ALAN M. ARAKAWA
Mayor

DAVID C. GOODE
Director

ROWENA M. DAGDAG-ANDAYA
Deputy Director

Telephone: (808) 270-7745
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COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

June 6, 2012

AUG 08 2012

FILE COPY

Mr. Gary Hooser, Director
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

RE: **Project Name:** Proposed Hauoli Street Drainage System Improvements Project
Applicant: County of Maui, Department of Public Works
Project ID: Draft Environmental Assessment and Anticipated Finding of No Significant Impact
TMKs: (2) 3-8-005:003 (por.) and 017 (por.) and (2) 3-8-014:011 (por.) and 015 (por.)

Dear Mr. Hooser:

With this letter, the County of Maui, Department of Public Works hereby transmits the Draft Environmental Assessment and anticipated Finding of No Significant Impact (DEA-AFONSI) for the proposed Hauoli Street Drainage System Improvements Project, situated at Tax Map Key Nos. (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.) in the Wailuku District on the island of Maui, for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, two (2) copies of the DEA-AFONSI, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

If there are any questions, please contact Wendy Kobashigawa, P.E. at 270-7745 or email wendy.kobashigawa@co.maui.hi.us.

Sincerely,

DAVID C. GOODE
Director

Enclosures

DG/wykk:gq(ED12-646)
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ALAN M. ARAKAWA
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Sincerely,

DAVID C. GOODE
Director

Enclosures

DG/wykk:gq(ED12-646)
S:\ENG\ALL\WYK\CIP\07-50HauoliStDrain\EA docs\Draft EA FONSI ltr.doc

Agency Action EA
Chapter 343, HRS
Publication Form

AUG 0 0 2012
FILE COPY

Project Name Proposed Hauoli Street Drainage System Improvements Project (DEA-AFONSI)

Island: Maui
District: Wailuku
TMK: (2) 3-8-005:003 (por.) and 017 (por.) and (2) 3-8-014:011 (por.) and 015 (por.)

RECEIVED
'12 JUL 27 P3:05
OFC. OF ENVIRONMENTAL QUALITY CONTROL

Permits: Special Management Area Assessment and Shoreline Setback Assessment

Proposing/Determination Agency: County of Maui, Department of Public Works, 200 South High Street, 4th Floor, Wailuku, Hawaii 96793, Contact: Wendy Kobashigawa, Phone: (808) 270-7745

Consultant: Munekiyo & Hiraga, Inc., 305 High Street, Suite 104, Wailuku, Hawaii 96793, Contact: Michael Munekiyo, AICP, President, Phone: (808) 244-2015

Status: 30-day comment period; Anticipated Finding of No Significant Impact

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

The County of Maui, Department of Public Works (DPW) proposes improvements to the existing Hauoli Street drainage system. The existing single cell 3-foot by 8-foot box culvert crossing Hauoli Street and the concrete drainage channel extending to the shore lack the capacity to adequately accommodate the volume of storm water runoff that collects in the drainage ditch *mauka* of Hauoli Street. During periods of heavy rainfall, runoff overtops the culvert, flooding Hauoli Street and neighboring properties.

The proposed action includes the replacement of the existing box culvert that crosses Hauoli Street with a 4-foot by 8-foot double cell box culvert with inlet control, along with modifications to the concrete drainage channel. Hauoli Street will be re-graded to direct runoff towards the drainage channel. Together, these improvements will increase the capacity of the drainage system to handle storm water flow and alleviate flooding and overtopping along Hauoli Street. The proposed action also involves the construction of an approximately 200-foot by 150-foot earthen water quality basin and grassed drainage channel on the *mauka* side of Hauoli Street which will be designed to allow sediment and particulates to settle before runoff drains into the culvert and discharges into the ocean. A new gravel access road will enable access for maintenance of the water quality basin.

Draft Environmental Assessment

PROPOSED HAUOLI STREET DRAINAGE IMPROVEMENTS

Prepared for:

County of Maui,
Department of Public Works

July 2012

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MUNEKIYO & HIRAGA, INC.

CONTENTS

Executive Summary ..... Page i

I. PROJECT OVERVIEW ..... Page 1

A. PROJECT LOCATION, EXISTING USE AND OWNERSHIP ..... Page 1

B. PROJECT NEED ..... Page 4

C. PROPOSED ACTION ..... Page 4

D. CHAPTER 343 HAWAII REVISED STATUTES REQUIREMENT ... Page 12

E. IMPLEMENTATION CONSIDERATIONS ..... Page 12
1. Special Management Area Assessment ..... Page 12
2. Shoreline Setback Assessment ..... Page 12

F. CONSTRUCTION COST AND TIMELINE ..... Page 13

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES ..... Page 14

A. PHYSICAL SETTING ..... Page 14
1. Surrounding Land Uses ..... Page 14
2. Climate ..... Page 15
3. Topography and Soil Characteristics ..... Page 16
4. Agricultural Productivity Considerations ..... Page 19
5. Flood and Tsunami Hazards ..... Page 19
6. Coastal Resources ..... Page 20
7. Flora and Fauna ..... Page 24
8. Streams, Wetlands, and Reservoirs ..... Page 26
9. Air Quality ..... Page 27
10. Noise Characteristics ..... Page 28
11. Water Quality ..... Page 28
12. Archaeological Resources ..... Page 30
13. Cultural Resources ..... Page 31
14. Scenic and Open Space Resources ..... Page 32

B. SOCIO-ECONOMIC ENVIRONMENT ..... Page 33
1. Land Use and Community Character ..... Page 33
2. Population and Economy ..... Page 34

C. PUBLIC SERVICES ..... Page 35
1. Solid Waste Collection and Disposal ..... Page 35
2. Medical Facilities, Police and Fire Protection Services ..... Page 36
3. Educational Facilities ..... Page 37
4. Recreational Facilities ..... Page 38

D. INFRASTRUCTURE ..... Page 39
1. Roadway Infrastructure ..... Page 39
2. Water ..... Page 40
3. Wastewater Systems ..... Page 41
4. Drainage ..... Page 41
5. Electrical and Telephone Systems ..... Page 43

E. CUMULATIVE AND SECONDARY IMPACTS ..... Page 43

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS ..... Page 45

A. STATE LAND USE DISTRICTS ..... Page 45

B. CONFORMITY WITH CHAPTER 226, HAWAII STATE PLAN ..... Page 45
1. Objectives and Policies of the Hawaii State Plan ..... Page 47

C. MAUI COUNTY GENERAL PLAN ..... Page 48

D. KIHEI-MAKENA COMMUNITY PLAN ..... Page 51

E. COUNTY ZONING ..... Page 54

F. SPECIAL MANAGEMENT AREA ..... Page 54
1. Recreational Resources ..... Page 57
2. Historic Resources ..... Page 58
3. Scenic and Open Space Resources ..... Page 59
4. Coastal Ecosystem ..... Page 59
5. Economic Use ..... Page 60
6. Coastal Hazards ..... Page 61
7. Managing Development ..... Page 62
8. Public Participation ..... Page 63
9. Beach Protection ..... Page 63
10. Marine Resources ..... Page 64

G. SHORELINE SETBACK ASSESSMENT ..... Page 70

IV. SUMMARY OF UNAVOIDABLE ENVIRONMENTAL IMPACTS ..... Page 72

V. ALTERNATIVES TO THE PROPOSED ACTION ..... Page 73

A. PREFERRED ALTERNATIVE ..... Page 73

B. NO ACTION ALTERNATIVE ..... Page 73

C. DEFERRED ACTION ALTERNATIVE ..... Page 74

D. DESIGN ALTERNATIVES ..... Page 74

E. DIVERSION OF DRAINAGE FLOW ..... Page 74

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES ..... Page 76

VII. SIGNIFICANCE CRITERIA ASSESSMENT ..... Page 77

VIII. LIST OF PERMITS AND APPROVALS ..... Page 82

IX. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED; AND RESPONSES TO SUBSTANTIVE COMMENTS ..... Page 83

X. REFERENCES ..... Page i

LIST OF FIGURES

Figure 1. Site Location Map ..... Page 2
Figure 2. Drainage Channel Site Photos ..... Page 3
Figure 3. Drainage Basins ..... Page 5
Figure 4. General Site Plan ..... Page 6
Figure 5. Water Quality Basin Plan ..... Page 7
Figure 6. Hauoli Street Plan ..... Page 9
Figure 7. Drainage Channel Plan ..... Page 10
Figure 8. Diversion Road Plan ..... Page 11
Figure 9. Soil Association Map ..... Page 17
Figure 10. Soil Classification Map ..... Page 18
Figure 11. Flood Insurance Rate Map ..... Page 21
Figure 12. Aerial Photo of Drainage Channel ..... Page 22
Figure 13. Shoreline Photos ..... Page 23
Figure 14. State Land Use Designations ..... Page 46
Figure 15. Kihei-Makena Community Plan Land Use Designations ..... Page 52
Figure 16. Maui County Zoning Map ..... Page 55
Figure 17. Special Management Area (SMA) Boundary Map ..... Page 56

LIST OF APPENDICES

Appendix A.	Hauoli Street Drainage Improvements Drainage Report
Appendix B.	Preliminary Development Plans
Appendix B-1.	Grouted Rip-Rap Plan
Appendix C.	Letter to Department of Planning Regarding Work Within Shoreline Setback Area
Appendix C-1.	Special Management Area Assessment and Shoreline Setback Assessment Concurrence from Department of Planning
Appendix C-2.	Shoreline Exhibit Concurrence from Department of Planning
Appendix D.	Coastal Assessment for Drainage Improvements at Hauoli Street
Appendix E.	Biological and Water Quality Survey Report
Appendix F.	Archaeological Assessment
Appendix F-1.	State Historic Preservation Division Approval Letter of Archaeological Assessment
Appendix G.	Archaeological Monitoring Plan
Appendix G-1.	State Historic Preservation Division Approval Letter of Archaeological Monitoring Plan
Appendix H.	Cultural Impact Assessment

Executive Summary

Project Name:	Proposed Hauoli Street Drainage Improvements
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawaii Revised Statutes
Agency Determination:	Anticipated Finding of No Significant Impact
Applicable Environmental Assessment Review "Trigger":	Use of County lands and funds Work within the Shoreline Setback Area
Location:	TMKs (2) 3-8-005:003 and 017 (pors.), and (2) 3-8-014:011 and 015 (pors.) Wailuku District Maalaea, Maui, Hawaii
Proposing Agency:	County of Maui Department of Public Works 200 South High Street Wailuku, Hawaii 96793 Contact: Wendy Kobashigawa Telephone: (808) 270-7745
Approving Agency:	County of Maui Department of Public Works 200 South High Street Wailuku, Hawaii 96793 Contact: Wendy Kobashigawa Telephone: (808) 270-7745
Consultant:	Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793 Contact: Michael T. Munekiyo, AICP Telephone: (808) 244-2015
Project Summary:	The County of Maui, Department of Public Works (DPW) proposes improvements to the existing Hauoli Street drainage system. The existing single cell 3-foot by 8-foot box culvert crossing Hauoli Street and the concrete drainage channel extending to the shore lack the capacity to adequately

accommodate the volume of storm water runoff that collects in the drainage ditch *mauka* of Hauoli Street. During periods of heavy rainfall, runoff overtops the culvert, flooding Hauoli Street and neighboring properties.

The proposed action includes the replacement of the existing box culvert that crosses Hauoli Street with a 4-foot by 8-foot double cell box culvert with inlet control, along with modifications to the existing concrete drainage channel. Hauoli Street will be re-graded to direct runoff towards the drainage channel. Together, these improvements will increase the capacity of the drainage system to handle storm water flow and alleviate flooding and overtopping along Hauoli Street. The proposed action also involves the construction of an approximately 200-foot by 150-foot earthen water quality basin and grassed drainage channel on the *mauka* side of Hauoli Street which will be designed to allow sediment and particulates to settle before runoff drains into the culvert and discharges into the ocean. A new gravel access road will enable access for maintenance of the water quality basin.

The preparation of a Chapter 343, Hawaii Revised Statutes (HRS) Environmental Assessment (EA) was triggered by the project's use of County lands and funds. Accordingly, this EA has been prepared to document the proposed project's technical characteristics, environmental impacts, mitigation measures, and alternatives. DPW will serve as the Approving Agency for the EA. Furthermore, the project site's location within the County of Maui's Special Management Area (SMA) and Shoreline Setback Area requires the preparation of a SMA Assessment application and Shoreline Setback Assessment (SSA) application, respectively. These applications are processed and approved administratively by the Planning Director.

I. PROJECT OVERVIEW

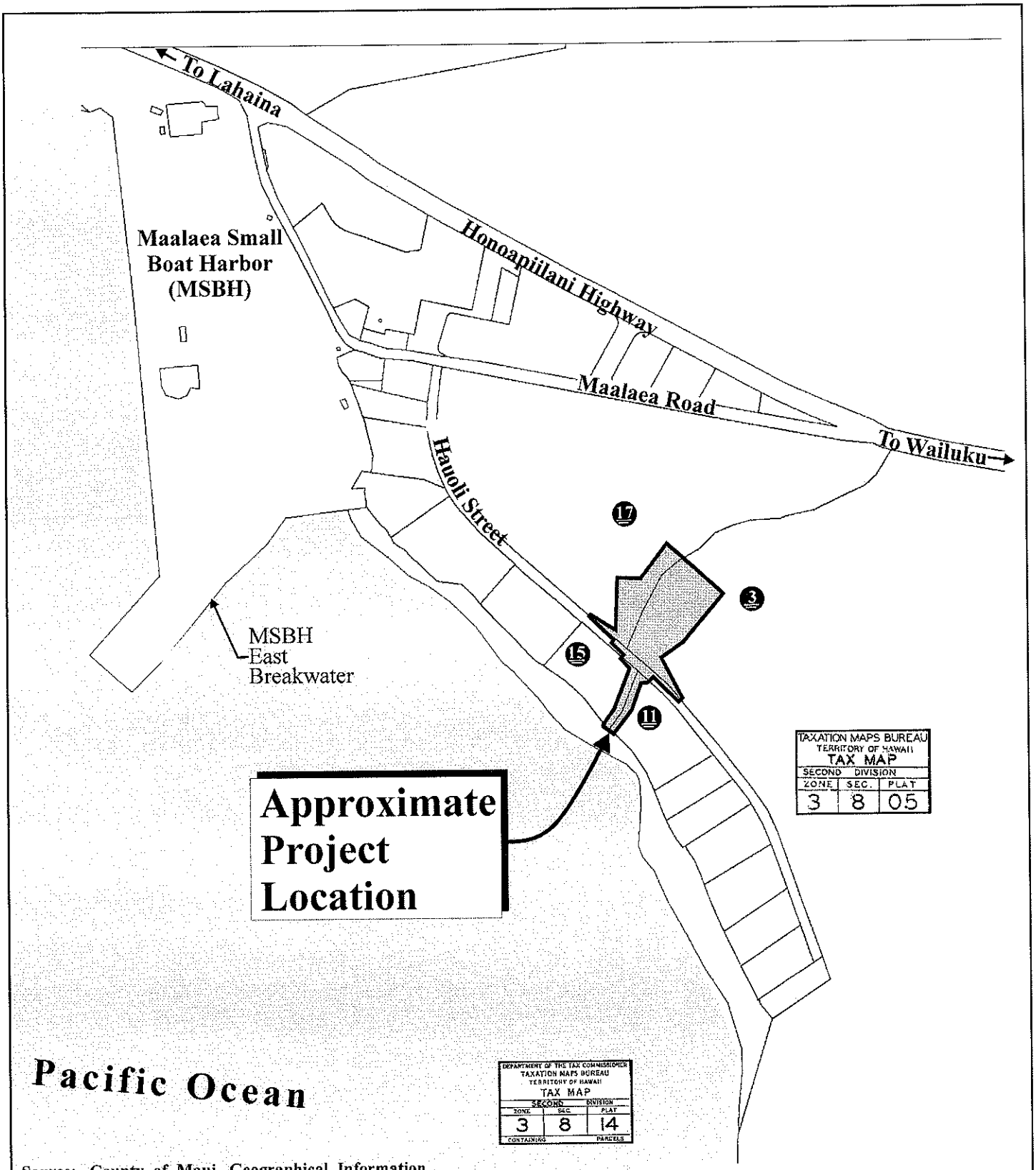
I. PROJECT OVERVIEW

A. PROJECT LOCATION, EXISTING USE AND OWNERSHIP

The applicant, the County of Maui, Department of Public Works (DPW), proposes improvements to the existing Hauoli Street drainage system. The existing drainage system consists of a 3-foot by 8-foot box culvert under Hauoli Street and a concrete-lined drainage channel on the *makai* side of Hauoli Street that runs within a 20-foot-wide drainage easement towards the shore. The proposed improvements include an approximately 200-foot by 150-foot earthen water quality basin on the *mauka* side of Hauoli Street, the replacement of the box culvert under Hauoli Street, and modifications to the concrete-lined drainage channel. The "project site", which includes the proposed water quality basin site and existing drainage channel, is identified by Tax Map Keys (TMKs) (2) 3-8-005:003 and 017 (pors.) (Parcel 3 and Parcel 17, respectively) and (2) 3-8-014:011 and 015 (pors.) (Parcel 11 and Parcel 15, respectively). See **Figure 1** and **Figure 2**.

Lands on the *mauka* side of Hauoli Street are generally under sugar cane cultivation, and the portions of Parcel 3 (1.38 acres) and Parcel 17 (1.13 acres) that are within the project site are mostly vegetated by kiawe, weeds, and grasses. An existing earthen agricultural drainage ditch runs between these parcels, feeding into the existing 3-foot by 8-foot culvert box under Hauoli Street. Lands on the *makai* side of Hauoli Street are occupied by beachfront condominiums. The existing concrete-lined drainage channel runs between Parcel 11 and Parcel 15 from Hauoli Street towards the shore. Access to the project site is via Hauoli Street, a 2-lane, improved County roadway which generally runs in an east-west direction, parallel to the shore. Hauoli Street is a two-lane road passing over the box culvert.

Lands underlying the proposed water quality basin are owned by Alexander & Baldwin, Inc. (A&B). The drainage channel lays within a 20-foot-wide drainage easement granted by A&B to the County of Maui. This easement occupies portions of Parcel 15 (0.06 acre), owned by the Island Sands Condominium to the south, and Parcel 11 (0.08 acre), owned by the Maalaea Banyans Condominium to the north. As mentioned above, Hauoli Street is a County roadway.



Source: County of Maui, Geographical Information Systems and Hawaii Realty Atlas 2008

Figure 1

Proposed Hauoli Street Drainage Improvements

Site Location Map

0 275 Feet
137 50 550

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\sitelocation

Photograph No. 1
West view from drainage channel vicinity, towards Maalaea Small Boat Harbor (MSBH)

Photograph No. 2
South view from drainage channel vicinity towards ocean

Photograph No. 3
North view from the ocean towards the drainage channel outlet. Island Sands condominium to left, Maalaea Banyans condominium to right.

Source: Munekiyo & Hiraga, Inc.

Figure 2 Proposed Hauoli Street Drainage Improvements

NOT TO SCALE

Drainage Channel Site Photos

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\DrainPhotos.DEA

B. PROJECT NEED

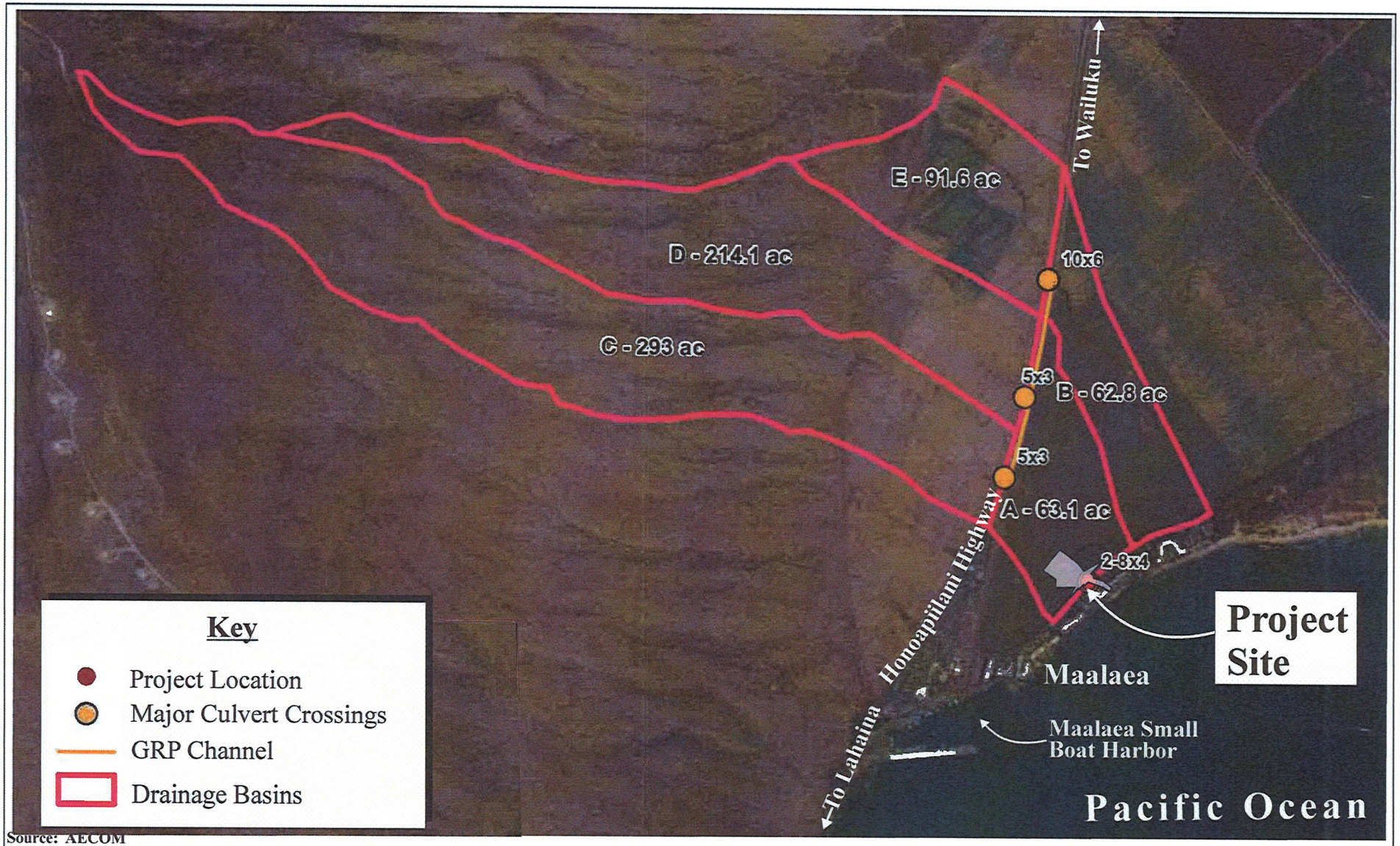
There are five (5) drainage basins encompassing approximately 724.6 acres of land that collect runoff from the mountain slopes mauka (upland) of the project site. During a 100-year, 24-hour storm, these five (5) basins collectively generate a peak flow of approximately 1,244 cubic feet per second (cfs). A portion of this flow is intercepted by culvert crossings and a grouted rip-rap channel along Honoapiilani Highway that divert portions of the flow towards Maalaea Bay to the south and to an outfall to the east of the project site. See **Figure 3**. The remaining portion of the flow, approximately 785 cfs, flows through the Hauoli Street drainage system. See **Appendix "A"**, the project drainage report.

The capacity of the existing Hauoli Street drainage system is inadequate to accommodate the 785 cfs of runoff that is generated by a 100-year, 24-hour storm. Consequently, during periods of heavy rainfall, Hauoli Street is over-topped by storm water runoff, a condition which leads to flooding of the neighboring condominium properties. Repeated occurrences drove the Maalaea Community Association to request that DPW improve the drainage system. In response, the proposed drainage system improvements are designed to remedy the inadequacy of the existing Hauoli Street drainage system and prevent future flooding of Hauoli Street and neighboring properties.

C. PROPOSED ACTION

The proposed Hauoli Street drainage system improvements include a number of components which are described below. See **Figure 4** and **Appendix "B"**.

- A water quality basin will be constructed upstream of Hauoli Street to reduce the sediment and pollutant load of the initial storm water runoff prior to discharge through the Hauoli Street drainage system. This basin will measure approximately 200 feet wide by 150 feet long by 2.5 feet deep with a volume of 1.7 acre feet, contained by a reinforced soil slope berm. Weedy and low maintenance vegetation within the basin will decrease runoff velocity, and a fore bay at the entrance of the basin will allow for greater sediment control. During low flows, runoff will be contained within the basin, and a series of four (4) 6-inch perforated PVC pipes will drain the basin within 48 hours to prevent stagnation. During heavy flows, runoff will overtop the reinforced soil slope berm to flow to the proposed double box culvert. See **Figure 5**.



Source: AECOM

Figure 3 Proposed Hauoli Street Drainage Improvements

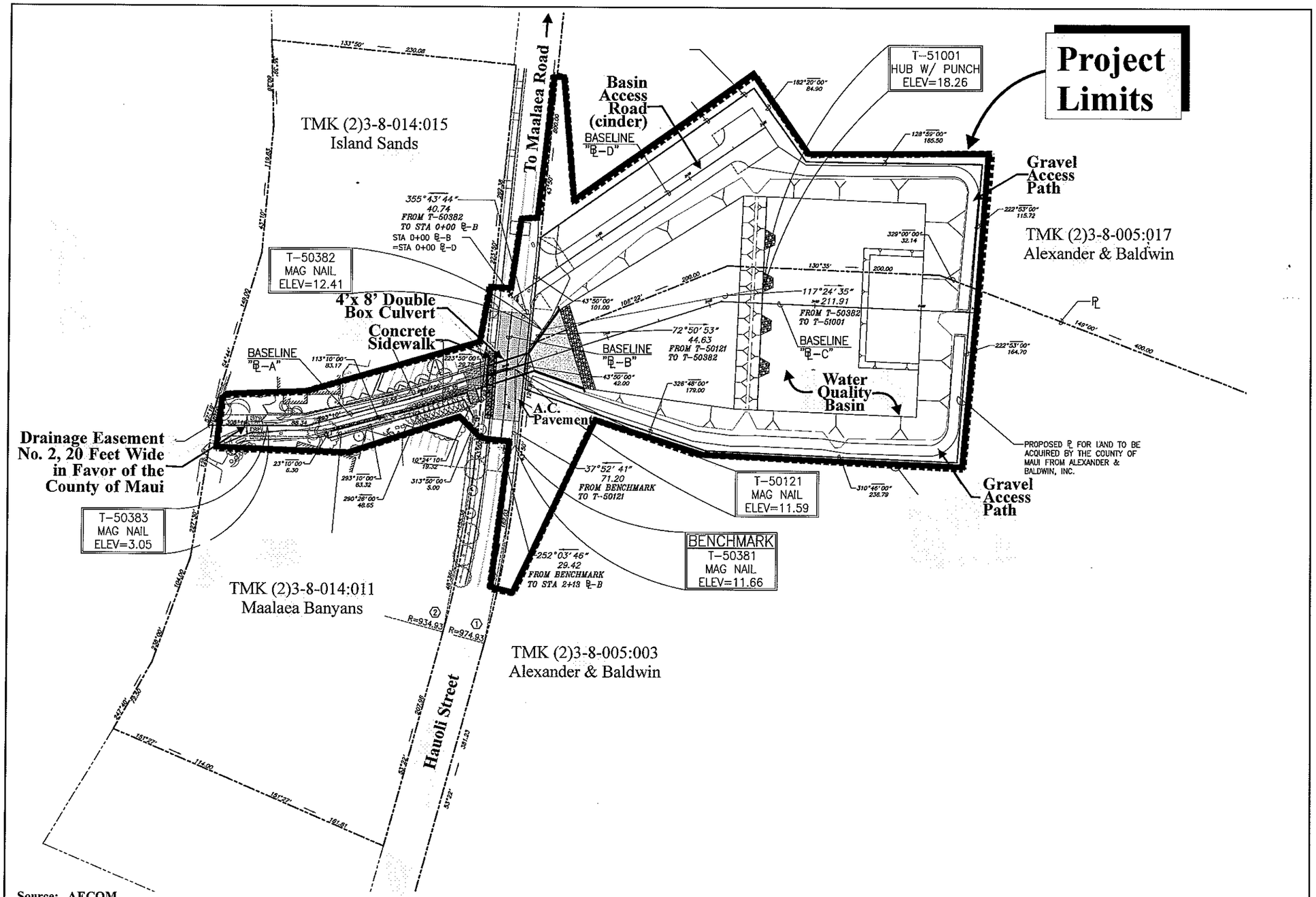
Drainage Basins

0 750 1,500 3,000 Feet

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\DrainBasin



Source: AECOM

Figure 4

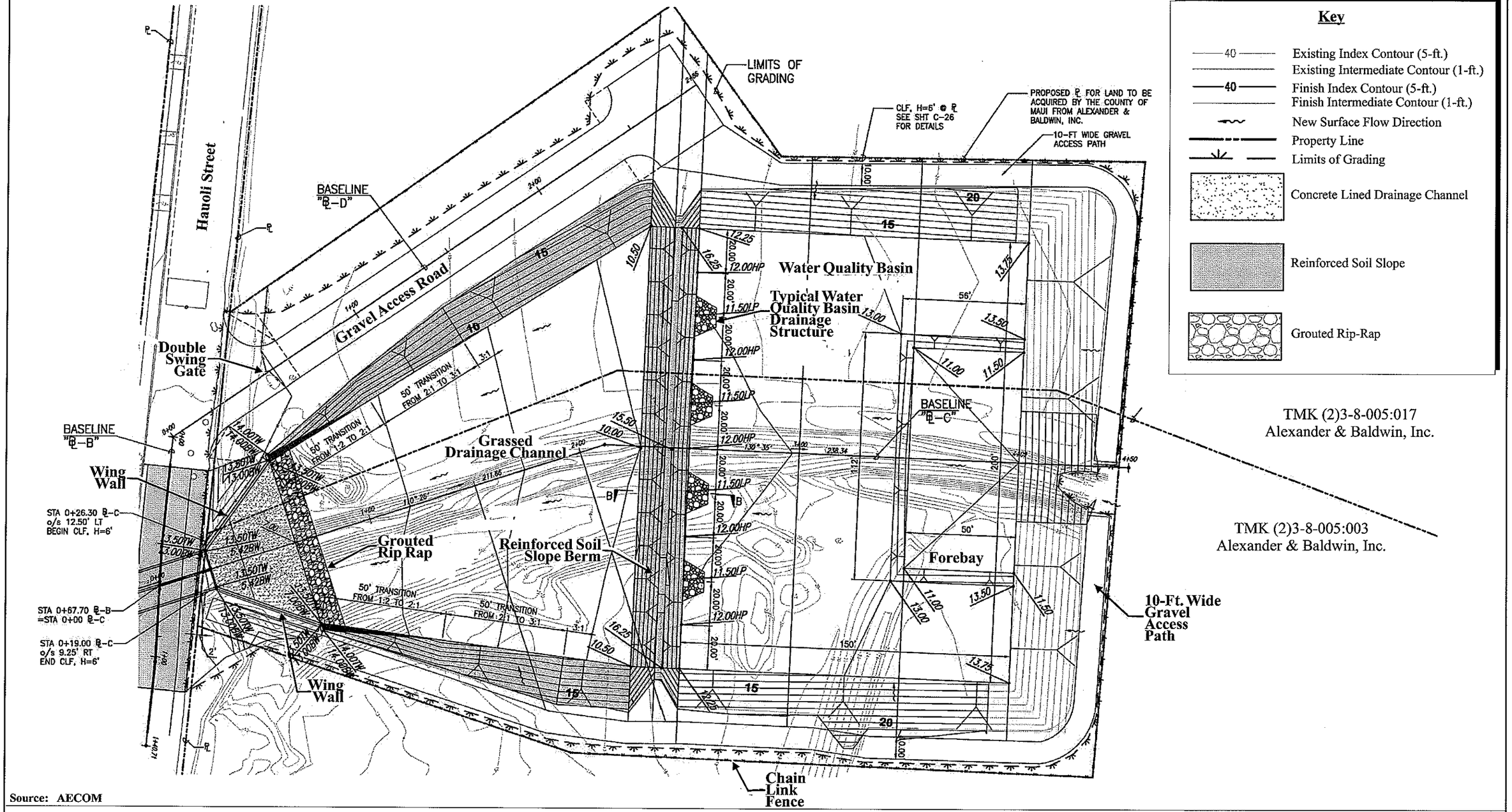
Proposed Hauoli Street Drainage Improvements
General Site Plan

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\siteplan



Source: AECOM

Figure 5

Proposed Hauoli Street Drainage Improvements

Water Quality Basin Plan

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO HIRAGA, INC.

AECOM\HauoliDrainage\WaterQualityPlan

- A grassed drainage channel will be constructed to provide a transition between the water quality basin and double cell box culvert. During heavy flows, runoff will overtop the reinforced soil slope berm of the water quality basin, flow through the grassed drainage channel, and continue through the double box culvert. Similar to the water quality basin, weedy and low maintenance vegetation within the channel will decrease runoff velocity. Refer to **Figure 5**.

- A gravel access road will be constructed to provide access to the basin and grassed drainage channel for maintenance purposes, along with a chain link fence around the perimeter of the basin, access road, and grassed drainage channel for security. Refer to **Figure 5**.

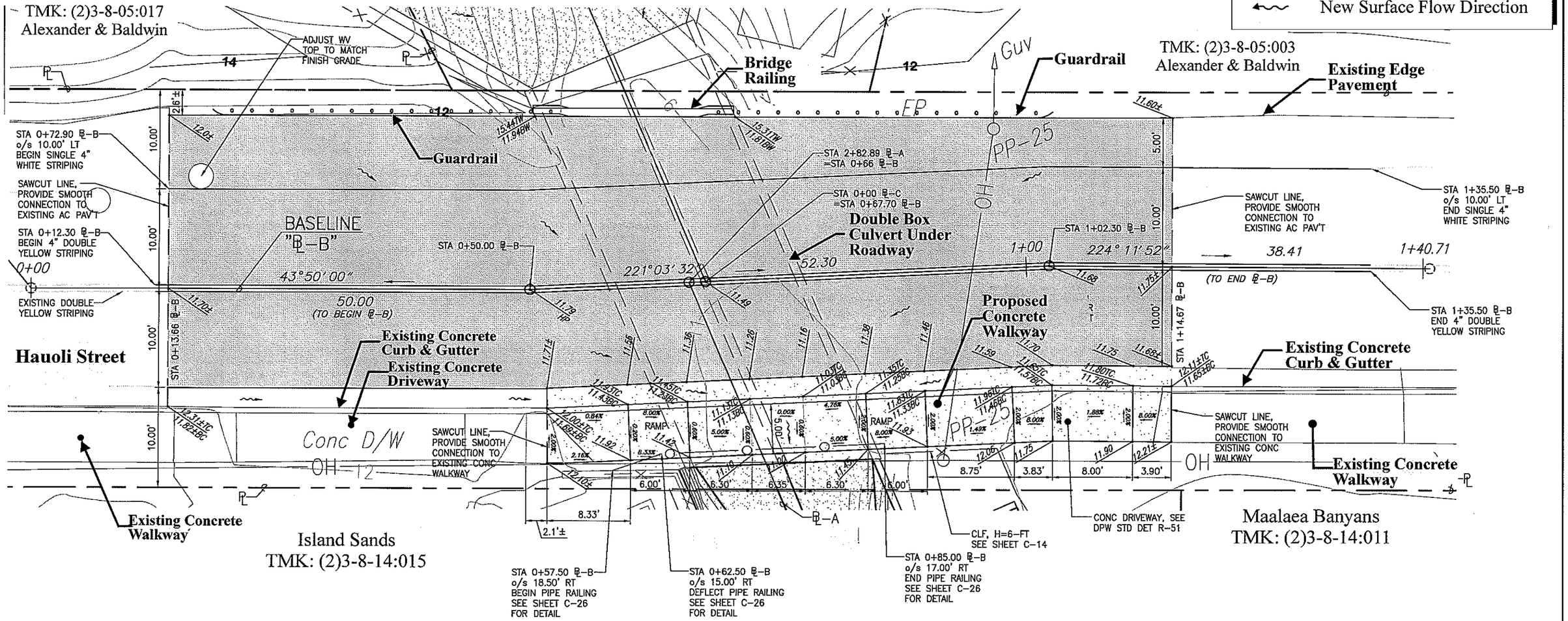
- Concrete wing walls will be created at the mauka (upland) entrance of the double box culvert to provide inlet control to further prevent overtopping of Hauoli Street during heavy flows. Refer to **Figure 5**.

- Re-grading of Hauoli Street will be conducted to direct runoff downslope to the existing, concrete-lined drainage channel on the makai (seaward) side of Hauoli Street. Existing and proposed curbs and gutters will collect and direct runoff towards the low point of the street near the beginning of the concrete-lined channel. Over the culvert, a guardrail will be installed along the mauka side of Hauoli Street, while a new sidewalk and parapet rail will be installed along the makai side of the street. See **Figure 6**.

- An 8-foot by 4-foot double cell box culvert with inlet control will replace the existing 3-foot by 8-foot box culvert crossing Hauoli Street. The larger box culvert will help prevent overtopping of Hauoli Street during heavy flows.

- A retaining wall will be constructed along the north side of the existing concrete-lined drainage channel to increase the capacity of the channel. This 3- to 4-foot tall wall is designed to contain runoff within the drainage channel and prevent future flooding of neighboring properties. Additionally, grouted rip-rap will be added to the mouth of the drainage channel to prevent further erosion. See **Figure 7**.

- During demolition and reconstruction of Hauoli Street, a temporary diversion road will be constructed to provide access to the properties and beach park that are located to the east of the project site. See **Figure 8**.



Source: AECOM

Figure 6

Proposed Hauoli Street Drainage Improvements

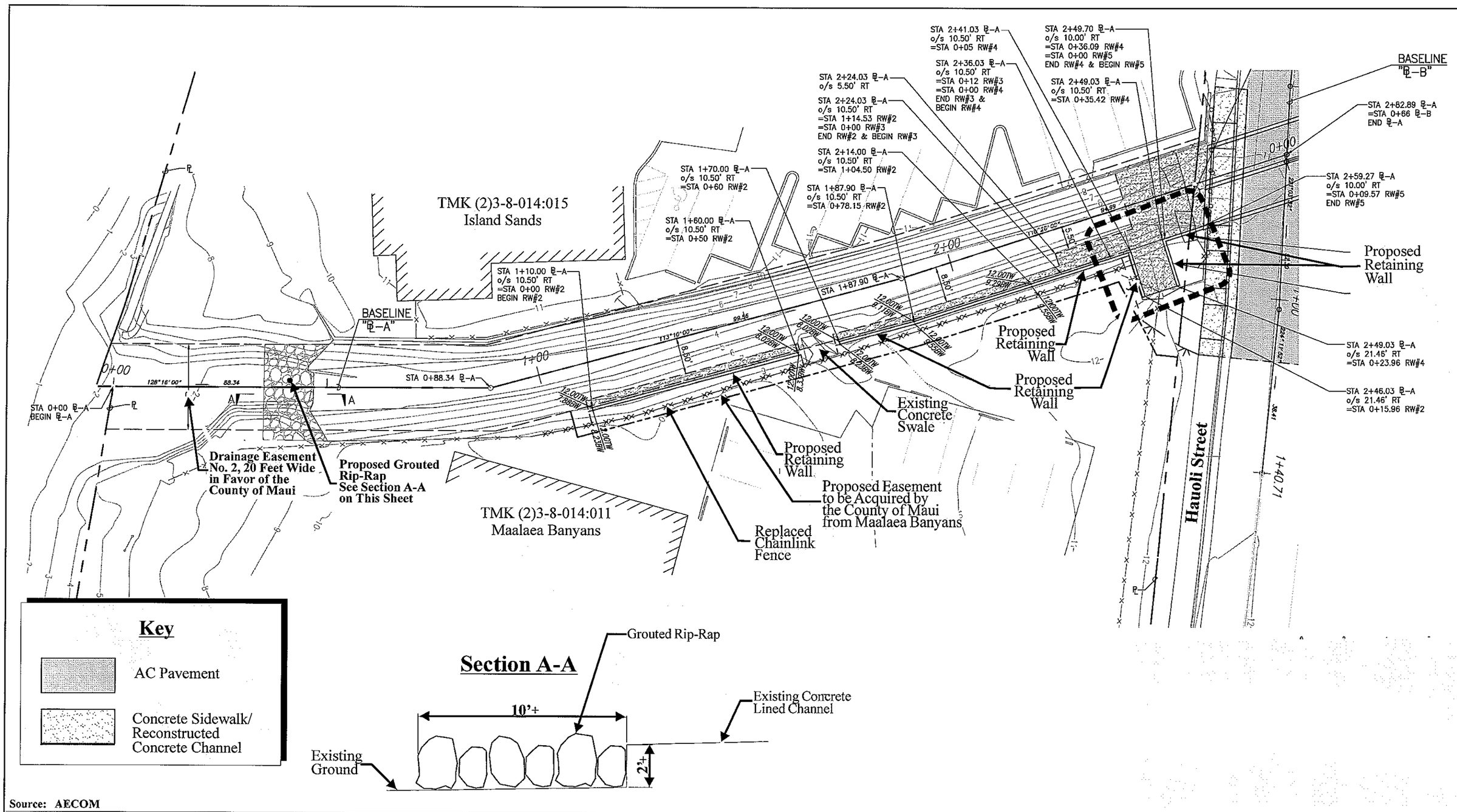
Hauoli Street Plan

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\HauoliStPlan



Source: AECOM

Figure 7

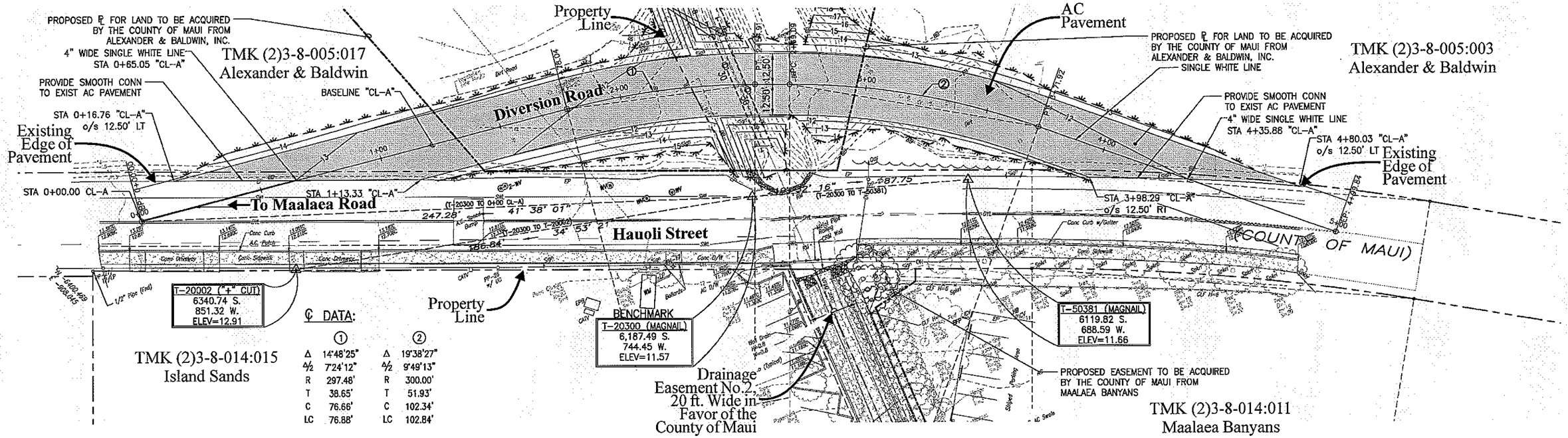
Proposed Hauoli Street Drainage Improvements
Drainage Channel Plan

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\DrainageChannel



Source: AECOM

Figure 8

Proposed Hauoli Street Drainage Improvements

Diversion Road Plan

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\DiversionRd

D. CHAPTER 343 HAWAII REVISED STATUTES REQUIREMENT

The proposed project will utilize County lands, specifically the 20-foot-wide drainage easement and the Hauoli Street right-of-way, as well as County funds. The use of County lands and funds is a trigger for the preparation of an Environmental Assessment (EA), pursuant to Chapter 343, Hawaii Revised Statutes (HRS). While the proposed project will involve work within the Shoreline Setback Area, which is also a trigger for the preparation of an EA, the limited scope of the action within the setback qualifies that project component as exempt from the requirements of Chapter 343, HRS.

This EA has been prepared in order to document the project's technical characteristics, environmental impacts, mitigation measures and alternatives. It is noted that DPW will serve as the Approving Agency for the EA.

E. IMPLEMENTATION CONSIDERATIONS

1. Special Management Area Assessment

The project site is located within the County of Maui's Special Management Area (SMA). Based on the scope of the proposed action, the County of Maui, Department of Planning (DPL) has directed the applicant to submit an SMA Assessment application for review and processing. See **Appendix "C"** and **Appendix "C-1"**. As directed by DPL, an SMA Assessment application will be submitted to DPL for processing.

2. Shoreline Setback Assessment

The mouth of the existing concrete drainage channel is located within the Shoreline Setback Area. The proposed work within the Shoreline Setback Area is limited to the addition of grouted rip-rap (GRP) to the mouth of the drainage channel. Refer to **Figure 4**. In this respect, Item 9 of §12-203-12 of the Shoreline Rules of the Maui Planning Commission, *Permitted structures and activities within the shoreline setback area*, specifies the following as a permitted use or activity:

> *A structure or activity that has been determined by the director to be a minor structure or minor activity within the shoreline setback area which does not adversely affect beach processes, does not artificially fix the shoreline, and does not interfere with public access or public views to and along the shoreline and which meets the purpose of this*

chapter, HRS chapter 205A, as amended, and chapter 19.62, Maui County Code, relating to coastal high hazard districts.

Further, as defined by §12-203-4 of the Shoreline Rules, a *"minor structure"* is a *"man-made structure that costs less than $125,000, does not impede the natural movement of the shoreline, does not alter the existing grade of the shoreline setback area..."* The proposed GRP work within the Shoreline Setback Area meets the criteria set forth by §12-203-12 and §12-203-4 of the Shoreline Rules, as confirmed by DPL. Accordingly, a Shoreline Setback Assessment (SSA) will be submitted to DPL for review and approval as instructed. Refer to **Appendix "C"** and **Appendix "C-1"**.

F. CONSTRUCTION COST AND TIMELINE

The construction cost for the proposed project is approximately $2 million. Pending the receipt of all necessary permits, construction is anticipated to be completed in approximately six (6) months to one (1) year.

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES

A. PHYSICAL SETTING

1. Surrounding Land Uses

a. Existing Conditions

The project site is located on the southwest coast of the Central Maui isthmus, approximately 8 miles south of the island's commercial and business center of Kahului, and approximately 9 miles south of the Kahului Airport. Honoapiilani Highway, the main artery connecting Central and West Maui, is located approximately 0.5 mile west of the project site.

The project site is accessed via Hauoli Street, a 2-lane County roadway that runs along the coast, roughly northeast to southwest. Situated along the coastline to the north and south of the project site are various beachfront condominiums. Actively cultivated sugar cane fields border the site on the *mauka* (north) side, while Maalaea Bay borders the site to the *makai* (south) side. To the west of the cane fields are the commercial and tourism centers of the Maalaea Triangle and Maalaea Harbor Village, as well as two (2) long-range master planned residential communities, Project District 11 (Maalaea Village) and Project District 12 (Maalaea *Mauka*), both of which are set forth by the Kihei-Makena Community Plan.

The five (5) drainage basins which are mauka (upland) of the project site encompass approximately 724.6 acres of land. The drainage basin acreage includes sugar cane fields and portions of Project Districts 11 and 12, as well as conservation lands situated further up the mountain slopes. An unmaintained agricultural ditch runs across the sugar cane fields and up to Hauoli Street. On the north side of this agricultural ditch is a vegetated area overgrown by dense kiawe and other more weedy species, and a thick understory of bufflegrass and giant guinea grass.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is designed to better accommodate runoff draining from the mountain slopes *mauka* of the project site. The purpose of the proposed project is to improve drainage conditions in the immediate vicinity of the site and to alleviate the flooding of Hauoli Street and the neighboring condominiums that occurs during periods of heavy rainfall. The proposed project is anticipated to have a positive effect on surrounding land uses.

2. Climate

a. Existing Conditions

Maui is characterized by a semi-tropical climate containing a multitude of individual microclimates. The mean annual temperature of the island is about 75 degrees Fahrenheit at all locations near sea level. The coolest months on Maui are December and January, with August and September representing the hottest months in the calendar year. A high proportion of the rainfall that Maui receives each year falls on the windward, northeast facing shores, leaving the leeward south and southwest coastal areas, including Maalaea, relatively dry. The leeward side of the island is characteristically affected by strong winds, and high ocean waves occur periodically throughout the year (County of Maui, 2011).

b. Potential Impacts and Proposed Mitigation Measures

The project site is relatively small in scale, encompassing approximately 2.5 acres, and involves no vertical construction other than the 3- to 4-foot tall wall along the northern side of the drainage channel. As such, the proposed action is not anticipated to affect local microclimates. The proposed drainage improvements are being designed to accommodate and manage storm water runoff resulting from periods of heavy rainfall.

3. Topography and Soil Characteristics

a. Existing Conditions

The Central Maui isthmus is generally flat and level. The existing concrete drainage channel slopes towards the ocean from Hauoli Street with a gentle grade ranging from 1 to 3 percent. Refer to **Appendix "A"**. On the *mauka* side of Hauoli Street, the site of the proposed water quality basin contains an old agricultural ditch that runs up to the existing box culvert under Hauoli Street.

Underlying the project site are soils belonging to the Pulehu-Ewa-Jaucas association. See **Figure 9**. The Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii characterizes the soils of this association as deep and well drained and located on alluvial fans and in basins (Foote et al., 1972).

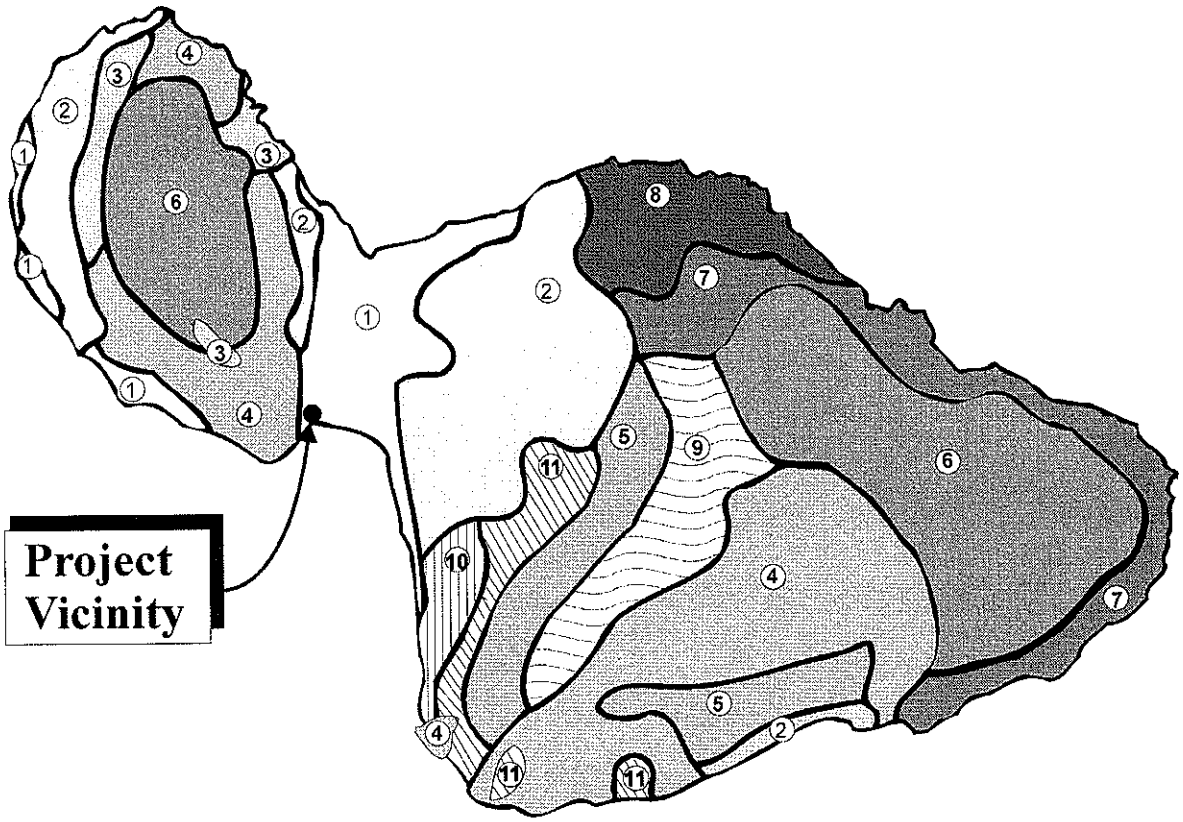
The soils underlying the project site are classified as EsB, Ewa Silty Clay, and EtB, Ewa Cobbly Silty Clay. See **Figure 10**. Both EsB and EtB soils are characterized by 3 to 7 percent slopes, with moderate permeability, slow runoff, and slight erosion hazard. The available water capacity for both soils is about 1.3 inches per foot of soil, and this well-drained soil occurs in basins and on alluvial fans, as within the project area. Ewa Silty Clay soils are predominantly used for sugar cane or pineapple cultivation in the Hawaiian Islands. Unlike Ewa Silty Clay soils, Ewa Cobbly Silty Clay soils have cobblestones and stones occurring on and in the surface layer.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not anticipated to have any adverse impact upon existing terrestrial conditions. The installation of the double box culvert and the construction of the drainage channel wall and water quality basin will not result in significant adverse modifications to the local topography. The water quality basin is a mitigation measure and a Best Management Practice designed to reduce runoff velocity and prevent sediment carried by storm water runoff from draining into the ocean.

LEGEND

- ① Pulehu-Ewa-Jaucas association
- ② Waiakoa-Keahua-Molokai association
- ③ Honolua-Olelo association
- ④ Rock land-Rough mountainous land association
- ⑤ Puu Pa-Kula-Pane association
- ⑥ Hydrandepts-Tropaquods association
- ⑦ Hana-Makaalae-Kailua association
- ⑧ Pauwela-Haiku association
- ⑨ Laumaia-Kaipoipoi-Olinda association
- ⑩ Keawakapu-Makena association
- ⑪ Kamaole-Oanapuka association



Source: USDA Soil Conservation Service

Figure 9

Proposed Hauoli Street Drainage Improvements
Soil Association Map

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: County of Maui, Department of Public Works

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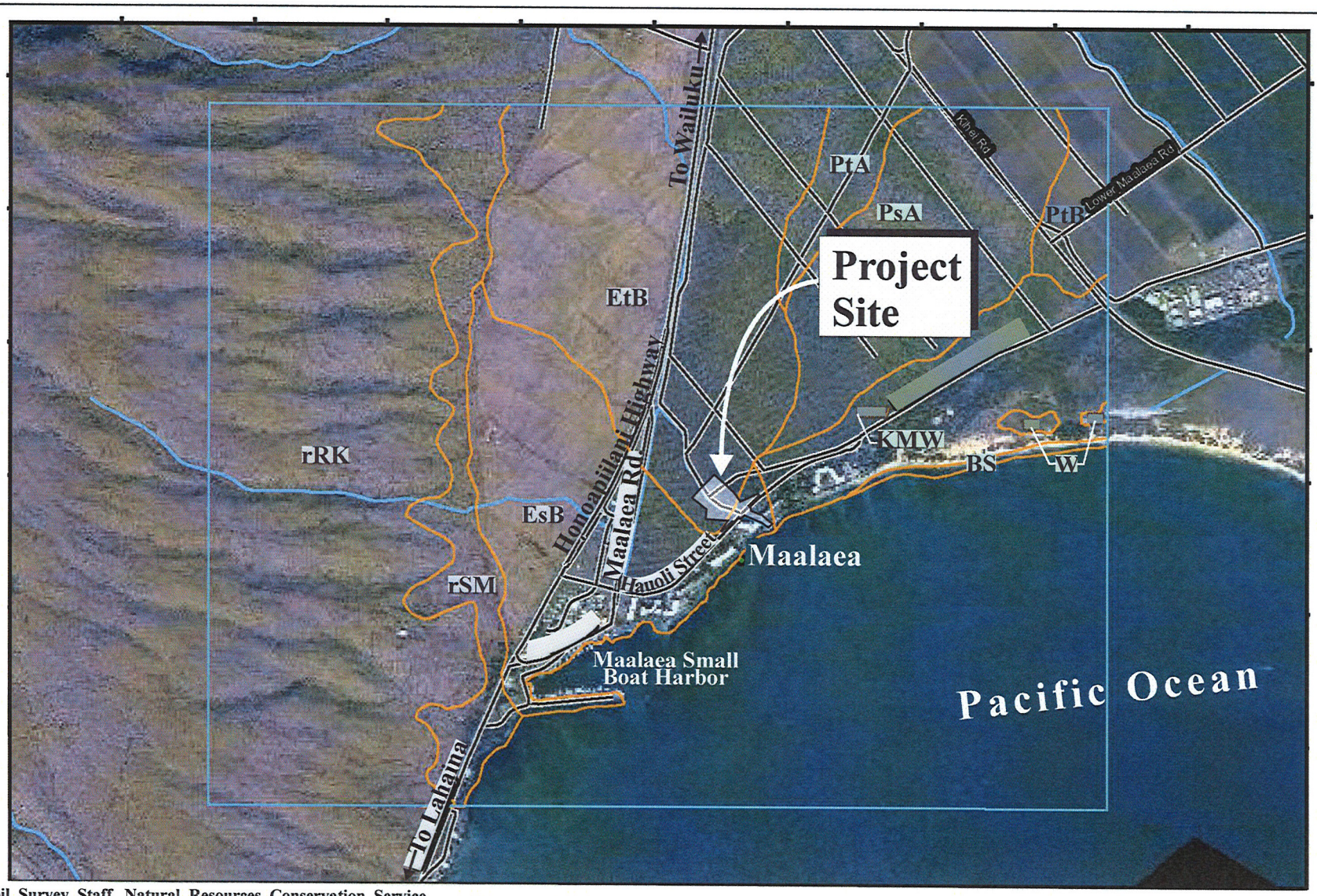

Source: Soil Survey Staff, Natural Resources Conservation Service

Figure 10 Proposed Hauoli Street Drainage Improvements

Soil Classification Map

1,000 Feet
0 500 2,000

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

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4. Agricultural Productivity Considerations

a. Existing Conditions

The existing drainage channel utilizes a narrow strip of land on the makai side of Hauoli Street that is bordered by condominium properties and is not utilized for agricultural production. On the mauka side of Hauoli Street, a small portion of the project site in Parcel 17, approximately one (1) acre, underlying the proposed water quality basin and access road is in sugar cane cultivation. The affected portion of Parcel 3 is vegetated by wild grasses, shrubs, and trees and is not utilized for cultivation. It is noted that the affected portions of Parcel 3 and Parcel 17 are designated for Project District use, rather than agricultural use, in the Kihei-Makena Community Plan.

b. Potential Impacts and Proposed Mitigation Measures

Improvements to the project site will have no significant adverse effects on agricultural productivity parameters. The drainage channel and proposed wall will not utilize agricultural lands. The water quality basin site utilizes less than two (2) acres of the sugar cane fields on Parcel 3 and Parcel 17. The affected acreage of cane field represents a small percentage of HC&S' actively cultivated sugar cane fields, and its removal from production is not anticipated to adversely impact the agricultural productivity of the 30,000-acre HC&S plantation. Meanwhile, the water quality basin will function to reduce runoff velocity and provide for sediment control, allowing sediments and pollutants that collect in storm water runoff from across the sugar cane fields to settle prior to discharge through the Hauoli Street drainage system.

5. Flood and Tsunami Hazards

a. Existing Conditions

The Flood Insurance Rate Map (FIRM) indicates that the existing concrete-lined drainage channel is situated within Zone X (shaded), in an area of 0.2 percent annual chance flood; areas of 1 percent annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1 percent annual chance flood. According to the FIRM, the *makai* end of the proposed drainage channel will

not enter Zone VE, which is described as a coastal flood zone with velocity hazard (wave action), and base flood elevation of 11 feet. The water quality basin site is located in Flood Zone X (shaded) and Flood Zone X (unshaded), areas outside the 0.2 percent annual chance flood plain. See **Figure 11.**

b. Potential Impacts and Proposed Mitigation Measures

The proposed drainage channel has been designed in accordance with Title MC-15, Subtitle 01, Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui. The proposed drainage improvements are designed to alleviate flooding on Hauoli Street and around the condominiums proximate to the existing drainage channel during heavy rainfall. In effect, the proposed project mitigates flooding conditions and will not adversely affect flood or tsunami conditions in the surrounding area.

6. Coastal Resources

a. Existing Conditions

A Coastal Assessment was prepared by Sea Engineering, Inc. (SEI) in December 2009. This report describes the local oceanographic and coastal settings, historical shoreline changes, existing shoreline conditions, and ongoing shoreline processes. See **Appendix "D"**.

There is a small beach area fronting the mouth of the drainage channel that consists of a cobble beach that extends 120 feet to the northeast in front of the Maalaea Banyans condominium and a sand beach that extends 240 feet to the southwest in front of the Island Sands condominium. The existing drainage channel opens near the middle of the sandy shoreline in this area. According to the Coastal Assessment Report, this sandy beach shoreline has been relatively stable since 1960. Past the Island Sands condominium towards the southwest, the 1,300-foot reach leading to the Maalaea Small Boat Harbor consists of hardened shoreline (seawall). See **Figure 12** and **Figure 13**.

Beyond the shoreline, the nearshore substrate in the vicinity of the project site mostly consists of basalt cobbles which are likely derived from the erosion of the local conglomerate. The loose cobbles form offshore shoals, with little

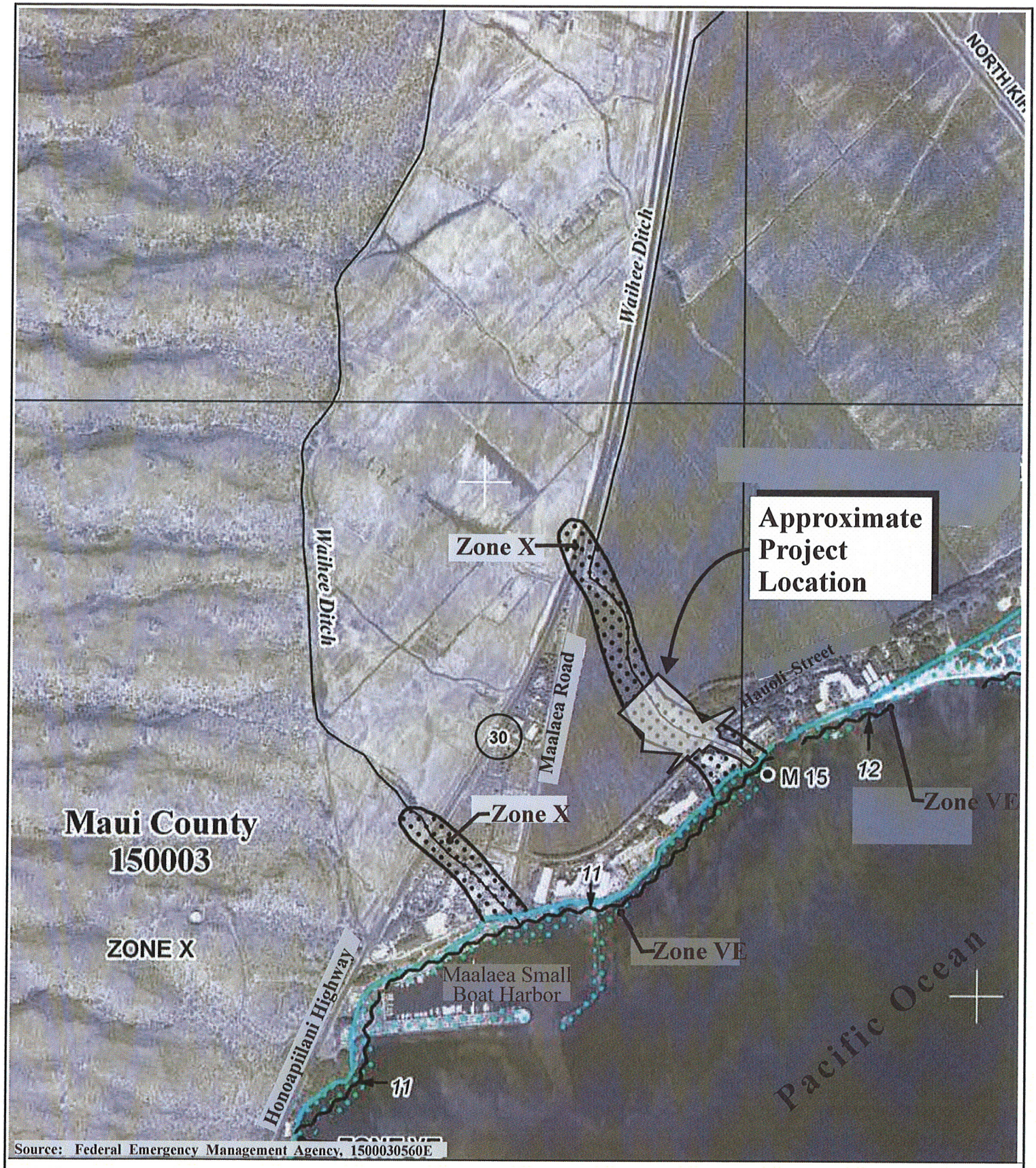


Figure 11

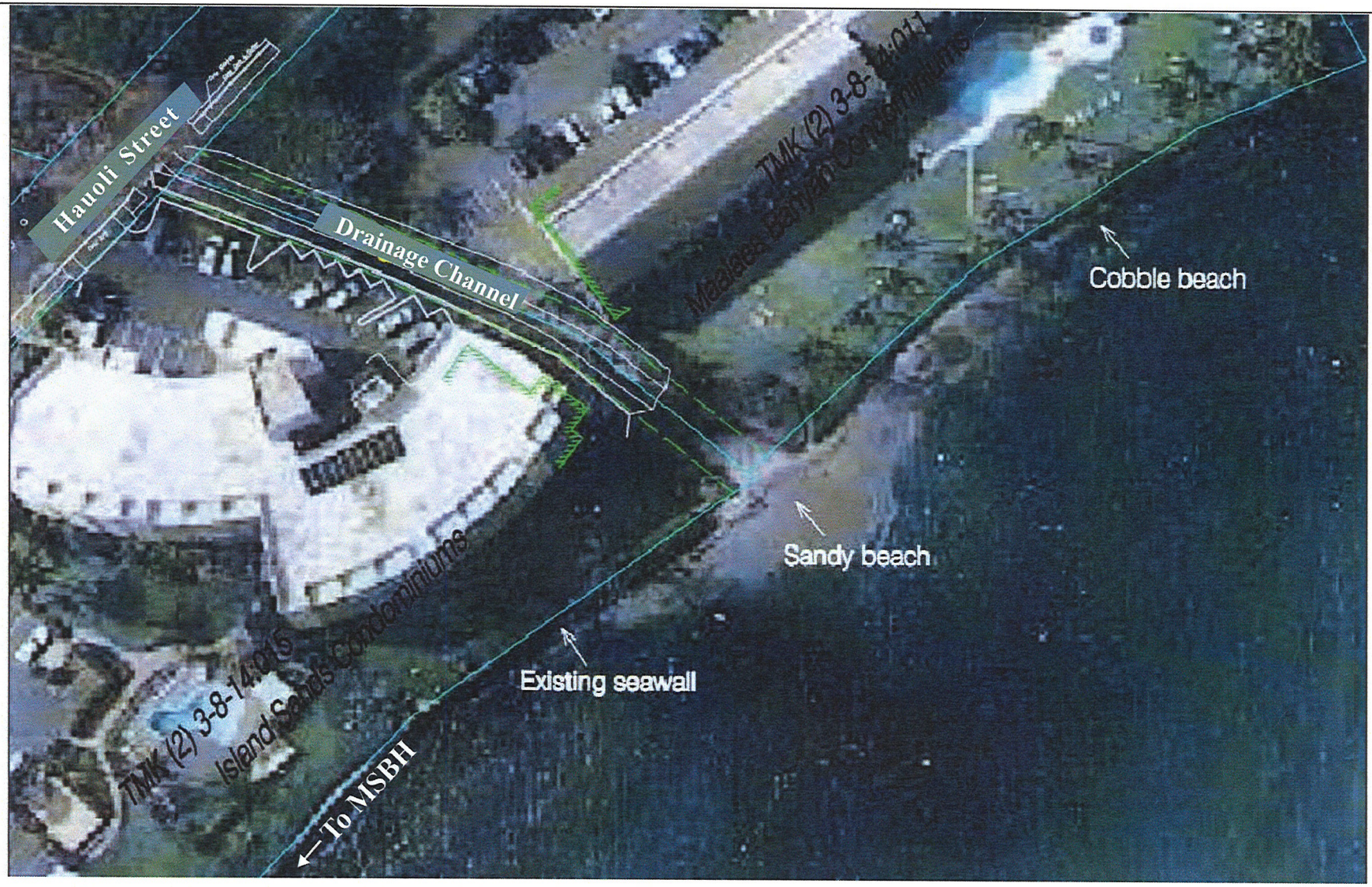
Proposed Hauoli Street Drainage Improvements
Flood Insurance Rate Map

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\firm



Source: Sea Engineering, Inc.

Figure 12 Proposed Hauoli Street Drainage Improvements

Aerial Photo of Drainage Channel

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

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Sandy beach on northeast side of Hauoli Street drainage outlet; cobble beach beyond

Sandy beach and seawall on southwest side of Hauoli Street drainage outlet

Source: Sea Engineering, Inc.

Figure 13 Proposed Hauoli Street Drainage Improvements
Shoreline Photos

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\shorelinephotos

sand in the nearshore area. In October 2009, a Biological and Water Quality Survey Report was prepared by AECOS, Inc. See **Appendix "E"**. The nearshore waters fronting the project site are classified as Class A, Open Coastal Waters. It is stated that these waters *"cannot act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class"*. Nearshore waters receive quantities of freshwater through groundwater seepage and surface discharge of runoff.

b. Potential Impacts and Proposed Mitigation Measures

The proposed drainage improvements are not anticipated to have significant adverse impacts on coastal resources or beach processes. The proposed drainage improvements do not involve hardening of the shoreline, and existing drainage patterns will be maintained. The replacement 4-foot by 8-foot double box culverts crossing Hauoli Street and proposed wall that will run downstream along the existing concrete drainage channel will create more capacity in the drainage system to accommodate storm water runoff from periods of heavy rainfall. The concrete drainage channel and proposed improvements end approximately 40 feet inland of the shoreline. Grouted rip-rap added to the mouth of the drainage channel is designed to prevent future erosion at this point. Due to its distance inland of the shoreline, this addition of grouted rip-rap is not anticipated to affect beach processes.

The installation of the proposed water quality basin is designed to reduce the sediment and pollutant load of storm water runoff and protect the water quality of the nearshore waters. The construction of this basin is anticipated to function by protecting the water quality of the nearshore marine environment. During construction, Best Management Practices (BMPs) for sediment and erosion control will be implemented to minimize the potential for dust and sediment from the project site to enter the nearshore environment. Refer to **Appendix "B"**.

7. Flora and Fauna

a. Existing Conditions

The portion of the project site *mauka* of Hauoli Street encompasses a small

portion of an actively cultivated sugar cane field, an old agricultural ditch, and dense *kiawe* woodland. A discussion of the area's vegetative characteristics is found in **Appendix "F"**. Apart from sugar cane, flora in this area include such introduced species as *kiawe*, klu, Christmas berry, and *koa haole*, with a thick understory of buffel grass, giant guinea grass, lion's ear, castor bean, slender mimosa, partridge pea, and abutilon. Native plants found in this area include the *maile hohono* and *`uhaloa*, species that are not considered to be rare.

Vegetation surrounding the drainage channel *makai* of Hauoli Street includes a similar range of introduced species including ironwood, castor bean, lion's ear, abutilon, klu, *koa haole*, buffel grass, and giant guinea grass. *Naupaka*, a common native shrub, is prevalent along the shoreline and the outlet of the drainage channel. Meanwhile, the condominium properties flanking the drainage channel are landscaped with yellow oleander, bougainvillea, Chinese banyan, and several varieties of hibiscus.

Fauna in and around the project site are typical of sugar cane lands and *kiawe* woodland. Species include common, non-native, introduced species such as stray cats, mongoose, mice, rats, egrets, and the common mynah.

In October 2009, AECOS, Inc. conducted a marine biological survey of the nearshore marine environment fronting the project site. Refer to **Appendix "E"**. A boulder and cobble bottom tide pool located below the beach that fronts the drainage channel hosts a variety of marine invertebrates typical of intertidal shorelines throughout Hawaii. Species generally include nerite snails, periwinkles, false *`opihi*, and hermit crabs, while *`opihi* and small sea slugs are present but rare in the area. Boulders and sea walls near the project site are marked by dense coverings of green algae. Shallow waters in this area host schools of Hawaiian anchovy, *āholehole*, and juvenile mullet.

The nearshore rubble fields and sand channels consists of eroded coral fragments that provide habitats for varieties of small crabs, crustose coralline algae, small sponges, and tube worms. Shallow water limestone reefs are dominated by algal cover, wherein varieties of sea urchins are found. Fish in these waters include *manini*, saddle wrasse, and many bar goatfish.

Further offshore, the limestone bottom is covered with multiple varieties of coral and coralline algae. Sea life observed include spiny brittle stars, red pencil urchins, speckled scorpionfish, and velvetfish.

b. Potential Impacts and Proposed Mitigation Measures

The majority of flora and fauna within and surrounding the project site are of common, non-native varieties. The native flora such as *naupaka, `uhaloa,* and *maile hohono* that were encountered are relatively common. Further, none of the aquatic species observed are listed as Threatened or Endangered and the project site does not offer any critical habitat for such species. The proposed water quality basin is designed to reduce the sediment and pollutant loads of runoff that passes into the drainage channel, thereby improving storm water quality. During construction, appropriate BMPs will be implemented to protect the marine environment from dust and sediment resulting from construction activities. Refer to **Appendix "B"**. Thus, the proposed project is not anticipated to adversely affect flora or fauna or critical habitat in the area.

8. Streams, Wetlands, and Reservoirs

a. Existing Conditions

The drainage basins mauka of the project site capture and funnel runoff down the mountain slope into an intermittent streambed and to an unmaintained agricultural ditch which leads into the box culvert and drainage channel on the *makai* side of Hauoli Street. Mauka of the project site, a grouted rip-rap drainage channel runs parallel to the eastern side of Honoapiilani Highway. This channel terminates nearby the mauka end of the agricultural ditch that leads to the Hauoli Street drainage system. Refer to **Figure 3**.

There are no perennial streams or any reservoirs in the vicinity of the project site. The Kealia Pond National Wildlife Refuge is located approximately one (1) mile northeast of the project site, and the Maalaea Small Boat Harbor (MSBH) is located approximately 0.3 miles south of the project site. Runoff from the drainage basins mauka of the project site do not flow into the Kealia Pond National Wildlife Refuge or the MSBH.

b. Potential Impacts and Proposed Mitigation Measures

The project site is located downstream of all drainage basins, and the drainage channel will not empty into the MSBH. Additionally, the project site does not encroach upon any perennial streams or any waterways associated with Kealia Pond. The proposed project is designed to accommodate storm water runoff flowing down from the drainage basins, intermittent streambed, and agricultural ditch that are mauka of the project site. In sum, the proposed project is not anticipated to have an adverse effect on surrounding streams, wetlands, or reservoirs.

9. Air Quality

a. Existing Conditions

The Maalaea Bay area in general does not experience adverse air quality conditions. One notable point source of air contaminants in the local area is the power generation station owned and operated by Maui Electric Company, Ltd. This industrial site is located approximately one (1) mile to the northeast of the project site; however, this power generation station is not considered a significant detriment to regional air quality, as the prevailing trade winds along the south coast quickly disperse emissions. Other airborne pollutants can largely be attributed to vehicle exhaust from Hauoli Street and the occasional burning of sugar cane by Hawaiian Commercial & Sugar Company (HC&S). All of the above sources are relatively intermittent, however, and the prevailing tradewinds disperse suspended particulates to maintain a relatively high level of air quality in and around the project area.

b. Potential Impacts and Proposed Mitigation Measures

Air quality impacts attributable to construction-related activities include short-term generation of dust. Construction BMPs, particularly for dust control measures such as regular watering and sprinkling and revegetation of graded areas, will be implemented to minimize impacts to surrounding residents. Due to the nature of the proposed project, which solely involves drainage system improvements, impacts on air quality are not anticipated to occur after the completion of construction.

10. Noise Characteristics

a. Existing Conditions

Existing background noise in the vicinity of the project site is principally attributed to ship traffic associated with the MSBH and vehicular traffic on Hauoli Street. The noise from inter-island flight paths of arriving and departing aircraft at Kahului Airport, located nine (9) miles to the northeast of the project site, represents another occasional source of noise. It should be noted that intermittent noise from wind adds to the overall ambient noise level from all of the aforementioned human sources.

b. Potential Impacts and Proposed Mitigation Measures

As with air quality, ambient noise conditions will be temporarily impacted by construction-related activities. Construction equipment and machinery will be the dominant sources of noise during the construction process. Construction BMPs relating to proper equipment and maintenance are anticipated to minimize noise levels from these sources, and equipment mufflers or other sound attenuating devices may also be utilized as required to mitigate adverse impacts to noise levels. All construction-related activities will be limited to normal, daylight and weekday working hours, unless waterline offset work becomes necessary, in which case night time work would occur.

Once construction is completed, the drainage improvements will not generate any noise impacts.

11. Water Quality

a. Existing Conditions

The mouth of the drainage channel opens onto a sandy beach that fronts the waters of Maalaea Bay. The MSBH is located approximately 0.3 mile to the southwest of the project site. A marine biological survey conducted by AECOS, Inc. concluded that the nearshore marine waters fronting the project site are classified as Class A, Open Coastal Waters. Refer to **Appendix "E"**. As dictated by Title 11, Chapter 54, Hawaii Administrative Rules (HAR) for

the State of Hawaii, Department of Health (DOH) regarding water quality standards, the use of Class A waters for recreational purposes and aesthetic enjoyment is to be protected. Any other use of Class A waters shall be permitted, so long as the proposed use is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreational activities in and on these waters.

Nearshore waters nearby the project site, namely the Maalaea Beach station (HI058771) and the Maalaea Boat Harbor station (open, coastal station, HI00082), were identified as impaired waters by the State of Hawaii Water Quality Monitoring and Assessment Report. The Maalaea Beach station, situated northeast of the project site, was listed as impaired for turbidity and chlorophyll, while the Maalaea Boat Harbor station, southwest of the project area, was listed as impaired for turbidity, chlorophyll, total nitrogen, and nitrate-nitrite nitrogen. This indicates that the nearshore waters do not meet the Hawaii Water Quality Standards for the parameters indicated.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

Nearshore waters at the project site receive freshwater from groundwater seepage through porous bedrock, as well as surface discharge or runoff from the Hauoli Street drainage system and other shoreline properties. Runoff is discharged from the Hauoli Street drainage system following periods of heavy rainfall. Title 11, Chapter 54, HAR states that Class A waters cannot act as receiving waters for any discharge that has not received the highest degree of treatment or control compatible with the established criteria for that class. In this regard, the water quality basin is an important control measure of the proposed drainage system improvements to protect receiving waters from storm water discharge. The basin is a water quality BMP that is designed to reduce the sediment and pollutant load of storm water runoff. During construction, appropriate BMPs identified by a sediment and erosion control plan will be implemented to ensure that dust and sediment generated by construction activities do not enter the marine environment. Refer to **Appendix "B"**. The existing drainage system does not have any water quality BMP measures; therefore, the proposed improvements are anticipated to provide a positive impact on water quality.

12. Archaeological Resources

a. Existing Conditions

An Archaeological Assessment of the project site was prepared by SCS in November 2009. This report was reviewed and approved by the State Historic Preservation Division (SHPD) on November 16, 2009. Refer to **Appendix "F"** and **Appendix "F-1"**. SCS conducted archival research, followed by a full pedestrian survey of the project site to determine the presence or absence of historical sites, to provide adequate recordation and documentation of any and all historic sites present, to determine the significance of any extant sites, and to provide recommendations to SHPD concerning site significance and mitigation, prior to the commencement of the proposed action.

The archival research and field inspection conducted by SCS yielded no historic or archaeological sites or surface features within the project site. Furthermore, given that the project site is limited to a streambed, it was concluded that any remains once present would have been washed downstream into the ocean. It is noted that sandy substrate, a common matrix for human burials in traditional periods, was encountered in the *makai* extent of the drainage channel.

b. Potential Impacts and Proposed Mitigation Measures

The archaeological research conducted by SCS yielded negative results and a low probability for encountering subsurface archaeological sites such as burials and habitation deposits. However, given the sandy substrate in the *makai* portion of the drainage channel, it was acknowledged there is a possibility that human burials could be encountered in this area. Thus, Archaeological Monitoring procedures were recommended as a precautionary measure during all ground-altering activities in the construction period. In following, an Archaeological Monitoring Plan was prepared by SCS in November 2009, and was reviewed and approved by SHPD on November 16, 2009. See **Appendix "G"** and **Appendix "G-1"**. The Monitoring Plan dictates that if human remains are identified during ground-altering activities, appropriate and lawful protocol concerning the Inadvertent Discovery of Human Remains (pursuant to Title 13-300-40 (a), (b), and (c), Hawaii

Administrative Rules) is followed. Additionally, the Monitoring Plan will ensure that any significant cultural resources that are uncovered will be sampled, documented, and evaluated for their historical significance, in accordance with recommendations of SHPD.

13. Cultural Resources

a. Existing Conditions

A Cultural Impact Assessment prepared by SCS evaluated the probability of impacts on identified cultural resources, cultural values, and rights within the project site and its vicinity. See **Appendix "H"**. The assessment notes that the project site is located in the Waikapu *Ahupuaa*. According to the assessment, the name Waikapu translates to, "water of the conch", and may possibly refer to a special conch shell that was referenced in the ancient Hawaiian legend of *"Puapualenalena"*. Another interpretation associates the name with the conch shell that Kamehameha used in ancient times to assemble his forces for battle on Maui.

Historically, the Waikapu region was considered a part of what was called Na Wai Eha, or "The Four Streams", which also included Waihee, Waiehu, and Wailuku. The presence of these streams enabled wetland taro farming to flourish in the area. The project site, however, is located at the southernmost tip of the Waikapu *Ahupuaa*. This area was recognized as being much drier than its counterparts and received much less precipitation than the *ahupuaa* to the north. Four (4) *mauka-makai* drainages were identified in the area and were most likely used to transfer water from the mountainside, providing moisture for marginal agricultural practices.

Following the onset of western contact, land in the Waikapu region was converted into commercial sugar cane fields. One of the first sugar cane companies in the area was the Hungtai Sugar Works, which was run by two (2) Chinese brothers. Later this land was acquired by the Wailuku Sugar Company, and continued to be used for sugar cultivation until termination of the company in 1988.

b. Potential Impacts and Proposed Mitigation Measures

In preparing the Cultural Impact Assessment, SCS contacted organizations whose jurisdiction includes knowledge of the area with an invitation for consultation. Refer to **Appendix "H"**.

The cultural consultant sought consultation via letter request from Thelma Shimaoka, Coordinator of the Maui Branch of the Office of Hawaiian Affairs; Hinano Rodrigues, Cultural Historian with the State Historic Preservation Division; the Maui Planning Department, Cultural Resources Commission; the Central Maui Hawaiian Civic Club; Kamika Kepaa of the Native Hawaiian Preservation Council; Na Kupuna O Maui; Keeaumoku Kapu; and Charles Maxwell of the Maui/Lanai Island Burial Council.

In addition, a Cultural Impact Assessment Notice was published on May 6, 7, and 10, 2009 in *The Honolulu Advertiser* and *The Maui News*. This notice requested information from the public regarding cultural resources or activities in the project site. The affected parcels were identified by TMK and contact information was provided.

Based on the information gathered during the cultural impact assessment, the proposed action is not anticipated to have an adverse impact upon Native Hawaiian cultural resources within the immediate vicinity. The property is not currently used for traditional cultural gathering, access, or religious practices. As noted previously, a program of archaeological monitoring will be carried out during the phases of construction involving ground altering. Refer to **Appendix "G"**. Should any cultural remains be encountered during construction and excavation, activity work in the vicinity of the find will halt and SHPD will be contacted to establish appropriate mitigation measures in accordance with Chapter 6E, Hawaii Revised Statutes.

14. Scenic and Open Space Resources

a. Existing Conditions

The project site is located along the southwest coast of Maui, an area where development is generally limited to beachfront condominiums. Scenic resources in the vicinity of the project site include Maalaea Bay, Molokini,

Kahoolawe, the southern slopes of the West Maui Mountains, and Haleakala. Open space resources around the project site include the expansive agricultural lands of the Central Valley just north of Maalaea, as well as the Kealia Pond National Wildlife Refuge which lies to the east of the project site.

b. Potential Impacts and Proposed Mitigation Measures

The views of the ocean and of the West Maui Mountains are the principal visual resources of the project site. The proposed action is limited to improvements to an existing drainage system, and as such, does not involve any vertical structures other than the 3- to 4-foot tall wall along the drainage channel which slopes towards the ocean. Considering that this wall will run perpendicular to the shore, between two (2) condominium buildings, the proposed project will not impact scenic or open space resources in the vicinity.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Land Use and Community Character

a. Existing Conditions

Existing and proposed land uses surrounding the project site are indicative of growth trends anticipated for the Maalaea area. The Maalaea Triangle, a commercial center with shops, restaurants, and commercial recreational uses, lies northwest of the project site, beyond the adjacent sugar cane fields. Project District 11 and Project District 12, both reflected as proposed master planned residential communities by the Kihei-Makena Community Plan, lay to the west of the project site. Project District 11 encompasses 650 acres, while Project District 12 encompasses 260 acres. Lands underlying the Project District 11 and Project District 12 areas are currently in agricultural use. There are a number of condominiums along the coastline immediately east and west of the project site, most of which are either owner-occupied or transient vacation rentals. The MSBH is located just west of these condominiums, with a string of single-family homes beyond.

b. Potential Impacts and Proposed Mitigation Measures

The proposed drainage improvements on Hauoli Street are not anticipated to adversely impact the regional setting and neighborhood character. The neighboring condominiums have experienced flooding in the past due to storm water runoff overflowing the banks of the existing culvert and drainage channel. The proposed drainage improvements will alleviate this periodic flooding of the roadway and nearby condominiums during heavy rainfall. Also, the proposed water quality basin is a mitigation measure to reduce sediment loads of runoff from lands mauka of the drainage channel and improve the quality of storm water that discharges into the ocean. In sum, the proposed project is anticipated to have a positive impact on surrounding land uses by improving drainage conditions in the Hauoli Street area to alleviate flooding during heavy rainfall.

2. Population and Economy

a. Existing Conditions

Hauoli Street is located along the southwest coast of Maui, within the Kihei-Makena Community Plan region, an area that has experienced significant population growth over the last four (4) decades. In the year 2000, the population of Maui Island was 117,644, with 22,870 people (19.4 percent of the island's population) residing in the Kihei-Makena Community Plan region (County of Maui, 2006). The growth in population since 1970 has been considerable, with population increasing from 1,636 in 1970, to approximately 7,263 in 1980, and to 15,365 in 1990. Over the past 40 years, the Kihei-Makena Community Plan region has experienced a 14-fold increase in resident population, and this growth is expected to continue. The resident population of Maui Island increased to 144,444 in the year 2010, with 27,270 people (18.9 percent) residing in the Kihei-Makena area (DBEDT, 2011).

The economy of Maui is heavily dependent upon the visitor industry, and the Kihei-Makena area presents a fine illustration of this characteristic. The presence of a number of vacation condominiums along Hauoli Street, including the Maalaea Bay, Maalaea Kai, Maalaea Yacht Marina, and Maalaea Mermaid, reflects the fact that Maui's south coast has grown to be one of the most popular resort-residential destinations in the State. The

Wailea and Makena areas, located further south, again reaffirm the island's economic dependence on tourism, with the presence of a number of major luxury hotels, such as the Fairmont Kea Lani, Grand Wailea, Wailea Marriott and Makena Beach & Golf Resort, all of which are located amongst internationally renowned golf courses.

The nearby MSBH is an important source of Maui's economic sustenance as it represents one of the focal points for tourism on the island. Many of the commercial boat operators based in the MSBH conduct Molokini snorkeling trips, whale-watching tours, deep sea fishing expeditions or sunset cruises on a regular basis. The popularity of the harbor as a tourist gateway can be attributed to its proximity to the airport in Kahului, the hotels in Kihei and Wailea, and Molokini crater, one of the top sightseeing destinations in Maui County.

As of May 2012, the nonseasonally adjusted unemployment rates for Maui County and the island of Maui were 6.7 percent and 6.6 percent, respectively. This shows a decrease from the respective 2011 figures, which had unemployment rates at 7.6 percent and 7.6 percent, respectively (DLIR, 2012).

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not a population generator, either in the short- or long-term. During the construction period, the proposed project will benefit the local economy by providing construction-related employment. After construction, the proposed project will alleviate flooding, protecting this popular tourist destination which is an important contributor to Maui's economy.

C. PUBLIC SERVICES

1. Solid Waste Collection and Disposal

a. Existing Conditions

Single-family residential solid waste collection service is provided by the County of Maui on a weekly basis. Residential solid waste collected by

County crews is disposed of at the County's 55-acre Central Maui Landfill facility, located 4.0 miles southeast of the Kahului Airport. In addition to County-collected refuse, the Central Maui Landfill also accepts waste from private collection companies that service certain residential areas and businesses. Privately owned facilities, such as the Maui Demolition and Construction Landfill and the Pohakulepo Concrete Recycling Facility, accept solid waste and concrete from demolition and construction activities. These facilities are located at Maalaea, near Honoapiilani Highway's junctions with North Kihei Road and the Kuihelani Highway. A privately operated green waste recycling facility is located at the Central Maui Landfill.

Any solid waste generated by the commercial activities around the project area is collected and disposed of by construction and private collection companies.

b. Potential Impacts and Proposed Mitigation Measures

A solid waste management plan will be developed, as appropriate, for the disposal of materials resulting from demolition and construction activities. The proposed project is small in scale and is not anticipated to adversely impact existing solid waste capacity. Once completed, the drainage facilities will be maintained by DPW. Maintenance will involve the periodic removal of sediments and solids from the water quality basin and drainage channel. Sediments will be taken to the old Waikapu landfill for storage for later use for repair work at other locations.

2. Medical Facilities, Police and Fire Protection Services

a. Existing Conditions

The only major medical facility on the island is Maui Memorial Medical Center, which is located in Kahului about eight (8) miles north of the project area. The 231-bed facility provides general, acute, and emergency care services.

Clinics and offices throughout the Kihei and Wailea areas offer medical services on a lesser scale. Such clinics include Kihei Clinic and Wailea Medical Services, Kihei Pediatric Clinic, Kihei Physicians and the Kihei-

Wailea Medical Center.

The project site is within the Maui Police Department's (MPD) service area, the headquarters for which are located in Wailuku. The MPD consists of several patrol, investigative and administrative divisions. The project site falls within the Kihei Patrol District IV, the MPD service that covers the Kihei-Makena Community Plan region. The Kihei substation is located at the Kihei Town Center near Times Supermarket, about five (5) miles southeast of the project site. Construction of the new Kihei Police Station commenced in December 2011 and the facility is anticipated to be completed within five (5) years. This facility is located on the mauka side of Piilani Highway, approximately 9.7 miles southeast of the project site.

The Maui County Department of Fire and Public Safety provides fire prevention, suppression, protection and emergency services to the islands of Maui, Lanai, and Molokai from 14 fire stations and a fire prevention office. The department's Kihei station, which services the Maalaea and Kihei areas, is situated off of South Kihei Road, approximately 8.5 miles southeast of the project site. The Makena-Wailea area is covered by a separate Wailea Fire Station. Other Central Maui stations are located in Wailuku Town on Kinipopo Street and in Kahului on Dairy Road.

b. Potential Impacts and Proposed Mitigation Measures

The proposed improvements are not anticipated to adversely impact the service capabilities for emergency medical, police, and fire operations. Notably, the project will enhance 2-way traffic over the Hauoli Street culvert, thereby improving emergency access along Hauoli Street. The project is not a population generator and will not expand the existing service area limits for these services.

3. Educational Facilities

a. Existing Conditions

The State Department of Education (DOE) operates three (3) schools in the Kihei area. Kihei Elementary School and Kamalii Elementary School each cover grades Kindergarten to 5, each with enrollments of 920 and 638

students, respectively, for the 2011-2012 school year. Lokelani Intermediate School includes grades 6 to 8, with 597 students enrolled for the 2011-2012 school year. The Kihei Public Charter High School is also located in the region with an approximate enrollment of 509 students in grades Kindergarten through 12. The majority of South Maui public school students in grades 9 through 12 attend Maui High School (current enrollment 1,826 students) located in Kahului (DOE, 2011). The DOE is currently undergoing the planning and design of the new Kihei High School (KHS) which will be situated *mauka* of Piilani Highway. The estimated build-out period for KHS is approximately five (5) years. Meanwhile, the University of Hawaii-Maui College is the primary higher education institution serving the County with its main campus located in Kahului.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not a population generator, and as such, will not place additional demand upon educational facilities in the region.

4. Recreational Facilities

a. Existing Conditions

Diverse recreational opportunities are available in the Kihei-Makena Community Plan region. Shoreline activities, such as fishing, surfing, jogging, camping, picnicking, snorkeling, swimming, and windsurfing, are by far the predominant form of recreation in the area. The County's Haycraft Park is located approximately 0.3 mile east of the project site, at the terminus of Hauoli Street, and provides access to a sandy beach with paved parking, portable restrooms, and shower facilities. The MSBH, located to the west of the project site, is an important venue for sport fishing, whale watching tours, and other boating activities.

Other public park facilities within a relatively short driving distance of the project site include Kalama and Kamaole I/II/III Beach Parks, located about seven (7) miles to the southeast of the project site along the Kihei coastline. Additional recreational resources available in Kihei and Wailea include the Kihei Community and Aquatic Center and various world-class golf courses and tennis centers. Meanwhile, the Lahaina Pali Trail, a Na Ala Hele Trail

System traditional route, originates at a point just under a mile northwest of the project site, at the base of the West Maui Mountains.

b. Potential Impacts and Proposed Mitigation Measures

By providing a sidewalk and 2-lane bridge over the replacement box culverts, the proposed improvements will enhance travel along Hauoli Street, particularly pedestrian access to nearby Haycraft Park. Aside from this, the proposed project is not a population generator and is not anticipated to have an adverse impact on any of the region's recreational facilities. The proposed water quality basin will reduce the sediment and pollutant load of runoff that passes through the Hauoli Street drainage system. In effect, the quality of storm water runoff will be improved, thereby protecting the water quality of the nearshore marine environment for watersports and other such recreational activities.

