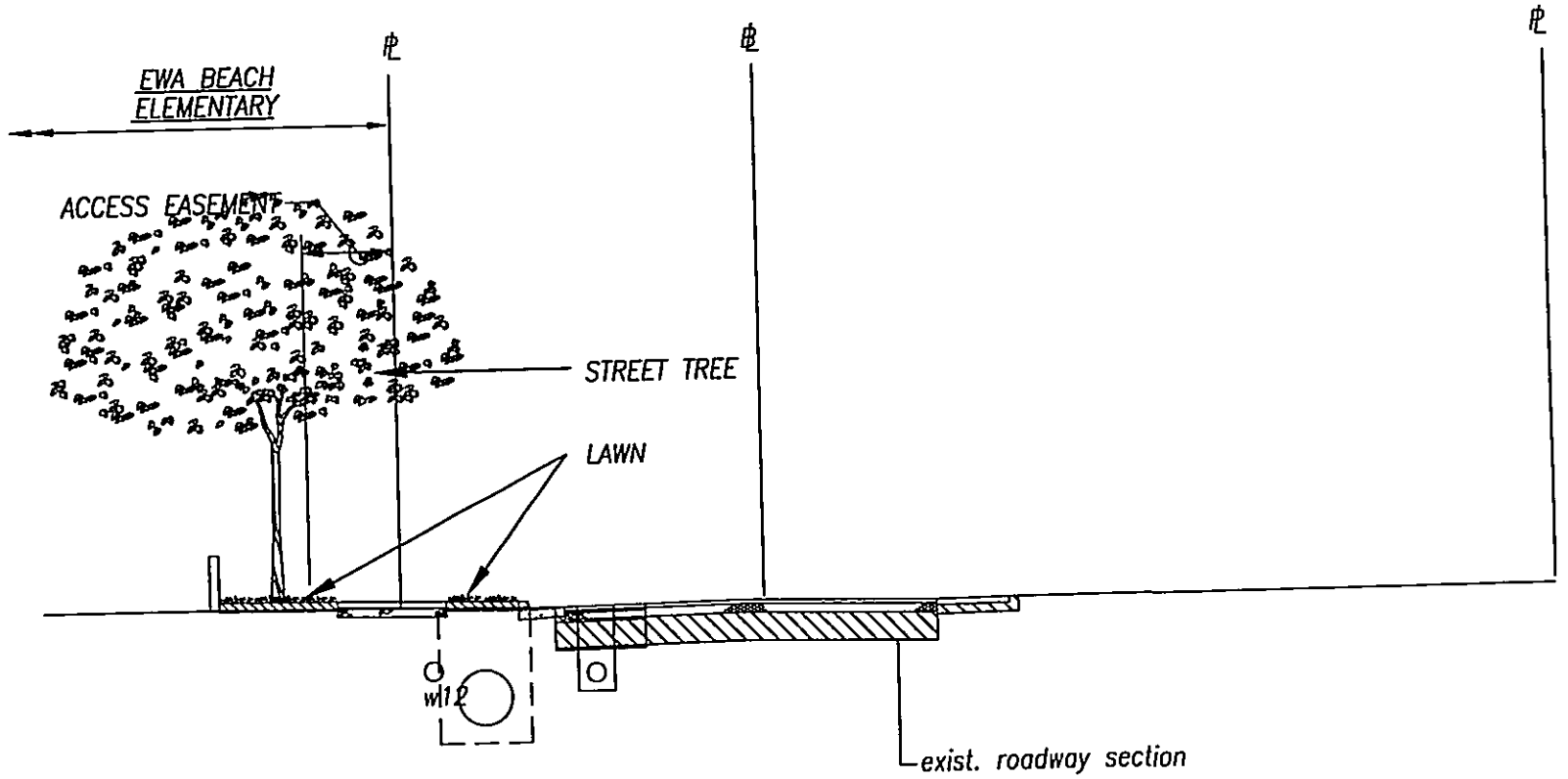

TYPICAL SECTION – EWA BEACH ELEM. "B"

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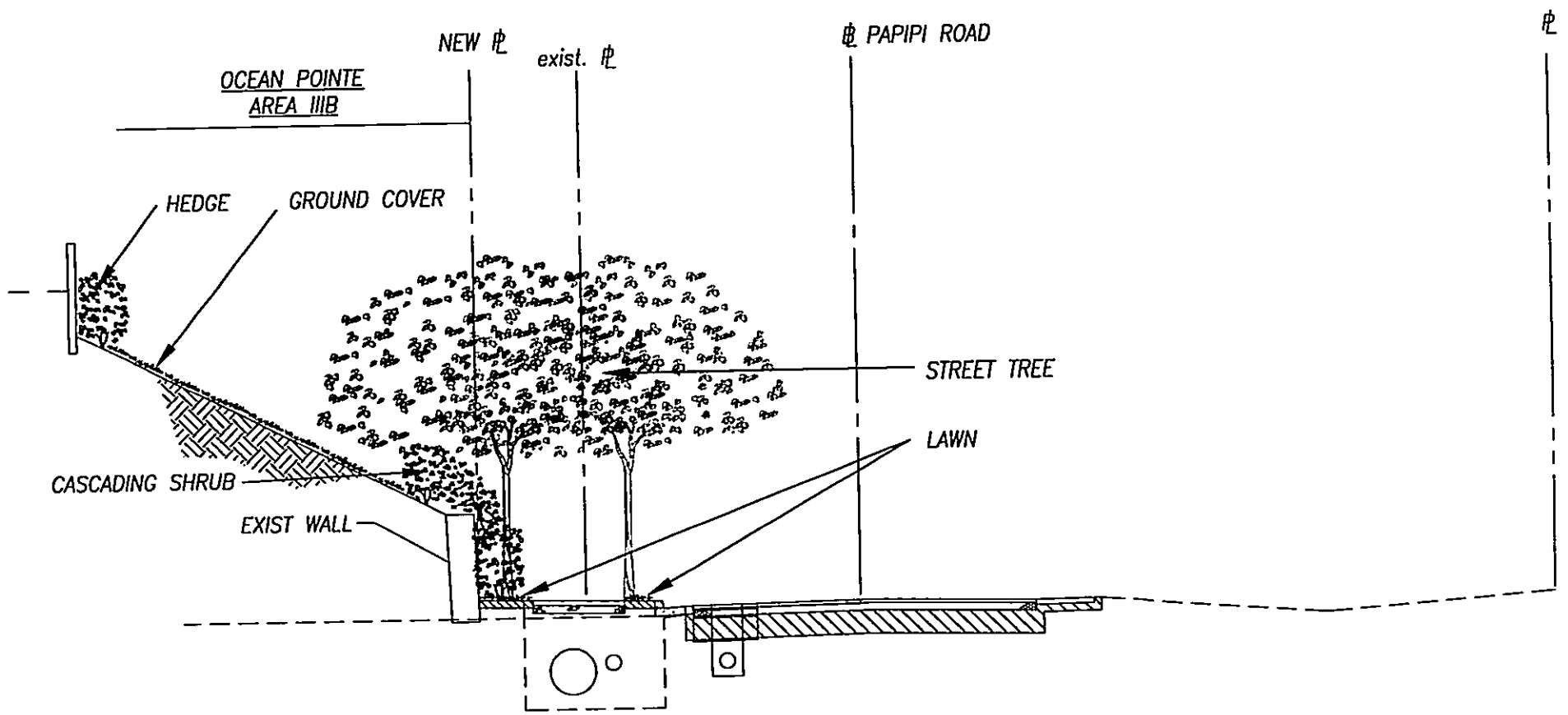
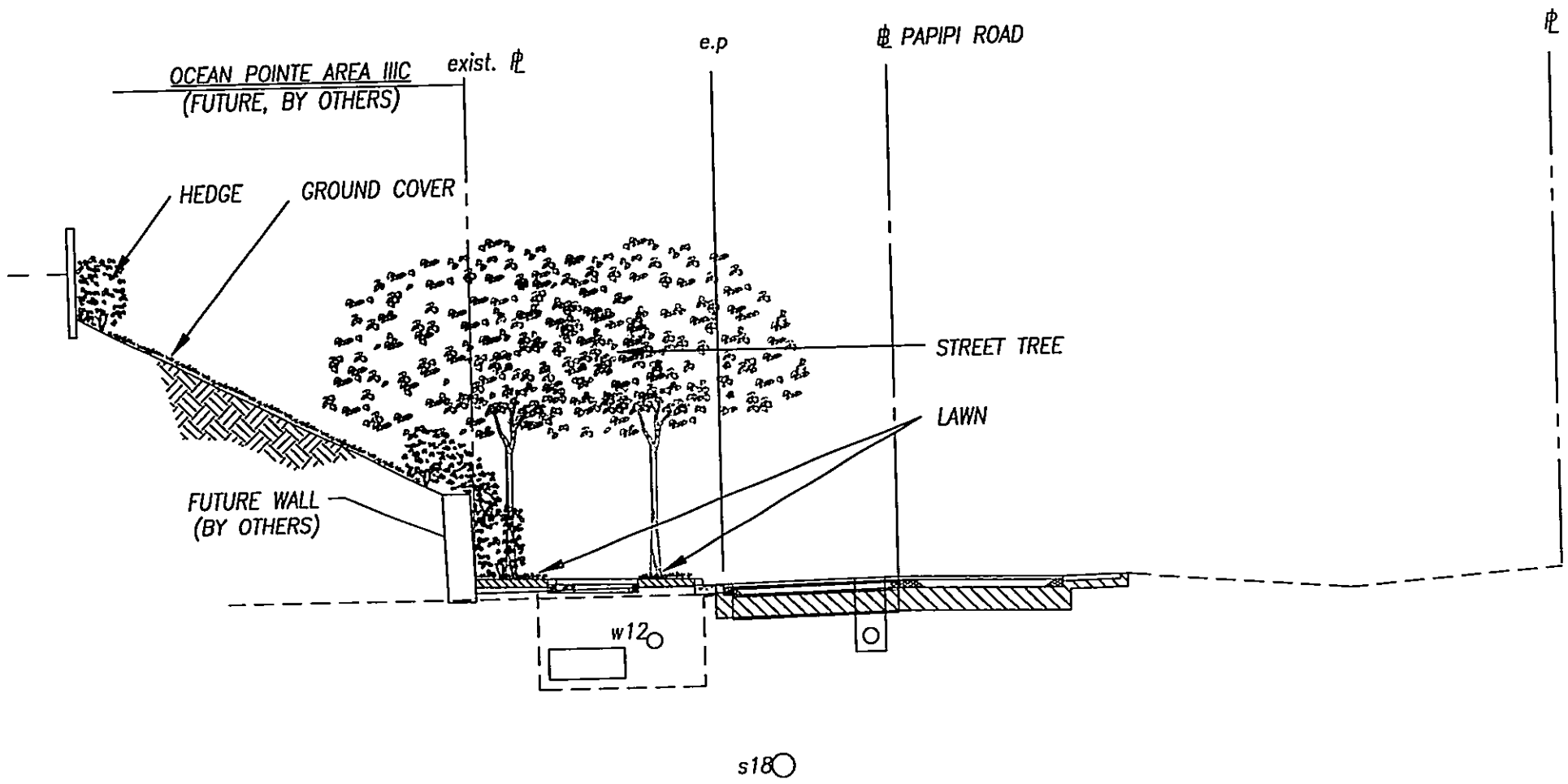