D. INFRASTRUCTURE

1. Roadway Infrastructure

a. Existing Conditions

Honoapiilani Highway, the single route for vehicles traveling between West Maui and Central Maui, is the major roadway in the vicinity of the project site. There are two (2) junctions on Honoapiilani Highway located to the north of the project site which lead to Kuihelani Highway and North Kihei Road. Kuihelani Highway provides a direct route to Kahului, including the Kahului Airport. North Kihei Road transitions into South Kihei Road and Piilani Highway, providing access to the residential and commercial areas of the south coast of Maui, namely Kihei, Wailea and Makena.

Access to the project site is via Hauoli Street, a 2-lane County roadway that terminates at Haycraft Park, approximately 0.3 mile east of the project site. Hauoli Street connects to Maalaea Road, a 2-lane County roadway which joins Honoapiilani Highway approximately 0.5 mile northwest of Hauoli Street.

b. Potential Impacts and Proposed Mitigation Measures

Aside from traffic associated with construction activity, the proposed drainage improvements will not generate any increase in traffic to the area. During the installation of the two (2) proposed 4-foot by 8-foot box culverts and repairs to the Hauoli Street crossing, traffic will be routed to a temporary diversion road on the mauka side of Hauoli Street to ensure that access for through traffic is maintained during construction. Refer to **Figure 8** and **Appendix "B"**. Due to the project site being limited to the localized Hauoli Street site, adverse impacts to traffic conditions on Maalaea Road and Honoapiilani Highway are not anticipated.

Once the project is completed, travel along Hauoli Street will be improved with the establishment of 2-way traffic and a sidewalk over the box culvert. The drainage system improvements are designed to prevent overtopping and flooding of Hauoli Street during periods of heavy rainfall. In effect, the proposed project will improve local roadway infrastructure.

2. Water

a. Existing Conditions

The County of Maui, Department of Water Supply serves five (5) main regions within the County: Central Maui, Upcountry Maui, West Maui, East Maui, and Molokai. The project site is located within the Central Maui service area. The water sources for the Central Maui System are the designated Iao aquifer, the Waihee aquifer, the Iao tunnel and Iao-Waikapu Ditch.

In the vicinity of the project site, an 8-inch waterline runs along the mauka side of Hauoli Street. In passing by the drainage system, the waterline is concrete-jacketed. Fire hydrant #17 is located nearby on Parcel 15.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project, which solely involves drainage improvements, will not require water service. The existing 8-inch waterline is offset on the upstream side of the box culvert inlet and will be under the new inlet structure. The

proposed action is not anticipated to affect the waterline. The location of the waterline offset will be verified in the field prior to excavation for construction near the inlet area.

3. Wastewater Systems

a. Existing Conditions

There is currently no wastewater collection infrastructure serving the Maalaea area. The existing single-family residences currently use cesspools or septic tanks for wastewater disposal. The commercial operations and condominiums in the area utilize a combination of private cesspools and small individual wastewater package treatment plants.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project does not include any components which require wastewater service and the proposed drainage improvements are separate systems that convey storm water during heavy rainfall; therefore, impacts to the County wastewater system are not anticipated as a result of the proposed action.

4. Drainage

a. Existing Conditions

A drainage report for the project was prepared by AECOM, Inc. in July 2012. Refer to **Appendix "A"**. The existing drainage pattern affecting the project site involves five (5) drainage basins that encompass approximately 724.6 acres of land mauka of the project site. These basins collectively generate approximately 1,244 cfs of runoff in a 100-year, 24-hour storm. A portion of the flow is channeled towards Maalaea Bay via a grouted rip-rap channel and series of culverts along Honoapiilani Highway. Another portion of the 1,244 cfs is channeled to an outfall located to the east of the project site. Refer to **Figure 3**. Consequently, during peak flows, approximately 785 cfs of the total 1,244 cfs of runoff flows to the Hauoli Street drainage system. The runoff is then channeled through the existing 3-foot by 8-foot single cell box culvert which passes under Hauoli Street. The existing concrete-lined

drainage channel conveys the runoff from the box culvert towards the ocean.

The existing box culvert and drainage channel which comprise the existing Hauoli Street drainage system lack the capacity to accommodate the 785 cfs of runoff that flows into the system. As a result, Hauoli Street and neighboring properties are prone to overtopping and flooding during periods of heavy rainfall.

b. Potential Impacts and Proposed Mitigation Measures

The proposed drainage improvements project arises out of an initiative to address the inadequate capacity of the existing 3-foot by 8-foot box culvert and drainage channel and the periodic flooding of Hauoli Street and neighboring properties during heavy rains. The replacement 4-foot by 8-foot double box culvert with inlet control will increase the conveyance capacity of the drainage system to accommodate flows from a 100-year, 24-hour storm. Meanwhile, runoff velocity will be reduced by the weedy grasses and vegetation which will line the water quality basin and drainage channel mauka of Hauoli Street. Together, the vegetated water quality basin, grassed drainage channel, replacement box culvert, and retaining wall along the north side of the concrete drainage channel will serve to prevent the overtopping onto Hauoli Street and periodic flooding of nearby properties. Refer to **Figure 4** and **Appendix "A"**.

The water quality basin that will be installed upstream of the drainage channel, on the *mauka* side of Hauoli Street, will reduce the sediment and pollutant load from the storm water runoff before the runoff enters the culvert and discharges into the ocean. The basin will measure approximately 200 feet wide by 150 feet long by 2.5 feet deep, discharging through the proposed 4-foot by 8-foot double box culvert and concrete lined drainage channel to the ocean. Refer to **Figure 5**. The basin is a water quality BMP designed to reduce runoff velocity and capture sediment and pollutants prior to discharging into the ocean.

The drainage improvements will alleviate periodic overflows of storm water runoff onto Hauoli Street and neighboring properties while also improving the quality of storm water runoff before discharging into the marine environment. In sum, the proposed project will improve local drainage

conditions.

5. Electrical and Telephone Systems

a. Existing Conditions

Electrical power and telephone services to the area are provided by Maui Electric Company, Ltd. and Hawaiian Telcom, respectively. An overhead utility line runs along the makai edge of Hauoli Street in the vicinity of the project site. A pole and guy wire of this line are located adjacent to the access ramp of the concrete drainage channel on the makai side of Hauoli Street.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project does not require electrical or telephone service; therefore, adverse impacts to these systems are not anticipated. The access ramp to the concrete drainage channel has been designed and positioned in such a way that the nearby pole and guy wire will not need to be relocated. In addition, the construction contractor will be instructed to exercise care when working in the area.

E. CUMULATIVE AND SECONDARY IMPACTS

Cumulative impacts are defined as the impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. The proposed project improves the existing local drainage system and is not part of a larger action, nor would it occur within the context of such actions. This proposed project will alleviate flooding that has occurred in the area during periods of heavy rainfall. As such, there are no direct community growth impacts resulting from or occurring with the project.

Secondary impacts are those which have the potential to occur later in time or farther in distance, but are still reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of the project. Secondary impacts from highway projects, for example, can occur because they can induce development by removing an impediment to growth, i.e. transportation access.

The proposed project is limited to improvements of the existing Hauoli Street drainage system. The project is not considered to be a population generator, and project implementation will not facilitate future development in the area. Although the lands underlying the proposed water quality basin are designated and zoned for agricultural uses, the approximately 1.38-acre portion of the basin on Parcel 3 will mostly occupy lands that are not cultivated and are vegetated by kiawe and non-native weeds and grasses. The approximately 1.13-acre portion of the basin and access road on Parcel 17 will take this land out of agricultural production; however, this area is not considered to be significant when assessed in relation to the 30,000 acres of HC&S sugar cane fields in Central Maui. Thus, the proposed project will not take a significant portion of land out of sugar cane production, and the agricultural productivity of surrounding lands will not be compromised. The proposed drainage system improvements are anticipated to have the positive impact of alleviating the flooding that occurs due to heavy rains. In addition, the water quality basin is designed to capture sediments and pollutants that are collected by storm water runoff in flowing down the mountain slopes, across Honoapiilani Highway, and across the sugar cane fields. In this way, the proposed project will function in protecting nearshore water quality. In effect, the proposed project is not anticipated to result in any substantial adverse impacts, either cumulative or secondary.

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICTS

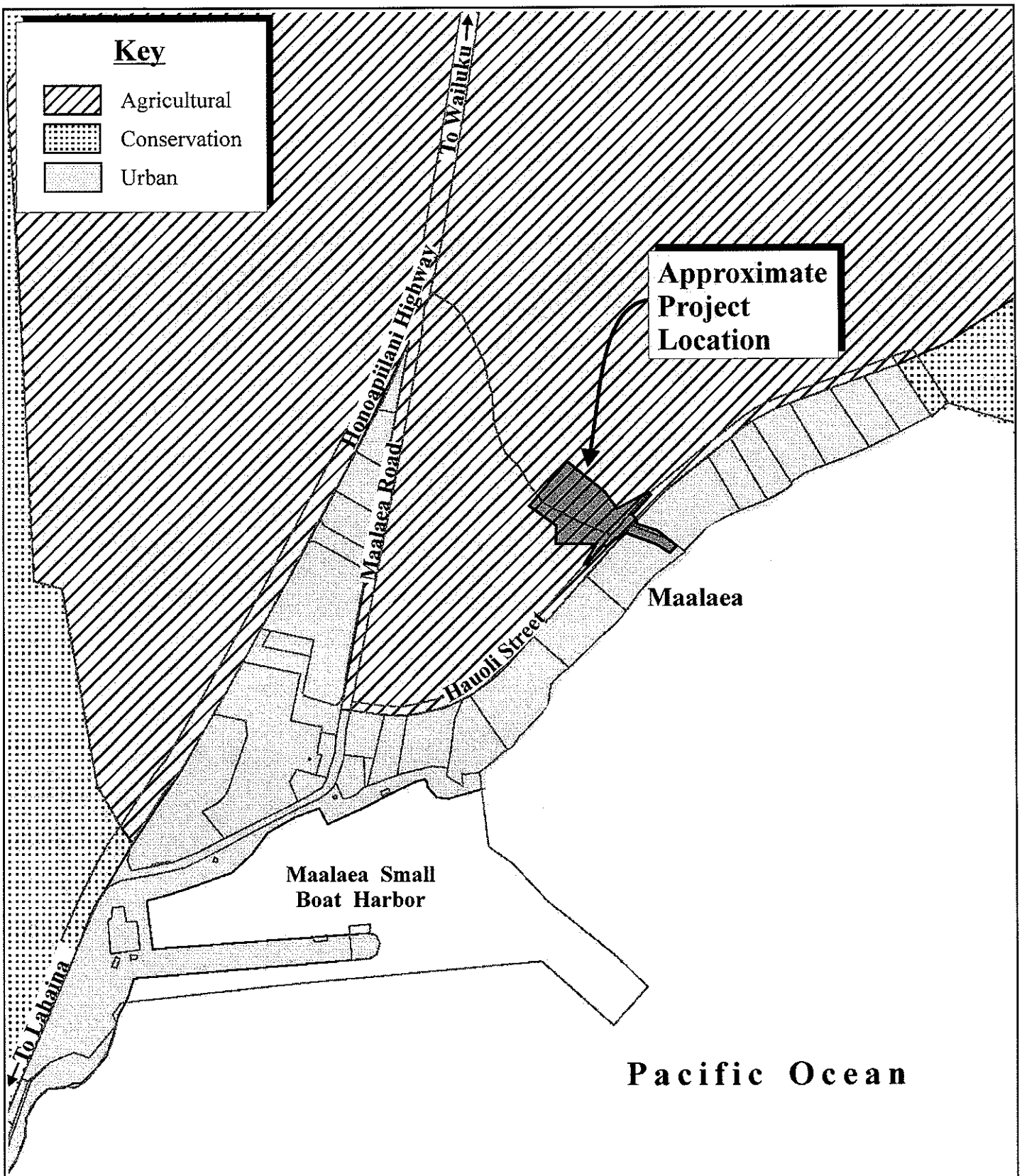
Chapter 205, Hawaii Revised Statutes (HRS), relating to the Land Use Commission, establishes four (4) major land use districts in which all lands in the state are placed. These districts are designated as "Urban", "Rural", "Agricultural", and "Conservation". The project site includes lands in the "Urban" and "Agricultural" districts. See **Figure 14**. The proposed water quality basin is located in the "Agricultural" district while the drainage channel is in the "Urban" district. The replacement box culvert proposed is in the existing right-of-way. Pursuant to Chapters 205-2 and 205-5, HRS, the drainage improvements are a permitted use in the "Agricultural" and "Urban" districts as they are compatible with and ancillary to the permitted uses. The proposed improvements will alleviate periodic flooding in the area from storm water flows and mitigate water quality impacts relating to storm water runoff from inland areas discharging into the ocean.

B. CONFORMITY WITH CHAPTER 226, HAWAII STATE PLAN

Chapter 226, HRS, also known as the Hawaii State Plan, is a long-range comprehensive plan which serves as a guide for the future long-term development of the State by identifying goals, objectives, policies and priorities, as well as implementation mechanisms.

The proposed improvements to the Hauoli Street drainage system are in consonance with the overall theme, goals and objectives and policies of Chapter 226, Hawaii Revised Statutes, relating to the Hawaii State Planning Act. The proposed project is in concert with the following goal of the Hawaii State Plan:

- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.



Source: State Land Use Commission

Figure 14

Proposed Hauoli Street Drainage Improvements

State Land Use Designations

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM/HauoliDrainage/SLUD

1. **Objectives and Policies of the Hawaii State Plan**

The proposed action is in conformance with the following objectives and policies of the Hawaii State Plan:

Chapter 226-8, HRS, Objectives and Policies for the Economy - Visitor Industry

226-8(b)(3), HRS: Improve the quality of existing visitor destination areas.

Chapter 226-11, HRS, Objectives and Policies for the Physical Environment - Land-based, Shoreline, and Marine Resources

226-11(a)(1), HRS: Prudent use of Hawaii's land-based, shoreline, and marine resources.

226-11(a)(2), HRS: Effective protection of Hawaii's unique and fragile environmental resources.

226-11(b)(3), HRS: Take into account the physical attributes of areas when planning and designing activities and facilities.

226-11(b)(4), HRS: Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.

226-11(b)(5), HRS: Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.

Chapter 226-13, HRS, Objectives and Policies for the Physical Environment - Land, Air, and Water Quality

226-13(a)(1), HRS: Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.

226-13(b)(2), HRS: Promote the proper management of Hawaii's land and water resources.

226-13(b)(3), HRS: Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.

226-13(b)(5), HRS: Reduce the threat to life and property from erosion, flooding,

tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.

Chapter 226-20, HRS, Objectives and Policies for Socio-cultural Advancement - Health

226-20(a)(2), HRS: Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.

C. MAUI COUNTY GENERAL PLAN

As indicated by the Maui County Charter, the purpose of the general plan shall be to:

> ... *indicate desired population and physical development patterns for each island and region within the county; shall address the unique problems and needs of each island and region; shall explain opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies, and implementing actions to be pursued with respect to population density; land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development.*

Chapter 2.80B of the Maui County Code, relating to the General Plan and Community Plans, implements the foregoing Charter provision through enabling legislation which calls for a Countywide Policy Plan and a Maui Island Plan. The Countywide Policy Plan was adopted as Ordinance No. 3732 on March 24, 2010. The Maui Island Plan is currently in the process of review and formulation by the Maui County Council.

With regard to the Countywide Policy Plan, Section 2.80B.030 of the Maui County Code states the following.

> The countywide policy plan shall provide broad policies and objectives which portray the desired direction of the County's future. The countywide policy plan shall include:
>
> 1. A vision for the County;
> 2. A statement of core themes or principles for the County; and
> 3. A list of countywide objectives and policies for population, land use,

the environment, the economy, and housing.

Core principles set forth in the Countywide Policy Plan are listed as follows:

1. Excellence in the stewardship of the natural environment and cultural resources;
2. Compassion for and understanding of others;
3. Respect for diversity;
4. Engagement and empowerment of Maui County residents;
5. Honor for all cultural traditions and histories;
6. Consideration of the contributions of past generations as well as the needs of future generations;
7. Commitment to self-sufficiency;
8. Wisdom and balance in decision making;
9. Thoughtful, island appropriate innovation; and
10. Nurturance of the health and well-being of our families and our communities.

Congruent with these core principles, the Countywide Policy Plan identifies goals objectives, policies and implementing actions for pertinent functional planning categories, which are identified as follows:

1. Natural environment
2. Local cultures and traditions
3. Education
4. Social and healthcare services
5. Housing opportunities for residents
6. Local economy
7. Parks and public facilities
8. Transportation options

9. Physical infrastructure

10. Sustainable land use and growth management

11. Good governance

With respect to the proposed Hauoli Street drainage improvements project the following goals, objectives, policies and implementing actions are illustrative of the project's compliance with the Countywide Policy Plan.

PROTECT THE NATURAL ENVIRONMENT

Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.

Objective:

- Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island.

  Policies:

  - Protect and restore nearshore reef environments and water quality.
  - Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs.
  - Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.
  - Regulate the use and maintenance of storm water-treatment.

Objective:

- Improve the stewardship of the natural environment.

  Policies:

  - Provide public access to beaches and shorelines for recreational and cultural purposes where appropriate.

IMPROVE PARKS AND PUBLIC FACILITIES

Goal: A full range of island-appropriate public facilities and recreational opportunities will be provided to improve the quality of life for residents and visitors.

Objective:

- Expand access to recreational opportunities and community facilities to meet the present and future needs of residents of all ages and physical abilities

  Policies:

  - Protect, enhance, and expand access to public shoreline and mountain resources.

In summary, the proposed project is consistent with the themes and principles of the Countywide Policy Plan as it will improve water quality impact to nearshore waters by incorporating Best Management Practices such as the use of a water quality basin. The proposed project will also protect residential and recreational land uses by alleviating flooding.

D. KIHEI-MAKENA COMMUNITY PLAN

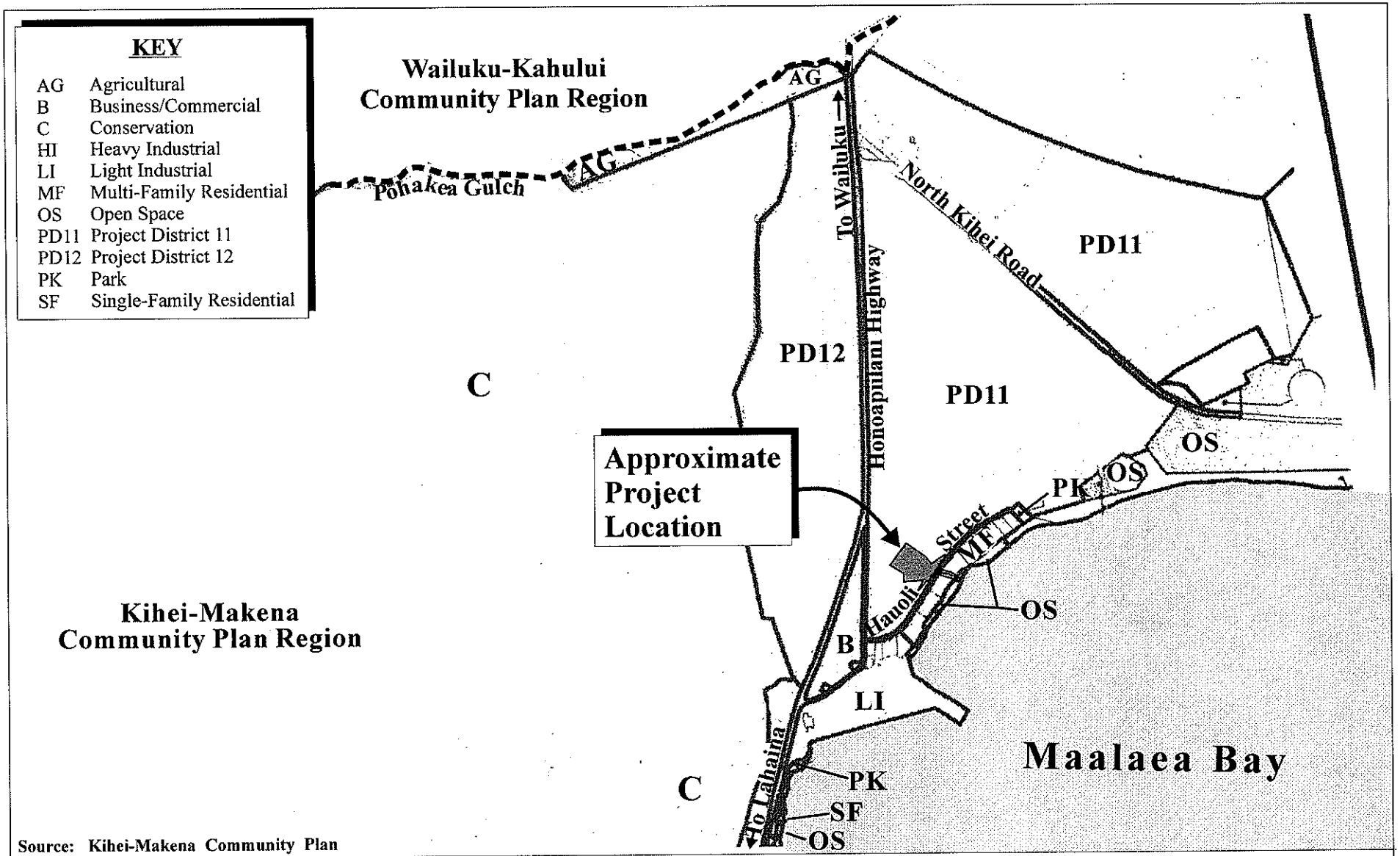
Within Maui County, there are nine (9) community plan regions. From a General Plan implementation standpoint, each region is governed by a community plan which sets forth desired land use patterns, as well as goals, objectives, policies, and implementing actions for a number of functional areas including infrastructure-related parameters.

The project site is located within the Kihei-Makena Community Plan region and designated for Multi-Family and Project District 11 uses. See **Figure 15**. The proposed drainage system improvements are compatible with and ancillary to the designated land uses.

The proposed action is in keeping with the following Community Plan goals, objectives, and policies:

ENVIRONMENT

Goal: Preservation, protection, and enhancement of Kihei-Makena's unique and fragile environmental resources.



Source: Kihei-Makena Community Plan

Figure 15 Proposed Hauoli Street Drainage Improvements

Kihei-Makena Community Plan Land Use Designations

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\CPLUD

Objectives and Policies:

e. Protect the quality of nearshore waters by ensuring that land-based discharges meet water quality standards. Continued monitoring of existing and future waste disposal systems is necessary to ensure their efficient operation. Programs should be implemented to reduce the reliance on injection wells for wastewater disposal.

PHYSICAL AND SOCIAL INFRASTRUCTURE

Goal: Provision of facility systems, public services and capital improvement projects in an efficient, reliable, cost effective, and environmentally sensitive manner which accommodates the needs of the Kihei-Makena community, and fully support present and planned land uses, especially in the case of project district implementation.

Allow no development for which infrastructure may not be available concurrent with the development's impacts.

Drainage

Objectives and Policies:

a. Design drainage systems that protect coastal water quality by incorporating best management practices to remove pollutants from runoff. Construct and maintain, as needed, sediment retention basins and other best management practices to remove sediments and other pollutants from runoff.

b. Construct necessary drainage improvements in flood prone areas. Where replacement drainage are required for flood protection, these systems shall be designed, constructed, and maintained using structural controls and best management practices to preserve the functions of the natural system that are beneficial to water quality. These functions include infiltration, moderation of flow velocity, reduced erosion, uptake of nutrients and pollutants by plans, filtering, and settlement of sediment particles. The use of landscaped swales and unlined channels shall be urged.

Implementing Actions:

b. Establish a comprehensive program of improvements to the storm drainage system; implement a maintenance program; and ensure that safety, property loss, pollutant removal, and the need for comprehensive planning, are considered.

Notwithstanding, any future revisions to the General Plan or the Kihei-Makena Community Plan are not anticipated to impact the need for the proposed action, nor affect the project's design parameters. The proposed project improves the existing drainage system to alleviate flooding in the area during heavy rains. Best Management Practices will be used such as construction of a water quality basin to capture sediments and pollutants before discharging into the ocean.

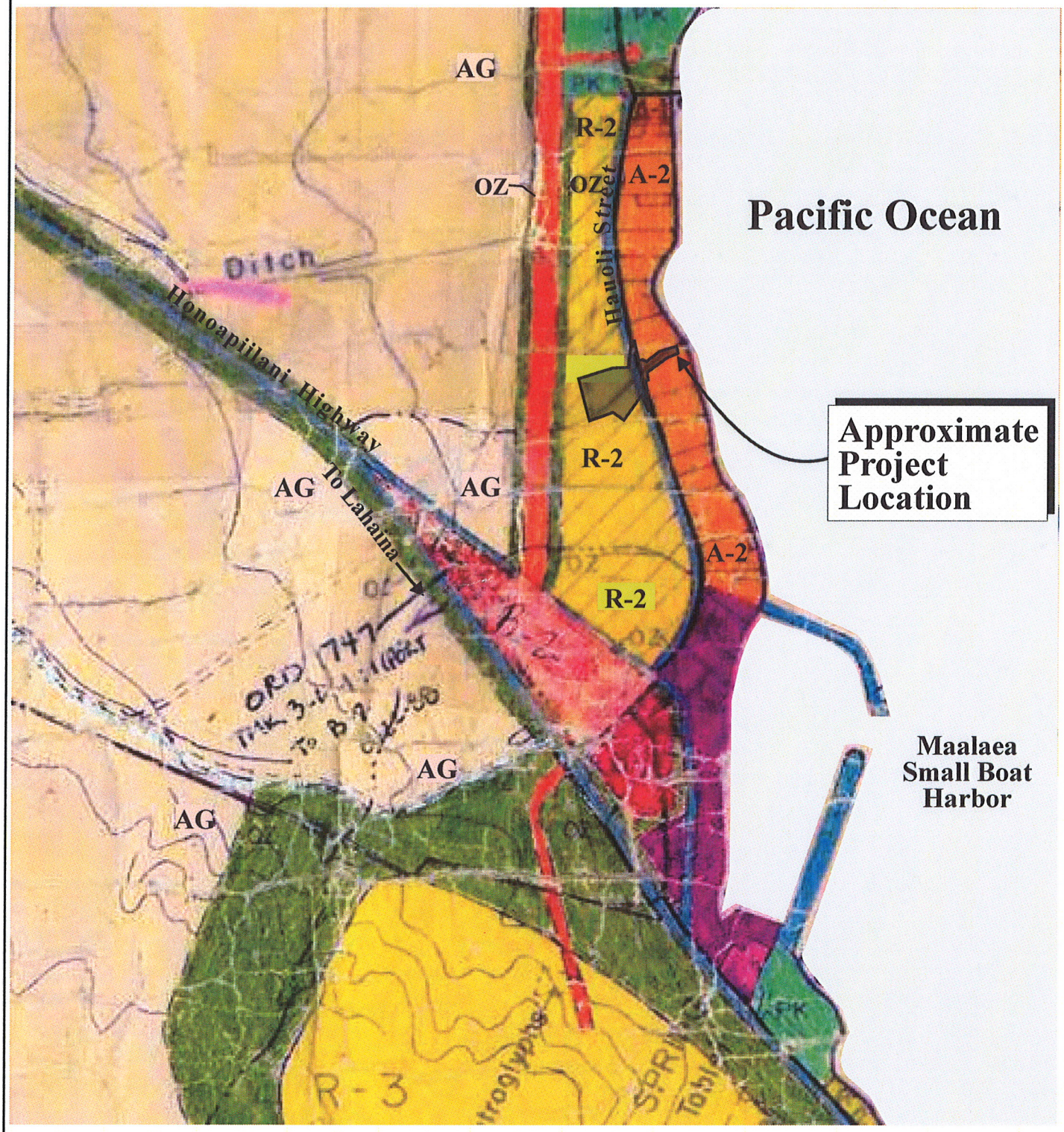
E. COUNTY ZONING

The proposed drainage system improvements encompass lands on four (4) separate TMK parcels. Parcels 11 and 15 are currently zoned "A-2, Apartment" district. Parcels 3 and 17 are much larger and have multiple zoning designations. The affected portions of these parcels are currently zoned "R-2, Residential". See **Figure 16**. The subject drainage improvements are appropriate for and ancillary to the A-2 and R-2 zoned lands. The proposed improvements will help mitigate storm water impacts from the surrounding lands on water quality in nearshore waters and protect the residential uses in the vicinity from flooding. It is noted that no improvements are proposed in the areas of Parcel 3 which are zoned Agricultural, Park or Open Zone. Additionally, no improvements are proposed in the areas of Parcel 17 which are zoned Agricultural or Open Space.

F. SPECIAL MANAGEMENT AREA

The project site is located within the County of Maui's Special Management Area (SMA). See **Figure 17**. The Hawaii Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, as well as the SMA Rules of the Maui Planning Commission establish objectives and policies for the preservation, protection, and restoration of natural resources of Hawaii's coastal zone.

This section addresses the proposed project's relationship to applicable coastal zone management considerations, as set forth by Chapter 205A, HRS and Sections 12-202-10 and 11, Rules and Regulations of the Maui Planning Commission, Special Management Area.



Source: Maui County Planning Department

Figure 16

Proposed Hauoli Street Drainage Improvements

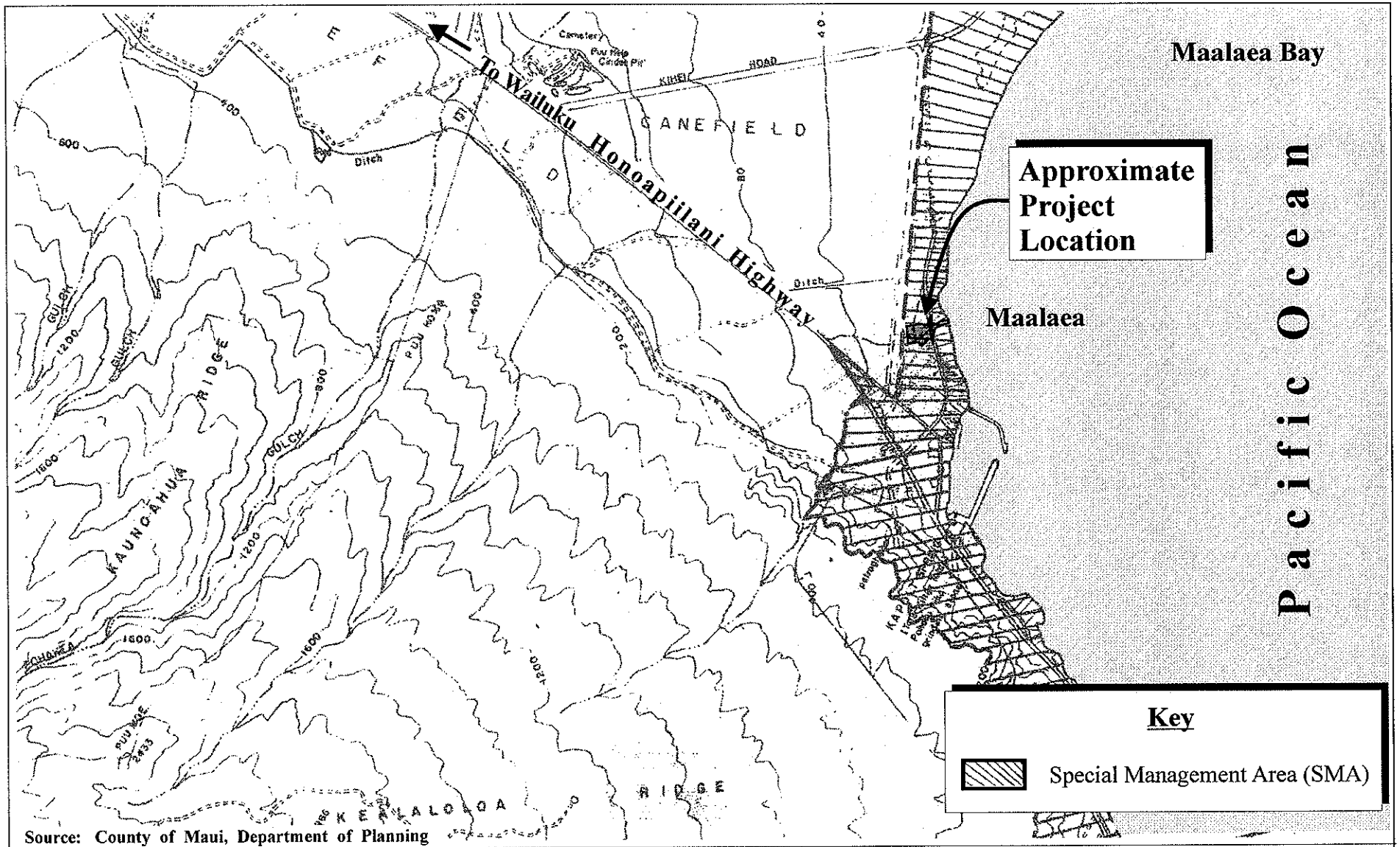
Maui County Zoning Map

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\zoningmap



Source: County of Maui, Department of Planning

Figure 17 Proposed Hauoli Street Drainage Improvements

NOT TO SCALE

Special Management Area (SMA) Boundary Map

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainagesmaboundary

HRS 205A-2 COASTAL ZONE MANAGEMENT PROGRAM OBJECTIVES AND POLICIES

1. Recreational Resources

Objective: Provide coastal recreational opportunities accessible to the public.

Policies:

a. Improve coordination and funding of coastal recreational planning and management; and

b. Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of Section 46-6, HRS.

Response: The proposed project includes a new water quality basin intended to improve the quality of storm water runoff moving through the existing drainage system and protect the water quality of Maalaea Bay. The proposed double box culvert, retaining wall, vegetated water quality basin, and grassed drainage channel are designed to prevent flooding of Hauoli Street and the adjacent condominium buildings which are in the vicinity of the shoreline. *Makai* of the proposed drainage improvements is a small section of sandy beach with recreational value. The proposed project will provide the benefits of protecting the water quality in the area and preserving the value of this recreational area. The addition of grouted rip-rap at the mouth of the concrete-lined drainage channel will be located over 40 feet away from the shoreline and will not affect beach processes of the sandy beach.

The proposed action will also improve the sidewalk on the makai side of Hauoli Street that passes over the box culverts. This will enhance pedestrian access along Hauoli Street and to Haycraft Park which is located approximately 0.3 mile east of the project site.

2. Historic Resources

Objective: 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.

Policies:

a. Identify and analyze significant archeological resources;

b. Maximize information retention through preservation of remains and artifacts or salvage operations; and

c. Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: An Archaeological Assessment was carried out for the proposed project by Scientific Consulting Services, Inc. (SCS). Refer to **Appendix "F"**. No

culturally significant or historic properties were discovered. An Archaeological Monitoring Plan was also prepared by SCS and approved by the State Historic Preservation Division (SHPD). Refer to **Appendix "G"** and **Appendix "G-1"**. Should human remains be inadvertently discovered during land-based, ground-altering activities, work will promptly cease in the immediate area of the find, and the find will be protected from further damage. SHPD will be immediately notified and procedures for the treatment of inadvertently discovered human remains will be followed pursuant to Chapter 6E, HRS.

3. **Scenic and Open Space Resources**

Objectives: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

a. Identify valued scenic resources in the coastal zone management area;

b. Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

c. Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

d. Encourage those developments that are not coastal dependent to locate in inland areas.

Response: The proposed action is not anticipated to impact scenic resources. The proposed box culverts and water quality basin will have minimal visual impact and will be constructed at or below existing grade, in an existing drainageway. The retaining wall in the concrete drainage channel makai of Hauoli Street will measure four (4) feet in height or less and will terminate over 100 feet away from the shoreline. Refer to **Figure 7**. Being located between two (2) beachfront condominiums, this wall is not anticipated to have a significant impact on scenic resources in the area.

4. **Coastal Ecosystem**

Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

a. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

b. Improve the technical basis for natural resource management;

c. Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

d. Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

e. Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Response: A Marine Biological and Water Quality Survey report was prepared for the project by AECOS, Inc. in November 2009. Water samples collected on October 6, 2009 from nearshore marine waters near the Hauoli drainage canal exhibited slightly depressed salinity values which indicate freshwater input. Generally high total suspended solids concentration and turbidity values reflect the turbid nearshore conditions observed. A considerable amount of benthic macroalgal fragments in the water column were indicated by elevated chlorophyll concentrations. High dissolved oxygen concentrations are attributed to an abundance of algae. Total nitrogen and nitrate-nitrite concentrations were considered high for marine waters. Refer to **Appendix "E"**. Appropriate Best Management Practices for sediment and erosion control will be implemented to minimize the effects of storm water runoff resulting from the construction of the project and to ensure that coastal ecosystems are not adversely impacted by construction activities. The proposed drainage system improvements are not anticipated to cause adverse impacts on the coastal environment. The inclusion of a water quality basin in the project design is a Best Management Practice mitigation measure to protect downstream and near water quality by removing sediment and pollutants from storm water runoff.

5. Economic Use

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

a. Concentrate coastal dependent development in appropriate areas;

b. Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

c. Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

   (i) Use of presently designated locations is not feasible;

   (ii) Adverse environmental effects are minimized; and

   (iii) The development is important to the State's economy.

Response: The proposed project is consistent with the goals of the Kihei-Makena Community Plan, which guides growth and development in the region. The project includes a water quality basin to improve storm water quality prior to discharging into the ocean. The proposed drainage system improvements will collectively serve to prevent flooding of Hauoli Street and neighboring properties. To enhance pedestrian access, the sidewalk on the *makai* side of Hauoli Street will be improved to connect over the box culverts. In consideration of these benefits, the proposed drainage system improvements are appropriately situated.

6. Coastal Hazards

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Policies:

a. Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

b. Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;

c. Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

d. Prevent coastal flooding from inland projects.

Response: Portions of the project site lie within Zone X (shaded), a category which includes areas of 0.2 percent annual chance flood, areas of 1 percent annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1 percent annual chance flood. The remaining portions of the project site are located in Zone X (unshaded), an area outside the 0.2 percent annual chance flood plain. The proposed improvements will be constructed in accordance with applicable County requirements for developments within flood hazard areas. In addition, the proposed water quality basin is designed to ensure that sediment from storm water runoff is minimized prior to discharging into the ocean.

7. Managing Development

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

a. Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

b. Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and

c. Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: The proposed project stems in part from requests from the Maalaea Community Association (MCA) to address the periodic flooding of Hauoli Street. Project plans have been developed in consultation with the MCA, and the project team attended a number of MCA meetings to provide updates to the community on the status of the project. Moving forward, public input will be solicited in coordination with the processing of the Draft EA, pursuant to the Chapter 343, HRS, environmental assessment review process. All aspects of development will be

conducted in accordance with applicable Federal, State, and County standards.

8. Public Participation

Objective: Stimulate public awareness, education, and participation in coastal management.

Policies:

a. Promote public involvement in coastal zone management processes;

b. Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

c. Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Response: As discussed above, the project team has met with the MCA on numerous occasions to discuss the project design and status. Further, opportunities for public awareness, education, and participation in coastal management will be provided through the Chapter 343, HRS EA process.

9. Beach Protection

Objective: Protect beaches for public use and recreation.

Policies:

a. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

b. Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

c. Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: Project construction will involve the demolition of a portion of the existing concrete-lined drainage channel in order to place a wall along the northern edge of the channel. This wall will be oriented generally perpendicular to the shore and will terminate at least 100 feet inland of the shoreline, such that beach processes will not be affected. Although a portion of the project site, specifically the mouth of the drainage channel, is located within the shoreline setback area, the proposed action involving the addition of grouted rip-rap to the mouth of the drainage channel will occur at least 40 feet inland of the shoreline. The proposed project does not involve any hardening of the shoreline, and the grouted rip-rap addition to the concrete drainage channel will not affect beach processes. No adverse impacts to the sandy beach located shoreward of the project area are anticipated to occur as a result of the proposed project.

10. Marine Resources

Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

a. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

b. Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

c. Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

d. Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

e. Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: The Coastal Assessment prepared by Sea Engineering, Inc. described and evaluated the oceanographic and coastal setting, historical shoreline changes, existing shoreline conditions, and ongoing shoreline processes in the vicinity of the

project site. Refer to **Appendix "D"**. The sandy beach fronting the drainage outlet has been relatively stable since 1960. The proposed improvements will not encroach upon this sandy beach. The Biological and Water Quality Survey report prepared by AECOS, Inc. assessed existing marine resources found in the vicinity of the project site. Refer to **Appendix "E"**. None of the species observed during this survey are listed as Threatened or Endangered.

The proposed water quality basin is designed to reduce sediment and pollutant loads of runoff discharge, thereby providing an improvement over existing conditions. In addition, Best Management Practices will be implemented during construction-related activities to support coastal zone management policies for the effective management of marine resources.

In addition to the foregoing objectives and policies, HRS Section 205A-30.5, Prohibitions, provides specification for the limitation of lighting in coastal shoreline areas in relation to the granting of SMA permits:

> *No Special Management Area Use Permit or Special Management Area Minor Permit shall be granted for structures that allow artificial light from floodlights, uplights, or spotlights used for decorative or aesthetic purposes when the light:*
>
> *(1) Directly illuminates the shoreline and ocean waters; or*
>
> *(2) Is directed to travel across property boundaries toward the shoreline and ocean waters.*

Response: The proposed project will be constructed during normal daylight hours and does not involve any form of light fixtures or artificial light. As such, the proposed improvements will not create any light-related impacts.

RULES AND REGULATIONS OF THE MAUI PLANNING COMMISSION, SPECIAL MANAGEMENT AREA RULES

The Rules and Regulations of the Maui Planning Commission, Chapter 202 were established in order to implement HRS Chapter 205A relating to Coastal Zone Management and Special Management Areas. In addition to establishing procedures for processing of SMA applications and procurement of related permits, the rules assist the Commission in giving consideration to state policy regarding coastal zones.

This section addresses the project's relationship to applicable Coastal Zone Management considerations as set forth by the Maui Planning Commission Rules and Regulations, Chapter 202, Special Management Area Permit Procedures, which are provided for considering the significance of potential environmental and ecological effects of a proposed action. The criteria have been reviewed and analyzed with respect to the proposed Hauoli Street Drainage System Improvements project, as follows:

1. **Involves an irrevocable commitment to loss or destruction of any natural or cultural resources**

   Being located within a developed area and amidst actively cultivated sugar cane fields, the project site contains no rare, endangered, or threatened species. The proposed water quality basin will function to protect and maintain the water quality of the nearshore marine environment by reducing the sediment and pollutant load of storm water runoff that passes through the drainage system.

   No cultural resources were documented within the project site. The archaeological assessment encountered no archaeological resources in the project site, largely due to the fact that the affected parcels have been developed or are under active sugar cane cultivation. Refer to **Appendix "F"** and **Appendix "H"**. Nevertheless, an archaeological monitoring plan, which was approved by the State Historic Preservation Division (SHPD), has been prepared for the proposed project and approved by SHPD. Refer to **Appendix "G"** and **Appendix "G-1"**.

2. **Significantly curtails the range of beneficial uses of the environment**

   The proposed project will not curtail the range of beneficial uses of the environment. Applicable Best Management Practices have been identified for implementation during the construction period as part of a sediment and erosion control plan to minimize any construction-related impacts. Additionally, the proposed water quality basin is a Best Management Practice to reduce the sediment and pollutant load of storm water runoff passing through the drainage system. This measure will serve to maintain the water quality of the nearshore marine environment and protect the recreational value of the shoreline area.

3. **Conflicts with the county's or state's long-term environmental policies or goals**

The proposed project does not conflict with the State's Environmental Policy and Guidelines set forth by Chapter 344, HRS. The proposed drainage system improvements will alleviate periodic flooding of the area, thereby enhancing the quality of life for residents in the area. The proposed water quality basin will also function to protect the water quality of the nearshore environment during heavy rains.

4. **Substantially affects the economic or social welfare and activities of the community, county, or state**

On a short-term basis, the proposed project will provide construction and construction-related employment opportunities, thereby having a beneficial impact on the local economy during the construction period. Once completed, the improved drainage system will protect this popular visitor destination by preventing the flooding of Hauoli Street and neighboring condominium properties that occurs during periods of heavy rainfall. The water quality basin will also function in protecting nearshore water quality. In this regard, the proposed project stands to benefit the surrounding community and economy.

5. **Involves substantial secondary impacts, such as population changes and increased effects on public facilities, streets, drainage, sewage, and water systems, and pedestrian walkways**

The proposed project is not a population generator, nor will it increase demands on public services. The project is proposed to improve an existing drainage system to alleviate flooding of the local roadway and neighboring properties. Additionally, the proposed project includes the construction of sidewalk improvements to improve pedestrian access in the area. In effect, the proposed project is not anticipated to involve any adverse secondary impacts.

6. **In itself has no significant adverse impacts but cumulatively has considerable effect upon the environment or involves a commitment for larger actions**

The proposed project is not anticipated to contribute to any significant adverse, long-term effects on the environment. Further, the proposed project does not involve a commitment for larger actions. The proposed action is limited to the improvement of the existing Hauoli Street drainage system.

7. **Substantially affects a rare, threatened, or endangered species of animal or plant, or its habitat**

As discussed in Chapter II, the project site contains no rare, threatened, or endangered species or critical habitat for such species. The proposed water quality basin is a mitigation measure designed to minimize the sediment and pollutant load of runoff to protect the water quality of the nearshore marine environment and biota.

8. **Is contrary to the state plan, county's general plan, appropriate community plans, zoning and subdivision ordinances**

As discussed in Chapter III, the proposed project is consistent with the underlying land use designations. The proposed improvements of the existing Hauoli Street drainage system will support the neighboring condominium and recreational land uses.

9. **Detrimentally affects air or water quality or ambient noise levels**

Construction activities will generate short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling and the installation of dust screens, will be implemented for sediment and erosion control and to minimize wind-blown particulates. Noise impacts generated by construction equipment will be minimized with the use of equipment mufflers or other noise-attenuating equipment and proper vehicle maintenance. Further, applicable provisions of the Hawaii Administrative Rules of the State Department of Health, Title 11, Chapter 46, Community Noise Control, will be adhered to. These rules require a noise permit if the noise levels generated by construction activities are expected to exceed the allowable levels set forth by Chapter 46. After the conclusion of project construction, the improved drainage system is not anticipated to produce adverse air quality or noise impacts.

The proposed water quality basin is a Best Management Practice to protect water quality in the nearshore marine environment. This basin is designed to reduce the sediment and pollutant load of storm water runoff passing through the drainage system. A sediment and erosion control plan will be implemented during the construction period to mitigate potential water quality impacts associated with construction activities. In this regard, the proposed project is not anticipated to have a detrimental effect on water quality on downstream and nearshore waters.

10. **Affects an environmentally sensitive area, such as flood plains, shoreline, tsunami zone, erosion-prone area, geologically hazardous land, fresh waters, or coastal waters**

The project site is located within Flood Zone X (shaded and unshaded), areas subject to minimal flooding. Notwithstanding, the proposed action involves improvements to an existing drainage system that is designed to alleviate flooding of Hauoli Street and neighboring properties. The Hauoli Street drainage system channels runoff towards the coastal waters of Maalaea Bay. The existing concrete-lined drainage channel terminates mauka of the shoreline on the sandy beach that fronts the project site. The proposed action will maintain the location of this drainage channel, and existing drainage patterns will not be altered. Within the shoreline setback area, work will be limited to the addition of grouted rip-rap (GRP) to the mouth of the drainage channel. The purpose of the GRP is to prevent further erosion in this area. Being located at least 40 feet inland of the shoreline, the GRP will not artificially harden the shoreline, nor will it affect beach processes. Thus, adverse impacts to the shoreline and beach processes are not anticipated to occur as a result of project implementation. The proposed water quality basin is designed to reduce the sediment and pollutant load of runoff passing through the drainage system. In this way, the proposed project would serve to protect the quality of the nearshore marine environment and would not have an adverse effect on any environmentally sensitive area in the project vicinity.

11. **Substantially alters natural land forms and existing public views to and along the shoreline**

The existing drainage channel that extends shoreward from Hauoli Street will be maintained in place as part of the proposed action. The proposed retaining wall will measure approximately three (3) to four (4) feet in height and will run along the concrete drainage channel, between the two (2) adjacent condominium buildings. This wall will terminate at least 100 feet inland of the shoreline and is not anticipated to affect public views to or along the shoreline. The GRP at the mouth of the drainage channel will be located over 40 feet inland of the shoreline, such that it will not fix the shoreline or affect beach processes. The proposed water quality basin on the mauka side of Hauoli Street is located on and around an existing agricultural ditch, such that construction of the basin will not substantially alter any natural land forms as it will involve minimal grading. Public views to and along the shoreline will not be affected as the drainage structures are low in profile.

12. Is contrary to the objectives and policies of chapter 205A, HRS

A review of the objectives and policies of Chapter 205A, HRS is provided in the preceding part of this section which addresses the project's relationship to the Hawaii Coastal Zone Management considerations. Based on the foregoing analysis, the proposed project will appropriately and adequately mitigate impacts to SMA-relevant areas of concern. Accordingly, there are no significant adverse environmental or ecological impacts anticipated to occur as a result of the proposed action.

G. SHORELINE SETBACK ASSESSMENT

The project site is located at minimum 40 feet inland of the shoreline; however, the makai portion of the drainage channel is located in the Shoreline Setback Area. The proposed work within the Shoreline Setback Area is limited to the addition of GRP to the mouth of the drainage channel. See **Appendix "B-1"**. In this respect, Item 9 of §12-203-12 of the Shoreline Rules of the Maui Planning Commission, *Permitted structures and activities within the shoreline setback area*, specifies the following as permitted:

> *A structure or activity that has been determined by the director to be a minor structure or minor activity within the shoreline setback area which does not adversely affect beach processes, does not artificially fix the shoreline, and does not interfere with public access or public views to and along the shoreline and which meets the purpose of this chapter, HRS chapter 205A, as amended, and chapter 19.62, Maui County Code, relating to coastal high hazard districts.*

Further, as defined by §12-203-4 of the Shoreline Rules, a *"minor structure"* is a *"man-made structure that costs less than $125,000, does not impede the natural movement of the shoreline, does not alter the existing grade of the shoreline setback area..."* The proposed GRP work within the Shoreline Setback Area meets the criteria set forth by §12-203-12 and §12-203-4 of the Shoreline Rules as follows:

- The cost of the GRP in the shoreline setback area is estimated at $16,750.00.
- The GRP will be located approximately 40 feet inland of the shoreline, such that it will not impede the natural movement of the shoreline, will not alter the existing grade of the shoreline setback area, will not adversely affect beach processes, and will not artificially fix the shoreline.

- The GRP will be installed at-grade at the mouth of the existing drainage channel and will not interfere with public access or public views to and along the shoreline.

- The proposed work preserves the natural shoreline environment and thereby meets the purpose of the Shoreline Rules and Chapter 205A, HRS.

- With respect to Chapter 19.62, Maui County Code, the drainage channel is located within Flood Zone X (shaded) and is not located within a coastal flood hazard area. The purpose of the proposed Hauoli Street Drainage Improvements project is to alleviate flooding in the Hauoli Street area.

Given the foregoing, the Planning Department confirmed that the proposed project is a permitted use within the Shoreline Setback Area per the provisions of §12-203-12(9) of the Shoreline Rules. Refer to **Appendix "C-1"**. A plan showing the location of the proposed GRP work in relation to the shoreline is provided in **Appendix "B-1"**. The Planning Department's acceptance of this GRP plan for the purpose of delineating the shoreline is provided in **Appendix "C-2"**.

IV. SUMMARY OF UNAVOIDABLE ENVIRONMENTAL IMPACTS

IV. SUMMARY OF UNAVOIDABLE ENVIRONMENTAL IMPACTS

The proposed project will result in certain unavoidable construction-related environmental impacts, such as temporary air and noise quality impacts, as outlined in Chapter II.

In the short term, site preparation, construction equipment, and construction activities associated with the proposed action will generate temporary noise impacts. Unavoidable air quality impacts due to the generation of dust and other airborne pollutants will also arise as a consequence of construction. Appropriate BMPs, such as frequent watering of exposed surfaces and regular maintenance of construction equipment, will be incorporated in the construction process to mitigate adverse impacts on the surrounding environment.

In the long term, the proposed project is not anticipated to result in any significant adverse environmental impacts. The proposed water quality basin is designed to reduce the sediment and pollutant load of storm water runoff prior to discharging into the ocean, thereby providing an improvement to water quality over existing conditions. When completed, the proposed drainage improvements will alleviate flooding in this area and is not anticipated to adversely impact the surrounding uses, infrastructure systems, or public services.

V. ALTERNATIVES TO THE PROPOSED ACTION

V. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The proposed drainage system improvements outlined in Chapter I represent the preferred alternative. This alternative consists of an approximately 200-foot by 150-foot earthen water quality basin and reinforced soil berm to contain the water volume from storm water flow and capture sediments and pollutants; a grassed drainage channel; a gravel access road for maintenance of the basin; a 4-foot by 8-foot double box culvert with inlet control at the Hauoli Street crossing; a retaining wall along the northern side of the existing drainage channel; and grouted rip-rap added to the mouth of the drainage channel. This design addresses both the flooding issues with the inadequate capacity of the existing drainage system and the water quality concerns associated with sediment from runoff. During low storm water flows, runoff will be contained in the water quality basin. Drainage will occur through four (4) 6-inch perforated PVC pipes designed to drain the basin in 48 hours. The basin is designed to allow for quieter sediment control. During heavy storm water flow, runoff will flow from the water quality basin through the proposed grassed drainage channel, through the replacement box culvert, and into the existing concrete-lined channel. Refer to **Appendix "B"**. The proposed water quality basin is considered a Best Management Practice mitigation measure to protect water quality downstream and in the nearshore environment.

The project design also includes an extension of the roadside sidewalk over the culvert bridge. This provision will provide benefits of enhanced pedestrian access to residents of Hauoli Street and visitors to the area.

B. NO ACTION ALTERNATIVE

The "no action" alternative would retain the existing drainage system consisting of a 3-foot by 8-foot single cell box culvert under Hauoli Street and concrete-lined drainage channel that stretches from Hauoli Street to the shore. The existing drainage system is insufficient to manage existing storm water flow, and the no action alternative would not remedy this situation. In addition, the no action alternative would provide no mechanisms for sediment

control or water quality improvements. Given the flooding risk and the floods which have previously damaged neighboring properties, as well as the sediment load of the existing runoff, the "no action" alternative was not deemed viable. Accordingly, the "no action" alternative is not preferable.

C. DEFERRED ACTION ALTERNATIVE

The "deferred action" alternative would have similar consequences to the "no action" alternative, in that the flooding and water quality concerns associated with the existing drainage system would not be addressed in a timely fashion. In the case of a heavy flood, this alternative could result in damage to neighboring properties on Hauoli Street and adverse water quality impacts downstream. Accordingly, the "deferred action" alternative is not preferable.

D. DESIGN ALTERNATIVES

An alternative design for the proposed project included the provision of a box culvert running from Hauoli Street to the end of the concrete-lined drainage channel, rather than maintaining the existing concrete-lined drainage channel. This design alternative was not preferred because of potential foundation and structural concerns associated with the close proximity of the existing condominium buildings to the drainage channel.

Another alternative design called for the existing 3-foot by 8-foot box culvert to remain in place while a detention pond would be built on the *mauka* side of Hauoli Street to detain the runoff generated by the Kealaloloa Ridge drainage basin. With the existing box culvert's capacity of 240 cfs, the detention pond would have to be designed to accommodate the difference between the 785 cfs generated by the drainage basin and the 240 cfs accommodated by the box culvert. The detention pond would have to measure at least 400 feet by 400 feet by 12 feet deep and have a storage capacity of 42 acre-feet covering an area of approximately 5 acres. The high project cost, vast land area, and scope of work required to implement this project rendered this alternative non-viable.

E. DIVERSION OF DRAINAGE FLOW

During the early consultation period on the Draft EA, the County of Maui, Department of Planning commented that the diversion of the drainage flow should be explored as a potential alternative to the proposed action. This option, however, was not considered feasible given

the 100-year, 24-hour storm runoff calculated at 785 cfs. Diversion infrastructure needed to accommodate all or a portion of the storm runoff would involve extensive engineering design and construction. Moreover, the outcome of altering drainage patterns poses a number of attendant environmental impact implications.

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The development of the proposed project is anticipated to result in the irreversible and irretrievable commitment of land and fiscal resources. Other resource commitments include energy, labor, and material resources required for project construction. The commitment of these resources, however, is considered appropriate when accounting for the benefits of decreased flooding hazard to the community and improved water quality of storm water flow to protect downstream and nearshore waters.

VII. SIGNIFICANCE CRITERIA ASSESSMENT

VII. SIGNIFICANCE CRITERIA ASSESSMENT

The "Significance Criteria", Section 12 of the Hawaii Administrative Rules, Title 11, Chapter 200, "Environmental Impact Statement Rules", was reviewed and analyzed to determine whether the proposed project will have significant impacts on the environment. The following criteria and analysis are provided.

1. **Involves an irrevocable commitment to, loss, or destruction of any natural or cultural resource.**

   The project site and surrounding properties have been previously developed or utilized for active sugar cane cultivation; consequently, there are no known rare, endangered, or threatened species of flora, fauna, or avifauna located within the project site or surrounding vicinity. In addition, the archaeological assessment and cultural impact assessment documented no known archaeological or culturally significant features in the project vicinity. Refer to **Appendix "F"** and **Appendix "H"**. However, as discussed in the archaeological monitoring plan, should any cultural artifacts or human remains be encountered during construction, work will stop in the immediate vicinity of the find, and the SHPD will be notified immediately to establish an appropriate mitigation strategy. Refer to **Appendix "G"**.

   In sum, the proposed project will not result in any adverse environmental impacts, and no natural, cultural, or archaeological resources will be adversely impacted by the proposed action.

2. **Curtails the range of beneficial uses of the environment.**

   The proposed project will not curtail the range of beneficial uses of the environment. The proposed action will improve local drainage conditions, and the water quality basin will improve the quality of storm water runoff to ensure that surrounding shoreline and nearshore waters are not adversely affected by the discharge. Additionally, Best Management Practices (BMPs) will be employed where appropriate, to minimize any construction-related impacts to the environment.

3. **Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.**

The proposed project aligns with the State's Environmental Policy and Guidelines as set forth in Chapter 344, Hawaii Revised Statutes (HRS).

4. **Substantially affects the economic welfare, social welfare, and cultural practices of the community or State.**

In the short term, the proposed project will directly benefit the local economy by providing construction-related employment; over the long term, the drainage system components will require periodic maintenance and protect the economy of this popular visitor destination. Meanwhile, the cultural impact assessment identified no cultural practices or resources within the project site. Due to the limited project area and scope of work, social welfare and cultural practices will not be directly affected by the proposed project.

5. **Substantially affects public health.**

No adverse impacts to public health and welfare are anticipated as a result of the proposed project. The proposed project is designed to alleviate the periodic flooding of Hauoli Street and neighboring properties. The water quality basin is designed to capture sediments and other pollutants from storm water runoff to protect the quality of the nearshore waters. The replacement box culverts and new drainage channel wall are designed to protect the community by preventing the flooding of Hauoli Street and neighboring condominiums that occurs during periods of heavy rainfall. In this regard, the proposed project will have a positive effect on public welfare.

6. **Involves substantial secondary impacts, such as population changes or effects on public facilities.**

The proposed project will not expand the service limits or requirements of public services such as police, fire, medical, educational, recreational, or solid waste collection services, nor will it have a negative impact on population parameters for the South Maui region. The proposed project is limited to improvements of the existing Hauoli Street drainage system.

From a land use standpoint, the proposed project is in keeping with the objectives and policies of the Kihei-Makena Community Plan. The proposed action will

provide necessary improvements to existing drainage infrastructure to support surrounding land uses.

The proposed project is not considered to be a population generator, and no secondary impacts are anticipated with the implementation of the proposed project.

7. **Involves a substantial degradation of environmental quality.**

Aside from the short-term impacts related to dust and noise generated during the construction phase, there is no anticipated degradation of environmental quality. Potential dust, noise, and erosion impacts associated with construction activities will be mitigated through utilization of appropriate BMPs. With respect to the long term, the construction of the water quality basin is a BMP to mitigate and minimize impacts to the shoreline and nearshore water resulting from the sediment and pollutant loads of storm water runoff. The proposed drainage improvements are low in profile and are not anticipated to alter the open space and scenic character of the area.

8. **Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.**

The proposed project does not involve a commitment to larger actions. The impacts assessed in this document are based on the entire action.

9. **Substantially affects a rare, threatened, or endangered species or its habitat.**

The existing concrete-lined drainage channel was previously developed and the land encompassed by the proposed water quality basin has been altered by years of sugar cane cultivation. There are no known rare, threatened, or endangered species of flora, fauna, or avifauna found at or around the project site and the project site contains no critical habitat for such species. Given these conditions, no impacts to rare, threatened, or endangered species are anticipated as a result of the proposed action.

10. **Detrimentally affects air or water quality or ambient noise levels.**

Construction activities will result in short-term air quality and noise impacts. Dust control measures such as regular watering and sprinkling, and installation of dust

screens will be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from the operation of construction equipment. Equipment mufflers or other noise attenuating equipment, as well as proper equipment and vehicle maintenance, will be used during construction activities. Construction noise impacts will be mitigated through compliance with applicable provisions of the State of Hawaii, Department of Health Administrative Rules (HAR) Title 11, Chapter 46, "Community Noise Control". These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels set forth in Chapter 46 HAR.

Water quality impacts will be mitigated by the proposed water quality basin and through the use of silt fences, sandbag check dams and graveled construction ingress and egress points, all of which are BMPs for sedimentation and erosion control. Refer to **Appendix "B"**. No long-term air or water quality or ambient noise level impacts are anticipated.

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.

Soils underlying the project site are not erosion-prone and there are no geologically hazardous lands or estuaries within or adjacent to the project site. Although the project site is located within Flood Zone X (shaded), an area with a 0.2 percent chance of annual flooding, and Flood Zone X (unshaded), an area outside the 0.2 percent annual chance flood plain, the proposed drainage system improvements are designed to accommodate the anticipated volume of storm water runoff generated by a 24-hour, 100-year storm. The proposed project is intended to alleviate flooding of surrounding properties and to improve the quality of storm water runoff to protect the water quality of Maalaea Bay. No other foreseeable adverse environmental effects are anticipated in conjunction with the proposed improvements.

12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.

The project site has not been identified as part of a scenic vista or viewplane. The proposed drainage system improvements are low in profile; therefore, scenic corridors and open space resources in the area will not be affected.

13. Requires substantial energy consumption.

The proposed project will involve a limited commitment of fuel for construction equipment, vehicles, and machinery during construction and maintenance activities. Once completed, the proposed drainage system will be maintained by use of equipment and vehicles and not require a substantial supply of energy.

Based on the foregoing analysis, it is anticipated that the proposed action will result in a Finding of No Significant Impact (FONSI).

VIII. LIST OF PERMITS AND APPROVALS

VIII. LIST OF PERMITS AND APPROVALS

The following Federal, State, and County permits and approvals may be required for project implementation:

State of Hawaii

1. Noise Permit (as applicable for construction activities)

2. National Pollutant Discharge Elimination System (NPDES) Permit

County of Maui

1. Special Management Area (SMA) Assessment

2. Shoreline Setback Assessment (SSA)

3. Construction Permits

4. Flood Development Permit, as applicable

IX. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED; AND RESPONSES TO SUBSTANTIVE COMMENTS

IX. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED; AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies and organizations were consulted during the preparation of the Draft Environmental Assessment. Agency comments and responses to substantive comments are also included in this section.

1. Ranae Ganske-Cerizo, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
77 Hookele Street, Suite 202
Kahului, Hawaii 96732

2. Commanding Officer
U. S. Coast Guard Station Maui
233 Maalaea Road
Wailuku, Hawaii 96793

3. George Young
Chief, Regulatory Branch
U.S. Department of the Army
U.S. Army Engineer District, Honolulu
Regulatory Branch
Building 230
Fort Shafter, Hawaii 96858-5440

4. Patrick Leonard
Field Supervisor
U. S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm. 3-122
Box 50088
Honolulu, Hawaii 96813

5. Russ K. Saito, State Comptroller
Department of Accounting and General Services
1151 Punchbowl Street, #426
Honolulu, Hawaii 96813

6. Theodore E. Liu, Director
State of Hawaii
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

7. Chiyome Fukino, M.D., Director
State of Hawaii
Department of Health
919 Ala Moana Blvd., Room 300
Honolulu, Hawaii 96814

8. Alec Wong, P.E., Chief
Clean Water Branch
State of Hawaii
Department of Health
919 Ala Moana Blvd., Room 300
Honolulu, Hawaii 96814

9. Brian Hunter, Planner
Clean Water Branch
Polluted Runoff Control Program
State of Hawaii
Department of Health
919 Ala Moana Blvd., Room 301
Honolulu, Hawaii 96814-4920

10. Patti Kitkowski
Acting District Environmental Health Program Chief
State of Hawaii
Department of Health
54 High Street
Wailuku, Hawaii 96793

11. Laura Thielen, Chairperson
State of Hawaii
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

12. Dr. Puaalaokalani Aiu, Administrator
State of Hawaii
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawaii 96707

13. Brennon Morioka, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

cc: Fred Cajigal

14. Major General Robert G.S. Lee, Director
Hawaii State Civil Defense
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

15. Katherine Kealoha, Director
Office Of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813

16. Clyde Nāmuo, Administrator
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

17. Abbey Seth Mayer, Director
State of Hawaii
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804

18. Gen Iinuma, Administrator
Maui Civil Defense Agency
200 South High Street
Wailuku, Hawaii 96793

19. Jeffrey A. Murray, Fire Chief
County of Maui
Department of Fire and Public Safety
200 Dairy Road
Kahului, Hawaii 96732

20. Jeffrey Hunt, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

21. Gary Yabuta, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawaii 96793

22. Milton Arakawa, Director
County of Maui **NOTE: SEND 3 COPIES**
Department of Public Works
200 South High Street
Wailuku, Hawaii 96793

23. Cheryl Okuma, Director
County of Maui
Department of Environmental Management
One Main Plaza
2200 Main Street, Suite 100
Wailuku, Hawaii 96793

24. Donald Medeiros, Director
County of Maui
Department of Transportation
200 South High Street
Wailuku, Hawaii 96793

25. Jeffrey Eng, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

26. Greg Kauhi, Manager, Customer Operations
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawaii 96733

27. **Oceanic Time Warner Cable**
350 Hoohana Street
Kahului, Hawaii 96732

28. **Hawaiian Telcom**
60 South Church Street
Wailuku, Hawaii 96793

29. Randall Moore
Hawaiian Commercial & Sugar Company
P. O. Box 266
Puunene, Hawaii 96784

30. **Maalaea Community Association**
50 Hauoli Street
Maalaea, Hawaii 96793

31. Jesse Spencer
Spencer Homes, Inc.
67 East Waiko Road
Wailuku, Hawaii 96793

32. **Maui Ocean Center**
192 Maalaea Road
Wailuku, Hawaii 96793

33. **Maalaea Harbor Village**
300 Maalaea Road
Wailuku, Maui 96793

34. Sam Harbo, President
Bill Brown, Treasurer
Island Sands AOAO
150 Hauoli Street
Wailuku, Hawaii 96793

35. Pam Daoust
Maalaea Banyans
190 Hauoli Street
Wailuku, Hawaii 96793

36. Kent Michaud, Resident Manager
Milowai Condominums
50 Hauoli Street
Wailuku, Hawaii 96793

37. Robin S. Knox
Water Quality Consulting, Inc.
728A Kupulau Drive
Kihei, Hawaii 96753

JUL 15 2009

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

REPLY TO
ATTENTION OF:

July 10, 2009

Regulatory Branch

File Number POH-2009-0230

Munekiyo & Hiraga, Inc.
Attn: Kimberly Skog, Planner
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Skog:

This letter responds to your letter dated July 1, 2009 requesting Department of the Army (DA) early consultation comments for the Proposed Hau'oli Street Drainage Improvements, Ma'alaea, Maui, at TMKs (2) 3-8-005:003 (por.) and (2) 3-8-014:011 & 015 (pors.). We have reviewed the project site figures you submitted with respect to the Corps' authority to issue Department of the Army (DA) permits pursuant to Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344).

Section 10 of the RHA of 1899 (33 USC 403) requires a DA permit be obtained for the **construction** of any structure **in or over any navigable water** of the U.S, subject to the ebb and flow of tide. Section 404 of the Clean Water Act requires that a DA permit be obtained for the **discharge** of dredged and/or **fill material** into waters of the U.S., including jurisdictional wetlands (33 USC 1344).

In reviewing the submitted information and resources available to the Corps, we have determined that the project site involves a drainage channel that discharges into Ma'alaea Harbor, a traditionally navigable water of the U.S., subject to Corps jurisdiction. The scope of activity appears to involve work in or over navigable waters of the United States, as designated by the Mean High Tide line (MHT) shoreward, and or discharge of dredged and/or fill material into waters of the U.S., therefore a **DA permit will be required**. This determination does not relieve you of the responsibility to obtain any other permits, licenses, or approvals that may be required under County, State, or Federal law for your proposed work

In preparation of your Environmental Assessment (EA), we advise you to address the specific scope of activity within the channel and calculated total volume of associated permanent fill regarding the construction of the two-box culvert extending from the desilting basin, under the drainage channel, to the shore, including calculated total volume of temporary fill resulting from the installment of Best Management Practices (BMPs) such as silt fences and sandbag berms.

Should you have any questions regarding this letter of comment, please contact Ms. Jessie Ann Pa'ahana of my staff at 438-7023 or by e-mail at *jessie.k.paahana@usace.army.mil* and reference the Corps File No. **POH-2009-230** in all future correspondence related to this project.

Please be advised you can provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

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

MUNEKIYO HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

January 17, 2012

George P. Young, P.E.
Chief, Regulatory Branch
Department of the Army
U. S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage Improvements Project at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii (File Number POH-2009-0230)

Dear Mr. Young:

Thank you for your letter of July 10, 2009, in response to the early consultation request for the proposed drainage improvements project at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we are providing additional information which we hope will clarify the scope of the project in relation to Department of the Army (DA) permit applicability.

In the vicinity of the shoreline, the proposed drainage improvements project affects an existing concrete-lined drainage channel that straddles the property boundary between TMKs (2) 3-8-014:011 and 015. The drainage channel terminates inland of the Mean High Tide Line. See **Figure 1** and **Figure 2**. A wall will be built along the northeastern side of the drainage channel and grouted rip-rap (GRP) will be added to the mouth of the drainage channel. The GRP will end approximately 40 feet inland of the Mean High Tide Line. See **Figure 3**. There will be no work performed shoreward of the Mean High Tide Line. The project site is approximately 800 feet east of the Maalaea Small Boat Harbor (MSBH), such that the drainage channel does not discharge into the MSBH.

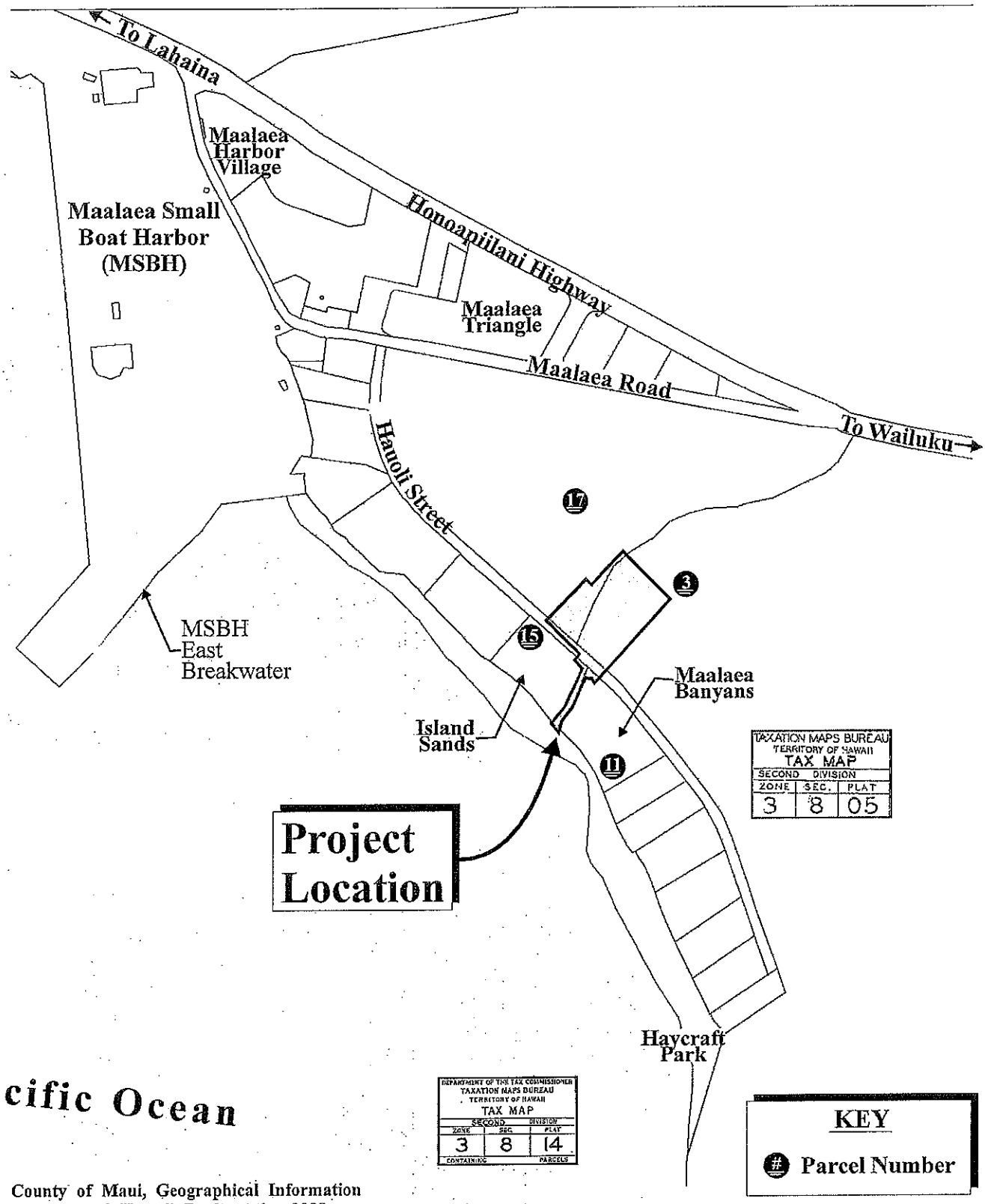
Given that the proposed project will not involve work in or over navigable waters of the United States, nor will it involve discharge of dredged and/or fill material into waters of the U.S., we respectfully request confirmation that a DA permit will **not** be required for the subject project.

Thank you again for your input on the Hauoli Street Drainage Improvements project. Should you have any questions, please do not hesitate to contact me at (808) 244-2015 or email planning@mhplanning.com.

Very truly yours,

Kimberly Skog
Associate

KS:yp
Enclosures
cc: Diane Kodama, AECOM (w/out enclosures)
Wendy Kobashigawa, Department of Public Works (w/out enclosures)
F:\DATA\AECOM\HauoliDrainage\DA.ecres.doc



Source: County of Maui, Geographical Information Systems and Hawaii Realty Atlas 2008

Figure 1

Proposed Hauoli Street Drainage Improvements

Site Location Map

137.25 549
0 Feet
274.5

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\sitelocation

Photograph No. 1
View from drainageway towards Maalaea Small Boat Harbor (MSBH)

Photograph No. 2
View from drainageway towards ocean

Photograph No. 3
View from the ocean facing the drainageway outlet

Source: Munekiyo & Hiraga, Inc.

Figure 2 Proposed Hauoli Street Drainage Improvements

Photographs in Drainage-Way Vicinity

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

Kimberly Skog

From: Paahana, Jessie K POH <Jessie.K.Paahana@usace.army.mil>
Sent: Friday, March 23, 2012 1:15 PM
To: General eMail
Subject: Attn: Kimberly Skog Re: POH-2009-00230 Hauoli Street Drainage Improvements (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Aloha, Ms. Skog:

I have reviewed your submittal dated January 17, 2012 requesting concurrence that, "a DA permit will not be required for the subject project". At this time, based on the submitted documents, we cannot firmly assert such a determination. I am requesting additional information regarding the drainage channel itself and further information regarding the construction of the wall and grouted rip rap. Please clarify the following:

1. What is the nature of the drainage channel? i.e., what type of water does it convey? Sheetflow from surrounding properties, storm water runoff? Does it flow at least 3 months out of the year? The drainage ditch itself may be jurisdictional depending on the nature of its flow and therefore, the grouted riprap would require authorization and the wall may as well, depending on where it is located relative to the channel.
2. Please provide construction specs for the wall and the grouted riprap including implementation of any BMPs i.e. silt fencing, etc. In addition, the construction methods including staging areas for equipment/machinery may require a permit. As such, please provide sufficient information detailing the construction plan, schedule, staging/access, etc.

Thank you,
Jessie

Jessie K Paahana, Biologist
US Army Corps of Engineers, Regulatory
Ft. Shafter, Bldg. 214
ph: 808.438.0391

Classification: UNCLASSIFIED
Caveats: NONE

MUNEKIYO HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

April 27, 2012

Jessie K. Paahana, Biologist
Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

SUBJECT: Hauoli Street Drainage Improvements Project at Maalaea, Maui, Hawaii, TMK Nos. (2) 3-8-005:003 and 017 and (2) 3-8-014:011 and 015 (POH-2009-00230)

Dear Ms. Paahana:

We are in receipt of your email dated March 23, 2012, requesting additional information regarding the subject project in order to determine the applicability of Department of the Army (DA) permitting requirements. For reference, this email is attached as **Exhibit "A"**. In response to your request, on behalf of the County of Maui, Department of Public Works (DPW), we provide the following information regarding the Hauoli Street drainage channel and the proposed improvements to the existing Hauoli Street drainage system.

1. Drainage Channel Information

The existing Hauoli Street drainage system consists of a 3-foot by 8-foot box culvert under Hauoli Street and a concrete-lined drainage channel that runs from the box culvert towards the shore. Lands adjacent to the drainage channel are occupied by beachfront condominiums. On the mauka side of Hauoli Street, an unmaintained earthen agricultural ditch runs up to the existing box culvert under Hauoli Street. See **Figure 1** and see site photographs in **Exhibit "B"**.

The purpose of the drainage system is to convey storm water runoff from mauka and surrounding properties. The drainage channel flows intermittently, only during periods of heavy rains, and heavy rains are infrequent occurrences in this region of the island. According to the National Oceanic and Atmospheric Administration (NOAA) Precipitation-Frequency Atlas of the United States, a 24-hour storm with a 1-year recurrence interval generates only 2.86 inches of rainfall in the Hauoli Watershed. See Appendix "B" of the drainage report for the subject project in **Exhibit "C"**.

The drainage report for the subject project was prepared by AECOM, Inc. in March 2012. Refer to **Exhibit "C"**. According to the drainage report, a 183.6-acre drainage basin collects runoff from the watershed of Kealaloloa Ridge of the West Maui Mountains, channeling storm water runoff towards the ocean. The total peak discharge generated by the Kealaloloa Ridge drainage basin in a 100-year, 24-hour storm is approximately 645.3 cubic feet per second (cfs). The capacity of the existing 3-foot by 8-foot box culvert is approximately 240 cfs. Currently, at approximately 405 cfs, Hauoli Street is over-topped by storm water runoff from heavy rains, a condition that results in flooding of Hauoli Street and neighboring properties. The County's drainage system improvement project is designed to accommodate runoff flowing at 645.3 cfs without flooding or overtopping Hauoli Street.

2. ***Scope of Proposed Improvements***

The purpose of the proposed drainage improvements project is to alleviate the periodic flooding of the existing drainage system, wherein excessive amounts of storm water runoff from heavy rainfall overflow onto Hauoli Street and into neighboring condominium properties. The proposed project involves construction of: (a) an approximately 200-foot by 150-foot earthen water quality basin on the *mauka* side of Hauoli Street with a gravel access road; (b) two (2) 4-foot by 8-foot box culverts crossing Hauoli Street to replace the existing 3-foot by 8-foot box culvert; (c) grouted rip-rap at the mouth of the drainage channel; and (d) a wall that will run within and along the northern side of the drainage channel. It is highlighted that the grouted rip-rap on the mouth of the drainage channel will be located at least 40 feet inland of the mean high tide line and the drainage channel wall will end over 100 feet inland of the mean high tide line. The perimeter of the water quality basin and access road will be surrounded by an 8-foot-high chain link fence with a double swing gate to secure the access road. A portion of the existing concrete drainage channel will be demolished for construction of the wall. The existing box culvert will be demolished and removed, as will portions of Hauoli Street, to enable the installation of the new box culverts. During construction of the box culverts, traffic will be diverted to a temporary detour roadway on the mauka side of Hauoli Street. Construction plans for the proposed improvements are provided in **Exhibit "D"**.

Construction Best Management Practices (BMPs) include silt fences, dust screens, graveled ingress/egress, and sodding and planting of exposed areas. These BMPs and the Erosion Control Plan are also provided in **Exhibit "D"**. It is highlighted that the proposed water quality basin is a BMP designed to reduce

the sediment and pollutant load of storm water runoff to meet water quality standards. The water quality basin will detain a portion of the runoff from the Kealaloloa Ridge drainage basin to allow pollutants and sediments to settle before discharge into the box culvert and concrete-lined drainage channel. The water quality basin and the transition from the basin to the box culvert will be grassed. During low storm water flows, runoff will be contained in the basin. Drainage will occur through four (4) 6-inch perforated PVC riser pipes designed to drain the basin in 48 hours.

Project construction is anticipated to span 6 to 12 months, commencing in late 2012.

As stated in our previous letter dated January 17, 2012, we respectfully request confirmation that a DA permit will not be required for the subject project.

Should you have any additional questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,

Kimberly Skog, Associate

KS:yp
Enclosures
cc: Wendy Kobashigwa, Department of Public Works (w/out enclosures)
Diane Kodama, AECOM, Inc. (w/out enclosures)
K:\DATA\AECOM\HauoliDrainage\DA.ltr.doc

EXHIBIT "A"

E-MAIL FROM JESSIE K. PAAHANA, US ARMY CORPS OF ENGINEERS, REGULATORY BRANCH

Kimberly Skog

From: Paahana, Jessie K POH <Jessie.K.Paahana@usace.army.mil>
Sent: Friday, March 23, 2012 1:15 PM
To: General eMail
Subject: Attn: Kimberly Skog Re: POH-2009-00230 Hauoli Street Drainage Improvements (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Aloha, Ms. Skog:

I have reviewed your submittal dated January 17, 2012 requesting concurrence that, "a DA permit will not be required for the subject project". At this time, based on the submitted documents, we cannot firmly assert such a determination. I am requesting additional information regarding the drainage channel itself and further information regarding the construction of the wall and grouted rip rap. Please clarify the following:

1. What is the nature of the drainage channel? i.e., what type of water does it convey? Sheetflow from surrounding properties, storm water runoff? Does it flow at least 3 months out of the year? The drainage ditch itself may be jurisdictional depending on the nature of its flow and therefore, the grouted riprap would require authorization and the wall may as well, depending on where it is located relative to the channel.
2. Please provide construction specs for the wall and the grouted riprap including implementation of any BMPs i.e. silt fencing, etc. In addition, the construction methods including staging areas for equipment/machinery may require a permit. As such, please provide sufficient information detailing the construction plan, schedule, staging/access, etc.

Thank you,
Jessie

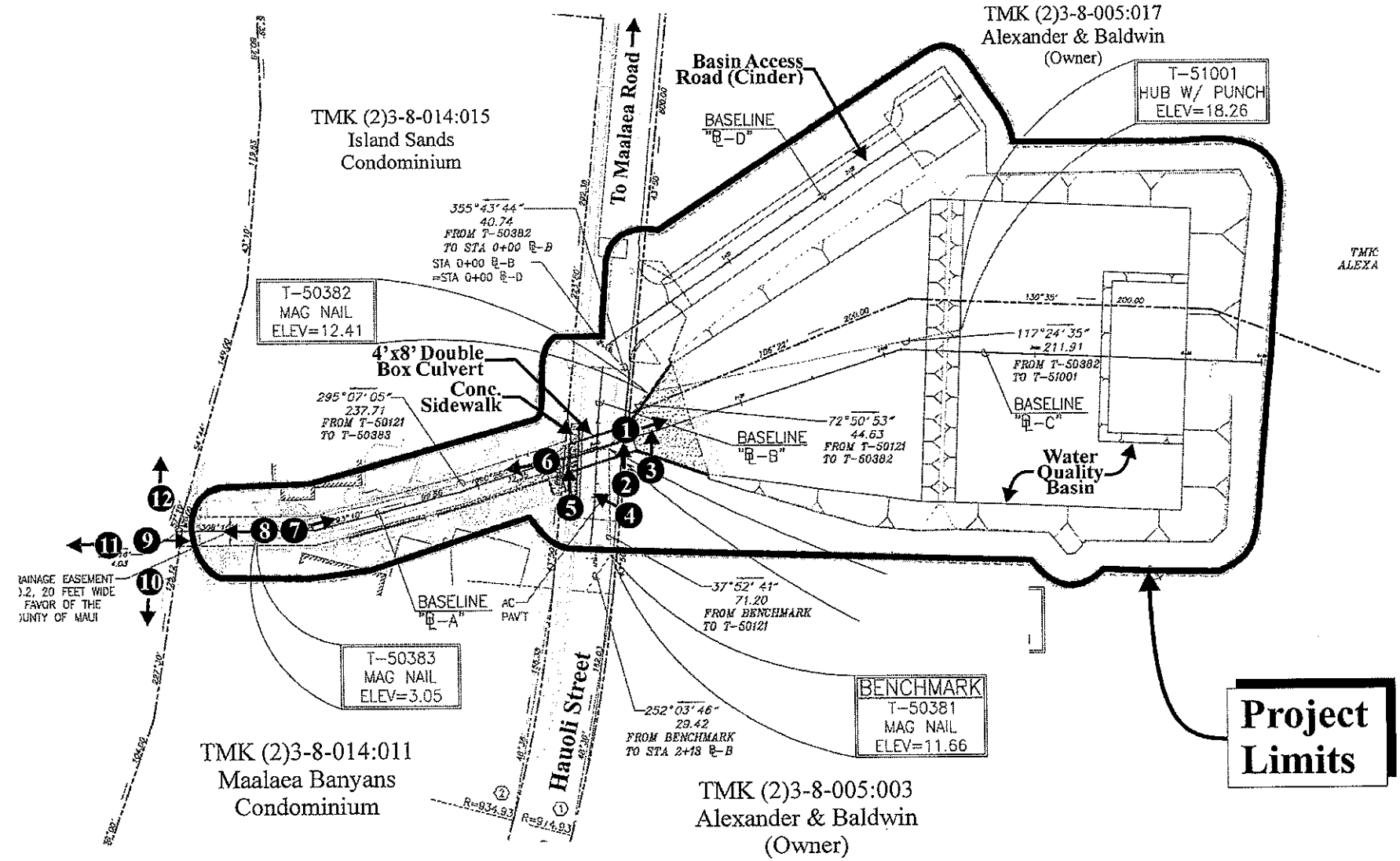
Jessie K Paahana, Biologist
US Army Corps of Engineers, Regulatory
Ft. Shafter, Bldg. 214
ph: 808.438.0391

Classification: UNCLASSIFIED
Caveats: NONE

EXHIBIT "A"

EXHIBIT "B"

SITE PHOTOGRAPHS



Source: AECOM Pacific, Inc.

Proposed Hauoli Street Drainage Improvements

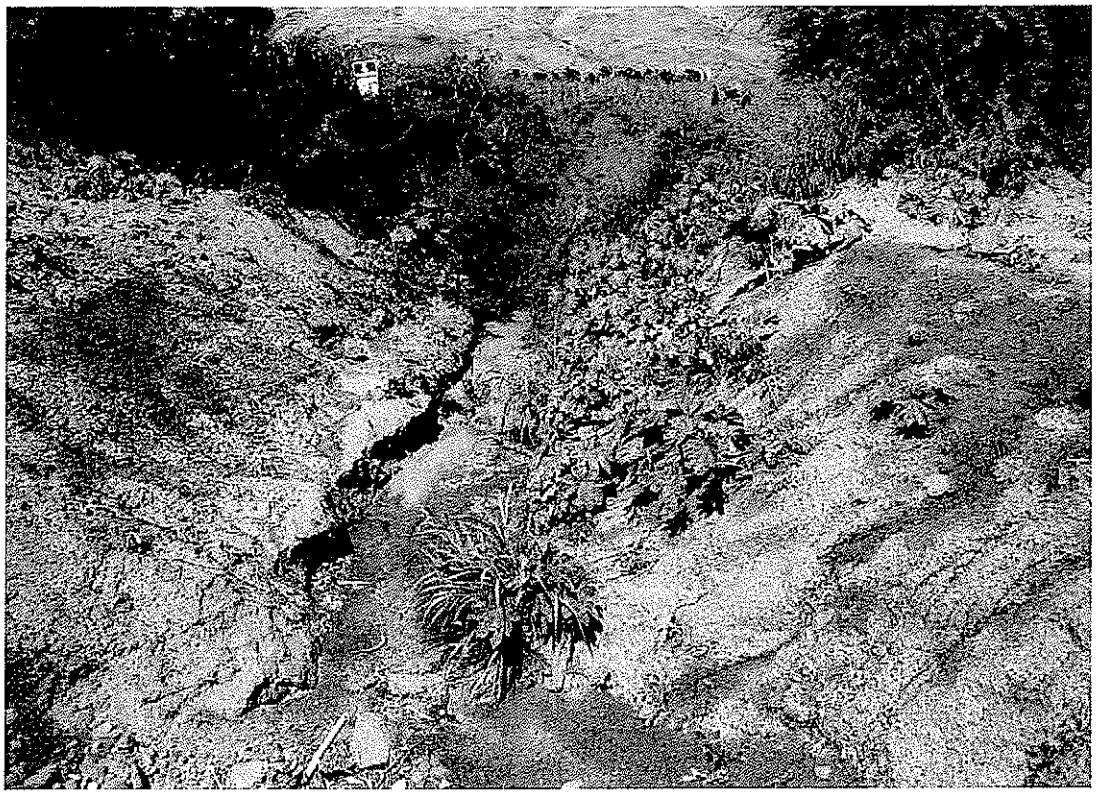
NOT TO SCALE

Photographic Reference Map

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\referencephoto



Photograph No. 1: View mauka from Hauoli Street into water quality basin site; portion of sugar cane field in background; West Maui Moutains beyond

Photograph No. 2: Box culvert opening on mauka side of Hauoli Street

Photograph No. 3: Box culvert opening on mauka side of Hauoli Street

Photograph No. 4: Sidewalk crossing on makai side of Hauoli Street; Island Sands Condominium in background

Photograph No. 5: View west along makai side of Hauoli Street; existing drainage channel in foreground at left; Island Sands Condominium background left

Photograph No. 6: View of drainage channel looking southeast from Hauoli Street; Island Sands Condominium parking at right; naupaka hedge in center background at terminus of drainage channel; Maalaea Bay beyond

Photograph No. 7: View northwest within existing concrete-lined drainage channel; Island Sands Condominium to the left; railing along Hauoli Street at background center

Photograph No. 8: End of existing concrete-lined drainage channel, facing south towards the ocean

Photograph No. 9: View from the shoreline northwest towards the drainage channel outlet; Island Sands Condominium to left; Maalaea Banyans Condominium to right

Photograph No. 10: View of shoreline to the east

Photograph No. 11: View of beach and rock outcropping in line with drainage channel

Photograph No. 12: View of beach and shoreline to the southwest

EXHIBIT "C"

DRAINAGE REPORT

(See Appendix "A" of This Draft EA Document)

EXHIBIT "D"

PROJECT PLANS

(See Appendix "B" of This Draft EA Document)

Justin Tanaka

From: Nadiera_Sukhraj@fws.gov
Sent: Monday, July 20, 2009 10:14 AM
To: Kimberly Skog
Cc: Michael_Molina@fws.gov
Subject: EC Comments from US F&W

In Reply Refer To:
12200-2009-FA-0130

Dear Ms. Skog,

The U.S. Fish and Wildlife Service (Service) has received the early consultation request for the the proposed Hau'oli Street drainage improvements on Maui. At this time we do not have specific comments on the project as the improvement design has not been completed. The Service does have concerns about the drainage volume that will be introduced into the marine environment and recommend that the estimated monthly or annual amount be identified in future plans. The sources of input into the drainage system should also be identified (wastewater, runoff from roadways, sediment, etc.). Standard Fish and Wildlife Best Management Practices should be incorporated into the project, both terrestrial and submerged, to avoid or minimize the project-related degradation of water quality conditions that may impact fish and wildlife resources (attached).

We appreciate the opportunity to comment on the project. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Nadiera C. Sukhraj at (808) 792-9410.

Nadiera C. Sukhraj
U.S. Fish and Wildlife Service, Pacific Islands Field Office
300 Ala Moana Blvd., Room 3-122, Box 50088
Honolulu, HI 96850
Tel: 808-792-9410 Fax: 808-792-9581

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The Fish and Wildlife Service recommends that the following measures be incorporated into projects to minimize the degradation of water quality and adverse impacts to fish and wildlife resources.

1. Turbidity and siltation from project-related work shall be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.

2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.

3. Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss of special aquatic site habitat (coral reefs, wetlands etc.) and any ecological functions unavoidably lost as a result of the project shall be replaced.

4. All project-related materials and equipment (dredges, barges, backhoes etc) to be placed in the water shall be cleaned of pollutants prior to use.

5. No project-related materials (fill, revetment rock, pipe etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands etc.);

6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.

7. No contamination (trash or debris disposal, non-native species introductions attraction of non-native pests etc.) of adjacent marine/aquatic environments (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests etc.) shall result from project-related activities. This shall be accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan (HACCP – see http://www.haccp-nrm.org/Wizard/default.asp) to prevent attraction and introduction of non-native species.

8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.

9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.

10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding etc.).

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Loyal A. Mehrhoff, Field Supervisor
U. S. Fish and Wildlife Service
Pacific Islands Field Office
300 Ala Moana Blvd.
Room 3-122, Box 50088
Honolulu, Hawaii 96850

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii (12200-2009-FA-0130)

Dear Mr. Mehrhoff:

Thank you for your department's email of July 20, 2009, in response to the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

The amount of runoff generated by the drainage basins mauka (upland) of the Hauoli Street drainage system will not change as a result of the proposed action. Although the size of the box culvert crossing Hauoli Street will increase, this measure is solely implemented to alleviate over topping of Hauoli Street and flooding of neighboring properties. In effect, the drainage volume that would be introduced into the marine environment will not change as a result of the proposed project. This drainage system does not collect wastewater. The estimated drainage volume and sources of input into the drainage system will be included in the Draft Environmental Assessment (EA).

With respect to the Standard Fish and Wildlife Best Management Practices, the applicant notes that the proposed drainage improvements project will not involve any dredging or filling, or any work within the marine environment. Applicable Best Management Practices will be implemented for sediment and erosion control during construction. It is highlighted that the project's proposed water quality basin is a Best Management Practice to reduce the sediment and pollutant load of storm water runoff to

preserve nearshore water quality. Best Management Practices for construction activity will be provided with the construction plans in the Draft EA.