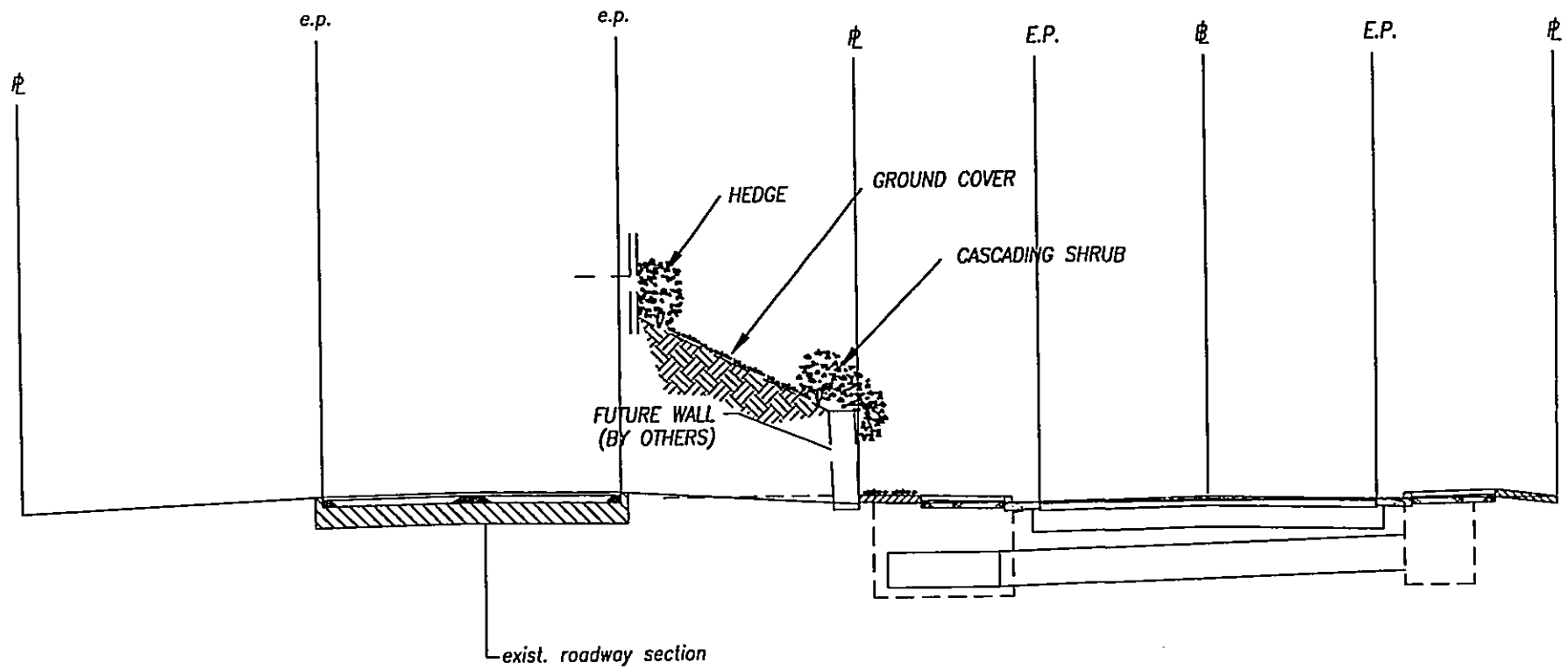
TYPICAL SECTION – PAPIPI ROAD (FRONTING AREA IIIB)

SCALE: 1" = 10'



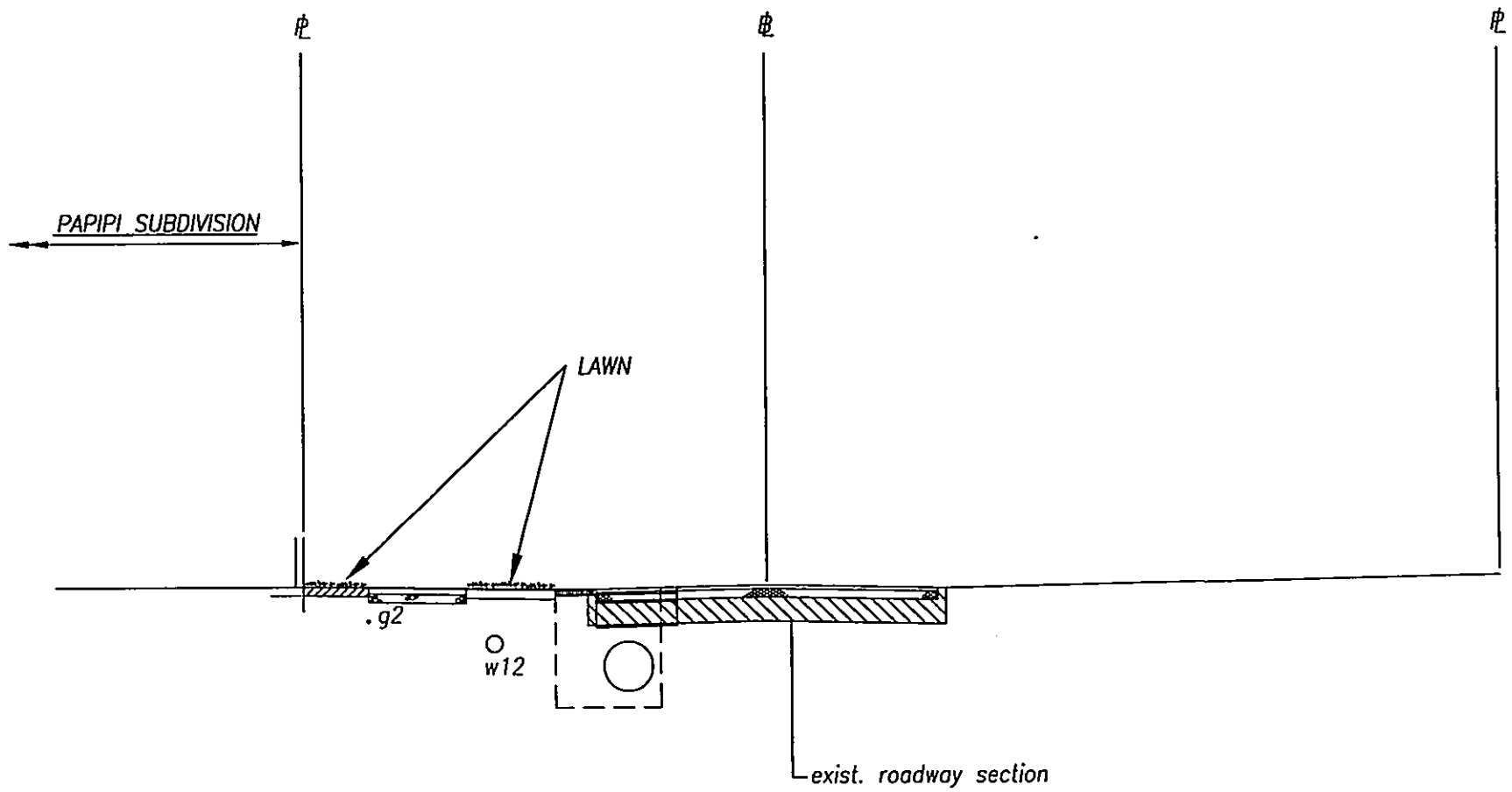
TYPICAL SECTION – PAPIPI ROAD (FRONTING AREA IIIC)

SCALE: 1" = 10'



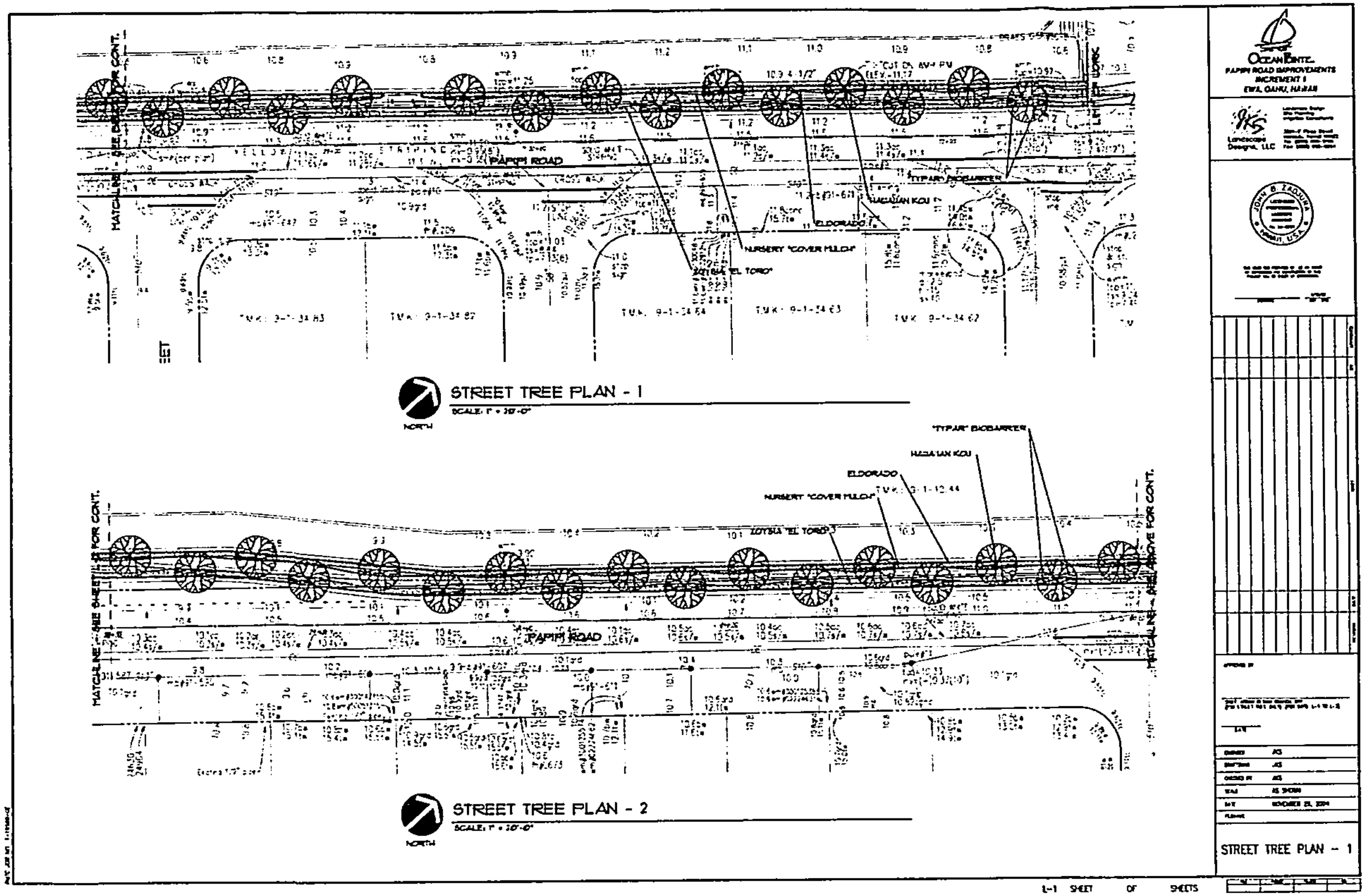
TYPICAL SECTION – PAPIPI ROAD ONEULA BEACH PARK EXTENSION

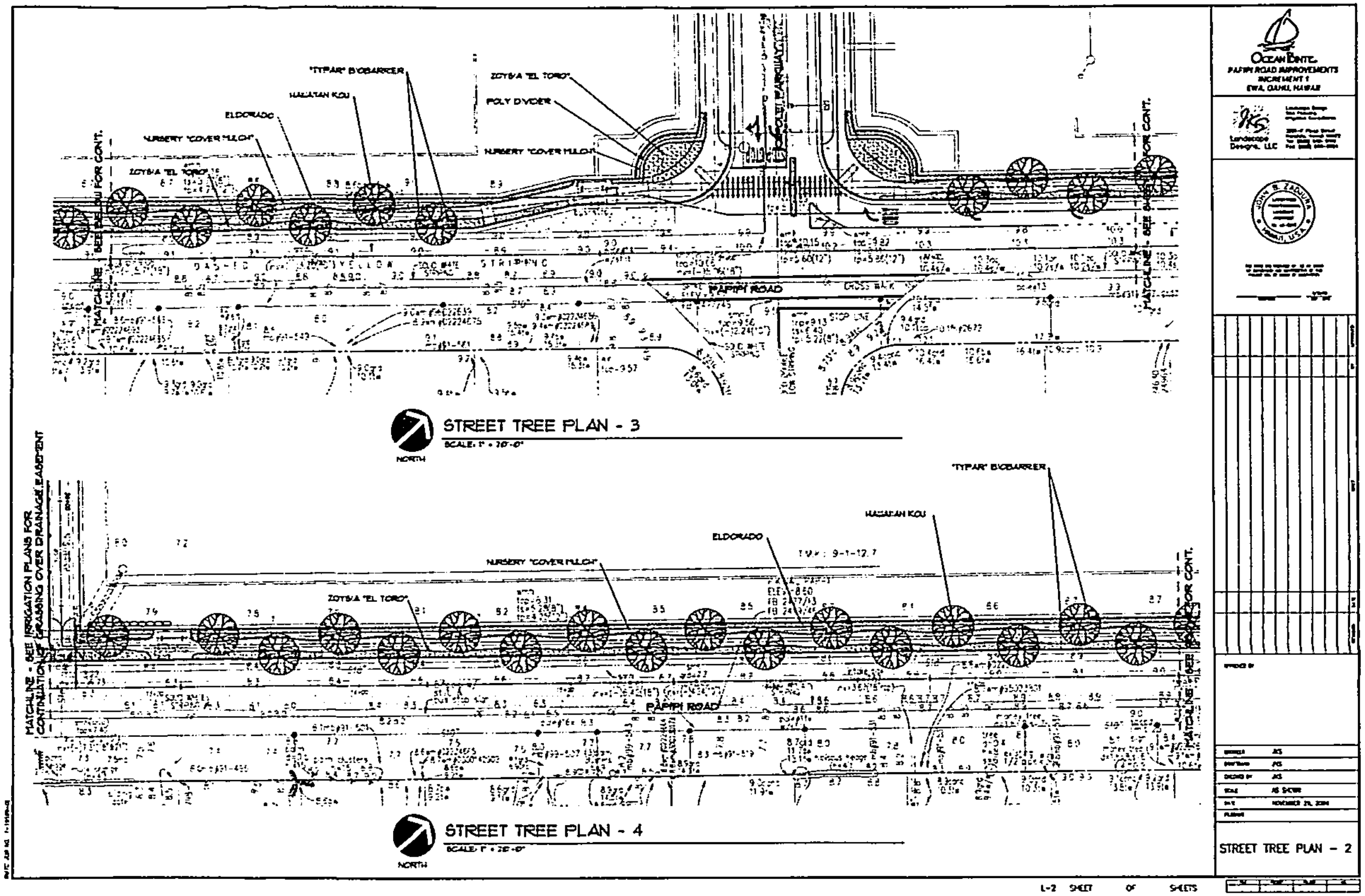
SCALE: 1" = 10'



TYPICAL SECTION – PAPIPI SUBDIVISION

SCALE: 1" = 10'


MATCHLINE - SEE DETAIL FOR CONT.
PAPIPI ROAD
NURSERY "COVER MULCH"
ZOYSIA "EL TORO"
ELDORADO
HAWAIIAN KOU
"TYPAR" BIOBARRIER
LIMIT OF WORK
STREET TREE PLAN - 1
SCALE: 1" = 20'-0"
NORTH
MATCHLINE - SEE ABOVE FOR CONT.
STREET TREE PLAN - 2
SCALE: 1" = 20'-0"
OCEAN POINTE
PAPIPI ROAD IMPROVEMENTS
INCREMENT I
EWA, OAHU, HAWAII
Landscape Designs, LLC
JOHN B. ZAQUDA
STREET TREE PLAN - 1
L-1 SHEET OF SHEETS

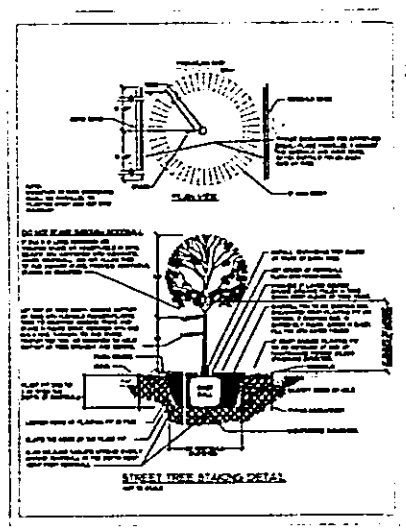


"TYPAR" BIOBARRIER
HALIAKAN KOU
ELDORADO
NURSERY "COVER MULCH"
ZOYSIA "EL TORO"
POLY DIVIDER
MATCHLINE - SEE BELOW FOR CONT.
MATCHLINE - SEE SHEET FOR CONT.
PAPIPI ROAD
STREET TREE PLAN - 3
SCALE: 1" = 20'-0"
NORTH
MATCHLINE - SEE IRRIGATION PLANS FOR CONTINUATION OF GRASSING OVER DRAINAGE EASEMENT
T.M.K.: 9-1-12:7
STREET TREE PLAN - 4
SCALE: 1" = 20'-0"
NORTH
OCEAN POINTE
PAPIPI ROAD IMPROVEMENTS
INCREMENT 1
EWA, OAHU, HAWAII
Landscape Designs, LLC
STREET TREE PLAN - 2
L-2 SHEET OF SHEETS

PLANT LIST & MISCELLANEOUS

QUANTITY	COMMON / BOTANICAL NAME	SIZE & REMARKS
57	HAWAIIAN KOU / CORDIA SUBCORDATA	25 GALLON CAN, 10'-0" HEIGHT, 3'-4" SPREAD, 2" CALIPER, 8' CLEAR BEFORE BRANCHING
15,200 S.F.	ELDORADO / ERANTHEMUM SP.	1 GALLON CAN, 12" HEIGHT, 8" SPREAD, @ 2'-0" O.C. SPACING
16,000 S.F.	ZOYSIA "EL TORO" / ZOYSIA SP.	2" PLUGS @ 4" O.C. SPACING
148 C.Y.	NURSERY "COVER MULCH" - HAWAIIAN EARTH PRODUCTS	3" LAYER UNDER SHRUBS
91	TREE TRUNK PROTECTOR	DEEP ROOT PARTNERS, "ARBORGUARD", "NO. 15-4"
12,300 L.F.	"TYPAR" BIOBARRIER	15½" MIN. WIDTH
1240 C.Y.	IMPORTED SCREENED SOIL - 6" DEPTH	SUPPLIED AND INSTALLED BY DEVELOPER
1100 L.F.	POLY DYDER	

NOTE:
ALL TREE / PALM PLANTING PITS SHALL BE OVER EXCAVATED BY 3 TIMES THE SIZE OF ITS ROOTBALL AND 2½ TIMES THE DEPTH. THE OVER EXCAVATION IS REQUIRED FOR THE GROWING PERIOD OF THE TREE / PALM. NO CORAL PARTICAL REMNANTS OR HIGH SALINITY SOILS SHALL BE ALLOWED AS BACKFILL MIX. ONLY APPROVED TESTED & AMENDED SOIL SHALL BE USED.



STREET TREE STAKING DETAIL

STREET TREE NOTES

1. UPON INSTALLATION OF THE STREET TREES, THE INSTALLER/CONTRACTOR SHALL CONTACT STANLEY ORA OF THE DIVISION OF URBAN FORESTRY, DEPARTMENT OF PARKS AND RECREATION (DPR) AT 973-7851 TO SCHEDULE AND INSPECTION OF THE TREES' INSTALLATION. NOTIFICATION MUST BE GIVEN AT LEAST SEVEN (7) DAYS PRIOR TO FINE PLANTING AND FINAL INSPECTIONS. A NOTICE OF ACCEPTANCE WILL BE MAILED BY THE BEAUTIFICATION ADMINISTRATOR WHEN HE HAS DETERMINED THE TREES HAVE BEEN PROPERLY INSTALLED AND MAINTAINED.
2. THE STREET TREE MAINTENANCE PERIOD SHALL BE FOR SIXTY (60) CALENDAR DAYS OR UNTIL PROJECT MAINTENANCE HAS BEEN ASSUMED BY ABUTTING PROPERTY OWNER.
3. THE STANDARD CITY AND COUNTY OF HONOLULU DEPARTMENT OF PARKS AND RECREATION SPECIFICATIONS FOR STREET TREE PLANTING AND LANDSCAPING SHALL BE MADE PART OF THE CONSTRUCTION DOCUMENTS.
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6. APPROVAL IS FOR STREET TREE PLANTING WITHIN THE ROAD RIGHT-OF-WAY ONLY. IT IS NOT AN APPROVAL OF THE PLANTING AND IRRIGATION PLAN OUTSIDE OF THE ROAD RIGHT-OF WAY.
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B. THE STREET TREE LIGHTING SYSTEM SHALL BE KEPT OPERATIONAL DURING CONSTRUCTION. ANY RELOCATION REQUIRED SHALL BE APPROVED BY THE MECHANICAL / ELECTRICAL DIVISION AND ENGINEERING DIVISION, DEPARTMENT OF DESIGN AND CONSTRUCTION AND PAID FOR BY THE CONTRACTOR.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES TO THE CITY'S EXISTING STREET LIGHTING FACILITIES, TRAFFIC SIGNAL FACILITIES (INCLUDING THE "TRAFFIC SIGNAL INTERCONNECT SYSTEM", COMMUNICATIONS FIBER OPTIC CABLE SYSTEM AND TRAFFIC SIGNAL FIBER OPTIC CABLE SYSTEM". ANY AND ALL DAMAGES TO THESE FACILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT HIS COST IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY AND COUNTY OF HONOLULU.