We will provide your office with a copy of the Draft EA when it is available for your review and comment.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
F:\DATA\AECOM\HauoliDrainage\USFWS.ecres.doc

JUL 15 2009

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

SANDI YAHIRO
DEPUTY COMPTROLLER

(P)1206.9

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

JUL 14 2009

Ms. Kimberly Skog, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

Subject: Early Consultation Request for
Proposed Hauoli Street Drainage Improvements at
TMK: (2) 3-8-005:003 (por.) and (2) 3-8-014:011 and 015 (pors.)
Maalaea, Maui, Hawaii

Thank you for the opportunity to provide early consultation comments on the proposed Hauoli Street Drainage Improvements project. This proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If you have any questions, please call me at 586-0400 or have your staff call Mr. Clarence Kubo of the Public Works Division at 586-0488.

Sincerely,

RUSS K. SAITO
State Comptroller

JUL 1 3 2009

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME LEINAALA FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EMD / WB
LUD-M3 8 005 003

July 10, 2009

Ms. Kimberly Skog, Planner
Munekiyo & Hiraga, Inc.
305 High Street Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

Subject: Early Consultation Request for Proposed Hauoli Street Drainage Improvements at TMKs (2) 3-8-005: 003 (portion) and (2) 3-8-014: 011 and 015 (portion), Maalaea, Maui, Hawaii

Thank you for allowing us the opportunity to review the above subject project proposes improvements to the Hauoli Street Drainage System. We have the following comments and information on the above subject property:

Our main concern is the proper treatment and disposal of domestic wastewater from any building, dwelling or establishment, temporary and/or permanent. Therefore, as this is a "street drainage" proposal and domestic wastewater is not a topic of concern, we have no objections to the proposed improvements.

We do encourage the developer to work with the County and utilize recycled water for irrigation and other non-potable water purposes wherever possible.

Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at (808)586-4294.

Sincerely,

TOMAS S. SEE, P.E., CHIEF
Wastewater Branch

c: DOH's Environmental Planning Office Mr. Jiacai Liu, Mr. Phillip Anderson
DOH-WWB's Maui Staff – Mr. Roland Tejano
CWB (w/attachments)

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Marshall Lum, Acting Chief
Wastewater Branch
State of Hawaii, Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii (EMD/ WB, LUD-M3 8 005 003)

Dear Mr. Lum:

Thank you for your department's letter of July 10, 2009, providing comments on the early consultation request regarding the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

In response to your comments regarding irrigation, we note that there are no plans for new landscaping for the proposed project; thus, there is no irrigation system proposed. If practicable and accessible, non-potable water may be utilized for dust control during construction.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Wendy Kobashigawa, County of Maui, Department of Public Works
Diane Kodama, AECOM
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JUL 21 2009

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
DOH/CWB

07079PDCL.09

July 17, 2009

Ms. Kimberly Skog
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

SUBJECT: Early Consultation Comments for the Preparation of an Environmental Assessment (EA) and Special Management Area (SMA) Permit Application for Hauoli Street Drainage Improvements Maalaea, Island of Maui, Hawaii TMKs: (2) 3-8-005:003 (por.) and (2) 3-8-014:011 & 015 (pors.)

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated July 1, 2009, requesting early consultation comments for the subject project in accordance with Hawaii Administrative Rules (HAR), Chapter 11-200 (Environmental Impact Statement Rules). The DOH, Office of Environmental Quality Control (OEQC) administers HAR, Chapter 11-200. Please contact the DOH, OEQC at the address below:

Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813
Ph. 586-4185
Fax. 586-4186
Email: oeqc@doh.hawaii.gov

The DOH-CWB administers HAR, Chapters 11-54 and 11-55. We have reviewed the subject document and offer these comments on your project. Please note that our review is based solely on the information provided in the subject document and its compliance with HAR, Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at http://www.hawaii.gov/health/environmental/env-planning/landuse/CWB-standardcomment.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

   a. Storm water associated with construction activities (i.e. excavation, grading, clearing, demolition, uprooting of vegetation, equipment staging, storage areas, stockpiles, etc.) that result in the disturbance of one (1) acre or more 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 start of the construction activities.

   b. Construction activity dewatering.

   You must submit a separate NOI form for each type of discharge at least 30 calendar days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 calendar days before the start of construction 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/forms/genl-index.html.

3. For types of wastewater not listed in Item 2 above or wastewater discharging into Class 1 or Class AA waters, you may need an NPDES individual permit. Class 1 waters include, but is not limited to, all State waters in natural reserves, preserves, sanctuaries, and refuges established by the Department of Land and Natural Resources under chapter 195, Hawaii Revised Statutes (HRS), or similar reserves for the protection of aquatic life established under chapter 195, HRS. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. The NPDES application forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

4. If this project involves work in a State water or if the drainage channel work area is tidally influenced with a State water, it is recommended that you consult with the Army Corps of Engineers, Regulatory Branch (Telephone Number: 808-438-9258) in regard to their permitting requirements.

5. Please clarify if the desilting basin will be cleaned prior to the start of project activities.

6. Please identify all State waters that may be impacted by the project.

7. Please specify all discharges to State waters from the project construction or operation activities.

8. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 Water Quality Certification are required, must comply with the Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

If you have any questions, please visit our website at http://www.hawaii.gov/health/environmental/water/cleanwater/index.html, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

DCL:rg

c: Environmental Planning Office [via e-mail only]

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Alec Wong, P.E., Chief
State of Hawaii
Department of Health
Clean Water Branch
P. O. Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii (DOH/CWB 07079PDCL.09)

Dear Mr. Wong:

Thank you for your letter of July 17, 2009, providing comments on the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

1. The applicant acknowledges that the Hauoli Street drainage improvements project must meet the criteria of the antidegradation policy, designated uses, and water quality criteria, pursuant to Hawaii Administrative Rules (HAR), Sections 11-54-1.1, 11-54-3 and 11-54-4 through 11-54-8, respectively. The proposed water quality basin is a Best Management Practice designed to minimize the sediment and pollutant load of runoff passing through the drainage channel.

2. The applicant confirms that a National Pollutant Discharge Elimination System (NPDES) general permit application will be filed, as applicable. This includes separate Notice of Intent (NOI) forms for storm water associated with construction activities resulting in the disturbance of one (1) acre or more of land area, as well as construction activity dewatering. The applicant notes that the waters of Maalaea Bay in the vicinity of the project are Class A waters.

3. The applicant acknowledges that a NPDES individual permit will be filed, as applicable, for types of wastewater not listed in Item No. 2 above. The waters of Maalaea Bay in the vicinity of the project are Class A waters.

4. The applicant is in the process of consulting with the Army Corps of Engineers to determine jurisdictional applicability. The applicant notes that the proposed project does not involve work in any State waters, and that the proposed drainage improvements will be located above tidally influenced elevations.

5. The proposed water quality basin is not an existing structure. The basin will be constructed on TMK (2) 3-8-005:003 (por.) and 017 (por.). The affected portion of Parcel 3 is vegetated with kiawe scrub and sugar cane while the affected portion of Parcel 17 is under active sugar cane cultivation. Once completed, the basin will be vegetated with weeds, grasses, and low maintenance vegetation.

6. The waters of Maalaea Bay are located in the vicinity of the project site. A description of the nearshore environment will be included in the Draft Environmental Assessment (EA).

7. A description of all discharges to Maalaea Bay from the project construction or operation activities will be provided in the Draft EA.

8. The applicant notes that the project will comply with the Water Quality Standards, pursuant to HAR, Chapter 11-54 and HAR, Chapter 11-55.

We will provide your office with a copy of the Draft EA when it is available for your review and comment.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
Snookie Mello, AECOS
Scott Sullivan, Sea Engineering, Inc.
F:\DATA\AECOM\HauoliDrainage\DOH CWB.ecres.doc

JUL 1 6 2009

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M. D.
DIRECTOR OF HEALTH

LORRIN W. PANG, M. D., M. P. H.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2102

July 15, 2009

Ms. Kimberly Skog
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Ms. Skog:

Subject: Early Consultation Request for Proposed Hau`oli Street Drainage Improvements, Ma`alaea, Maui, Hawai`i
TMK: (2) 3-8-005:003 (por.) and (2) 3-8-014:011 and 015 (por.)

Thank you for the opportunity to comment on the early consultation. The following comments are offered:

1. National Pollutant Discharge Elimination System (NPDES) permit coverage may be required for this project. The Clean Water Branch should be contacted at 808 586-4309.

2. The noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules, Chapter 11-46 "Community Noise Control". A noise permit may be required and should be obtained before the commencement of this project.

It is strongly recommended that the Standard Comments found at the Department's website: http://hawaii.gov/health/environmental/env-planning/landuse/landuse.html be reviewed, and any comments specifically applicable to this project should be adhered to.

Should you have any questions, please call me at 808 984-8230 or e-mail me at patricia.kitkowski@doh.hawaii.gov.

Sincerely,

Patti Kitkowski

Patti Kitkowski
Acting District Environmental Health Program Chief

c EPO

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Patti Kitkowski
District Environmental Health
Program Chief
State of Hawaii
Department of Health
Maui District Health Office
54 High Street
Wailuku, Hawaii 96793-2102

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii

Dear Ms. Kitkowski:

Thank you for your letter of July 15, 2009, providing comments on the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

1. The applicant confirms that a National Pollutant Discharge Elimination System (NPDES) permit will be filed, as applicable. The applicant notes that the waters of Maalaea Bay in the vicinity of the project are Class A waters. Comments on the proposed action have been received from the State Department of Health Clean Water Branch.

2. The applicant acknowledges that a noise permit may be required, and will be obtained before the commencement of the Hauoli Street drainage improvements project, as applicable.

3. The Department's Standard Comments will be consulted and adhered to, as applicable.

We will provide your office with a copy of the Draft Environmental Assessment when it is available for your review and comment.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
F:\DATA\AECOM\HauoliDrainage\DOH Maui.ecres.doc

JUL 2 1 2009

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 20, 2009

Munekiyo & Hiraga, Inc.
305 High Street Suite 104
Wailuku, Hawaii 96793

Attention: Ms. Kimberly Skog, Planner

Ladies and Gentlemen:

Subject: Early Consultation for Proposed Hau'oli Street Drainage Improvements

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Office of Conservation & Coastal Lands, Engineering Division, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Charlene E. Unoki

for Morris M. Atta
Administrator

MA-10-09

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
OFFICE OF CONSERVATION
& COASTAL LANDS

2009 JUL -7 P 2:39

DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 6, 2009

MEMORANDUM

Fr ~~TO:~~

DLNR Agencies:
x Div. of Aquatic Resources
x Div. of Boating & Ocean Recreation
x Engineering Division
__ Div. of Forestry & Wildlife
__ Div. of State Parks
~~x~~ Commission on Water Resource Management
x Office of Conservation & Coastal Lands
~~x~~ ~~Land Division – Maui District~~

TO ~~FROM:~~ for Morris M. Atta Charlene
SUBJECT: Early Consultation for Proposed Hau'oli Street Drainage Improvements
LOCATION: Island of Maui
APPLICANT: Munekiyo & Hiraga Inc. on behalf of the County of Maui

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by July 19, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

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

Signed: _____
Date: 7-14-09

40

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 6, 2009

'09 JUL 07 PM03:19 ENGINEERING

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
~~x~~ Div. of Boating & Ocean Recreation
x Engineering Division
~~Div. of Forestry~~ & Wildlife
Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
x Land Division –Maui District

FROM: Morris M. Atta
SUBJECT: Early Consultation for Proposed Hau'oli Street Drainage Improvements
LOCATION: Island of Maui
APPLICANT: Munekiyo & Hiraga Inc. on behalf of the County of Maui

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by July 19, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

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

Signed:
Date: 7/8/09

RECEIVED
LAND DIVISION
09 JUL -9 P 4:16
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/MorrisAtta
Ref.: EarlyConsultHauoliDrainageImpvts
Maui.466

COMMENTS

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

(X) **Please take note that based on the maps provided it appears that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zones B, C, and V18. The Flood Insurance Program does not have any regulations for developments within Flood Zones B and C, however, it does regulate developments within Zone V18 as indicated in bold letters below.**

( ) 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 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 Sumitomo at (808) 768-8097 or Mr. Mario Siu Li at (808) 768-8098 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.

(X) **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 Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

Signed: _____
ERIC T. HIRANO, CHIEF ENGINEER

Date: 7/8/09

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Russell Tsuji, Administrator
State of Hawaii
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii

Dear Mr. Tsuji:

Thank you for your department's letter of July 20, 2009, providing comments on the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

The applicant would like to clarify that the project site itself is located in Flood Zone X (shaded) and Flood Zone X (unshaded), based on the Federal Emergency Management Agency Flood Insurance Rate Map No. 1500030560E, which went into effect in September of 2009, following the date of your comments. See **Exhibit "A"**. There are no restrictions on development within Flood Zone X. The applicant notes that the purpose of the proposed drainage improvements project is to alleviate periodic flooding of Hauoli Street and neighboring properties.

The applicant confirms that the project must comply with the applicable rules and regulations of the National Flood Insurance Program (NFIP), in Title 44 of the Code of Federal Regulations (44CFR).

We will provide your office with a copy of the Draft Environmental Assessment when it is available, for your review and comment.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
Attachment
cc: Diane Kodama, AECOM (w/attachment)
Wendy Kobashigawa, Department of Public Works (w/attachment)
F:\DATA\AECOM\HauoliDrainage\DLNR.ecres.doc

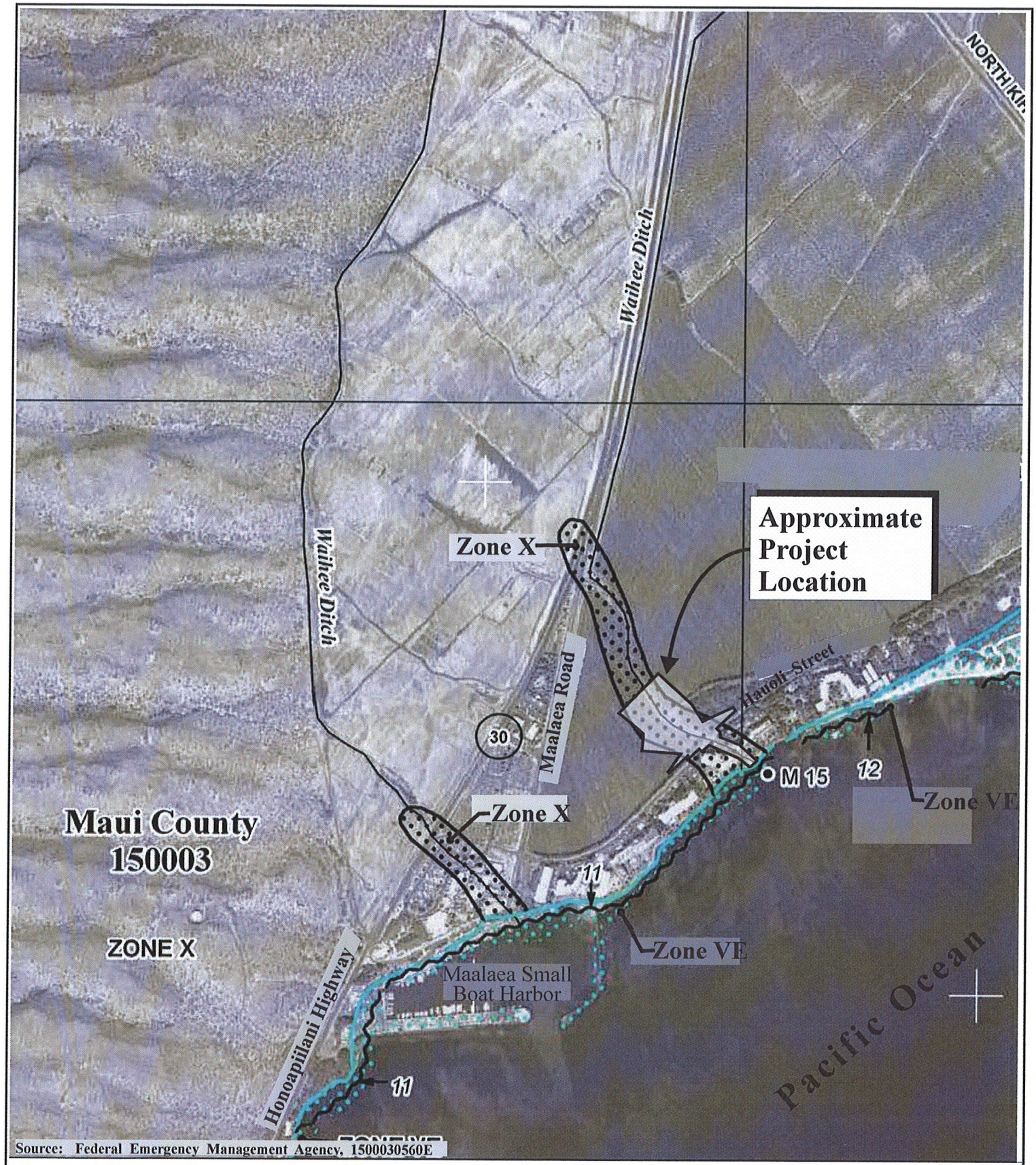

Exhibit "A"

Proposed Hauoli Street Drainage Improvements
Flood Insurance Rate Map

NOT TO SCALE

Prepared for: County of Maui, Department of Public Works

MUNEKIYO & HIRAGA, INC.

AECOM\HauoliDrainage\firm

AUG 1 2 2009

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

August 5, 2009

Ms. Kimberly Skog
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai'i 96793

LOG NO: 2009.2932
DOC NO: 0908PC15
Archaeology

SUBJECT: **Chapter 6E-8 Historic Preservation Review –**
Request for Comments for the Proposed Hauoli Street Drainage Improvements
Waikapu Ahupua'a, Wailuku District, Island of Maui
TMK: (2) 3-8-005:003; (2) 3-8-014:011 por.; (2) 3-8-014:015 por.

Thank you for the opportunity to comment on the aforementioned project, correspondence for which we received on July 6, 2009.

Based on the submitted information, the project involves the installation of a two box culvert extending from a 12,000 square foot desilting basin on the *mauka* side of Hauoli Street, under an 11,500 square foot drainage channel on the *makai* side of the same street and then to the shore.

A search of our records indicates that an archaeological assessment (archaeological inventory survey resulting in an absence of culturally significant and/or historic properties) was conducted of a portion of the proposed project area [the report did not include TMK (2) 3-8-005:003], for which a revised report was accepted in August of 2008 (SHPD LOG NO: 2008.3836/DOC NO: 0808PC40). Even though no historically significant resources were identified, precautionary archaeological monitoring was recommended for future ground altering disturbance in the area. However, we have not yet received the monitoring plan which will need to be reviewed and accepted by this office prior to such work taking place.

Therefore, until the monitoring plan for the proposed project has been submitted to, reviewed and accepted by the SHPD, we **cannot** agree that the proposed project will have no effect on historic properties.

If you have any questions or comments regarding this letter, please contact the SHPD's Lead Maui Archaeologist, Ms. Patty Conte (Patty.J.Conte@hawaii.gov).

Aloha,

Nancy A. McMahon

Nancy McMahon, Deputy SHPO/State Archaeologist
State Historic Preservation Division

c: Jeff Hunt, Director, Dept. of Planning, FAX (808) 270-7634

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Puaalaokalani Aiu, Administrator
State of Hawaii
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii

Dear Ms. Aiu:

Thank you for your department's letter of August 5, 2009 (SHPD Log No: 2009.2932; Doc. No: 0908PC15), providing comments on the early consultation letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

The applicant notes that a revised archaeological assessment was prepared for the project in November 2009. This revised document was accepted by the State Historic Preservation Division (SHPD) by letter dated November 16, 2009 (SHPD Log No. 2009.4360; Doc No. 0911PC26). The archaeological assessment identified no culturally significant historic properties, but precautionary archaeological monitoring was recommended for future ground altering disturbance. A revised archaeological monitoring plan was prepared for the project in November 2009. This revised document was also accepted by SHPD by letter dated November 16, 2009 (SHPD Log No. 2009.4361; Doc No. 0911PC27).

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
F:\DATA\AECOM\HauoliDrainage\SHPD.ecres.doc

JUL 3 0 2009

LINDA LINGLE
GOVERNOR

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI
JIRO A. SUMADA

IN REPLY REFER TO:

STP 8.3350

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

July 28, 2009

Ms. Kimberly Skog
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

Subject: Proposed Hauoli Street Drainage Improvements
Early Consultation (EC)
TMKs 3-8-005: 003 (por.) and 3-8-014: 011 and 015 (pors.)

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project to install a two-box culvert, which will extend from the existing desilting basin on the mauka side of Hauoli Street, under the existing drainage channel on the makai side of the street, then to the shoreline. DOT notes that the work is to be done within Maui County's existing 20-foot wide drainage easement. The State highway, Honoapiilani Highway, is located "upstream" of the subject project area.

Given the potential impacts to Honoapiilani Highway, DOT requests that the following comments be addressed in the Draft Environmental Assessment (DEA).

1. The DEA should evaluate the potential inconveniece to the public, including residents, visitors, merchants, commercial operators (e.g., ocean activity tour operators), bicyclists and other stakeholders in the area.

2. The DEA should include an evaluation of the construction vehicles and equipment that may be used at the job site. A DOT Highways Division permit is required to transport oversized equipment and/or overweight loads on State highway facilities.

3. The applicant must coordinate the project construction schedule with the Highways Division Maui District Office to minimize possible conflicts with scheduled State highway construction and maintenance projects in the area.

4. After construction, the applicant must provide the Highways Division Maui District Office with a safety monitoring and maintence inspection program for these drainage facilities.

DOT appreciates the opportunity to provide comments. If there are any questions, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 587-2356.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Glenn Okimoto, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii (Reference No. STP 8.3350)

Dear Mr. Okimoto:

Thank you for your department's letter of July 28, 2009, providing comments on the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, County of Maui, Department of Public Works, we offer the following information in response to your comments.

The applicant would like to clarify that there is no existing desilting basin. A new water quality basin is proposed to be constructed in an area mauka of Hauoli Street that is currently in agricultural use.

1. The Draft Environmental Assessment (EA) will evaluate the potential inconvenience to the public. Stakeholders in the area, including Maalaea Harbor Village, the Maalaea Community Association, and various condominiums, have been consulted during the project design and early consultation processes.

2. A description of construction traffic and its impacts will be included in the Draft EA. As applicable, a State of Hawaii, Department of Transportation (DOT), Highways Division permit will be secured for the transport of oversized equipment and/or overweight loads on State Highway facilities.

3. The applicant will coordinate the project construction schedule with the Highways Division Maui District Office to minimize possible conflicts, as needed.

4. The applicant will provide the Highways Division Maui District Office with a safety monitoring and maintenance inspection program for the proposed drainage improvements, as required.

We will provide your office with a copy of the Draft EA when it is available for your review and comment.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
F:\DATA\AECOM\HauoliDrainage\SDOT.ecres.doc

JUL 2 0 2009

LINDA LINGLE
GOVERNOR

MAJOR GENERAL ROBERT G. F. LEE
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

PHONE (808) 733-4300
FAX (808) 733-4287

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

July 17, 2009

Ms. Kimberly Skog, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

Early Consultation Request, Proposed Hau'oli Street Drainage Improvements
Ma'alaea, Maui, Hawaii

Thank you for the opportunity to comment on this project. We have no recommendations to make at this time. We anticipate reviewing the Draft Environmental Assessment when it is completed and will make any appropriate comments at that time.

If you have any questions, please call Mr. Richard Stercho, Hazard Mitigation Planner, at (808) 733-4300, ext. 583.

Sincerely,

EDWARD T. TEIXEIRA
Vice Director of Civil Defense

c: Diane Kodama, AECOM
Joe Krueger, Department of Public Works, Engineering Division

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Victor Gustafson
Interim Vice Director of Civil Defense
State of Hawaii
Department of Defense
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii (File Number POH-2009-0230)

Dear Mr. Gustafson:

Thank you for your department's letter of July 17, 2009, in response to the Early Consultation Letter for the proposed drainage system improvements project at Hauoli Street in Maalaea.

We will notify your office as to when the Draft Environmental Assessment is available for review and comment.

Should you have any questions, please feel free to call me at (808) 244-2015.

Very truly yours,

Kimberly Skog, Associate

KS:yp
Enclosures
cc: Diane Kodama, AECOM (w/out enclosures)
Wendy Kobashigawa, Department of Public Works (w/out enclosures)
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CHARMAINE TAVARES
Mayor

JEFFREY S. HUNT
Director

KATHLEEN ROSS AOKI
Deputy Director

AUG 1 1 2009

COUNTY OF MAUI
DEPARTMENT OF PLANNING

August 11, 2009

Ms. Kimberly Skog, Planner
Munekiyo & Hiraga, Inc.
305 South High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

SUBJECT: EARLY CONSULTATION ON THE PROPOSED HAU'OLI STREET DRAINAGE IMPROVEMENTS, LOCATED AT MA'ALAEA, MAUI, HAWAII, TMK(S): (2) 3-8-005:003 (POR.) AND (2) 3-8-014:011 (EAC 2009/0028)

The Department of Planning (Department) is in receipt of your letter, dated July 1, 2009, requesting comment on the above-proposed action. Only a site map was included to comment on. Limited project details were provided. The Department understands the proposed action includes the following:

- The County of Maui Department of Public Works (DPW) proposes to improve an existing drainage system at Hau'oli Street that includes a desilting basin mauka of the Hau'oli Street and a drainage easement to the shore. The DPW proposes to construct two (2) buried box culverts from the desilting basin to the shore; and

- Drainage partially comes from agricultural fields in the vicinity.

Based on the foregoing, the Department provides the following comments in preparation of the Draft Environmental Assessment (EA):

1. Fully describe the project and the reasons for the improvements;

2. Research and cite any past and current studies regarding the current state of the health of the offshore reef environment in this vicinity. Describe and document known impacts of pollution from runoff on the local reef environment;

3. Identify and provide a map of the entire watershed that partially drains into this proposed drainage channel and box culvert;

4. Describe any local wetlands in the vicinity and provide alternatives that will minimize environmental impacts on these wetlands;

5. Since drainage may contain agricultural products and pesticides, allowing runoff to directly enter the ocean in this vicinity will potentially have negative effects on the marine waters and reef ecology. Describe the shoreline and offshore ecology at the effluent and provide alternative solutions, to include increasing the size and volume of the desilting basin, to that will protect the offshore environment, reef structures, and water quality;

6. Investigate diversion of the flow to other areas in order to minimize or eliminate runoff into the ocean at this area;

7. Address social and physical impacts to surrounding neighborhoods, including noise and air pollution. Provide mitigation alternatives to any potential social and physical impacts;

8. Provide mitigation alternatives to ensure that Best Management Practices shall be implemented to insure that water quality and marine resources are protected;

9. If work is to be performed in the shoreline area, the project must comply with the Chapter 203, *Shoreline Rules for the Maui Planning Commission*; and

10. To the extent possible, ensure that the proposed box culverts will not adversely affect beach processes or artificially fix the shoreline.

Thank you for the opportunity to comment. Please include the Department on the distribution list for the Draft EA. Should you require further clarification, please contact Staff Planner James Buika by email at james.buika@mauicounty.gov or by phone at (808) 270-6271.

Sincerely,

CLAYTON I. YOSHIDA, AICP
Planning Program Administrator

for JEFFREY S. HUNT, AICP
Planning Director

xc: James A. Buika, Staff Planner
ZAED
Long Range Division
Project File
General File

JSH:CIY:JAB:sg
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MUNEKIYO HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

William Spence, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii (EAC 2009/0028)

Dear Mr. Spence:

Thank you for your department's letter of August 11, 2009, providing comments on the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

The applicant would like to clarify that the proposed improvements are located on four (4) TMK parcels, (2) 3-8-014:011 and 015 (pors.), as well as (2) 3-8-005:003 and 017 (pors.), Maalaea, Maui, Hawaii.

1. The Draft Environmental Assessment (EA) will include a full description of the project and the project need.

2. A Biological and Water Quality report will be provided as a supporting technical document for the Draft EA. The Draft EA will include a discussion of the health of the offshore reef environment in the vicinity, as well as an evaluation of the impacts of runoff on the reef environment.

3. A map of the watershed which will drain partially into the proposed drainage improvements will be provided in the Draft EA.

4. The Draft EA will include a section describing wetlands in the vicinity of the proposed project with a discussion of any related impacts and proposed mitigation measures.

5. With data provided by the Biological and Water Quality report, the Draft EA will include a discussion of the shoreline and offshore ecology in line with the drainage-way, potential impacts, and proposed mitigation measures.

6. The Draft EA will include a discussion of alternatives to the proposed action, to include diversion of the drainage flow to other areas.

7. The Draft EA will include a discussion of social and physical impacts to surrounding neighborhoods, as well as possible mitigation measures.

8. The proposed water quality basin is a Best Management Practice for protecting water quality and marine resources. This basin will be further described in the Draft EA.

9. The applicant has consulted with your Department regarding proposed work within the Shoreline Setback Area. In complying with Chapter 203, Shoreline Rules for the Maui Planning Commission, a Shoreline Setback Assessment will be submitted for review and approval, as directed by your Department.

10. The Draft EA will include a discussion of the potential impacts to beach processes and the shoreline, as well as possible mitigation measures and alternatives.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
Snookie Mello, AECOS
Scott Sullivan, Sea Engineering
F:\DATA\AECOM\HauoliDrainage\DPL.ecres.doc

JUL 2 7 2009

POLICE DEPARTMENT
COUNTY OF MAUI

CHARMAINE TAVARES
MAYOR

OUR REFERENCE
YOUR REFERENCE ti

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

GARY A. YABUTA
CHIEF OF POLICE

CLAYTON N.Y.W. TOM
DEPUTY CHIEF OF POLICE

July 21, 2009

Ms. Kimberly Skog
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Skog:

SUBJECT: Early Consultation Request for Proposed Hau'oli Street Drainage Improvements at TMKs (2) 3-8-005:003 (por.) and (2) 3-8-014:011 and 015 (pors.)

Thank you for your letter of July 1, 2009, requesting comments on the above subject.

We have reviewed the information submitted for this project and have enclosed a copy of our comments. Thank you for giving us the opportunity to comment on this project.

Very truly yours,

AC Wayne T. Ribao

Assistant Chief Wayne T. Ribao
for: Gary A. Yabuta
Chief of Police

c: Jeffrey Hunt, Planning Department

60

COPY

I AGREE WIT
OFC. BROWN
AC W. [illegible]
07/21/09

TO : GARY YABUTA, CHIEF OF POLICE, COUNTY OF MAUI

VIA : CHANNELS 07/20/09

FROM : ALAN BROWN, POLICE OFFICER III, DISTRICT VI KIHEI

SUBJECT : EARLY CONSULTATION REQUEST FOR HAU'OLI ST. DRAINANGE IMPROVEMENTS

This To-From is in response to a request for early consultation request for the proposed Hao'oli St. drainage improvements in the Maalaea area.

The applicant, the County of Maui, is proposing improvements to the Hau'oli St. drainage system that due to the use of County funds and the use of County lands, an Environmental Assessment needs to be prepared.

The only concerns for this project at this time would be the traffic control plans that will be in place during construction of the project. As this is an early consultation request no traffic plans or assessments have been made. As such no further comment on the subject can be made until such plan/assessment has been prepared.

Any further comment will be reserved until further information in provided.

FURTHER COMMENTS WILL BE MADE UPON RECEIPT OF A TRAFFIC CONTROL PLAN DURING CONSTRUCTION.

ALT. [illegible]
07.20.09 @ 0915

Respectfully Submitted

Officer Alan Brown E1505
071909 @ 0430 hrs

MUNEKIYO HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Gary Yabuta, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii

Dear Chief Yabuta:

Thank you for your department's letter of July 21, 2009, in response to the Early Consultation Letter for the proposed drainage system improvements project at Hauoli Street in Maalaea. On behalf of the applicant, County of Maui, Department of Public Works, we offer the following information in response to your comments.

You have the applicant's assurance that traffic control plans will be developed for implementation during periods of construction. Construction-related improvements include a temporary diversion and mauka of Hauoli Street to enable access down the roadway during construction of the replacement box culvert and re-grading of Hauoli Street. Your office will be provided with a copy of the traffic control plans and Draft Environmental Assessment when they become available for your review and comment.

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

Should you have any questions, please feel free to call me at 244-2015.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
K:\DATA\AECOM\HauoliDrainage\MPD.ecres.doc

JUL 2 8 2009

CHARMAINE TAVARES
Mayor

MILTON M. ARAKAWA, A.I.C.P.
Director

MICHAEL M. MIYAMOTO
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

July 22, 2009

Ms. Kimberly Skog, Planner
MUNEKIYO & HIRAGA, INC.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Skog:

SUBJECT: EARLY CONSULTATION REQUEST FOR PROPOSED HAUOLI STREET DRAINAGE IMPROVEMENTS TMK: (2) 3-8-005:003 (POR.); 3-8-014:011; 3-8-014:015 (PORS.)

We reviewed your early consultation request for the above-referenced subject application and offer the following comments:

1. Maintenance access needs to be provided to the desilting basin.

2. Maintenance access needs to be provided to the box culvert outlet on the shoreline for mechanical removal of accumulated sand and debris that may block the outlet due to tidal action.

3. Depending upon the depth of the desilting basin, security fencing may be needed to keep people, especially children, out.

Please call Michael Miyamoto at 270-7845 if you have any questions regarding this letter.

Sincerely,

for MILTON M. ARAKAWA, A.I.C.P.
Director of Public Works

MMA:MMM:ls
xc: Highways Division
Engineering Division
S:\LUCA\CZM\Prop_Hauoli_drainage_imp_38005003_por_38014011_015_ls.wpd

64

MUNEKIYO HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

David Goode
Director of Public Works
County of Maui
Department of Public Works
200 South High Street, Room No. 434
Wailuku, Hawaii 96793

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii

Dear Mr. Goode:

Thank you for your department's letter of July 22, 2009, in response to the Early Consultation Letter for the proposed drainage system improvements project at Hauoli Street in Maalaea. The following information is offered in response to your comments.

1. A gravel access road will provide access to the water quality basin for maintenance crews.

2. Project plans have been revised such that the box culvert will be limited to the Hauoli Street crossing. The existing drainage channel that extends toward the shore will be maintained. The drainage channel will be accessible for maintenance by an access ramp that will be constructed at the top of the concrete channel.

3. For security, the perimeter of the water quality basin will be enclosed with 6-foot-high chain-link fence. The entry to the gravel access road will be gated.

Should you have any questions, please feel free to call me at 244-2015.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
K:\DATA\AECOM\HauoliDrainage\DPW.ecres.doc

AUG 0 6 2009

CHARMAINE TAVARES
Mayor

CHERYL K. OKUMA, Esq.
Director

GREGG KRESGE
Deputy Director

TRACY TAKAMINE, P.E.
Solid Waste Division

DAVID TAYLOR, P.E.
Wastewater Reclamation Division

COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
2200 MAIN STREET, SUITE 100
WAILUKU, MAUI, HAWAII 96793

August 4, 2009

Ms. Kimberly Skog
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

SUBJECT: **HAU'OLI STREET DRAINAGE IMPROVEMENTS**
EARLY CONSULTATION
TMK (2) 3-8-005:003 (POR.) AND
(2) 3-8-014:011 AND 015(PORS.), MAALAEA

We reviewed the subject application and have the following comments:

1. Solid Waste Division comments:

   a. None.

2. Wastewater Reclamation Division (WWRD) comments:

   a. None. There is no County sewer system in the area of the subject property.

If you have any questions regarding this memorandum, please contact Gregg Kresge at 270-8230.

Sincerely,

Cheryl K. Okuma, Director

JUL 15 2009

CHARMAINE TAVARES
MAYOR

DON A. MEDEIROS
Director
WAYNE A. BOTEILHO
Deputy Director
Telephone (808) 270-7511
Facsimile (808) 270-7505

DEPARTMENT OF TRANSPORTATION

COUNTY OF MAUI
200 South High Street
Wailuku, Hawaii, USA 96793-2155

July 13, 2009

Ms. Kimberly Skog
Munekiyo & Hiraga Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Subject: Early Consultation Request for Proposed Hau'oli Street Drainage Improvements

Dear Ms. Skog,

Thank you for the opportunity to comment on this project. We have no comments to make at this time.

Please feel free to contact me if you have any questions.

Sincerely,

Don Medeiros
Director

JUL 2 2 2009

CHARMAINE TAVARES
Mayor

JEFFREY K. ENG
Director

ERIC H. YAMASHIGE, P.E., L.S.
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

July 16, 2009

Munekiyo & Hiraga, Inc.
Attention: Kimberly Skog, Planner
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

RE: Project Name: Proposed Hau'oli Street Drainage Improvements
Applicant: County of Maui, Department of Public Works
Project I.D.: Early Consultation
TMKs: (2) 3-8-005:003 (por) and (2) 3-8-014:011 and 015 pors)

Thank you for the opportunity to comment on this application.

The project site is served by an 8-inch waterline and fire hydrant #17 on Hau'oli Street. Storage for the site is provided by the 500,000 gallon Ma'alaea tank. You will find enclosed copies of a fire protection map of the area and copies of three as-builts for the area. Please have your Engineering Consultant contact our Engineering Division at 270-7835 for full-size as-built plans of the site.

In order to protect the groundwater as well as the marine aquatic life, the Department of Water Supply (DWS) encourages the applicant to adopt best management practices (BMP) for construction of drainage systems. Please refer to the enclosed BMP "Open Drainage Systems". The DWS also encourages the applicant to utilize reclaimed or non-potable water for dust control and other non-potable uses.

Should you have any questions, please contact our Water Resources & Planning Division at 244-8550.

Sincerely,

JEFFREY K. ENG, DIRECTOR
ayi

"By Water All Things Find Life"

The Department of Water Supply is an Equal Opportunity provider and employer. To file a complaint of discrimination, write: USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington DC 20250-9410. Or call (202) 720-5964 (voice and TDD)

Printed on recycled paper

Enclosures: BMP - Open Drainage Systems
Fire Protection Map of area
Construction Plans for Off-site Waterline Maalaea
Maalaea Kai Condominium Offsite Waterline Plan
The Island Sands 8 Inch Waterline Offsite

c: Engineering Division
Joe Krueger, Department of Public Works, Engineering Division (w/enclosures)

#4: Open Drainage Systems

Activities:

These systems include facilities, retention/detention facilities, swales, pollution control devices, manholes, catch basins, vaults, pipes, culverts, ditches and inlets/outlets. (Open drainage systems that are part of the watercourses and streams systems are covered in Maintenance Category #5, Watercourses and Streams.)

BMP Table:

Routine BMPs	
BMPs	**Description**
Maintaining Open Drainage Systems	Maintain drainage systems.
Permits	Maintenance activities within waters of the state will be covered under Maintenance Category #5, Watercourses and Streams.
Scheduling	Plan and schedule work in dry conditions, except in emergency situations.
Equipment/ Tools	Vehicle and equipment maintenance, repair and/or service will be performed at designated repair facilities whenever possible. Use the following practices to reduce the potential for discharge of pollutants to watercourses or streams from vehicle and equipment maintenance, service and repair operations. • Prohibit discharge of any wastewaters to stormwater. • Prohibit discharge of any wastewaters to stormwater drains. Do not pour material down drains or hose down work areas. Use either dry sweeping or damp mopping. • Remove buildup of oils and grease on equipment. • Perform equipment and vehicle maintenance in areas that prevent discharges to the storm drain system. • Collect and properly manage (recycle or dispose of) used materials: grease, oil, oil filter, antifreeze, cleaning solutions lead-acid batteries, tires, hydraulic and transmission fluid.

Continued on next page.

Equipment/ Tools *Continued from preceding page.*	• Surfaces shall be cleaned following the discharge or spill incident. At the end of shift, park equipment in designated areas. Clean equipment and tools off site in an area where pollutants can be contained. If unable to move equipment and tools off site, control and remove cleaning by-products.
Material/Debris Disposal	Remove and dispose of collected materials and liquids off site. Solid materials removed from the site will be taken to a disposal or recycling area.
Spill Prevention & Control	Carry spill kit used for small spills related to equipment failure. At a minimum, WSDOT will carry a five-gallon capacity spill kit designed for petroleum products that will be carried on vehicle or with equipment. Desired outcome is to control, absorb or contain spill for clean up and disposal.

Site Specific BMPs

BMPs	Description
Are you disturbing soils? *Continued on next page.*	Exposed and unworked soils shall be stabilized by application of BMPs that protect the soil from the erosive forces of raindrop impact and flowing water: • During winter season – October through June – no soils shall remain exposed and unworked for more than two days. • During the summer season – July through September – no soils shall remain exposed and unworked for more than seven days. • These conditions apply to all soils on site, whether or not at final grade. Leave vegetative buffer outside of work zone to provide biofiltration and shading outside of the back slope of ditch. Leave vegetative buffer of grasses and small forbs between the shoulder and ditch if the area is wide enough. Leave vegetated sections of grasses and small forbs in ditchline where sediment buildup does not impede flow or infiltration. After removal of sediments from ditch line, replant disturbed soils with grasses and small forbs. Prior to BMP removal, clean up accumulated sediments and seed or replant disturbed area.

Site Specific BMPs

Continued from preceding page.

Use any of the four BMP outcome categories at or around the work site to reduce turbidity, sediment and/or pollutants from entering watercourses or streams, wetlands, lakes or other waterbodies:

"Filter/Perimeter Protection"

- Coir Log
- Continuous Berm
- Curb Inlet Sediment Trap
- Excelsior Filled Log
- Filter Fabric
- Gravel Filled Sump
- Half Round Filter
- Inlet Protection
- Kimble Filter Pipe
- Silt Fence
- Silt Mat
- Straw Bale Barrier (1)
- Straw Bale Barrier (2)
- Straw Bale Barrier (3)
- Straw Log
- Washed Rock

"Keep Water from Work Area"

- Aqua Barrier
- Cofferdam
- Dewatering
- Diversion Berm
- Diversion Channel
- Plastic Covering
- Sandbag
- Stream Bypass
- Vactoring

"Reduce Potential for Soil Erosion"

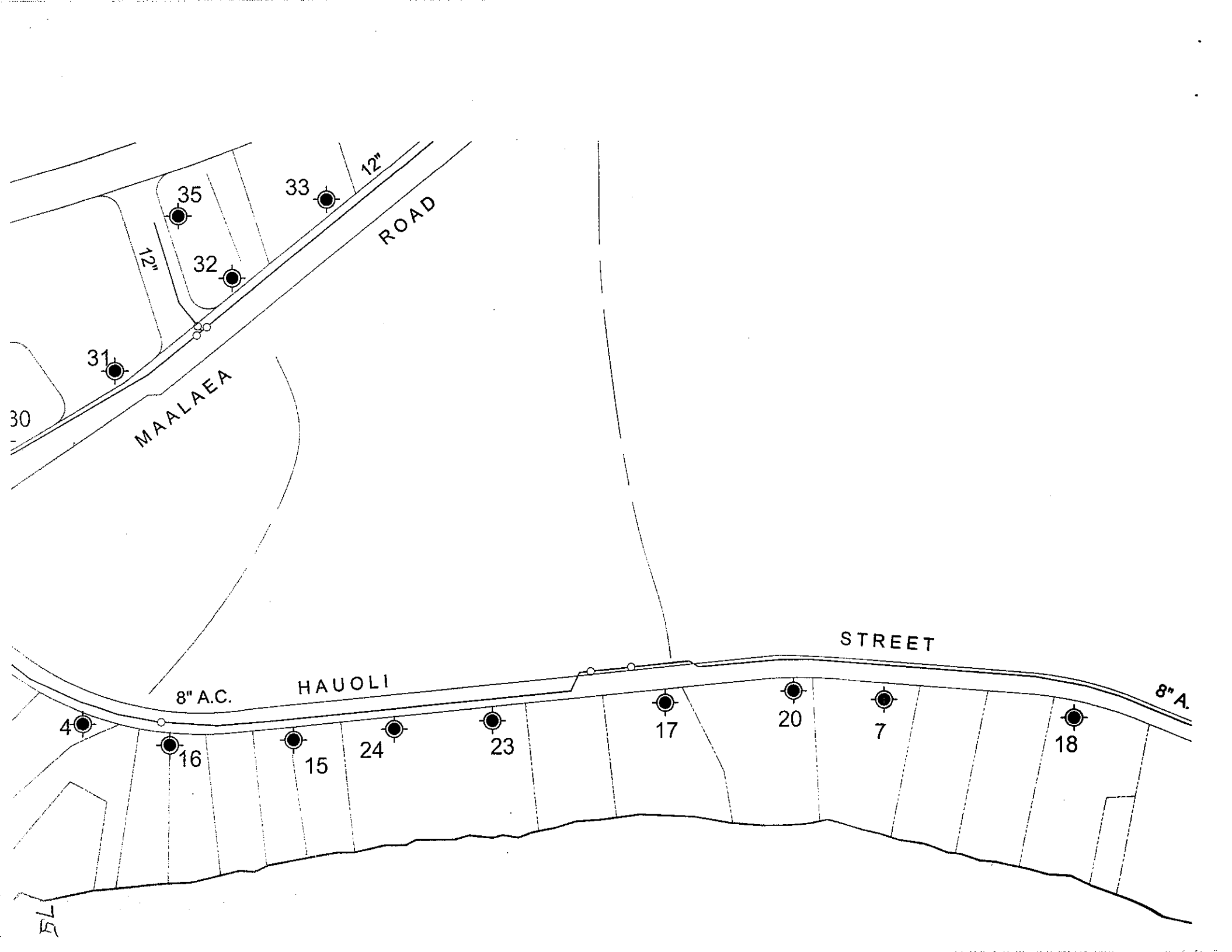
- Back of Slope Planting
- Construction Access Road
- Ditch Lining
- Dust Control
- Filter Fabric
- Grass Lined Channel
- Hand Seeding
- Hydroseeding
- Filter Fabric
- Live Staking
- Mulching
- Plastic Covering
- Soil Stabilization (Blankets/Matting)
- Surface Roughening
- Sweeping
- Vegetative Buffer

"Reduce Water Velocity/Erosive Forces"

- Back of Slope Planting
- Coir Fabric
- Coir Log
- Continuous Berm
- Ditch Lining
- Sandbag
- Silt Fence
- Silt Mat
- Straw Bale Barrier (1)
- Straw Bale Barrier (2)

Continued on next page.

Site Specific BMPs *Continued from preceding page.*	Excelsior Filled Log Grass Lined Channel Hand Seeding Hydroseeding Large Woody Material Live Staking Mulching Rip Rap Rock Check Dam Straw Bale Barrier (3) Straw Log Stream Bank Stabilization Surface Roughening Triangular Silt Dike Turbidity Curtain Vegetative Buffer Go to http://www.wsdot.wa.gov/biz/maintenance/pdf/Guidelines/Part2.pdf RRMP Part 2 BMPs for installation guidelines.


12"
33
35
ROAD
12"
32
31
MAALAEA
30
STREET
8" A.C.
HAUOLI
8" A.
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16
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7
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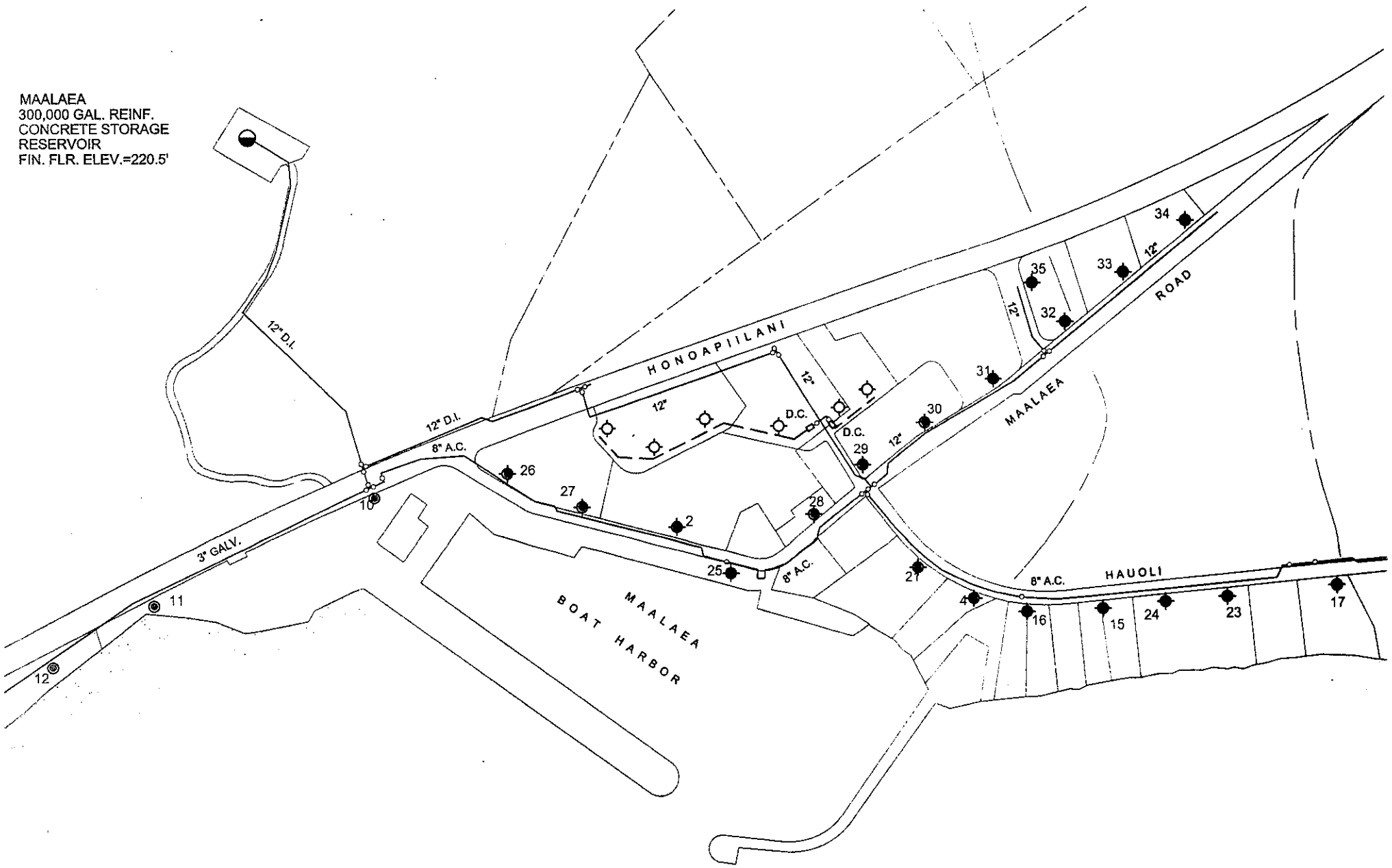
MAALAEA
300,000 GAL. REINF.
CONCRETE STORAGE
RESERVOIR
FIN. FLR. ELEV.=220.5'
12" D.I.
12" D.I.
8" A.C.
3" GALV.
HONOAPIILANI
ROAD
MAALAEA
12"
D.C.
D.C.
8" A.C.
8" A.C.
HAUOLI
MAALAEA
BOAT HARBOR
10
11
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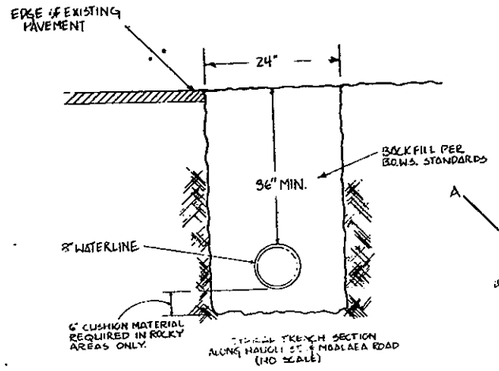
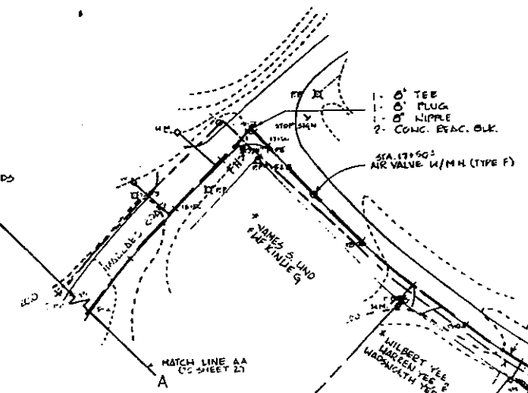
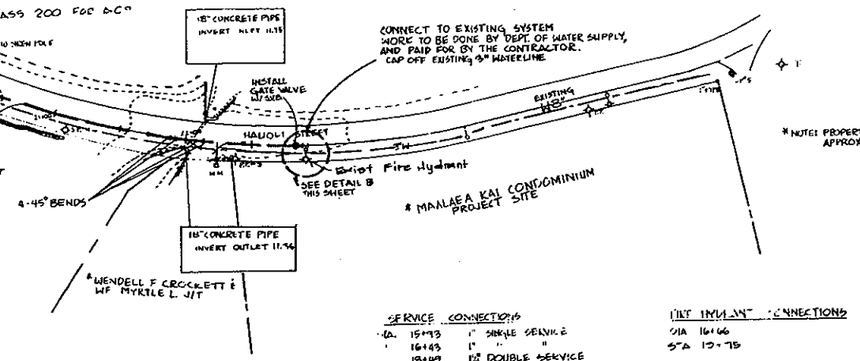
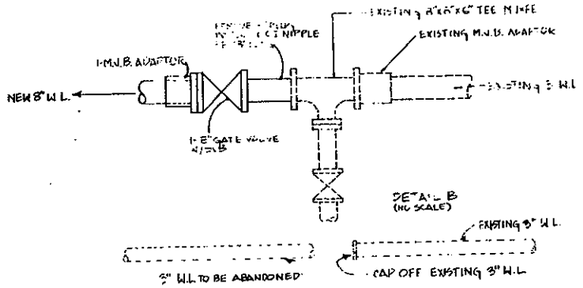
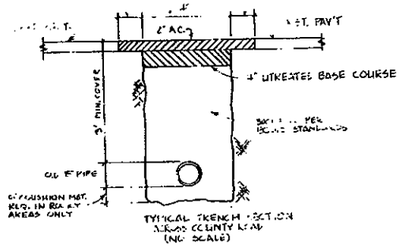








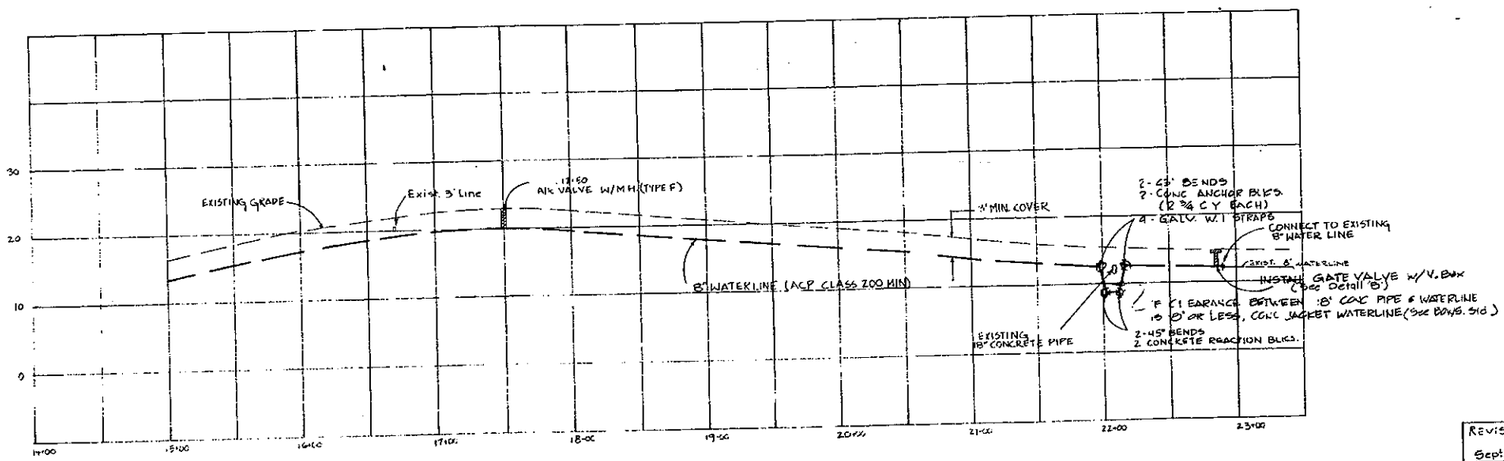


SERVICE CONNECTIONS

14+93	1"	SINGLE SERVICE
16+49	1"	" "
18+09	1½"	DOUBLE SERVICE
19+51	1"	SINGLE SERVICE
22+24	1"	" "

12" INVERT 24" CONNECTIONS

STA	16+66
STA	17+75



SCALE HORIZ. 1" = 50'
VERT. 1" = 10'

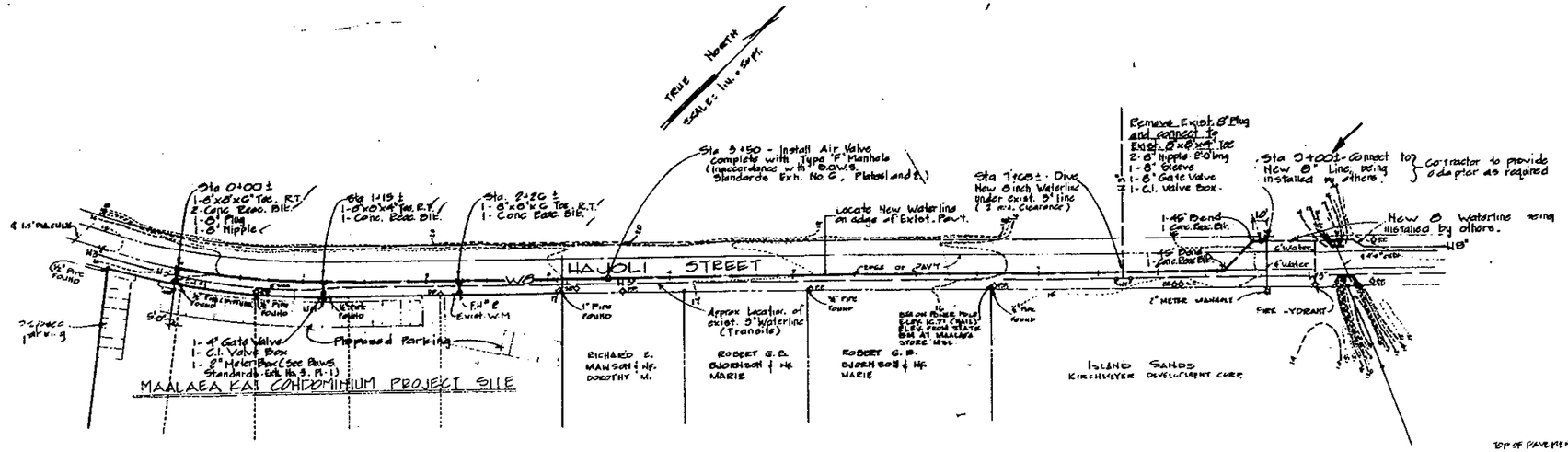
CONSTRUCTION PLANS FOR OFFSITE WATERLINE MAALAEA

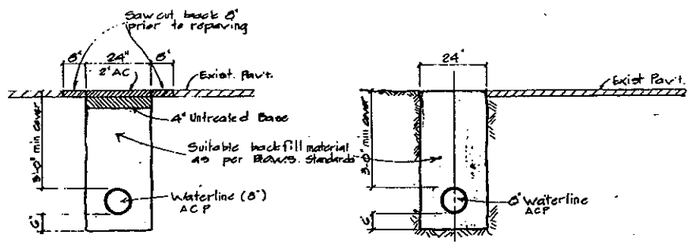
REVISION
Sept. 5, 1974
Nov. 4, 1974
(installed Fire Hydrant & Service Laterals as per BOWS.)

This map was prepared by me or under my supervision
DATE 7-12-74

WARREN S. LINEMORI - ENGR, INC.
CIVIL ENGINEERS - LAND SURVEYORS
2163 KAOHU ST., WAILUKU, MAUI

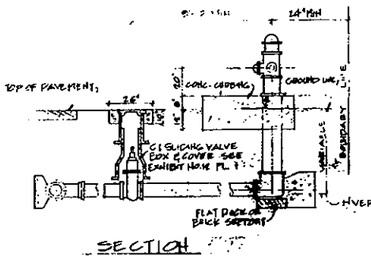
SHEET 3 OF 4



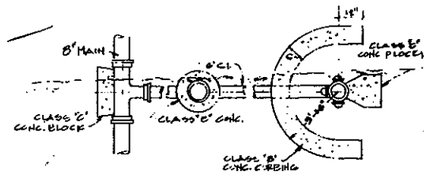


TYPICAL TRENCH SECTION
ACP025 DRIVEWAY
Scale: ½"=1'-0"

TYPICAL TRENCH SECTION
6" WATERLINE
Scale: ½" = 1'-0"

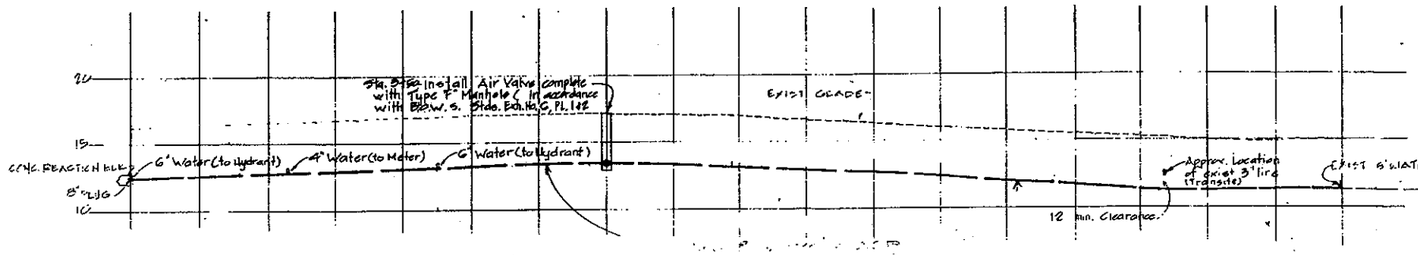


SECTION



PLAN

TYPICAL HYDRANT INSTALLATION
NOT TO SCALE



NEW 8 INCH ALONG HAUOLI ST. SCALE: HORIZ. INCH = 5 FEET VERT. INCH = 5 FEET

NOTES:

1. The Contractor shall notify the Board of Water Supply, in writing, one week prior to commencement of work. The Contractor shall also notify the B.O.W.S. in writing, not less than two days prior to actual commencement of work.
3. The exact depth & location of existing waterlines, service laterals and other utilities are not known. It shall be the Contractor's responsibility to locate same, prior to trenching for new waterline
The cost of uncovering, relocating or adjusting existing waterlines, service laterals (unless otherwise noted) and other utilities, shall be considered incidental to the cost of the new waterline. The work will not be paid for separately. Facilities damaged by the Contractor's operation, shall be repaired immediately by the Contractor, at his expense
6. B.O.W.S. will furnish all labor to connect new 8-inch waterline to existing 8-inch waterline. Contractor to pay the cost of B.O.W.S. work.
No hookup shall be done by other than Dept. of Water Supply personnel. Private hookup shall not be accepted by the Dept. of Water Supply.
7. Contractor shall obtain a "Construction Permit" from the Director of Public Works, County of Maui, prior to doing any work on the Hauoli St.
8. Waterline to be ACP, Class 200 min.
9. One lane of traffic to be open at all time

REVISED PLAN
DATE Oct. 29, 1973

DIRECTOR, DEPARTMENT OF PLANNING DATE

Revision:
Oct. 12, 1973
Oct. 20, 1973

MAALAEA KAI CONDOMINIUM
OFFSITE WATERLINE PLAN FOR E & G DEVELOPMENT INC.

APPROVED BY:

DIRECTOR DEPARTMENT OF PUBLIC WORKS DATE

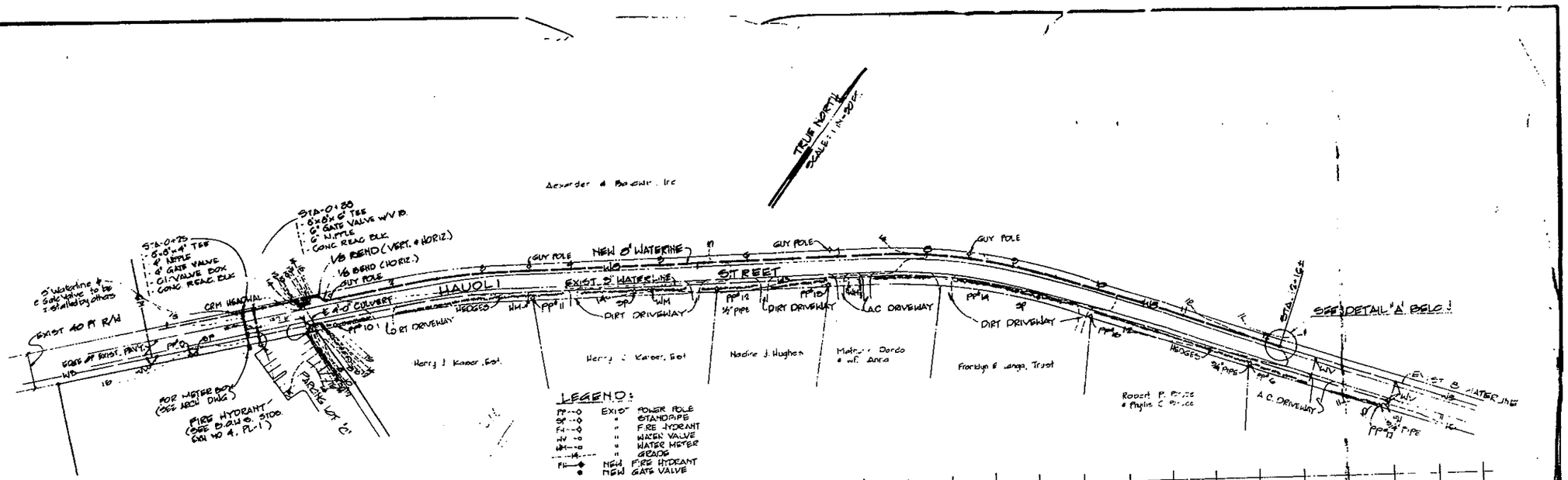
Carl Kurama 10/5/73
DIRECTOR DEPARTMENT OF WATER SUPPLY DATE

DIRECTOR DEPARTMENT OF PLANNING 10/24/73

Prepared by: Warren S. Unemori

WARREN S. UNEMORI · ENGINEERING, INC.
CIVIL ENGINEERS · LAND SURVEYORS
2123 Kaahu St. · Wailuku, Maui, Hawaii

Sept. 7, 1973 DV73-003

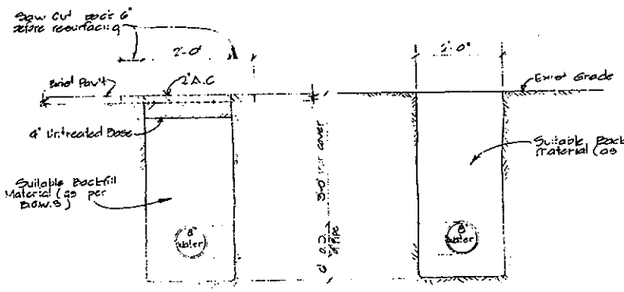


8 INCH WATERLINE - OFFSITE

SCALE: HOR: 1" = 30'
VERT: 1" = 5'

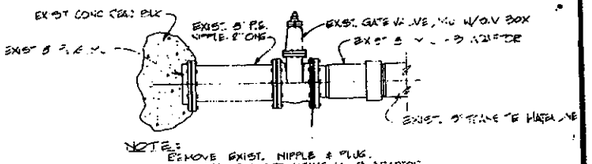
NOTES:

1. B.O.W.S. WILL FURNISH ALL LABOR TO CONNECT NEW 8 INCH WATERLINE TO EXIST 8" WATERLINE. CONTRACTOR TO PAY THE COST OF BOWS. WORK.
2. ALL MATERIALS & INSTALLATIONS SHALL BE IN ACCORDANCE WITH B.O.W.S. STANDARDS. COUNTY OF MAUI.
3. CONCRETE FOR REACTION BLOCKS SHALL BE CLASS 'C'.
4. REINFORCED CONCRETE JACKET & BED COURSE MATERIALS FOR WATERLINE WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS CONTRACT ITEMS.
5. CONTRACTOR SHALL OBTAIN 'CONSTRUCTION PERMIT' FROM THE DIRECTOR OF PUBLIC WORKS, COUNTY OF MAUI, PRIOR TO DOING ANY WORK ON HAUOLI STREET.
6. THE EXACT DEPTH & LOCATION OF EXIST. WATERLINES, SERVICE LATERALS & OTHER FACILITIES, ARE NOT SHOWN. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO LOCATE THE SAME, PRIOR TO TRENCHING FOR NEW WATERLINE. THE COST OF LOWERING, RELOCATING OR ADJUSTING EXIST. WATERLINE, LATERALS & OTHER FACILITIES, SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE NEW WATERLINE. THIS WORK WILL NOT BE PAID FOR SEPARATELY. FACILITIES DAMAGED BY THE CONTRACTOR'S OPERATION SHALL BE REPAIRED IMMEDIATELY BY THE CONTRACTOR, AT HIS OWN EXPENSE.
7. IN NO CASE SHALL FIRE HYDRANTS BE INSTALLED WHERE IT WOULD INTERFERE WITH DRIVEWAYS
8. FOR FIRE HYDRANTS, SEE B.O.W.S. STANDARDS, EXH. NO. 4 PLATE - 1.
9. FOR CONCRETE JACKET, SEE BOWS STANDARDS, EXH. NO. 9 PLATE - 1.
10. PROVIDE CONCRETE REACTION BLOCK AT ALL BENDS.



TYPICAL TRENCH DETAIL AT ROAD CROSSING
Scale: 3/8" = 1'-0"

TYPICAL TRENCH DETAIL
Scale: 3/4" = 1'-0"



NOTE:
REMOVE EXIST. NIPPLE & PLUG. CONNECT NEW PIPE USING M.J. ADAPTOR

DETAIL "A"
SCALE: 3/4" = 1'-0"

APPROVAL:

Carl K. Arakawa — 6/19/74
DIRECTOR DEPT. OF WATER SUPPLY — DATE

[illegible] — 6/19/74
DIRECTOR DEPT. OF PUBLIC WORKS — DATE

[illegible] — 6/19/74
CHIEF ENVIRONMENTAL PROTECTION AND HEALTH SERVICES DIVISION — DATE

8

SCALE: 1" = 50'
SCALE: 1" = 5'
50 0 50 100 150
5 0 5 10 15

GRAPHIC SCALES

LEMMON, FREETH, HAINES, JONES & FARRELL
ARCHITECTURE PLANNING INTERIOR DESIGN
HONOLULU, HAWAII WAILUKU, MAUI, HI.

the island sands
T.M.K. 3-8-14: 14 & 15 MAALAEA, MAUI, HAWAII

8 INCH WATERLINE - OFFSITE

REVISION	SHEET
	C20-2 OF 82 SHEETS
	DESIGN BY W.S.U.
	DRAWN BY H. S.
	JOB NO. 1710
	DATE 3-20-73

MUNEKIYO HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

David Taylor, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793-2155

SUBJECT: Early Consultation for the Proposed Hauoli Street Drainage System Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.), and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii

Dear Mr. Taylor:

Thank you for your department's letter of July 16, 2009, providing comments on the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

The applicant notes the location of the Department of Water Supply's 8-inch waterline and fire hydrant No. 17. A copy of your letter has been forwarded to the engineering consultant for review.

The Department's Best Management Practices will be consulted and adhered to, as applicable. The applicant acknowledges the suggestion to utilize reclaimed or non-potable water for dust control and other non-potable uses. We note that the project scope does not involve any irrigation.

We will provide your office with a copy of the Draft Environmental Assessment when it is available for your review and comment.

Thank you again for your input on the Hauoli Street Drainage project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Diane Kodama, AECOM
Wendy Kobashigawa, Department of Public Works
F:\DATA\AECOM\HauoliDrainage\DWS.ecres.doc

JUL 0 9 2009

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

July 8, 2009

Ms. Kimberly Skog, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Early Consultation for the Proposed Hau'oli Street Drainage Improvements
Tax Map Key: (2) 3-8-005:003 (por.), (2) 3-8-014:011, and 015 (por.)
Hau'oli Street
Ma'alaea, Maui Hawaii

Dear Ms. Skog,

Thank you for allowing us to comment on the Early Consultation for the subject project.

In reviewing our records and the information received, Maui Electric Company (MECO) highly encourages the customer's consultant to submit detailed drawings and a project time schedule as soon as practical to coordinate any electrical line/pole relocation as necessary. The customer should also contact Hawaiian TelCom and Time Warner Oceanic Cable to coordinate possible relocation of their facilities.

Should you have any questions or concerns, please call me at 871-2340.

Sincerely,

Ray Okazaki
Staff Engineer

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 20, 2012

Ray Okazaki
Staff Engineer
Maui Electric Company, Ltd.
210 West Kamehameha Avenue
P.O. Box 398
Kahului, Hawaii 96733

Subject: Early Consultation for the Proposed Hauoli Street Drainage Sytem Improvements at TMKs (2) 3-8-005:003 (por.) and 017 (por.) and (2) 3-8-014:011 (por.) and 015 (por.), Maalaea, Maui, Hawaii

Dear Mr. Okazaki:

Thank you for your letter of July 8, 2009, providing comments on the Early Consultation Letter for the proposed drainage system improvements at Hauoli Street in Maalaea. On behalf of the applicant, the County of Maui, Department of Public Works, we offer the following information in response to your comments.

We recognize the importance of coordination with Maui Electric Company (MECO), should any electrical line or pole relocations be necessary. The project components have been situated in such a way that electrical line or pole relocations are not anticipated. As appropriate, the Department of Public Works will provide detailed drawings and a project time schedule to MECO, as soon as they are available. Hawaiian Telcom and Time Warner Oceanic Cable will also be contacted if their facilities could possibly be impacted.

Thank you again for your input on the Hauoli Street drainage improvements project.

Very truly yours,

Kimberly Skog, Associate

KS:yp
cc: Wendy Kobashigawa, County of Maui, Department of Public Works
Diane Kodama, AECOM
F:\DATA\AECOM\HauoliDrainage\MECO.ecres.doc

X. REFERENCES

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APPENDIX A.

Hauoli Street Drainage Improvements Drainage Report

Hauoli Street Drainage Improvements

Wailuku, Island of Maui, Hawai'i

Fronting TMKs: (2nd Div) 3-8-005:003, 017; 3-8-014:011, 015

Drainage Report

July 2012

Prepared for:

County of Maui
Department of Public Works
Engineering Division
200 South High Street
Wailuku, Maui Hawaii 96793

Prepared by:

AECOM
1001 Bishop Street
Suite 1600
Honolulu, Hawai'i 96813

Hauoli Street Drainage Improvements

Drainage Report

FRONTING TMKs: (2nd Div) 3-8-005:003 & 017
(2nd Div) 3-8-014:011 & 015

July 2012

(Expires April 30, 2014)

This work was prepared by me or under my direct supervision.

7/14/12

Signature (***Diane Y. Kodama***) Date
AECOM

TABLE OF CONTENTS

Page

ENGINEER'S STAMP AND SIGNATURE 1
TABLE OF CONTENTS 2
SECTION 1 4
1.1 PURPOSE 4
1.2 GENERAL INFORMATION 4
SECTION 2 5
2.1 LOCATION 5
2.2 TOPOGRAPHY 5
2.3 SOILS 5
2.4 DRAINAGE/FLOODING 6
2.5 RAINFALL 6
SECTION 3 7
3.1 METHODOLOGY 7
3.2 HYDROLOGIC CRITERIA 7
3.3 EXISTING DRAINAGE CONDITIONS 8
3.4 PROPOSED DRAINAGE IMPROVEMENTS 9
3.5 CONCLUSIONS 11
SECTION 4 12
4.1 METHODOLOGY 12
4.2 WATER QUALITY CRITERIA 12
4.3 CONCLUSIONS 12
REFERENCES 15

FIGURES

FIGURE 1 Location Map

FIGURE 2 Soils Map

FIGURE 3 FIRM Map

FIGURE 4 Hauoli Street Drainage Improvements Drainage Basins Existing

FIGURE 5 Hauoli Street Drainage Improvements Drainage Basins Proposed

FIGURE 6 Hauoli Street Drainage Improvements Model Schematic

FIGURE 7 Hauoli Street Drainage Improvements Water Quality Basin Plan

FIGURE 7 Hauoli Street Drainage Improvements Water Quality Basin Profile

APPENDIX

APPENDIX A Reference from "TITLE MC-15 DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT, SUBTITLE 01, CHAPTER 4, RULES FOR THE DESIGN OF *STORM DRAINAGE FACILITIES IN THE COUNTY OF MAUI,"* County of Maui.

APPENDIX B Drainage Design Calculation, EXISTING CONDITION

APPENDIX C Drainage Design Calculation, PROPOSED CONDITION

APPENDIX D Storm Water Quality Pond Design Calculation, PROPOSED CONDITION

SECTION 1

INTRODUCTION

1.1 PURPOSE

The objective of this drainage report is to analyze the existing culvert crossing on Hauoli Street and propose drainage improvements in accordance with County of Maui design standard, "Title MC-15 Department of Public Works and Waste Management, Subtitle 01, Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui." Also the effect of the proposed drainage improvements on existing drainage patterns will be evaluated. A drainage report is required to obtain government approval for the proposed project. This report analyzes the conditions before and after the construction of the proposed improvements.

1.2 GENERAL INFORMATION

A. Hauoli Street Drainage Improvements is being developed by the County of Maui, Department of Public Works. The project site encompasses a portion of four parcels. The first parcel (Tax Map Key [TMK] (2) 3-8-005: 17) is bounded by Honoapiilani Highway and Hauoli Street and has a total area of 1.13 acres within the project limits. The second parcel (TMK: (2) 3-8-005: 003) is adjacent to the first parcel and has a total of 1.38 acres within the project limits. The third parcel (TMK(2)3-8-014:015) is located on the makai side of Hauoli Street, west of the existing concrete drainage channel and has a total of 0.06 acres within the project limits. The fourth parcel (TMK (2)3-8-014:011) is adjacent to the third parcel located east of the concrete drainage channel with a total of 0.08 acres within the project limits.

B. Owner: County of Maui, Department of Public Works
250 South High Street
Wailuku, Hawai'i 96793-2155
Contact: Ms. Wendy Kobashigawa (808) 270-7745

C. Vicinity & Location Map (See Figure 1)

SECTION 2

PHYSICAL ENVIRONMENT

2.1 LOCATION

The Hauoli Street Drainage Improvements project site is located along Hauoli Street in Maalaea. Along the mauka side of Hauoli Street the earthen drainage channel fronts the southern portion of TMK (2)3-8-005: 003 and the northern portion of TMK (2)3-8-005:017. On the makai side, the concrete drainage channel runs within a 20-foot wide drainage easement between TMKs (2)3-8-014: 011 and (2)3-8-014: 015. Refer to Figure 1 for a Location Map of the project.

2.2 TOPOGRAPHY

The project site is located in Central Maui, the isthmus between West Maui and East Maui. Central Maui is generally flat and fairly level. The drainage channel slopes at a gentle grade between 1 and 3 percent. The drainage channel on the mauka side of Hauoli Street is covered and lined with wild grasses, shrubs and small trees. The adjacent land is used for agricultural purposes. The drainage channel on the makai side of Hauoli Street is concrete lined. The adjacent land is developed with apartment buildings on both sides of the drainage channel.

2.3 SOILS

The NRCS Hawaii website (www.hi.nrcs.usda.gov) provides an online database of State of Hawaii soils. This database categorizes the soils on the project site as EsB and EtB. The other soils within the estimated drainage basin are rSM, rRK, and OMB. Four of these soils (EsB, EtB, rSM, and OMB) are classified as "B," hydrological type; the other soil type rRK is classified as "D." See Figure 2, Soils Map.

- EsB, Ewa silty clay, 3 to 7% slopes, permeability is moderate. Runoff is slow, and the erosion hazard is slight. The available water capacity is about 1.3 inches per foot of soil. This well-drained soil occurs in basins and on alluvial fans.
- Etb, Ewa cobbly silty clay, 3 to 7% slopes, similar to EsB, above; however, cobblestones and stones occur on the surface and in the surface layer.

- rSM, Stony Alluvial Land, consists of stones, boulders, and soil deposited by streams along the bottom of gulches and on alluvial fans. Permeability is high. This type of soil typically has a slope of 3 to 15%.
- rRK, Rock land is made up of areas where exposed rock covers 25 to 90% of the surface. The rock outcrops and very shallow soils are the main characteristics.
- OMB, Oli silt loam, 3 to 10%, runoff is medium. The erosion hazard is moderate. This soil occupies smooth slopes on the uplands of West Maui.

2.4 DRAINAGE/FLOODING

According to the FEMA Flood Insurance Rate Maps (Community-Panel Number 150030560E, September 25, 2009), the project site is in Zone X classification. Zone X is defined as areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. See the attached **Figure 3** for reference.

2.5 RAINFALL

According to NOAA Atlas 14 Precipitation Frequency Data Server (http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_hi.html), the annual mean rainfall for the project area is 11.8 inches.

SECTION 3

DRAINAGE

3.1 METHODOLOGY

The "Department of Public Works and Waste Management – County of Maui – Chapter 4 – Rules for the Design of Storm Drainage Facilities in the County of Maui," is the basic design reference effective since November 12, 1995. See Appendix A.

3.2 HYDROLOGIC CRITERIA

The hydrologic criteria used to obtain peak discharges are summarized as follows:

Criteria

Recurrence Interval:

For Bridge/Culvert: Tm = 100 years (based on 24 hour storm, for drainage areas greater than 100 acres) the Natural Resources Conservation Service (NRCS, formerly Soil Conservation Service) hydrograph method shall be used.

For Retention/Detention Basin: Tm = 100 years (based on 24 hour storm, for Retention and Detention Basins with drainage areas greater than 100 acres)

Runoff Quantity: Rational Method (for drainage areas of 100 acres or less)

NRCS Method, Hydrograph Analysis (for drainage areas greater than 100 acres and all streams)

Software

XP-SWMM (Version 2010): Computer software used to simulate natural rainfall-runoff events and the hydraulic performance of drainage systems. The XP-SWMM program incorporates the NRCS method into its calculations. The program has been approved by FEMA and the EPA.

3.3 EXISTING DRAINAGE CONDITIONS

The "Hauoli Street Drainage Improvements Drainage Basins" figure (Figure 4) shows five existing drainage areas with a total of 724.60 acres. The drainage areas were derived from available topography and survey data, drainage plans from the Honoapiilani Highway Widening project, and site visit photos and observations.

Drainage areas C, D and E are located on the mauka side of Honapiilani Highway, beginning from the ridgeline and ending at Honoapiilani Highway. Drainage areas A and B are located on the makai side of Honoapiilani Highway, starting from Honoapiilani Highway and ending at Hauoli Street. The existing drainage structures shown on Figure 4 that flow across Honoapiilani Highway are (2)5x3 box culverts and a (1)10x6 box. The existing drainage structure shown on Figure 4 which flows across Hauoli Street is an 8x3 box culvert. The berm shown on Figure 2 is located on the mauka side of Hauoli Street. There are also two outfall locations shown on Figure 2. The outfall located within the project limits is labeled as "Site Outfall". The second outfall which is located east of the project limits discharges overflow from Hauoli Street. Runoff generated from Basins C, D and E flow in the south eastern direction through the existing box culverts across Honoapiilani Highway into Basins A and B. Runoff from Basin A flow to the south east through the existing 8x3 box culvert crossing Hauoli Street. Basins B and E flow towards the outfall located east of the project limits. Downstream of the culvert crossing a concrete-lined drainage ditch conveys the runoff to Maalaea Bay/Pacific Ocean. The drainage areas that contribute to the project site have a total peak discharge of 1,244 cubic feet per second generated by drainage areas A, C and D. Refer to Appendix B for existing drainage calculations.

3.3.1 Hydraulic Analysis for the Existing Condition

The XP-SWMM (version 2010), a computer program used to model natural rainfall-runoff events and analyzes the hydraulic performance of drainage systems. The XP-SWMM was used to analyze the existing drainage pattern. The existing box culverts located on Honoapiilani Highway and on Hauoli Street were included in the model. A summary of the drainage basin runoff data is provided in Appendix B, Table 5.

Rainfall depths for the modeled storm events are listed in Appendix B, Table 2. The rainfall depths were referenced from Urban Hydrology for Small Watersheds Technical Release 55 (TR-

55), June 1986. The SCS Type I rainfall distribution was used. Drainage areas with detailed calculations of curve numbers and time of concentrations are provided in Appendix B, Tables 3 and 4.

Overland flow paths were included in the analysis to account for possible overflows of the designed conveyance system. The storm water model of the existing drainage flow shows that the excess runoff overtopping Honoapiilani Highway originates from drainage areas C and D. Locations where overland flow paths were added include:

1. Inlets, located along Honoapiilani Highway, to the existing culverts where the culvert capacity could be exceeded during certain storm events.
2. Locations where water could overflow Honoapiilani Highway or Hauoli Street.
3. Locations along the GRP Channel, parallel to Honoapiilani Highway.
4. Along Honapiilani Highway towards Maalaea.

The most significant overflow path is along Honoapiilani Highway towards Maalaea. The 100-year, 24-hour storm event results show a peak flow of 1,244 cfs in that overland flow path. Only a portion of this water will reach the project site. Approximately 421 cfs generated by other overflow paths does not reach the project site due to the size of the existing culvert crossings under Honoapiilani Highway. The model shows that the flow to the outfall is located east of the project site. See model schematic, Figure 6.

The peak flow that will impact the project site is 785 cfs. The model confirms that the 8x3 box culvert under Hauoli Street is undersized, and Hauoli Street will be over-topped by runoff generated by the 724.6 acre watershed.

3.4 PROPOSED DRAINAGE IMPROVEMENTS

Drainage improvements that were implemented to remediate the existing flow of 785 cfs from over topping Hauoli Street are listed below:

1. Constructing a water quality basin.
2. Installing a grassed drainage channel.
3. Constructing wing walls for inlet control (Wing walls at 30 to 75 degrees to barrel, top corner rounded to radius of 1/12 barrel dimension).
4. Replacing the existing 8x3 box culvert with a double 8x4 box culvert.
5. Re-grading Hauoli Street.

6. Installing retaining walls to the existing concrete channel downstream of Hauoli Street.

3.4.1 Hydraulic Analysis for the Proposed Condition

A model was created using the XP-SWMM software to analyze the existing runoff of 785 cfs. To determine that the existing 785 cfs would be remediated and not overtop Hauoli Street the alternatives listed above were incorporated into the model. A summary of the drainage basin runoff data is provided in Appendix B, Table 5.

3.4.2 Proposed Drainage Improvements

The following improvements were utilized to prevent runoff from overtopping the Hauoli Street culvert.

Water Quality Basin

A water quality basin will be installed upstream of Hauoli Street to reduce sediment and pollutant load from the initial storm runoff before discharging into the ocean. The basin will be approximately 200 feet wide x 150 feet long x 2.5 feet deep with side slopes of 3:1 (H:V) and a volume of approximately of 1.7 acre-feet. The runoff velocity will be decreased due to the weedy and low maintenance vegetation within the water quality basin. During low flows the runoff will be contained within the basin and drained within 48 hours through 6" perforated PVC outlet pipes. During large flows runoff will overtop the reinforce soil slope berm and will continue to flow to the proposed double 8x4 box culverts.

Grassed Drainage Channel

A grassed drainage channel will be installed upstream of Hauoli Street, below the proposed water quality basin. A reinforced soil slope berm will separate the basin from the grassed drainage channel. During large flows runoff that will overtop the berm will flow through the grassed channel continuing to the proposed double box culvert. The runoff velocity will be lowered due to the weedy and low maintenance vegetation within the drainage channel.

Wing Walls for Inlet Control

Concrete wing walls will be installed at the entrance of the proposed double box culverts for inlet control (Wing walls at 30 to 75 degrees to barrel, top corner rounded to radius of 1/12 barrel

dimension). The top of wing wall elevations will be 14 feet, and the water elevation in the pond at peak flow will be 12.84 leaving at least 1 foot of freeboard.

Replacing 8x4 Double Box Culvert

Replacing the existing 8x3 box culvert with an 8x4 double cell box culvert with inlet control increases the existing runoff capacity being conveyed to Maalaea Bay.

Re-Grade Hauoli Street

The roadway portion above the 8x4 double box culverts will be sloped to direct runoff toward the existing drainage canal. Runoff will be collected by the existing and proposed concrete curb and gutters, flowing off Hauoli at the low point of the street located on the makai side of Hauoli Street.

Retaining Wall Downstream of Hauoli Street

Installing retaining walls along the existing drainage channel downstream of Hauoli Street will increase the capacity of the drainage channel. Increasing the capacity of the drainage channel would not allow the runoff to flow into the adjacent properties not allowing flooding to occur.

3.5 CONCLUSIONS

The proposed improvements to the existing 3'x8' single cell box culvert consists of a 8x4 double cell box culvert, a water quality basin with a grassed drainage channel, retaining walls along the downstream concrete channel and improving the concrete channel, will provide an increased conveyance capacity.

The drainage hydrology and hydraulic calculations have been performed in accordance with County of Maui's drainage standards.

SECTION 4

STORM WATER QUALITY

4.1 METHODOLOGY

A storm water quality detention pond will be installed upstream of the proposed drainage improvements to reduce the sediment and pollutant load from the initial storm runoff before it enters the drainage conveyance and ultimately discharges into the ocean. The City and County of Honolulu, "Rules Relating to Storm Drainage Standards, §1-5, Section II – Storm Water Quality, §1-5.1.C. Detention Based Water Quality Control" is the basic design reference.

4.2 WATER QUALITY CRITERIA

The purpose of the water quality criteria is to reduce the pollution associated with storm water runoff to receiving waters to the "maximum extent practical". The initial storm water runoff will be detained for a 48 hours which allows storm water pollutants and sediments to settle. Please refer to Appendix D, Storm Water Quality Pond Design Calculation, for preliminary sizing calculations based on design volume and detention time. This proposed water quality basin pond will be normally dry.

4.3 CONCLUSIONS

The proposed water quality basin will be approximately 200 feet wide x 150 feet long x 2.5-feet deep with side slopes of 3:1 (H:V) and a volume of approximately of 1.7 acre-feet. The basin has a reinforced soil slope berm to contain the water quality volume. During low flows the runoff will be contained within the water quality basin. To drain the water quality basin during small rainfall events a series of four 6" perforated PVC pipe will be used to prevent stagnant water. The outlet pipe were sized to drain the entire pond in a 48 hour period. The water quality basin will also have a fore bay installed at the entrance to allow for greater sediment control and has been sized to account for roughly 15% of the entire water quality volume. During large flows the runoff will overtop the berm and will continue to the proposed double box culvert via

the proposed grassed drainage channel. See Figure 7, Hauoli Street Drainage Improvements Water Quality Basin Profile.

4.4 Operation and Maintenance Plan

4.4.1 Post-Construction Inspection and Maintenance

Main types of post-construction erosion are rutting of slopes from storm water runoff and scouring at inlet and outlet areas of the box culvert. Side slopes above and beneath the normal water surface elevation are designed with a maximum slope of 3:1 horizontal to vertical. Most areas outside the pond will remain undisturbed during construction and will help prevent future erosion and maintenance problems. In addition, all exposed areas will be grass seeded after construction.

Once vegetation has been established, side slope erosion should not be expected to occur. If erosion occurs, a determination will be made as to the cause. A common cause of erosion is a concentrated flow from overland areas down side slopes. If the cause of erosion is bare soil, then the area should be reseeded with the specified seed mix, and mulched or blanketed with an erosion control mat. If concentrated flow is determined to be the cause then re-grading to distribute the flow over a wider area and restoration with seed and mulch are recommended. It may be necessary to use erosion control matting or other erosion control devices to protect exposed soil until vegetation is established.

Areas of erosion should be stabilized immediately upon detection. Erosion areas need to be accessed with small equipment and hand labor used to minimize disturbance to restore plant communities. Minimal grading and imported topsoil will be used to repair damaged areas. Areas should be seeded with a cover crop in accordance with the project specifications developed for site construction.

4.4.2 Post-Construction Monitoring

General observations for erosion should be made during normal inspection periods. Inlet and outlet areas of the box culvert, and side slopes should be checked for erosion after large storm events. Side slopes should be checked for rutting or slumping. Inlet and outlet areas of the box culvert should be checked for any structural damage. More frequent inspections after smaller

storms are recommended during the first year of operation.

4.4.3 Routine Maintenance

Clean the inlet and outlet areas of the box culvert of accumulated debris during regular inspections. Remove debris such as leaves and litter. The remaining area should have vegetative growth. Reinforced soil slopes should be periodically inspected after installation.

4.4.4 Non-Routine Maintenance

Inspections to check the depth of the sediment accumulated on the bottom of the pond should be made approximately every 10 years or more frequently if needed. After sediment in the pond accumulates to a depth of two (2) feet (less than three (3) feet below the normal water surface) provisions should be made to remove the sediment accumulated on the bottom of the pond. This will prevent scour and resuspension of solids accumulated on the bottom of the pond. Proper permits shall be acquired and the sediment should be removed of and properly disposed of. If structural problems are observed during regular inspections within either the box culvert or the berm, an engineer should be consulted to further inspect and provide a solution to the problem.

REFERENCES

1. *Flood Insurance Rate Map, Maui County, Hawaii*, Map Number 150003 0235 B, Federal Emergency Management Agency, US Department of Homeland Security, June 1, 1981.

2. *Maalaea Quadrangle, Hawaii – Maui Co., Island of Maui, 7.5 Minute Series (Topographic)*, United States Department of the Interior Geological Survey, Revised 1983.