STREET TREE NOTES:
STREET TREE PLANTING STANDARDS (MINIMUM CLEARANCE)

STREET FEATURE	DESIRABLE DISTANCE
STREET INTERSECTION	30'
STORM DRAIN / WATER /	5'
SEWER LINE	5'
UTILITY POLE	5'
FIRE HYDRANT	5'
ELECTROLIER (STREET LIGHTS)	5'
PEDESTRIAN CROSSWALK	5'
DRIVEWAY	5'
ANOTHER TREE	20'

TREE SIZES ARE: "SMALL" IF UP TO 25 FEET IN HEIGHT, "MEDIUM" IF BETWEEN 26 TO 35 FEET, AND "LARGE" IF HIGHER THAN 35 FEET.

OCEAN POINTE
PAPAPI ROAD IMPROVEMENTS
INCREMENT 1
EWA, OAHU, HAWAII

Landscape Designs, LLC

JOHN B. FAGUNY
LICENSED
PROFESSIONAL
ENGINEER
HAWAII, U.S.A.

DESIGNED	JFS
DRAFTED	JFS
CHECKED BY	JFS
SCALE	NOT TO SCALE
DATE	NOVEMBER 28, 2004
FILENAME	

PLANT LIST & DETAILS

L-1 SHEET OF SHEETS

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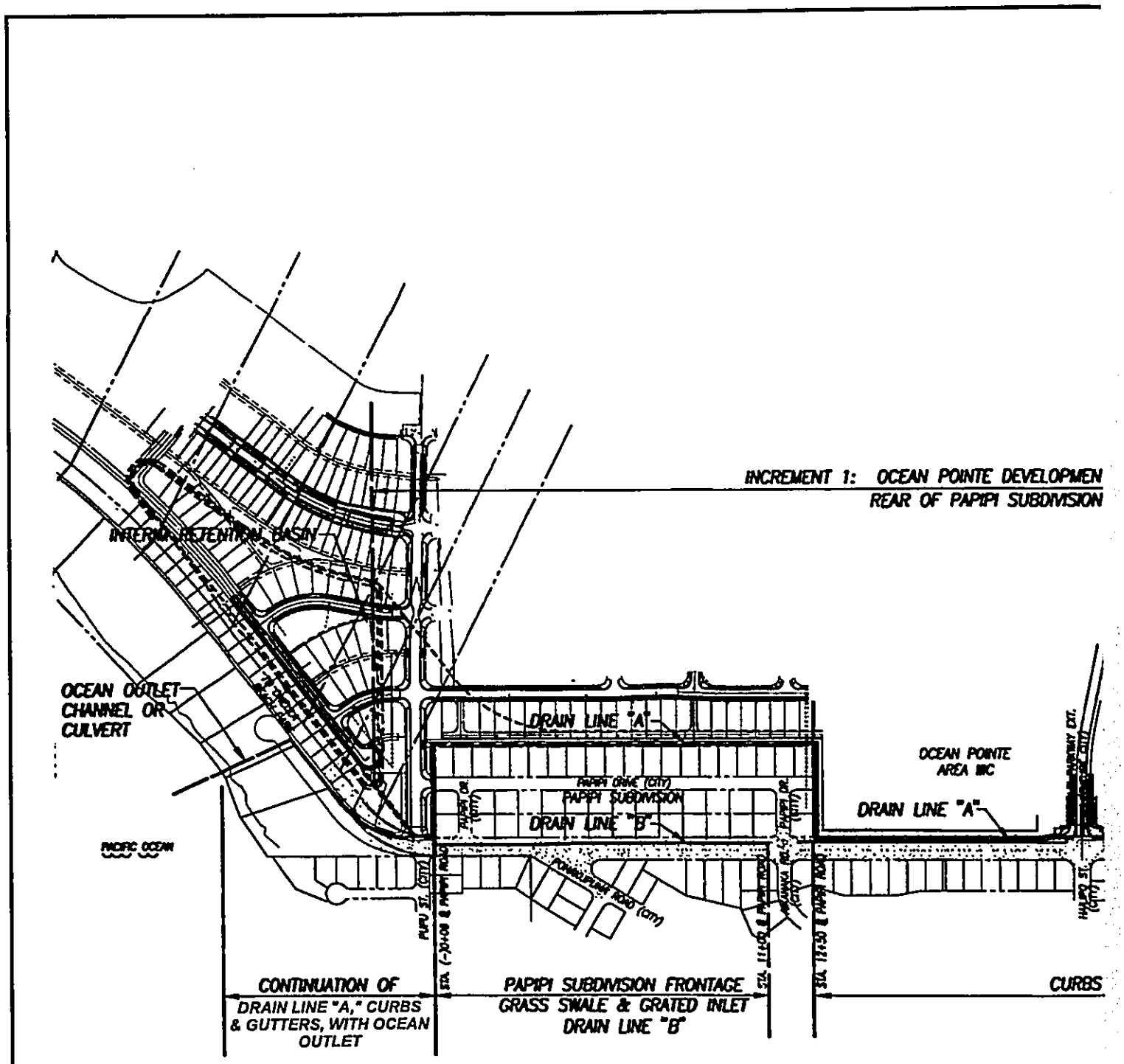

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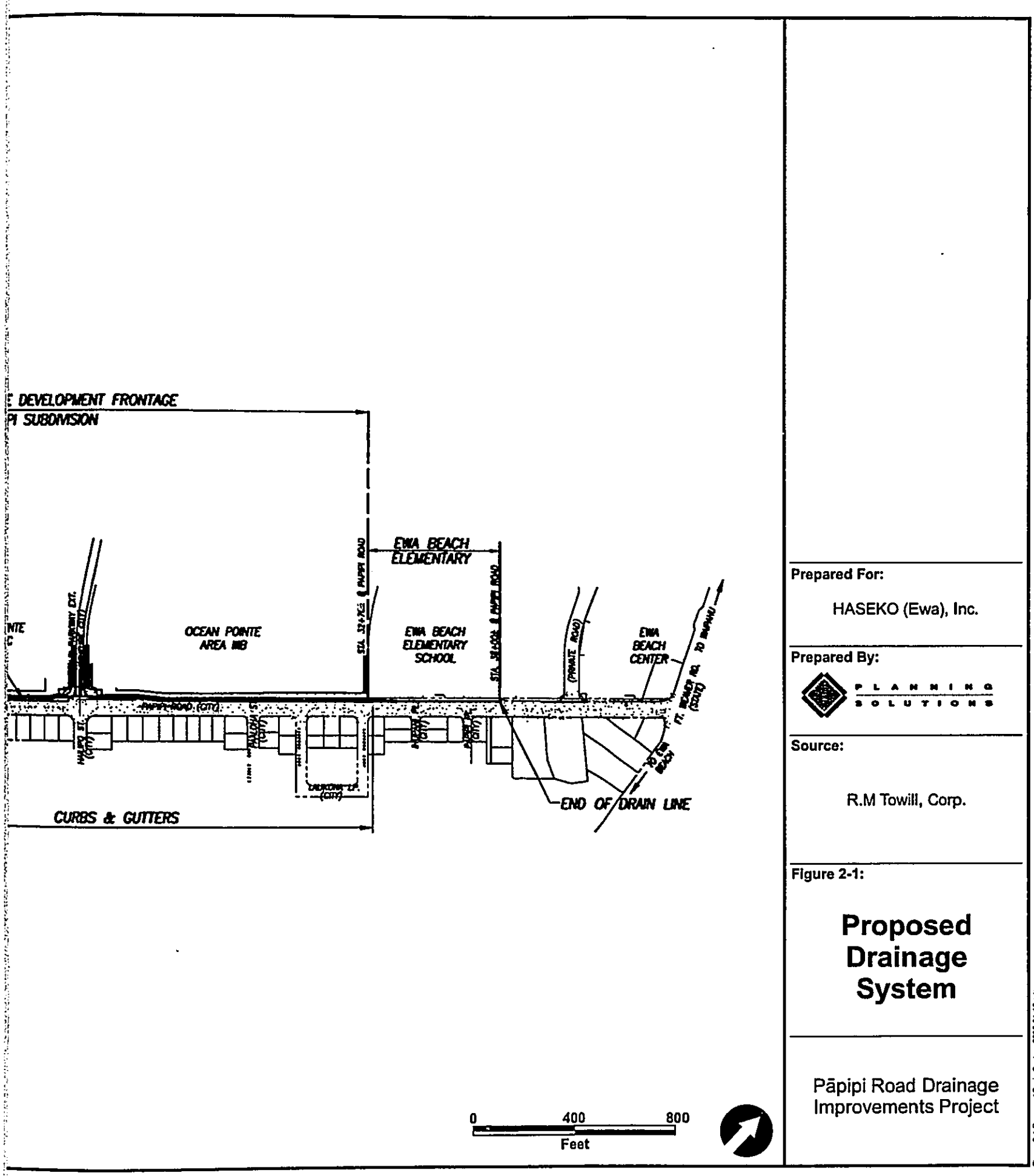


Prepared For:

HASEKO (Ewa), Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

R.M Towill, Corp.

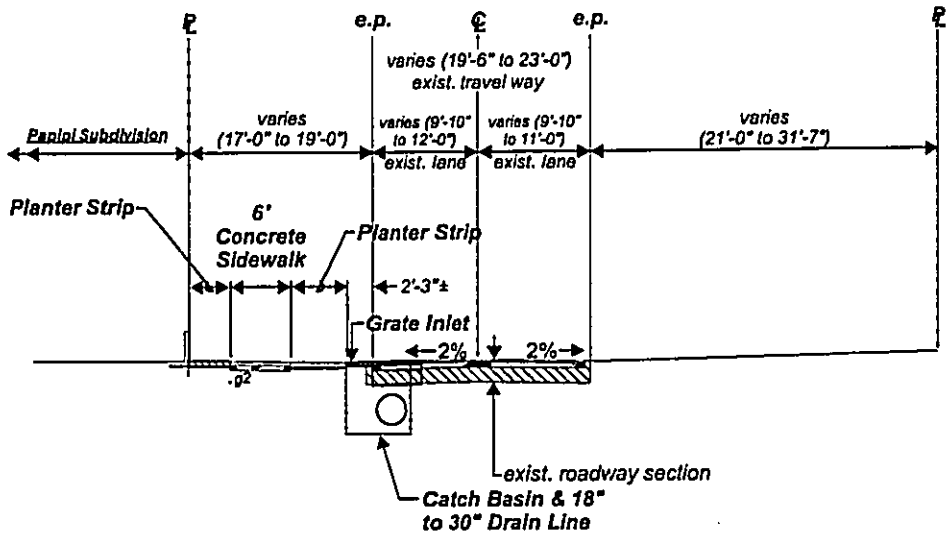
Figure 2-1:

Proposed Drainage System

Pāpipi Road Drainage Improvements Project

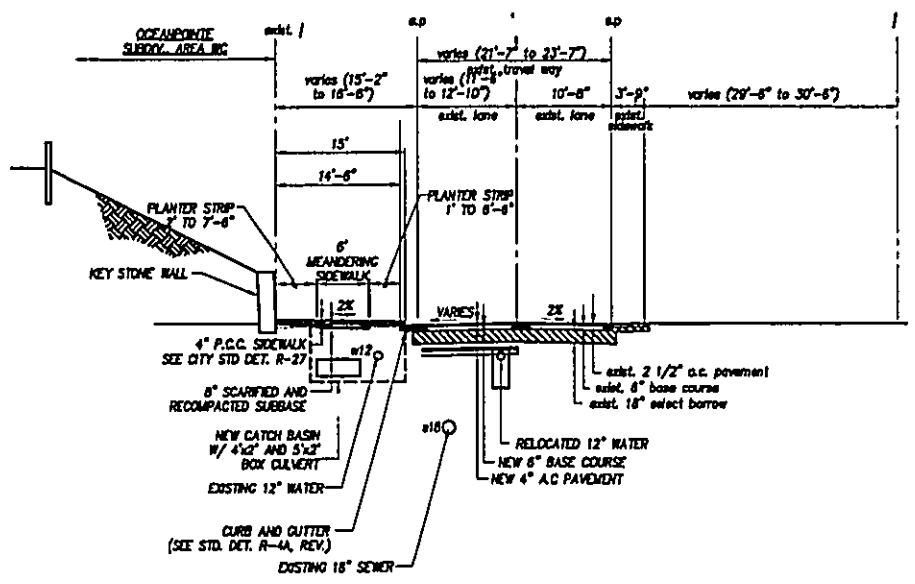
Figure 2-1 Proposed Drain System 2005-01-10.cdr

RECEIVED AS FOLLOWS



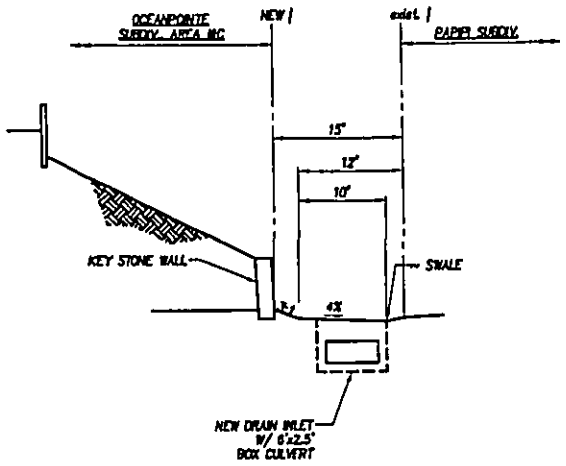
TYPICAL SECTION – PAPIPI SUBDIV.

Makai Side



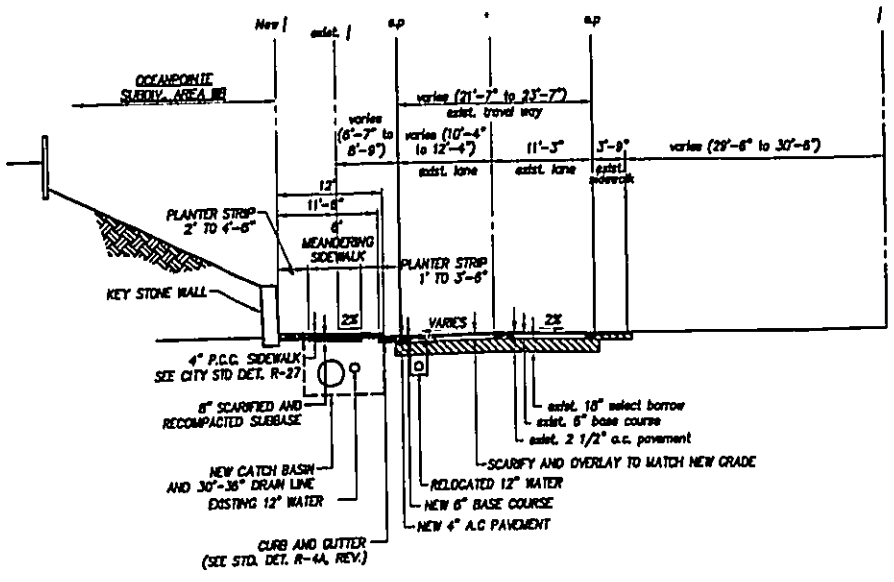
TYPICAL SECTION – OCEAN POINTE SUBDIV., AREA IIIC

RECEIVED AS FOLLOWS



TYPICAL SECTION – PAPIPI SUBDIV.

Mauka Side



TYPICAL SECTION – OCEAN POINTE SUBDIV., AREA IIIB

0 10 20

Feet

Prepared For:

HASEKO (Ewa), Inc.

Prepared By:

PLANNING SOLUTIONS

Source:

R.M. Towill, Inc.

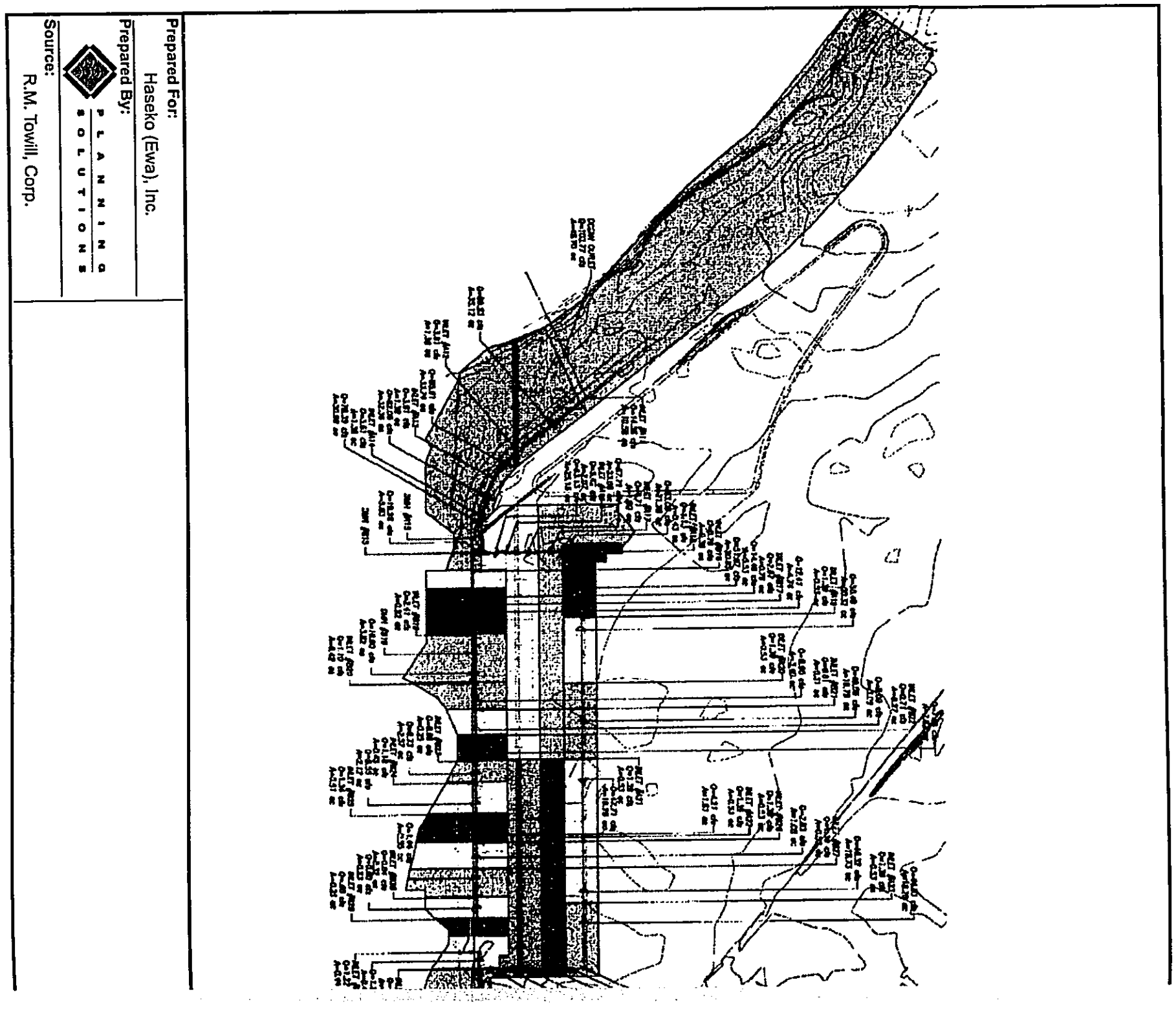
Figure 2-3:

Typical Cross-Sections

Pāpipi Road Drainage Improvements Project

Figure 2-3 Typical Cross-Sections 2005-01-10.cdr

RECEIVED AS FOLLOWS



Prepared For:
Haseko (Ewa), Inc.

Prepared By:
PLANNING SOLUTIONS

Source:
R.M. Towill, Corp.