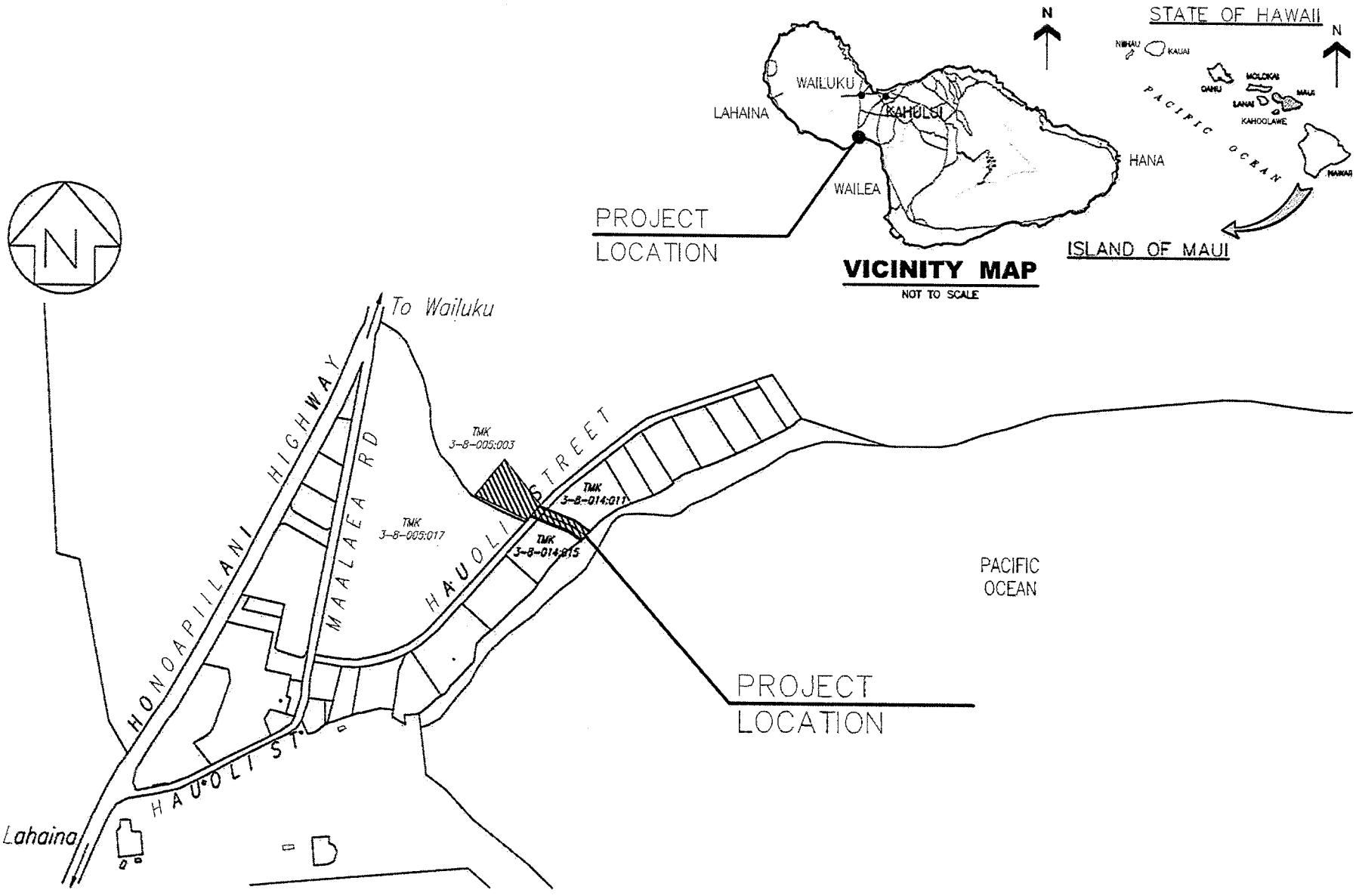
3. *Rules for the Design of Storm Drainage Facilities in the County of Maui,* Department of Public Works and Waste Management, County of Maui, November 1995.

4. *Rules Relating to Storm Drainage Standards,* Department of Planning and Permitting, City and County of Honolulu, January 2000.

5. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, *NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 4 Version 2.1: Hawaiian Islands,* 2009

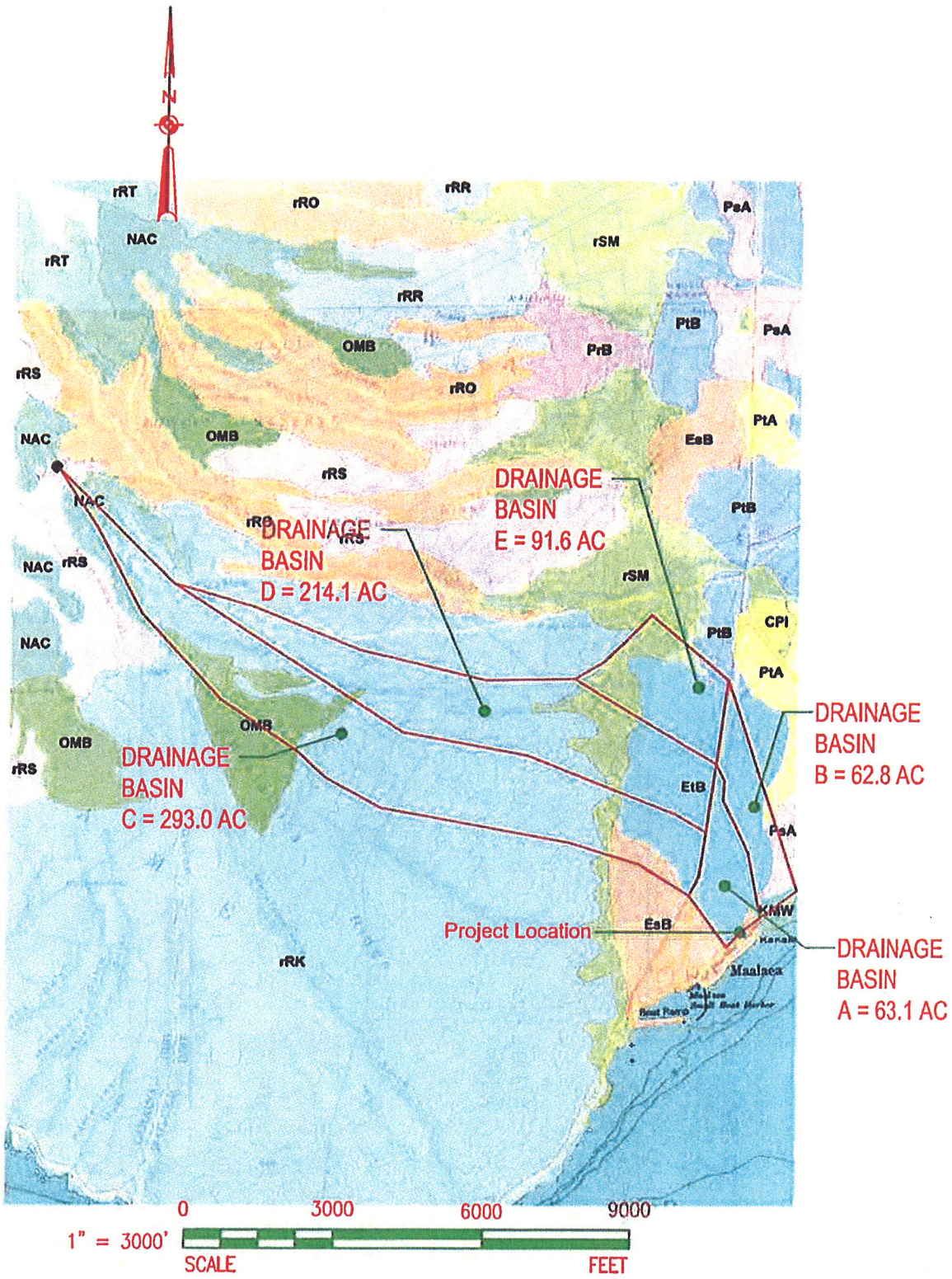
6. United States Department of Agriculture, Natural Resources Conservation Service, *Urban Hydrology for Small Watersheds, TR-55*, June 1986.

7. United States Department of Agriculture, Natural Resources Conservation Service, *Web Soil Survey,* <http://websoilsurvey.nrcs.usda.gov/app/>, June 11, 2008



AECOM
1001 BISHOP ST, SUITE 1600, HONOLULU, HAWAII 96813

FIGURE 1
LOCATION MAP
Drainage Report
HAUOLI STREET DRAINAGE IMPROVEMENTS
Maalaea, Island of Maui, Hawaii
JULY 2012



AECOM
1001 BISHOP ST, SUITE 1600, HONOLULU, HAWAII 96813

Soils Map
Drainage Report
HAUOLI STREET DRAINAGE IMPROVEMENTS
Wailuku, Island of Maui, Hawaii
JULY 2012

SOURCE: Federal Emergency Management Agency

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0560E

FIRM

FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 560 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MAUI COUNTY	150003	0560	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
1500030560E

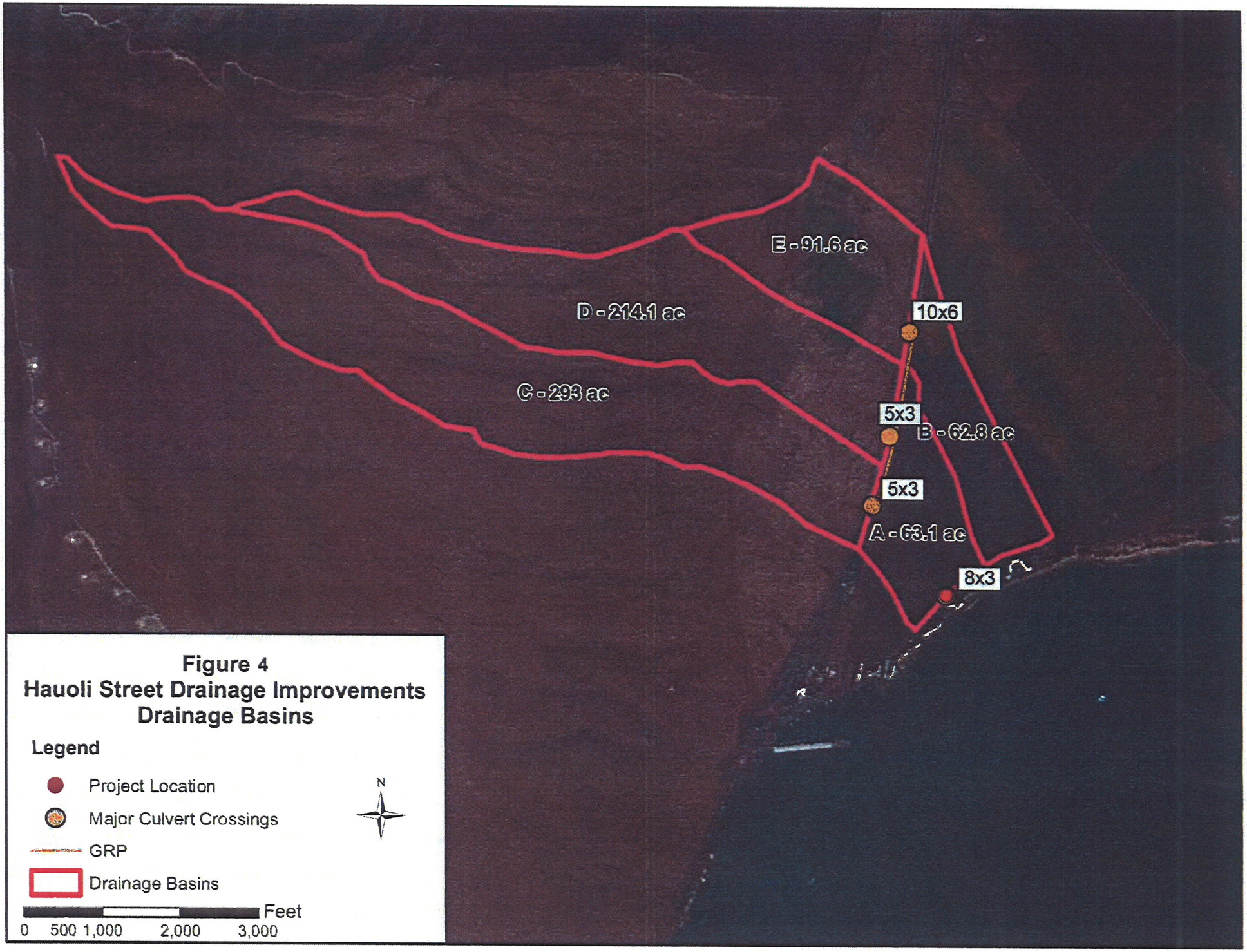
MAP REVISED
SEPTEMBER 25, 2009

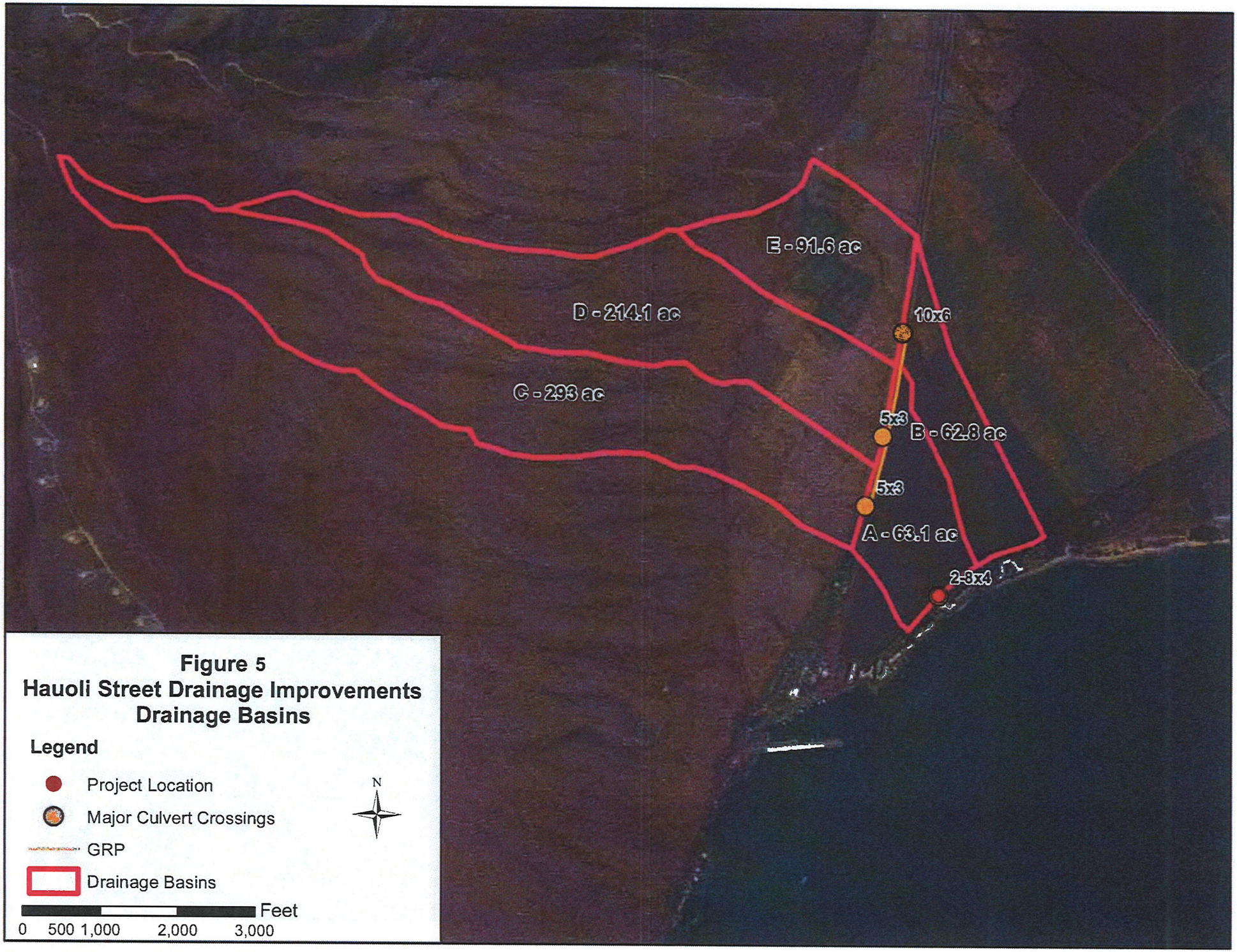
Federal Emergency Management Agency

AECOM

1001 BISHOP ST, SUITE 1600, HONOLULU, HAWAII 96813

FIGURE 3
FIRM MAP
Drainage Report
HAUOLI STREET DRAINAGE IMPROVEMENTS
Maalaea, Island of Maui, Hawaii
JUNE 2012


E - 91.6 ac
D - 214.1 ac
C - 293 ac
10x6
5x3
B - 62.8 ac
5x3
A - 63.1 ac
8x3
Figure 4
Hauoli Street Drainage Improvements
Drainage Basins
Legend
Project Location
Major Culvert Crossings
GRP
Drainage Basins
N
Feet
0 500 1,000 2,000 3,000


E - 91.6 ac
D - 214.1 ac
C - 293 ac
10x6
5x3
B - 62.8 ac
5x3
A - 63.1 ac
2-8x4
Figure 5
Hauoli Street Drainage Improvements
Drainage Basins
Legend
Project Location
Major Culvert Crossings
GRP
Drainage Basins
N
Feet
0 500 1,000 2,000 3,000

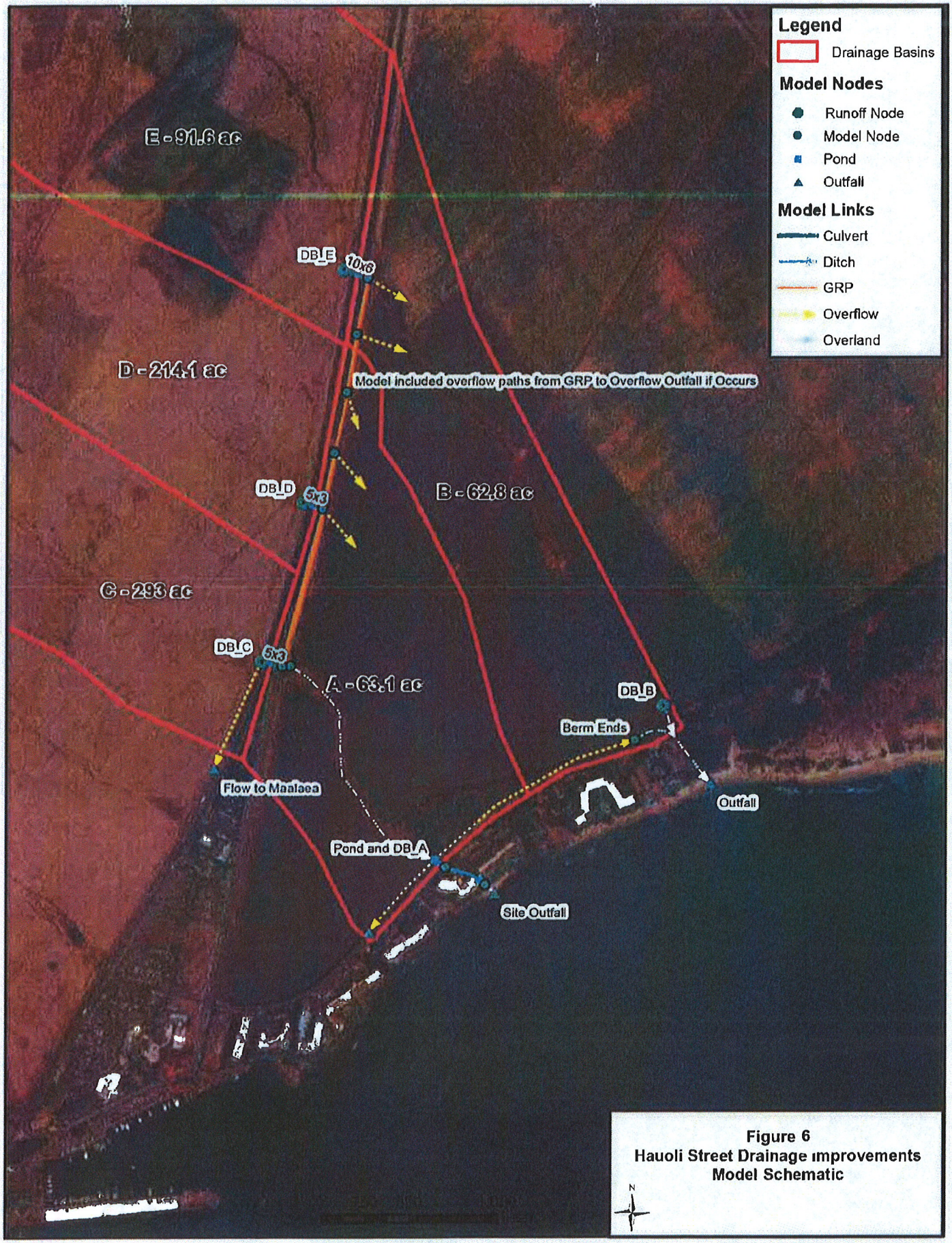
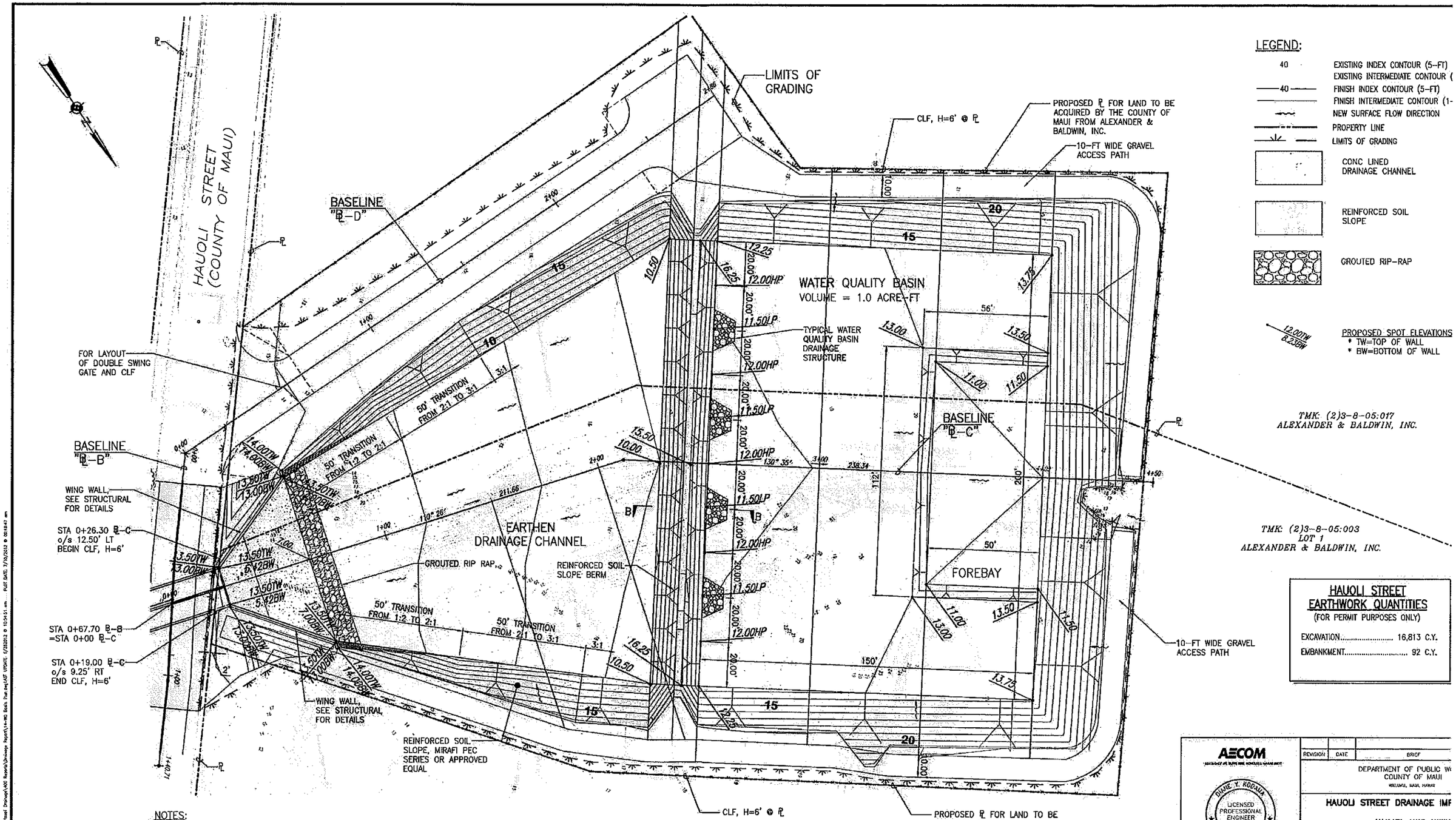


Figure 6
Hauoli Street Drainage Improvements
Model Schematic



LEGEND:

- 40 — EXISTING INDEX CONTOUR (5–FT)
- EXISTING INTERMEDIATE CONTOUR (
- 40 — FINISH INDEX CONTOUR (5–FT)
- FINISH INTERMEDIATE CONTOUR (1–
- NEW SURFACE FLOW DIRECTION
- PROPERTY LINE
- LIMITS OF GRADING
- CONC LINED DRAINAGE CHANNEL
- REINFORCED SOIL SLOPE
- GROUTED RIP–RAP
- 12.00TW / 8.25BW — PROPOSED SPOT ELEVATIONS
  - * TW=TOP OF WALL
  - * BW=BOTTOM OF WALL

TMK: (2)3–8–05:017
ALEXANDER & BALDWIN, INC.

TMK: (2)3–8–05:003
LOT 1
ALEXANDER & BALDWIN, INC.

HAUOLI STREET EARTHWORK QUANTITIES
(FOR PERMIT PURPOSES ONLY)

EXCAVATION	16,813 C.Y.
EMBANKMENT	92 C.Y.

NOTES:

1. SEE FIGURE 8 FOR PROFILE OF THE WATER QUALITY BASIN.
2. EARTHWORK QUANTITIES ARE BASED ON THE TOPOGRAPHIC SURVEY RECIEVED JUNE 7, 2011, WHICH MAY NOT SHOW ACCURATE CONDITIONS.

WATER QUALITY BASIN PLAN

SCALE: 1"=20'

1" = 20' SCALE 0 20 40 60 FEET

AECOM

DIANE Y. KODAIRA
LICENSED PROFESSIONAL ENGINEER
No. 6653–C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF

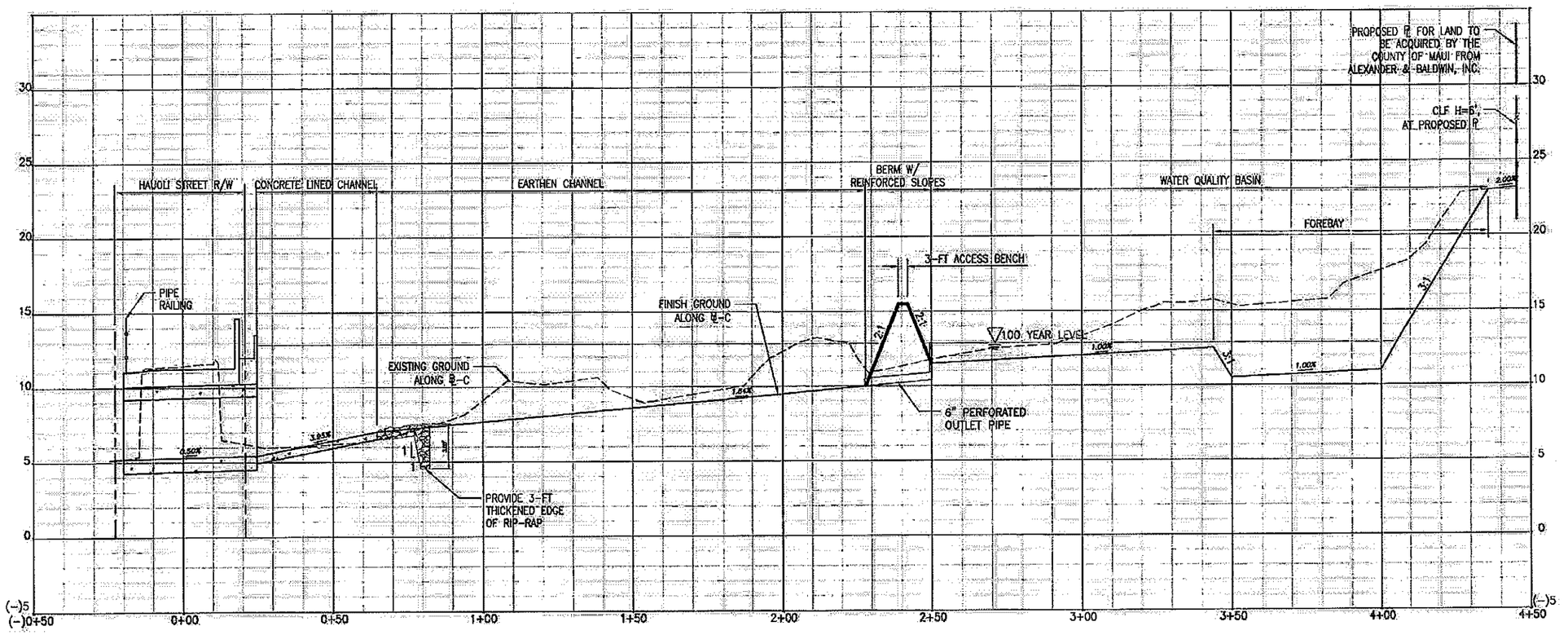
DEPARTMENT OF PUBLIC W
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMP
MAALAEA, MAUI, HAWAI
JOB NUMBER 07–50

FIGURE 7
WATER QUALITY BASIN

DESIGNED BY	AHT	DRAWN BY	AHT

DATE FIRM MEMBI



WATER QUALITY BASIN PROFILE

SCALE: 1"=20' (HORIZONTAL)
SCALE: 1"=4' (VERTICAL)

1" = 20' SCALE 0 20

1" = 4' SCALE 0 4

AECOM

LICENSED PROFESSIONAL ENGINEER No. 8688-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF

DEPARTMENT OF PUBLIC W
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMP

MAALAEA, MAUI, HAWAI
JOB NUMBER 07-50

FIGURE 8
WATER QUALITY BASIN PI

DESIGNED BY AHT | DRAWN BY AHT

DATE | FIRM MEMB

APPENDIX A

Title Mc-15 Department Of Public Works And Waste Management, Subtitle 01, Chapter 4, Rules For The Design Of Storm Drainage Facilities In The County Of Maui

TITLE MC-15

DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT

COUNTY OF MAUI

CHAPTER 4

RULES FOR THE DESIGN OF
STORM DRAINAGE FACILITIES
IN THE COUNTY OF MAUI

SUMMARY

1. Chapter 4, entitled "Rules For The Design Of Storm Drainage Facilities In The County of Maui", is hereby adopted to read as follows:

"TITLE MC-15
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBTITLE 01

CHAPTER 4

RULES FOR THE DESIGN OF
STORM DRAINAGE FACILITIES
IN THE COUNTY OF MAUI

GENERAL PROVISIONS

§15-04-01	Title
§15-04-02	Authority
§15-04-03	Purpose
§15-04-04	Definitions
§15-04-05	Hydrologic criteria
§15-04-06	Design standards
§15-04-07	Severability
§15-04-08	Appendix - reference tables and charts

§15-04-01 Title. The rules in this Title shall be known as the "Rules For The Design of Storm Drainage Facilities in the County of Maui". [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §18.20.130A, Maui County Code)

§15-04-02 Authority. The rules herein are established pursuant to the provisions of Sections 46.15(13) and 46.15(14), Hawaii Revised Statutes, and Section 18.20.130A, Maui County Code. [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §18.20.130A, Maui County Code)

§15-04-03 Purpose. These rules govern the design of storm drainage facilities in the County of Maui. [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §18.20.130A, Maui County Code)

§15-04-04 Definitions. For the purpose of these rules, unless it is plainly evident from the context that a different meaning is intended, certain words and phrases used herein are defined as follows:

"Detention facilities" means temporarily impound runoff to control runoff rates.

"Director" means the Director of Public Works and Waste Management.

"Infiltration facilities" means facilities, such as, infiltration basins, retention basins and porous pavements, which rely on absorption of runoff.

"Injection wells" are wells that dispose runoff into the subsurface and shall be in conformance with applicable State Department of Health Underground Injection Control (UIC) Rules.

"Sumps" mean either detention facilities or infiltration facilities. [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §18.20.130A, Maui County Code)

§15-04-05 Hydrologic criteria.

Recurrence interval.

(a) For drainage areas of 100 acres or less, Tm (recurrence interval) = 10 year based on 1 hour storm, unless otherwise specified.

(b) For drainage areas of 100 acres or less with sump, or tailwater effect, Tm (recurrence interval) = 50 year based on 1 hour storm.

(c) For the design of roadway culverts and bridges with drainage areas less than 100 acres, Tm (recurrence interval) = 50 year based on 1 hour storm.

(d) For drainage areas greater than 100 acres and all streams, the Natural Resources Conservation Service (NRCS, formerly Soil Conservation Service) hydrograph method shall be used, Tm (recurrence interval) = 100 year based on 24 hour storm.

(e) Retention and Detention Basins: Tm (recurrence interval) = 50 year based on 1 hour storm for drainage areas 100 acres or less.

Tm (recurrence interval) = 100 year based on 24 hour storm for drainage areas more than 100 acres.

(f) When a drainage area of less than 100 acres contributes to a major stream or channel with a total drainage area greater than 100 acres, the contributory drainage system shall be designed for 10 year or 50 year storm, whichever is applicable.

Runoff Quantity.

(a) Rational Method: For drainage areas of 100 acres or less, the rational method along with the accompanying reference tables and charts, or latest revision thereof, shall be used. The formula Q=CIA may be used to determine quantities of flow rate, in which:

Q=flow rate in cubic feet per second;

C=runoff coefficient;

I=rainfall intensity in inches per hour for a duration equal to the time of concentration; and
A=drainage area in acres.

(b) Runoff Coefficient (C):

(1) For Off-site Areas - The "C" value shall be determined from Table No. 1 and based on the current use of the drainage area. For distinctive composite drainage areas, a weighted value of runoff coefficient shall be used.

(2) For On-site Areas - Composite areas shall be designated and a weighted value of runoff coefficient shall be determined using the runoff coefficient from Table 1 or 2, whichever is higher. Minimum runoff coefficients for built-up areas are noted in Table 3.

(c) Time of Concentration (Tc)

(1) Determine overland flow time from Plate 1 generally for paved, bare soil and g r a s s e d areas.

(2) Determine flow time over small agricultural areas with well-defined divides and drainage channels from Plate 3.

(A) Use upper curve for well-forested areas representing:

$$Tc=0.0136K^{0.77}$$

(B) Use lower curve for areas with little or no cover, representing:

$$Tc=0.0078\ K^{0.77}$$

(3) To verify the time of concentration, divide the estimated longest route of runoff by the appropriate runoff velocity from Table 4.

(4) Tc for flows in uniform channels and in culverts shall be computed by length of run divided by computed velocity. L/V

(d) Rainfall Intensity (I) - The design rainfall intensity of a drainage area shall be determined by the following procedure:

(1) Select the appropriate 1-hour rainfall value from Plates 4 to 9 for the design recurrence interval for each individual island.

(2) Enter Plate 2 with the 1-hour rainfall value and the required time of concentration. Obtain the design rainfall intensity in inches per hour.

Natural Resources Conservation Service (NRCS) Method, Hydrograph Analysis

(a) For drainage areas greater than 100 acres and all streams, the Natural Resources Conservation Service method shall be used.

(b) The procedure for computing the peak flows and plotting the hydrographs shall be as outlined in the NRCS, National Engineering Handbook, Section 4, Hydrology, Supplement, or latest revision thereof or Erosion and Sediment Control Guide for Hawaii, NRCS, March 1981, or latest revision thereof.

(c) The NRCS computer program TR55 or TR20 may be used in lieu of the NRCS hydrograph analysis.

Federal Emergency Management Agency (FEMA)

Federal Emergency Management Agency (FEMA) storm flows shall be the minimum storm flow in drainage basins where flows have been determined in the "Flood Insurance Study," Maui County. [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §18.20.130A, Maui County Code)

§15-04-06 Design Standards. (a) General Conditions: The design and capacity of a drainage system shall be based on the following conditions:

(1) The drainage system shall dispose the design storm runoff and subsurface water without damage to street facilities, structures or ground and cause no serious interruption of normal vehicular traffic, and in a manner that will not adversely affect downstream and adjoining properties.

(2) System must have maximum reliability of operation with minimum maintenance and upkeep requirements.

(3) If applicable, system must be adaptable to future expansion.

(4) Where sump conditions exist; a safety measure such as an overflow swale shall be provided to prevent flooding of adjacent lots in the event the design capacity of the closed conduit is exceeded.

(5) In general, natural gullies, waterways, streams and tributaries shall not be replaced with a closed system except at roadway crossings. For natural drainageways with contributory areas greater than 100 acres, the engineer shall determine, dimension and designate the 100 year flooded width as a drainage reserve in the drainage report and on the final subdivision map, if applicable.

(6) Roadway culverts and bridges shall be designed to pass the design flow as determined by this ~~design criteria. Under open channel hydraulic~~ analysis the minimum freeboard shall be as specified in the design criteria for open channels. Multiple span road crossings (bridges) shall have minimum clear spans of 30-feet, unless otherwise permitted by the Director. Where possible, the roadway shall be designed to form a sag vertical curve with a low point at the waterway crossing with minimum grades to confine and control overflow at the crossing.

(7) In general, outlets for enclosed drains emptying into open channels shall be designed to point downstream at an angle of 45 degrees. Junctions of open channels shall be designed to flow as nearly parallel as possible.

(8) Outlet velocities of storm waters leaving culverts and channels shall not exceed existing drainage velocities when entering existing drainage ways.

(9) Subsurface drains may be installed when approved by the Director, provided no ground water is encountered or will be encountered during wet weather.

(10) In areas where existing drainage systems are inadequate, the existing system shall be upgraded to handle runoff from the new project area or a new system shall be provided to connect to an adequate outlet. When there is no existing drainage system or adequate outlet to connect to, the additional runoff generated by the development may be retained on-site in a temporary retention basin with the following design conditions:

(A) Storage volume of an infiltration basin, infiltration trench piping, or retention basin shall equal at least the total additional runoff volume for the appropriate storm intensity.

(B) Soil percolation shall not be used in satisfying required storage volumes.

(C) Fifty percent (50%) of voids within the rock envelope for subsurface drains may be used in satisfying required storage volume provided that filter fabric is installed around the subsurface pipe and at the interface of the rock envelope and soil.

(D) Sumps, detention and retention facilities will remain private.

(E) Detention or retention ponds with embankment heights equal to or in excess of 25 feet or with storage capacity equal to or in excess of 50 acre-feet shall conform to all state and federal requirements relative to dams.

(11) Flooded widths shall not be more than the following for the appropriate design storm:

(A) 8 feet for all curbed streets.

(B) No portion of the pavement shall be flooded for non-curbed streets. All storm runoff shall be confined to the roadway shoulder swale.

(12) Provide spillway or other devices that will direct overflow for design storms to an appropriate drainage channel or drainage system to assure that there will be no adverse effects on downstream or adjacent properties.

(13) Additional storm runoff from a new development shall be disposed of at an appropriate drainage outlet or drainage system so as not to create any additional adverse effects to adjacent or downstream properties.

(14) Off-site flows may be passed safely through a development provided there are no additional adverse effects resulting from the new development to adjacent and downstream properties.

(15) All new structures shall have either:
(A) The lowest floor or lowest opening be at least one foot above the crown of the nearest street or above the highest grade adjacent to the structure; or
(B) The site plan ensure that new structures are protected from local drainage problems.

(b) Drainage system

(1) Closed Conduits:

(A) Freeboard and Hydraulic Grade Line (HGL) unless otherwise authorize by the Director:

i. 1' - freeboard within drainage structures.

ii. HGL shall not be less than 1' below finish ground elevation.

(B) Minimum Pipe Sizes Within County Right-of-Way:

i. 18" diameter for lateral not exceeding 50 feet in length connecting drainage structures to main line.

ii. 24" diameter for main trunk line

(C) Materials and "n" Values:

i.	Concrete Pipe	n=0.013
ii.	*High Density Polyethylene Pipe (HDPE)	n=0.013
iii.	*Corrugated Aluminum Pipe (CAP) and *Corrugated Galvanized Metal Pipe (CMP), annular (1/2 X 2 2/3 corrugation, All sizes):	
	Unpaved	n=0.024
	25% paved invert	n=0.021
	Lower 50% Paved	n=0.018
	100% Paved	n=0.013
iv.	Helical *CAP and *CSP (1/2 X 2 2/3 corrugation):	
	18"	n=0.014
	24"	n=0.017
	30"	n=0.018
	36" to 48"	n=0.020
	54" and larger	n=0.021
v.	*Spiral Rib Pipe All sizes	n=0.011

*Shall be allowed only upon submittal of soil test, PH value, etc. to substantiate soil/effluent/pipe material compatibility and with written approval from the Director.

(2) Open Channels

(A) Freeboard: Freeboard shall be according to the U.S. Department of Interior Bureau of Reclamation's empirical formula,

$$\text{Freeboard in feet} = 2.000+0.025v\sqrt[3]{d}$$

where v is the velocity in feet per second and d is the flow depth in feet. Freeboard shall be provided at bends from the superelevated water surface.

(B) Material, "n" values and maximum velocities:

Material	Manning n	Max. v (fps)
Concrete, trowel finish	0.013	no limitation
Concrete, form finish	0.015	no limitation
Gunite, good section	0.018	20
Gunite, wavy section	0.020	20
Grouted Rubble Paving (GRP)	0.025	20
Cement Rubble Masonry (CRM)	0.025	20
Rock, smooth, uniform	0.030	10
Rock, jagged, irregular	0.045	10
Earth, fairly uniform, grassed	0.035	5

(C) Channel rights-of-ways shall encompass the channel width and include sufficient width for maintenance.

(D) Special considerations shall be made for guard rails and fences, debris control structures, energy dissipators, etc.

(c) Drainage report: Three copies of a drainage report, when required, shall be submitted to the Land Use and Codes Administration for approval. The drainage report shall be sealed and signed by a professional civil engineer licensed to practice in the State of Hawaii and at a minimum, include the following:

(1) Hydrologic runoff computations
  (A) On-Site
    i. Existing Conditions
    ii. Developed Conditions
  (B) Off-Site
    i. Existing Conditions
    ii. Allowances for future conditions (if any).
(2) Hydraulic Analysis:
  (A) Catch Basins & Inlet Capacities.
  (B) Flooded Road Width.
  (C) Hydraulic Grade Line (HGL). The HGL shall be shown on the construction plans.
(3) Contributory drainage area maps and schematic drainage scheme.

(b) The chairperson and vice-chairperson shall have responsibilities and duties as prescribed in this chapter. [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §1.16.040 Maui County Charter

§15-04-07 Severability. If any portion of the foregoing rules or the applicability thereof to any person, property or circumstance is held invalid for any reason, such invalidity shall not affect other provisions or applications which can be given effect without the invalid provision or application, and to this end these are declared to be severable. [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §18.20.130A, Maui County Code)

§15-04-08 Appendix. Reference charts and tables attached hereto and made a part hereof." [Eff. 11/12/95] (Auth: §§46.15(13) and (14), Hawaii Revised Statutes) (Imp: §18.20.130A, Maui County Code)

ADOPTED THIS 14th DAY OF July, 1995, by the Director of Public Works and Waste Management, County of Maui, State of Hawaii.

CHARLES JENCKS
Its Director
Department of Public Works &
Waste Management
County of Maui

APPROVED AS TO FORM
AND LEGALITY:

LILLIAN B. KOLLER
Deputy Corporation Counsel
County of Maui
c:\wp51\rules\drngacnd(pk)

APPROVED this 14 day of July, 1995.

LINDA CROCKETT LINGLE
Mayor
County of Maui

CERTIFICATION

I, CHARLES JENCKS, in my capacity as Director of Public Works and Waste Management, County of Maui, do hereby certify:

1. That the foregoing is a full, true and correct copy of the Rules of the Department of Public Works and Waste Management relating to the Rules for the Design of Storm Drainage Facilities in the County of Maui.

2. That the notice of public hearing on the foregoing Rules, which notice included the substance of such Rules, was published in the Maui News on June 12 and _____, 19 95.

CHARLES JENCKS
Director, Department of Public Works and Waste Management
County of Maui

Received this 2nd day of

November, 19 95.

DARYL T. YAMAMOTO
County Clerk
County of Maui

Table 1

GUIDE FOR THE DETERMINATION OF RUNOFF COEFFICIENTS FOR BUILT-UP AREAS*

WATERSHED CHARACTERISTICS	EXTREME	HIGH	MODERATE	LOW
INFILTRATION	NEGLIGIBLE 0.20	SLOW 0.14	MEDIUM 0.07	HIGH 0.0
RELIEF	STEEP (> 25%) 0.08	HILLY (15 - 25%) 0.06	ROLLING (5 - 15%) 0.03	FLAT (0 - 5%) 0.0
VEGETAL COVER	NONE 0.07	POOR (< 10%) 0.05	GOOD (10 - 50%) 0.03	HIGH (50 - 90%) 0.0
DEVELOPMENT TYPE	INDUSTRIAL & BUSINESS 0.55	HOTEL - APARTMENT 0.45	RESIDENTIAL 0.40	AGRICULTURAL 0.15

NOTE: The design coefficient "c" must result from a total of the values for all four watershed characteristics of the site.

Table 2

RUNOFF COEFFICIENTS

Type of Drainage Area	Runoff Coefficient C
Business:	
Downtown areas	0.95
Neighborhood areas	0.70
Residential:	
Single-family areas	0.50
Multi-units, detached	0.60
Multi-units, attached	0.75
Suburban	0.40
Apartment dwelling areas	0.70
Industrial:	
Light areas	0.80
Heavy areas	0.90
Parks, cemeteries	0.25
Playgrounds	0.35
Railroad-yard areas	0.40
Unimproved areas	0.30
Streets:	
Asphaltic	0.95
Concrete	0.95
Brick	0.85
Drive and walks	0.85
Roofs	0.95
Lawns:	
Sandy, soil, flat, 2%	0.10
Sandy, soil, avg., 2-7%	0.15
Sandy, soil, steep, 7%	0.20
Heavy soil, flat, 2%	0.17
Heavy soil, avg., 2-7%	0.22
Heavy soil, steep, 7%	0.35

Table 3

MINIMUM RUNOFF COEFFICIENTS FOR BUILT-UP AREAS

RESIDENTIAL AREAS:	C = 0.55 to 0.70
HOTEL-APARTMENT AREAS:	C = 0.70 to 0.90
BUSINESS AREAS:	C = 0.80 to 0.90
INDUSTRIAL AREAS:	C = 0.80 to 0.90

The type of soil, the type of open space and ground cover, and the slope of the ground shall be considered in arriving at reasonable and acceptable runoff coefficients.

Table 4

APPROXIMATE AVERAGE VELOCITIES OF RUNOFF FOR CALCULATING TIME OF CONCENTRATION

TYPE OF FLOW	VELOCITY IN FPS FOR SLOPES (in percent) INDICATED			
OVERLAND FLOW:	0-3%	4-7%	8-11%	12-15%
Woodlands	1.0	2.0	3.0	3.5
Pastures	1.5	3.0	4.0	4.5
Cultivated	2.0	4.0	5.0	6.0
Pavements	5.0	12.0	15.0	18.0
OPEN CHANNEL FLOW:				
Improved Channels	Determine Velocity by Manning's Formula			
Natural Channel* (not well defined)	1.0	3.0	5.0	8.0

**These values vary with the channel size and other conditions so that the ones given are the averages of a wide range. Wherever possible, more accurate determinations should be made for particular conditions by Manning's formula.*

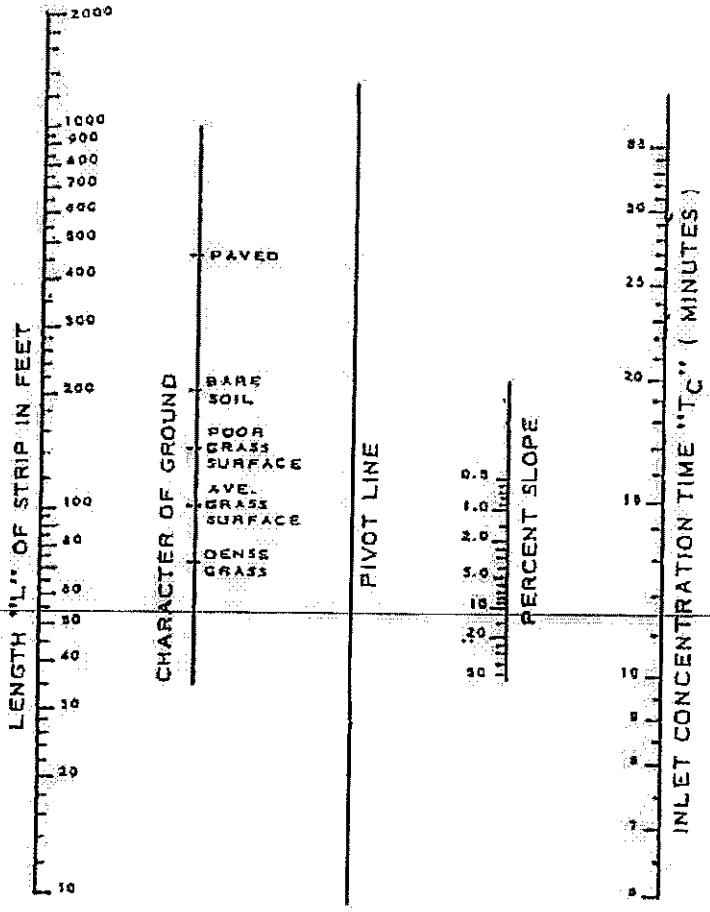
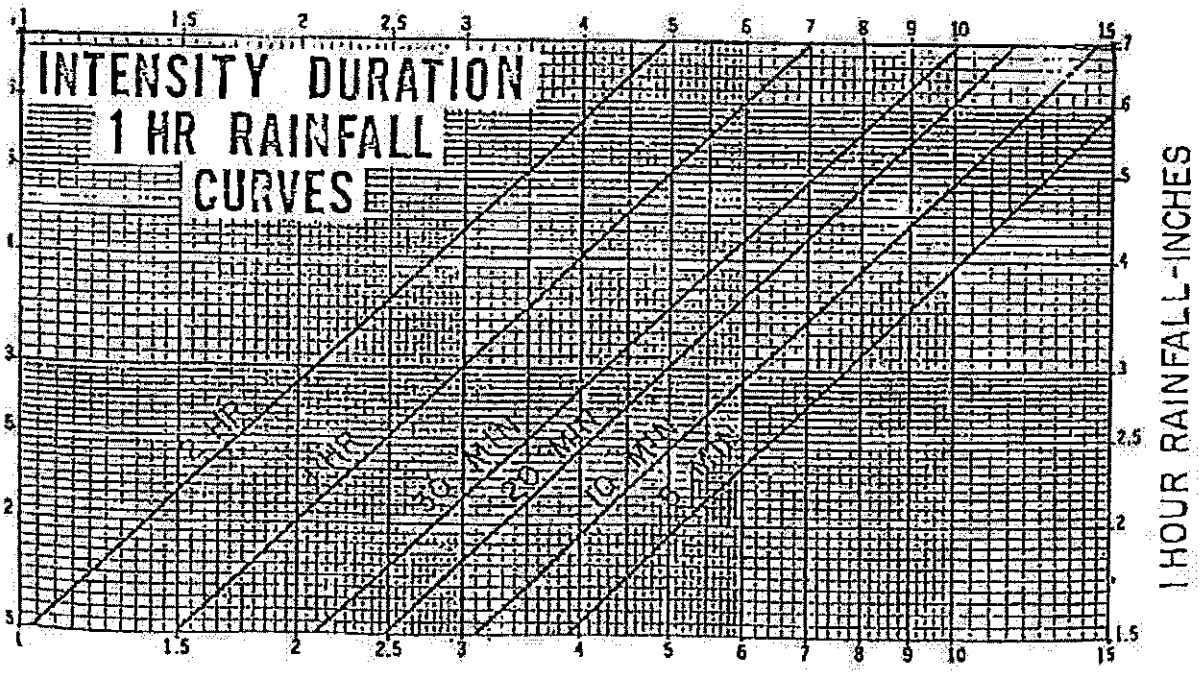
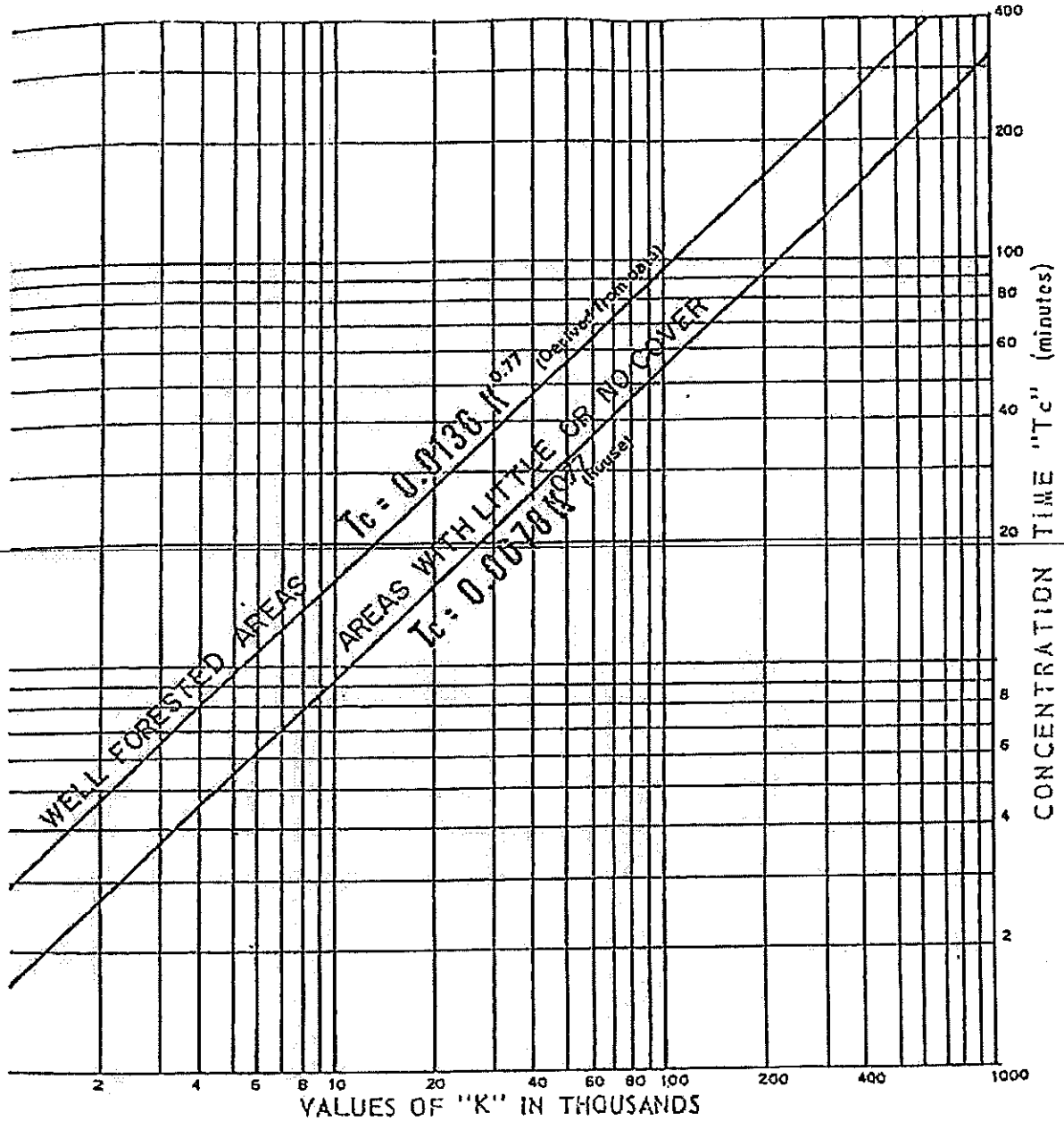


Plate 1

Overland Flow Chart

Plate 2





L = Maximum length of travel in feet
H = Difference in elevation between most remote point and outlet in feet.
S = Slope H/L

$$K = \frac{L}{\sqrt{S}} = \sqrt{\frac{L^3}{H}}$$

Use upper curve for well forested areas.
Use lower curve for areas with little or no cover.

SOURCE: CITY PLANNING COMMISSION
Graph from Hunter Rouse Engineering Hydraulics

Plate 3

Time of Concentration

(OF SMALL AGRICULTURAL DRAINAGE BASIN)

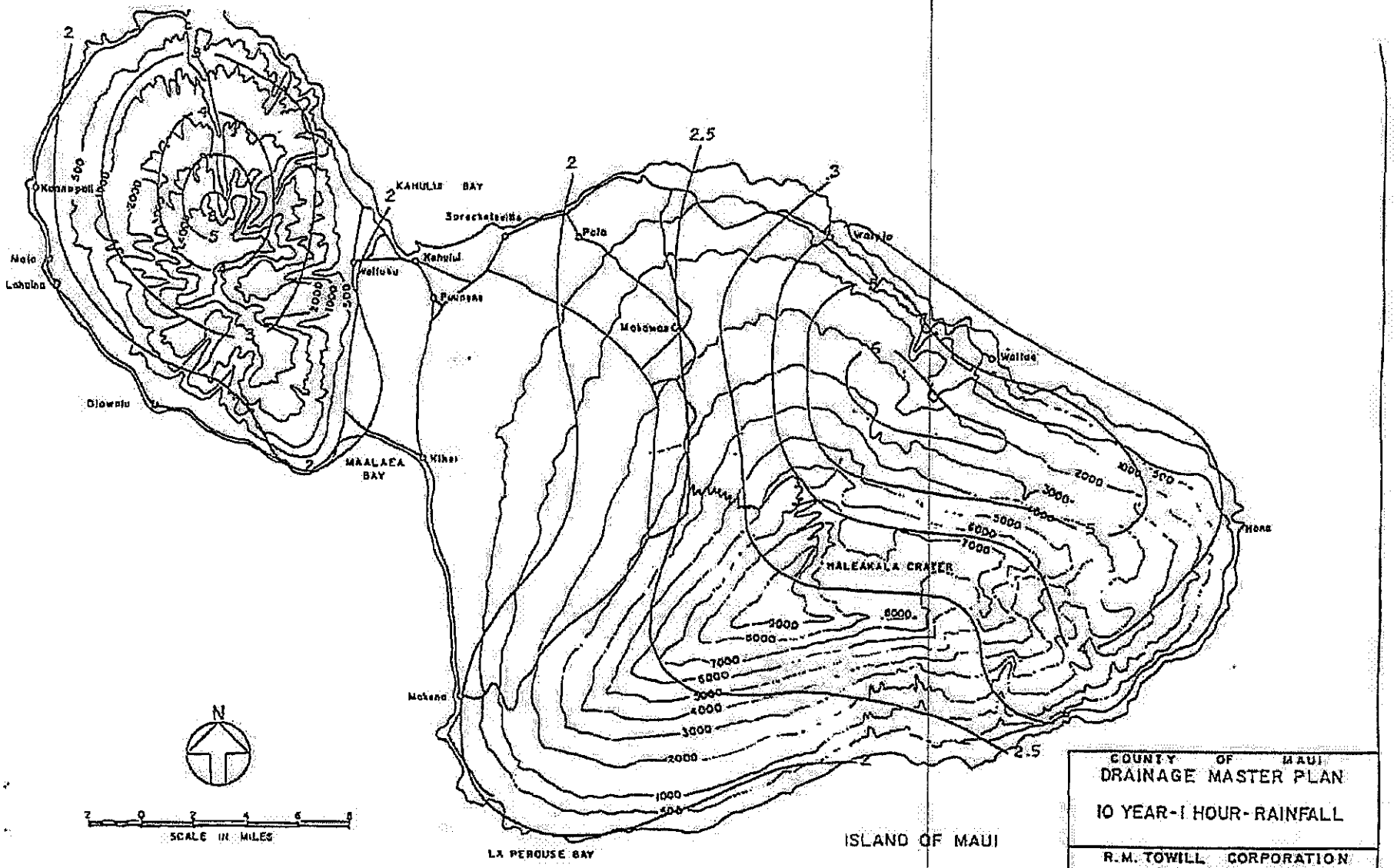
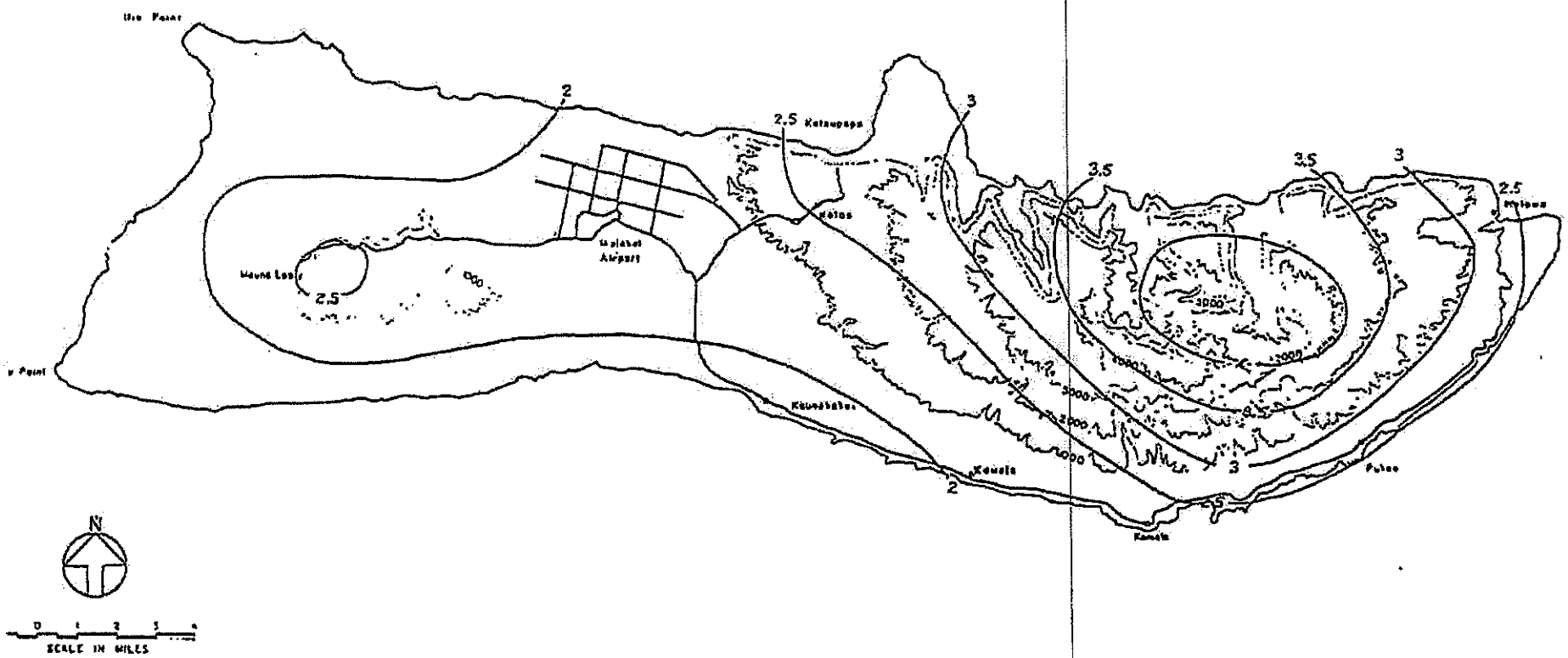

KAHULUI BAY
Kahului
Pala
Waiyio
Wailua
Hana
Makawao
Kihei
MAALAEA BAY
Olowalu
Lahaina
Maia
Kaanapali
HALEAKALA CRATER
Makena
LA PEROUSE BAY
ISLAND OF MAUI
N
SCALE IN MILES
COUNTY OF MAUI
DRAINAGE MASTER PLAN
10 YEAR-1 HOUR-RAINFALL
R.M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

PLATE 4

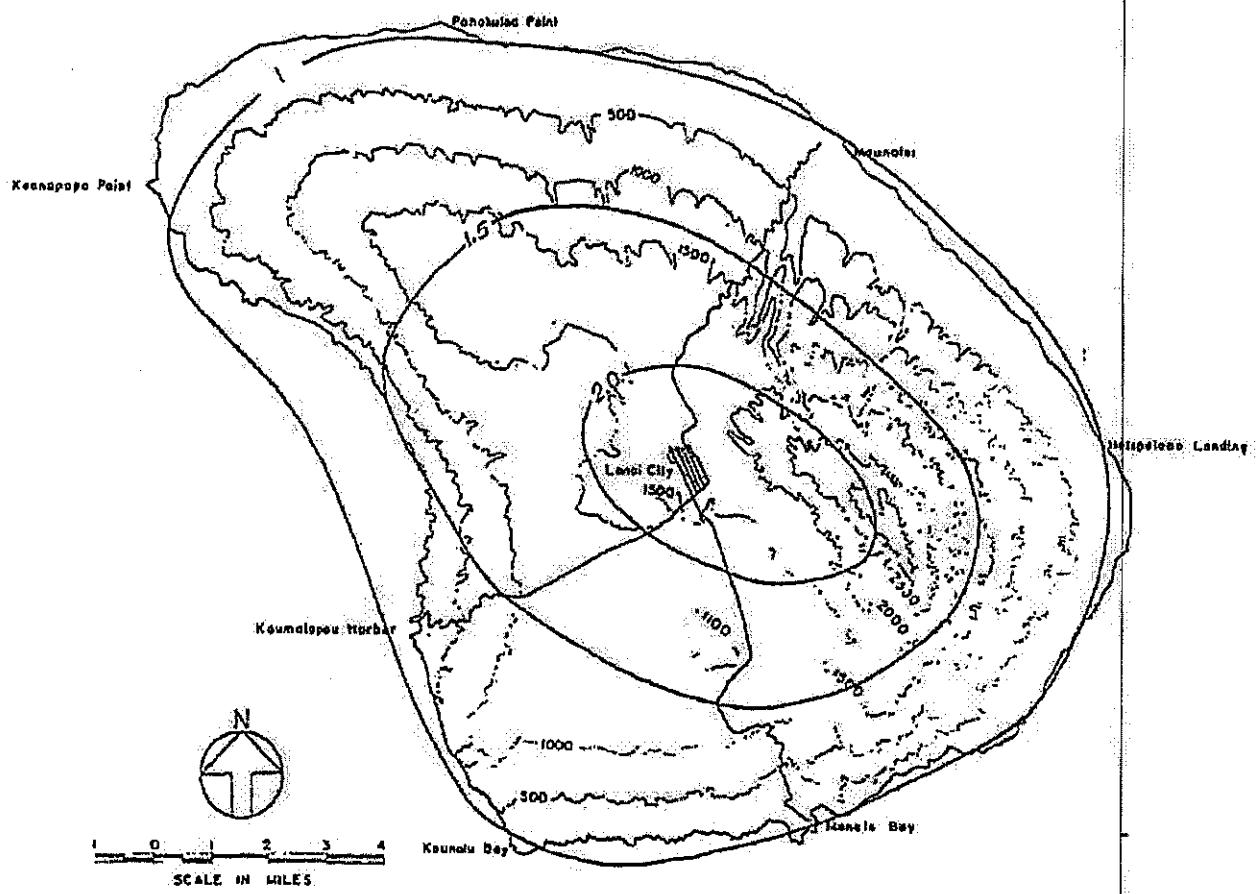


ISLAND OF MOLOKAI

COUNTY OF MAUI
DRAINAGE MASTER PLAN
10 YEAR - 1 HOUR - RAINFALL

R. M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

PLATE 5

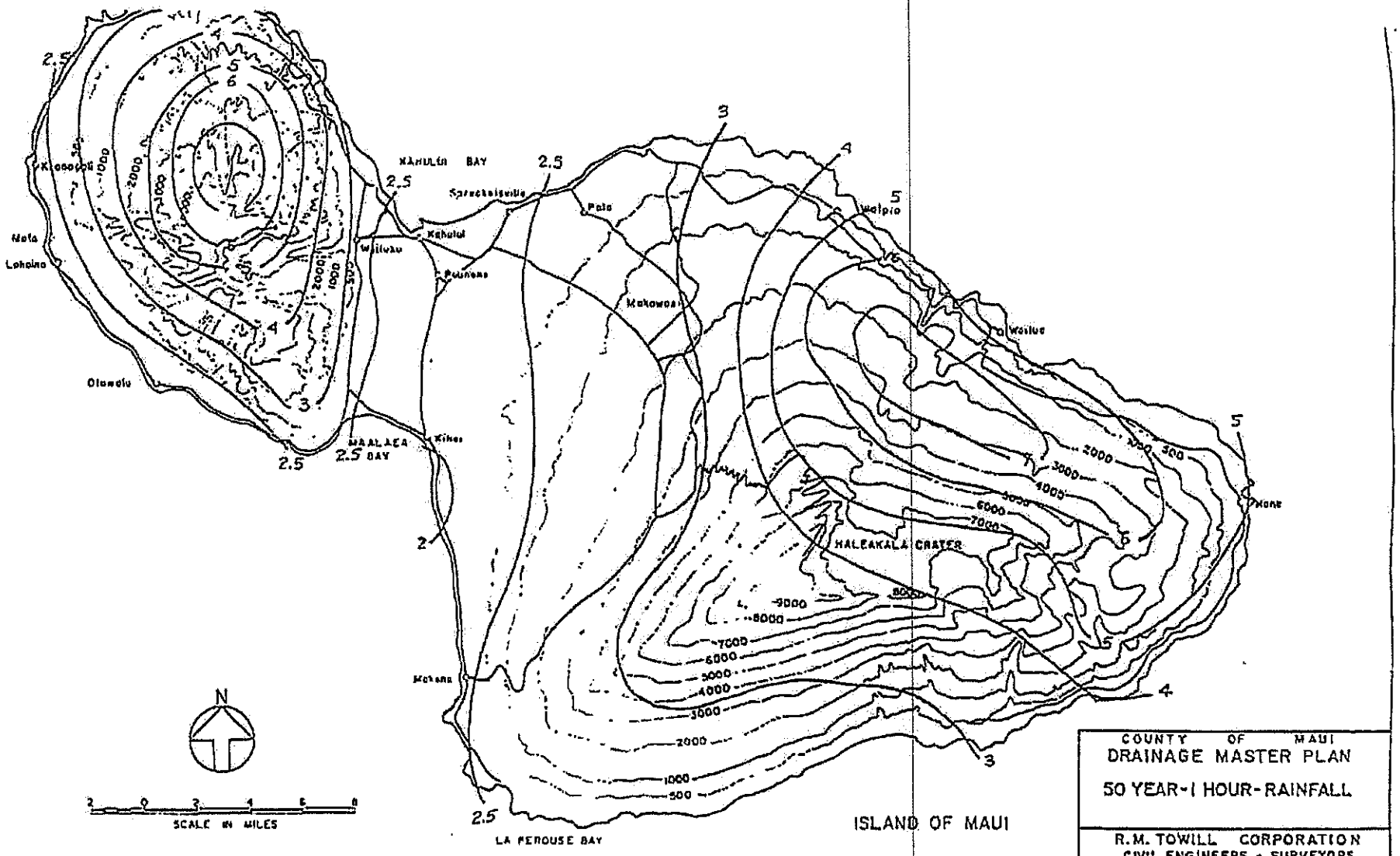


ISLAND OF LANAI

COUNTY OF MAUI
DRAINAGE MASTER PLAN
10 YEAR-1 HOUR-RAINFALL

R.M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

PLATE 6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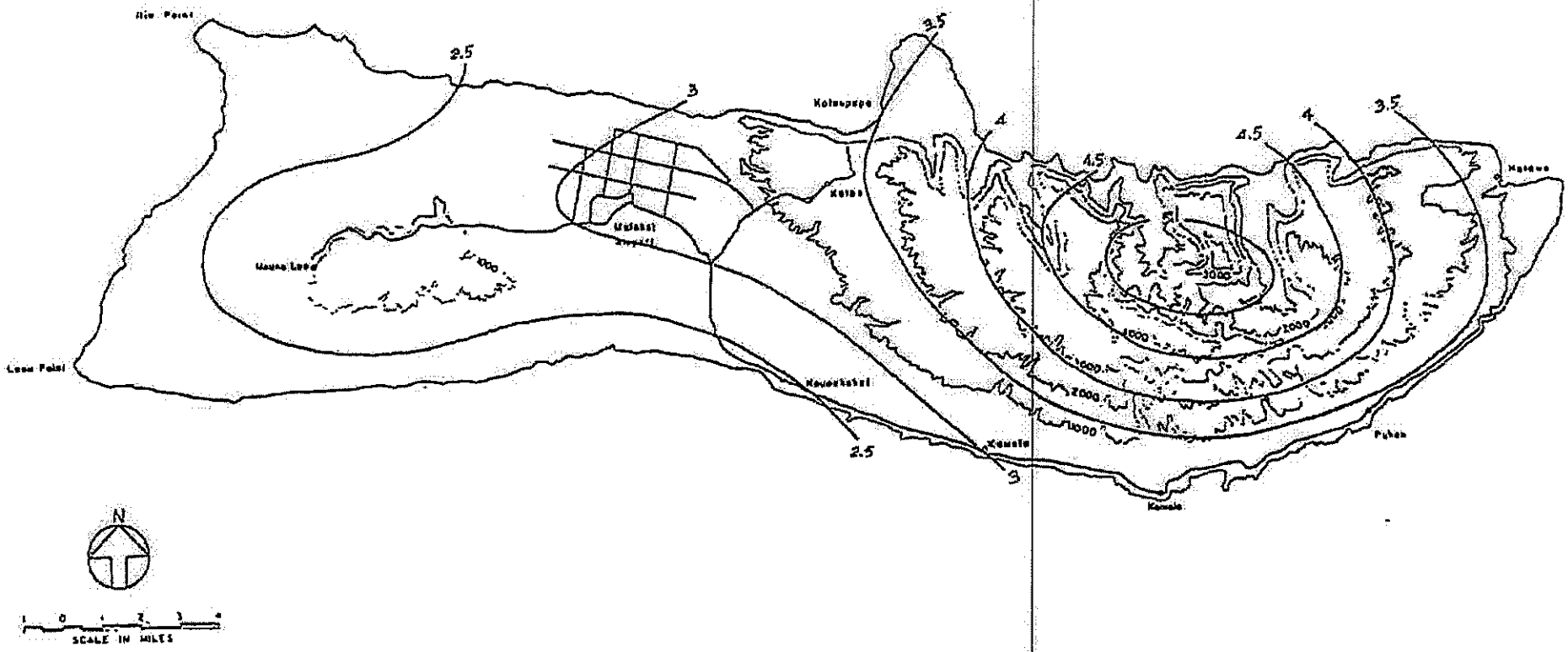
Spreckelsville
Kahului
Wailuku
Paunene
Pala
Makawao
Waipio
Wailuu
Kihei
MAALAEA BAY
Makena
LA PEROUSE BAY
HALEAKALA CRATER
Hana
Olowalu
Lahaina
Mala
Kaanapali
ISLAND OF MAUI
SCALE IN MILES
N
COUNTY OF MAUI
DRAINAGE MASTER PLAN
50 YEAR-1 HOUR-RAINFALL
R.M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

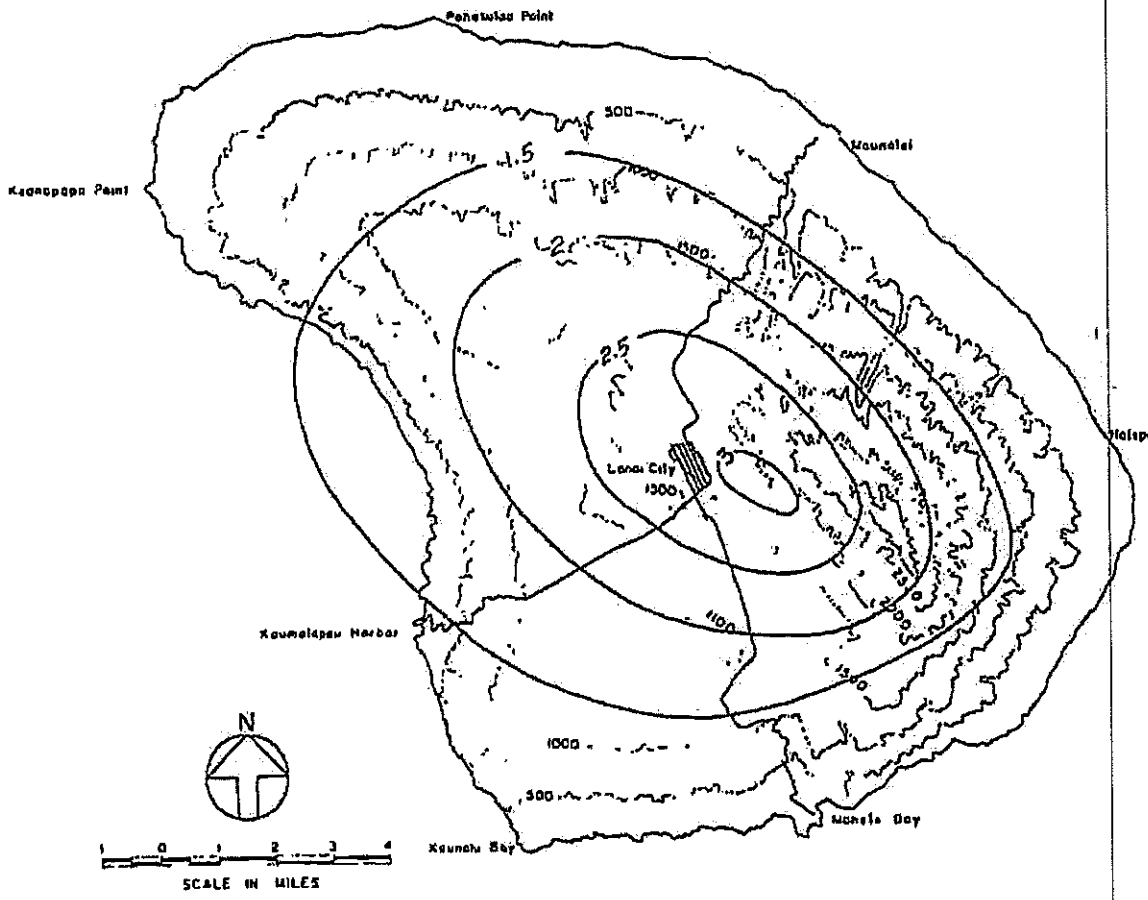
PLATE 7



ISLAND OF MOLOKAI

COUNTY OF MAUI
DRAINAGE MASTER PLAN
50 YEAR-1 HOUR-RAINFALL
R.M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

PLATE 8



ISLAND OF LANAI

COUNTY OF MAUI
DRAINAGE MASTER PLAN
50 YEAR-1 HOUR-RAINFALL

R. M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

PLATE 9

APPENDIX B

Drainage Design Calculation
EXISTING CONDITION

Drainage Design Calculations

Project Title: Haouli Street Drainage Improvements **Prepared By:** JH/CB **Date:** June 14, 2012
Location: Maalaea, Island of Maui, HI **Checked By:** DYK **Date:** July 10, 2012
Item: DRAINAGE FLOW CALCULATIONS (**EXISTING** CONDITION)

A. PURPOSE

Determine the quantity of surface runoff flow in cubic feet per second of the drainage area that contributes to the drainage area that flows toward the existing Haouli Street culvert. The 100-year, 24-hour storm was used to estimate the design flow as stated as a requirement by Ref. 1.

B. CRITERIA

The XP-SWMM version 2010 model shall be used to analyze the existing drainage area, using the SCS Method, Ref. 2.

C. REFERENCES

1. *Title MC-15, Rules for the Design of Storm Drainage Facilities in the County of Maui, Chapter 4* Department of Public Works and Wastewater Management, County of Maui.
2. *Erosion and Sediment Control Guide for Hawaii in Cooperation with the Hawaii Association of Soil and Water Conservation Society of America, Hawaii Chapter., USDA, SCS, Honolulu, Hawaii March 1981.*
3. *USGS Map, Maalaea, Hawaii, 20156-F4-TF-023, 1986*
4. *USDA Web Soil Survey – Online Data*
5. *Urban Hydrology for Small Watersheds Technical Release 55 (TR-55), June 1986.*

D. CALCULATIONS

A = Drainage area in acres (Ac), Figure 1.

Runoff Depth = Depth of runoff (in.)

CN= Curve Number

Tc = Time of concentration (min)

Peak Runoff rate = Flow rate in cubic feet per second (cfs)

Area

Based on available topography and survey data, drainage plans from the Honoapiilani Highway Widening Project, and site visit photos and observations, there are five drainage areas with a total of 724.60 acres. Drainage areas are shown in Figure 4. The Drainage Areas are provided in Table 1.

Table 1. Drainage Areas

100-year, 24-hour storm

Basin ID	Area
	(acres)
A	63.1
B	62.8
C	293.0
D	214.1
E	91.6

Rainfall Depths

Rainfall depths used for the modeled storm events are listed in Table 2, *Urban Hydrology for Small Watersheds Technical Release 55 (TR-55), June* (Reference 5).

Table 2. Rainfall Depths

Storm Event	Rainfall Depth
	(in)
1-year, 24-hour	2.86
2-year, 24-hour	3.93
5-year, 24-hour	5.47
10-year, 24-hour	6.75
25-year, 24-hour	8.61
50-year, 24-hour	10.2
100-year, 24-hour	11.8

Curve Number

The SCS Type I rainfall distribution was used. The drainage areas and detailed calculations of curve numbers are provided in Tables 3.

Table 3. Curve Number Calculation for Hauoli Street Drainage Analysis

Drainage Basin	Land Use	Area	Hydrologic Group	CN	CN*Area	Weighted CN
		(acres)				
A	ROW	6.86	B	79.5	545.02	
A	Trees	4.34	B	55	238.97	
A	Sugar Cane	51.88	B	59	3,060.77	
	Basin Totals:	**63.08**			**3,844.76**	**61**
B	ROW	3.93	B	79.5	312.38	
B	Trees	1.50	B	55	82.67	
B	Sugar Cane	57.37	B	59	3,384.94	
	Basin Totals:	**62.80**			**3,779.99**	**60**
C	Steep Slopes	199.15	D	80	15,931.84	
C	Steep Slopes	29.98	B	61	1,828.73	
C	Steep Slopes	9.43	B	61	575.22	
C	Sugar Cane	51.27	B	59	3,025.13	
C	ROW	3.21	B	79.5	255.31	
	Basin Totals:	**293.04**			**2,1616.23**	**74**
D	Steep Slopes	131.04	D	80	10,482.96	
D	Steep Slopes	3.12	B	61	190.34	
D	Steep Slopes	22.98	B	61	1,401.80	
D	Sugar Cane	53.89	B	59	3,179.63	
D	ROW	3.04	B	79.5	241.47	
D	Steep Slopes	0.00	D	80	0.00	
	Basin Totals:	**214.07**			**15,496.32**	**72**
E	Sugar Cane	65.66	B	59	3873.86	
E	ROW	3.83	B	79.5	304.10	
E	Steep Slopes	0.40	D	80	32.27	
E	Steep Slopes	21.73	B	61	1325.40	
	Basin Totals:	**91.62**			**5,535.63**	**60**

Curve Number

The SCS Type I rainfall distribution was used. The drainage areas and detailed calculations for the time of concentrations are provided in Tables 4.

Table 4. Time of Concentration Calculations

Basin Name	Units	A	B	C	D	E
Area (acres)		63.08	62.80	293.04	214.07	91.60
Sheet flow						
2. Mannings roughness coeff., n (table 3-1)		0.4	0.4	0.4	0.4	0.4
3. Flow length, L (total L<300. ft)	ft	100	100	100	100	100
4. Two-year 24-hour rainfall, P2	in	3.93	3.93	3.93	3.93	3.93
4b. Vertical drop (ft)	ft	3	3	17	24	11
5. Land slope, s	ft/ft	0.03	0.03	0.17	0.24	0.11
6. Tt=0.007(nL)^0.8/P2^0.5/s^0.4	hr	**0.275**	**0.275**	**0.137**	**0.120**	**0.163**
Shallow concentrated flow						
7. Surface description (paved or unpaved)		UNPAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED
8. Flow length, L	ft	2,650	3,390	11,750	9,170	3,075
8b. Vertical drop	ft	60	90	1,980	1,540	200
9. Watercourse slope, s	ft/ft	0.023	0.027	0.17	0.17	0.065
10. Average velocity, V (figure 3-1)	ft/s	2.43	2.63	6.62	6.61	4.11
11. Tt= L/3600/V	hr	**0.303**	**0.358**	**0.493**	**0.385**	**0.208**
Channel flow						
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, Pw	ft					
14. Hydraulic radius, r=a/Pw	ft	0.000	0.000	0.000	0.000	0.000
14A. Vertical drop	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. V=1.49*r^(2/3)s^(1/2)/n	ft/s	0.000	0.000	0.000	0.000	0.000
18. Flow length, L	ft					
19. Tt= L/3600/V	hr	0.000	0.000	0.000	0.000	0.000
20. Total Watershed Tc	hr	**0.578**	**0.633**	**0.630**	**0.505**	**0.371**
	min.	**35**	**38**	**38**	**30**	**22**

Summary

A summary of the drainage basin runoff data is provided in Table 5.

Table 5. Hydrologic Input and Results
100-year, 24-hour storm

Basin ID	Area	CN	Tc	Runoff Depth	Peak Runoff Rate
	(acres)		(min)	(in)	(cfs)
A	63.1	61	35	6.38	169
B	62.8	60	38	6.27	157
C	293.0	74	38	8.23	1,003
D	214.1	72	30	8.05	813
E	91.6	60	22	6.35	308

Overland flow path locations that were included to account for possible overflows of the designed conveyance system include:

1) Inlets to the existing culverts where the culvert capacity could be exceeded during certain storm events,
2) Locations where water could overflow Honoapiilani Highway or Hauoli Street,
3) Along the GRP channel, and
4) Along Honoapiilani Highway towards Maalaea.

The most significant overflow path is along Honoapiilani Highway towards Maalaea. For the 100-year, 24-hour storm event, the modeling results show a peak flow of 1,244 cfs in that overland flow path. This overflow does not reach the project site. The remaining 421 cfs generated by the other overflow paths will not reach the project site and will flow to the outfall location east tf the project site. See model schematic, Figure 6.

Thus, the total amount of drainage runoff affecting the project site is anticipated to be about **785 cfs,** in the existing condition.

APPENDIX C

Drainage Design Calculation
PROPOSED CONDITION

Drainage Design Calculations

Project Title: Haouli Street Drainage Improvements **Prepared By:** JH/CB/TS **Date:** June 14, 2012
Location: Maalaea, Island of Maui, HI **Checked By:** DYK **Date:** July 10, 2012
Item: DRAINAGE FLOW CALCULATIONS (**PROPOSED** CONDITION)

A. PURPOSE

Determine the quantity of surface runoff flow in cubic feet per second of the drainage area that contributes to the drainage area that flows toward the existing Haouli Street culvert. The 100-year, 24-hour storm was used to estimate the design flow as stated as a requirement by Ref. 1.

B. CRITERIA

The XP-SWMM version 2010 model shall be used to analyze the existing drainage area, using the SCS Method, Ref. 2.

C. REFERENCES

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4. *USDA Web Soil Survey – Online Data*
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14A. Vertical drop	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. V=1.49*r^(2/3)s^(1/2)/n	ft/s	0.000	0.000	0.000	0.000	0.000
18. Flow length, L	ft					
19. Tt= L/3600/V	hr	0.000	0.000	0.000	0.000	0.000
20. Total Watershed Tc	hr	**0.578**	**0.633**	**0.630**	**0.505**	**0.371**
	min.	**35**	**38**	**38**	**30**	**22**

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100-year, 24-hour storm

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2) Locations where water could overflow Honoapiilani Highway or Hauoli Street,
3) Along the GRP channel, and
4) Along Honoapiilani Highway towards Maalaea.

The most significant overflow path is along Honoapiilani Highway towards Maalaea. For the 100-year, 24-hour storm event, the modeling results show a peak flow of 1,244 cfs in that overland flow path. This overflow does not reach the project site.

The XP-SWMM Model results indicate the peak flow in the GRP channel is less than its designed maximum capacity, as shown in Table 6. See attachment for model input data.

Table 6. Model Results*
100-year, 24-hour Results

	Scenario 1
Peak flow into Water Quality Basin (cfs)	785
Maximum Water Surface Elevation in Water Quality Basin	12.84
Is water flowing over Hauoli Street?	No

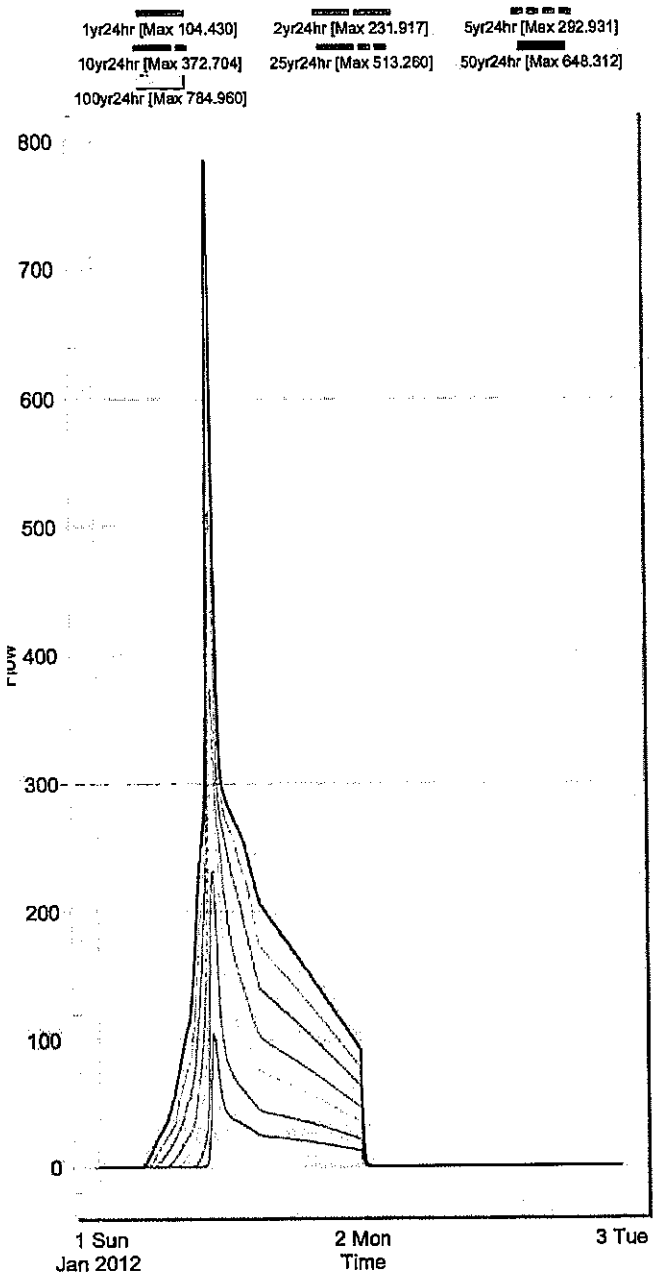
**The top of wing wall elevation is set at 14 ft in the model runs.*

Thus, the total amount of drainage in the existing conditions is anticipated to be about **785 cfs.**

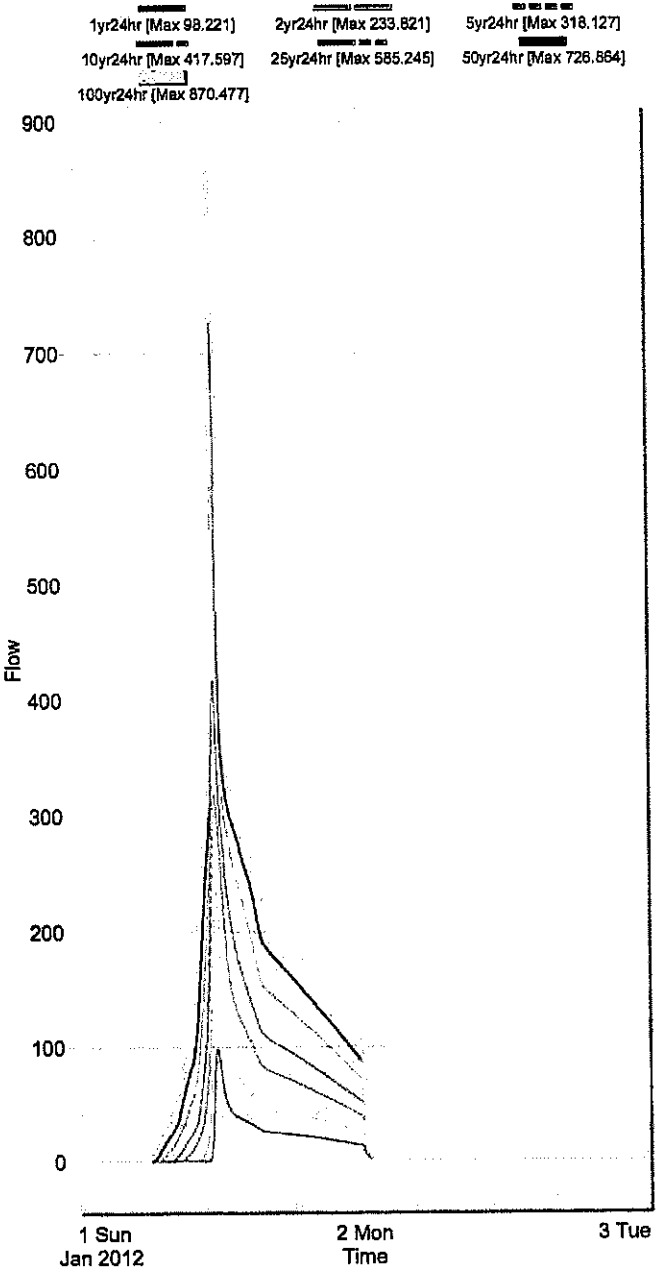
ATTACHEMENT 1

XP-SWMM MODEL INPUT DATA WITH HYDROGRAPHS

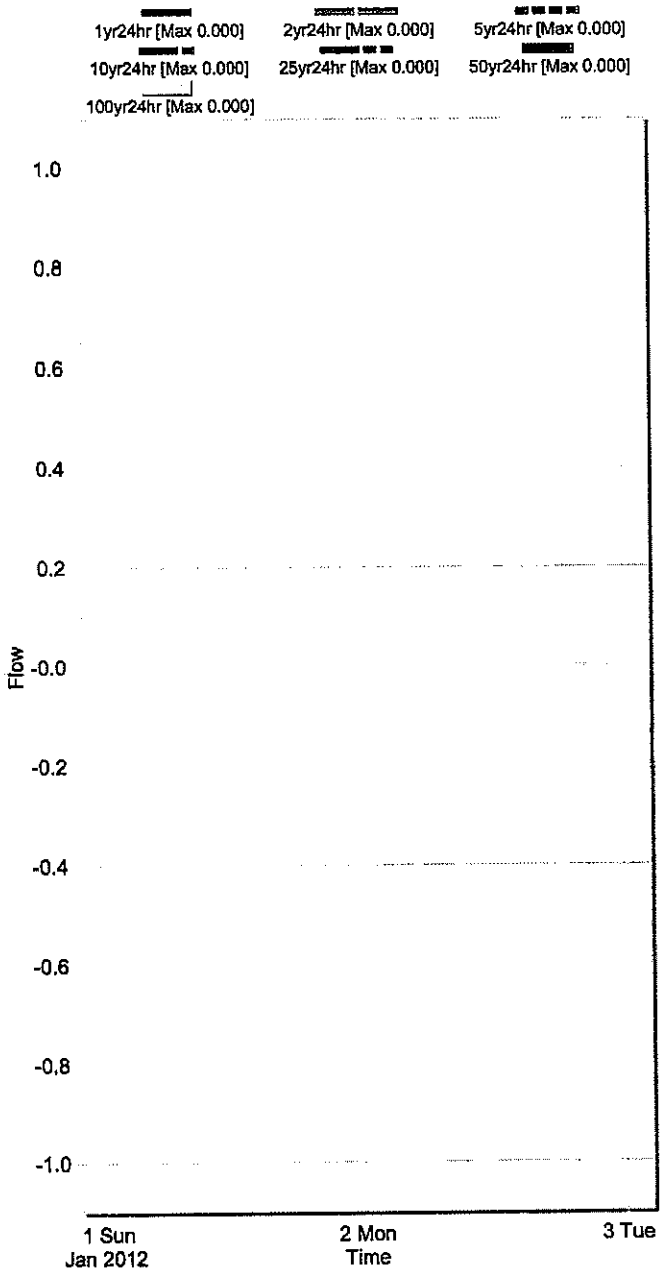
Conduit Link24 from Node25 to DB_A



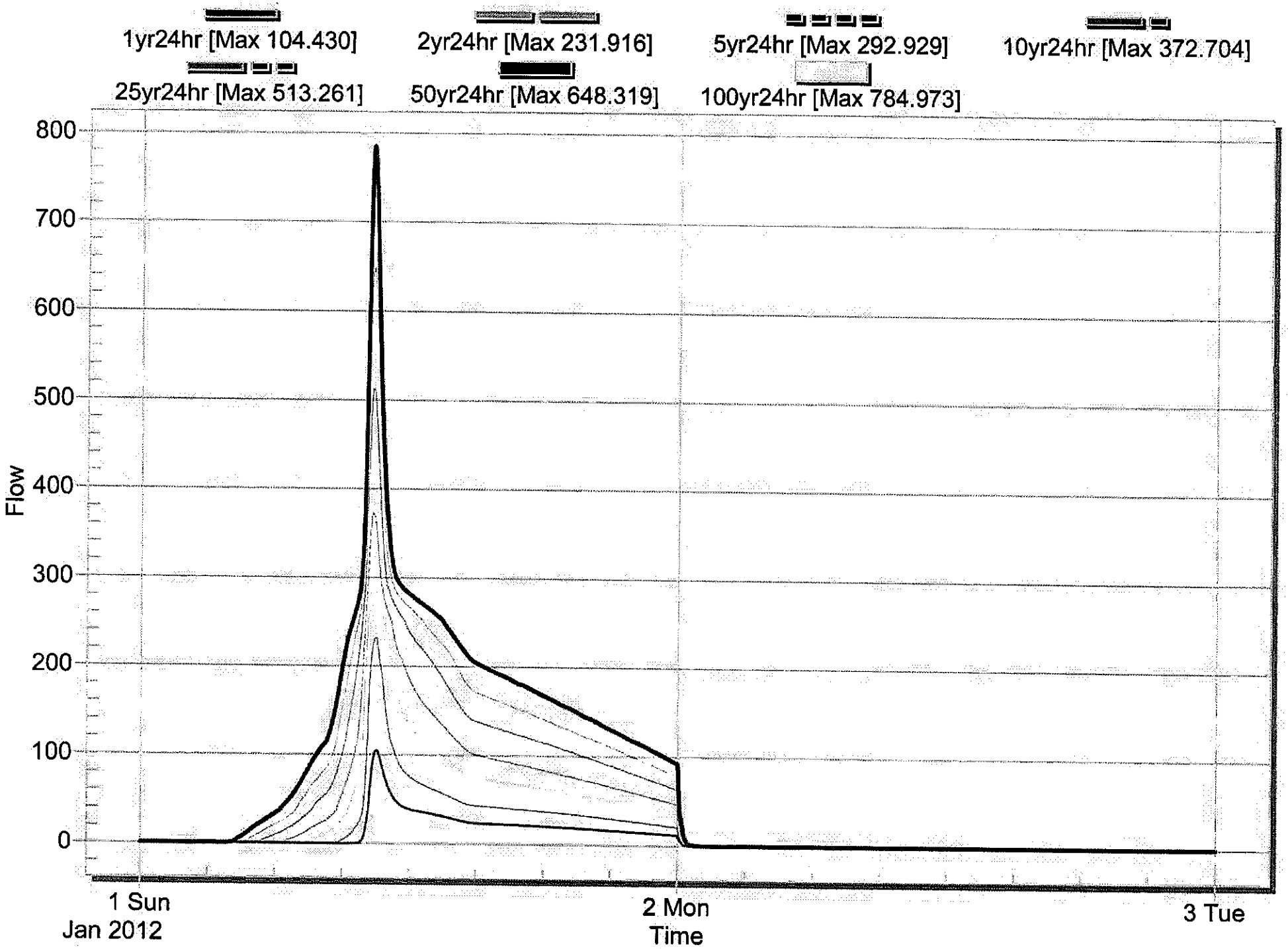
Conduit BoxCulv2 from DB_A to CulvDN



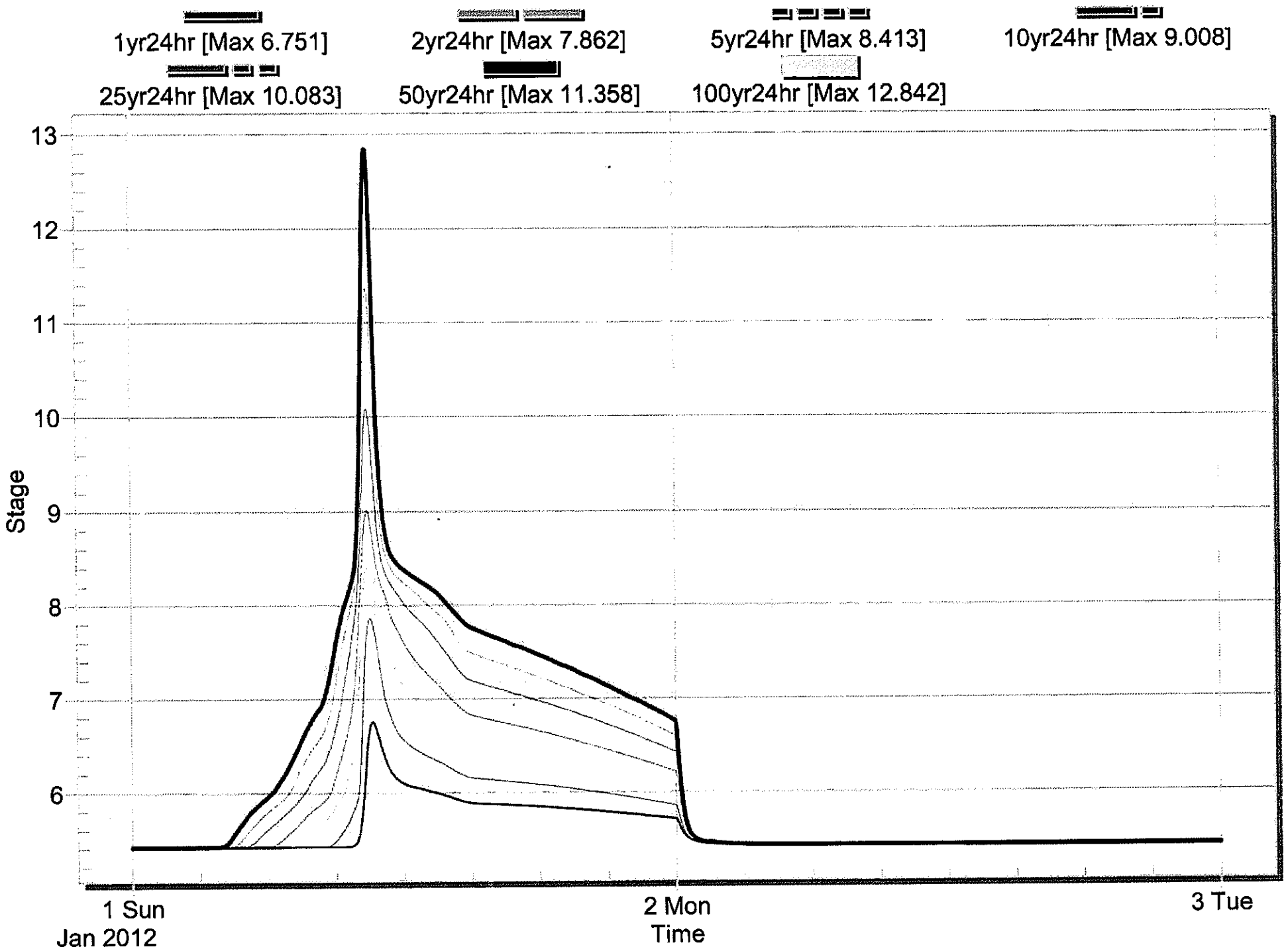
Conduit Street from DB_A to CulvDN



Conduit Link24 from Node25 to DB_A



Node - DB_A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2yr24hr [Max 7.862]
5yr24hr [Max 8.413]
10yr24hr [Max 9.008]
25yr24hr [Max 10.083]
50yr24hr [Max 11.358]
100yr24hr [Max 12.842]
13
12
11
10
9
8
7
6
Stage
1 Sun
Jan 2012
2 Mon
Time
3 Tue

Attachment 1
Model Node Data

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
DB_A	1yr24hr	5.42	6.7
DB_A	2yr24hr	5.42	8.1
DB_A	5yr24hr	5.42	9.9
DB_A	10yr24hr	5.42	12.0
DB_A	25yr24hr	5.42	14.3
DB_A	50yr24hr	5.42	14.6
DB_A	100yr24hr	5.42	14.8
EndDtch	1yr24hr	2	2.5
EndDtch	2yr24hr	2	3.1
EndDtch	5yr24hr	2	3.4
EndDtch	10yr24hr	2	3.4
EndDtch	25yr24hr	2	3.7
EndDtch	50yr24hr	2	3.8
EndDtch	100yr24hr	2	4.0
Ocean	1yr24hr	0	0.5
Ocean	2yr24hr	0	1.1
Ocean	5yr24hr	0	1.2
Ocean	10yr24hr	0	1.4
Ocean	25yr24hr	0	1.7
Ocean	50yr24hr	0	1.8
Ocean	100yr24hr	0	2.0
CulvDN	1yr24hr	4.92	6.2
CulvDN	2yr24hr	4.92	7.0

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
CulvDN	5yr24hr	4.92	7.9
CulvDN	10yr24hr	4.92	8.5
CulvDN	25yr24hr	4.92	9.1
CulvDN	50yr24hr	4.92	9.6
CulvDN	100yr24hr	4.92	9.7
Node19	1yr24hr	12.9	12.9
Node19	2yr24hr	12.9	12.9
Node19	5yr24hr	12.9	12.9
Node19	10yr24hr	12.9	12.9
Node19	25yr24hr	12.9	13.8
Node19	50yr24hr	12.9	14.3
Node19	100yr24hr	12.9	14.5
Node20	1yr24hr	12.9	13.5
Node20	2yr24hr	12.9	13.7
Node20	5yr24hr	12.9	14.0
Node20	10yr24hr	12.9	14.1
Node20	25yr24hr	12.9	14.3
Node20	50yr24hr	12.9	14.6
Node20	100yr24hr	12.9	14.8
DB_B	1yr24hr	11.5	14.1
DB_B	2yr24hr	11.5	14.2
DB_B	5yr24hr	11.5	14.3
DB_B	10yr24hr	11.5	14.4
DB_B	25yr24hr	11.5	14.5

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
DB_B	50yr24hr	11.5	14.6
DB_B	100yr24hr	11.5	14.8
Node22	1yr24hr	15	15.0
Node22	2yr24hr	15	15.0
Node22	5yr24hr	15	15.0
Node22	10yr24hr	15	15.0
Node22	25yr24hr	15	15.0
Node22	50yr24hr	15	15.0
Node22	100yr24hr	15	15.0
SC_Ocean	1yr24hr	0	0.0
SC_Ocean	2yr24hr	0	0.1
SC_Ocean	5yr24hr	0	0.2
SC_Ocean	10yr24hr	0	0.4
SC_Ocean	25yr24hr	0	0.5
SC_Ocean	50yr24hr	0	0.6
SC_Ocean	100yr24hr	0	0.8
DB_C	1yr24hr	52	54.9
DB_C	2yr24hr	52	57.2
DB_C	5yr24hr	52	57.7
DB_C	10yr24hr	52	58.0
DB_C	25yr24hr	52	58.4
DB_C	50yr24hr	52	58.7
DB_C	100yr24hr	52	59.0
Node25	1yr24hr	43	44.5

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
Node25	2yr24hr	43	44.9
Node25	5yr24hr	43	45.3
Node25	10yr24hr	43	45.6
Node25	25yr24hr	43	45.9
Node25	50yr24hr	43	46.1
Node25	100yr24hr	43	46.3
GRP1	1yr24hr	86.5	86.6
GRP1	2yr24hr	86.5	86.9
GRP1	5yr24hr	86.5	87.4
GRP1	10yr24hr	86.5	87.7
GRP1	25yr24hr	86.5	88.1
GRP1	50yr24hr	86.5	88.5
GRP1	100yr24hr	86.5	88.8
GRP5	1yr24hr	61.67	62.4
GRP5	2yr24hr	61.67	62.9
GRP5	5yr24hr	61.67	63.2
GRP5	10yr24hr	61.67	63.5
GRP5	25yr24hr	61.67	63.8
GRP5	50yr24hr	61.67	64.1
GRP5	100yr24hr	61.67	64.3
DB_E	1yr24hr	89	89.1
DB_E	2yr24hr	89	89.2
DB_E	5yr24hr	89	89.5
DB_E	10yr24hr	89	89.7

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
DB_E	25yr24hr	89	90.0
DB_E	50yr24hr	89	90.2
DB_E	100yr24hr	89	90.5
DB_D	1yr24hr	63.5	65.7
DB_D	2yr24hr	63.5	67.8
DB_D	5yr24hr	63.5	68.3
DB_D	10yr24hr	63.5	68.5
DB_D	25yr24hr	63.5	68.7
DB_D	50yr24hr	63.5	68.9
DB_D	100yr24hr	63.5	69.0
Node30	1yr24hr	47	47.5
Node30	2yr24hr	47	47.9
Node30	5yr24hr	47	48.6
Node30	10yr24hr	47	49.1
Node30	25yr24hr	47	49.7
Node30	50yr24hr	47	50.1
Node30	100yr24hr	47	50.5
SC_Ocean1	1yr24hr	0	0.0
SC_Ocean1	2yr24hr	0	0.0
SC_Ocean1	5yr24hr	0	0.0
SC_Ocean1	10yr24hr	0	0.0
SC_Ocean1	25yr24hr	0	0.0
SC_Ocean1	50yr24hr	0	0.0
SC_Ocean1	100yr24hr	0	0.0

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
GRP3	1yr24hr	74.09	74.2
GRP3	2yr24hr	74.09	74.5
GRP3	5yr24hr	74.09	75.0
GRP3	10yr24hr	74.09	75.3
GRP3	25yr24hr	74.09	75.7
GRP3	50yr24hr	74.09	76.1
GRP3	100yr24hr	74.09	76.4
SC_Ocean2	1yr24hr	0	0.0
SC_Ocean2	2yr24hr	0	0.0
SC_Ocean2	5yr24hr	0	0.0
SC_Ocean2	10yr24hr	0	0.0
SC_Ocean2	25yr24hr	0	0.0
SC_Ocean2	50yr24hr	0	0.0
SC_Ocean2	100yr24hr	0	0.0
GRP2	1yr24hr	80.3	80.4
GRP2	2yr24hr	80.3	80.7
GRP2	5yr24hr	80.3	81.2
GRP2	10yr24hr	80.3	81.5
GRP2	25yr24hr	80.3	81.9
GRP2	50yr24hr	80.3	82.3
GRP2	100yr24hr	80.3	82.6
GRP4	1yr24hr	67.88	68.0
GRP4	2yr24hr	67.88	68.3
GRP4	5yr24hr	67.88	68.8

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
GRP4	10yr24hr	67.88	69.1
GRP4	25yr24hr	67.88	69.5
GRP4	50yr24hr	67.88	69.8
GRP4	100yr24hr	67.88	70.1
SC_Ocean3	1yr24hr	0	0.0
SC_Ocean3	2yr24hr	0	0.0
SC_Ocean3	5yr24hr	0	0.0
SC_Ocean3	10yr24hr	0	0.0
SC_Ocean3	25yr24hr	0	0.0
SC_Ocean3	50yr24hr	0	0.0
SC_Ocean3	100yr24hr	0	0.0
SC_Ocean4	1yr24hr	0	0.0
SC_Ocean4	2yr24hr	0	0.0
SC_Ocean4	5yr24hr	0	0.0
SC_Ocean4	10yr24hr	0	0.0
SC_Ocean4	25yr24hr	0	0.0
SC_Ocean4	50yr24hr	0	0.0
SC_Ocean4	100yr24hr	0	0.0
To_Maalaea	1yr24hr	37	37.0
To_Maalaea	2yr24hr	37	37.5
To_Maalaea	5yr24hr	37	38.0
To_Maalaea	10yr24hr	37	38.2
To_Maalaea	25yr24hr	37	38.4
To_Maalaea	50yr24hr	37	38.6

Node Name	Storm	Invert Elevation	Max Water Elevation
		(ft)	(ft)
To_Maalaea	100yr24hr	37	38.7

ATTACHEMENT 2

XP-SWMM MODEL LINK DATA

Attachment 2
Model Link Data

Link Name	Conduit Name	Upstream Node Name	Downstream Node Name	Downstream Invert Elevation	Upstream Invert Elevation	Dia. (Height)	Length	Conduit Slope
				(ft)	(ft)	(ft)	(ft)	(%)
BetwCond	ditch	CulvDN	EndDtch	2	4.92	10	364	0.802
End_SCFE	End_SCFE	Node20	DB_B	11.5	12.9	0	20	7
EndSCFW	EndSCFW	Node19	Node22	15	12.9	0	20	-10.5
GRP_Over	GRP_Over	GRP3	SC_Ocean2	0	79.59	0	3110	2.559
GRP_Over 1	GRP_Over1	GRP1	SC_Ocean1	0	92	0	3550	2.592
GRP_Over 2	GRP_Over2	GRP5	Node20	12.9	67.17	0	1990	2.727
HauoliSt	BoxCulv2	DB_A	CulvDN	4.92	5.42	4	100	0.5
HauoliSt	Street	DB_A	CulvDN	11.7	14	10	100	2.3
Link23	2-36in	DB_C	Node30	47	52	3	76	6.579
Link23	2-36_Over	DB_C	Node30	56.9	57	10	76	0.132
Link24	Link24	Node25	DB_A	20	43	0	1360	1.691
Link25	Link25	GRP1	GRP2	80.3	86.5	0	342.5	1.81
Link25.1	Link25.1	GRP3	GRP4	67.88	74.09	0	342.5	1.813
Link25.1.1	Link25.1.1	GRP4	GRP5	61.67	67.88	0	342.5	1.813
Link25.2	Link25.2	GRP2	GRP3	74.09	80.3	0	342.5	1.813
Link26	Link26	GRP5	Node25	43	61.67	0	890	2.098
Link28	10x6	DB_E	GRP1	86.5	89	6	62.5	4
Link28	10x6Over	DB_E	GRP1	97.9	98	10	62.5	0.16
Link29	3x5	DB_D	GRP5	62.5	63.5	3	67	1.493

Link29	3x5_over	DB_D	GRP5	69.4	69.5	10	67	0.149
Link30	Link30	Node30	Node25	43	47	10	48	8.333
Link32	Link32	DB_E	DB_D	67.5	93	0	1370	1.861
Link33	Link33	DB_D	DB_C	56	67.5	0	890	1.292
Link38	Link38	GRP2	SC_Ocean3	0	85.8	0	3100	2.768
Link39	Link39	GRP4	SC_Ocean4	0	73.38	0	2600	2.822
Link40	Link40	DB_C	To_Maalaea	37	56	0	1000	1.9
Out	Dischrg	EndDtch	Ocean	0	2	10	20	0
SC_Over_R	SC_Over_R	DB_B	SC_Ocean	0	11.5	0	400	2.875
SCFE_Over	SCFE_Over	DB_A	Node20	12.9	13	0	1500	0.007
SCFW_Over	SCFW_Over	DB_A	Node19	12.9	13	0	1640	0.006

APPENDIX D

Storm Water Quality Pond Design Calculation
PROPOSED CONDITION

AECOM

JOB TITLE HAUOLI STREET DRAINAGE IMPROVEMENTS
JOB NO. 60182639 CALCULATION NO. 1
ORIGINATOR ALEX TIEDEMANN DATE 2/22/12
REVIEWER DIANE KODAMA DATE
SCALE N/A SHEET NO. 1 OF 4

PURPOSE: TO DETERMINE THE REQUIRED WATER QUALITY VOLUME & TO SIZE THE OUTLET RISER TO TARGET DETENTION TIME OF GREATER THAN 48 HRS.

REFERENCES: "RULES RELATING TO STORM DRAINAGE STANDARDS", DPP, C&C OF HONOLULU, JANUARY 2000.

§ 1-5.1.C DETENTION BASED WATER QUALITY CONTROL

1.) DESIGN VOLUME

a) RUNOFF COEFFICIENT, C

$$C = 0.05 + (0.009)(IMP)$$

WHERE: IMP = IMPERVIOUS AREA FOR THE TRIBUTARY WATERSHED, EXPRESSED AS A PERCENTAGE

TRIBUTARY WATERSHED AREA = 183.60 ACRES
IMPERVIOUS AREA = 1.00 ACRES (PAVEMENT)

$$IMP = \frac{1}{183.6} * 100\% = 0.54\%$$

$$C = 0.05 + (0.009)(0.54)$$

$$\boxed{C = 0.055}$$

b) DESIGN STORM SIZE: 1" STORM

c) VOLUME CALCULATION

$$WQDV = C * 1" * A * 3630$$

WHERE:
WQDV = WATER QUALITY DESIGN VOLUME (CUBIC FEET)
C = RUNOFF COEFFICIENT, 0.055
A = AREA OF SITE (ACRES), 183.6
3630 = CONVERSION FACTOR

$$WQDV = 0.055\ (1")\ (183.60)(3630)$$

$$WQDV = 36,656 \text{ CUBIC FEET}$$

Grid: 5x5 = 1 in

AECOM

JOB TITLE Haven Street Drainage Improvements
JOB NO. 60182639 CALCULATION NO. 1
ORIGINATOR Alex Tiedemann DATE 2/22/12
REVIEWER Diane Kodama DATE
SCALE N/A SHEET NO. 2 OF 4

WQDV = 36,656 CUBIC FEET (CF)

ALLOW 20% EXTRA VOLUME FOR SEDIMENT STORAGE.

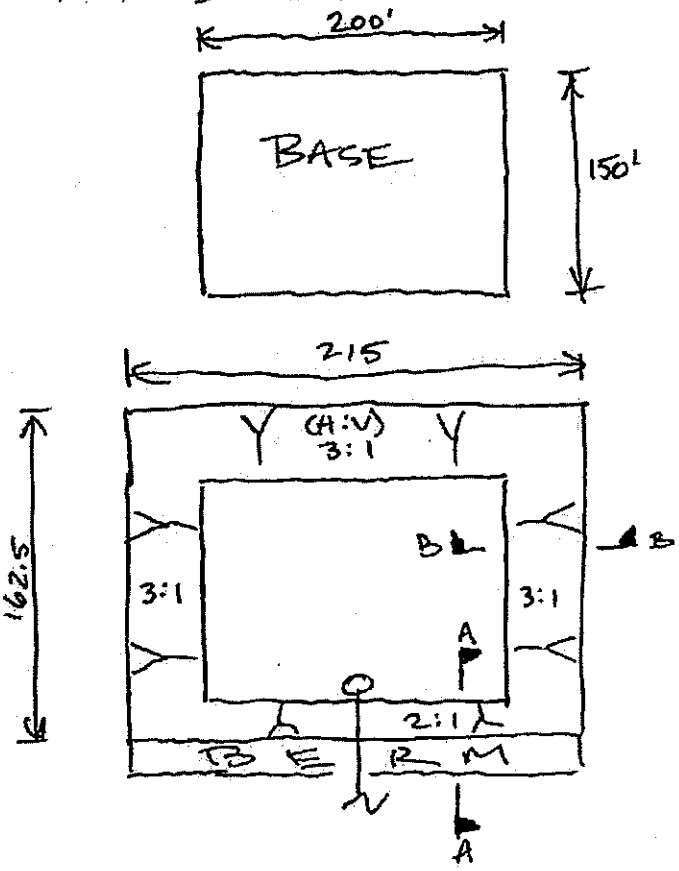
$36,656 * 1.20 = 43,987 \Rightarrow$ **44,000 CF SAY**

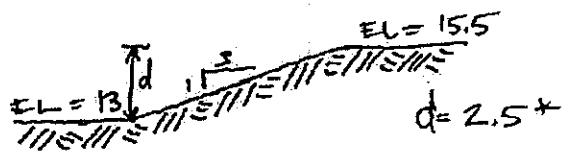
2. DETENTION TIME

- DRAW DOWN TIME
  TOTAL TIME ≥ 48 HRS.*
  *~~BOTTOM HALF DETENTION VOLUME ≥ 36 HRS.~~

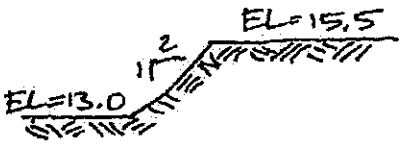
- OUTLET SIZING
  - MEET DETENTION TIME & MIN 4" DIAMETER

PROPOSED POND





SEC B-B



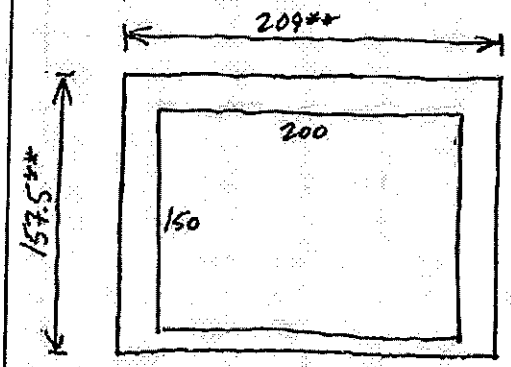
SEC A-A

* SIZED W/ 1' FREEBOARD

Grid: 5x5 = 1 in

AECOM

JOB TITLE HAUAI STREET DRAINAGE IMPROVEMENTS
JOB NO. 60182639 CALCULATION NO. 1
ORIGINATOR ALEX TIEDEMANN DATE 2/22/12
REVIEWER DANE KODAMA DATE
SCALE N/A SHEET NO. 3 OF 4



** BASIN DIMENSIONS NOT INCLUDING FREEBOARD

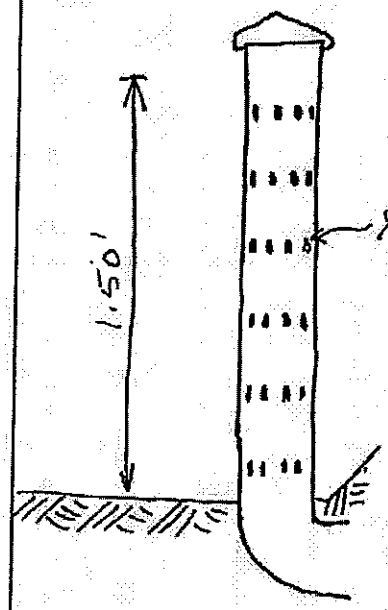
STORAGE

200 * 150 = 30,000 SQ FT
209 * 157.5 = 32,917.5 SQ FT

$\left(\frac{32,917.5 + 30,000}{2}\right) * 1.5 = 47,188$ CF

S = 47,188 ≥ 44,000 ✓ OK

OUTLET RISER



6" PVC PIPE
W/
6 ROWS & 8 COLUMNS OF ½" HOLES DRILLED INTO PIPE

SEE ATTACHED SPREADSHEET FOR DRAW DOWN TIME CALCULATION FOR EACH RISER PIPE.

TOTAL DRAW DOWN TIME = 196.0 HRS
FOR FOUR (4) RISERS

DRAW DOWN TIME = 196.0/4
= 49 HRS ≥ 48 HRS ✓

DRAW DOWN TIME
FOR BOTTOM HALF DETENTION VOLUME

$= \frac{124.035 + 30.296}{4} \pm \frac{154.331}{4} =$ 38.6 HRS ≥ 36 HRS ✓

Grid: 5x5 - 1in

Hauoli Street Drainage Improvements
Drain Down Time Calc Per 6" Riser.
Feb 22, 2012
Sheet 4 of 4

	Full Pond	Water Level at: Row Number (water level at 1/2 hole spacing above hole) 1	2	3	4	5	6
Riser Diameter (in.)	6						
Hole Diameter (in.)	0.50						
Area of Each Hole (in2)	0.1963						
Area of Each Hole (ft2)	0.00136						
# of Rows	6						
# of Columns	8						
Area of all holes up to and including indicated row (ft2)=	0.065	0.011	0.022	0.033	0.044	0.055	0.065
h (ft.) at 1/2 vertical spacing above indicated row	1.5	0.250	0.50	0.75	1.00	1.25	1.50
Computed Flow Rate at when pond is at 1/2 vertical spacing above indicated row (cfs)	0.262	0.018	0.050	0.093	0.143	0.199	0.262
Average Flow Rate from 1/2 vertical spacing above indicated row to 1/2 below (cfs) (Use Perforated Riser Equation with hh= h)		0.01	0.03	0.07	0.12	0.17	0.23
Extended Detention Pond Volume at 1/2 vertical spacing above indicated row (ft3)		0	15239	23041	30965	39014	47188
Extended Detention Pond Volume Draining from 1/2 vertical spacing above indicated row to 1/2 below (ft3)			15239	7802	7924	8049	8174
Drain Time for Extended Detention Pond Volume Draining from 1/2 vertical spacing above indicated row to 1/2 below (hours)			124.035	30.296	18.711	13.077	9.843

Total Drain Time (hours)	**196.0**

APPENDIX B.

Preliminary Development Plans

CONSTRUCTION PLANS

FOR

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII

COUNTY OF MAUI

DEPARTMENT OF PUBLIC WORKS

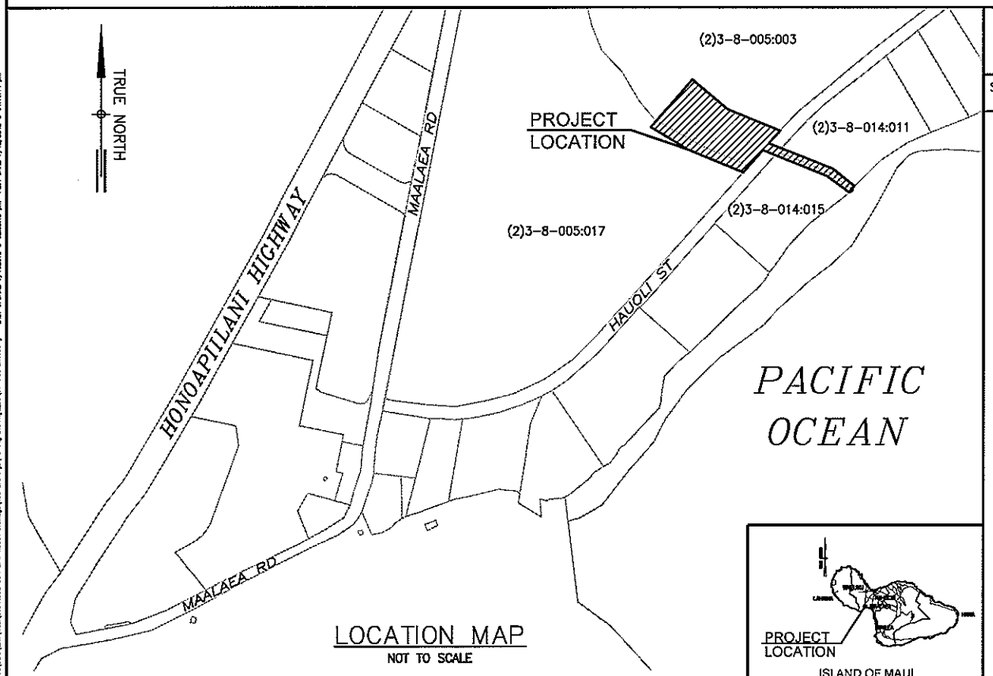
JOB NUMBER: 07-50

TMKs: (2nd) 3-8-005: POR. 3, POR. 17;
(2nd) 3-8-014: POR. 11, POR. 15

PREPARED BY:

AECOM
1001 BISHOP STREET
SUITE 1600
HONOLULU, HAWAII 96813

JULY 2012



LOCATION MAP
NOT TO SCALE

TMK: (2nd Div.) 3 – 8 – 005 : POR. 3, POR. 17;
(2nd Div.) 3 – 8 – 014 : POR. 11, POR. 15

ISLAND OF MAUI

VICINITY MAP
NOT TO SCALE

INDEX TO DRAWINGS

SHEET NO.	SHEET NAME	SHEET TITLE	SHEET NO.	SHEET NAME	SHEET TITLE
1	T-1	TITLE SHEET	24	C-23	WATER QUALITY BASIN CROSS SECTIONS – 2
2	C-1	CONSTRUCTION NOTES	25	C-24	WATER QUALITY BASIN CROSS SECTIONS – 3
3	C-2	CONSTRUCTION NOTES	26	C-25	CONCRETE JOINTING PLAN
4	C-3	CONSTRUCTION PHASING – DIVERSION ROAD	27	C-26	MISCELLANEOUS DETAILS – 1
5	C-4	CONSTRUCTION PHASING – HAUOLI STREET	28	C-27	MISCELLANEOUS DETAILS – 2
6	C-5	DIVERSION ROAD – PLAN & PROFILE	29	C-28	MISCELLANEOUS DETAILS – 3
7	C-6	DIVERSION ROAD – GRADING & DRAINAGE PLAN	30	C-29	GUARDRAIL DETAILS – 1
8	C-7	DIVERSION ROAD – TRAFFIC CONTROL PLAN	31	C-30	GUARDRAIL DETAILS – 2
9	C-8	GENERAL SITE PLAN	32	S-1	GENERAL NOTES
10	C-9	EROSION CONTROL PLAN	33	S-2	TYPICAL DETAILS
11	C-10	EROSION CONTROL DETAILS AND BMP NOTES	34	S-3	BOX CULVERT AND RETAINING WALL – STRUCTURAL PLAN
12	C-11	DEMOLITION PLAN	35	S-4	DOWNSTREAM RETAINING WALLS – STRUCTURAL PLAN
13	C-12	DRAINAGE CHANNEL PLAN		S-5	NOT USED
14	C-13	PROFILES OF RETAINING WALLS RW#2,RW#3,RW#4 & RW#5	36	S-6	CULVERT SECTIONS AND DETAILS
15	C-14	DRAINAGE CHANNEL TRANSITION PLAN & SECTIONS	37	S-7	CULVERT SECTIONS AND DETAILS
16	C-15	DRAINAGE CHANNEL CROSS SECTIONS	38	S-8	CULVERT SECTIONS AND DETAILS
17	C-16	HAUOLI STREET PLAN	39	S-9	RETAINING WING WALL DETAIL
18	C-17	HAUOLI STREET PROFILE	40	S-10	RETAINING WALL DETAILS
19	C-18	HAUOLI STREET CROSS SECTIONS	41	S-11	RAMP PLAN AND DETAILS
20	C-19	WATER QUALITY BASIN ACCESS ROAD PLAN			
21	C-20	WATER QUALITY BASIN PLAN			
22	C-21	WATER QUALITY BASIN PROFILE			
23	C-22	WATER QUALITY BASIN CROSS SECTIONS – 1			

APPROVED:

P:\05\TECHNIC A:\05\DGN\Misc\[05504388 CSH SPF Haudi Drainage\05 Drawings\Working Drawings_ACAD-R24 Sheet.dwg LAST UPDATED: 7/12/2012 @ 02:53:13 pm PLOT DATE: 7/12/2012 @ 01:19:44 pm

GENERAL NOTES:

1. VERIFY AND CHECK ALL DIMENSIONS AND DETAILS ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

2. WORK INCIDENTAL TO THE CONTRACT AND NECESSARY TO COMPLETE THE PROJECT, ALTHOUGH NOT SPECIFICALLY REFERRED TO ON THE CONTRACT DOCUMENTS, SHALL BE FURNISHED AND PERFORMED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

3. IN PERFORMING ALL WORK, THE CONTRACTOR SHALL EXERCISE DUE CARE AND CAUTION NECESSARY TO AVOID ANY DAMAGE INFLICTED TO AND IMPAIRMENT IN THE USE OF ANY EXISTING UTILITY LINE. ANY DAMAGE INFLICTED ON EXISTING UTILITY LINES RESULTING FROM THE CONTRACTOR'S OPERATIONS SHALL BE IMMEDIATELY REPAIRED OR RESTORED AS DIRECTED BY THE ENGINEER AT THE CONTRACTOR'S EXPENSE.

4. THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY; AND THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.

5. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM RUBBISH, DUST, NOISE, EROSION, ETC. THE WORK SHALL BE DONE IN CONFORMANCE WITH THE AIR AND WATER POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.

6. THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR NEW LINES.

7. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES, AND OTHER PROTECTIVE FACILITIES, AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER QUALITY AND WATER POLLUTION CONTROL STANDARDS CONTAINED IN HAWAII ADMINISTRATIVE RULES, CHAPTER 11-54, "WATER QUALITY STANDARDS" AND CHAPTER 11-55, "WATER POLLUTION CONTROL". BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING CONSTRUCTION.

9. WHEN TRENCH EXCAVATION IS ADJACENT TO OR UNDER EXISTING STRUCTURES OR FACILITIES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY SHEETING AND BRACING THE EXCAVATION AND STABILIZING THE EXISTING GROUND TO RENDER IT SAFE AND SECURE FROM POSSIBLE SLIDES, CAVE-INS AND SETTLEMENT AND FOR PROPERLY SUPPORTING EXISTING STRUCTURES AND FACILITIES WITH BEAMS, STRUTS OR UNDERPINNING TO FULLY PROTECT THEM FROM DAMAGE.

10. NO CONTRACTOR SHALL PERFORM ANY CONSTRUCTION OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW INTO EXISTING CITY DRAINAGE SYSTEMS, OR ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY AND BEAR ALL COSTS INCURRED FOR ANY REMEDIAL ACTIONS.

11. PRIOR TO START OF EXCAVATION, THE CONTRACTOR SHALL NOTIFY ALL AGENCIES AND UTILITIES AND HAVE THEM LOCATE THEIR RESPECTIVE LINES AFFECTED. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ALL OF HIS CONSTRUCTION AND SHALL PAY FOR ALL DAMAGES TO AND FOR THE PROTECTION OF EXISTING UTILITIES AND STRUCTURES.

12. THE CONTRACTOR SHALL RESTORE TO THEIR ORIGINAL OR BETTER CONDITION, ALL IMPROVEMENTS DAMAGED AS A RESULT OF THE CONSTRUCTION, INCLUDING PAVEMENTS, EMBANKMENTS, CURBS, SIGNS, LANDSCAPING, STRUCTURES, UTILITIES, WALLS, FENCES, ETC. UNLESS PROVIDED FOR SPECIFICALLY IN THE PROPOSAL. DEMOLITION AND RESTORATION OF EXISTING ITEMS SHALL BE INCIDENTAL AND INCLUDED WITHIN THE AMOUNT PAID FOR UNCLASSIFIED TRENCH EXCAVATION.

13. THE CONTRACTOR SHALL PROVIDE A LAND SURVEYOR, LICENSED IN THE STATE OF HAWAII, TO STAKE OUT BENCHMARK, BASELINE, CONSTRUCTION STAKES FOR THE NEW WORK. THE CONTRACTOR SHALL VERIFY AND CHECK ALL DIMENSIONS AND DETAILS SHOWN ON THE DRAWING PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.

14. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED PERMITS FROM APPROPRIATE GOVERNMENT AGENCIES.

15. THE BENCH MARK FOR THIS PROJECT IS SHOWN ON DRAWING C-8.

16. ALL ABANDONED PIPE OPENINGS SHALL BE PLUGGED WITH CLASS C 2000 CONCRETE TO A DEPTH OF 1.50 TIMES THE DIAMETER OF THE PIPE. PAYMENT FOR CUTTING AND PLUGGING SHALL NOT BE MADE DIRECTLY BUT SHALL BE INCIDENTAL TO THE VARIOUS ITEMS OF THE PROPOSAL. THE CONTRACTOR SHALL VERIFY THE SIZE AND TYPE OF LINE TO BE PLUGGED.

17. THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH DEPARTMENT OF HEALTH REGULATIONS TITLE 11, CHAPTER 46 REGARDING NOISE CONTROL FOR OAHU.

18. THE CONTRACTOR IS ALERTED TO THE ENCOUNTERING OF OBSTACLES WHETHER SHOWN ON THE PLANS OR NOT, OR WHICH MAY DIFFER IN LOCATION FROM THAT SHOWN ON THE PLANS WHICH MAY INTERFERE WITH HIS NORMAL METHOD OF OPERATIONS. THE CONTRACTOR SHALL TAKE INTO ACCOUNT ANY ADDITIONAL COSTS ANTICIPATED DUE TO THESE CONDITIONS AND SHALL HAVE THESE COSTS INCLUDED IN THE BID ITEMS WHICH HE FEELS MOST APPROPRIATE.

GENERAL NOTES CONT.:

19. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL ASSUMPTIONS, DEDUCTIONS, OR CONCLUSIONS HE MAY MAKE OR DERIVE FROM THE SUBSURFACE INFORMATION OR DATA FURNISHED ON THE PLANS. THE CONTRACTOR MUST SATISFY HIMSELF THROUGH HIS OWN INVESTIGATIONS AS TO WHAT SUBSURFACE CONDITIONS ARE TO BE ENCOUNTERED.

20. IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015).

21. IF THE CONTRACTOR ELECTS NOT TO EXPOSE AND VERIFY ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES AT CROSSINGS PRIOR TO PIPELINE EXCAVATION, HE FORFEITS HIS RIGHTS FOR ANY CLAIMS FOR COMPENSATION CAUSED BY ANY CONFLICTS WITH EXISTING UTILITIES AND STRUCTURES.

22. A SOILS REPORT BY HIRATA & ASSOCIATES, INC. DATED OCTOBER 7, 2008, CAN BE OBTAINED FROM THE OWNER.

23. ALL CONSTRUCTION WORK SHALL BE DONE IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG). THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS AND OTHER PROTECTIVE FACILITIES WHICH SHALL CONFORM WITH THE ADAAG.

24. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS' ENGINEERING DIVISION SEVEN (7) DAYS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

GRADING NOTES:

1. ALL GRADING WORK SHALL CONFORM TO CHAPTER 20.08 OF THE MAUI COUNTY CODE, 1983, AS AMENDED, AS RELATED TO GRADING, SOIL EROSION AND SEDIMENT CONTROL, AND SOIL REPORT BY HIRATA & ASSOCIATES, INC. DATED OCTOBER 7, 2008, WHERE APPLICABLE.

2. NO CONTRACTOR SHALL PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATIONS OCCUR, THE COSTS INCURRED FOR ANY REMEDIAL ACTION BY THE CHIEF ENGINEER SHALL BE PAYABLE BY THE CONTRACTOR.

3. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS CONTAINED IN THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE HEALTH DEPARTMENT.

4. ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.

5. ALL SLOPES AND EXPOSED AREAS SHALL BE SODDED OR PLANTED AS SOON AS FINAL GRADES HAVE BEEN ESTABLISHED. PLANTING SHALL NOT BE DELAYED UNTIL ALL GRADING WORK HAS BEEN COMPLETED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS, AND ANY AREA WITHIN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED SHALL BE PLANTED.

6. FILLS ON SLOPES STEEPER THAN 5:1 SHALL BE KEYED.

7. THE COUNTY SHALL BE INFORMED OF THE LOCATION OF THE BORROW/DISPOSAL SITE FOR THE PROJECT WHEN THE APPLICATION FOR A GRADING PERMIT IS MADE. THE BORROW/DISPOSAL SITE MUST ALSO FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE.

8. NO GRADING WORK SHALL BE DONE ON SATURDAYS, SUNDAYS AND HOLIDAYS AT ANY TIME WITHOUT PRIOR NOTICE TO THE ENGINEER.

9. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.

10. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS CONTAINED IN HAWAII ADMINISTRATIVE RULES, CHAPTER 11-55, "WATER POLLUTION CONTROL" AND CHAPTER 11-54, "WATER QUALITY STANDARDS" AND THE NPDES PERMIT FOR THE PROJECT.

11. WHERE APPLICABLE AND FEASIBLE THE MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY EARTH MOVING PHASE OF THE GRADING IS INITIATED.

12. TEMPORARY EROSION CONTROLS SHALL NOT BE REMOVED BEFORE PERMANENT EROSION CONTROLS ARE IN-PLACE AND ESTABLISHED.

13. TEMPORARY EROSION CONTROL PROCEDURES SHALL BE SUBMITTED FOR APPROVAL PRIOR TO APPLICATION FOR GRADING PERMIT.

14. IF THE GRADING WORK INVOLVES CONTAMINATED SOIL, THEN ALL GRADING WORK SHALL BE DONE IN CONFORMANCE WITH APPLICABLE STATE AND FEDERAL REQUIREMENTS.

15. NON-COMPLIANCE TO ANY OF THE ABOVE REQUIREMENTS SHALL MEAN IMMEDIATE SUSPENSION OF ALL WORK, AND REMEDIAL WORK SHOULD COMMENCE IMMEDIATELY. ALL COSTS INCURRED SHALL BE BILLED TO THE PERMITEE. FURTHERMORE, VIOLATORS SHALL BE SUBJECTED TO ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES.

EROSION/TEMPORARY DUST CONTROL NOTES:

1. DURING CONSTRUCTION, PREVENTIVE MEASURES SHALL BE USED TO CONTROL FORESEEABLE DUST, EROSION OR SEDIMENTATION PROBLEMS, WHICH MAY ARISE AS THE JOB PROGRESSES.

2. ALL FILL, SUBBASE AND BASE MATERIAL PLACED WITHIN THE ROAD PAVEMENT PRISM SHALL BE SUBSTANTIALLY COMPACTED BY THE END OF THE DAY.

3. THE CONTRACTOR SHALL CONDUCT HIS GRADING OPERATIONS SO THAT EXCAVATION EMBANKMENT AND IMPORTED MATERIAL SHALL BE DAMPENED WITH WATER DURING HIS GRADING OPERATIONS AT ALL TIMES.

4. WATER TRUCK AND/OR TEMPORARY SPRINKLERS SHALL BE AVAILABLE ON THE JOB SITE AT ALL TIMES TO ENSURE BARE EARTH DOES NOT CREATE A DUST PROBLEM.

5. FUGITIVE DUST AND SOLID WASTE DISPOSAL DURING GRUBBING AND GRADING ACTIVITIES SHALL MEET REQUIREMENTS OF ADMINISTRATIVE RULES, TITLE II, CHAPTER 60.1, "AIR POLLUTION CONTROL," AND CHAPTER 56, "SOLID WASTE MANAGEMENT CONTROL."

6. TEMPORARY VEGETATIVE COVER SHALL BE PLANTED WITHIN A PERIOD OF THIRTY (30) CALENDAR DAYS AFTER THE SITE HAS BEEN GRADED OR BARED OF VEGETATION OR IF FINAL GRADING OR LANDSCAPING OF THE SITE WILL BE SUSPENDED FOR MORE THAN THIRTY (30) CALENDAR DAYS. TEMPORARY VEGETATIVE COVER SHALL CONSIST OF 40-LB COMMON RYE GRASS SEED PER ACRE. 400 LB PER ACRE 10-10-10 OR EQUIVALENT FERTILIZER WORKED INTO SEED BED BEFORE PLANTING. TEMPORARY SPRINKLER SYSTEM TO BE INSTALLED CONCURRENTLY WITH ALL PLANTINGS. PLANTING AND MAINTENANCE TO GRASS SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION," DATED SEPTEMBER 1986.

PUBLIC HEALTH, SAFETY AND CONVENIENCE:

1. THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH AND SAFETY AND ENVIRONMENTAL QUALITY.

2. THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK AND DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. THE COSTS INCURRED FOR ANY NECESSARY REMEDIAL ACTION BY THE CHIEF ENGINEER SHALL BE PAYABLE BY THE CONTRACTOR.

3. THE CONTRACTOR, AT HIS EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE OF DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.

4. AS REQUIRED BY THE COUNTY, THE CONTRACTOR SHALL HIRE SPECIAL DUTY POLICE OFFICERS TO CONTROL THE FLOW OF TRAFFIC.

5. DURING NON-WORKING HOURS ALL LANES SHALL BE OPEN AND ALL EXCAVATIONS ON THE ROADWAY SHALL BE COVERED WITH A SAFE NON-SKID BRIDGING MATERIAL. DRIVEWAYS SHALL BE KEPT OPEN UNLESS THE OWNERS TO THE PROPERTY USING THESE RIGHTS-OF-WAYS ARE OTHERWISE PROVIDED FOR SATISFACTORILY.

6. DURING WORKING HOURS, THE CONTRACTOR SHALL MAINTAIN A ROADWAY SUITABLE FOR ONE LANE OF TRAFFIC WITH FLAGMEN AT BOTH ENDS, ALTERNATING DIRECTION OF TRAFFIC FLOW.

7. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES, AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE, AND SAFETY OF THE PUBLIC.

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CONSTRUCTION NOTES - 1

DESIGNED BY AHT	DRAWN BY AHT	CHECKED BY DYK/MD

DATE   FIRM MEMBER   DATE

C-1   SHEET 2 OF 41

FILE	POCKET	FOLDER	NUMBER

CONSTRUCTION NOTES WITHIN COUNTY RIGHT-OF-WAY

1. CONTRACTOR SHALL OBTAIN A PERMIT TO PERFORM WORK ON COUNTY HIGHWAYS FROM THE DEVELOPMENT SERVICES ADMINISTRATION TWO (2) WEEKS PRIOR TO THE COMMENCEMENT OF WORK.
2. STANDARD DETAIL DRAWINGS AND STANDARD SPECIFICATIONS OF THE DEPARTMENT OF PUBLIC WORKS SHALL BE INCLUDED AS PART OF THE CONSTRUCTION PLANS.
3. ALL CONSTRUCTION WORK SHALL STRICTLY CONFORM TO THE APPLICABLE SECTIONS OF THE 2005 HAWAII STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AND THE SEPTEMBER 1984 "STANDARD DETAILS" FOR PUBLIC WORKS CONSTRUCTION OF THE DEPARTMENT OF PUBLIC WORKS, AS AMENDED.
4. IF EXISTING UTILITIES, WHETHER OR NOT SHOWN ON PLANS, ARE DAMAGED DURING CONSTRUCTION, THE CONTRACTOR SHALL AT HIS OWN EXPENSE BE REQUIRED TO REPAIR SUCH UTILITIES.
5. CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, AND OTHER PROTECTIVE DEVICES FOR THE PROTECTION, SAFETY AND CONVENIENCE OF THE PUBLIC, ACCORDING TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICE FOR STREETS AND HIGHWAYS", 2009 AND TO THE RULES AND REGULATIONS GOVERNING THE USE OF TRAFFIC CONTROL DEVICES AT WORKSITES AND/OR ADJACENT TO PUBLIC STREETS AND HIGHWAYS ADOPTED BY THE HIGHWAY SAFETY COORDINATOR AND THE U.S. FEDERAL HIGHWAY ADMINISTRATION "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS" DATED 2009.
6. THE DIRECTOR PUBLIC WORKS AND/OR THE DIRECTOR OF THE DEPARTMENT OF WATER SUPPLY HAS THE RIGHT TO STOP CONSTRUCTION SHOULD ANY WORK BE FOUND CONTRARY TO THE APPROVED CONSTRUCTION PLAN OR DETRIMENTAL TO THE PUBLIC'S INTEREST.
7. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE DEVELOPMENT SERVICES ADMINISTRATION FIVE (5) DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
8. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH AND COUNTY GRADING ORDINANCE.
9. THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK AND DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. THE COST INCURRED FOR ANY NECESSARY REMEDIAL ACTION ORDERED BY THE DIRECTOR OF PUBLIC WORKS SHALL BE PAID BY THE CONTRACTOR.
10. CONSTRUCTION DEBRIS AND WASTES SHALL BE DEPOSITED AT AN APPROPRIATE WORK SITE. THE CONTRACTOR SHALL INFORM THE DIRECTOR OF PUBLIC WORKS OF THE LOCATION OF THE DISPOSAL SITES. THE DISPOSAL SITE MUST FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE.
11. THE CONTRACTOR SHALL SUBMIT A TIFF AND FIVE (5) COPIES OF THE "AS-BUILT" DRAWINGS PRIOR TO THE FINAL APPROVAL OF THE IMPROVEMENTS.
12. IF THE CLEARANCE BETWEEN A WASTEWATER LINE AND A NEW OR EXISTING WATERLINE IS EIGHTEEN INCHES (18") OR LESS, THE WASTEWATER LINE SHALL BE CONCRETE-JACKETED IN ACCORDANCE WITH THE STANDARD DETAILS OF PUBLIC WORKS CONSTRUCTION DATED SEPTEMBER 1984.
13. SHOULD HISTORIC SITES SUCH AS WALLS, PLATFORMS, PAVEMENTS, OR MOUNDS, OR REMAINS SUCH AS ARTIFACTS BURIALS, CONCENTRATION OF SHELL OR CHARCOAL BE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, WORK SHALL CEASE IMMEDIATELY IN THE IMMEDIATE VICINITY OF THE FIND AND THE FIND SHALL BE PROTECTED FROM FURTHER DAMAGE. THE CONTRACTOR AND/OR LANDOWNER SHALL IMMEDIATELY CONTACT THE STATE HISTORIC PRESERVATION DIVISION @ 243-5169 WHICH WILL ASSESS THE SIGNIFICANCE OF THE FIND AND RECOMMEND AN APPROPRIATE MITIGATION MEASURE, IF NECESSARY.
14. PURSUANT OF MAUI COUNTY CODE SECTION 3.44.015(C), THE COUNTY OF MAUI IS NOT RESPONSIBLE FOR ANY PARK, ROADWAY, EASEMENT (INCLUDING BUT NOT LIMITED TO DRAINAGE, SEWER, ACCESS, RECLAIMED WATER, OR AVIGATION EASEMENT), OR ANY OTHER INTEREST IN REAL PROPERTY SHOWN ON THIS MAP OR SHOWN ON THESE PLANS, UNLESS THE MAUI COUNTY COUNCIL HAS ACCEPTED ITS DEDICATION BY A RESOLUTION APPROVED BY A MAJORITY OF COUNCIL'S MEMBERS AT A REGULAR OR SPECIAL MEETING OF THE MAUI COUNTY COUNCIL.

LIST OF ABBREVIATIONS:

&	AND
°	DEGREE(S)
%	PERCENT
A	
AC; A.C.	ASPHALTIC CONCRETE OR ACRES
A/C	AIR CONDITIONING
AD	AREA DRAIN
ADA	AMERICANS WITH DISABILITIES ACT
ADD	ADDITIVE
ADAAG	AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES
APP	APPROVED
APPROX.	APPROXIMATE
ARV	AIR RELIEF VALVE
B	
℄, BL	BASELINE
BB	BOTTOM BANK
BC	BOTTOM OF CURB
BFP	BACK FLOW PREVENTER
BLK	BLOCK
BMP	BEST MANAGEMENT PRACTICES
BOT.	BOTTOM
BUILDING	BUILDING
BV	BOTTOM VERTICAL
BW	BOTTOM OF WALL
BWS	BOARD OF WATER SUPPLY
C	
C&C	CITY AND COUNTY OF HONOLULU
CB; C.B.	CATCH BASIN
CBF	CATCH BASIN FILTER
CBMH	CATCH BASIN MANHOLE
CIP	CAST IRON PIPE
℄; CL	CENTERLINE
C.L.	CHAIN LINK
CLF	CHAIN LINK FENCE
CLR	CLEARENCE
CMU	CONCRETE MANSONRY UNIT
CO; C.O.	CLEANOUT
COL.	COLUMN
COM	COUNTY OF MAUII
COL.	COMMUNICATION
CONC;CONC.	CONCRETE
CONN	CONNECTION
CONT.	CONTINUOUS
COTG	CLEAN OUT TO GRADE
CRM	CONCRETE RUBBLE MANSONRY
CT	COURT
C.Y.	CUBIC YARD
D	
D; DL	DIAMETER; DRAINLINE
D=	APPROXIMATE DIAMETER
D/W	DRIVEWAY
DET	DETAIL
D.I.	DRAIN INLET
DIA	DIAMETER
DMH	DRAIN MANHOLE
DPP	C&C DEPARTMENT OF PLANNING AND PERMITTING
DPW	C&C DEPARTMENT OF PUBLIC WORKS
DR	DRIVE
D.S.	DOWN SPOUT
DSP	DRY STAND PIPE
DWG	DRAWING
DWY.	DRIVEWAY
DYL	DOUBLE YELLOW LINE

LIST OF ABBREVIATIONS:

E	
E	EAST; EASTING; ELECTRICAL
ELEC	ELECTRICAL
EL; ELEV	ELEVATION
EP	EDGE PAVEMENT
EPB	ELECTRICAL PULLBOX
EQ.	EQUAL, EQUIVALENT
ESW	EDGE SIDEWALK
EXIST; EX	EXISTING
F	
F.A.	FIRE ALARM
FH; F.H.	FIRE HYDRANT
FIN	FINISH
FM	FORCE MAIN
'; FT	FOOT (FEET)
FTG.	FOOTING
G	
G	GAS
GALV	GALVINIZED
G.I.	GRATED INLET
GDI	GRATED DRAIN INLET
GMH	GAS MANHOLE
GND	GROUND
G.P.	GUARD POST/GUY POLE/GATE POST
GRD	GRADE
GS	GALVANIZED STEEL
GV	GAS OR GATE VALVE
G.W.	GUY WIRE
H	
H; HORIZ	HEIGHT; HORIZONTAL
H=	APPROXIMATE HEIGHT
HB; H.B.	HORIZONTAL BEND; HOSE BIBB
HBV	HORIZONTAL BOTTOM VERTICAL
HDPE	HIGH DENSITY POLYETHYLENE
HECO	HAWAIIAN ELECTRIC COMPANY
HTV	HORIZONTAL TOP VERTICAL
HYD	HYDRANT
I	
ICV	IRRIGATION CONTROL VALVE
I.D.	INNER DIAMETER
", IN.	INCH(ES)
INV; INV.	INVERT
L	
L	LENGTH
LD	LAND
LOG	LIMITS OF GRADING
LP; L.P.	LIGHTPOLE; LAMP POST
LT	LEFT TURN
M	
MAX	MAXIMUM
MB	METER BOX
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MON	MONUMENT
MPH	MILES PER HOUR
MSL	MEAN SEA LEVEL
N	
N	NORTH; NORTHING
NO.; #	NUMBER
O	
OC; O.C.	ON CENTER
OD	OUTSIDE DIAMETER
O/H	OVERHEAD
O/S; o/s	OFFSET

LIST OF ABBREVIATIONS:

P	
ℙ	PROPERTY LINE
PAV'T; PAVT	PAVEMENT
PB	PULLBOX
PP	POWERPOLE
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
R	
R/W; ROW	RIGHT-OF-WAY
RAD; RAD.	RADIUS
RCP	REINFORCED CONCRETE PIPE
REINF	REINFORCEMENT
RT	RIGHT TURN
S	
S; SL	SPREAD OR SEWER; SEWERLINE OR SLOPE
S=	APPROXIMATE SIZE
S/W	SIDEWALK
SDMH	STORM DRAIN MANHOLE
S.F.	SQUARE FOOT/FEET
SHT	SHEET
S.L.	STREET LIGHT
SLB	STREET LIGHT BOX
SMH	SEWER MANHOLE
ST	STREET
STA; STA.	STATION
STD; STD.	STANDARD
SWL	SINGLE WHITE LINE
T	
T; TEL.	TELEPHONE
TB	TOP BANK
TC	TOP OF CURB
TMK	TAX MAP KEY
T.O.S.	TOP OF SLAB
TP	TELEPHONE POLE OR TOP PIPE
TS	TOP STEM
TV	TOP VERTICAL OR TOP VALVE
TW	TOP OF WALL
TYP; TYP.	TYPICAL
U	
UE	UNDERGROUND ELECTRICAL LINE
U.P.	UTILITY POLE
U.P./S.L.	UTILITY POLE W/ STREET LIGHT
V	
V; VERT	VERTICAL
VB	VALVE BOX
VIF	VERIFY IN FIELD
W	
W; WL	WATER OR WIDTH; WATERLINE
W/	WITH
W/W	WALKWAY
WM	WATER METER
WMH	WATER MANHOLE
WP	WORKING PRESSURE
WTR	WATER
WV	WATER VALVE BOX
X	
X-WALK	CROSS WALK

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CONSTRUCTION NOTES - 2

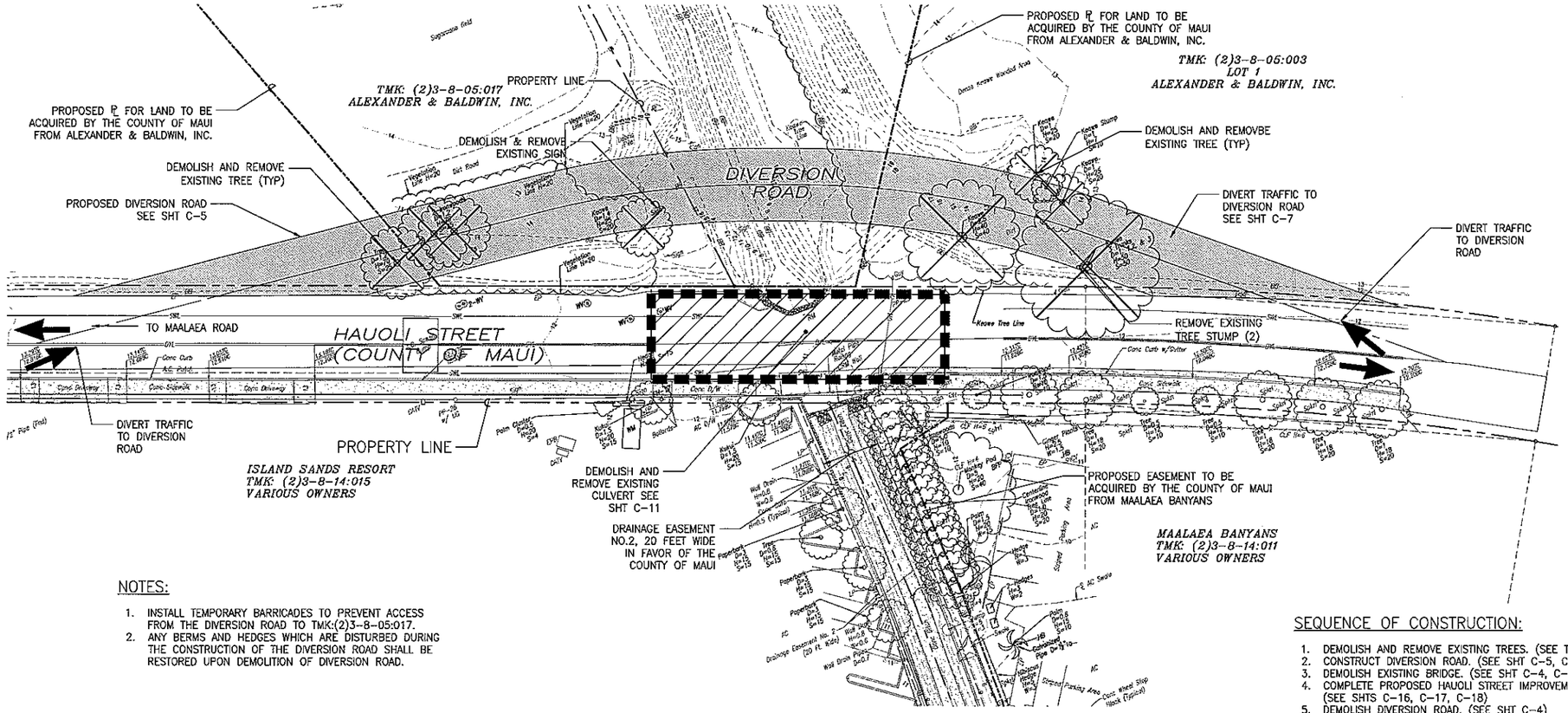
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-2 SHEET 3 OF 41

FILE	POCKET	FOLDER	NUMBER

P:\PW\FLDWG FILES\DAVIA\0AHA\388 25th PW Haual Drainage\400 Drawings\Working Drawings_ETC\02-Construction Plans\Sheet1.dgn 7/12/2013 @ 11:51:48 am PLOT DATE: 7/12/2013 @ 8:05:13 pm



NOTES:

1. INSTALL TEMPORARY BARRICADES TO PREVENT ACCESS FROM THE DIVERSION ROAD TO TMK:(2)3-8-05:017.
2. ANY BERMS AND HEDGES WHICH ARE DISTURBED DURING THE CONSTRUCTION OF THE DIVERSION ROAD SHALL BE RESTORED UPON DEMOLITION OF DIVERSION ROAD.

SEQUENCE OF CONSTRUCTION:

1. DEMOLISH AND REMOVE EXISTING TREES. (SEE THS SHT)
2. CONSTRUCT DIVERSION ROAD. (SEE SHT C-5, C-6)
3. DEMOLISH EXISTING BRIDGE. (SEE SHT C-4, C-11)
4. COMPLETE PROPOSED HAUOLI STREET IMPROVEMENTS. (SEE SHTS C-16, C-17, C-18)
5. DEMOLISH DIVERSION ROAD. (SEE SHT C-4)
6. CONSTRUCT PROPOSED DRAINAGE BASIN. (SEE SHT C-8)

LEGEND:

AC PAV'T TO BE DEMOLISHED AND REMOVED

PROPOSED AC PAV'T

TREE/HEDGE TO BE DEMOLISHED AND REMOVED

PHASE I – DIVERSION ROAD CONSTRUCTION & DEMOLITION PLAN

SCALE: 1"=20'

1" = 20' SCALE 0 20 40 60 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8688-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CONSTRUCTION PHASING – DIVERSION ROAD

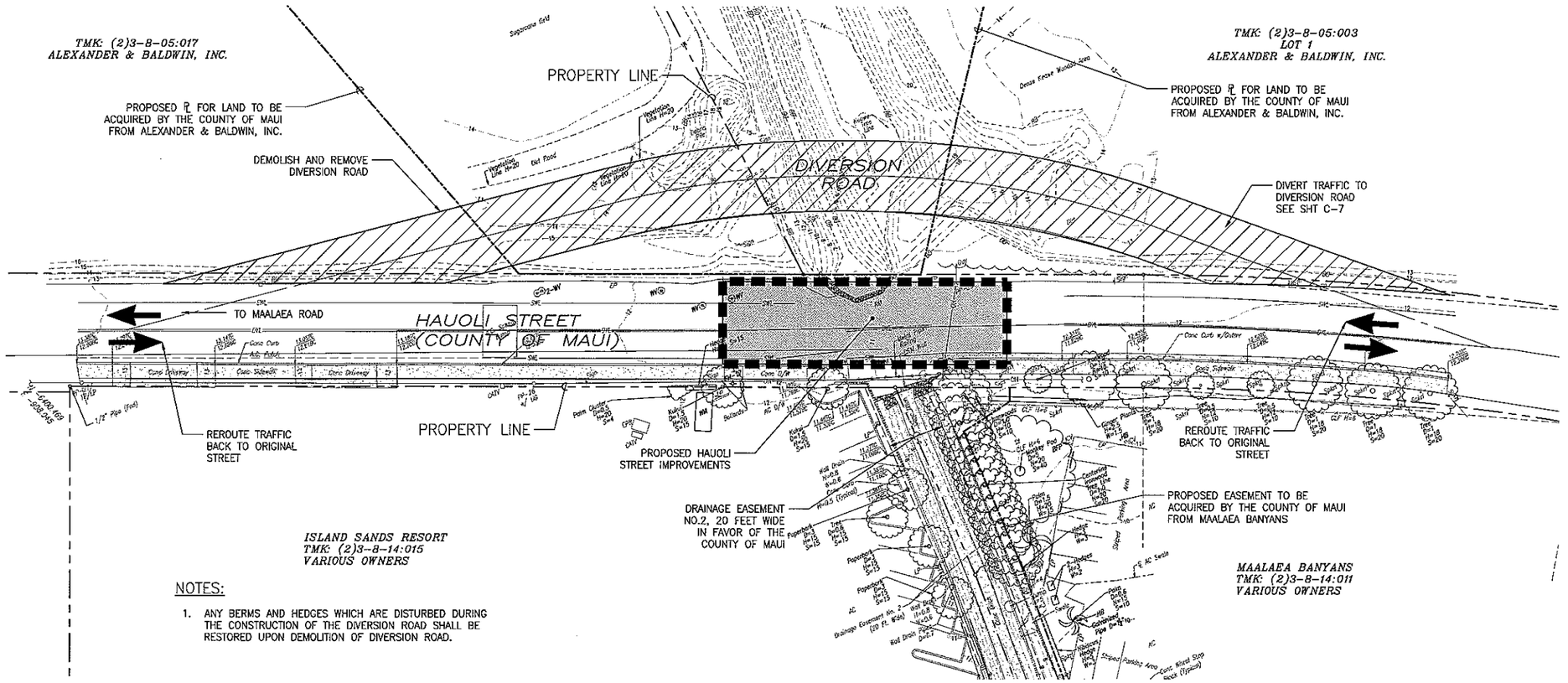
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-3 SHEET 4 OF 41

FILE	POCKET	FOLDER	NUMBER

PATH/FILENAME: F:\JOBS\Civil\Haui\8004388.COM\DPW Haui Drainage\Hauoli Drainage_SV\11-Maker Plan\8004388PP.dgn 7/19/2013 @ 11:56:05 am PLOT DATE: 7/19/2013 @ 01:08:41 pm



NOTES:

1. ANY BERMS AND HEDGES WHICH ARE DISTURBED DURING THE CONSTRUCTION OF THE DIVERSION ROAD SHALL BE RESTORED UPON DEMOLITION OF DIVERSION ROAD.

LEGEND:

AC PAV'T TO BE DEMOLISHED AND REMOVED

PROPOSED AC PAV'T

PHASE II – HAUOLI STREET CONSTRUCTION

SCALE: 1"=20'

1" = 20' SCALE 0 20 40 60 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8588-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CONSTRUCTION PHASING – HAUOLI STREET

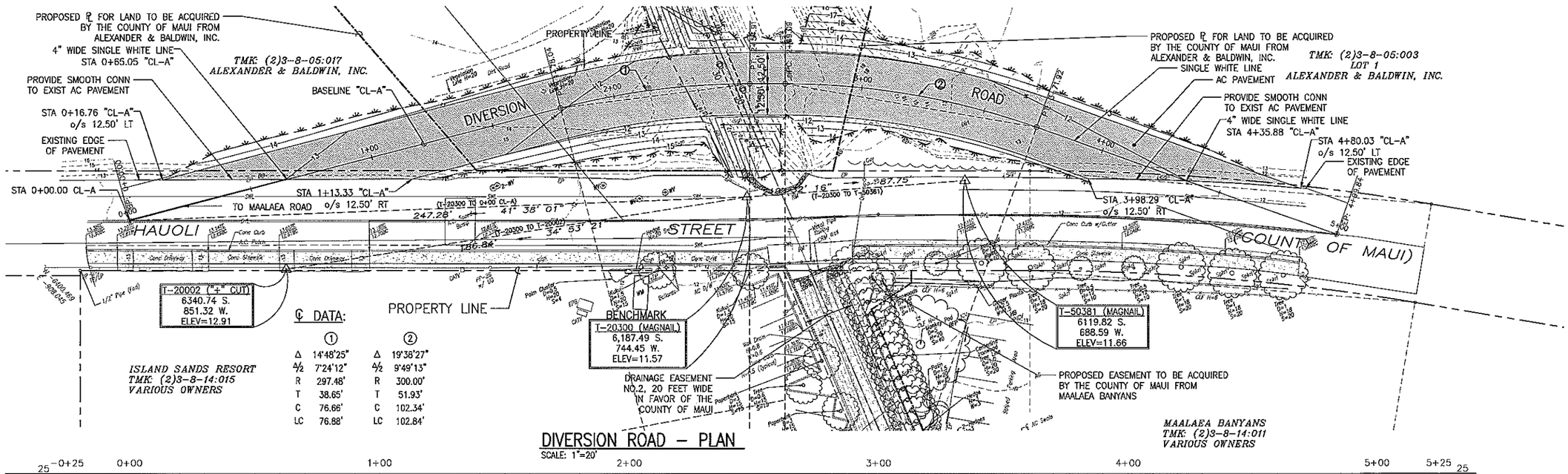
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

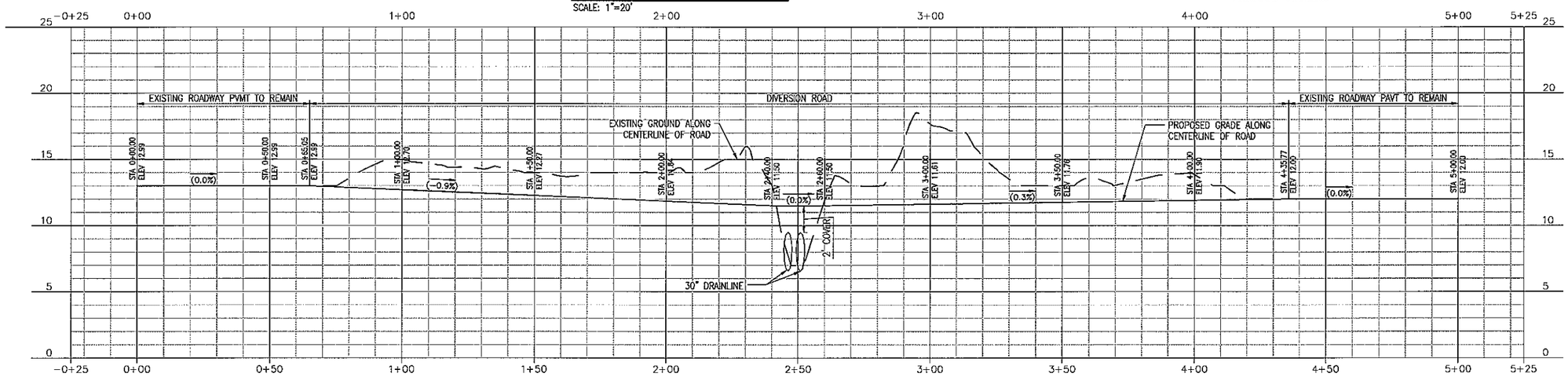
C-4 SHEET 5 OF 41

FILE	POCKET	FOLDER	NUMBER

P:\ENGINEERING\Projects\60044508 CDA DPW Hauoli Driveway\ACAD Drawings\Hauoli Driveway_XCVR-Outline Plan-PROJ.dwg 7/16/2013 @ 11:15:13 am PLOT DATE: 7/12/2013 @ 8:23:07 am



DIVERSION ROAD – PLAN
SCALE: 1"=20'



DIVERSION ROAD – PROFILE
SCALE: 1"=20'
1"=4'

1" = 4' SCALE 0 4 8 12 FEET
1" = 20' SCALE 0 20 40 60 FEET

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8888-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CONSTRUCTION PHASING – DIVERSION ROAD

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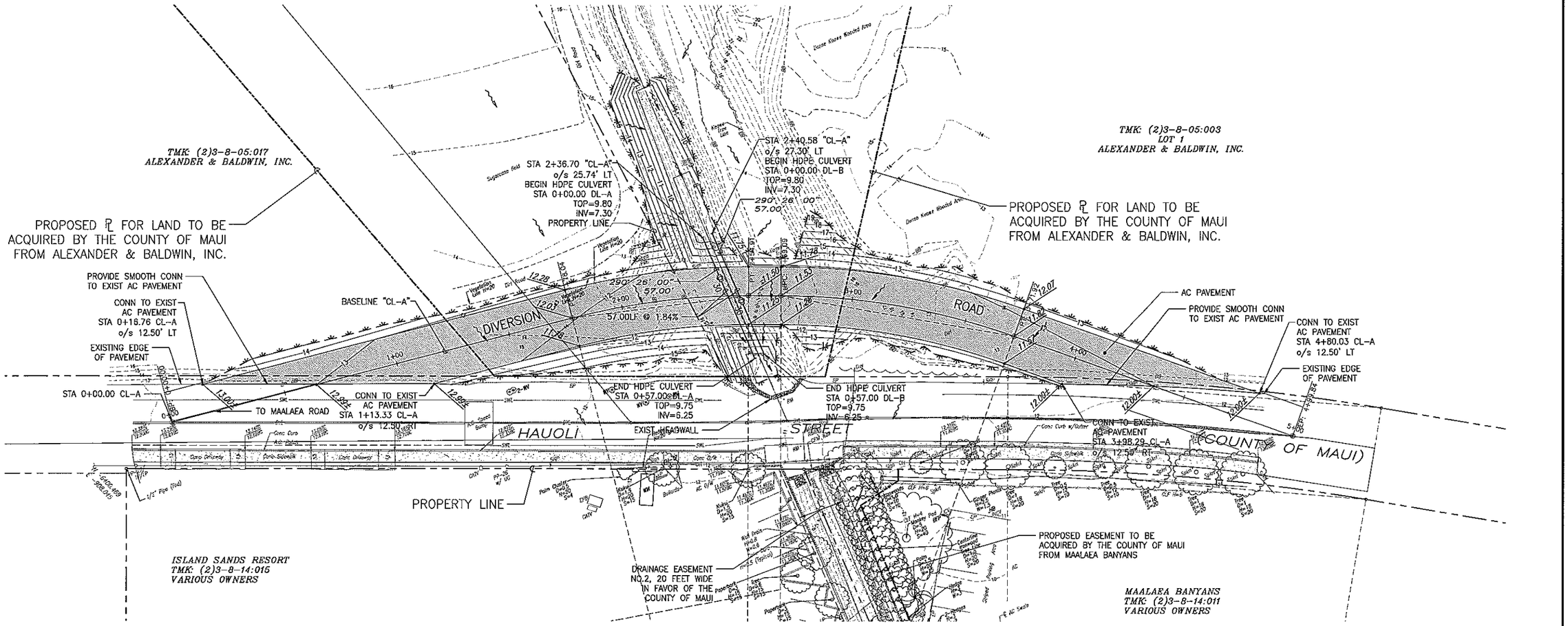
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-5 SHEET 6 OF 41

FILE	POCKET	FOLDER	NUMBER

PATH/FILENAME: P:\DOT\Civil\Hauoli Drainage\100 Drawings\Working Drawings_50\50-Diversion Rd.dgn$ PRINTED BY: dyk PLOT DATE: 7/15/2013 @ 01:31:36 pm

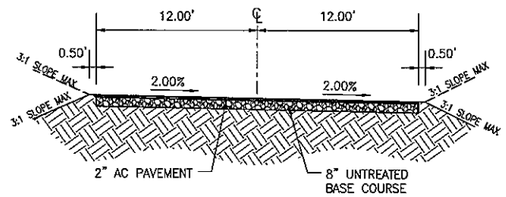


DIVERSION ROAD – GRADING & DRAINAGE PLAN

SCALE: 1"=20'

LEGEND:

- EXISTING INDEX CONTOUR (5-FT)
- EXISTING INTERMEDIATE CONTOUR (1-FT)
- FINISH INDEX CONTOUR (5-FT)
- FINISH INTERMEDIATE CONTOUR (1-FT)
- NEW SURFACE FLOW DIRECTION
- PROPERTY LINE
- LIMITS OF GRADING
- AC PAVEMENT



DIVERSION ROAD SECTION

SCALE: 1"=5'

1" = 5' SCALE 0 5 10 15 FEET

1" = 20' SCALE 0 20 40 60 FEET

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8588-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

DIVERSION ROAD – GRADING & DRAINAGE PLAN

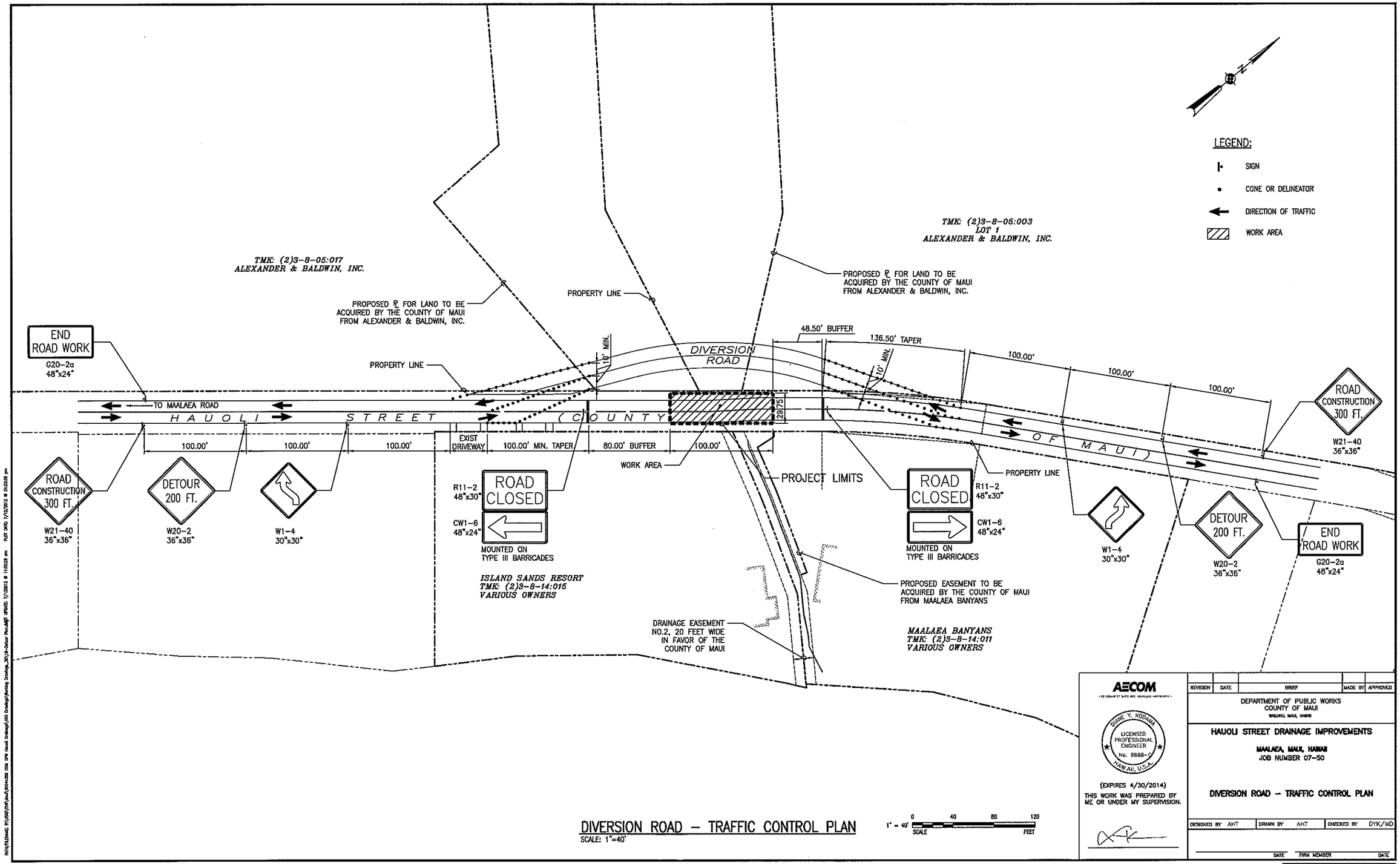
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-6 SHEET 7 OF 41

FILE	POCKET	FOLDER	NUMBER

PATH/FILENAME: P:\WORK\Work\60145258 (SW Road Drainage\A00 Drawings\Working Drawings_DR\21-Diversion Rd.dgn 08/08/13, 8:/60145258.sm PLOT DATE: 7/17/2013 @ 6:12:25 pm



DIVERSION ROAD – TRAFFIC CONTROL PLAN
SCALE: 1"=40'

1" = 40' SCALE 0 40 80 120 FEET

AECOM

DUANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8888-C
HAWAII, U.S.A.

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WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS
MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

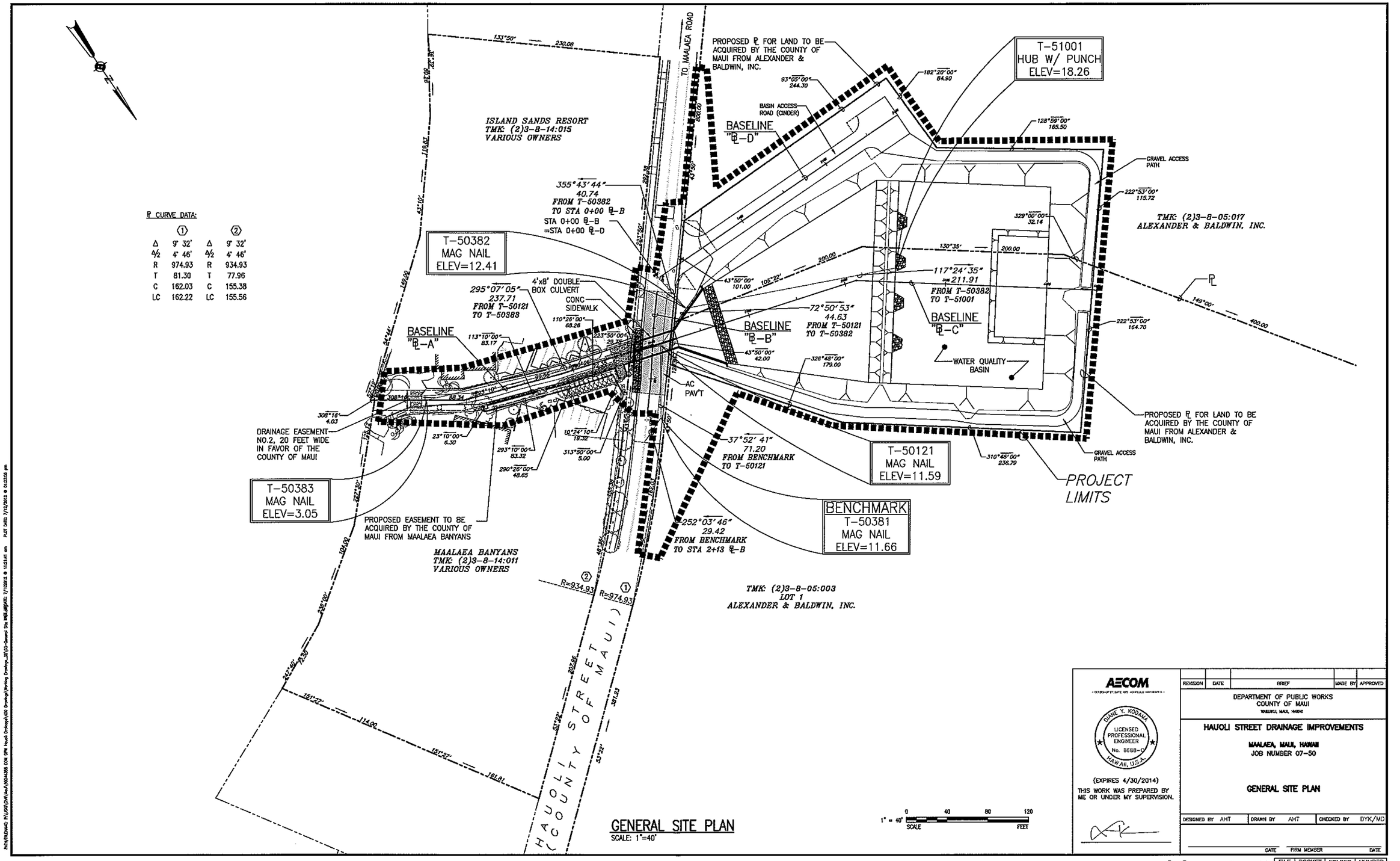
DIVERSION ROAD – TRAFFIC CONTROL PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

M:\ENTITLEMENTS_PLANS\DYK\Haui Drainage\400 Drawings\Working Drawings_36\18-Sheet Pro.MPT PRINTED: 7/3/2013 @ 11:55:28 am PLOT DATE: 7/12/2013 @ 9:03:38 am



AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8658-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

GENERAL SITE PLAN

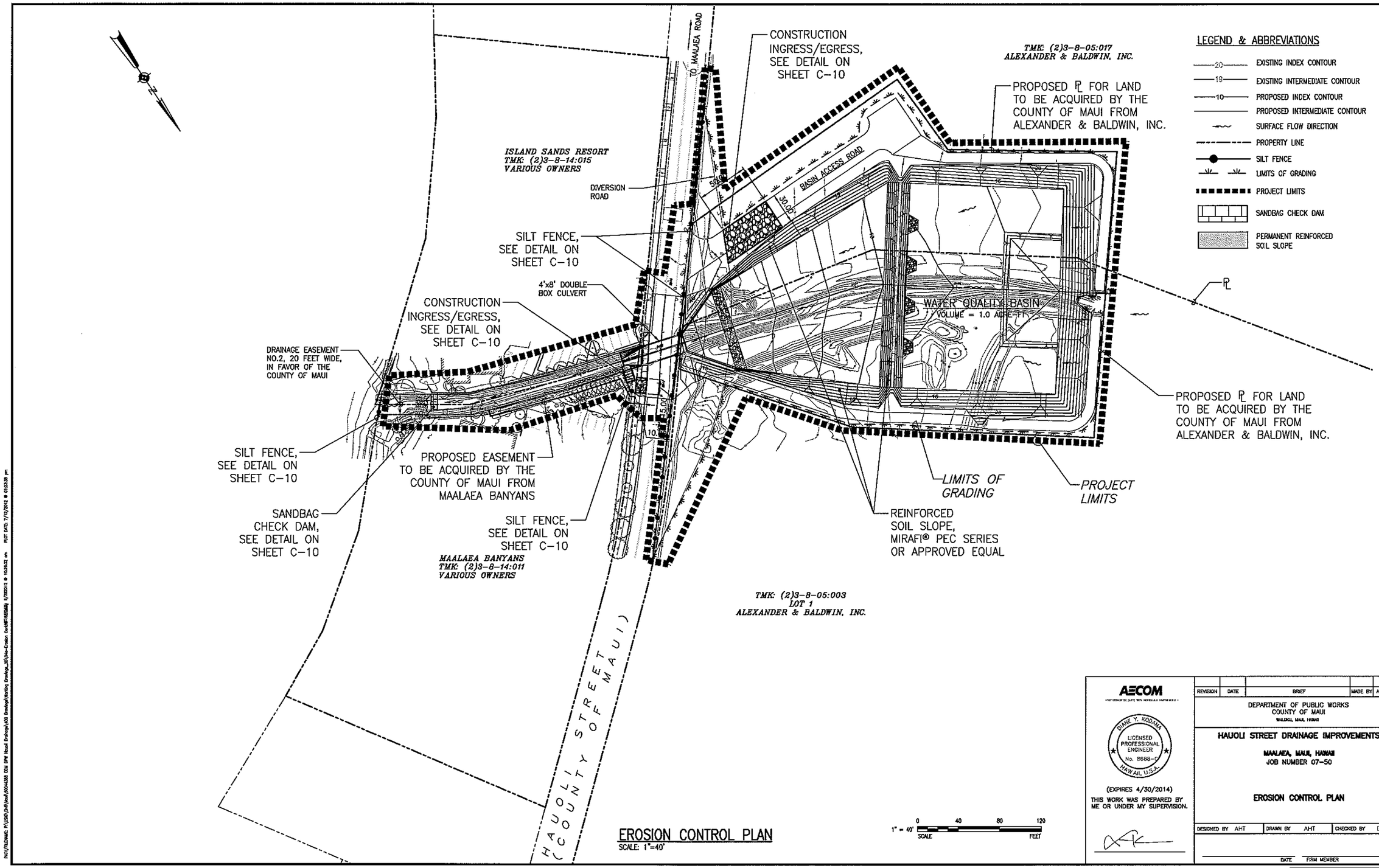
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-8 SHEET 9 OF 41

FILE	POCKET	FOLDER	NUMBER

P:\PROJECTS\MAUI\Drafting\Drawings\07-50 Hauoli Drainage\Working Drawings\07-50 Hauoli Site Plan.dgn PLOT DATE: 7/12/2013 @ 1:51:41 pm PLOT DRVR: 7/12/2013 @ 10:55:05 pm



EROSION CONTROL PLAN
SCALE: 1"=40'

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

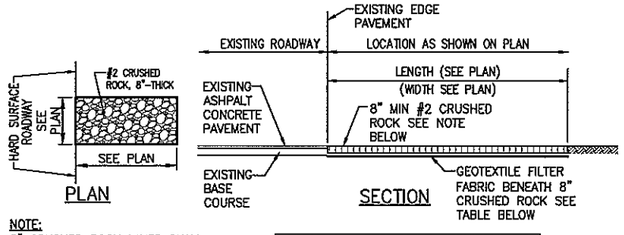
EROSION CONTROL PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

PLOT/FILENAME: P:\LAND\Drft\Haui\EROSION CON DWG Haui Drainage\LAND Drawings\Grading Drawings\Haui Erosion Con.dwg PLOT DATE: 7/12/2013 @ 10:33:39 am

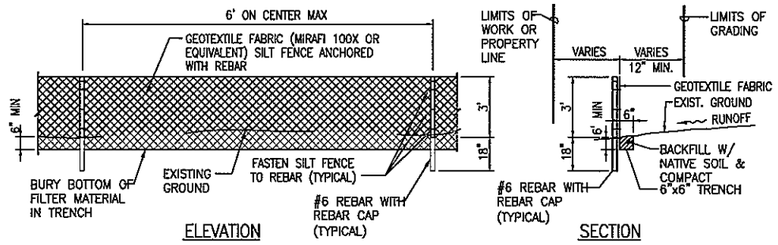


NOTE:
8" CRUSHED ROCK LAYER SHALL BE REMOVED IMMEDIATELY PRIOR TO INSTALLATION OF ROADWAY BASE COURSE.

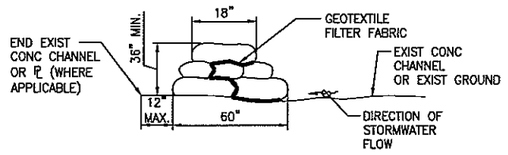
TABLE A GEOTEXTILE REQUIREMENTS

PHYSICAL PROPERTY	REQUIREMENTS
GRAB TENSILE STRENGTH	220 LB (ASTM D1682)
ELONGATION FAILURE	50% (ASTM D1682)
MULLEN BURST STRENGTH	430 LB (ASTM D3786)
PUNCTURE STRENGTH	125 LB (ASTM D751, MODIFIED)
EQUIVALENT OPENING	SIZE 40-80 (U.S. STD SIEVE, CW-02215)

CONSTRUCTION INGRESS/EGRESS
NOT TO SCALE



SILT FENCE DETAIL
NOT TO SCALE



SANDBAG CHECK DAM DETAIL
NOT TO SCALE

TYPICAL DIMENSIONS PER SANDBAG
WIDTH: 16" TO 18"
LENGTH: 24" TO 30"
THICKNESS: 6" TO 8"
WEIGHT: 90 TO 125 POUNDS

BEST MANAGEMENT PRACTICES NOTES:

1. THE CONTRACTOR SHALL MAINTAIN ALL SILT FENCES, CONSTRUCTION INGRESS/EGRESS, AND OTHER ITEMS SHOWN ON THE EROSION CONTROL PLAN UNTIL ALL CONSTRUCTION IS COMPLETED AND ACCEPTED BY THE OWNER.
2. THE CONSTRUCTION INGRESS AND EGRESS SHALL HAVE A 8" THICK CRUSHED ROCK LAYER LOCATED AT AND TO THE DIMENSIONS AS SHOWN ON THE EROSION CONTROL PLAN. SHOULD THE CONTRACTOR REQUIRE A INGRESS AND EGRESS, OTHER THAN WHAT IS SHOWN ON THE EROSION CONTROL PLAN, THE CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN ALL NECESSARY APPROVALS, INCLUDING THAT FOR RELOCATION OF THE CRUSHED ROCK AREA AS REQUIRED.
3. SLOPE AND EXPOSED AREAS SHALL BE SODDED OR PLANTED AS SOON AS FINAL GRADES HAVE BEEN ESTABLISHED. PLANTING SHALL NOT BE DELAYED UNTIL ALL GRADING HAS BEEN COMPLETED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS AND ANY AREA WITHIN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED SHALL BE PLANTED.