RECEIVED AS FOLLOWS

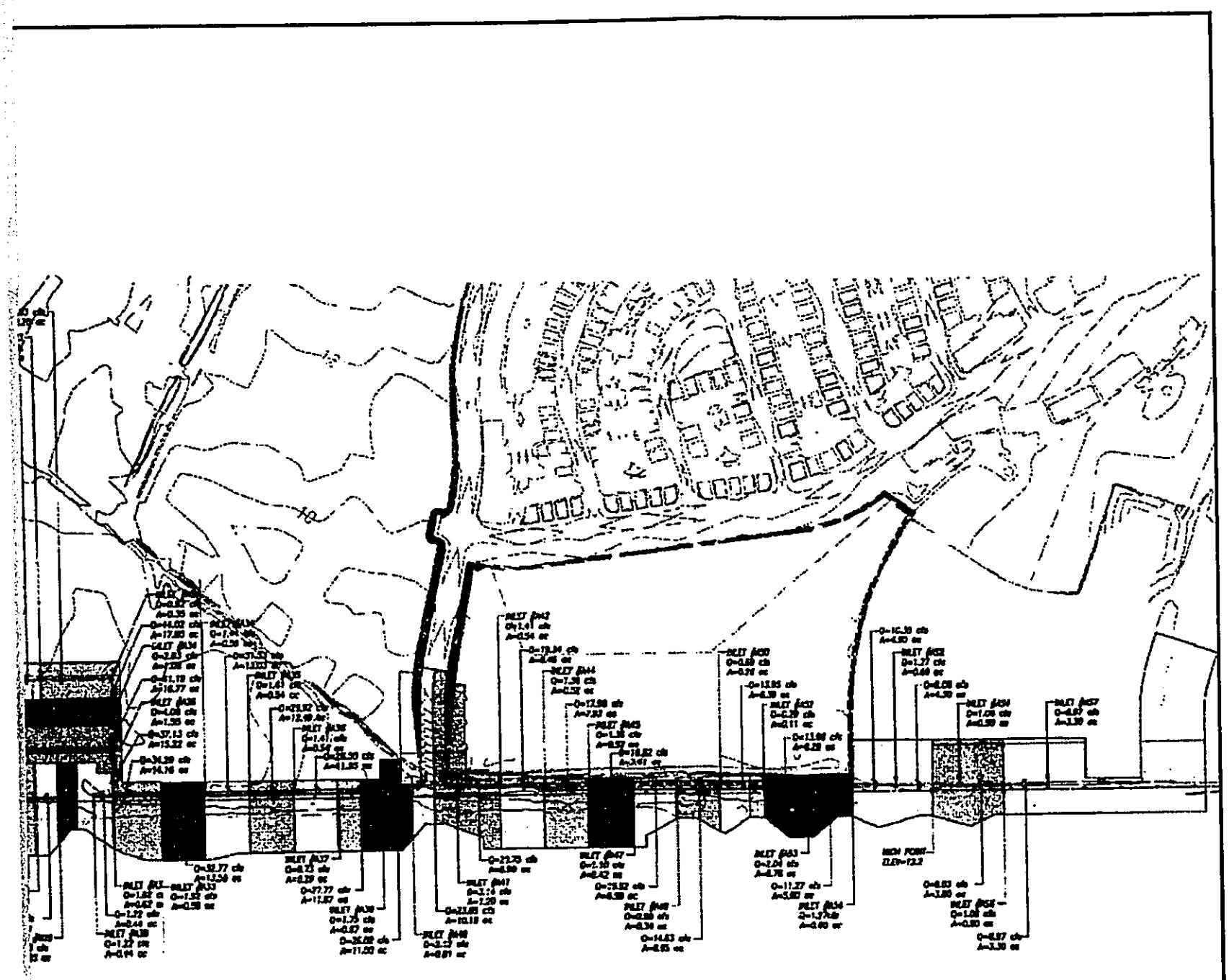


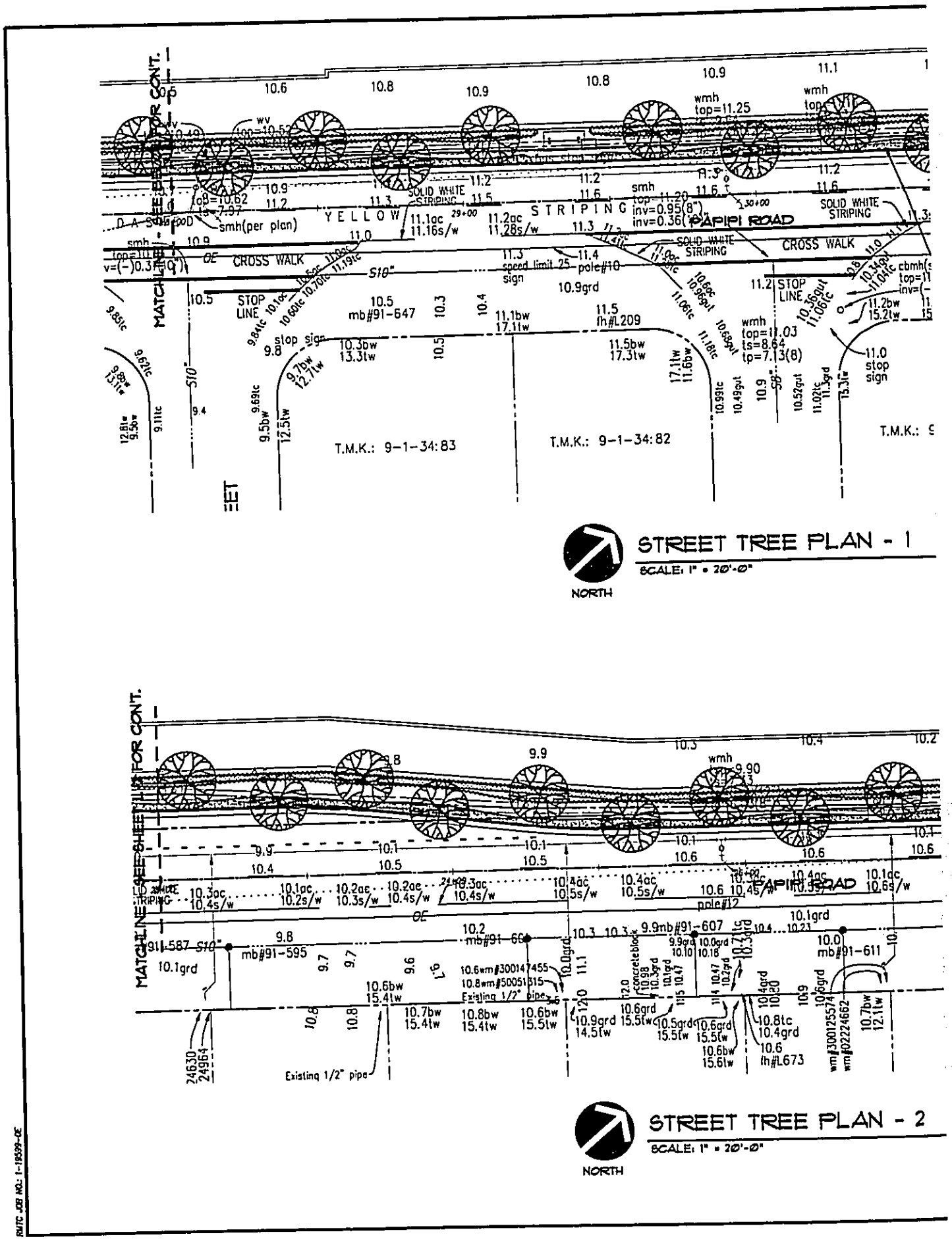
Figure 3-1:

Drainage System Runoff

Pāpipi Road Drainage Improvements Project

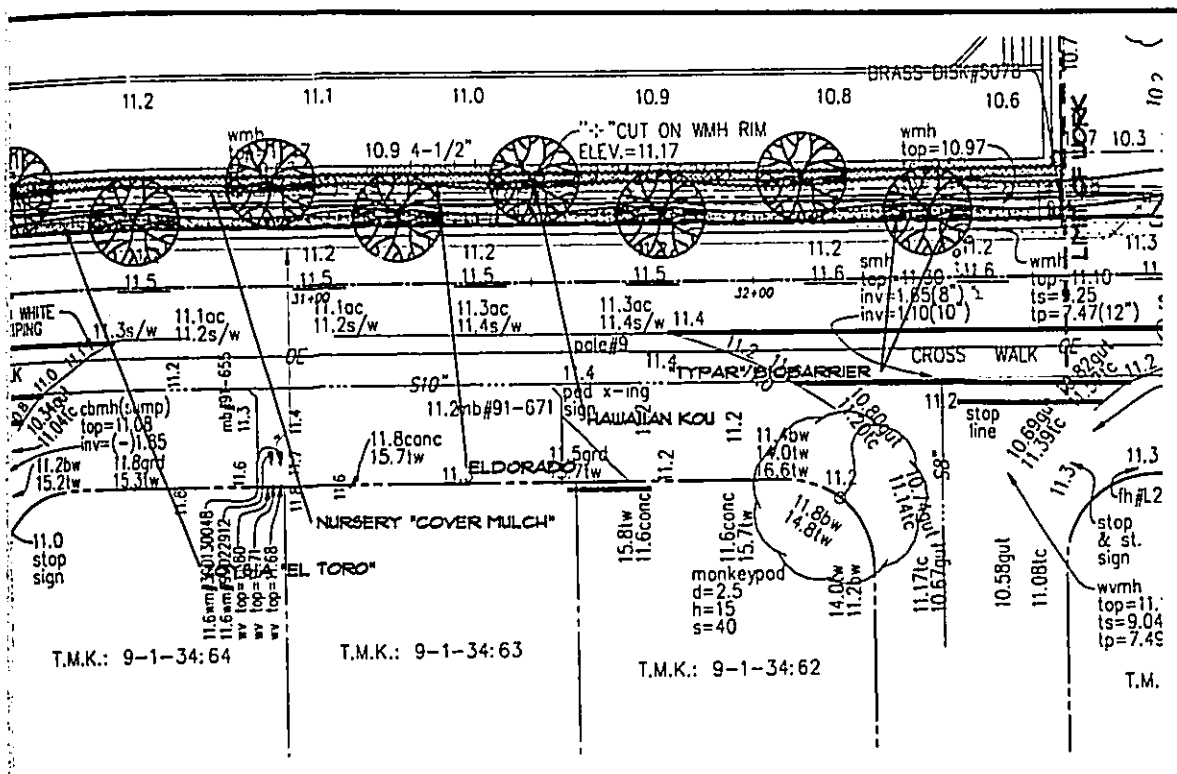
Figure 3-1 Drainage System Runoff 2005-01-10.cdr

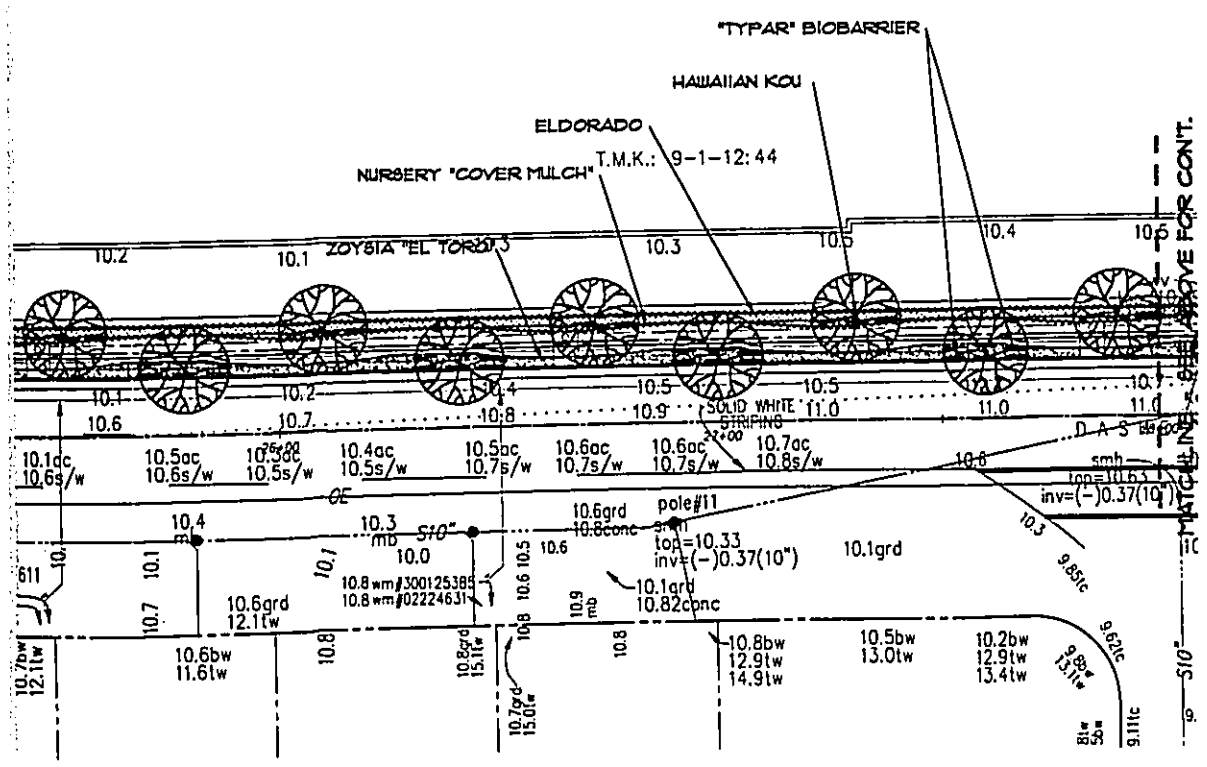
RECEIVED AS FOLLOWS



RUTC JOB NO.: 1-19599-OE

RECEIVED AS FOLLOWS





OCEAN POINTE

PAPIPI ROAD IMPROVEMENTS
INCREMENT 1
EWA, OAHU, HAWAII

Landscape Designs, LLC
Landscape Design
Site Planning
Irrigation Consultants
3561-F Pinao Street
Honolulu, Hawaii 96822
Tel: (808) 988-5166
Fax: (808) 988-0554

JOHN B. ZADJURA
LICENSED PROFESSIONAL LANDSCAPE ARCHITECT
No. LA-0365
HAWAII, U.S.A.