   UNLESS INDICATED OTHERWISE IN THE SPECIAL PROVISIONS OR PROPOSAL, PAYMENT FOR PLANTING OR GRASSING REQUIRED UNDER THIS ITEM (OTHER THAN THAT SPECIFIED FOR LANDSCAPING) SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO AND INCLUDED IN THE PRICES BID FOR MASS GRADING.
4. ALL BEST MANAGEMENT PRACTICES (BMP'S) SHALL NOT BE REMOVED UNTIL ALL PERMANENT EROSION CONTROLS ARE IN PLACE AND ESTABLISHED.
5. AT THE END OF GRADING OPERATIONS, EXISTING CATCH BASINS AND DRAIN MANHOLES SURROUNDING THE PROJECT SITE SHALL BE INSPECTED AND ANY ACCUMULATED SEDIMENT AND DEBRIS FOUND IN THE DRAIN STRUCTURES SHALL BE REMOVED. FLUSHING INTO THE CB'S AND DMH'S IS PROHIBITED.
6. THE CONTRACTOR AT HIS OWN EXPENSE SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL CHAPTER 11-60, "AIR POLLUTION CONTROL."
7. ALL STORM DRAIN INLETS ON SITE, AND THOSE OFFSITE WHICH MAY RECEIVE RUNOFF FROM THE SITE SHALL USE INLET PROTECTION. THE CONTRACTOR SHALL INSTALL INLET PROTECTION BEFORE ANY EARTHWORK IS INITIATED.
8. THE CONTRACTOR SHALL KEEP EXISTING AND NEW ROADWAYS FREE FROM SILT.
9. THE CONTRACTOR SHALL INSPECT SILT FENCES ON A WEEKLY BASIS AND AFTER RAINFALL, REPAIRING THE FENCES WHENEVER THEY ARE DAMAGED AND REMOVING SILT WHEN IT REACHES ONE-THIRD THE HEIGHT OF THE FENCE.
10. THE CONTRACTOR SHALL INSPECT ALL CATCH BASINS/DRAIN INLET PROTECTION MEASURES ON A WEEKLY BASIS AND AFTER RAINFALL, REPAIRING AS NEEDED AND REMOVING SILT WHEN IT REACHES ONE-HALF THE DEPTH OF THE FILTER.
11. THE CONTRACTOR SHALL INSTALL A DUST FENCE AROUND THE ENTIRE PROJECT SITE. THE CONTRACTOR SHALL ADJUST THE HEIGHT AND PLACEMENT AS NEEDED TO SUIT FIELD CONDITIONS AND TO PROTECT HOMES AND BUSINESSES IN THE SURROUNDING AREA.

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8658-C HAWAII, U.S.A.

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WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

EROSION CONTROL DETAILS AND BMP NOTES

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-10 SHEET 11 OF 41

FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/12/2013 @ 9:10:54 pm
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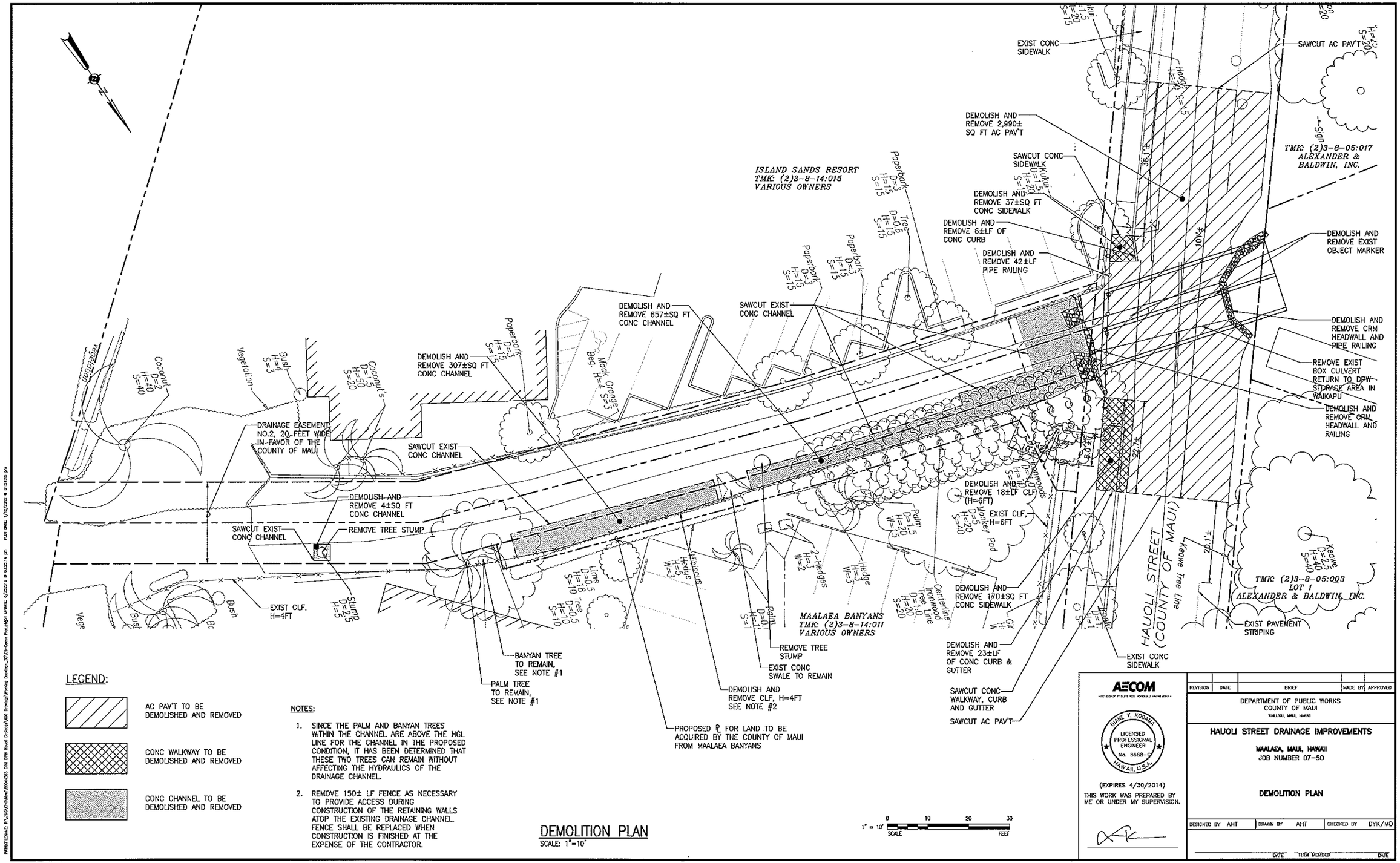

LEGEND:

- AC PAV'T TO BE DEMOLISHED AND REMOVED
- CONC WALKWAY TO BE DEMOLISHED AND REMOVED
- CONC CHANNEL TO BE DEMOLISHED AND REMOVED

NOTES:

1. SINCE THE PALM AND BANYAN TREES WITHIN THE CHANNEL ARE ABOVE THE HGL LINE FOR THE CHANNEL IN THE PROPOSED CONDITION, IT HAS BEEN DETERMINED THAT THESE TWO TREES CAN REMAIN WITHOUT AFFECTING THE HYDRAULICS OF THE DRAINAGE CHANNEL.
2. REMOVE 150± LF FENCE AS NECESSARY TO PROVIDE ACCESS DURING CONSTRUCTION OF THE RETAINING WALLS ATOP THE EXISTING DRAINAGE CHANNEL. FENCE SHALL BE REPLACED WHEN CONSTRUCTION IS FINISHED AT THE EXPENSE OF THE CONTRACTOR.

DEMOLITION PLAN

SCALE: 1"=10'

1" = 10' SCALE 0 10 20 30 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8558-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

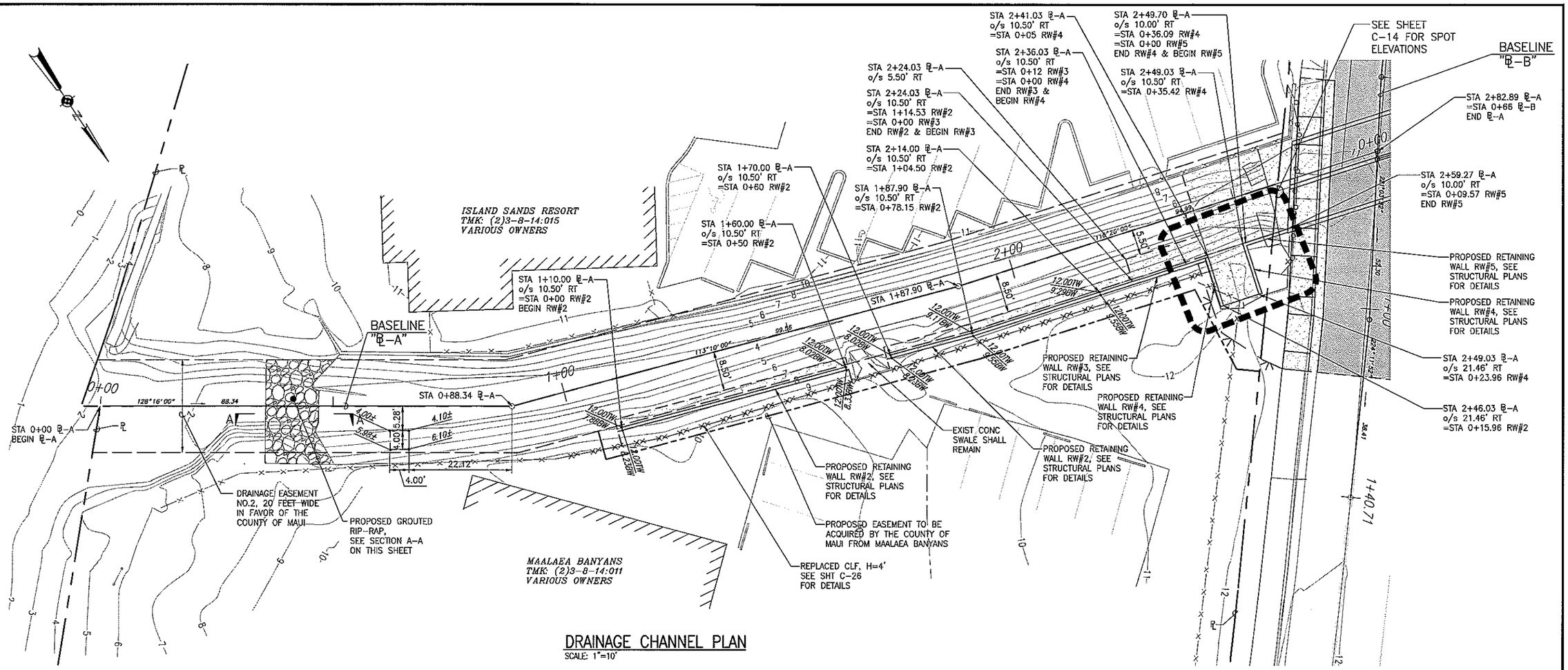
MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

DEMOLITION PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

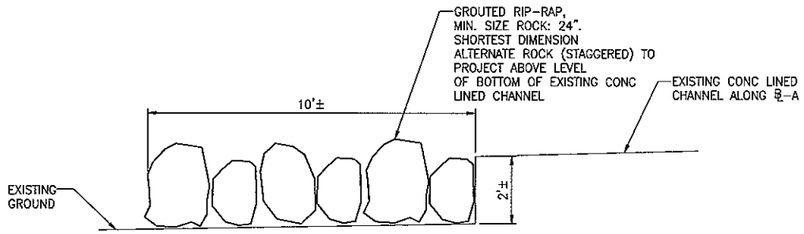


DRAINAGE CHANNEL PLAN

SCALE: 1"=10'

LEGEND:

- AC PAVEMENT
- CONCRETE SIDEWALK/ RECONSTRUCTED CONC CHANNEL
- 12.00TW / 8.23BW — PROPOSED SPOT ELEVATIONS:
  - * TW=TOP OF WALL
  - * BW=BOTTOM OF WALL



SECTION A-A

SCALE: 1"=2'

NOTES:

1. SEE SHEET C-13 FOR PROFILES OF RETAINING WALLS, RW#2, RW#3, RW#4 & RW#5.
2. SEE SHEETS C-14 & C-15 FOR CROSS SECTIONS OF DRAINAGE CHANNEL.
3. SEE STRUCTURAL DRAWINGS FOR RETAINING WALL PLAN AND DETAILS.

1" = 2' SCALE 0 2 4 6 FEET

1" = 5' SCALE 0 5 10 15 FEET

1" = 10' SCALE 0 10 20 30 FEET

AECOM

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(EXPIRES 4/30/2014)

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WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

DRAINAGE CHANNEL PLAN

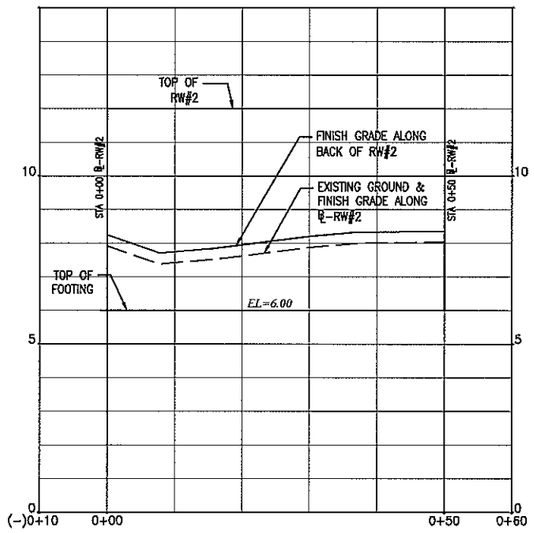
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

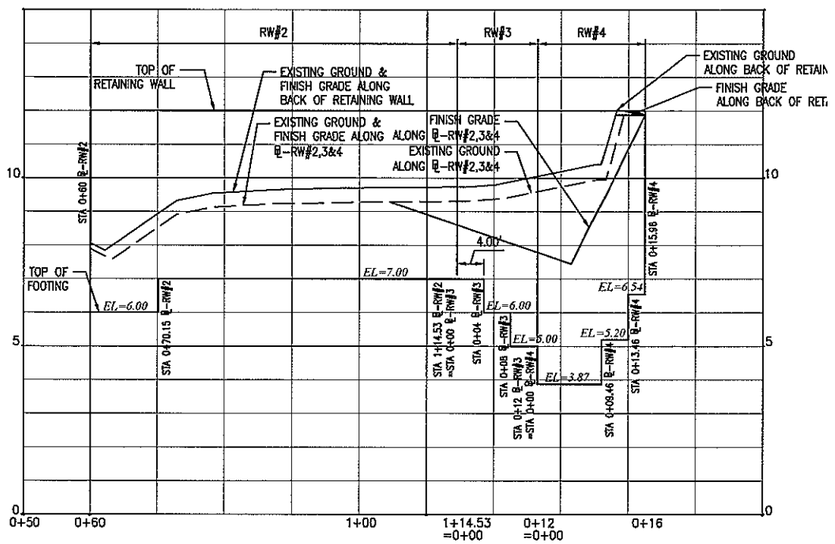
C-12 SHEET 13 OF 41

FILE	POCKET	FOLDER	NUMBER

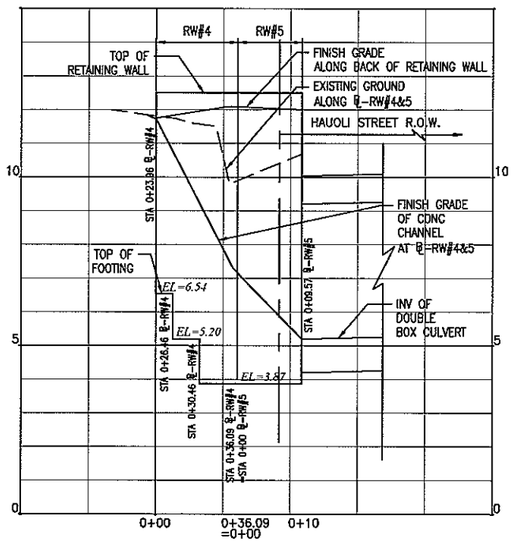
R:\PUBLISHING P:\WRS\Civil\Mxd\A0041A3B 2014 GPK Maui Drawings\400 Drawings\Working Drawings_36"x36"-Drainage Ch.MXD 7/12/2013 @ 10:36:57 pm PLOT DATE: 7/12/2013 @ 10:40:49 pm



PROFILE – RW#2 (STA 0+00–0+50)
SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



PROFILE – RW#2 (STA 0+60–1+14.53),
RW#3 (STA 0+00–0+12),
RW#4 (STA 0+00–0+15.96)
SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



PROFILE – RW#4 (STA 0+23.96),
RW#5 (STA 0+00–0+09.57)
SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)

1" = 10' SCALE 0 10 20 30 FEET
1" = 2' SCALE 0 2 4 6 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8588-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07–50

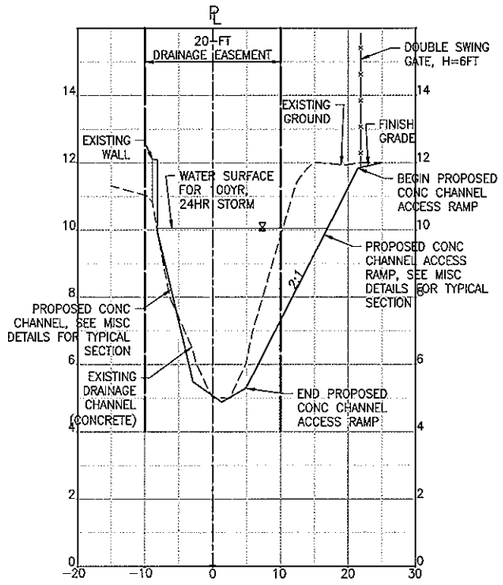
PROFILES OF RETAINING WALLS – RW#2, RW#3, RW#4 & RW#5

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

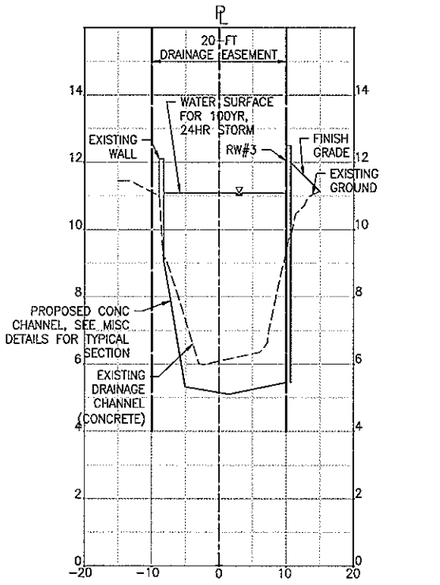
FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/12/2013 @ 01:25:41 pm
H:\h\ZLDWG\ PUBS\DWG\HAUOLI\MAP\4388 CDM DPK Hauoli Drainage\Working Drawings_50\01-Roadway\ MAP\4388DPK_6.DGN



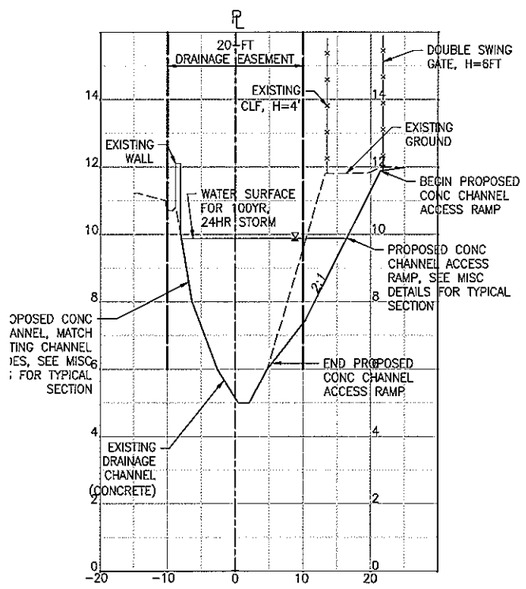
T-2 – STA 2+48.03 BL-A

SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



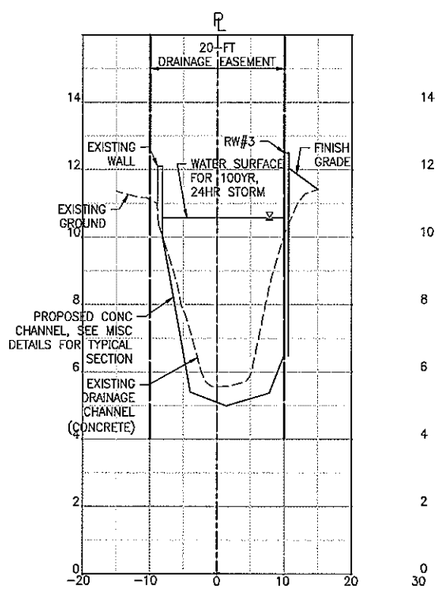
T-4 – STA 2+58.03 BL-A

SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



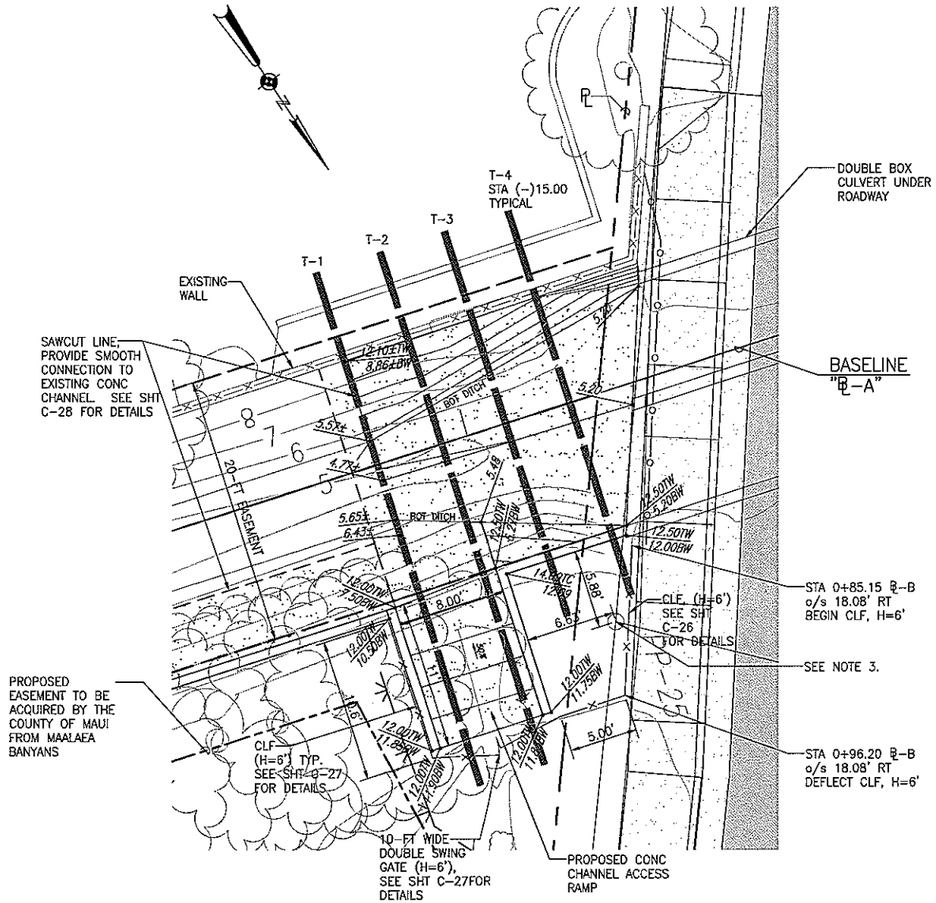
T-1 – STA 2+43.03 BL-A

SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



T-3 – STA 2+53.03 BL-A

SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



PLAN – DRAINAGE CHANNEL TRANSITION

SCALE: 1"=5'

LEGEND:

RECONSTRUCTED CONC CHANNEL

12.00TW
8.23BW

PROPOSED SPOT ELEVATIONS:
* TW=TOP OF WALL
* BW=BOTTOM OF WALL

1" = 10' SCALE 0 10 20 30 FEET

1" = 5' SCALE 0 5 10 15 FEET

1" = 2' SCALE 0 2 4 6 FEET

NOTE:

1. SEE SHEET C-13 FOR PROFILES OF RETAINING WALLS, RW#1, RW#2 & RW#3.
2. SEE SHEET C-15 FOR CONTINUATION OF CROSS SECTIONS OF DRAINAGE CHANNEL.
3. SEE NOTE 3, SHEET C-1.

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8688-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

DRAINAGE CHANNEL TRANSITION PLAN & SECTIONS

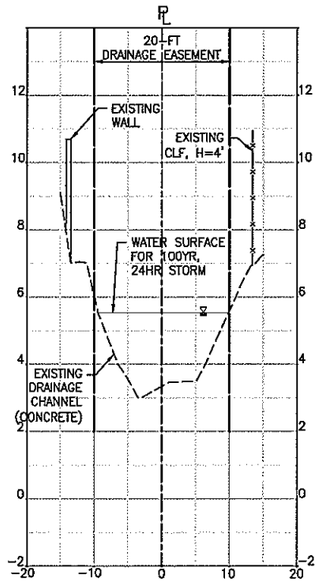
DESIGNED BY AHT	DRAWN BY AHT	CHECKED BY DYK/MD

DATE FIRM MEMBER DATE

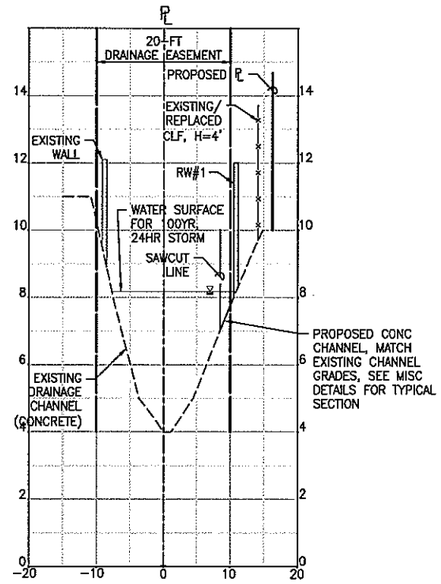
FILE	POCKET	FOLDER	NUMBER

C-14 SHEET 15 OF 41

R:\PW\PLANNING\...\Maui\2004\A308 (DPW Hauoli Drainage)\AMD Drawings\Working Drawings_MXD\...\Drainage Channel Transition Plan & Sections.mxd PLOT DATE: 7/12/2013 @ 01:28:45 pm



STA 0+50 BL-A
SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



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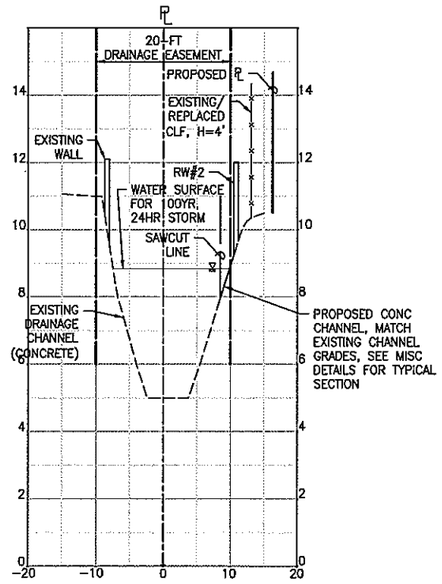
SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



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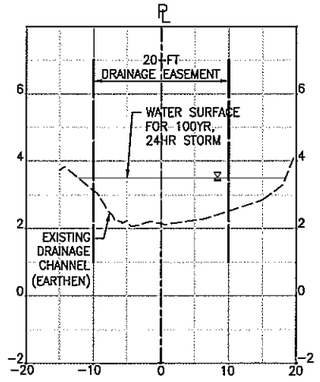
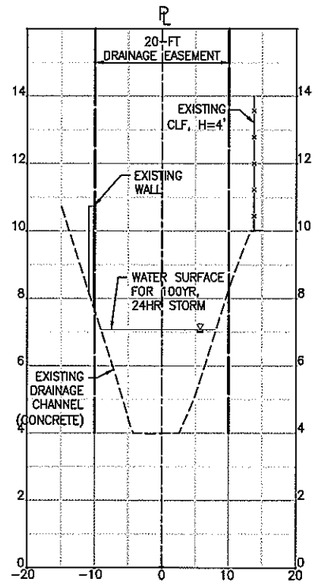
SCALE: 1"=2' (VERTICAL)



STA 0+00 BL-A
SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)



STA 1+00 BL-A
SCALE: 1"=10' (HORIZONTAL)
SCALE: 1"=2' (VERTICAL)

1" = 10' SCALE: 0, 10, 20, 30 FEET

1" = 2' SCALE: 0, 2, 4, 6 FEET

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

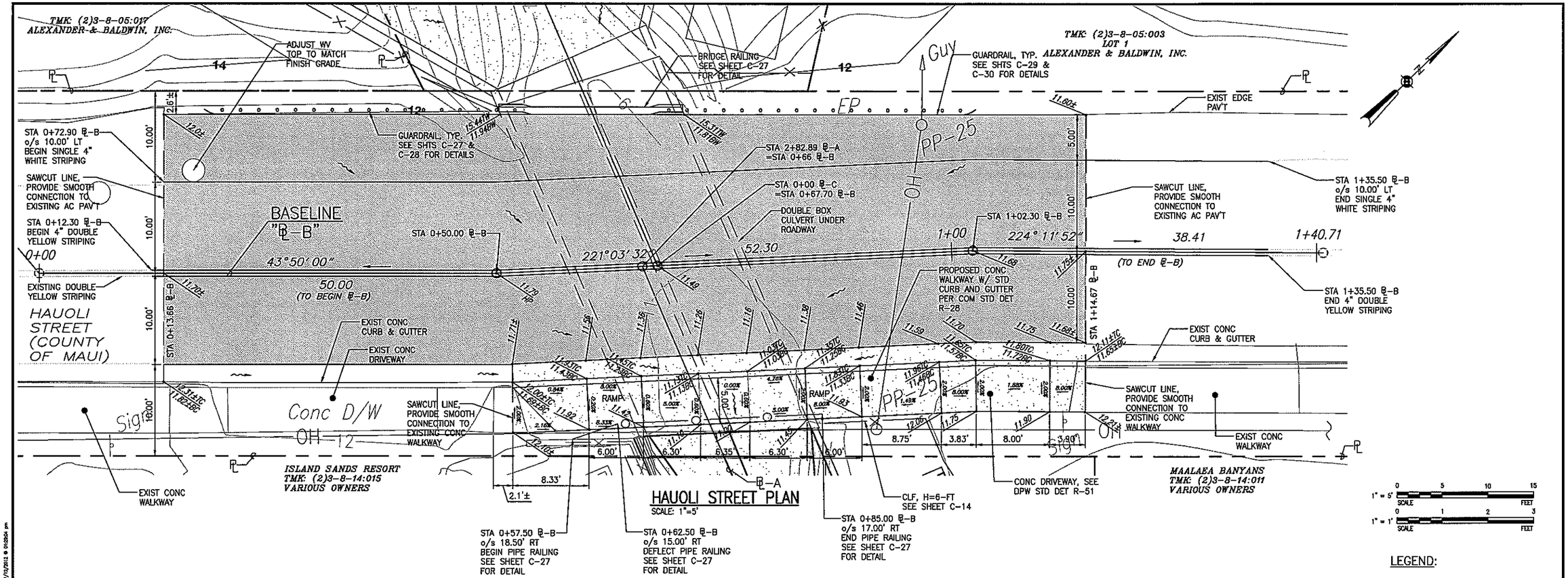
DRAINAGE CHANNEL CROSS SECTIONS

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE | FIRM MEMBER | DATE

FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 1/13/2012 @ 09:05:26 pm
PLOTTED BY: DIANE KODAMA
PLOT SCALE: 1.0000
PATH/FILENAME: P:\DEPT\DWR\Maui\300A\005 CDM (DPW Hauoli Drainage)\600 Drawings\Working Drawings_30"\DR-Drainage Ch\MISC DRAWINGS\DRAINAGE CHANNEL CROSS SECTIONS.dgn



AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8588-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

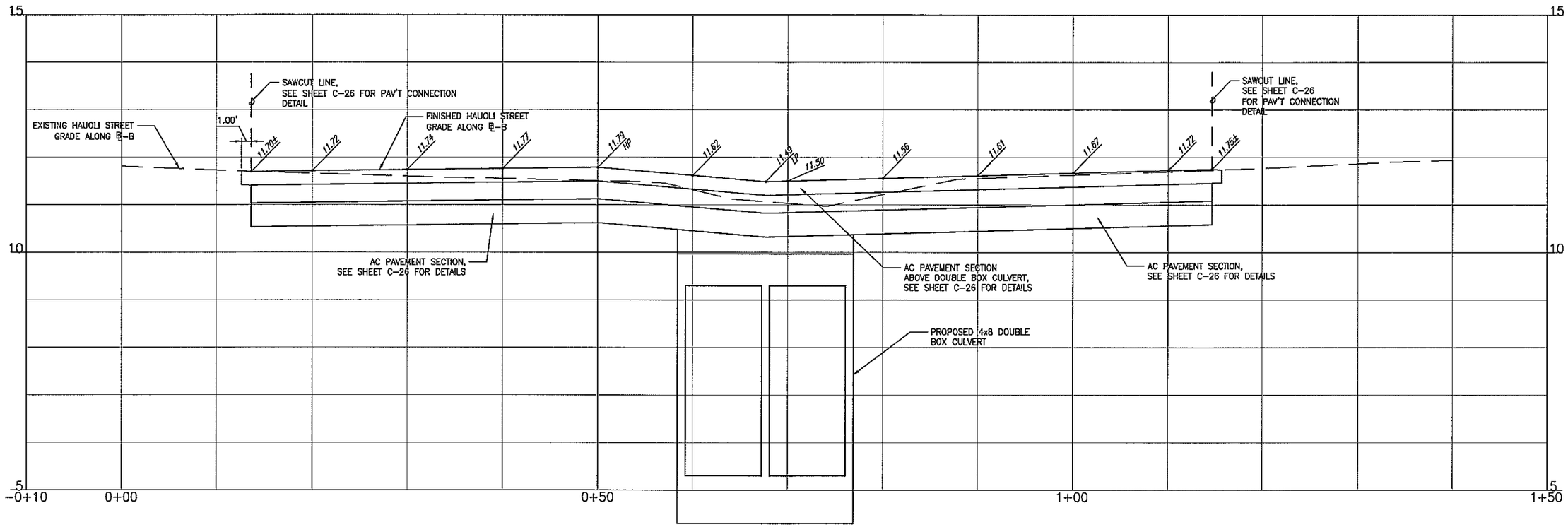
HAUOLI STREET PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

PLOT/ENGINEER: P:\JOBS\DWG\Hauoli\DESIGN\CIVIL\CDR\ Hauoli Drainage\Working Drawings\DWG\Hauoli St PLAN&PROFILE 07250015 @ 10.00=1 on PLOT DATE: 2/12/2013 @ 09:09:54 am



HAUOLI STREET PROFILE

SCALE: 1"=5' (HORIZONTAL)
SCALE: 1"=1' (VERTICAL)

1" = 5' SCALE 0 5 10 15 FEET

1" = 1' SCALE 0 1 2 3 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8688-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

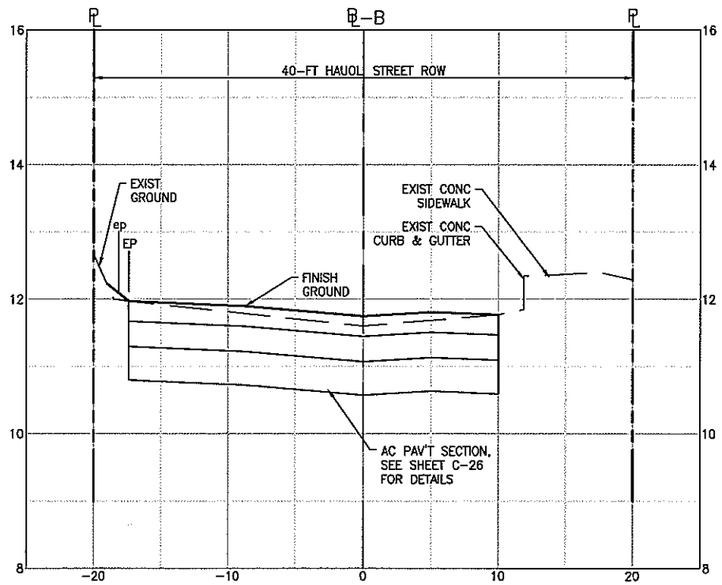
HAUOLI STREET PROFILE

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

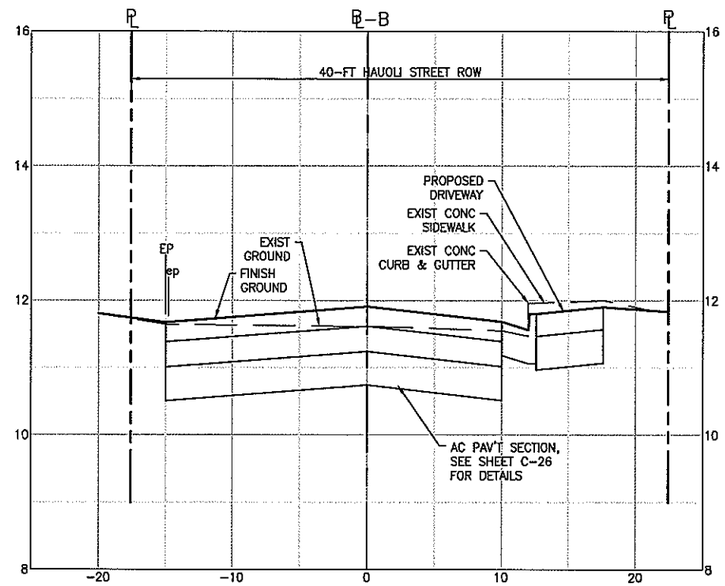
DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

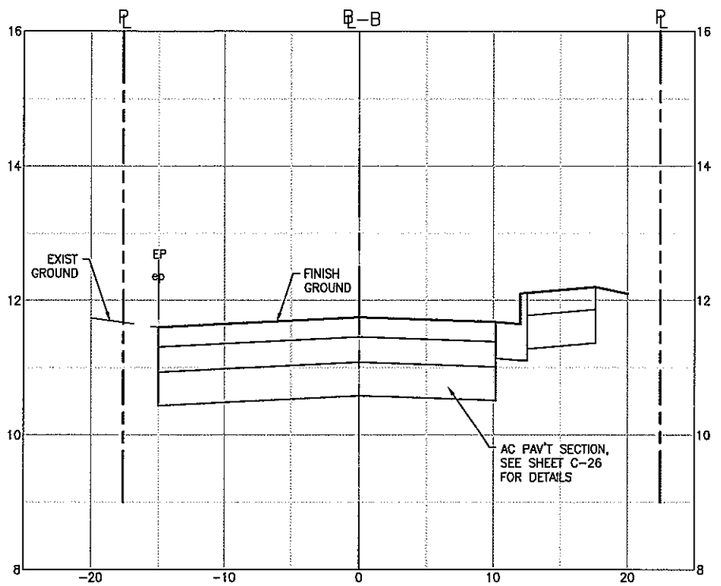
PATH: P:\LAND\Civil\Hauoli Drainage\Working Drawings\C-17 Hauoli St Profile.dgn PLOT DATE: 7/17/2013 @ 9:05:33 am PLOTTED BY: AHT



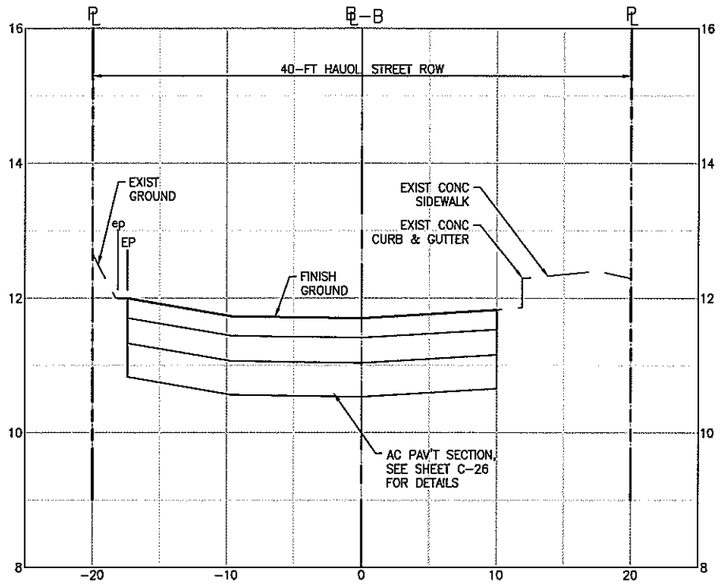
EARTHWORK – STA 0+31.81 ℄–B
FILL AREA=0.12 SQ FT
CUT AREA=29.67 SQ FT
EMBANK=0.04 CYD
EXCAV=20.75 CYD



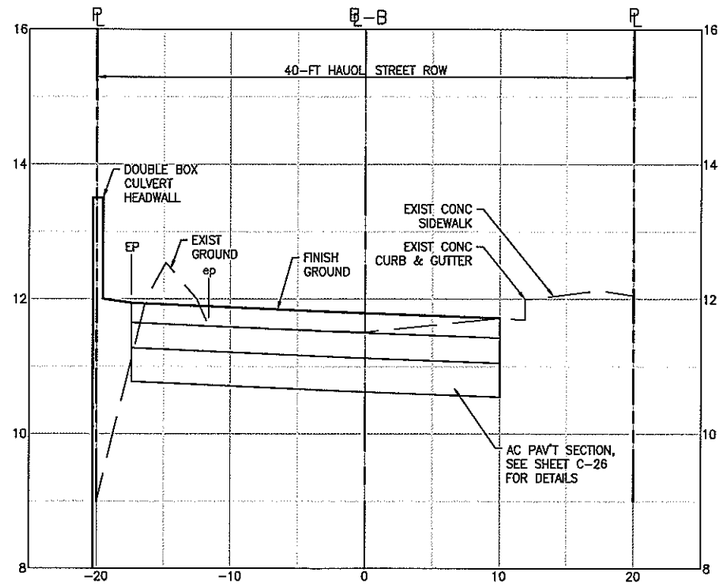
EARTHWORK – STA 1+00 ℄–B
FILL AREA=0.08 SQ FT
CUT AREA=30.85 SQ FT
EMBANK=3.45 CYD
EXCAV=54.59 CYD



EARTHWORK – STA 1+14.65 ℄–B
FILL AREA=0.00 SQ FT
CUT AREA=35.12 SQ FT
EMBANK=0.02 CYD
EXCAV=17.90 CYD



EARTHWORK – STA 0+13.62 ℄–B
FILL AREA=0.00 SQ FT
CUT AREA=31.97 SQ FT
EMBANK=0.00 CYD
EXCAV=0.00 CYD



EARTHWORK – STA 0+50 ℄–B
FILL AREA=3.65 SQ FT
CUT AREA=28.11 SQ FT
EMBANK=1.27 CYD
EXCAV=19.46 CYD

HAUOLI STREET EARTHWORK QUANTITIES

(FOR PERMIT PURPOSES ONLY)

EXCAVATION ..... 113 C.Y.
EMBANKMENT..... 5 C.Y.

1" = 5' SCALE (HORIZONTAL) 0 5 10 15 FEET
1" = 1' SCALE (VERTICAL) 0 1 2 3 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8688–C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07–50

HAUOLI STREET CROSS SECTIONS

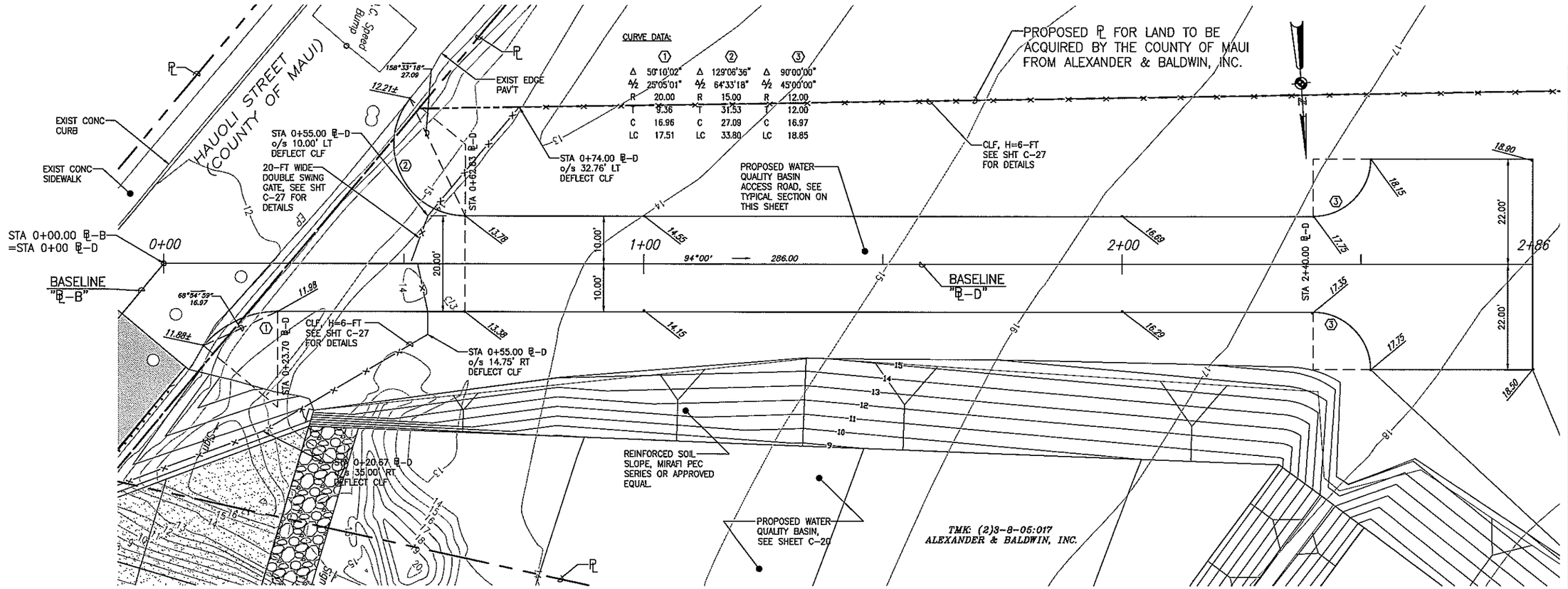
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C–18 SHEET 19 OF 41

FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/12/2013 @ 9:40:38 am
PATH/FILENAME: P:\JOBS\DWG\MAUI\2007\50\CAD\Haui Drainage\MXD Drawings\Working Drawings_2013-Sheet 19 Cross Sections.dwg

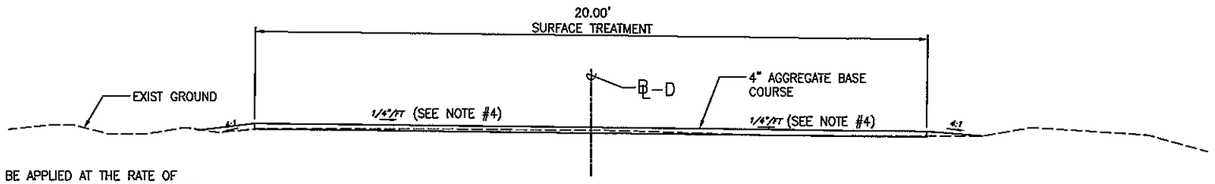


WATER QUALITY BASIN ACCESS ROAD PLAN

SCALE: 1"=10'

1" = 10' SCALE 0 10 20 30 FEET

1" = 2' SCALE 0 2 4 6 FEET



NOTES:

1. PRIME COAT (SS-1) SHALL BE APPLIED AT THE RATE OF APPROXIMATELY 0.35 GAL. PER SQ. YD. AFTER BASECOURSE HAS BEEN COMPACTED.
2. AFTER THE BITUMINOUS MATERIAL HAS BEEN ABSORBED, RS-1 SHALL BE APPLIED AT A RATE OF 0.35 GAL. PER SQ. YD.
3. SIZE 8 ROCKS (CHIPS) SHALL THEN BE SPREAD IN A UNIFORM LAYER AT THE RATE OF APPROXIMATELY 20 LBS. PER SQ. YD. AND ROLLED.
4. CROSS SLOPE OF ACCESS ROAD SHALL SLOPE TOWARDS THE WATER QUALITY BASIN.

WATER QUALITY BASIN ACCESS ROAD TYPICAL SECTION

SCALE: 1"=2'

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8658-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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REVISION	DATE	BRIEF	MADE BY	APPROVED

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

WATER QUALITY BASIN ACCESS ROAD PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-19 SHEET 20 OF 41

FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/12/2013 @ 9:43:00 am
PLOTTED BY: PLOTTED BY: Mark Kodama
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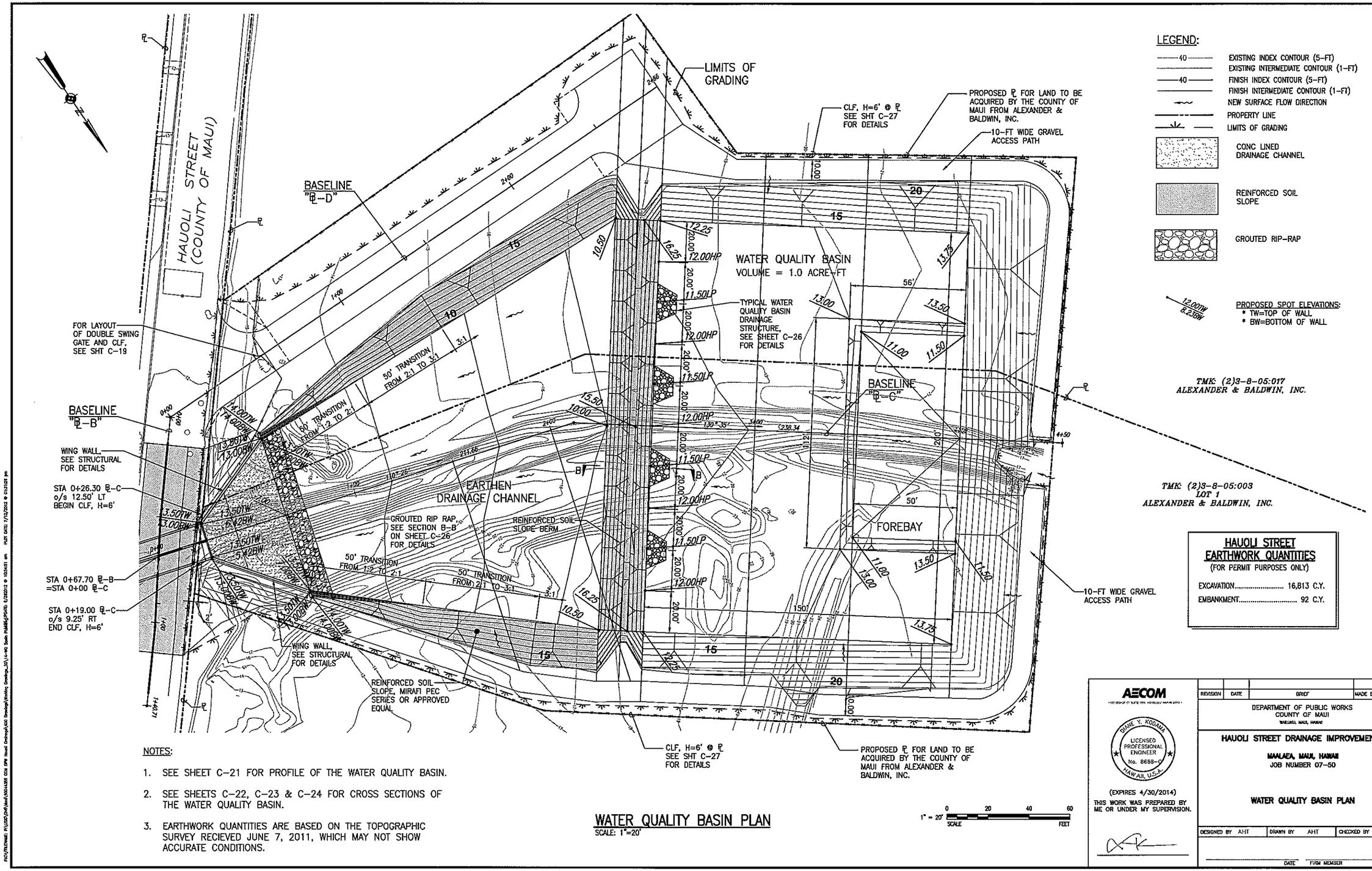

NOTES:

1. SEE SHEET C–21 FOR PROFILE OF THE WATER QUALITY BASIN.
2. SEE SHEETS C–22, C–23 & C–24 FOR CROSS SECTIONS OF THE WATER QUALITY BASIN.
3. EARTHWORK QUANTITIES ARE BASED ON THE TOPOGRAPHIC SURVEY RECIEVED JUNE 7, 2011, WHICH MAY NOT SHOW ACCURATE CONDITIONS.

WATER QUALITY BASIN PLAN

SCALE: 1"=20'

1" = 20' SCALE 0 20 40 60 FEET

HAUOLI STREET EARTHWORK QUANTITIES
(FOR PERMIT PURPOSES ONLY)

EXCAVATION..... 16,813 C.Y.
EMBANKMENT..... 92 C.Y.

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688–E
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
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REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

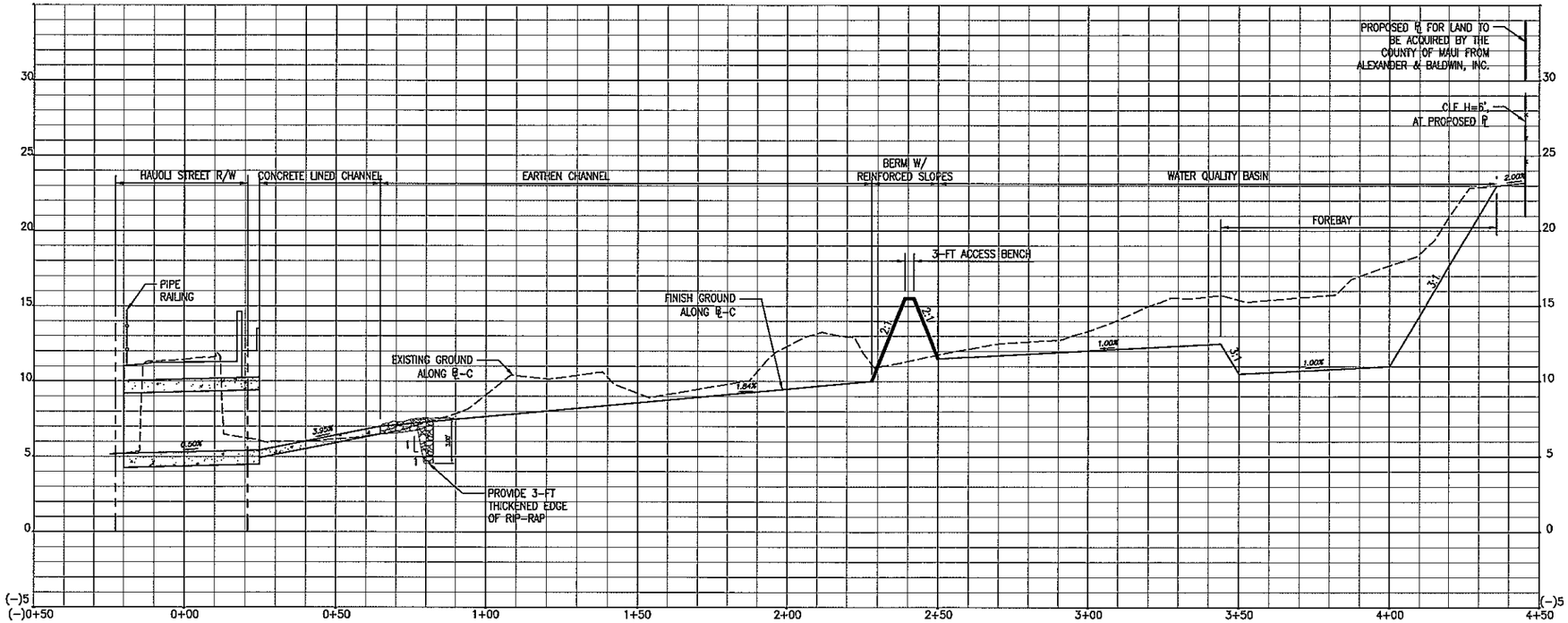
MAALAEA, MAUI, HAWAII
JOB NUMBER 07–50

WATER QUALITY BASIN PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER



WATER QUALITY BASIN PROFILE

SCALE: 1"=20' (HORIZONTAL)
SCALE: 1"=4' (VERTICAL)

1" = 20' SCALE 0 20 40 60 FEET

1" = 4' SCALE 0 4 8 12 FEET

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

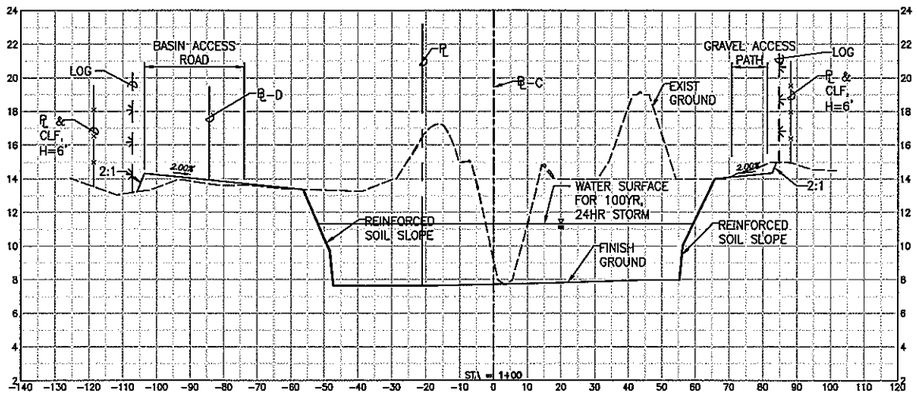
MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

WATER QUALITY BASIN PROFILE

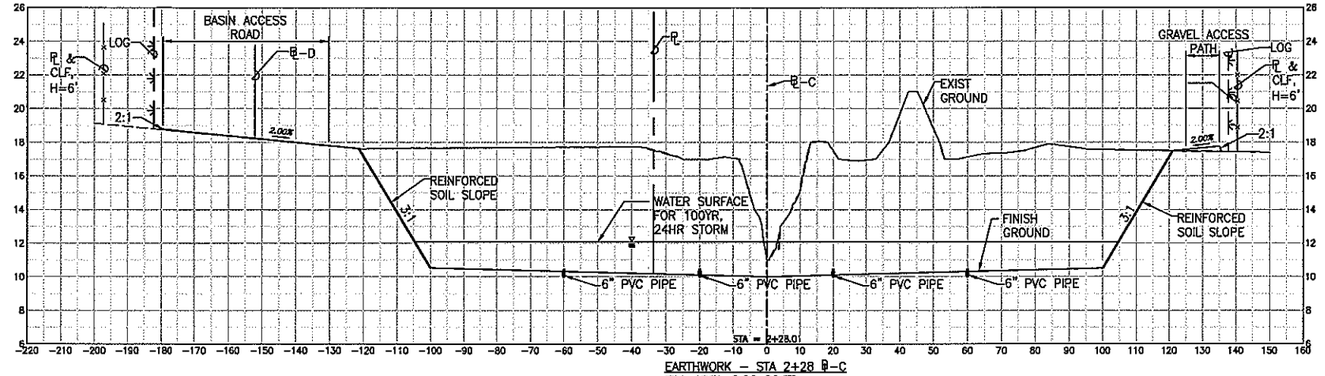
DESIGNED BY AHT | DRAWN BY AHT | CHECKED BY DYK/MD

DATE FIRM MEMBER DATE

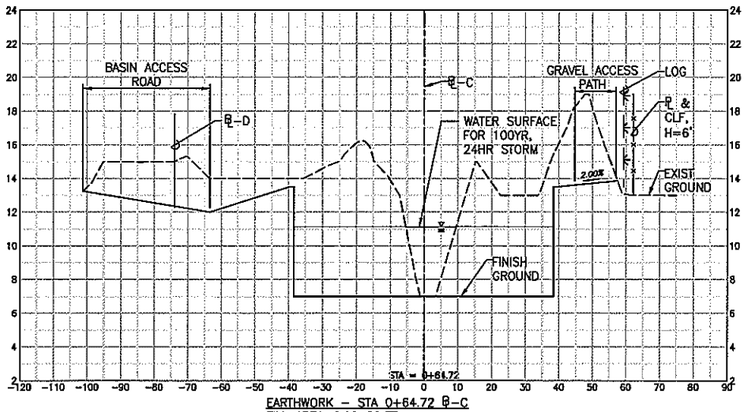
FILE	POCKET	FOLDER	NUMBER



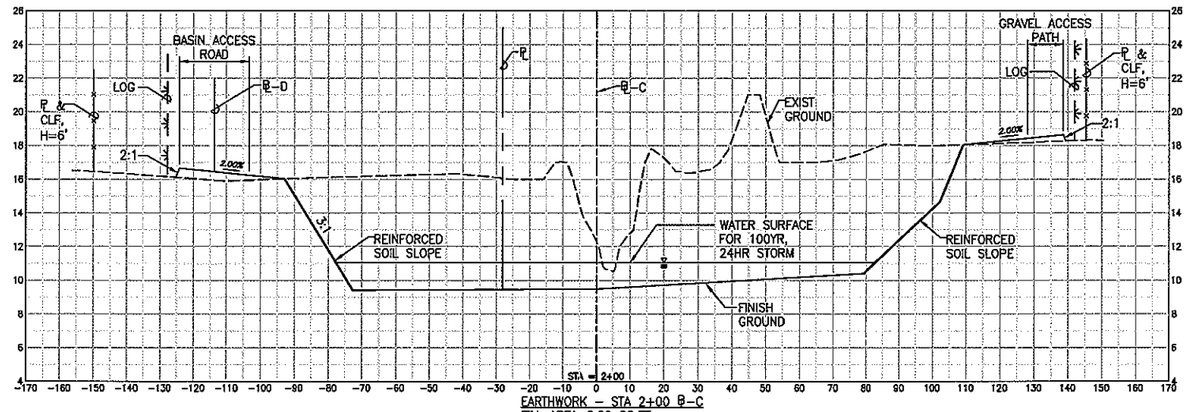
EARTHWORK – STA 1+00 ℄–C
FILL AREA=1.12 SQ.FT.
CUT AREA=747.76 SQ.FT.
EMBANK=0.7 CYD
EXCAV=820.1 CYD



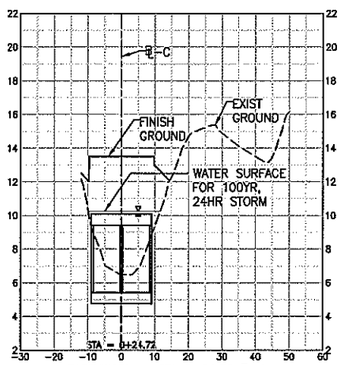
EARTHWORK – STA 2+28 ℄–C
FILL AREA=0.00 SQ.FT.
CUT AREA=1556.19 SQ.FT.
EMBANK=0.00 CYD
EXCAV=1438.2 CYD



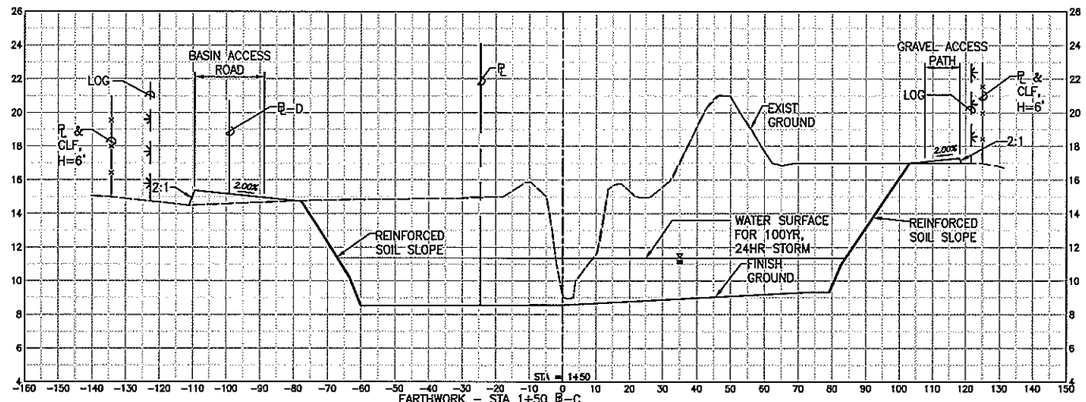
EARTHWORK – STA 0+64.72 ℄–C
FILL AREA=0.00 SQ.FT.
CUT AREA=507.46 SQ.FT.
EMBANK=13.1 CYD
EXCAV=409.2 CYD



EARTHWORK – STA 2+00 ℄–C
FILL AREA=0.00 SQ.FT.
CUT AREA=1217.50 SQ.FT.
EMBANK=0.00 CYD
EXCAV=2157.9 CYD



EARTHWORK – STA 0+24.72 ℄–C
FILL AREA=17.67 SQ.FT.
CUT AREA=44.95 SQ.FT.
EMBANK=0.00 CYD
EXCAV=0.00 CYD



EARTHWORK – STA 1+50 ℄–C
FILL AREA=0.00 SQ.FT.
CUT AREA=1113.03 SQ.FT.
EMBANK=1.0 CYD
EXCAV=1723.0 CYD

1" = 20' SCALE (HORIZONTAL) FEET
1" = 4' SCALE (VERTICAL) FEET

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

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DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

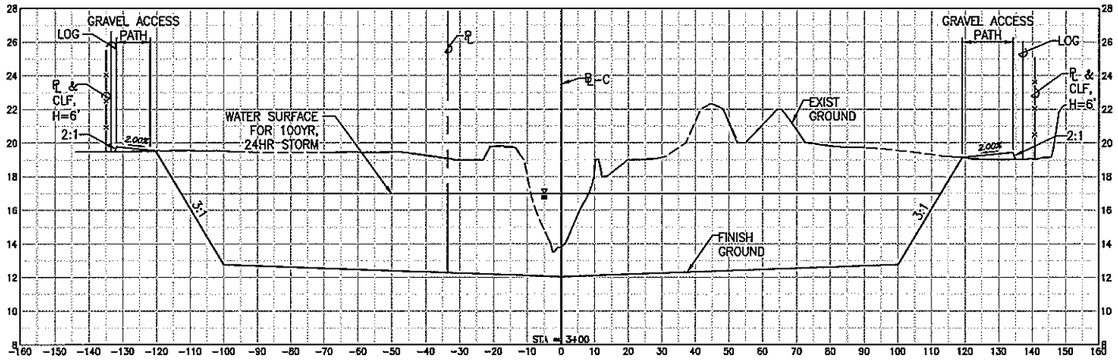
MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

WATER QUALITY BASIN CROSS SECTIONS – 1

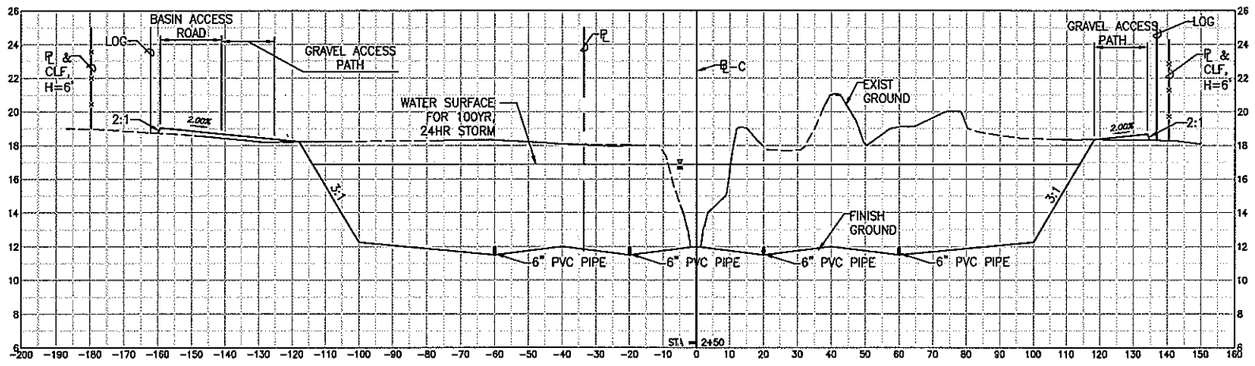
DESIGNED BY AHT | DRAWN BY AHT | CHECKED BY DYK/MD

DATE | FIRM MEMBER | DATE

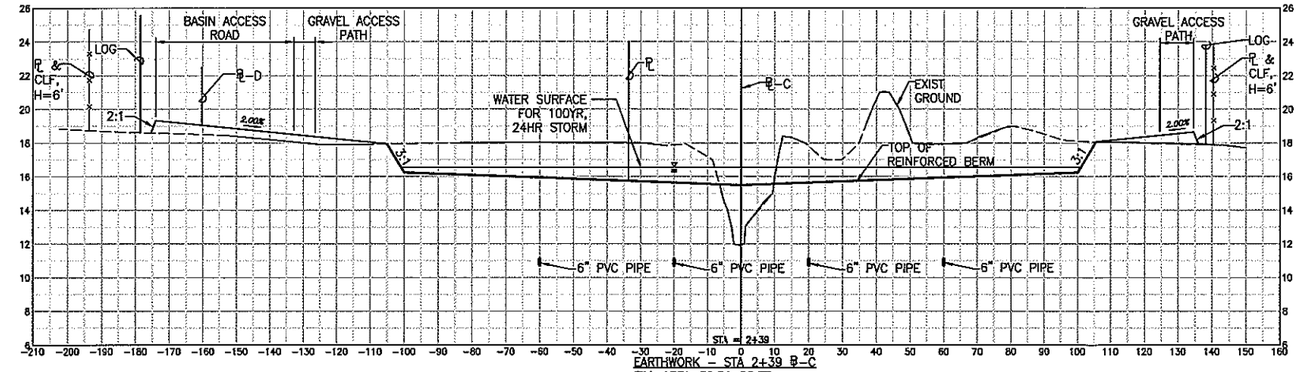
FILE	POCKET	FOLDER	NUMBER



EARTHWORK – STA 3+00 ℄–C
FILL AREA=0.00 SQ.FT.
CUT AREA=1513.19 SQ.FT.
EMBANK=0.00 CYD
EXCAV=2660.1 CYD



EARTHWORK – STA 2+50 ℄–C
FILL AREA=0.00 SQ.FT.
CUT AREA=1359.74 SQ.FT.
EMBANK=11.9 CYD
EXCAV=692.6 CYD



EARTHWORK – STA 2+39 ℄–C
FILL AREA=30.51 SQ.FT.
CUT AREA=421.15 SQ.FT.
EMBANK=6.2 CYD
EXCAV=402.8 CYD

1" = 20' SCALE 0 20 40 60 FEET
1" = 4' SCALE 0 4 8 12 FEET

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

WATER QUALITY BASIN CROSS SECTIONS – 2

DESIGNED BY	AHT	DRAWN BY	AHT	CHECKED BY	DYK/MD

DATE FIRM MEMBER DATE

C-23 SHEET 24 OF 41

FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/12/2013 @ 9:33:56 am
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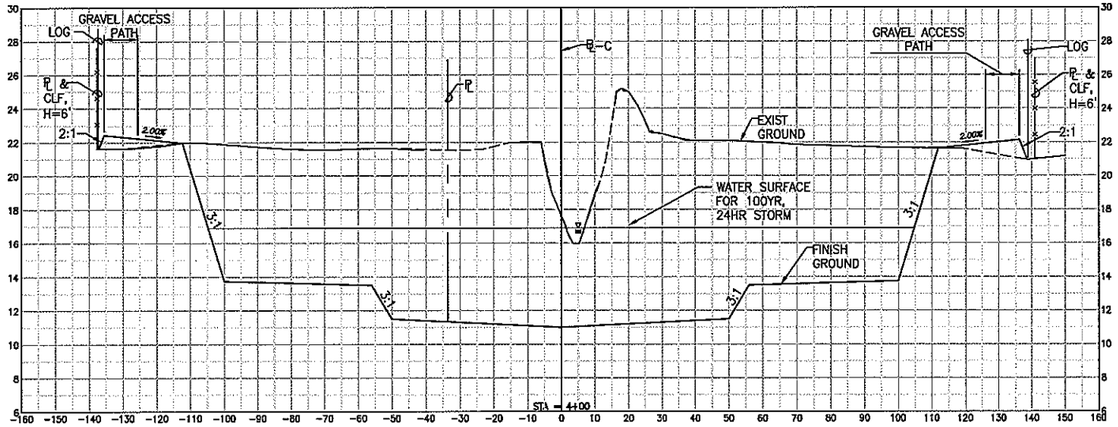
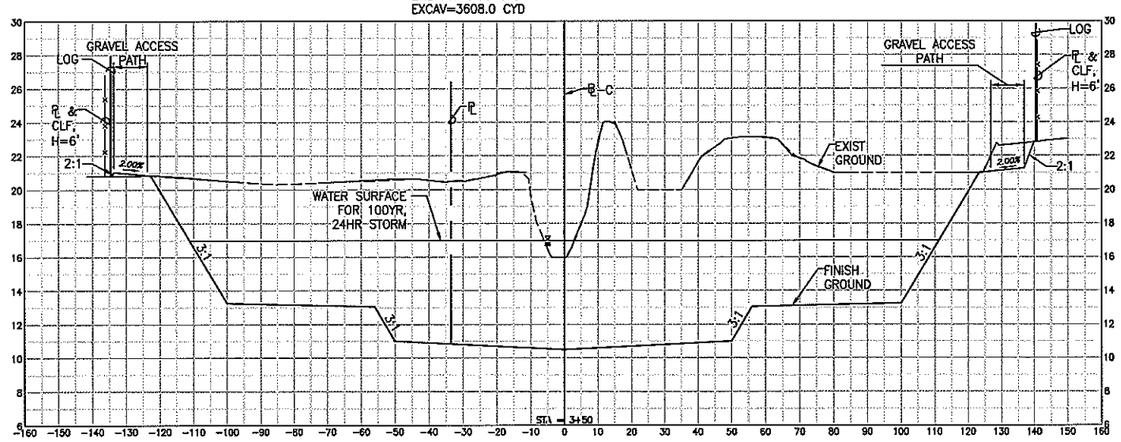


EARTHWORK – STA 4+00 P–C
FILL AREA=0.00 SQ.FT.
CUT AREA=1942.6 SQ.FT.
EMBANK=0.00 CYD
EXCAV=3608.0 CYD



EARTHWORK – STA 3+50 P–C
FILL AREA=0.00 SQ.FT.
CUT AREA=1954.13 SQ.FT.
EMBANK=0.00 CYD
EXCAV=3210.5 CYD

1" = 20' SCALE: 0, 20, 40, 60 FEET
1" = 4' SCALE: 0, 4, 8, 12 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8688-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

WATER QUALITY BASIN CROSS SECTIONS – 3

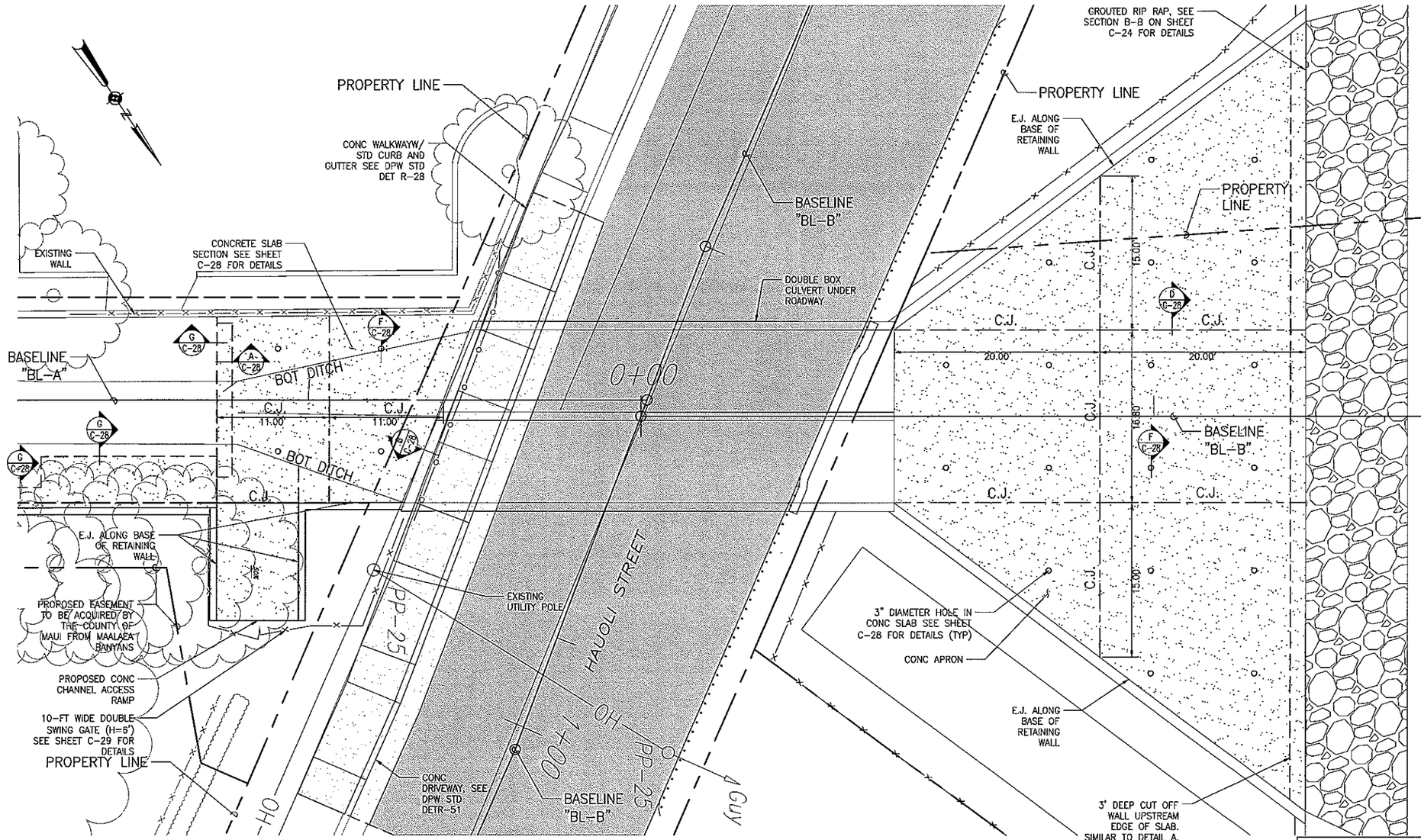
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-24 SHEET 25 OF 41

FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/12/2013 @ 9:04:19 am
PLOTTED BY: PLOTTED FROM: P:\GIS\CAD\Land\0504386 CSA DPW Haoli Drainage\Old Drawings\Working Drawings_GIS\A-WQ Basin Xsections.dgn



CONCRETE JOINTING PLAN

SCALE: 1"=5'

LEGEND:

RECONSTRUCTED CONC CHANNEL

1" = 5' SCALE 0 5 10 15 FEET

NOTE:

1. 1. ALL CONCRETE WORK SHALL CONFORM TO ACI 318-08.
2. SLEEVES EXCEEDING ONE-THIRD THE SLAB OR WALL THICKNESS SHALL NOT BE PLACED IN STRUCTURAL CONCRETE UNLESS SPECIFICALLY DETAILED. PIPE MAY PASS THROUGH STRUCTURAL CONCRETE IN SLEEVES BUT SHALL NOT BE EMBEDDED THEREIN.
3. LOCATION OF CONSTRUCTION, COLD JOINTS AND EXPANSION JOINTS ARE SHOWN ON THE PLANS. IN GENERAL, ALL SLABS HAVE CONSTRUCTION JOINTS SPACED NOT MORE THAN 20'-0" APART ALONG THE CHANNEL CENTERLINE.
4. 48 HOURS PRIOR TO THE POURING OF ANY STRUCTURAL CONCRETE, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO AN INSPECTION CAN BE MADE OF ALL FORMS AND REINFORCING STEEL.
5. UNLESS OTHERWISE NOTED, ALL CONCRETE SHALL BE COUNTY OF MAUI CLASS "A" WITH COMPRESSIVE STRENGTH OF f'c=3000 PSI MINIMUM. ADDITIONALLY, THE MAXIMUM WATER-TO-CEMENT RATION OF THE CONCRETE SHALL NOT EXCEED 0.50.
6. ALL CONCRETE SHALL HAVE A MAXIMUM AGGREGATE SIZE OF 1".
7. CONCRETE MIXES SHALL BE DESIGNED BY A QUALIFIED TESTING LABORATORY AND SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND ACCEPTANCE AT LEAST 14 DAYS BEFORE ACTUAL CONCRETE PLACING OPERATIONS.
8. CONCRETE COMPRESSIVE STRENGTH SHALL BE VERIFIED BY TEST CYLINDERS. SEE STANDARD SPECIFICATIONS. COST OF TESTING SHALL BE BORNE BY THE CONTRACTOR.
9. THE USE OF ANY CALCIUM CHLORIDE IN ANY CONCRETE IS PROHIBITED.
10. TOP SURFACES OF SLABS SHALL BE STRUCK OFF WITH A STRIKE BOARD AFTER THE CONCRETE HAS BEEN PLACED AND COMPACTED. THE SURFACE SHALL THEN BE FLOATED NOT LESS THAN TWO TIMES WITH WOOD FLOATS, UNTIL ALL EXCESS WATER IS REMOVED. AFTER THE CONCRETE HAS HARDENED SUFFICIENTLY, A FINAL FINISH WITH A STEEL TROWEL SHALL BE APPLIED.
11. JOINT SEALING COMPOUND SHALL BE POLYSULFIDE OR URETHANE COMPOUND CONFORMING TO ASTM C920, TYPE S OR M, CLASS 50, USE NT.
12. EXPANSION JOINT FILLER SHALL BE PREMOULDED MATERIAL COMPOSED OF NONCELLULOSE RUBBER MATERIAL CONFORMING TO ASTM D1752. THICKNESS SHALL BE AS CALLED OUT FOR IN THE PLANS.
13. ¾" DIAMETER SMOOTH DOWELS FOR EXPANSION JOINTS SHALL CONFORM TO ASTM A36 AND SHALL BE HOT DIPPED GALVANIZED.
14. EPOXY BONDING AGENT USED TO BOND FRESH CONCRETE TO HARDENED CONCRETE SHALL CONFORM TO ASTM C881, GRADE 1 OR 2, CLASS C, TYPE V.

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8688-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

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REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CONCRETE JOINTING PLANS

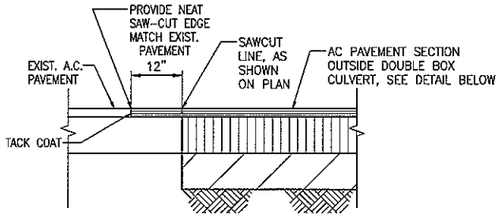
DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-25 SHEET 26 OF 41

FILE	POCKET	FOLDER	NUMBER

P:\07\50\DWG\Plan\50-07-0014308 CSH RPR Haoli Driveway\GIS Drawing\Working Drawings_3D\CONCRETE JOINTING PLAN.dgn 7/12/2013 @ 01:45:54 pm PLOT DATE: 7/12/2013 @ 01:50:58 pm

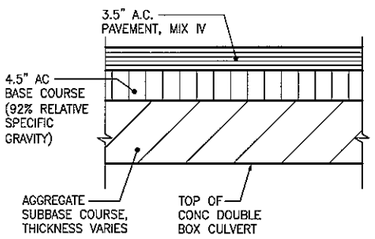


NOTES:

1. NEW CONSTRUCTION SHALL BE EQUAL OR BETTER THAN EXISTING IN THICKNESS AND IN QUALITY.
2. PAVEMENT SLOPE SHALL MATCH EXISTING PAVEMENT SLOPE TO PROVIDE SMOOTH RIDING CONNECTION.

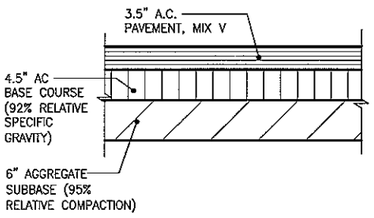
TYP. A.C. PAVEMENT CONN. DETAIL

NOT TO SCALE



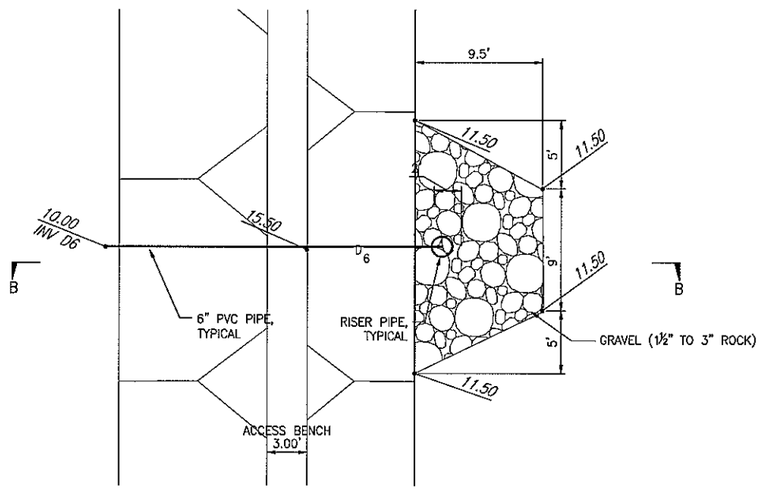
A.C. PAVEMENT SECTION ABOVE DOUBLE BOX CULVERT

SCALE: NTS



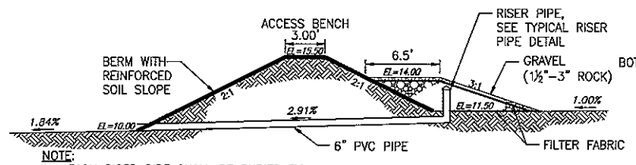
A.C. PAVEMENT SECTION OUTSIDE DOUBLE BOX CULVERT

SCALE: NTS



WATER QUALITY BASIN DRAINAGE STRUCTURE DETAIL (TYPICAL)

SCALE: 1"=5'

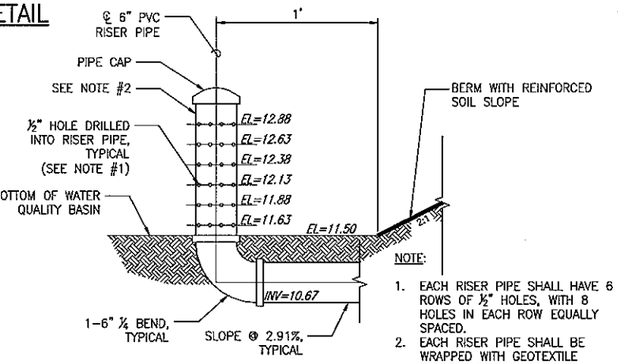


NOTE:

1. EACH RISER PIPE SHALL BE BURIED BY THE GRAVEL.
2. PROVIDE GEOTEXTILE FILTER FABRIC LAYER AT BOTTOM OF GRAVEL AND JUST BELOW SURFACE OF GRAVEL.

SECTION B–B – WATER QUALITY BASIN DRAINAGE STRUCTURE DETAIL

SCALE: 1"=5'

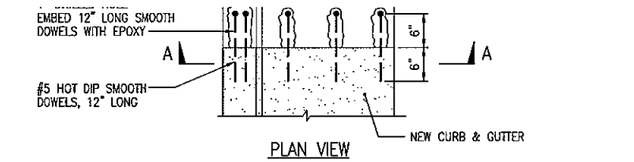


NOTE:

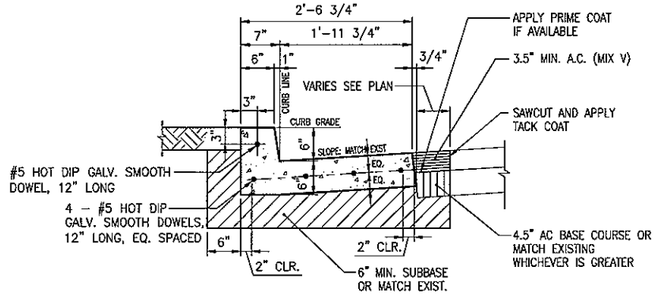
1. EACH RISER PIPE SHALL HAVE 6 ROWS OF ½" HOLES, WITH 8 HOLES IN EACH ROW EQUALLY SPACED.
2. EACH RISER PIPE SHALL BE WRAPPED WITH GEOTEXTILE FILTER FABRIC SUCH THAT EVERY HOLE IS COVERED WITH THE FABRIC.

TYPICAL RISER PIPE DETAIL

SCALE: NTS



PLAN VIEW



SECTION "A–A"

CONC CURB & GUTTER CONNECTION DETAIL

SCALE: 1" = 1'-0"

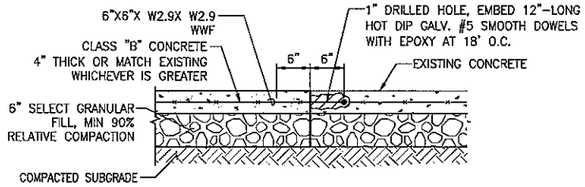
1" = 5' SCALE 0 5 10 15 FEET

1" = 1' SCALE 0 1 2 3 FEET

1-1/2" = 1' SCALE 0 1 2 FEET

CONCRETE/CONCRETE SIDEWALK CONNECTION

NOT TO SCALE



AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8658-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

MISCELLANEOUS DETAILS – 1

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/12/2013 @ 01:38:12 pm
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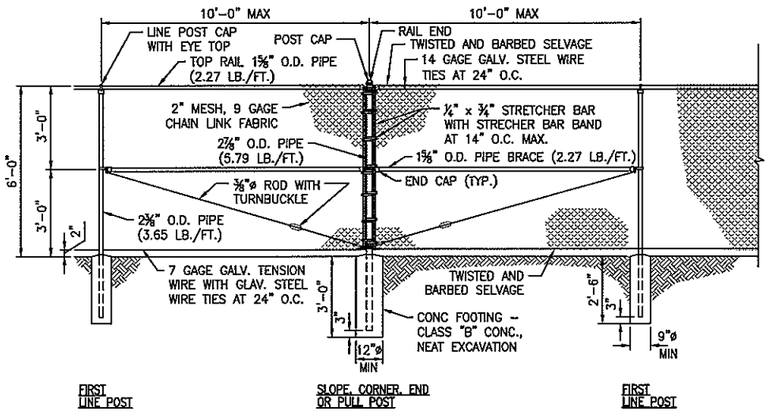
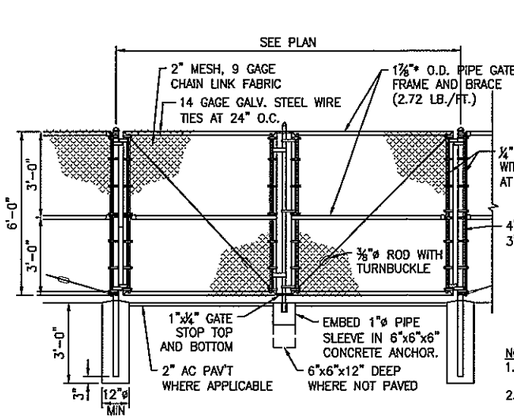


TYPICAL 6-FT HIGH CHAIN LINK FENCE
NOT TO SCALE

NOTES:
1. POSTS AND BRACES SHALL BE SCHEDULE 40 (STANDARD WEIGHT) PIPE. SIZES SPECIFIED ARE OUTSIDE DIAMETER.
2. ALL FENCING MATERIAL SHALL BE GALVANIZED STEEL.
3. TOP RAIL COUPLINGS SHALL BE LOCATED WITHIN 6" OF LINE POSTS.
4. TOP OF CONCRETE FOOTING SHALL BE CROWNED TO SHED WATER.

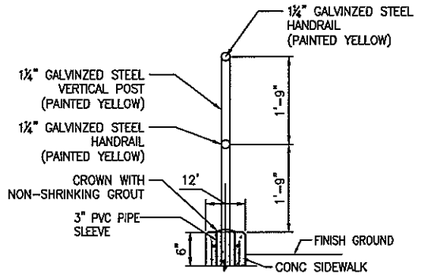


* FOR OPENINGS OVER 12' USE 2⅜" O.D. (ALL WELDED JOINTS WITH VERTICAL IN CENTER OF GATE)

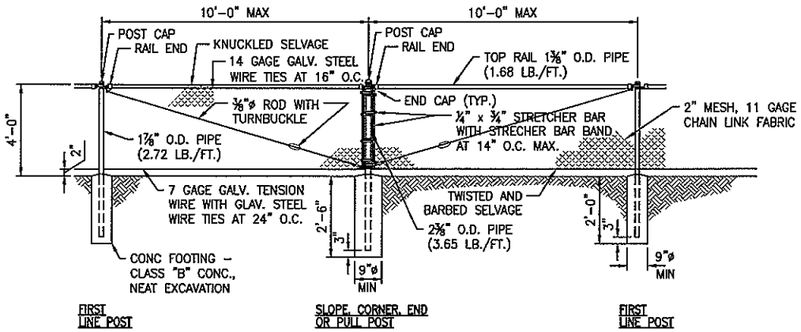
4" O.D. PIPE (9.11 LB./FT.) FOR GATES OVER 12'
3" O.D. PIPE (7.58 LB./FT.) FOR GATES 12' OR LESS

DOUBLE SWING GATE
NOT TO SCALE

NOTES:
1. ALL FENCING MATERIAL INCLUDING GATE HARDWARE SHALL BE GALVANIZED STEEL.
2. POSTS, BRACES, AND GATE FRAMES SHALL BE SCHEDULE 40 (STANDARD WEIGHT) PIPE. SIZES SPECIFIED ARE OUTSIDE DIAMETER.
3. GATE SHALL BE PROVIDED WITH TUBULAR PLUNGER BAR, 1 LOCK KEEPER, 1 LOCK KEEPER GUIDE, 2 LATCH FORKS, 2 FORK CATCHES, 1 CATCH FOR PLUNGER BAR, AND 2 GATE STOPS.
4. CORNER FITTINGS FOR GATE FRAMES MAY BE USED IN LIEU OF WELDING.
5. GATE SHALL HAVE KNUCKLED SELVAGE TOP AND BOTTOM.
6. TOP OF CONCRETE FOOTING SHALL BE CROWNED TO SHED WATER.



PIPE RAILING CONNECTION DETAIL
NOT TO SCALE



TYPICAL 4-FT HIGH CHAIN LINK FENCE
NOT TO SCALE

NOTES:
1. POSTS AND BRACES SHALL BE SCHEDULE 40 (STANDARD WEIGHT) PIPE. SIZES SPECIFIED ARE OUTSIDE DIAMETER.
2. ALL FENCING MATERIAL SHALL BE GALVANIZED STEEL.
3. TOP RAIL COUPLINGS SHALL BE LOCATED WITHIN 6" OF LINE POSTS.
4. TOP OF CONCRETE FOOTING SHALL BE CROWNED TO SHED WATER.

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

MISCELLANEOUS DETAILS - 2

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

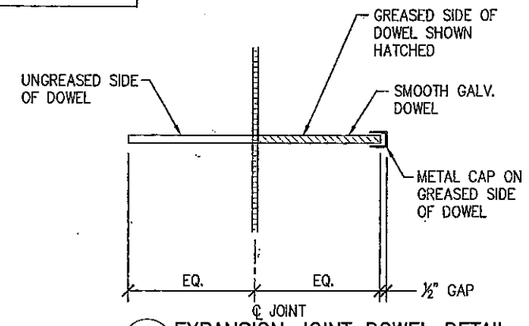
DATE FIRM MEMBER DATE

C-27 SHEET 28 OF 41

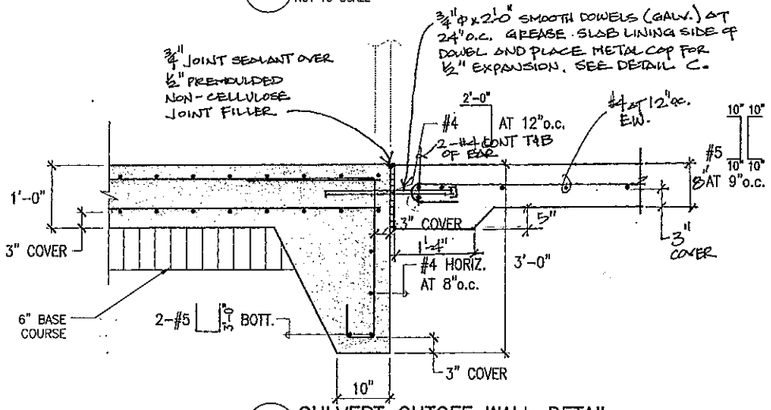
FILE	POCKET	FOLDER	NUMBER

PATH/FILENAME: P:\Users\DeMello\Desktop\Haiku Drainage\MXD Drawings\Working Drawings_All\Construction Details_MXD.dgn PDF SAVED: 7/10/2013 @ 9:16:53 pm PLOT SAVED: 7/12/2013 @ 9:16:53 pm

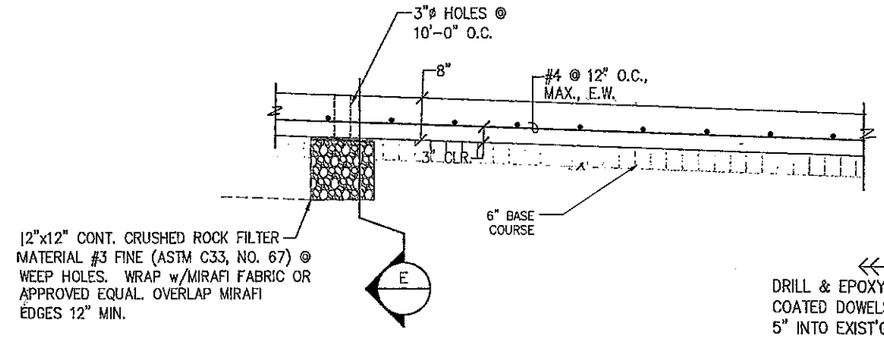
NOTE:
1. SMOOTH DOWELS SHALL BE INSTALLED PARALLEL TO ONE ANOTHER PRIOR TO PLACING CONCRETE.



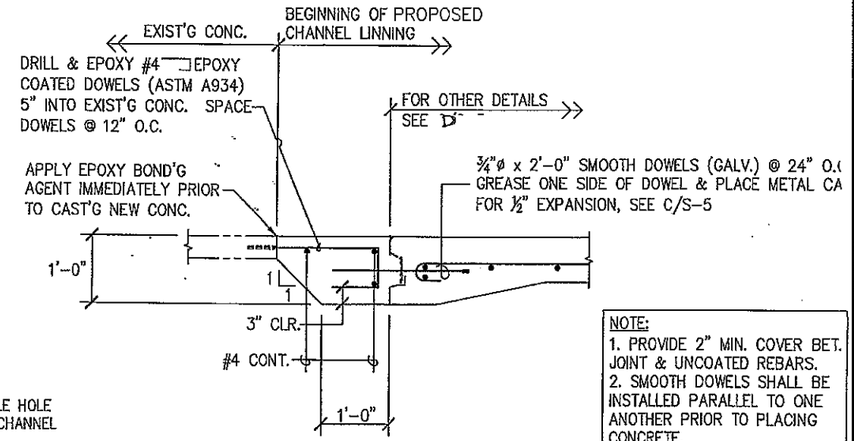
C EXPANSION JOINT DOWEL DETAIL
NOT TO SCALE



B CULVERT CUTOFF WALL DETAIL
NOT TO SCALE

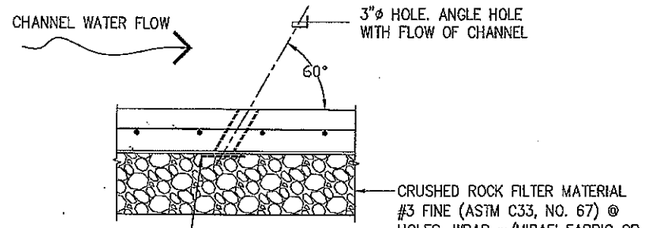


F TYPICAL SLAB SECTION
NOT TO SCALE



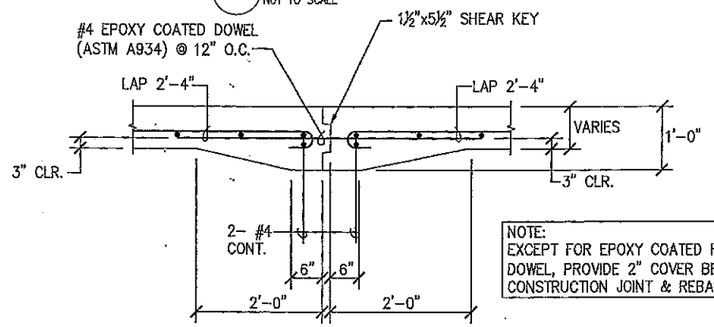
NOTE:
1. PROVIDE 2" MIN. COVER BET. JOINT & UNCOATED REBARS.
2. SMOOTH DOWELS SHALL BE INSTALLED PARALLEL TO ONE ANOTHER PRIOR TO PLACING CONCRETE.

G CONSTRUCTION JOINT (C.J.) AT EXISTING CONC.
NOT TO SCALE



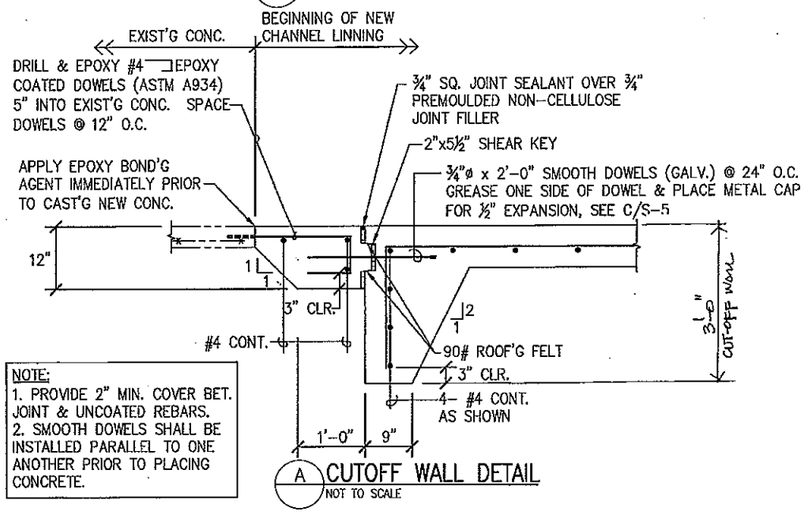
NOTE:
PROVIDE 2" MIN. COVER BET. WEEP HOLE & REINFORCING

E SLAB 3" DIA. HOLE SECTION
NOT TO SCALE



NOTE:
EXCEPT FOR EPOXY COATED REBAR DOWEL, PROVIDE 2" COVER BET. CONSTRUCTION JOINT & REBARS

D CONSTRUCTION JOINT (C.J.) DETAIL
NOT TO SCALE



NOTE:
1. PROVIDE 2" MIN. COVER BET. JOINT & UNCOATED REBARS.
2. SMOOTH DOWELS SHALL BE INSTALLED PARALLEL TO ONE ANOTHER PRIOR TO PLACING CONCRETE.

A CUTOFF WALL DETAIL
NOT TO SCALE

AECOM

DUANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8688-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

MISCELLANEOUS DETAILS – 3

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

P:\PUBLIC WORKS\Maui\60043388 CSM CPM Hauoli Drainage\Civil Drawings\Working Drawings_ACAD\Miscellaneous Details.dgn 3/13/2013 9:01:58 am PLOT DATE: 3/13/2013 @ 9:03:43 am

NOTES:

A. The work necessary to connect guardrail to concrete end post shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and will not be paid for separately.
B. Lap terminal connector and rail element in direction of traffic to prevent snagging.
C. All anchor bolts shall be high strength bolts conforming to the requirements of ASTM 325 and Standard Specification, Section 713.04.
D. Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
E. "Terminal Connector", "Transition Section" and thrie beam shall be fabricated from 10gauge steel conforming to the requirements of AASHTO M 180, Type II, Class B.
F. "Terminal Connector" and standard spacer, including all anchor bolts, cap PL, nuts and washers, shall be hot-dip galvanized after fabrication.
G. Cap PL shall be fabricated from ASTM A 36.
H. First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.
I. Double (nest 1st panel) thrie beam elements at all end post connections, except on highways with one-way traffic pattern, use single thrie beam elements at end post on trailing end only.
J. Where double (nested) beam occur, 12" "Back-up Plate" not required.
K. Heads of through anchor bolts shall be placed on the traffic side of the rail.
L. All steel shapes, rails and plates shall conform to ASTM A 36 specifications.

NOTES:

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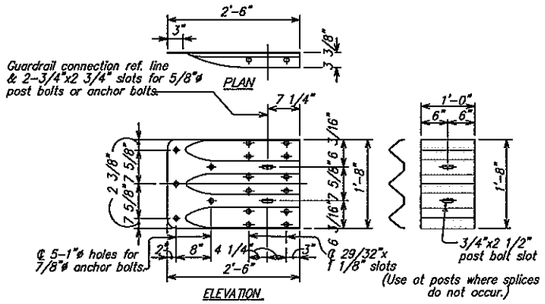
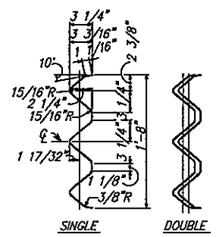
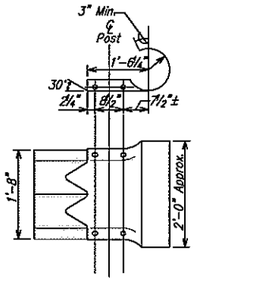


TERMINAL CONNECTOR
Scale: NTS

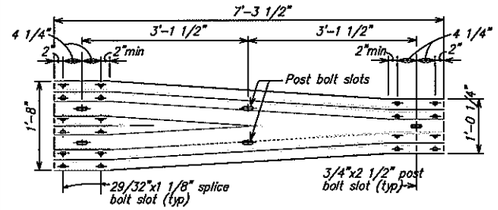
BACKUP PLATE
Scale: NTS



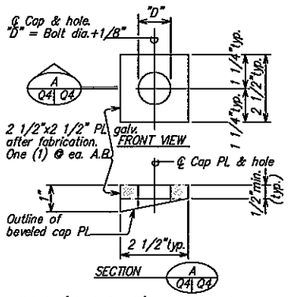
SECTION THRU
RAIL ELEMENT
Scale: NTS



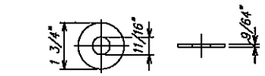
THRIE-BEAM SECTION (ROUNDED)
Scale: NTS



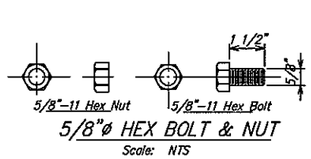
TRANSITION SECTION
Scale: NTS



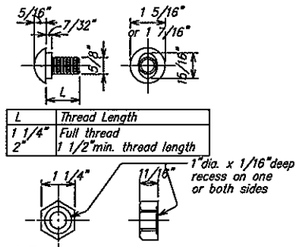
CAP (BEARING) PLATE DETAIL
Scale: NTS



STEEL WASHER FOR 5/8"Ø BOLT
Scale: NTS

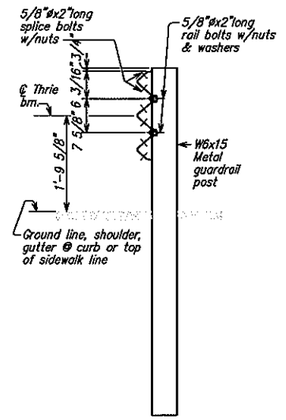


5/8"Ø HEX BOLT & NUT
Scale: NTS

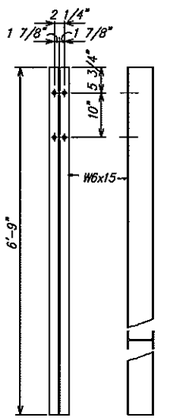


L	Thread Length
1 1/4"	Full thread
2"	1 1/2"min. thread length

5/8"Ø BUTTON HEAD BOLT
& RECESS NUT
Scale: NTS

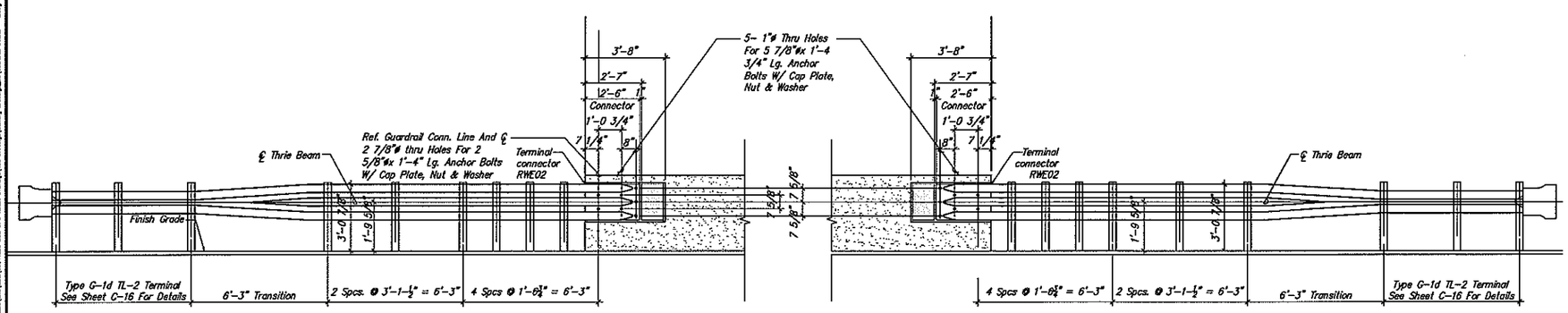


TYPICAL SECTION
METAL GUARDRAIL ON METAL POST
WITHOUT METAL SPACER BLOCK
Scale: NTS



POST DETAILS
Scale: NTS

METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS



ELEVATION
Scale: NTS

AECOM

DIANE Y. KODAMA
LICENSED PROFESSIONAL ENGINEER
No. 8588-C
HAWAII, U.S.A.

(EXPIRES 4/30/2014)
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

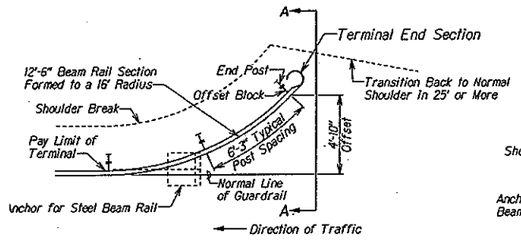
GUARDRAIL DETAILS - 1

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

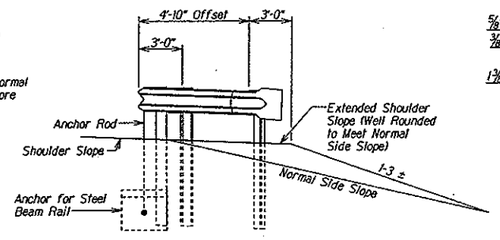
FILE	POCKET	FOLDER	NUMBER

PLOT DATE: 7/10/2013 @ 01:31:15 pm
PLOTTED BY: PLOTTED ON: M:\Projects\Maui\Haiku\Haiku Stream Improvements\Drawings\Working Drawings\C-29 Guardrail Details - 1.dgn

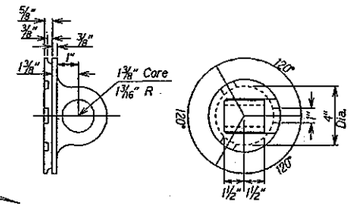


APPROACH END DETAIL

(APPROVED FOR USE WHERE V < 45 MPH)

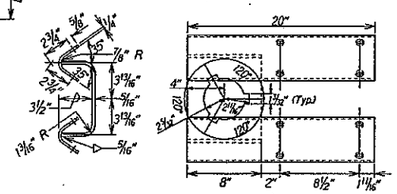


SECTION A-A



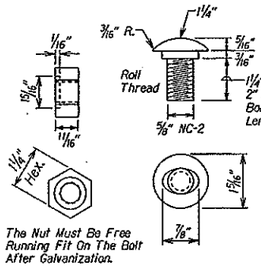
ANCHOR ROD CONNECTOR

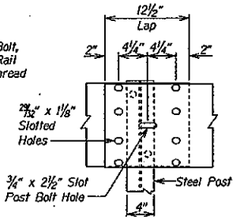
(MALLEABLE IRON CASTING OR EQUAL)



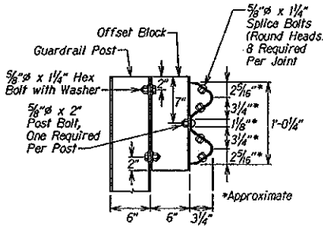
ANCHOR SPIDER

(WELDMENT)

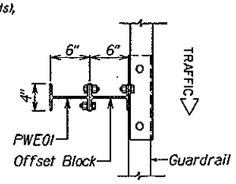




ELEVATION OF GUARDAIL SPLICE AT POST

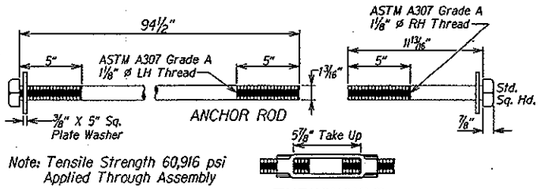


CROSS SECTION



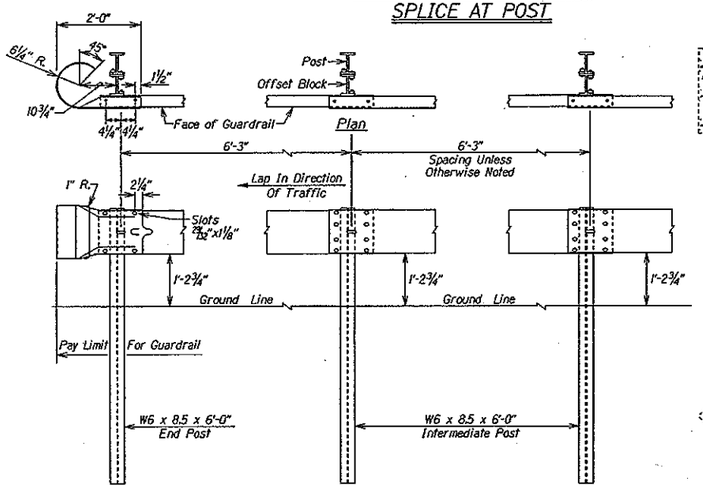
PLAN

GUARDRAIL SPLICE

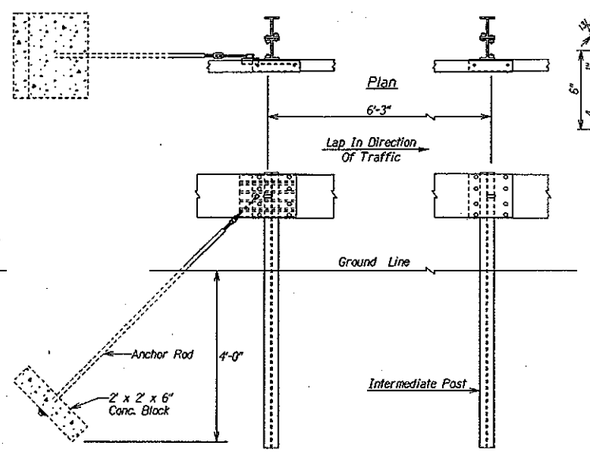


Note: Tensile Strength 60,916 psi Applied Through Assembly

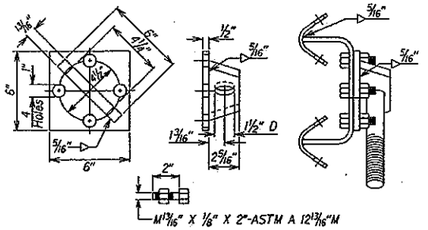
TURNBUCKLE



ASSEMBLY ELEVATION



ANCHOR FOR STEEL BEAM RAIL



ALTERNATE ANCHOR ROD CONNECTOR

TYPE G-1d TL-2 TERMINAL DETAILS

SCALE: NOT TO SCALE

AECOM

DIANE Y. KOBAMA LICENSED PROFESSIONAL ENGINEER No. 8688-C HAWAII, U.S.A.

(EXPIRES 4/30/2014)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

GUARDRAIL DETAILS – 2

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

C-30 SHEET 31 OF 41

FILE	POCKET	FOLDER	NUMBER

PATH/FILENAME: P:\DWG\DrDrive\0804388 CDA DPW Hawaii Designs\ADR Drawings\Working Drawings_30\Control Design\MAS.pgpDATE: 7/12/2012 @ 8:15:15 pm PLOT DATE: 7/12/2012 @ 9:03:28 pm

GENERAL NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL FIELD DIMENSIONS AND CONDITIONS PRIOR TO STARTING WORK. ALL DISCREPANCIES SHALL BE PROMPTLY REPORTED TO THE ENGINEER.
2. ALL OMISSIONS OR CONFLICTS BETWEEN THE VARIOUS ELEMENTS OF THE WORKING DRAWINGS AND/OR SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT OR STRUCTURAL ENGINEER BEFORE PROCEEDING WITH ANY WORK SO INVOLVED.
3. ALL WORK SHALL CONFORM TO HAWAII STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION DATED 2005 AND STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, 1984 AS AMENDED, UNLESS OTHERWISE NOTED.
4. UNLESS SPECIFICALLY DETAILED ELSEWHERE, CONTRACTOR SHALL FOLLOW TYPICAL DETAILS SHOWN IN SHEETS S-1 THROUGH S-2 .
5. WHERE CONDITIONS HAVE NOT BEEN SPECIFICALLY INDICATED BUT ARE SIMILAR TO TYPICAL DETAILS SHOWN ON SHEETS S-1 THOUGH S-2, MODIFY TYPICAL DETAILS AS DIRECTED TO MEET SPECIAL CONDITIONS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SHORING. THE CONTRACTOR SHALL PROVIDE TEMPORARY ERECTION BRACING AND SHORING FOR ALL STRUCTURAL MEMBERS AS REQUIRED FOR STRUCTURAL STABILITY OF THE STRUCTURE DURING ALL PHASES OF CONSTRUCTION.
7. STRUCTURAL DRAWINGS, WHERE INDICATED, HAVE BEEN DRAWN TO APPROXIMATE SCALE. UNLESS DRAWINGS SPECIFICALLY PROVIDES A DIMENSION, THE CONTRACTOR SHALL NOT USE STRUCTURAL DRAWINGS TO DETERMINE DIMENSIONS. DRAWINGS SHALL NOT BE SCALED TO DETERMINE DIMENSIONS.

REINFORCING STEEL:

1. UNLESS OTHERWISE INDICATED ON PLANS AND/OR SCHEDULE, ALL REINFORCING STEEL SHALL BE HIGH STRENGTH GRADE DEFORMED BARS WHICH SHALL CONFORM TO THE STANDARD SPECIFICATION OF ASTM A615 GRADE 60. ALL REINFORCING STEEL TO BE WELDED SHALL CONFORM TO ASTM A706, GRADE 60. ALL REINFORCING SHALL BE EPOXY COATED IN ACCORDANCE WITH ASTM A934.
2. LOW HYDROGEN WELDING RODS SHALL BE USED FOR ALL WELDING TO REINFORCING BARS.
3. REINFORCING SHALL BE SPLICED ONLY AS SHOWN OR NOTED. SPLICES AT OTHER LOCATIONS SHALL BE MADE AWAY FROM POINTS OF MAXIMUM STRESS AND APPROVED BY THE ENGINEER. SEE DETAILS FOR "LAP SPLICES".
4. BARS NOTED AS "CONT." VERTICAL AND HORIZONTAL WALL REINFORCING AND COLUMN REINFORCING SHALL HAVE A MINIMUM SPLICE EQUAL TO 48 BAR DIAMETERS BUT NOT LESS THAN 24 INCHES, UNLESS OTHERWISE NOTED.
5. PROVIDE DOWELS IN FOOTINGS THE SAME SIZE AND NUMBER AND IN THE SAME LOCATION AS VERTICAL COLUMN AND WALL REINFORCING. DOWELS SHALL HAVE A MINIMUM PROJECTION EQUAL TO 48 BAR DIAMETERS BUT NOT LESS THAN 24 INCHES, UNLESS OTHERWISE NOTED.
6. ALL REINFORCING STEEL, ANCHOR BOLTS AND OTHER INSERTS SHALL BE SECURED IN POSITION PRIOR TO PLACING CONCRETE.
7. CONCRETE PROTECTION FOR REINFORCING STEEL SHALL BE UNLESS OTHERWISE SHOWN:

   CONCRETE CAST AGAINST EARTH .... 3"
   CONCRETE EXPOSED TO EARTH OR
   WEATHER (BUT NOT CAST AGAINST EARTH)
   - WALLS AND RAILINGS .... 2"
   - TOP OF DECK SLAB .... 2½"
   - SLAB SOFFIT .... 1½"

   WITH THE EXCEPTION OF FORMED SOFFITS OR MEMBERS 4" OR LESS IN THICKNESS, TOLERANCE FOR COVER SHALL BE +/-⅜" FOR MEMBERS 12" THICK OR LESS AND +/-½" FOR MEMBERS GREATER THAN 12" THICK. FOR FORMED SOFFITS OR MEMBERS 4" OR LESS THICK, THE TOLERANCE FOR COVER SHALL BE +⅜",-¼". HOWEVER, FOR ALL CASES, THE COVER SHALL NOT BE LESS THAN 1/3 OF WHAT IS INDICATED AND REQUIRED BY THE DRAWINGS AND SPECIFICATIONS.

CULVERT DESIGN LOADS:

1. DESIGN IN CONFORMANCE WITH AASHTO LRFD DESIGN SPECIFICATIONS, 5th EDITION, 2010.
2. TRAFFIC LOAD:
   HL93 - COMBINATION OF DESIGN TRUCK OR DESIGN TANDEM WITH DESIGN LANE LOAD.
3. UPSTREAM TRAFFIC RAIL LOAD:
   DESIGN SPEED OF 30 MPH OR LESS.
   BRIDGE RAILING TEST LEVEL TL-1.
4. DOWNSTREAM RAILING DESIGNED BY OTHERS.

CONCRETE:

1. ALL CONCRETE WORK SHALL CONFORM TO ACI 318-05.
2. PIPES AND SLEEVES SHALL NOT BE PLACED IN STRUCTURAL CONCRETE UNLESS SPECIFICALLY DETAILED..
3. SECURE ALL BOLTS, ANCHORS, INSERTS, ETC. AND VERIFY ALL GROOVES, SLOTS, AND FINISHES PRIOR TO PLACING CONCRETE.
4. VERIFY LOCATIONS AND DIMENSIONS OF SLOTS, ANCHORS, DUCTS, ETC., RELATING TO MECHANICAL, ELECTRICAL AND ARCHITECTURAL WORK BEFORE POURING CONCRETE.
5. ALL CONCRETE WORK SHALL BE THOROUGHLY CONSOLIDATED DURING PLACEMENT USING A MECHANICAL VIBRATOR. ALL CONCRETE SHALL BE CURED FOR A PERIOD OF NOT LESS THAN 14 DAYS.
6. LOCATIONS OF ALL CONSTRUCTION OR COLD JOINTS SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.
7. 72 HOURS PRIOR TO THE POURING OF ANY STRUCTURAL CONCRETE, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO AN INSPECTION CAN BE MADE OF ALL FORMS AND REINFORCING STEEL.
8. THE CAST-IN-PLACE CONCRETE 28 DAY COMPRESSIVE STRENGTH, MAXIMUM AGGREGATE SIZE AND MAXIMUM WATER-TO-CEMENT RATIO TO BE AS FOLLOWS:

	STRENGTH (PSI)	TOP SIZE AGGREGATE TO BE USED	MAX. W/C RATIO
CULVERT	5,000	¾"	0.40
WALLS AND ABUTMENTS	5,000	¾"	0.40
FOOTINGS	5,000	¾"	0.40

9. CONCRETE MIXES SHALL BE DESIGNED BY A QUALIFIED TESTING LABORATORY AND SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND ACCEPTANCE AT LEAST 21 DAYS BEFORE ACTUAL CONCRETE PLACING OPERATIONS.
10. THE USE OF CALCIUM CHLORIDE IN ANY CONCRETE IS PROHIBITED.
11. TOP SURFACE OF CULVERT TOP SLAB SHALL BE FINISHED TO A SMOOTH SKID-RESISTANT SURFACE. AFTER THE CONCRETE IS PLACED AND CONSOLIDATED, THE TOP OF SLAB SHALL BE FINISHED USING APPROVED POWER-DRIVEN FINISHING MACHINES. ALL SURFACES SHALL BE STRUCK-OFF BY EQUIPMENT SUPPORTD BY AND TRAVELING ON RAILS OR HEADERS. THE RAILS, HEADERS, AND STRIKE-OFF EQUIPMENT SHALL BE OF SUFFICIENT STRENGTH AND BE ADJUSTED SO THE CONCRETE SURFACE AFTER STRIKE-OFF SHALL CONFORM TO THE PLANNED PROFILE AND CROSS-SECTION. AFTER STRIKE-OFF, THE SURFACE SHALL BE FINISHED WITH A FLOAT, ROLLER, OR APPROVED DEVICE AS NECESSARY TO TO REMOVE ANY IRREGULARITIES AND TO LEAVE SUFFICIENT MORTAR AT THE SURFACE OF THE CONCRETE FOR TEXTURING. THE SURFACE SHALL BE GIVEN A SKID-RESISTANT TEXTURE BY EITHER BURLAP DRAGGING OR BROOMING. THE TEXTURE AND METHOD EMPLOYED SHALL BE SUBMITTED FOR APPROVAL TO THE ENGINEER.
12. TOP SURFACE OF CULVERT BOTTOM SLAB SHALL BE STRUCK OFF WITH A STRIKE BOARD AFTER THE CONCRETE HAS BEEN PLACED AND COMPACTED. THE SURFACE SHALL THEN BE FLOATED NOT LESS THAN TWO TIMES WITH WOOD FLOATS, UNTIL ALL EXCESS WATER IS REMOVED. AFTER THE CONCRETE HAS HARDENED SUFFICIENTLY, A FINAL FINISH WITH A STEEL TROWEL SHALL BE APPLIED.
13. JOINT SEALING COMPOUND SHALL BE POLYSULFIDE OR URETHANE COMPOUND CONFORMING TO ASTM C 920, TYPE S OR M, CLASS 100/50, USE T.
14. EXPANSION JOINT FILLER SHALL BE PREMOULDED MATERIAL COMPOSED OF NONCELLULOSE RUBBER MATERIAL CONFORMING TO ASTM D 1752. THICKNESS SHALL BE AS DESIGNATED IN THE PLANS.
15. ½" DIAMETER SMOOTH DOWELS FOR EXPANSION JOINTS SHALL CONFORM TO ASTM A 36 AND SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
16. EPOXY BONDING AGENT USED TO BOND FRESH CONCRETE TO HARDENED CONCRETE SHALL CONFORM TO ASTM C 881, GRADE 1 OR 2, CLASS C, TYPE V.
17. CONCRETE COMPRESSIVE STRENGTH SHALL BE VERIFIED BY TEST CYLINDERS. SEE SPECIFICATIONS. COST OF REQUIRED TESTING SHALL BE BORNE BY THE CONTRACTOR.
18. EPOXY BONDING AGENT USED TO BOND FRESH CONCRETE TO HARDENED CONCRETE SHALL CONFORM TO ASTM C881, GRADE 1 OR 2, CLASS C, TYPE V.
19. A CONCRETE CORROSION INHIBITING ADMIXTURE, SUCH AS "MCI-2005", SHALL BE ADDED TO THE CONCRETE AT A RATE OF 1.5 PINTS/CUBIC YARD.

FOUNDATION NOTES:

1. FOUNDATION DESIGN OF CULVERT AND RETAINING WALLS SHALL BE BASED ON THE "GEOTECHNICAL ENGINEERING EXPLORATION HAUOLI STREET DRAINAGE IMPROVEMENTS, MAALAEA, MAUI, HAWAII" DATED APRIL 19, 2010 BY GEOLABS, INC. THE NOTES STATED BELOW ARE THOSE RELATED TO THE CULVERT AND RETAINING WALLS ONLY. OTHER REQUIREMENTS, RELATED TO WATER QUALITY BASIN, SHORING AND PAVEMENTS HAVE NOT BEEN INCLUDED BELOW. THE CONTRACTOR SHALL FOLLOW ALL RECOMMENDATIONS WITHIN THIS REPORT.
2. VEGETATION, CONCRETE DEBRIS, DELETERIOUS MATERIAL AND OTHER UNSUITABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF PROPERLY OFF-SITE. SOFT AND YIELDING AREAS ENCOUNTERED DURING CLEARING AND GRUBBING BELOW AREAS DESIGNATED TO RECEIVE FILL SHALL BE OVER-EXCAVATED TO EXPOSE FIRM MATERIAL AND THE RESULTING EXCAVATION SHALL BE BACKFILLED WITH WELL COMPACTED GENERAL FILL. THE EXCAVATED SOFT SOILS SHALL BE DISPOSED OF PROPERLY OFF-SITE.
3. IN GENERAL, THE OVER-EXCAVATED SUBGRADES AND AREAS DESIGNATED TO RECEIVE FILLS (EXPOSING SOILS) SHALL BE SCARIFIED TO A DEPTH OF 8-INCHES, MOISTURE-CONDITIONED TO ABOVE THE OPTIMUM MOISTURE CONTENT AND RECOMPACTED TO A MINIMUM OF 90 PERCENT RELATIVE COMPACTION.
4. IMPORTED FILL MATERIALS SHALL CONSIST OF NON-EXPANSIVE SELECT GRANULAR MATERIALS SUCH AS CRUSHED CORAL OR BASALT. THE MATERIAL SHALL BE WELL GRADED FROM COURSE TO FINE WITH PARTICLES NO LARGER THAN 3-INCHES IN LARGEST DIMENSION. IN ADDITION, THE MATERIAL SHALL CONTAIN BETWEEN 10 AND 30 PERCENT PARTICLES PASSING THE NO. 200 SIEVE. THE MATERIAL SHALL HAVE A LABORATORY CBR VALUE OF 20 OR MORE AND SHALL HAVE A MAXIMUM SWELL OF 1 PERCENT OR LESS WHEN TESTED IN ACCORDANCE WITH ASTM 1883. IMPORTED FILL MATERIAL SHALL BE TESTED FOR CONFORMANCE PRIOR TO DELIVERY TO THE PROJECT SITE FOR THE INTENDED USE.
5. IN GENERAL, FILLS AND BACKFILLS SHALL BE MOISTURE-CONDITIONED TO ABOVE OPTIMUM MOISTURE, PLACED IN LEVEL LIFTS NOT EXCEEDING 8-INCHES IN LOOSE THICKNESS AND COMPACTED TO A MINIMUM OF 90 PERCENT RELATIVE COMPACTION. FILLS AND BACKFILLS WITHIN 3-FEET OF THE PAVEMENT GRADE ELEVATION SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT RELATIVE COMPACTION. RELATIVE COMPACTION REFERS TO THE IN-PLACE DRY-DENSITY OF SOIL EXPRESSED AS A PERCENTAGE OF THE MAXIMUM DRY-DENSITY OF THE SAME SOIL ESTABLISHED IN ACCORDANCE WITH ASTM D1557. OPTIMUM MOISTURE IS THE WATER CONTENT (PERCENTAGE BY DRY WEIGHT) CORRESPONDING TO THE MAXIMUM DRY DENSITY. COMPACTION SHALL BE ACCOMPLISHED BY SHEEPSFOOT ROLLERS, VIBRATORY ROLLERS OR OTHER TYPES OF ACCEPTABLE COMPACTION EQUIPMENT. WATER TAMPING, JETTING OR PONDING SHALL NOT BE ALLOWED TO COMPACT THE FILLS.
6. SOME OF THE ON-SITE SOILS GENERALLY EXIST IN A MOIST TO WET CONDITION. SIGNIFICANT MOISTURE REDUCTION MAY BE REQUIRED TO ACHIEVE THE MINIMUM 90 PERCENT COMPACTION CRITERIA, ESPECIALLY FOR MATERIALS PRIMARILY CONSISTING OF SILTS AND CLAYS. AERATION TO LOWER THE SOIL MOISTURE AND MORE COMPACTION EFFORT TO ACHIEVE THE REQUIRED COMPACTION WOULD GENERALLY REDUCE THE RATE OF FILL PLACEMENT.
7. THE SUBGRADE BENEATH THE NEW BOX CULVERT SHALL BE SCARIFIED TO A DEPTH OF ABOUT 8-INCHES, MOISTURE-CONDITIONED TO AT LEAST 2 PERCENT ABOVE THE OPTIMUM MOISTURE CONTENT AND RECOMPACTED TO A MINIMUM OF 90 PERCENT RELATIVE COMPACTION.
8. SOFT AND/OR LOOSE SOILS ENCOUNTERED AT THE BOTTOM OF THE BOX CULVERT EXCAVATIONS SHALL BE REMOVED TO EXPOSE THE FIRM UNDERLYING FIRM MATERIALS. ALTERNATELY, A SUBGRADE STABILIZATION LAYER CONSISTING OF 24-INCHES OF NO. 2 ROCK (ASTM C33, NO. 4 GRADATION) WRAPPED IN A NON-WOVEN FILTER FABRIC (MIRAFI 180N OR EQUIVALENT) MAY BE PROVIDED BELOW THE 8-INCH BEDDING LAYER FOR UNIFORM SUPPORT OF THE NEW BOX CULVERT. THE STABILIZATION LAYER SHALL EXTEND BEYOND THE SIDES OF THE BOX CULVERT A MINIMUM OF 12-INCHES.
9. AN 8-INCH THICK GRAVEL CUSHION LAYER SHALL BE PLACED BETWEEN THE NEW BOX CULVERT AND THE UNDERLYING SUBGRADE SOILS OR STABILIZATION LAYER. THE GRAVEL SHALL CONSIST OF FREE-DRAINING MATERIALS, SUCH AS NO.3B FINE GRAVEL (ASTM C33, NO. 67 GRADATION) OR SIMILAR MATERIAL.
10. THE USE OF SAND OR S4C AS BACKFILL MATERIALS AROUND THE CULVERT STRUCTURE IS PROHIBITED.
11. THE BOTTOM OF RETAINING WALL FOUNDATIONS SHALL BE RECOMPACTED TO A MINIMUM OF 90 PERCENT RELATIVE COMPACTION TO PROVIDE A RELATIVELY FIRM SMOOTH BEARING SURFACE PRIOR TO PLACEMENT OF REINFORCING STEEL AND CONCRETE. SOFT AND/OR MATERIALS ENCOUNTERED AT THE BOTTOM OF RETAINING WALL FOUNDATION EXCAVATIONS SHALL BE OVER-EXCAVATED TO EXPOSE THE UNDERLYING FIRM MATERIALS. THE OVER-EXCAVATION TO REMOVE THE SOFT AND /OR LOOSE MATERIALS SHALL BE BACKFILLED WITH SELECTED GRANULAR FILL MATERIALS COMPACTED TO A MINIMUM OF 90 PERCENT RELATIVE COMPACTION OR THE FOUNDATION MAY EXTEND DEEPER TO BEAR DIRECTLY ON THE UNDERLYING COMPETENT MATERIAL.
12. RELATIVE MOIST TO WET SOIL CONDITION MAY BE ENCOUNTERED NEAR THE BOTTOM OF EXCAVATIONS. IF PUMPING OR YIELDING CONDITIONS OCCURS AT THE BOTTOM OF EXCAVATIONS OR IF SOFT POCKETS ARE TOO THICK TO BE REMOVED COMPLETELY FROM A PRACTICAL STANDPOINT, PROVIDE A STABILIZATION LAYER CONSISTING OF 24-INCHES OF NO. 2 ROCK (ASTM C33, NO. 4 GRADATION) WRAPPED IN A NON-WOVEN FILTER FABRIC (MIRAFI 180N OR EQUIVALENT) BELOW THE 8-INCH BEDDING LAYER FOR UNIFORM SUPPORT OF THE NEW BOX CULVERT. THE STABILIZATION LAYER SHALL EXTEND BEYOND THE SIDES OF THE BOX CULVERT A MINIMUM OF 12-INCHES.
13. RETAINING WALLS SHALL BE WELL DRAINED TO REDUCE THE BUILD-UP OF HYDROSTATIC PRESSURES. PROVIDE A 12-INCH WIDE ZONE OF PERMEABLE MATERIAL, NO.3B FINE GRAVEL (ASTM C22, NO. 67 GRADATION) PLACED DIRECTLY AROUND A PERFORATED PIPE (PERFORATIONS FACING DOWNWARD) AT THE BASE OF THE WALL DISCHARGING TO AN APPROPRIATE OUTLET OF WEEP HOLE. AS AN ALTERNATE, A PREFABRICATED DRAINAGE PRODUCT SUCH AS MIRADRAIN OR ENKADRAIN MAY BE USED INSTEAD OF THE DRAINAGE MATERIAL. THE PREFABRICATED DRAINAGE PRODUCT SHALL ALSO BE HYDRAULICALLY CONNECTED TO A PERFORATED PIPE AT THE BASE OF THE WALL.
14. BACKFILL BEHIND THE PERMEABLE DRAINAGE ZONE SHALL CONSIST OF FREE-DRAINING COMPACTED FILLS. UNLESS COVERED BY CONCRETE SLABS, THE UPPER 12-INCHES OF BACKFILL BEHIND RETAINING WALLS SHALL CONSIST OF LOW-EXPANSION, RELATIVELY IMPERVIOUS MATERIALS TO REDUCE THE POTENTIAL FOR EXCESSIVE WATER INFILTRATION BEHIND WALLS.

FOUNDATION NOTES (cont.):

15. SOIL DESIGN VALUES ARE:

a. ACTIVE EARTH PRESSURE:

ACTIVE, LEVEL BACKFILL	40 PCF (HORIZ.)
AT-REST, LEVEL BACKFILL	60 PCF (HORIZ.)
ACTIVE, 2H:1V BACKFILL	58 PCF (HORIZ.) 29 PCF (VERT.)
AT-REST, LEVEL BACKFILL	76 PCF (HORIZ.) 38 PCF (VERT.)

b. AASHTO LRFD RESISTANCE LIMITS (FOR CULVERTS AND WING WALLS)

	EXTREME EVENT LIMIT STATE	STRENGTH LIMIT STATE
BEARING PRESSURE (PSF)	6,000	3,600
COEFFICIENT OF SLIDING FRICTION	0.42	0.34
PASSIVE PRESSURE RESISTANCE (PCF)	300	150

c. SERVICE LIMITS (FOR DOWNSTREAM RETAINING WALLS)

BEARING PRESSURE	2,000 PSF
COEFFICIENT OF SLIDING FRICTION	0.30
PASSIVE PRESSURE	300 PCF

ABBREVATIONS

A.B.	ANCHOR BOLT	EA.	EACH	LONG.	LONGITUDINAL	STD.	STANDARD
ARCH.	ARCHITECTURAL OR ARCHITECT	E.J.	EXPANSION JOINT	MAX.	MAXIMUM	T&B	TOP AND BOTTOM
@	AT	E.F.	EACH FACE	M.B.	MACHINE BOLT	THK.	THICK
BAL.	BALANCE	EL.	ELEVATOR	MECH.	MECHANICAL	T.O.C.	TOP OF CONCRETE
BOT.	BOTTOM	ELEV.	ELEVATION	MIN.	MINIMUM	T.O.F.	TOP OF FOOTING
BM.	BEAM	EQ.	EQUAL	N.T.S.	NOT TO SCALE	T.O.S.	TOP OF SLAB
B.T.B.	BASALTIC TERMITE BARRIER	EXP.	EXPANSION	NO.	NUMBER	T.O.W.	TOP OF WALL
C.I.P.	CAST IN PLACE	EXT.	EXTERIOR	O.C.	ON CENTER	TRANS.	TRANSVERSE
C.J.	CONSTRUCTION OR CONTROL JOINT	E.W.	EACH WAY	OPP.	OPPOSITE	TYP.	TYPICAL
CL	CENTER LINE	F.P.	FULL PENETRATION	PL.	PLATE	VERT.	VERTICAL
CLR.	CLEAR	FT.	FOOT OR FEET	PSI.	POUNDS PER SQUARE INCH	W/	WITH
CMU	CONCRETE MASONRY UNIT	FTG.	FOOTING	PSF	POUNDS PER SQUARE FOOT	W/O	WITH OUT
COL.	COLUMN	GA.	GAGE	R.F. OR	REINFORCED OR	W.J.	WALL JOINT
CONC.	CONCRETE	GALV.	GALVANIZE	REINF.	REINFORCEMENT	W.W.F.	WELDED WIRE FABRIC
CONT.	CONTINUOUS	HORIZ.	HORIZONTAL	REQ'D.	REQUIRED	W.W.M.	WELDED WIRE MESH
CONN.	CONNECTION	HSB	HIGH STRENGTH BOLT	SHT.	SHEET		
DIA. OR ø	DIAMETER	INT.	INTERIOR	SP.	SPACE OR SPACES		
DIAG.	DIAGONAL	JT	JOINT	SIM.	SIMILAR		
DET.	DETAIL	KSF	KIPS PER SQUARE FOOT	SQ.	SQUARE		

Fri, 01 Jun 2012 - 5:02am
\\Server\projects on drawing server\MM\2009\09H066 - Hauoli Street Box Culvert\S-1 General Notes.dwg

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LICENSED PROFESSIONAL ENGINEER
No. 7159-S
HAWAII, U.S.A.

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

ENERAL NOTES

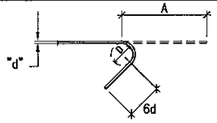
DESIGNED BY KH | DRAWN BY MM | CHECKED BY BIN

DATE | FIRM MEMBER | DATE

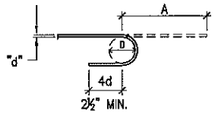
S-1 SHEET OF 31

FILE	POCKET	FOLDER	NUMBER

MINIMUM EXTENSION LENGTHS "A"				
BAR SIZE	STANDARD HOOKS		TIES AND STIRRUPS	
	180° HOOKS	90° HOOKS	90° HOOKS	135° HOOKS
#3	6"	7"	5"	6"
#4	8"	9"	6"	7"
#5	9"	11"	7"	9"
#6	11"	13"	14"	12"
#7	12"	15"	16"	14"
#8	14"	17"	19"	16"
#9	19"	21"	NA	NA
#10	21"	24"	NA	NA
#11	24"	26"	NA	NA
#14	34"	34"	NA	NA
#18	45"	45"	NA	NA

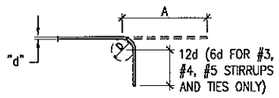


BAR BEND 135°



STANDARD HOOK 180°

BAR SIZE	D
#3,#4,#5 #6,#7,#8	6 d
#9,#10,#11	8 d
#14,#18	10 d

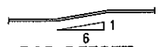


BAR BEND 90°

A TYPICAL REBAR BENDING
S-2 NOT TO SCALE

BAR SIZE	f'c = 3000 PSI		f'c = 4000 PSI		f'c = 5000 PSI		f'c = 6000 PSI	
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	24"	24"	24"	24"	24"	24"	24"	24"
#4	29"	24"	25"	24"	24"	24"	24"	24"
#5	36"	28"	31"	24"	28"	24"	26"	24"
#6	43"	33"	37"	29"	34"	26"	31"	24"
#7	63"	48"	54"	42"	49"	38"	45"	34"
#8	72"	55"	62"	48"	56"	43"	51"	39"
#9	81"	62"	70"	54"	63"	48"	57"	44"
#10	91"	70"	79"	61"	70"	54"	64"	50"
#11	101"	78"	87"	67"	78"	60"	71"	55"

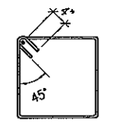
LAP SPLICE



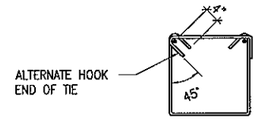
BAR OFFSET

NOTES:
1. LAP SPLICE LENGTHS ARE FOR CLASS A LAP SPLICES ONLY.
2. LAP SPLICE LENGTHS ARE FOR GRADE 60 DEFORMED BARS.
3. LAP SPLICE LENGTHS SHALL BE IN ACCORDANCE WITH THIS TABLE, UNLESS OTHERWISE SHOWN OR NOTED.

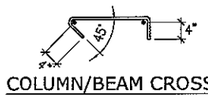
B TYPICAL LAP SPLICE DETAIL
S-2 NOT TO SCALE



ONE PIECE



TWO PIECE (WHERE ALLOWED)

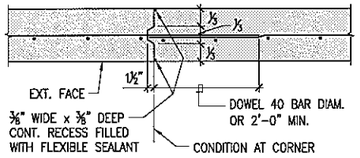


COLUMN/BEAM CROSS TIES

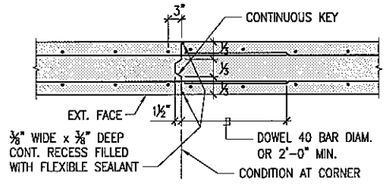
NOTES:
1. THESE DETAILS SHALL APPLY TO #3, #4, AND #5 BARS- GRADE 40 AND GRADE 60.
2. ALL BARS SHALL BE BENT COLD.

C STIRRUP AND TIE DETAIL
S-2 NOT TO SCALE

NOTE:
1. PROVIDE VERT. CONSTRUCTION JOINT NO FURTHER THAN 40'-0" MAX., UNLESS OTHERWISE NOTED, SEE DRAWINGS FOR SPECIFIED LOCATIONS.
2. CLEAN SURFACE OF JOINT THOROUGHLY BEFORE MAKING POUR.

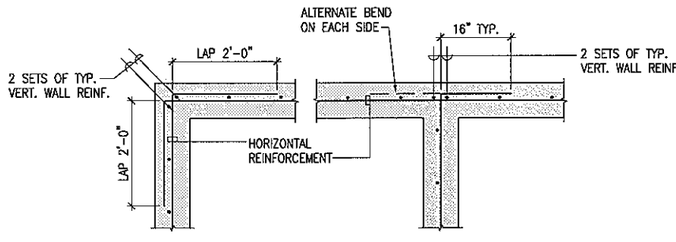


SINGLE CURTAIN



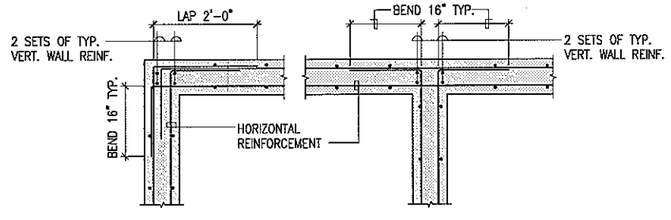
DOUBLE CURTAIN

D CONCRETE WALL CONSTRUCTION/CONTRACTION JOINT
S-2 NOT TO SCALE



AT CORNER AT INTERSECTION

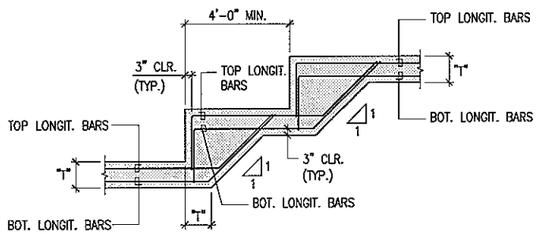
SINGLE CURTAIN



AT CORNER AT INTERSECTION

DOUBLE CURTAIN

E CONCRETE REINFORCING AT WALL INTERSECTIONS
S-2 NOT TO SCALE



F TYP. STEPPED FOOTING DETAIL
S-2 NOT TO SCALE

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

TYPICAL DETAILS

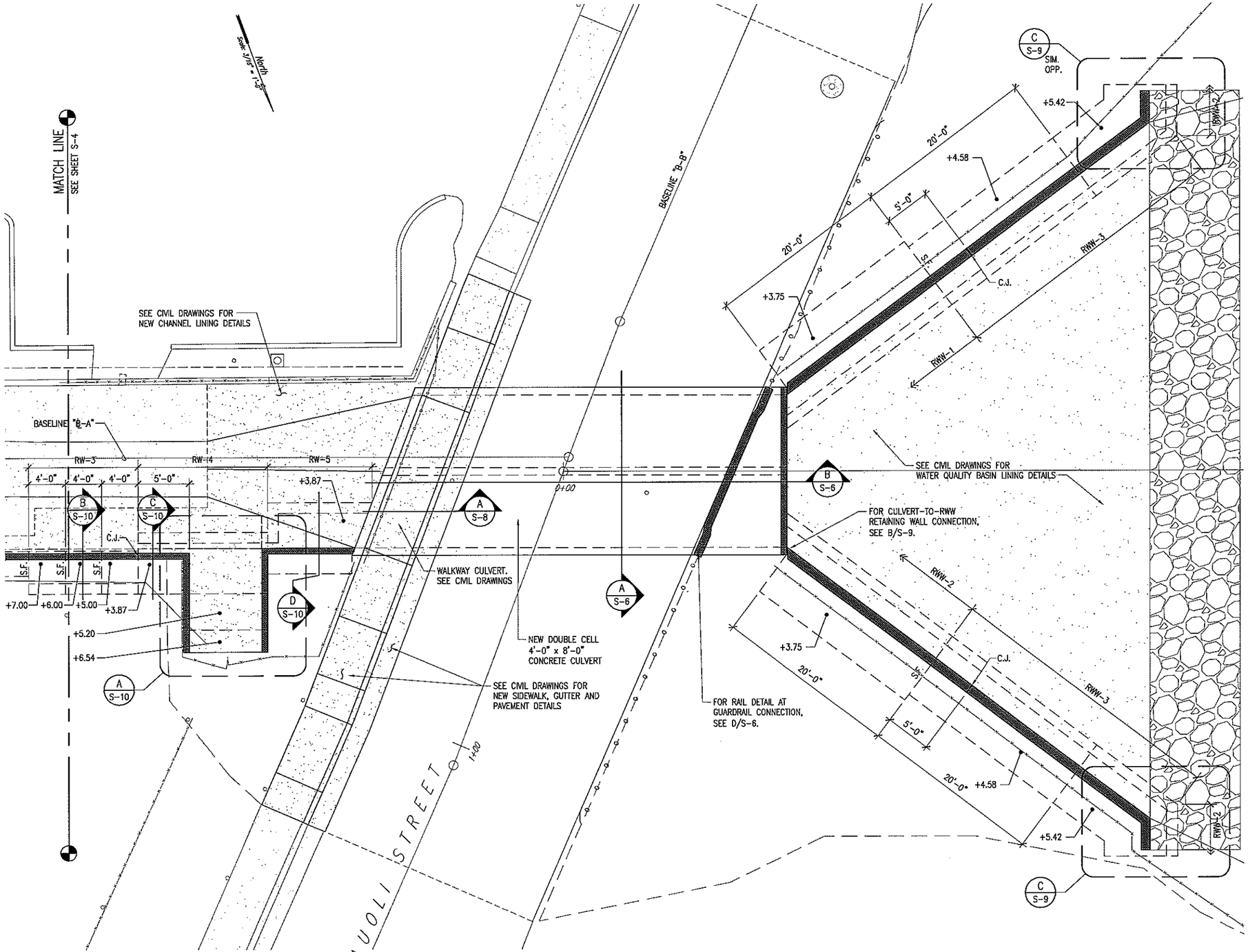
DESIGNED BY KH	DRAWN BY MM	CHECKED BY BIN

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

S-2 SHEET 23 OF 31

Fri, 01 Jun 2012 - 3:03pm
V:\Drawing projects on drawing server\MAUI\2007\07M050 - Hauoli Street Box Culvert\S-2 Typical Details.dwg



BOX CULVERT AND RETAINING WALL - STRUCTURAL PLAN

SCALE: 3/16" = 1'-0"

NOTES & LEGEND:

+3.42 – INDICATES TOP OF FOOTING ELEVATION.

RW– – INDICATES RETAINING WALL TYPE. SEE SHEET S-10.

RWW– – INDICATES RETAINING WING WALL TYPE. SEE A/S-9.

S.F. – INDICATES STEPPED FOOTING. UNLESS OTHERWISE NOTED, USE DETAIL F/S-2.

C.J. – INDICATES WALL CONTRACTION/CONSTRUCTION JOINT. SEE D/S-2.

NOTE: LOCATION OF WALLS ARE INDICATED IN CIVIL DRAWINGS. FOOTINGS ARE LOCATED RELATIVE TO WALL FACES AND ARE SHOWN IN RETAINING WALL SCHEDULES ON SHEET S-9 AND S-10.

GRAPHIC SCALE

3/16"=1'-0" 1' 0 1' 5' 10' 15'

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HAWAII, U.S.A.

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HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

BOX CULVERT AND RETAINING WALL - STRUCTURAL PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
KH	MM	BIN

DATE FIRM MEMBER DATE

FILE | POCKET | FOLDER | NUMBER

S-3 SHEET 24 OF 31

Fri, 01 Jun 2012 – 5:31pm
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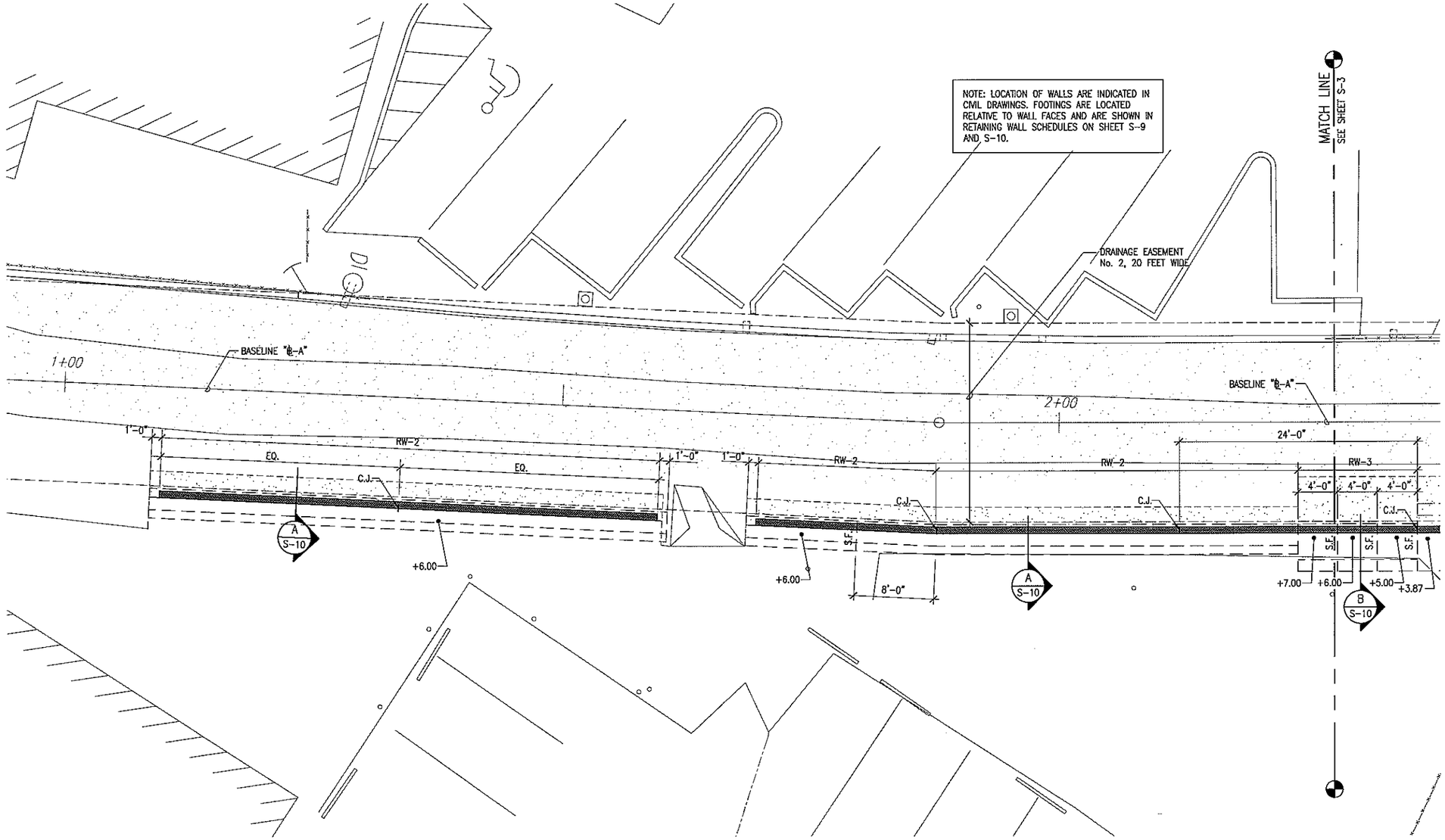

NOTES & LEGEND:

+3.42	– INDICATES TOP OF FOOTING ELEVATION.
RW–	– INDICATES RETAINING WALL TYPE. SEE SHEET S-10.
RWW–	– INDICATES RETAINING WING WALL TYPE. SEE A/S-9.
S.F.	– INDICATES STEPPED FOOTING. UNLESS OTHERWISE NOTED, USE DETAIL F/S-2.
C.J.	– INDICATES WALL CONTRACTION/CONSTRUCTION JOINT. SEE D/S-2.

DOWNSTREAM RETAINING WALLS - STRUCTURAL PLAN

SCALE: 3/16" = 1'-0"

GRAPHIC SCALE

3/16"=1'-0" 1' 0 1' 5' 10' 15'

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HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

DOWNSTREAM RETAINING WALLS – STRUCTURAL PLAN

DESIGNED BY KH	DRAWN BY MM	CHECKED BY BIN

DATE FIRM MEMBER DATE

S-4 SHEET 25 OF 31

FILE POCKET FOLDER NUMBER

Fri, 01 Jun 2012 - 5:05am
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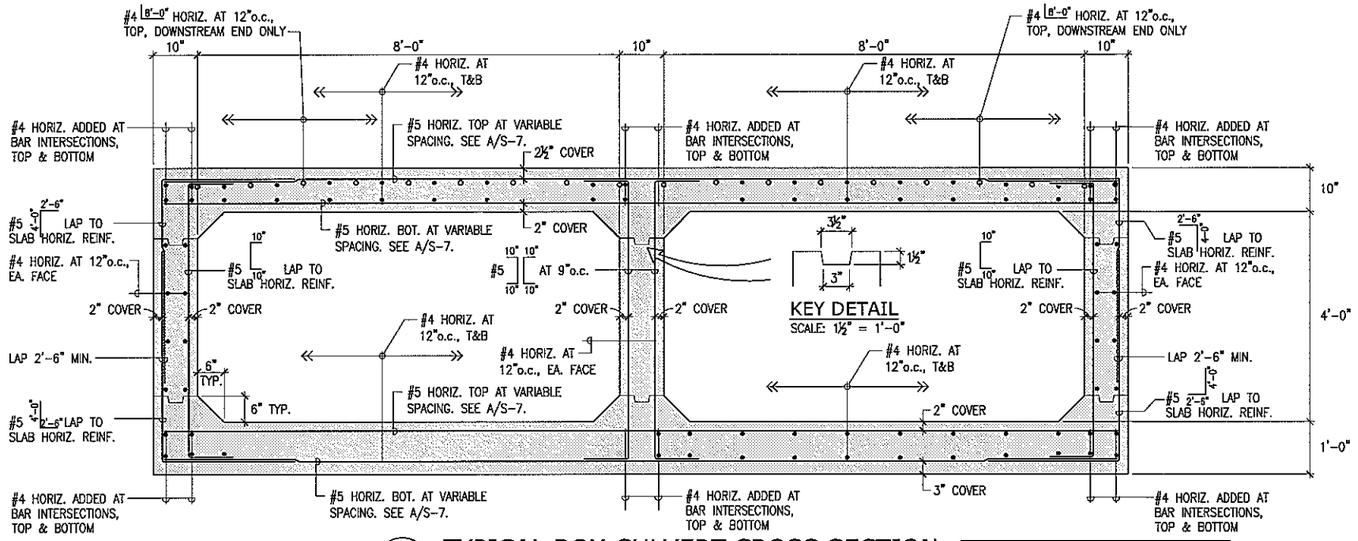
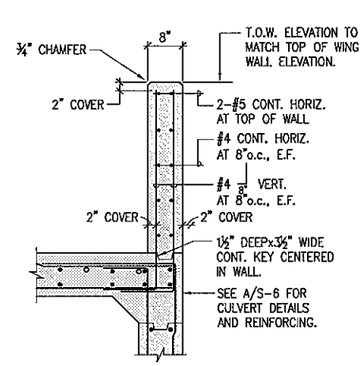
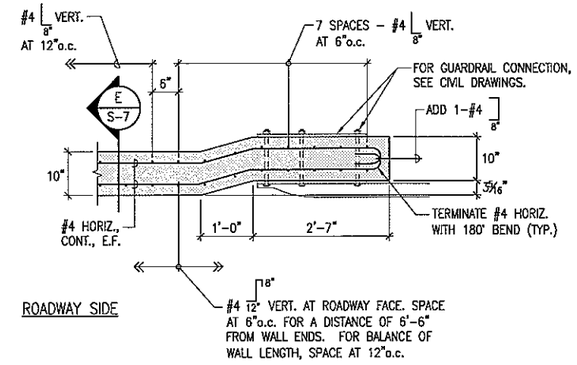


A S-6 **TYPICAL BOX CULVERT CROSS SECTION**
SCALE: 3/4" = 1'-0"

SEE FOUNDATION NOTES ON SHEET S-1 FOR EXCAVATION FOR CULVERT, SUBGRADE PREPARATION GRAVEL CUSHION, BACKFILL AND DRAINAGE REQUIREMENTS.

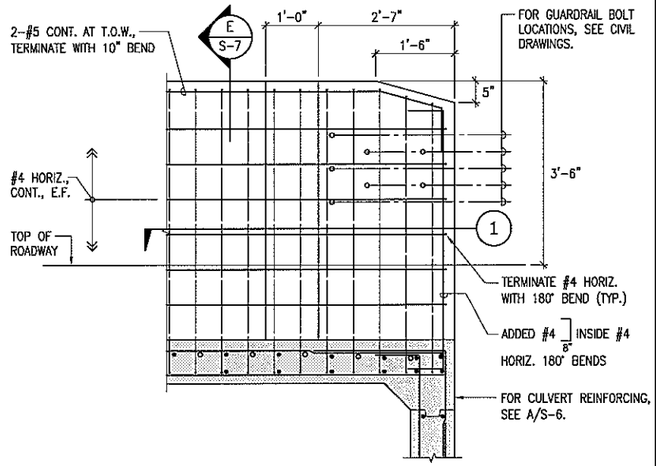


C S-6 **HEADWALL DETAIL**
SCALE: 3/4" = 1'-0"



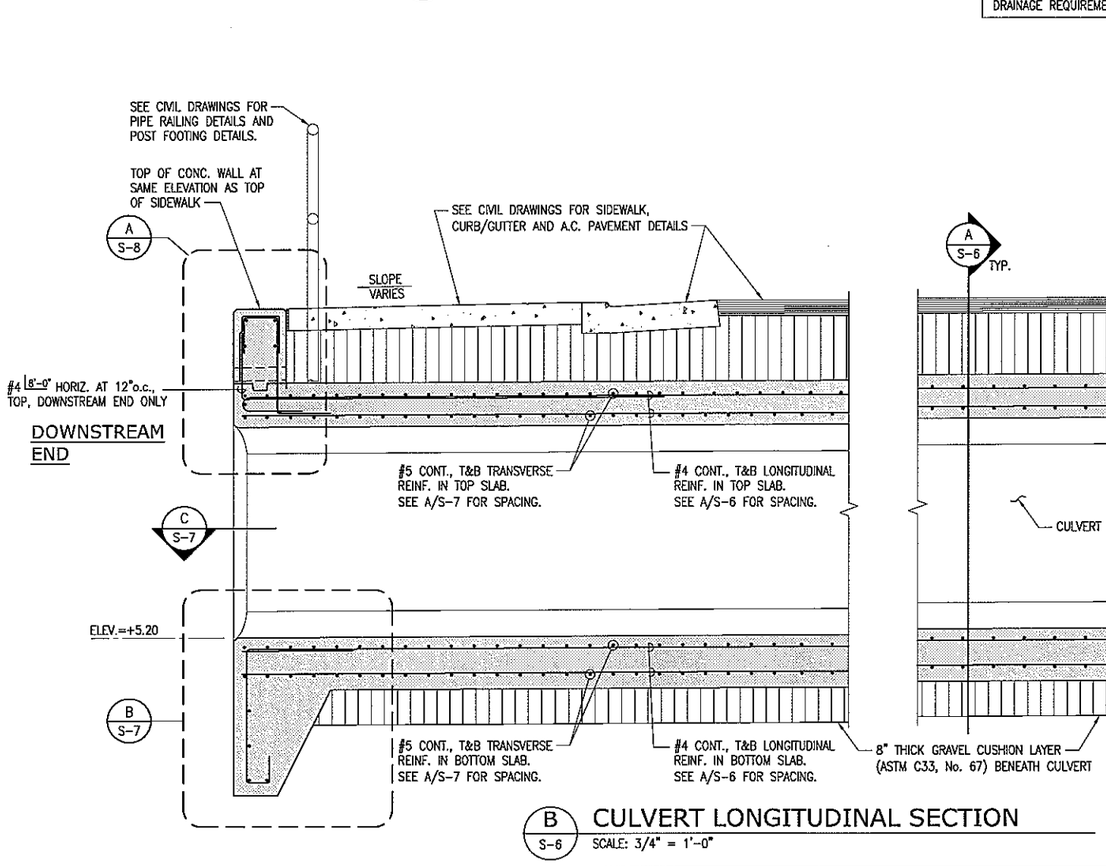
ROADWAY SIDE

1 **PLAN SECTION**



ELEVATION

D S-6 **CONC. RAIL AT GUARDRAIL CONNECTION**
SCALE: 3/4" = 1'-0"



B S-6 **CULVERT LONGITUDINAL SECTION**
SCALE: 3/4" = 1'-0"

GRAPHIC SCALE
3/4"=1'-0" 1' 0 1' 2' 3'

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HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CULVERT SECTIONS AND DETAILS

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KH	MM	BIN

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

S-6 SHEET 26 OF 31

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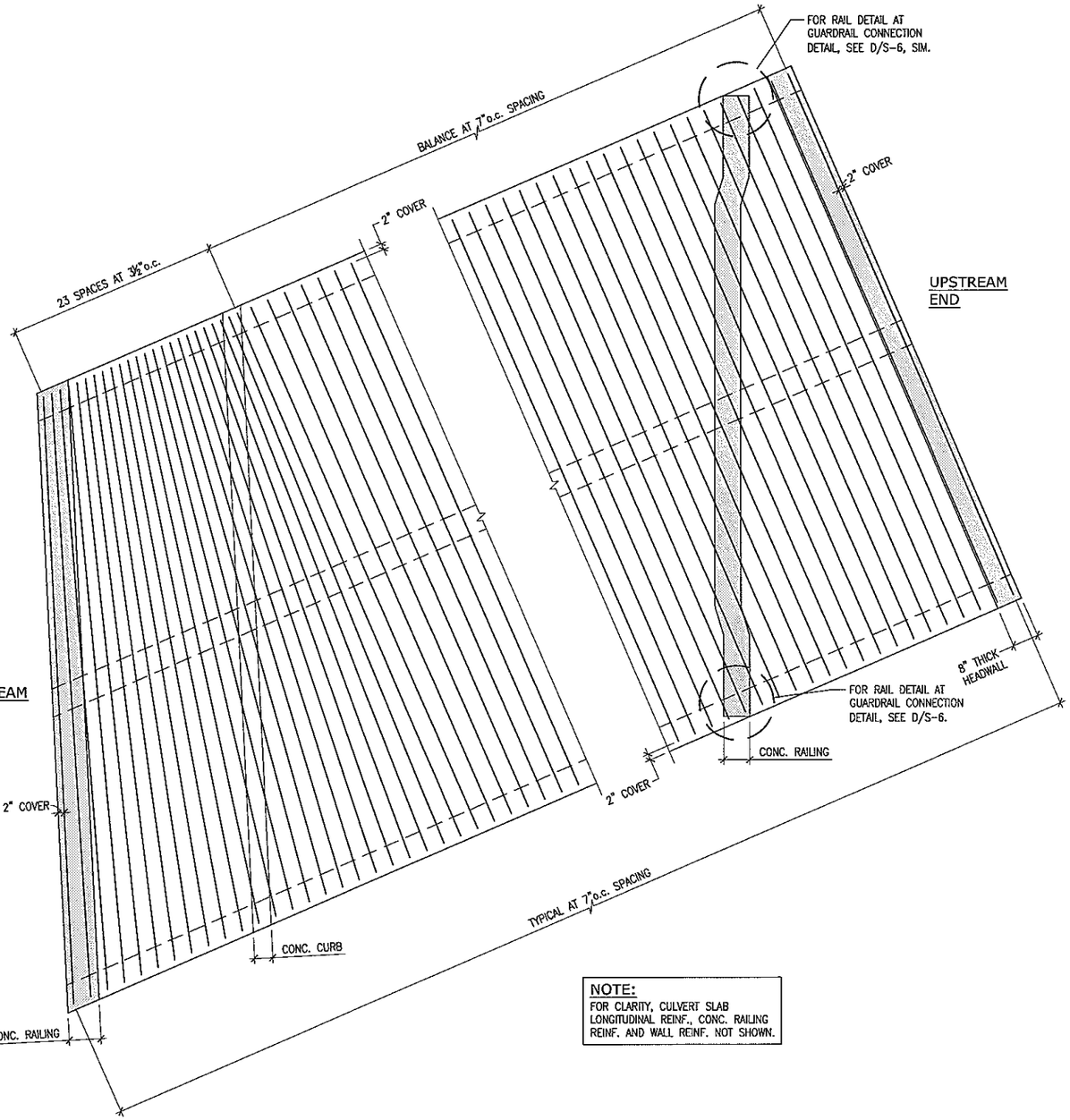
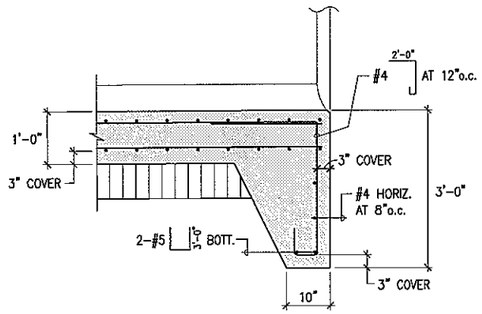
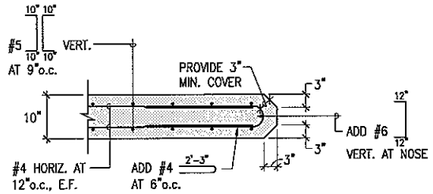


NOTE:
FOR CLARITY, CULVERT SLAB LONGITUDINAL REINF., CONC. RAILING REINF. AND WALL REINF. NOT SHOWN.

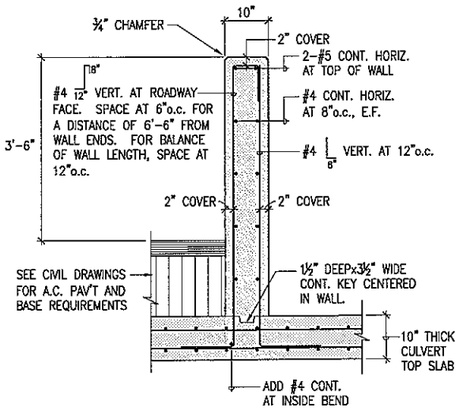
A / S-7 CULVERT T&B SLAB TRANSVERSE REINFORCEMENT SPACING
SCALE: 1/2" = 1'-0"



B / S-7 CULVERT CUT-OFF WALL
SCALE: 3/4" = 1'-0"



C / S-7 END CONDITION OF CULVERT CENTER WALL
SCALE: 3/4" = 1'-0"



D / S-7 UPSTREAM CONC RAIL DETAIL
SCALE: 3/4" = 1'-0"

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CULVERT SECTIONS AND DETAILS

BEVERLY ISHII-NAKAYAMA
LICENSED PROFESSIONAL ENGINEER
No. 7159-S
HAWAII, U.S.A.

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Expiration Date of License 4-30-12

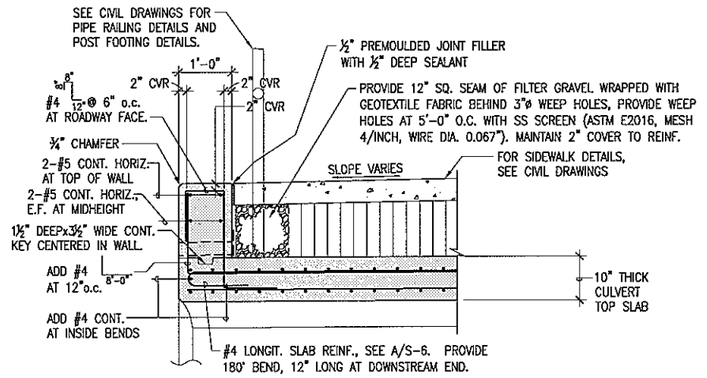
DESIGNED BY	KH	DRAWN BY	MM	CHECKED BY	BIN

DATE FIRM NUMBER DATE

FILE	POCKET	FOLDER	NUMBER

S-7 SHEET 27 OF 31

Fri, 01 Jun 2012 - 3:07pm
\\Users\brooke on drives server\MM\2009\09h056 - Hauoli Street Box Culvert\S-7 Sections.dwg



A S-8 TYPICAL DOWNSTREAM CONC. RAIL DETAIL

SCALE: 3/4" = 1'-0"

LICENSED PROFESSIONAL ENGINEER
BEVERLY ISHII-NAKAYAMA
No. 7159-S
HAWAII, U.S.A.

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Expiration Date of License 4-30-12

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

CULVERT SECTIONS AND DETAILS

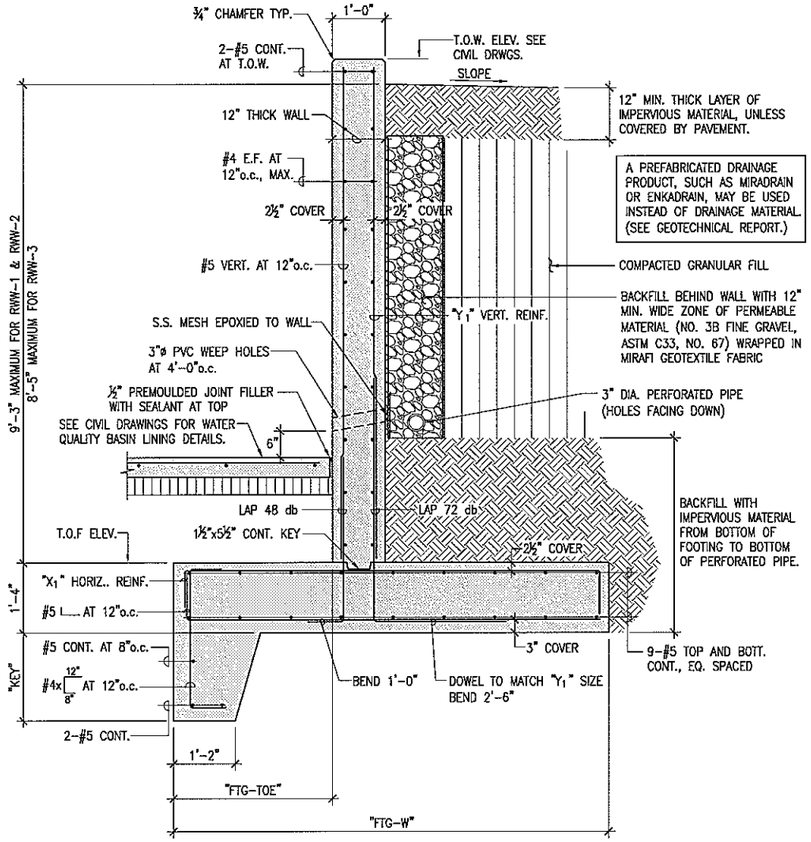
DESIGNED BY	DRAWN BY	CHECKED BY
KH	MM	BIN

DATE FIRM MEMBER DATE

FILE	POSTED	FOLDER	MARKED

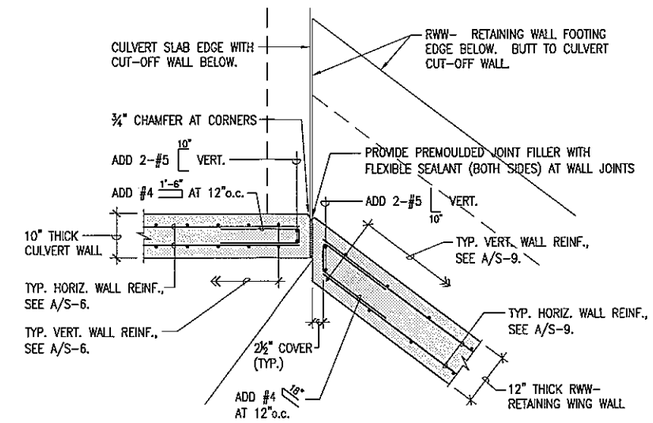
S-8 SHEET 28 OF 31

Fri, 01 Jun 2012 - 5:07pm
\\Dpw-ap\pub$ on Survey server\MW\2007\07050S8 - Hauoli Street Box Culvert\S-8 Sections.dwg



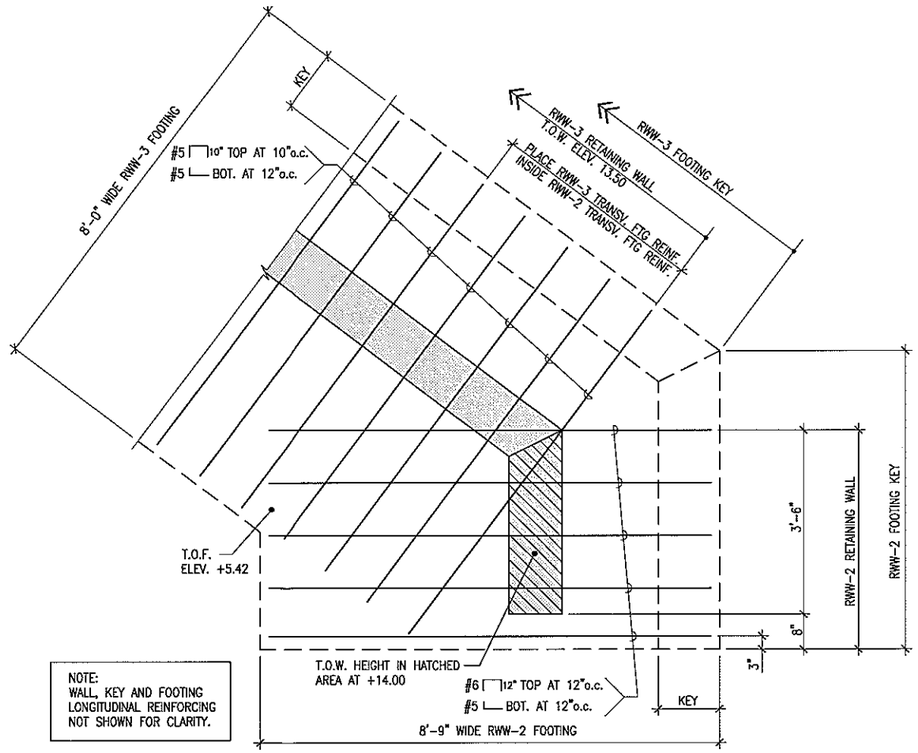
RETAINING WING WALL SCHEDULE					
MARK	"FTG-W"	"FTG-TOE"	"KEY"	"X1"	"Y1"
RWW-1	8'-9"	3'-0"	3'-0"	#6 @ 12" AT 12"o.c.	#6 VERT. AT 12"o.c.
RWW-2	8'-9"	3'-0"	1'-9"	#6 @ 12" AT 12"o.c.	#6 VERT. AT 12"o.c.
RWW-3	8'-0"	3'-0"	1'-6"	#5 @ 10" AT 12"o.c.	#5 VERT. AT 10"o.c.

A S-9 RETAINING WING WALL (RWW-) DETAILS
NOT TO SCALE



NOTE:
BASIN SLAB-ON-GRADE NOT SHOWN. SEE CIVIL DRAWINGS.

B S-9 CULVERT-TO-RWW RETAINING WALL DETAIL
SCALE: 3/4" = 1'-0"



NOTE:
WALL, KEY AND FOOTING LONGITUDINAL REINFORCING NOT SHOWN FOR CLARITY.

C S-9 END OF RWW- WINGWALL FOOTING
SCALE: 3/4" = 1'-0"

GRAPHIC SCALE
3/4"=1'-0" 1' 0 1' 2' 3'

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Expiration Date of License 4-30-12

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

RETAINING WING WALL DETAIL

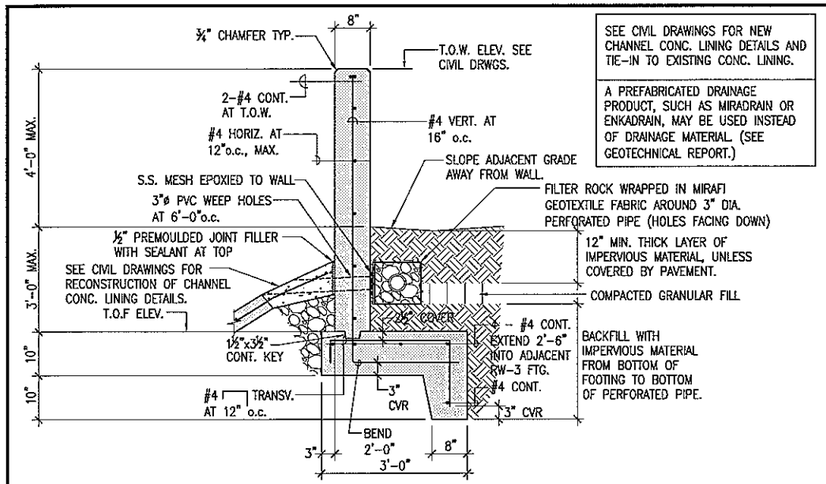
DESIGNED BY	DRAWN BY	CHECKED BY
KH	MM	BIN

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

S-9 SHEET OF 31

Fri, 01 Jun 2012 - 5:08am
\\Server\projects on drawing server\MM\2002\Hsbbb - Hauoli Street Box Culvert\S-9 Sections.dwg

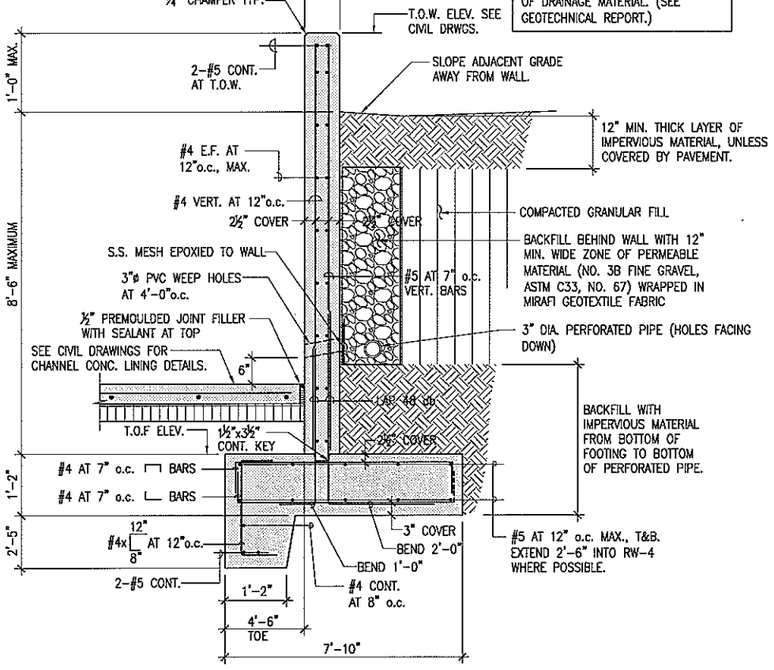


SEE CIVIL DRAWINGS FOR NEW CHANNEL CONC. LINING DETAILS AND TIE-IN TO EXISTING CONC. LINING.

A PREFABRICATED DRAINAGE PRODUCT, SUCH AS MIRADRAIN OR ENKADRAIN, MAY BE USED INSTEAD OF DRAINAGE MATERIAL. (SEE GEOTECHNICAL REPORT.)

A S-10 RETAINING WALL RW-2 DETAILS

NOT TO SCALE

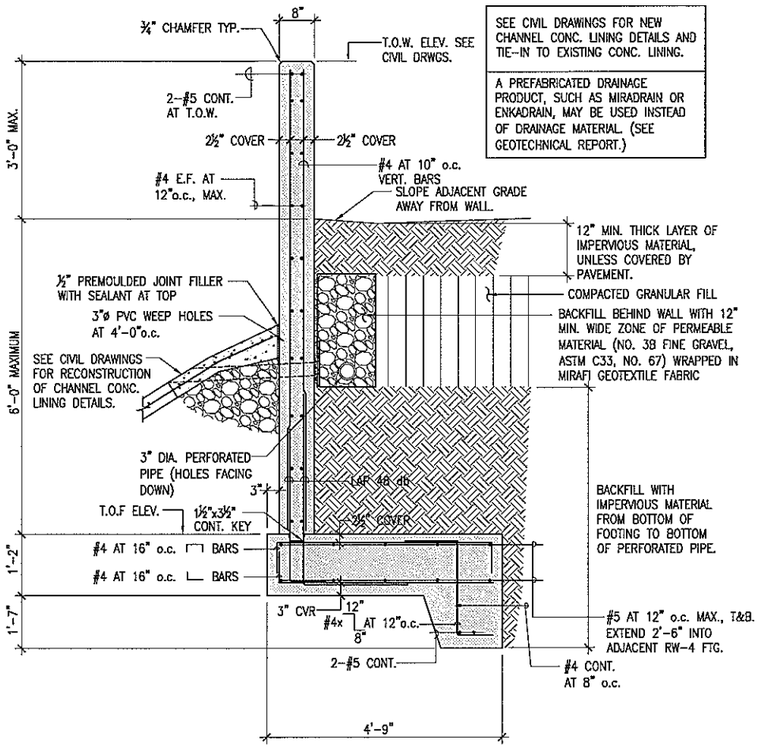


SEE CIVIL DRAWINGS FOR NEW CHANNEL CONC. LINING DETAILS AND TIE-IN TO EXISTING CONC. LINING.

A PREFABRICATED DRAINAGE PRODUCT, SUCH AS MIRADRAIN OR ENKADRAIN, MAY BE USED INSTEAD OF DRAINAGE MATERIAL. (SEE GEOTECHNICAL REPORT.)

D S-10 RETAINING WALL RW-5 DETAILS

NOT TO SCALE

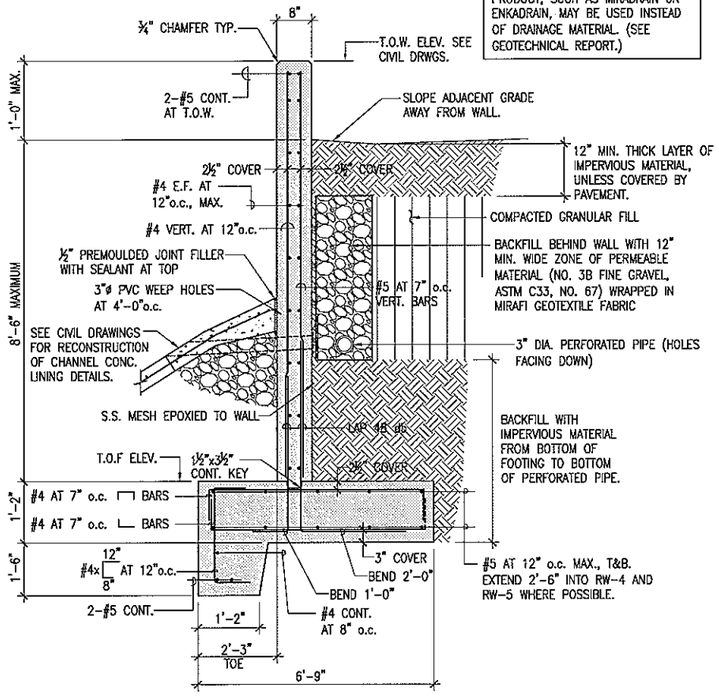


SEE CIVIL DRAWINGS FOR NEW CHANNEL CONC. LINING DETAILS AND TIE-IN TO EXISTING CONC. LINING.

A PREFABRICATED DRAINAGE PRODUCT, SUCH AS MIRADRAIN OR ENKADRAIN, MAY BE USED INSTEAD OF DRAINAGE MATERIAL. (SEE GEOTECHNICAL REPORT.)

B S-10 RETAINING WALL RW-3 DETAILS

NOT TO SCALE



SEE CIVIL DRAWINGS FOR NEW CHANNEL CONC. LINING DETAILS AND TIE-IN TO EXISTING CONC. LINING.

A PREFABRICATED DRAINAGE PRODUCT, SUCH AS MIRADRAIN OR ENKADRAIN, MAY BE USED INSTEAD OF DRAINAGE MATERIAL. (SEE GEOTECHNICAL REPORT.)