THESE PLANS WERE PREPARED BY ME OR UNDER MY SUPERVISION AND EXAMINATION OF THE PROJECT SITE, OR UNDER MY RESPONSIBLE CHARGE.

SIGNATURE — EXP. DATE

BY	DATE	REVISION
		APPROVED

APPROVED BY

CHIEF, URBAN DESIGN BRANCH, DPP
(FOR STREET TREE ONLY) (FOR SHTS. L-1 TO L-3)

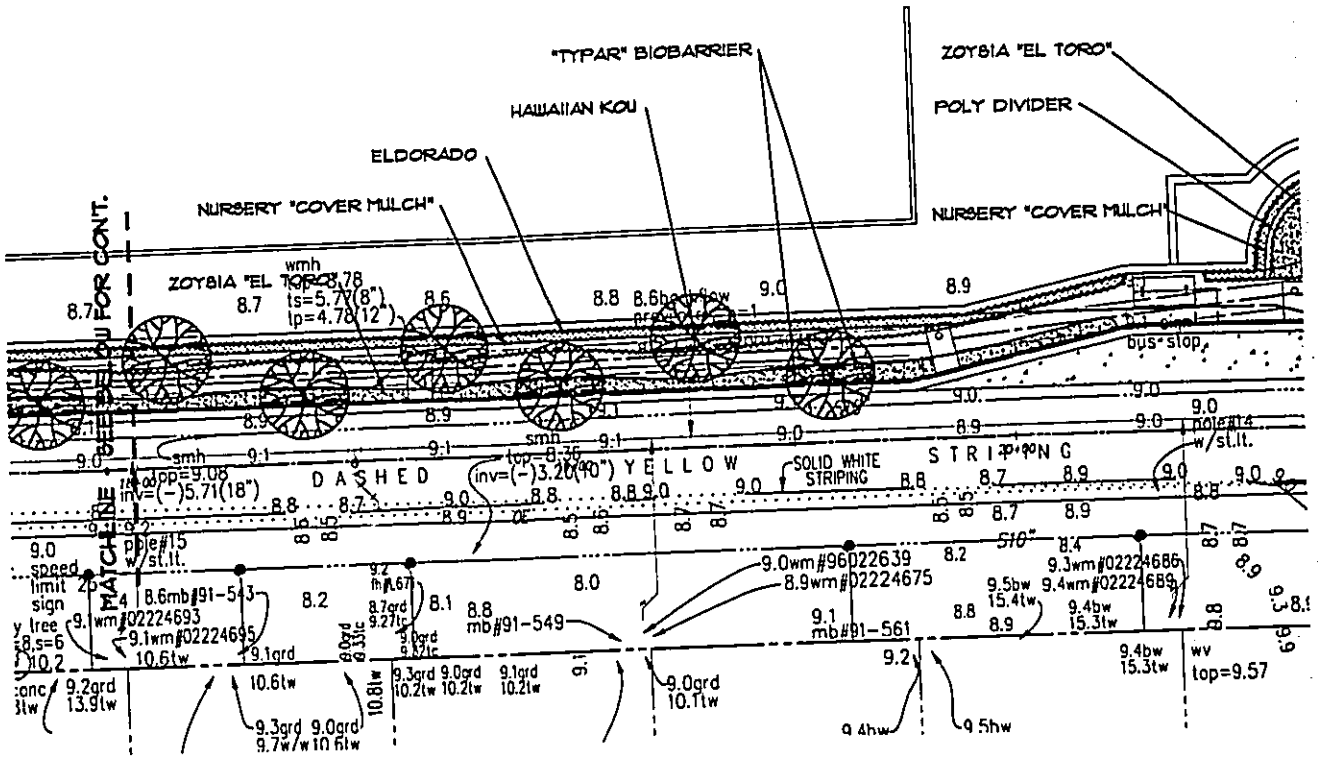
DATE

ENGINEER	JKS
DRAFTSMAN	JKS
CHECKED BY	JKS
SCALE	AS SHOWN
DATE	NOVEMBER 29, 2004
FILENAME	

STREET TREE PLAN – 1

FILE	FOLDER	FOLDER	NO.

RECEIVED AS FOLLOWS



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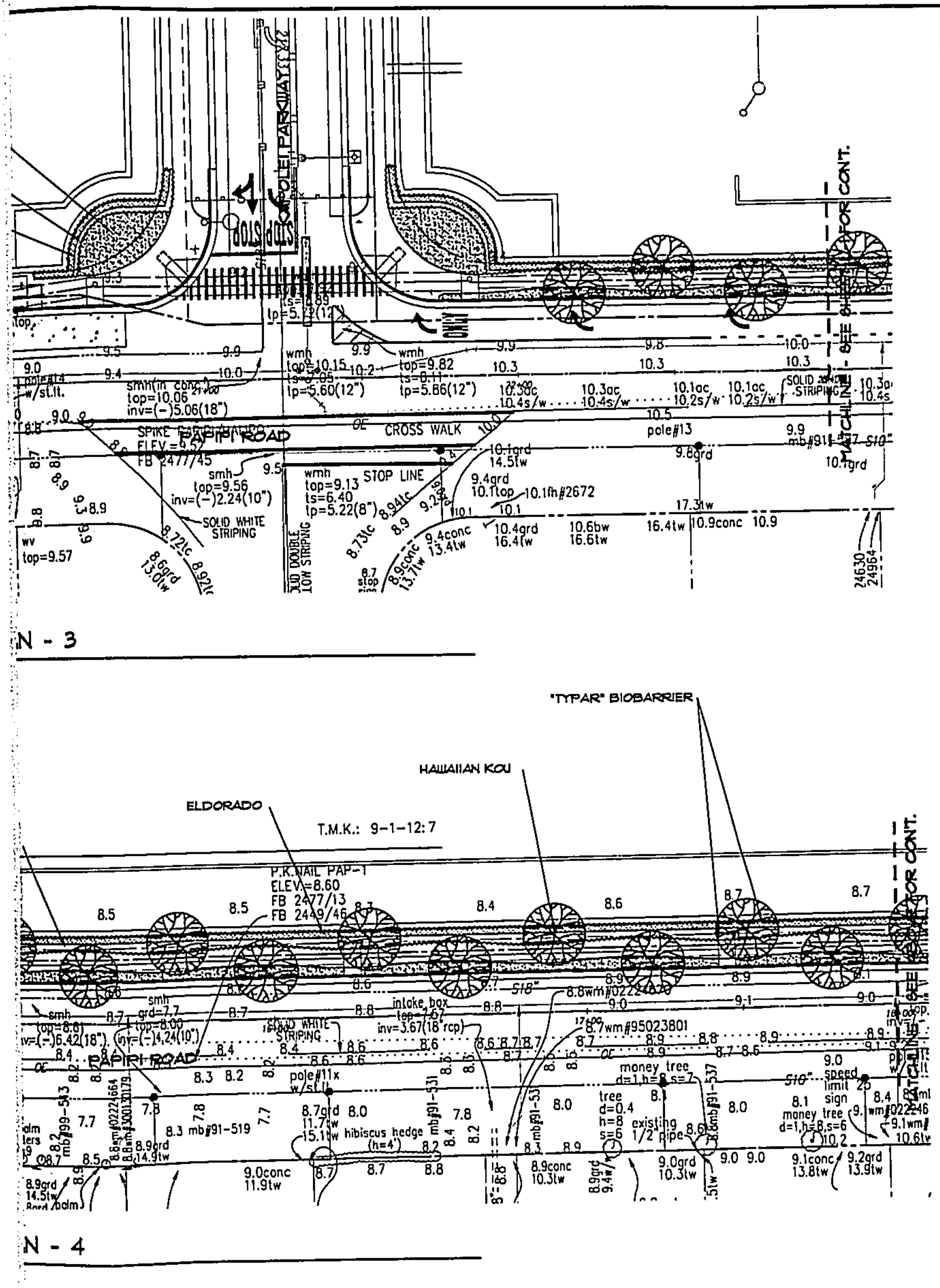

OCEAN POINTE
PAPIPI ROAD IMPROVEMENTS
INCREMENT 1
EWA, OAHU, HAWAII

Landscape Designs, LLC

JOHN B. ZADJURA — HAWAII, U.S.A.

ENGINEER	JKS
DRAFTSMAN	JKS
CHECKED BY	JKS
SCALE	AS SHOWN
DATE	NOVEMBER 29, 2004
FILENAME	

STREET TREE PLAN - 2

L-2 SHEET OF SHEETS

RECEIVED AS FOLLOWS

PLANT LIST & MISCELLANEOUS

QUANTITY	COMMON / BOTANICAL NAME	SIZE & REMARKS
57	HAWAIIAN KOU / CORDIA SUBCORDATA	25 GALLON CAN, 10'-12' HEIGHT, 3'-4' SPREAD, 2" CALIPER, 5' C
±3,200 S.F.	ELDORADO / ERANTHEMUM SP.	1 GALLON CAN, 12" HEIGHT, 8" SPREAD, @ 2'-0" O.C. SPACING
±6,000 S.F.	ZOYSIA "EL TORO" / ZOYSIA SP.	2" PLUGS @ 4" O.C. SPACING
±48 C.Y.	NURSERY "COVER MULCH" - HAWAIIAN EARTH PRODUCTS	2" LAYER UNDER SHRUBS
57	TREE TRUNK PROTECTOR	DEEP ROOT PARTNERS, "ARBORGARD", "AG 9-4+
±2,300 L.F.	"TYPAR" BIOBARRIER	19½" MIN. WIDTH
±260 C.Y.	IMPORTED SCREENED SOIL - 6" DEPTH	SUPPLIED AND INSTALLED BY DEVELOPER
±100 L.F.	POLY DIVIDER	

NOTE:
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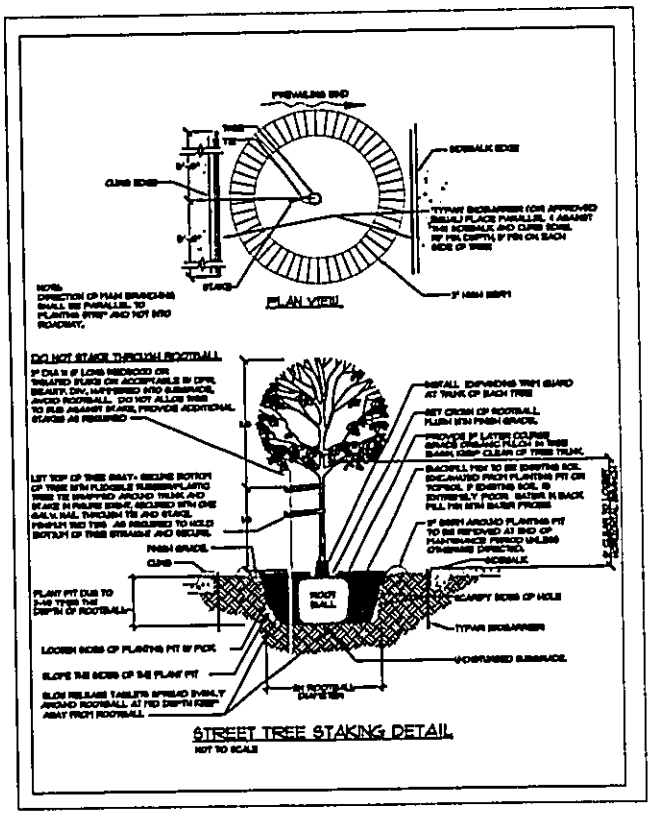

STREET TREE STAKING DETAIL
NOT TO SCALE

RMTS JOB NO.: 1-19599-OE

RECEIVED AS FOLLOWS

1" CALIPER, 8' CLEAR BEFORE BRANCHING

O.C. SPACING

-4-

STREET TREE NOTES

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PEDESTRIAN CROSSWALK	5'
DRIVEWAY	5'
ANOTHER TREE	22'

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OCEAN POINTE
PAPIPI ROAD IMPROVEMENTS
INCREMENT 1
EWA, OAHU, HAWAII

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Site Planning
Irrigation Consultants
3261-F Pinao Street
Honolulu, Hawaii 96822
Tel. (808) 988-5186
Fax (808) 988-0564

JOHN B. ZADJURA
LICENSED PROFESSIONAL LANDSCAPE ARCHITECT
No. LA-0368
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSISTS OF THE PAGES MARKED AS SIGNED BY ME.

4/26/05
SIGNATURE DATE

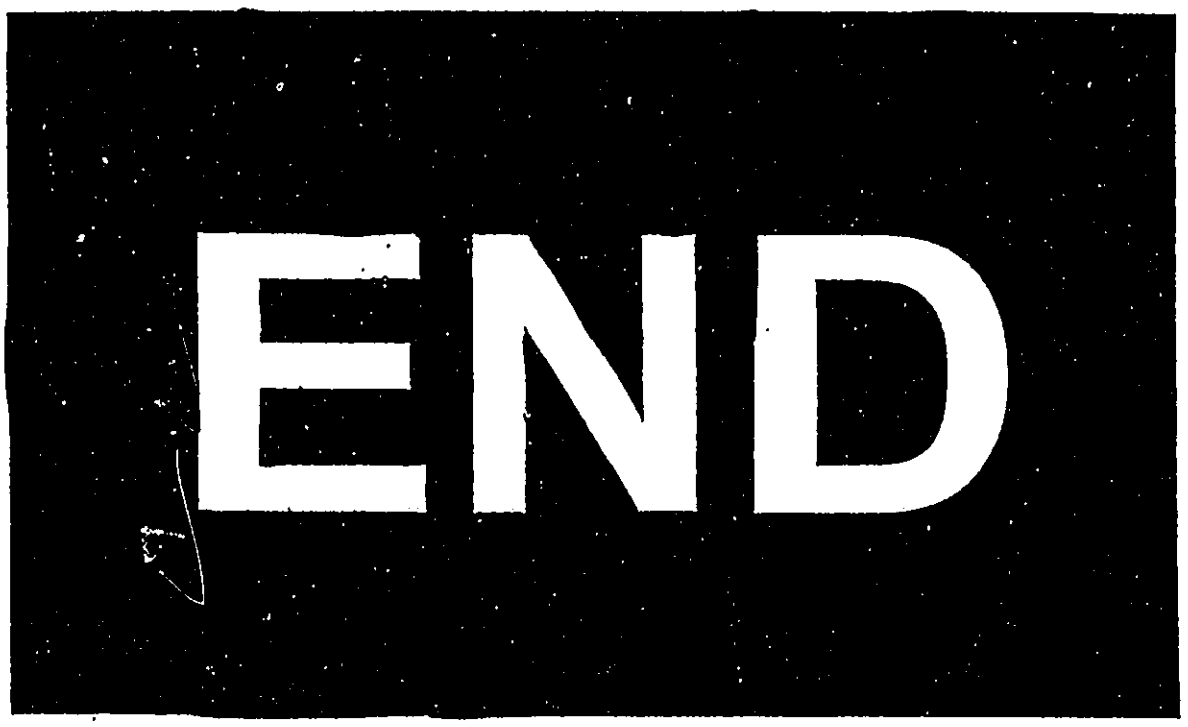
NO.	BY	DATE	REVISION
			APPROVED

APPROVED BY

ENGINEER	JKS
DRAFTSMAN	JKS
CHECKED BY	JKS
SCALE	NOT TO SCALE
DATE	NOVEMBER 29, 2004
FILENAME	

PLANT LIST & DETAILS

FILE	NAME	PAGE	NO.

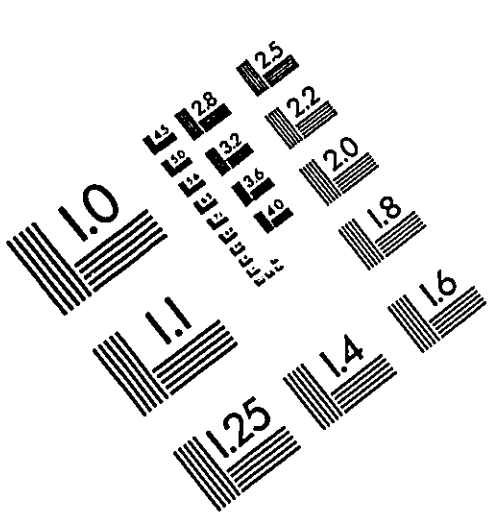


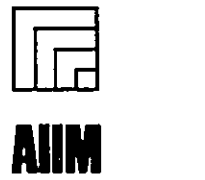
CERTIFICATION

I HEREBY CERTIFY THAT THE MICROPHOTOGRAPH APPEARING IN THIS REEL OF FILM ARE TRUE COPIES OF THE ORIGINAL DOCUMENTS.

2005
DATE

SIGNATURE OF OPERATOR





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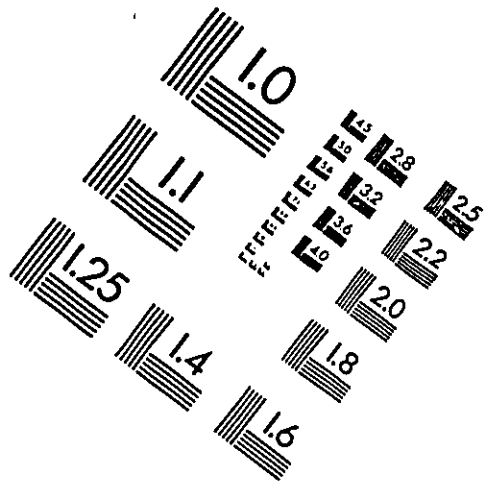

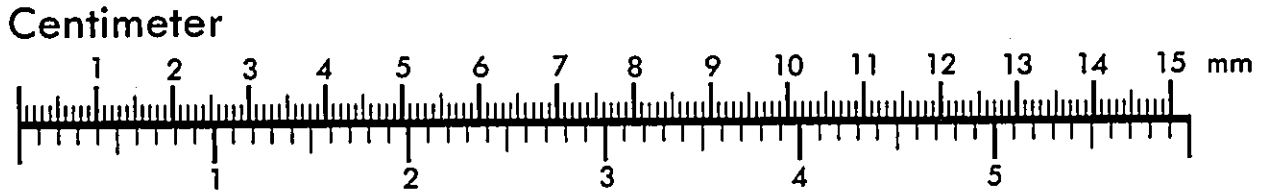

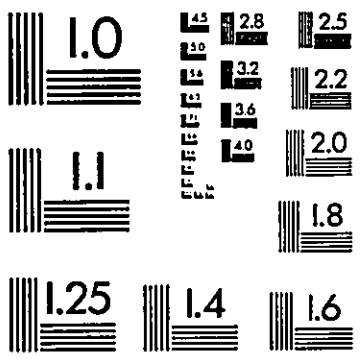

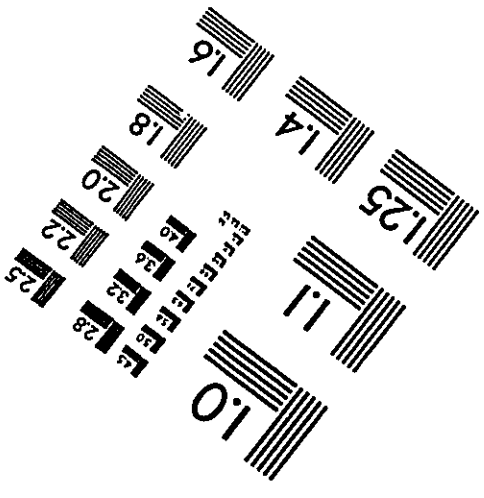

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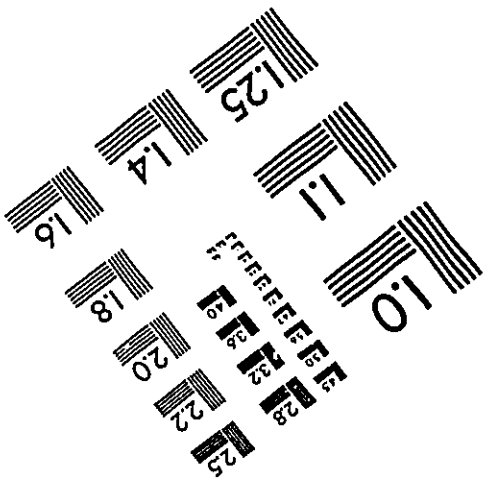

DENSITY TARGET