C S-10 RETAINING WALL RW-4 DETAILS

NOT TO SCALE

GRAPHIC SCALE

3/4"=1'-0" 1' 0 1' 2' 3'

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

RETAINING WALL DETAILS

BEVERLY ISHII-NAKAYAMA LICENSED PROFESSIONAL ENGINEER No. 7159-S HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Expiration Date of License 4-30-12

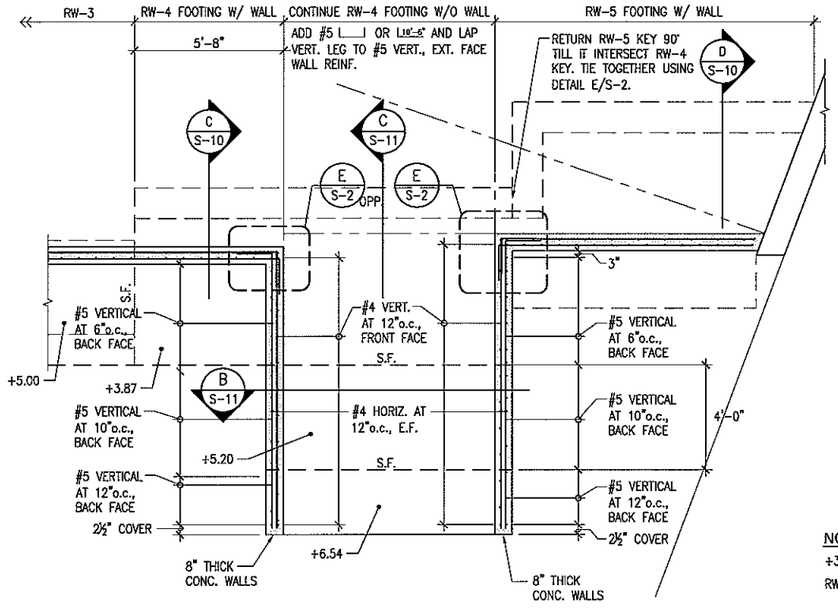
DESIGNED BY	DRAWN BY	CHECKED BY
KH	MM	BIN

DATE FIRM MEMBER DATE

S-10 SHEET OF 31

FILE	POCKET	FOLDER	NUMBER

Fri, 01 Jun 2012 - 5:42pm
\\Server\projects on drawing server\MAI\2009\09165 - Hauoli Street Box Culvert\S-10 Sections.dwg

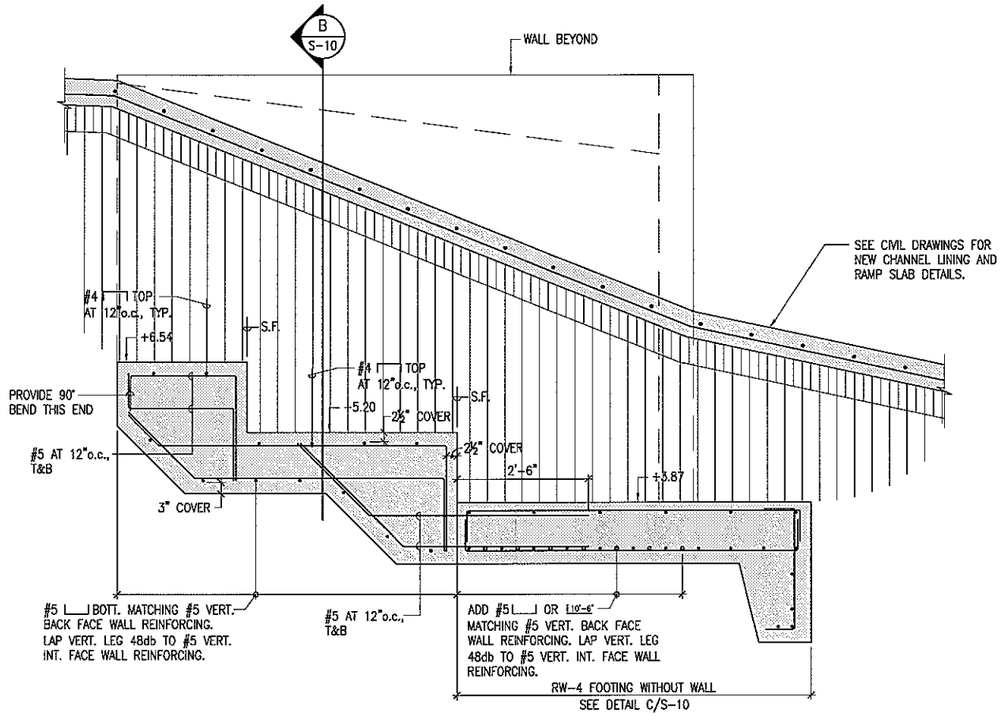


A S-11 **RAMP FOUNDATION PLAN**
SCALE: 3/8" = 1'-0"

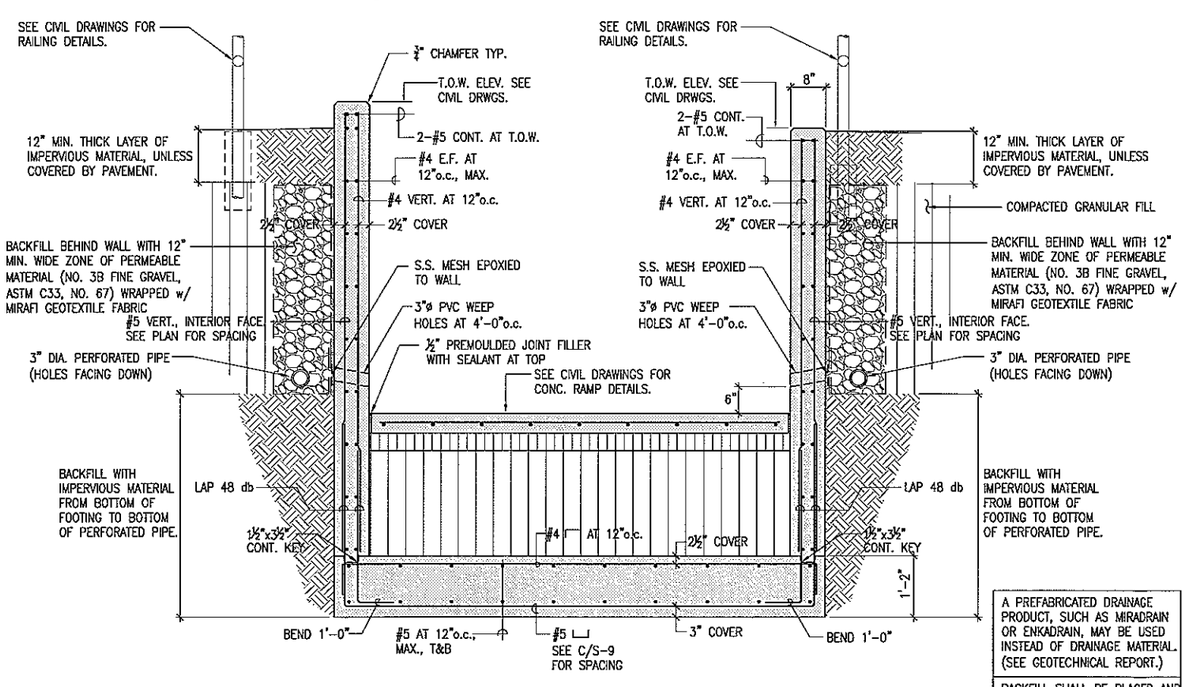
NOTE:
SEE CIVIL DRAWINGS FOR NEW CHANNEL LINING AND RAMP SLAB DETAILS.

NOTES & LEGEND:

+3.42 – INDICATES TOP OF FOOTING ELEVATION.
RW– – INDICATES RETAINING WALL TYPE. SEE A/S-10.
S.F. – INDICATES STEPPED FOOTING. UNLESS OTHERWISE NOTED, USE DETAIL F/S-2.



C S-11 **RAMP LONGITUDINAL SECTION**
SCALE: 3/4" = 1'-0"



A PREFABRICATED DRAINAGE PRODUCT, SUCH AS MIRADRAIN OR ENKADRAIN, MAY BE USED INSTEAD OF DRAINAGE MATERIAL. (SEE GEOTECHNICAL REPORT.)

BACKFILL SHALL BE PLACED AND COMPACTED ON BOTH SIDES OF WALLS EVENLY AS BACKFILLING PROGRESSES UPWARD.

B S-11 **RAMP TRANSVERSE SECTION**
SCALE: 3/4" = 1'-0"

GRAPHIC SCALES
3/8"=1'-0" 1' 0 1' 2' 3' 4' 5' 6' 7'
3/4"=1'-0" 1' 0 1' 2' 3'

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07-50

RAMP PLAN AND DETAILS

BEVERLY ISHII-NAKAYAMA LICENSED PROFESSIONAL ENGINEER No. 7159-S HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Beverly K. Ishii-Nakayama
Expiration Date of License 4-30-12

DESIGNED BY	KH	DRAWN BY	MM	CHECKED BY	BIN

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

fg, 01 Jun 2012 - 5:10pm
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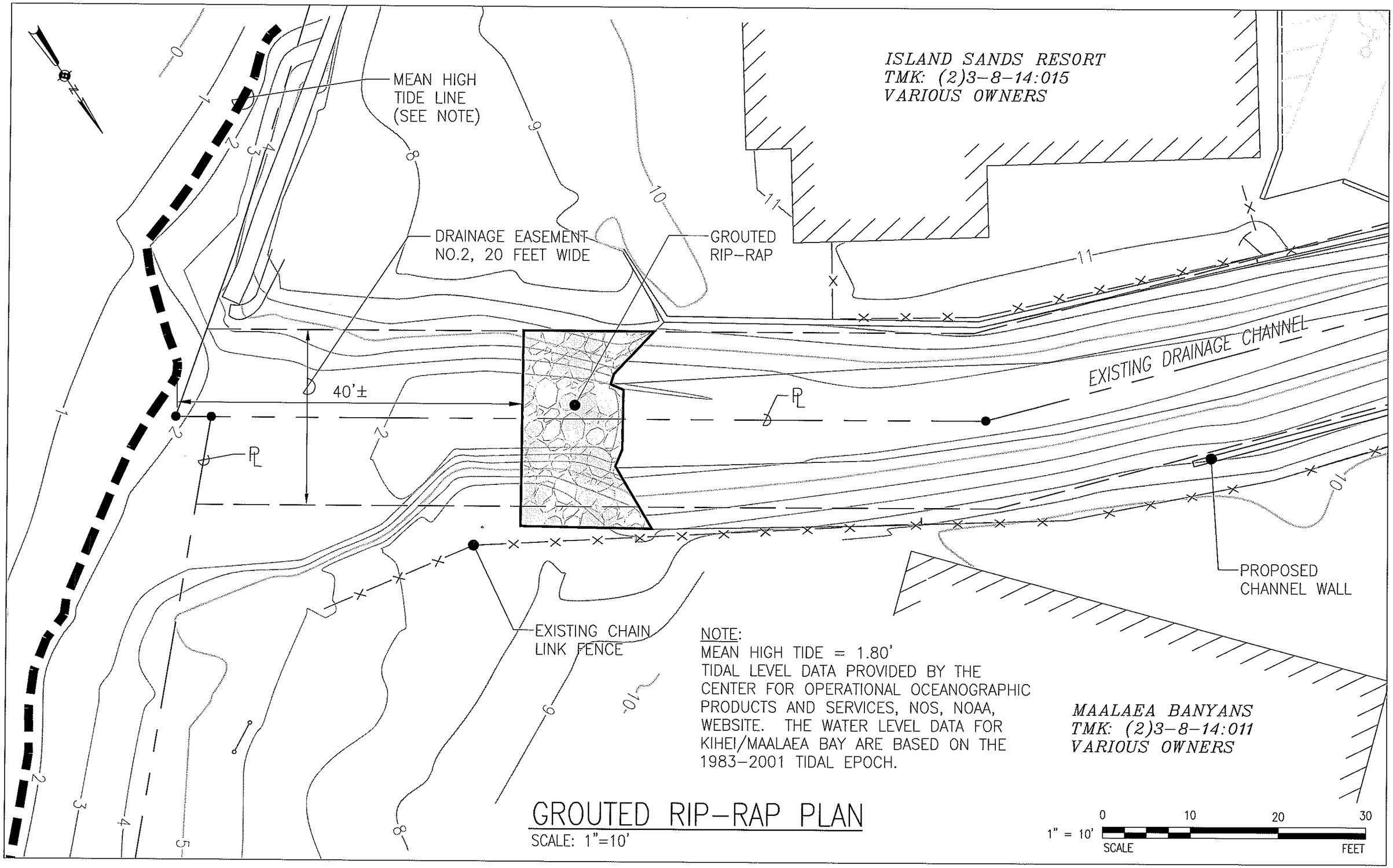
APPENDIX B-1.

Grouted Rip-Rap Plan



NOTE:
MEAN HIGH TIDE = 1.80'
TIDAL LEVEL DATA PROVIDED BY THE CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES, NOS, NOAA, WEBSITE. THE WATER LEVEL DATA FOR KIHEI/MAALAEA BAY ARE BASED ON THE 1983-2001 TIDAL EPOCH.

GROUTED RIP-RAP PLAN

SCALE: 1"=10'

1" = 10'

0 10 20 30

SCALE FEET

APPENDIX C.

Letter to Department of Planning Regarding Work Within Shoreline Setback Area

ALAN M. ARAKAWA
Mayor

DAVID C. GOODE
Director

ROWENA M. DAGDAG-ANDAYA
Deputy Director

Telephone: (808) 270-7745
Fax: (808) 270-7975

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

January 17, 2012

Mr. William Spence, Director
County of Maui
Department of Planning
Attention: Clayton Yoshida
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: PROPOSED HAUOLI STREET DRAINAGE IMPROVEMENTS PROJECT
JOB NO. 07-50
PERMITTED USE WITHIN SHORELINE SETBACK AREA

Dear Mr. Spence:

Our project team met with Clayton Yoshida on Thursday, December 29, 2011 to discuss the applicable permitting requirements for the proposed Hauoli Street Drainage Improvements project at Maalaea, Maui. As a follow up to our meeting, we are writing to request confirmation from the Planning Department that the proposed action is a permitted use within the Shoreline Setback Area per the provisions of the Shoreline Rules of the Maui Planning Commission.

The subject project is needed in order to alleviate flooding that occurs during periods of heavy rainfall due to the inadequate capacity of the existing drainage system. This is a public safety improvement project that must be implemented in a timely manner. The existing drainage system consists of a single-cell box culvert under Hauoli Street and a concrete-lined drainage channel that extends towards the shoreline on the makai side of Hauoli Street. The proposed improvements involve construction of a water quality basin on the mauka side of Hauoli Street; replacement of the existing box culvert under Hauoli Street with a double-box culvert; and the addition of a wall to the existing drainage channel on the makai side of Hauoli Street to increase the capacity of the drainage channel and prevent future flooding. Grouted rip-rap (GRP) would be added to the mouth of the drainage channel to prevent erosion. We are hoping to secure funding for construction as part of the Fiscal Year 2013 budget.

The proposed work within the Shoreline Setback Area is limited to the addition of GRP to the mouth of the drainage channel. See Exhibit "A". In this respect, Item 9 of §12-203-12 of the Shoreline Rules of the Maui Planning Commission, Permitted structures and activities within the shoreline setback area, specifies the following:

> *A structure or activity that has been determined by the director to be a minor structure or minor activity within the shoreline setback area which does not adversely affect beach processes, does not artificially fix the shoreline, and does not interfere with public access or public views to and along the shoreline and which meets the purpose of this chapter, HRS chapter 205A, as amended, and chapter 19.62, Maui County Code, relating to coastal high hazard districts.*

Further, as defined by §12-203-4 of the Shoreline Rules, a "minor structure" is a "man-made structure that costs less than $125,000, does not impede the natural movement of the shoreline, does not alter the existing grade of the shoreline setback area..." The proposed GRP work within the Shoreline Setback Area meets the criteria set forth by §12-203-12 and §12-203-4 of the Shoreline Rules as follows.

- The cost of the GRP in the shoreline setback area is estimated at $16,750.00.
- The GRP will be located approximately 40 feet inland of the shoreline, such that it will not impede the natural movement of the shoreline, will not alter the existing grade of the shoreline setback area, will not adversely affect beach processes, and will not artificially fix the shoreline.
- The GRP will be installed at-grade at the mouth of the existing drainage channel and will not interfere with public access or public views to and along the shoreline.
- The proposed work preserves the natural shoreline environment and thereby meets the purpose of the Shoreline Rules and Chapter 205A, HRS.
- With respect to Chapter 19.62, Maui County Code, the drainage channel is located within Flood Zone X (shaded) and is not located within a coastal flood hazard area. The purpose of the proposed Hauoli Street Drainage Improvements project is to alleviate flooding in the Hauoli Street area.

Given the foregoing, we respectfully request confirmation that the proposed project is a permitted use within the Shoreline Setback Area per the provisions of §12-203-12(9) of the Shoreline Rules.

It is noted that compliance with Chapter 343, HRS will be met with the preparation and processing of an Environmental Assessment (EA), triggered by the use of County funds and work within the Shoreline Setback Area. Further consultation will be carried out with your Department to determine applicable Special Management Area permitting requirements. As discussed on December 29, 2011, a partial shoreline survey of the shoreline fronting the drainage channel will be prepared by a licensed surveyor.

Should you have any questions, please contact Wendy Kobashigawa of our Engineering Division at 270-7745.

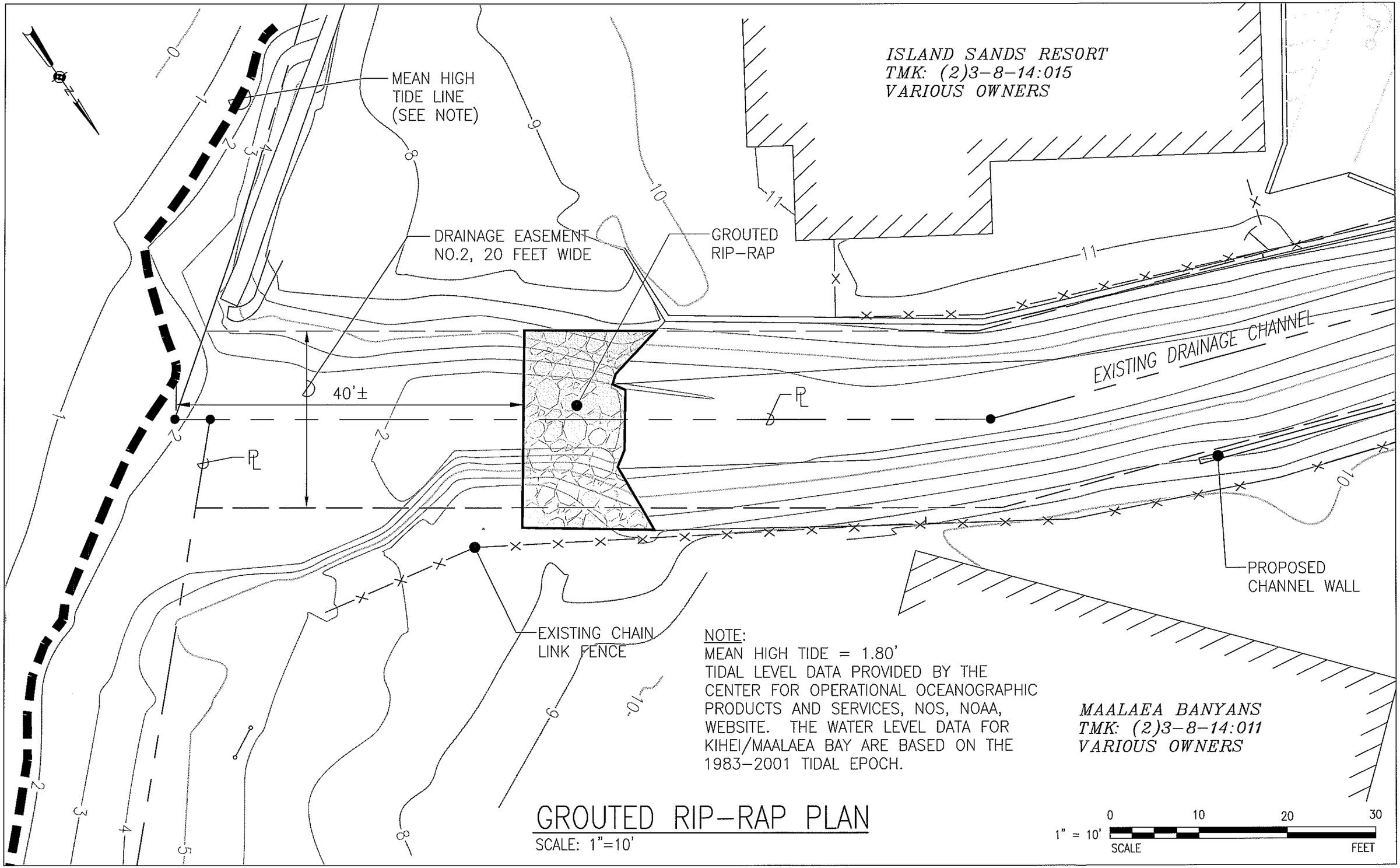
Sincerely,

DAVID C. GOODE
Director

CY/WYK:gq (ED12-062)
S:\ENG\ALL\WYK\CIP\07-50HauoliStDrain\SSV\Planning Ltr from DPW.doc

Enclosure

xc: Kimberly Skog, Munekiyo & Hiraga, Inc. (w/enclosure)



GROUTED RIP-RAP PLAN

SCALE: 1"=10'

EXHIBIT "A"

APPENDIX C-1.

Special Management Area Assessment and Shoreline Setback Assessment Concurrence from Department of Planning

Kimberly Skog

From: James Buika <James.Buika@co.maui.hi.us>
Sent: Thursday, February 16, 2012 10:38 AM
To: David Goode; Wendy Kobashigawa
Cc: James Buika; Jeffrey Dack; Venus Bolosan; Kimberly Skog
Subject: Planning Dept concurrence on work at Hauoli Street Drainage RFC 20120005

Dear Mr. Goode,

This email serves as concurrence that the proposed work in your letter dated January 17, 2012 to Director Spence, Planning Dept., RFC 20120005, is an allowed activity in the Shoreline Setback Area under Section 12-203-12(9) of the Shoreline Rules for the Maui Planning Commission. The Department agrees with your analysis.

Please submit a SMA Assessment Application and a Shoreline Setback Assessment Application to the Planning Department from review and approval. With the applications, please submit a copy of this email and the January 17, 2012 subject letter.

Thank you,
Jim Buika

Jim Buika, Planner
Department of Planning
Current Division
County of Maui
250 South High Street
Wailuku, HI 96793
(808) 270-6271
(808) 270-1775 Fax
james.buika@mauicounty.gov

County of Maui.

IT Security measures will reject attachments

larger than 11 MB, and will block or quarantine

high-risk file types in attachments.

APPENDIX C-2.

Shoreline Exhibit Concurrence from Department of Planning

Kimberly Skog

From: James Buika <James.Buika@co.maui.hi.us>
Sent: Friday, March 02, 2012 3:40 PM
To: Kimberly Skog
Cc: Clayton Yoshida; Jeffrey Dack; Cheryl Okuma
Subject: RE: Planning Dept concurrence on work at Hauoli Street Drainage RFC 20120005

Dear Kim,

I have reviewed the two exhibits and concur, from the information presented, that the Grouted Rip-Rap exhibit is acceptable for SMA Application purposes to delineate the shoreline for the Public Works mitigation project. From the plans presented, the project will most likely not impede the natural movement of the shoreline, nor impede lateral access along the shoreline and views to and along the shoreline.

Once the application is submitted, please ensure that the assigned planner does a site visit to fully understand the project.

Thank you,
Jim Buika

Jim Buika, Planner
Department of Planning
Current Division
County of Maui
250 South High Street
Wailuku, HI 96793
(808) 270-6271
(808) 270-1775 Fax
james.buika@mauicounty.gov

>>> Kimberly Skog <Kimberly@mhplanning.com> 3/1/2012 3:45 PM >>>
Hi Jim,

Good speaking with you today.

To follow up on our discussion, attached are (1) the Drainage Channel Plan and (2) the Grouted Rip-Rap exhibit showing the mouth of the drainage channel in relation to the mean high tide line. Please confirm that the Grouted Rip-Rap exhibit will be acceptable as a shoreline survey for the SMA Assessment and Shoreline Setback Assessment applications for the subject project. If you will need to do a site visit, or if you have any questions, please let me know.

Many thanks,
Kim

Kimberly Skog
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793
Telephone: (808) 244-2015

Facsimile: (808) 244-8729
Email: kimberly@mhplanning.com

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Please consider the environment before printing this email.

-----Original Message-----
From: James Buika [mailto:James.Buika@co.maui.hi.us]
Sent: Thursday, February 16, 2012 10:38 AM
To: David Goode; Wendy Kobashigawa
Cc: James Buika; Jeffrey Dack; Venus Bolosan; Kimberly Skog
Subject: Planning Dept concurrence on work at Hauoli Street Drainage RFC 20120005

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Please submit a SMA Assessment Application and a Shoreline Setback Assessment Application to the Planning Department from review and approval. With the applications, please submit a copy of this email and the January 17, 2012 subject letter.

Thank you,
Jim Buika

Jim Buika, Planner
Department of Planning
Current Division
County of Maui
250 South High Street
Wailuku, HI 96793
(808) 270-6271
(808) 270-1775 Fax
james.buika@mauicounty.gov

County of Maui.

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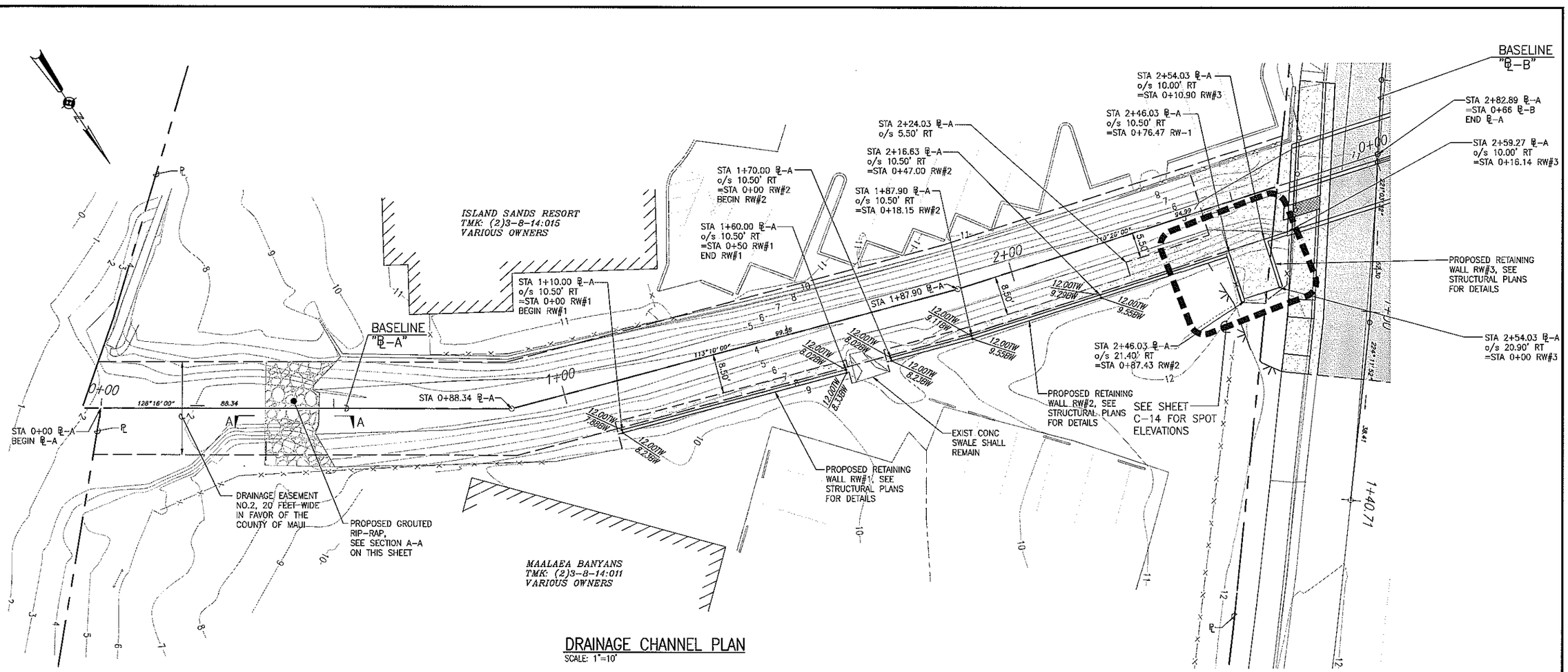


DRAINAGE CHANNEL PLAN

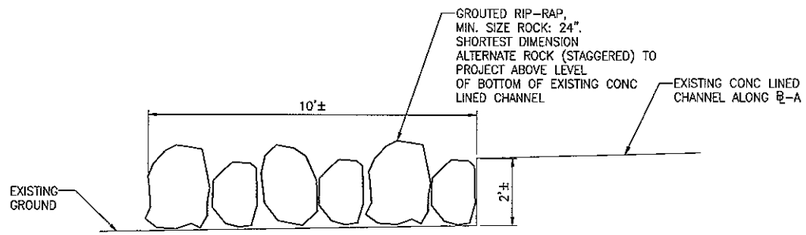
SCALE: 1"=10'

LEGEND:

- AC PAVEMENT
- CONCRETE SIDEWALK/ RECONSTRUCTED CONC CHANNEL
- 12.00TW 8.25BW — PROPOSED SPOT ELEVATIONS:
  - * TW=TOP OF WALL
  - * BW=BOTTOM OF WALL

NOTE:

1. SEE SHEET C–13 FOR PROFILES OF RETAINING WALLS, RW#1, RW#2 & RW#3.
2. SEE SHEETS C–14 & C–15 FOR CROSS SECTIONS OF DRAINAGE CHANNEL.



SECTION A–A

SCALE: 1"=2'

1" = 2' SCALE 0 2 4 6 FEET

1" = 5' SCALE 0 5 10 15 FEET

1" = 10' SCALE 0 10 20 30 FEET

AECOM

DIANE Y. KODAMA LICENSED PROFESSIONAL ENGINEER No. 8685–C HAWAII, U.S.A.

(EXPIRES 4/30/2012)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

HAUOLI STREET DRAINAGE IMPROVEMENTS

MAALAEA, MAUI, HAWAII
JOB NUMBER 07–50

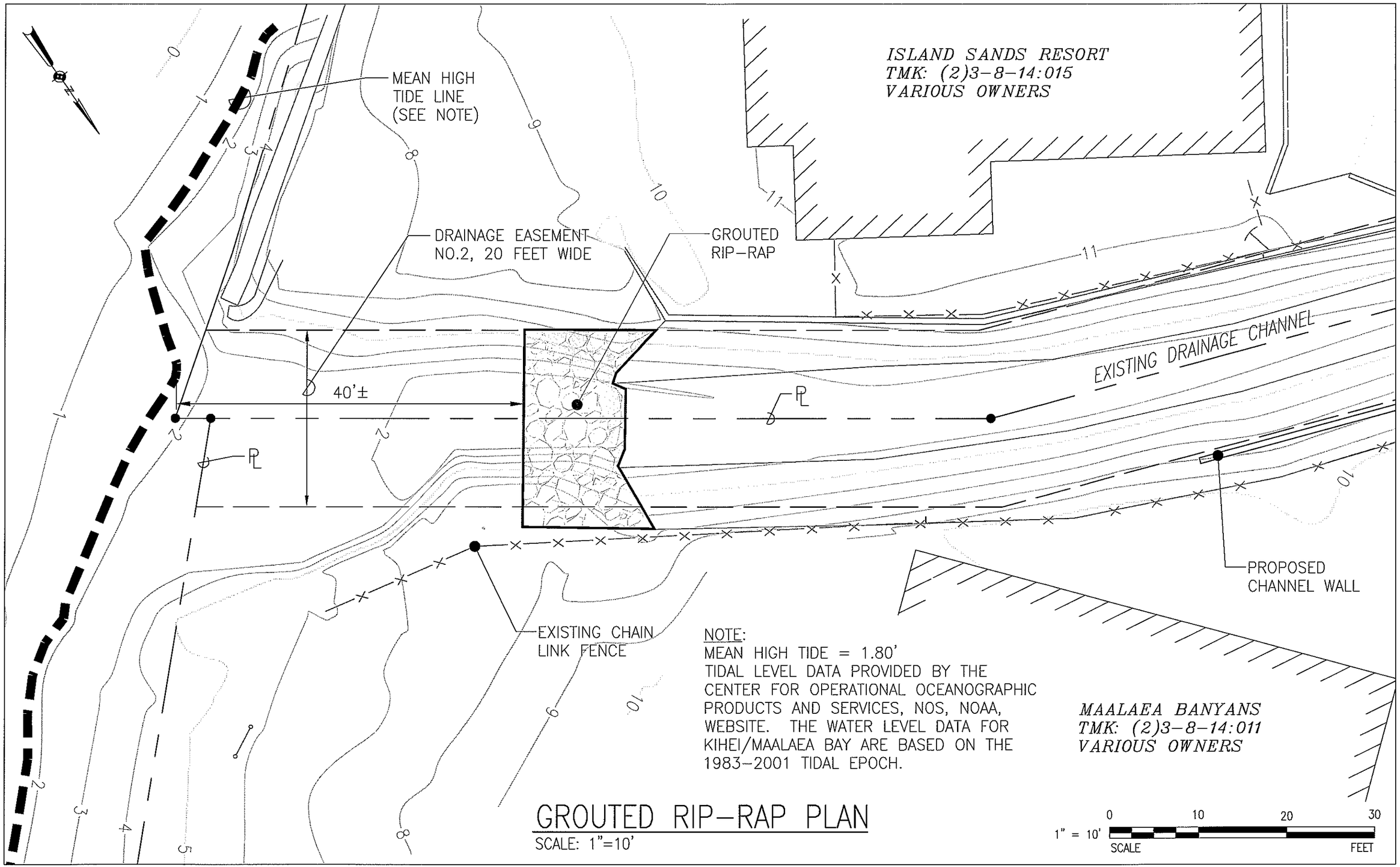
DRAINAGE CHANNEL PLAN

DESIGNED BY	DRAWN BY	CHECKED BY
AHT	AHT	DYK/MD

DATE FIRM MEMBER DATE

FILE	POCKET	FOLDER	NUMBER

R:\PW\PLANS\ A\USER\Dirk\Hwy\60040SB.DGN [PW Road Drainage\ADD Drawings\Waiakoa Drainage_30-36-Drainage Outfall #8&#9.dgn] 3/30/2012 @ 04:48:19 pm PLOT DATE: 3/30/2012 @ 04:48:19 pm



NOTE:
MEAN HIGH TIDE = 1.80'
TIDAL LEVEL DATA PROVIDED BY THE CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES, NOS, NOAA, WEBSITE. THE WATER LEVEL DATA FOR KIHEI/MAALAEA BAY ARE BASED ON THE 1983-2001 TIDAL EPOCH.

GROUTED RIP-RAP PLAN

SCALE: 1"=10'

APPENDIX D.

Coastal Assessment for Drainage Improvements at Hauoli Street

COASTAL ASSESSMENT
FOR DRAINAGE IMPROVEMENTS AT HAUOLI STREET

Maalaea, Maui, Hawaii

December, 2009

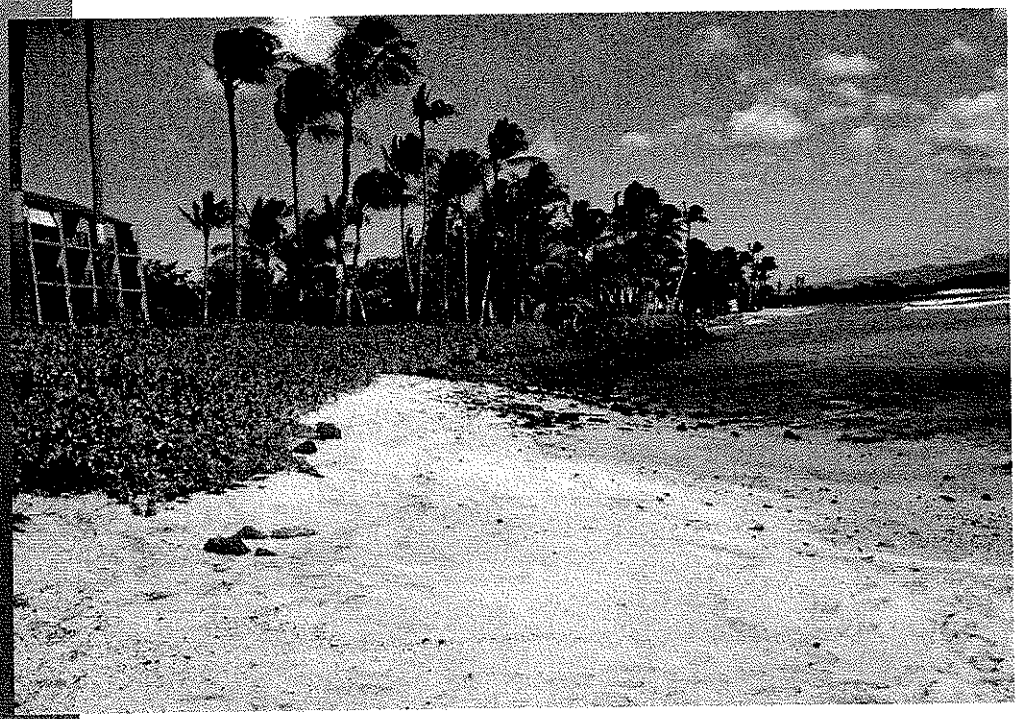


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TABLE OF CONTENTS

1. INTRODUCTION 1

2. SITE CONDITIONS 2

3. PHYSICAL OCEANOGRAPHIC ENVIRONMENT 6

3.1 TIDES 6
3.2 WINDS 6
3.3 CURRENTS 8
3.4 WAVES 8
3.4.1 Prevailing Waves 8
3.4.2 Prevailing Deepwater Wave Climate 9

4. COASTAL HAZARDS 12

4.1 TSUNAMIS 12
4.2 FLOODING 12
4.3 EXTREME WAVES AND NEARSHORE WATER LEVELS 12
4.3.1 Extreme Deepwater Waves 12
4.3.2 Extreme Nearshore Water Levels 14
4.3.3 Extreme Nearshore Wave Heights 14

5. SHORELINE CHANGES 16

5.1 HISTORICAL SHORELINE CHANGES 16
5.2 FIELD STUDY 17
5.3 EXISTING SHORELINE ANALYSIS 18

6. REFERENCES 20

LIST OF FIGURES

FIGURE 1-1 PROJECT LOCATION MAP 1
FIGURE 2-1 PROJECT LOCATION MAP 2
FIGURE 2-2 PROJECT SITE LOCATION 3
FIGURE 2-3 COBBLE AND SAND BEACH IN FRONT OF MAALAEA BANYAN CONDOMINIUMS 3
FIGURE 2-4 SANDY BEACH ON NORTHEAST SIDE OF HAUOLI STREET DRAINAGE OUTLET 4
FIGURE 2-5 SANDY BEACH AND SEAWALL ON SOUTHWEST SIDE OF HAUOLI STREET DRAINAGE OUTLET 4
FIGURE 2-6 SAND BEACH AND ROCK SHOAL IN FRONT OF HAUOLI STREET DRAINAGE OUTLET 5
FIGURE 3-1 WIND ROSE DIAGRAM, MAALAEA HARBOR 7
FIGURE 3-2 WAVE HEIGHT DISTRIBUTION: WIS STATION 114 10
FIGURE 3-3 WAVE PERIOD DISTRIBUTION: WIS STATION 114 11
FIGURE 5-1 MAALAEA SHORELINE EROSION MAP 17
FIGURE 5-2 EXISTING SANDY BEACH CONTOURS AT HAUOLI STREET DRAINAGE OUTLET (11-06-2009) 18

FIGURE 5-3 SHORELINE CHANGES AT HAUOLI STREET DRAINAGE OUTLET 19

LIST OF TABLES

TABLE 3-1 TIDE LEVEL DATA FOR MAALAEA BAY 6
TABLE 4-1 TSUNAMI RUNUP ELEVATION ABOVE MLLW AT MAALAEA 12
TABLE 4-2 SELECTED EXTREME DEEPWATER WAVE CONDITIONS 13
TABLE 4-3 EXTREME WATER LEVEL RISES AT SHORE 14

1. INTRODUCTION

Sea Engineering, Inc. has been retained to provide a coastal evaluation study in support of the Environmental Assessment for proposed Hauoli Street Drainage Improvements, Maalaea, Maui. Maalaea is located on the south shore of Maui, about six miles south of Kahului and three miles northwest of Kihei (Figure 1-1). The shoreline faces southeast and is in a fairly well protected location. The existing drainage system at Hauoli Street includes a desilting basin on the north side of Hauoli Street and a drainage easement to the shoreline. The drainage easement is located at the boundary of the shoreline properties of TMKs (2) 3-8-014:011 and 015. The east parcel (Parcel 11) and west parcel (Parcel 15) contain Maalaea Banyans condominiums and Island Sands condominiums, respectively.

The coastal evaluation study includes:

- Description of the oceanographic and coastal setting
- Evaluation of possible coastal hazards
- Historical shoreline changes (erosion or accretion) at the project site
- Description of shoreline conditions and ongoing shoreline processes

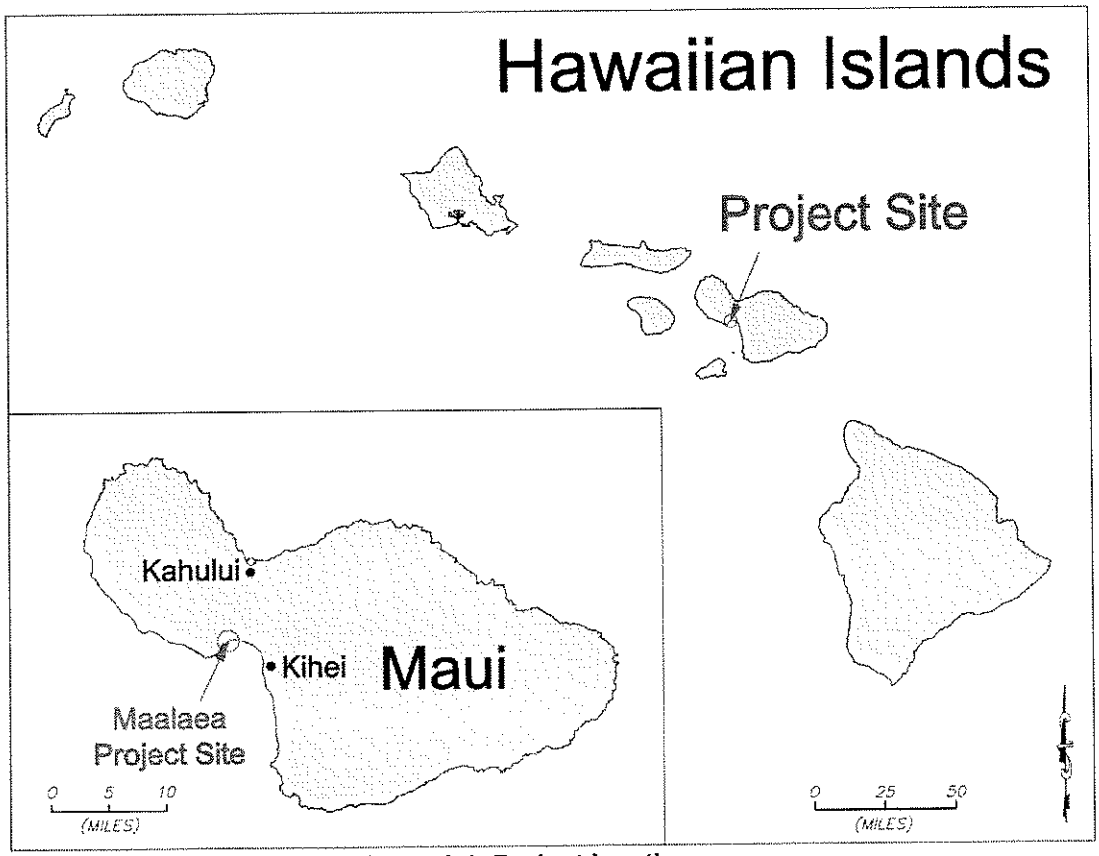


Figure 1-1 Project location map

2. SITE CONDITIONS

The project site is located on Maalaea Bay less than 0.5 miles northeast of Maalaea Harbor (Figure 2-1). The drainage outlet is located at the boundary of two shoreline parcels. The east parcel with Maalaea Banyans condominiums has an approximately 270-foot shoreline and the west property containing Island Sands condominiums has a 380-foot shoreline (Figure 2-2).

Along the shoreline, a cobble beach extends 120 feet to the east in front of Maalaea Banyans condominiums and transitions into a 240-foot long sand beach to the west property shoreline (Figures 2-3, and 2-4). The project drainage outlet is located in the middle of the sandy shoreline, which appears to be stable. Beyond the sand beach to the southwest, the 1,300-foot shoreline reach leading to the Maalaea boat harbor has been hardened with shore protection structures (Figure 2-5).

The drainage easement landward of the beach berm is covered with thick vegetation, suggesting that there has been little or no flow in recent months. The beach berm is also at a higher elevation than the drainage, also indicating there has been little flow.

The nearshore substrate off the project site is composed primarily of basalt cobbles likely derived from the erosion of the local conglomerate. The loose cobbles form offshore shoals and there is little sand in the nearshore area. Figure 2-6 shows the sand beach and rock shoal in front of the drainage outlet.

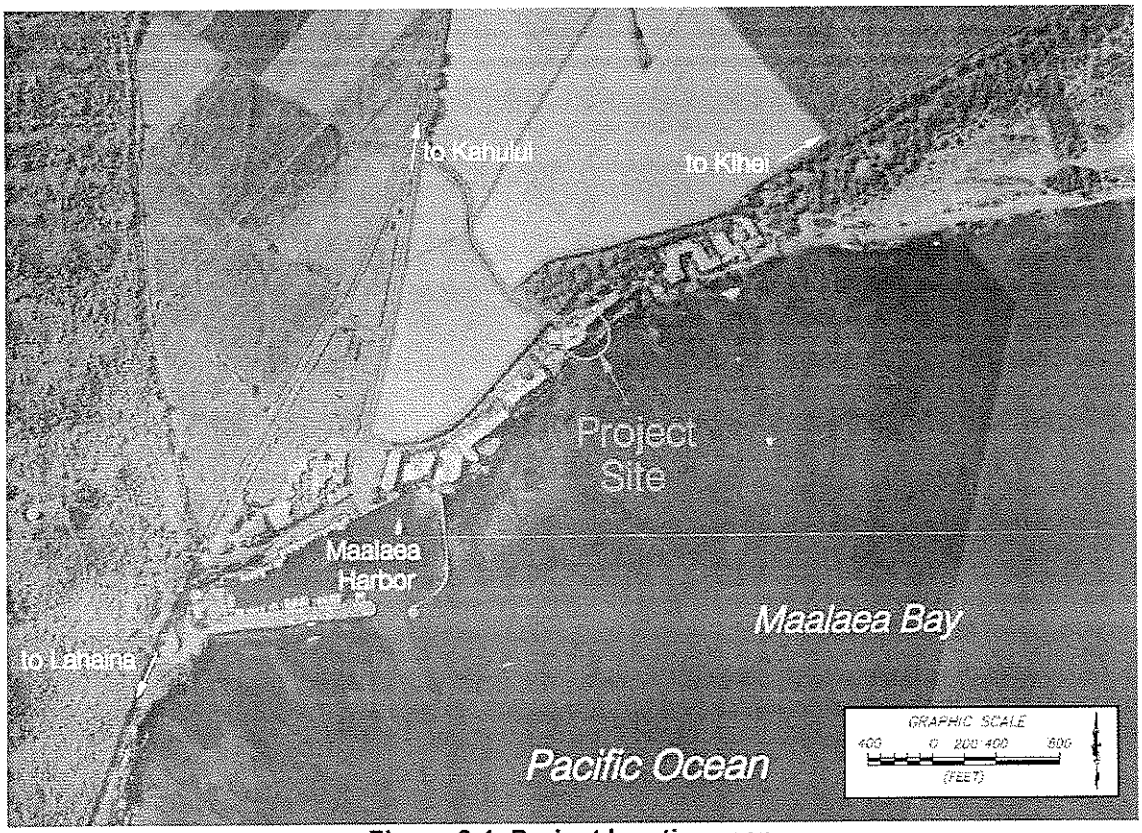


Figure 2-1 Project location map

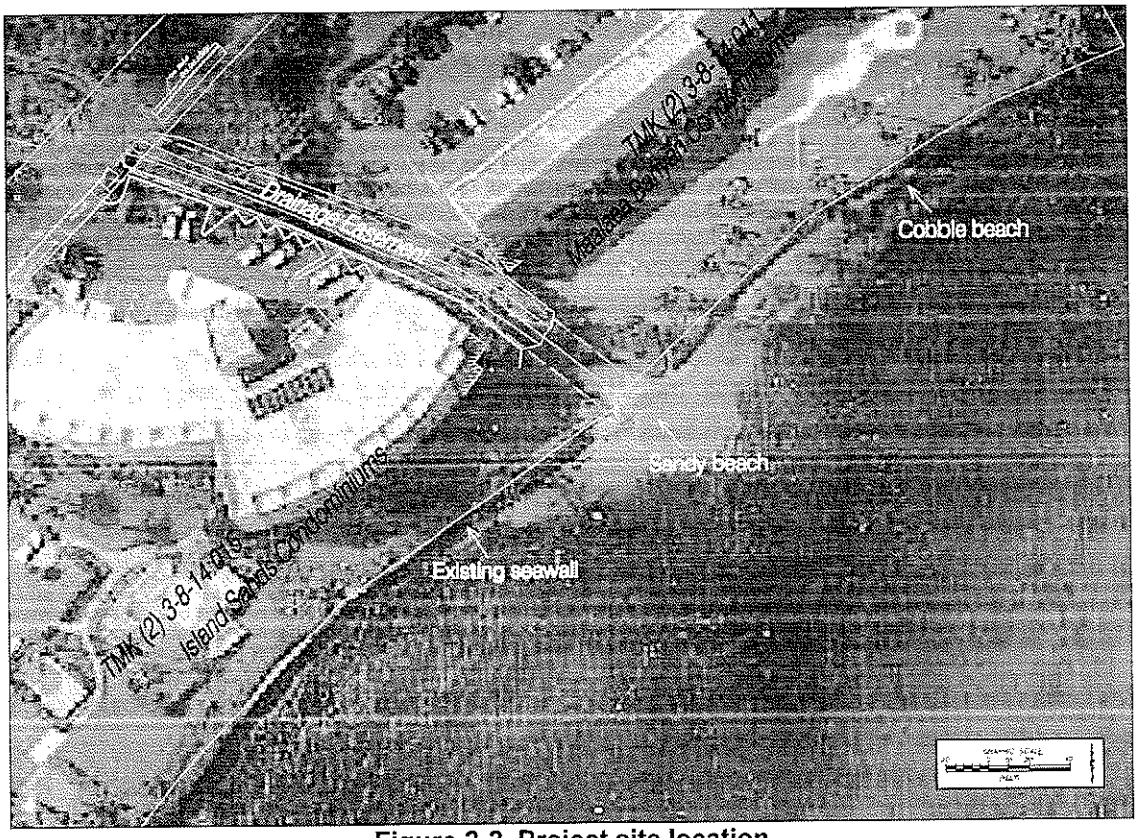


Figure 2-2 Project site location

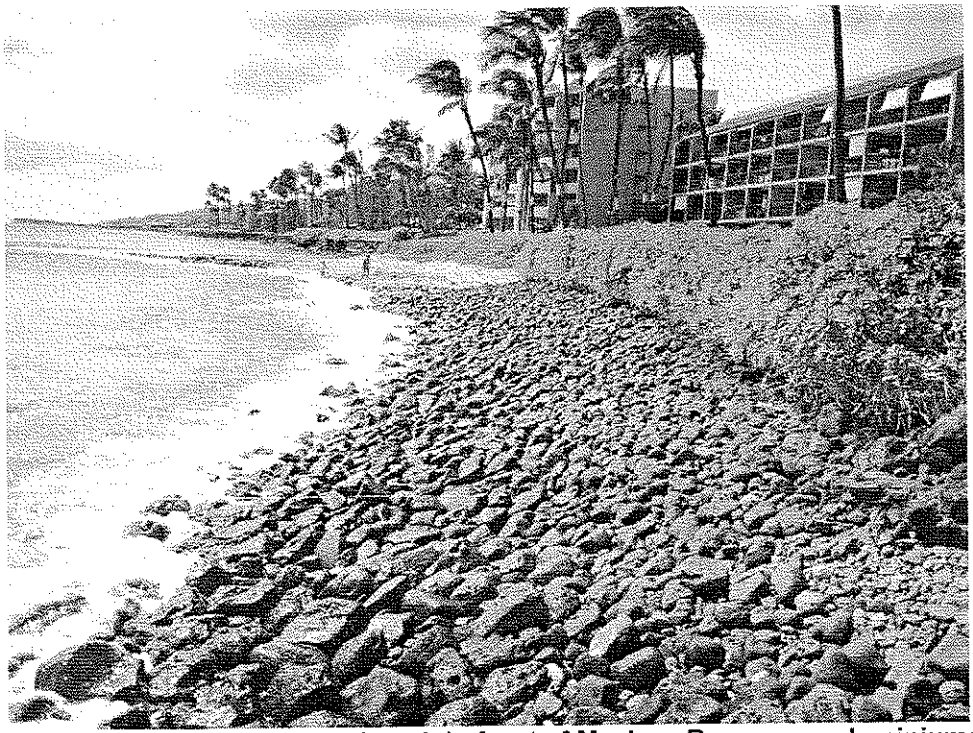


Figure 2-3 Cobble and sand beach in front of Maalaea Banyan condominiums

Figure 2-4 Sandy beach on northeast side of Hauoli Street drainage outlet

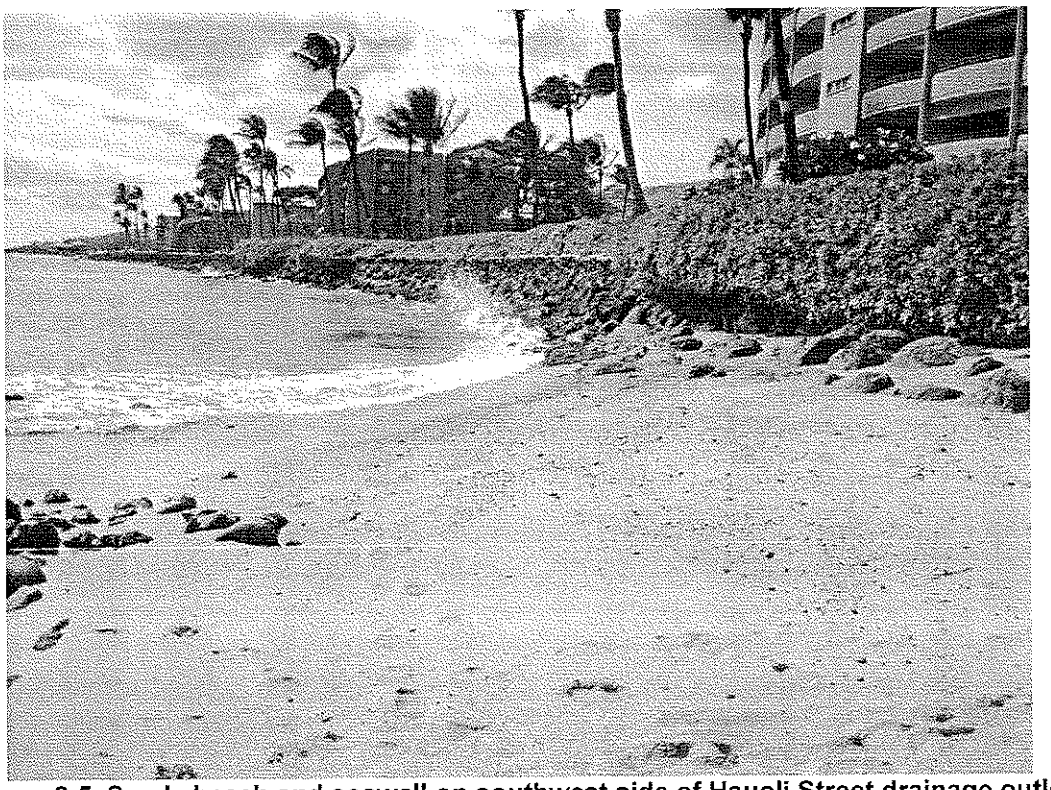


Figure 2-5 Sandy beach and seawall on southwest side of Hauoli Street drainage outlet

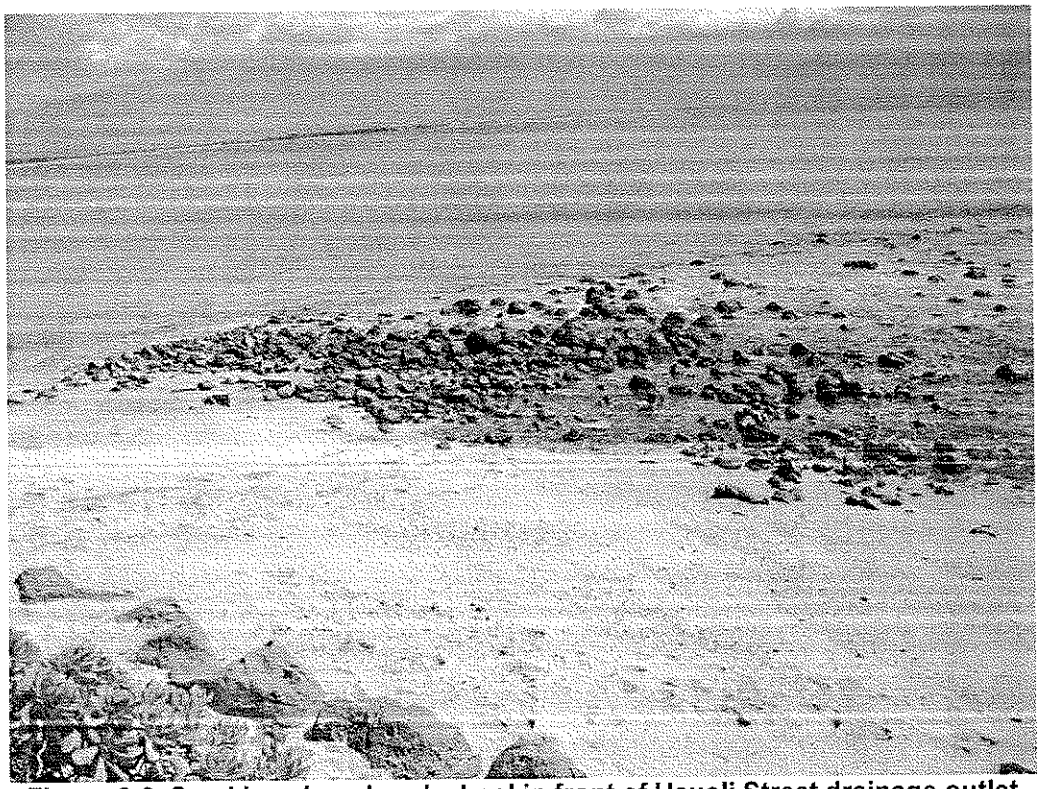


Figure 2-6 Sand beach and rock shoal in front of Hauoli Street drainage outlet

3. PHYSICAL OCEANOGRAPHIC ENVIRONMENT

3.1 Tides

Hawaii tides are semi-diurnal with two high and low tides each 24-hour period with different elevations. Tidal predictions and historical extreme water levels are given by the Center for Operational Oceanographic Products and Services, NOS, NOAA, website. The water level data for Kihei/Maalaea Bay, based on the 1983-2001 tidal epoch, are shown in Table 3-1.

Table 3-1 Tide level data for Maalaea Bay

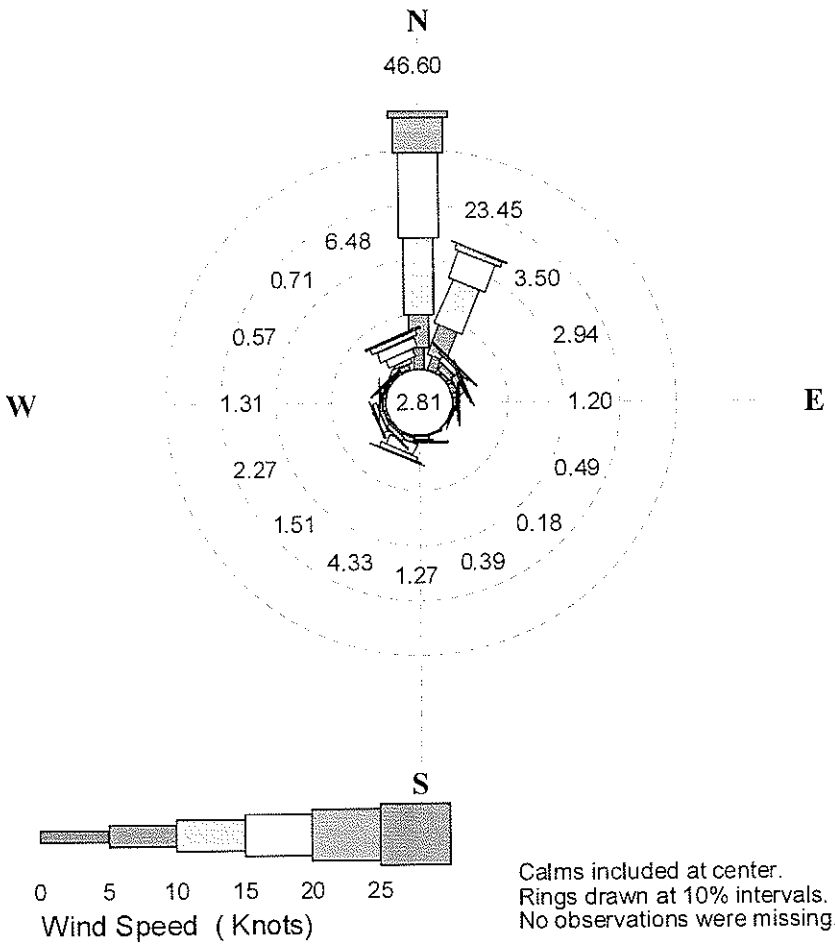
Mean Higher High Water	2.3 feet
Mean High Water	1.8 feet
Mean Tide Level	1.0 feet
Mean Low Water	0.2 feet
Mean Lower Low Water	0.0 feet

3.2 Winds

The prevailing wind throughout the year in the Hawaiian Islands is the northeasterly trade wind. Its average frequency varies from more than 90% during the summer season to only 50% in January, with an overall annual frequency of about 70%. The tradewinds are relatively constant during the spring and summer with typical speeds of 10 to 20 miles per hour.

During the winter months, the northeast trade winds weaken and south to southwesterly Kona winds occur when low pressure systems have a close approach to the islands. Kona winds range from light and variable to gale force winds produced by local pressure systems. These storms are often accompanied by heavy rains.

On Maui, local wind conditions are heavily influenced by regional topography. At Maalaea, the northeast tradewinds become northerly as they are funneled between the volcanoes of East and West Maui. The speeds are also significantly greater than those approaching the north coast of Maui due to the funneling effect. A total of 12 months of hourly wind data measured at Maalaea has been obtained from the National Weather Service office. The data is for the periods of July-December 2003, February-March 2004, and July-October 2004. The available data set is in the form of direction and 2-minute sustained wind speed at 33 feet above the ground. Figure 3-1 presents a wind rose of 2-minute sustained wind speed versus direction along with a histogram. The wind rose shows that the winds at Maalaea Harbor come from a narrow directional sector between north-northeast more than 75 percent of the time. Although southerly winds occur only a small percentage of the time, they are occasionally strong. The strongest wind in this record is 39.96 knots from 350° TN, while the strongest southerly wind was 29.97 knots from 210° TN.



PERCENT OCCURRENCE: Wind Speed (Knots)
LOWER BOUND OF CATEGORY

DIR	0	5	10	15	20	25
N	3.85	5.95	13.77	15.52	6.31	1.20
NNE	2.65	5.65	8.72	5.16	1.16	0.10
NE	0.73	1.18	0.99	0.39	0.17	0.04
ENE	1.21	1.18	0.33	0.18	0.03	0.00
E	0.70	0.28	0.12	0.08	0.03	0.00
ESE	0.31	0.13	0.04	0.01	0.00	0.00
SE	0.09	0.08	0.01	0.00	0.00	0.00
SSE	0.26	0.13	0.00	0.00	0.00	0.00

TOTAL OBS = 7764 MISSING OBS = 0

PERCENT OCCURRENCE: Wind Speed (Knots)
LOWER BOUND OF CATEGORY

DIR	0	5	10	15	20	25
S	0.32	0.36	0.30	0.14	0.12	0.04
SSW	0.37	1.00	1.93	0.84	0.13	0.05
SW	0.15	0.49	0.62	0.22	0.03	0.00
WSW	0.49	0.86	0.73	0.18	0.00	0.00
W	0.52	0.57	0.17	0.03	0.03	0.01
WNW	0.28	0.19	0.03	0.04	0.01	0.01
NW	0.21	0.19	0.15	0.09	0.04	0.03
NNW	1.08	0.70	1.49	1.93	1.09	0.18

CALM OBS = 218 PERCENT CALM = 2.81

Figure 3-1 Wind Rose diagram, Maalaea Harbor

3.3 Currents

Current measurements were performed by Sea Engineering (1996) at three measurement stations in Maalaea Bay between November 26, 1996, and December 8, 1998. Eighteen months of data were obtained over the two year period. The study was conducted under the direction of the U.S. Army Corps of Engineers, Pacific Ocean Division, before the start of construction of modifications to Maalaea small boat harbor.

Measuring Stations 1 and 2 were located 2 miles eastward of Maalaea harbor and are about 0.5 miles and 0.9 miles off the shoreline, respectively. The respective water depths at Stations 1 and 2 were 44 and 59 feet. The current meter at Station 3, located directly 0.3 miles off the harbor in a water depth of 43 feet. The meters at Stations 1 and 2 measured currents at 6 feet above the water bottom. The current meter at Station 3 measured currents throughout the water column.

The study results show that the upper 10 to 15 feet of the water column appeared to be directly influenced by the wind, resulting in unidirectional flow and high net transport speeds. By contrast, the mid-depth and near bottom currents were relatively weak. The maximum near-bottom speed measured at Stations 1 and 2 was 30.5 cm/sec. The average current speed at Station 2, the offshore station, was approximately 6 cm/sec, and the average current speed at Station 1, the inshore station, was 3 cm/sec. Current at both stations illustrated bi-directional flow, typically associated with flow reversals due to the semidiurnal tide. Current direction at these two stations was highly variable but had the highest frequency of occurrence in the northwest quadrant.

At Station 3 the dominant characteristic was the strong response of the surface currents to the prevailing winds. In contrast to the data at Stations 1 and 2, the deeper layers at Station 3 showed little or no tidal effect. However, these deeper currents did exhibit the same tendency toward low speeds. There was much less directional scatter in the data.

In summary, there is a very active flow in the upper water column that acts in direct response to the prevailing wind. The flow in the deeper layer is weak, with some limited tidal influence.

3.4 Waves

3.4.1 Prevailing Waves

The wave climate in Hawaii is typically characterized by four general wave types. These include northeast tradewind waves, southern swell, North Pacific swell, and Kona wind waves. Tropical storms and hurricanes also generate waves that can approach the islands from virtually any direction. Unlike winds, any and all of these wave conditions may occur at the same time.

Tradewind waves occur throughout the year and are the most persistent April through September when they usually dominate the local wave climate. Tradewind deepwater waves are typically between 3 to 8 feet high with periods of 5 to 10 seconds. The direction of approach varies between north-northeast and east-southeast and is centered on the east-northeast direction. The project site at Maalaea is on the leeward side of Maui, and is sheltered from tradewind waves.

Southern swell is generated by storms in the southern hemisphere and is most prevalent during the summer months of April through September. Traveling long distances of up to 5,000 miles, these waves arrive with relatively low deepwater wave heights of 1 to 4 feet and periods of 14 to 20 seconds. Southern swells approach islands between the southeasterly and southwesterly directions. While the island of Kahoolawe shelters the Maalaea area from southwesterly approaching waves, the project site is generally exposed to swell from the southerly direction.

During the winter months strong storms generate large North Pacific swells that range in direction from west-northwest to northeast and arrive at the northern Hawaiian shores with little attenuation of wave energy. These are the waves that have made surfing beaches on the north shores of Oahu and Maui famous. Deepwater wave heights often reach 15 feet and in extreme cases can reach 30 feet. Periods vary between 12 and 20 seconds, depending on the location of the storm. The project site at Maalaea is sheltered from north swell by the island of Maui.

Kona storm waves also directly approach the project site; however these waves are fairly infrequent, occurring only about 10 percent of the time during a typical year. Kona waves typically range in period from 6 to 10 seconds with heights of 5 to 10 feet, and approach from the southwest.

Severe tropical storms and hurricanes have approached the Hawaiian Islands in the past. Most of these storms passed well far from the islands, or weakened in intensity as they reached Hawaii, but there have been notable exceptions. Recent hurricanes impacting the Hawaiian Islands include Hurricane Iwa in 1982 and Hurricane Iniki in 1992. Iniki directly hit the island of Kauai and resulted in large waves along the southern shores of all the Hawaiian islands.

3.4.2 Prevailing Deepwater Wave Climate

The Maalaea project site faces southeast and is affected by south swell during the summer months and Kona storm waves in the winter and spring. Kahoolawe, Lanai, and East and West Maui produce sheltering effects that limit the approach direction of waves that can affect Maalaea.

Wave information is available in the form of hindcast data sets provided by the U.S. Army Corps of Engineers' Wave Information Studies (WIS). WIS results are generated by numerical simulation of past wind and wave conditions. WIS information produces records of wave conditions based on historical wind and wave conditions at numerous stations around the Hawaiian Islands. These hourly records of wave conditions are available for the years 1981 through 2004.

WIS Station 114, located 65 miles southwest of the project site, was chosen as being representative, since it was exposed to the same waves that would affect Maalaea. The wave height and wave period distributions for the WIS 114 data set are presented as roses in Figure 3-2 and Figure 3-3. The predominant wave approach at the WIS station is swell from the northwest and south-southwest.

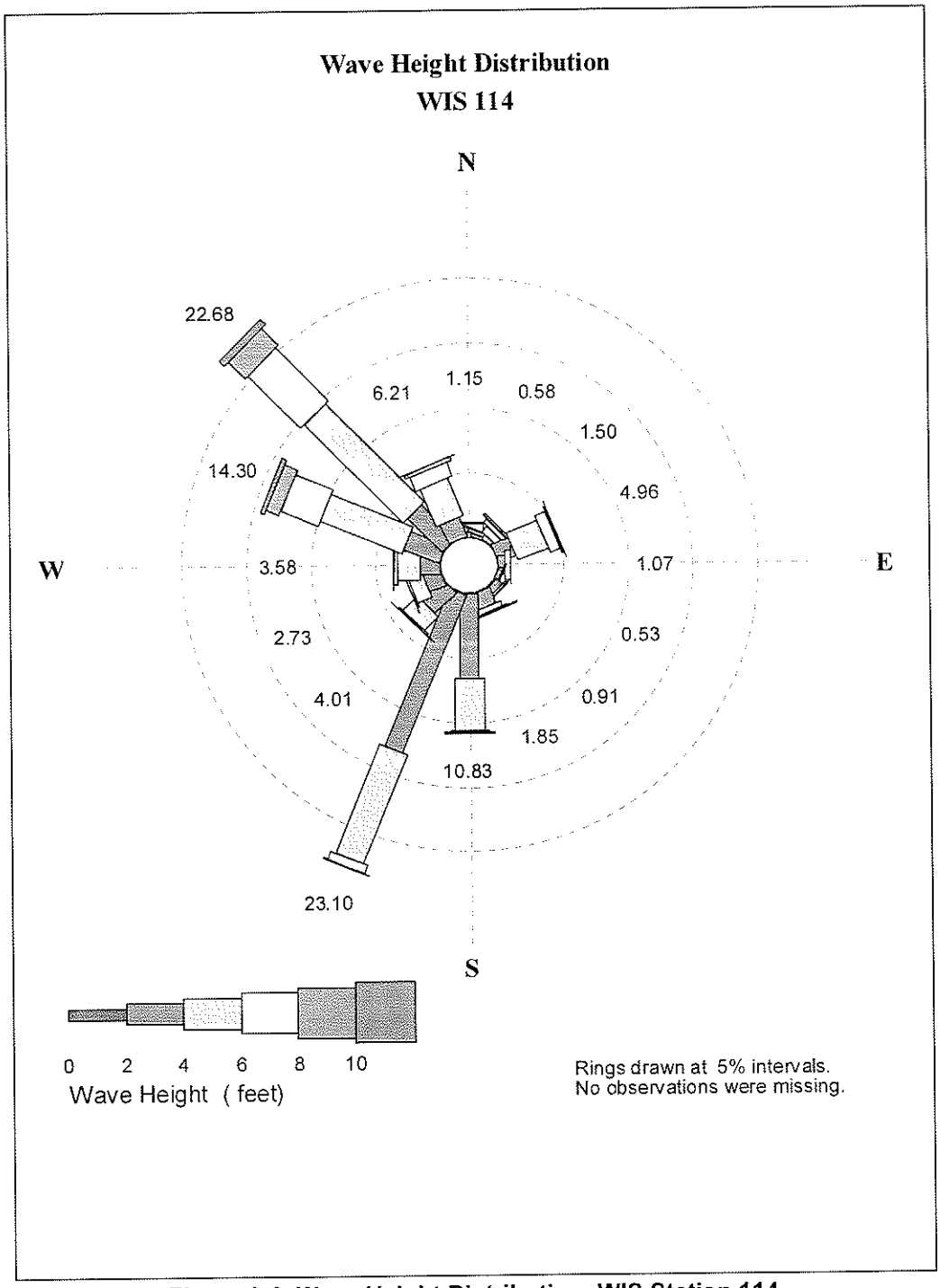


Figure 3-2 Wave Height Distribution: WIS Station 114

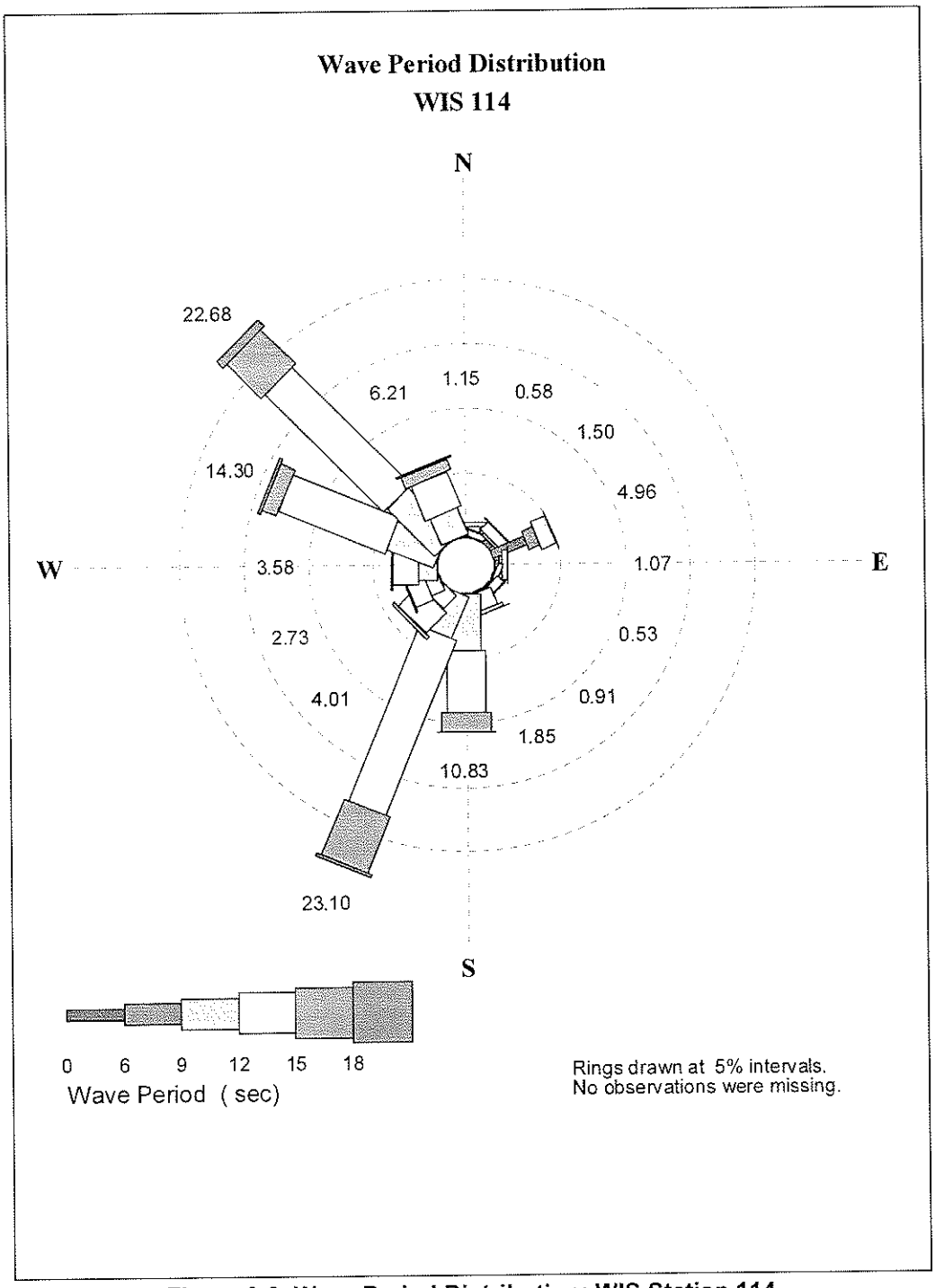


Figure 3-3 Wave Period Distribution: WIS Station 114

4. COASTAL HAZARDS

4.1 Tsunamis

Loomis (1976) presented runup elevations for tsunamis that have affected the Hawaiian Islands. The tsunami runup elevations that were measured near the Maalaea project site are given in Table 4-1. Runup elevations are above mean lower low water. The 1946 and 1957 tsunamis were generated near Alaska, while the 1960 tsunami was generated near Chile. Based on these historical tsunamis, a tsunami of similar size may cause overtopping and inundation along the study shoreline.

Table 4-1 Tsunami Runup Elevation above MLLW at Maalaea

Tsunami	Runup elevation (feet)
1946	9
1957	8
1960	11

4.2 Flooding

Flood Insurance Rate Map (FIRM) by Federal Emergency Management Agency (FEMA) provides flood information at the project site at Maalaea, Maui. Based on the FIRM (revised on September 25, 2009), the shoreline fronting the project site is designated as a special flood hazard area subject to inundation by the 1% probability annual flood. The project shoreline area is categorized as a VE zone with a base flood elevation of 11 feet above the local tide datum (MSL). The VE zone indicates the coastal flood zone with velocity hazard (wave action).

4.3 Extreme Waves and Nearshore Water Levels

4.3.1 Extreme Deepwater Waves

The Hawaiian Islands are annually exposed to high waves generated by storms such as Kona storms and tropical storms including hurricanes, and large swell waves generated by distant north or south Pacific storms. Kona storm waves directly approach the project site. Deepwater wave heights during the severe Kona storm of January 1980 were about 17 feet. These waves had a significant impact on the south and west shores of Maui.

Severe tropical storms and hurricanes obviously have the potential to generate extremely large waves, which in turn could potentially result in large waves at the project site. Recent hurricanes impacting the Hawaiian Islands include Hurricane Iwa in 1982 and Hurricane Iniki in 1992. Iniki directly hit the island of Kauai and resulted in large waves along the southern shores of all the Hawaiian islands.

High wave events considered here include:

- Fifty-year return period wave
- Severe Kona storm wave
- Close approach hurricane generated waves

A refraction analysis completed by Sea Engineering (1994) for 22.5-degree direction bins revealed that, because of the sheltering effects of Kahoolawe, Lanai, Molokai, and West Maui, waves coming from South and SW through WSW produce the most wave energy in the vicinity of Maalaea. Waves from these directional sectors travel in nearly straight paths toward Maalaea Bay.

The WIS deepwater wave data was filtered for waves from these directional sectors. The annual highest waves from the filtered data were obtained and these 24 wave heights ranged from 6.0 feet to 18.9 feet with the corresponding wave periods ranging from 6.5 seconds to 16.5 seconds. Based on the Gumbel analysis, the 50-year wave height of 16.6 feet was determined. Within the 24 years of data, the five largest waves have periods of 7.1 to 12.9 seconds, which appear to be associated with Kona or tropical storms. Thus, the wave period of the 50-year wave can be considered to be about 10 seconds.

The severe Kona storm of January 1980 is commonly considered as a severe Kona storm condition. Hindcasts of the wave conditions by Sea Engineering indicated a deepwater wave height of 17 feet with a 9-second period approaching from 210 degrees, similar to the 50-year wave based on the WIS wave data.

The report *Hurricanes in Hawaii* (Haraguchi, 1984), prepared for the U.S. Army Corps of Engineers, Honolulu Engineer District (HED), presents hypothetical model and worst-case hurricane scenarios for the Hawaiian Islands. These scenario hurricanes have been used for detailed studies of hurricane storm wave inundation limits for the islands of Oahu and Kauai, prepared by Bretschneider and Noda (1985), and Sea Engineering (1986, 1993, and 2000) for the USACE-HED. The model hurricane is defined as the probable hurricane that will strike Hawaii in the future, based on the characteristics of storms previously approaching or striking the islands. The worst-case hurricane characteristics are based on subjective analysis of the data from 20 critical hurricanes in the Central Pacific and understanding of the basic atmospheric and oceanic conditions surrounding the Hawaiian Islands.

Deepwater model hurricane wave parameters off the south shore of Oahu are reported by Bretschneider and Noda (1985). Wave height, period and approach direction for the model hurricane are 31 feet, 12 seconds, 175 degrees.

The extreme deepwater wave conditions are summarized in Table 4-2.

Table 4-2 Selected extreme deepwater wave conditions

Type of Wave	Deepwater Wave Height (feet)	Wave Period (sec.)	Deepwater Direction
50-Year Wave	16.6	10	S, SW&WSW
Kona Storm Wave (1980)	17	9	210
Model Hurricane	31	12	175

4.3.2 Extreme Nearshore Water Levels

During high wave conditions, the nearshore water level may be elevated above the tide level by the action of breaking waves offshore. This water level rise, termed wave setup, is typically 10 to 13% of the breaker height. During hurricane conditions, an additional water level rise can occur due to wind stress and reduced atmospheric pressure. Collectively termed "storm surge," this can potentially add another 1 to 2 feet to the still-water level. For example, during the 1992 passage of Hurricane Iniki over Port Allen Harbor on the island of Kauai, a National Weather Service tide gauge recorded a water level rise of 4.9 feet above the predicted tide elevation.

Storm water level rise at the shoreline is a combination of astronomical tide, wave setup and storm surge. The astronomical tide level for MHHW is 2.3 feet in Maalaea Bay (Table 3-1).

The deepwater wave conditions were entered into the Automated Coastal Engineering System (ACES version 4.03) developed by the U.S. Army Corps of Engineers in order to determine the wave refraction, breaking wave height and its water depth. All waves were assumed to approach from the south, since the project site has the most direct exposure from that direction. The deepwater waves experience approximately 20 degrees of refraction from deep water to breaking. Wave setup for case of the 50-year deepwater wave of 16.6-foot high from the south with a period of 10 seconds is 2.6 feet (Shore Protection Manual, 1984). The total water level rise could be 4.9 feet above MLLW for the 50-year wave conditions. The total still water level rises for three extreme deepwater conditions are summarized in Table 4-3.

Table 4-3 Extreme water level rises at shore

	50-year wave	**Kona Storm**	**Hurricane**
Deepwater Wave Height H_o (ft)	16.6	17.0	31.0
Breaking Wave Height H_b (ft)	20.5	19.8	35.3
Still Water Level Rise			
Astronomical tide (ft)	2.3	2.3	2.3
Storm surge (ft)	0.0	0.0	3.6
Wave setup (ft)	2.6	2.7	5.0
Total SWL rise at shore (ft)	4.9	5.0	10.9

4.3.3 Extreme Nearshore Wave Heights

During storm or large wave conditions, there may be multiple zones of wave breaking. Wave heights are said to be *depth-limited* because once the water depth becomes shallow enough the wave breaks, losing size and energy. The wave, however, may reform before it reaches the shoreline and break again when the depth-limited ratio is attained. The still water level rise during storm events is an important consideration because it allows larger wave heights to reach the shoreline.

The waves reform from the breaker zone toward shore and shoal to a height limited by the water depth. The wave breaker index for shallow reef environments varies from 0.5 to 0.78, where a

value of 0.65 is applied to sites with very gently-sloping nearshore bathymetry such as the Maalaea project site. Considering the water depth near the shoreline is approximately one foot relative to MLLW, the wave heights along the shoreline are 4.2 feet during 50-year and Kona Storm wave conditions, and up to 8.1 feet during the hurricane wave conditions.

5. SHORELINE CHANGES

5.1 Historical Shoreline Changes

Coastal erosion along the shoreline has been evaluated by the University of Hawaii's Coastal Geology Group (CGG). The CGG used historical aerial photographs dating from 1900 to 1997 to compare the shoreline changes. In the study, the shoreline is defined as being located at approximately the mean lower low water level by identifying the beach toe on the aerial photographs (Fletcher al., 2003). The aerial photographs have been ortho-rectified and geo-referenced. The low water marks on the photographs were digitized to provide a record of the historical changes to that representative coastal feature. The section of the erosion map pertaining to the project site is shown in Figure 5-1. The erosion map shows annual erosion rates of 0.6 to 1.6 feet per year along the two parcels at the project site (transects 114-123). The long-term annual erosion rate at the existing drainage outlet site is 0.8 feet shown at transect 119.

These long-term annual erosion rates are mainly based on the shoreline changes between 1900 and the year before the seawalls were built along the shore. After the seawalls were built the shoreline erosion was stopped at the hardened shoreline. Interpretation of the historical shorelines suggests that the seawall construction started between 1949 and 1960 along the shoreline from the project area westward to Maalaea Harbor and the seawall construction was completed before 1975, since the 1960 shoreline was the first to lie along the majority of the present-day seawall locations and by 1975 most of the shoreline segments were along the present-day seawall locations.

Since the shoreline was hardened, shoreline changes appear to be active only along the sandy beach section at the drainage outlet. The sandy beach shoreline is relatively stable during the aerial-photo periods between 1960 and 1997 with small alternating cycles of accretion and erosion.

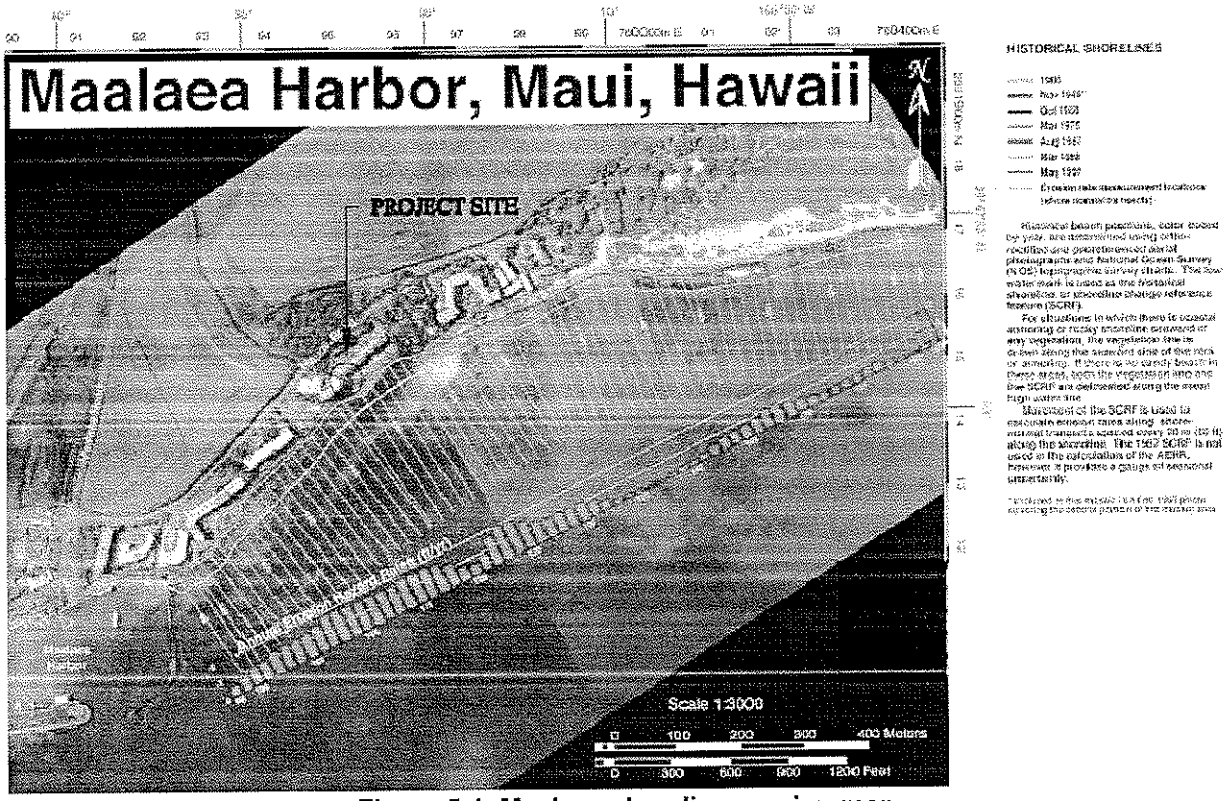


Figure 5-1 Maalaea shoreline erosion map

5.2 Field Study

On November 6, 2009, a coastal field study was conducted at the Hauoli drainage outlet, Maalaea, Maui. During the field study the beach toe location and beach profiles were measured. The vertical datum was based on the elevation of 3.05 feet at the survey point T-50383 (MAG NAIL), which is located in the drainage easement. The survey point information was obtained from the drawing for the Hauoli Street drainage project, dated August 26, 2009. The tidal datum (typically mean sea level or mean lower low water) of survey point T-50383 has not been established.

The fixed survey base points during the field study were established based on previously surveyed locations. During the field study, the reported tide levels were between +0.4 and +1.5 feet above mean lower low water (MLLW) based on the measured tide levels at Kahului Harbor on Maui and Honolulu Harbor on Oahu. The field study results are presented as the existing beach contours and beach toe locations at the study area in Figure 5-2 and Figure 5-3.

Measured beach toe elevations are between -1.5 and -3.3 feet in Figure 5-2. In the area bounded by the beach toe line and the -3-foot contour line, there is a shoal formed from rocks with typical diameters between six inches and one foot.

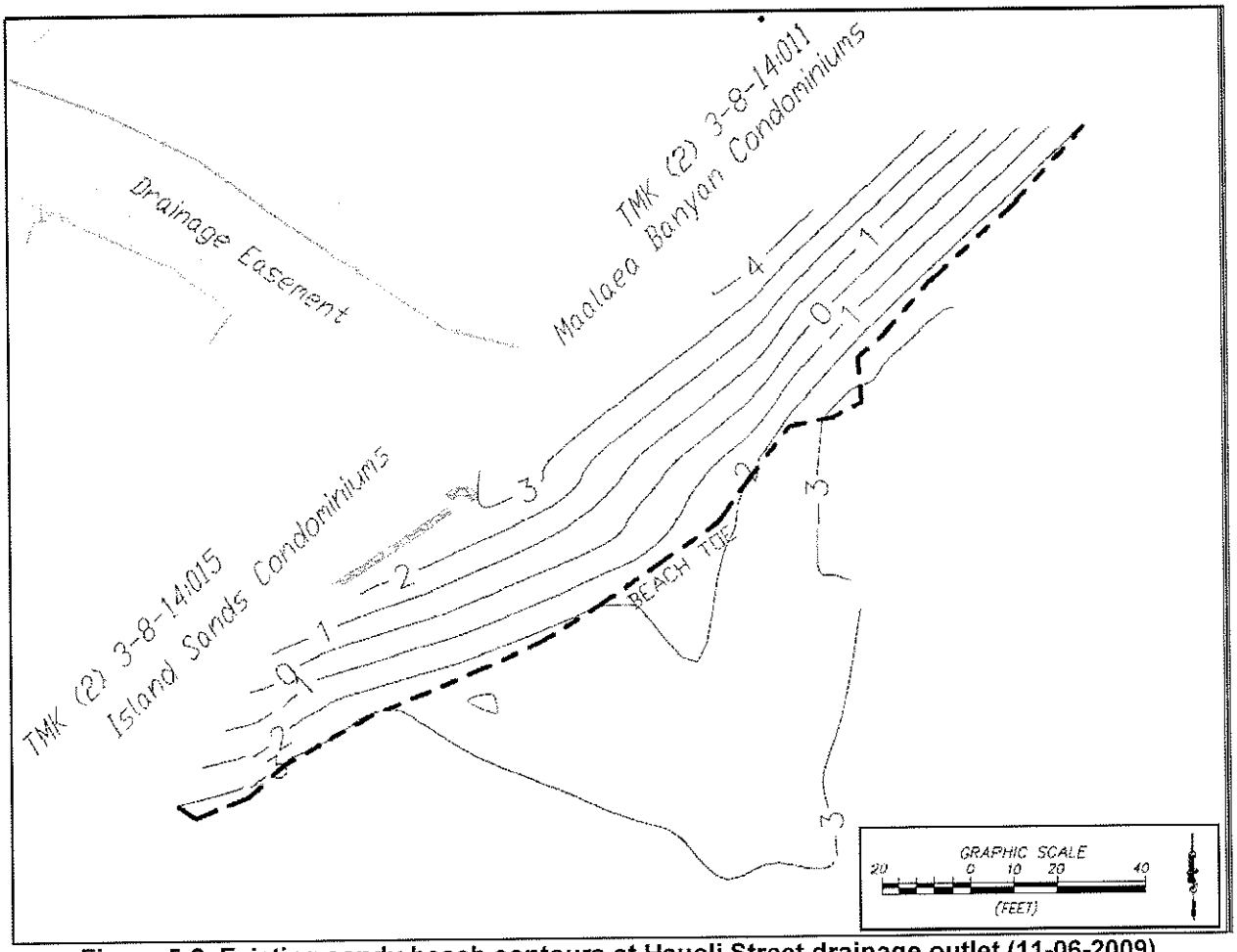


Figure 5-2 Existing sandy beach contours at Hauoli Street drainage outlet (11-06-2009)

5.3 Existing Shoreline Analysis

Much of the shoreline on the west side of the existing drainage outlet is hardened. As a result the shoreline erosion is stopped at the seawalls and the shoreline is defined as being along the shoreline structures. The existing shoreline at the project site was determined based on the sandy beach toe location obtained during the site visit on November 6, 2009. The existing sandy beach length is approximately 240 feet.

The shoreline changes along the sandy beach are determined by comparing the existing shoreline to the 1997 shoreline. As shown on Figure 5-3, the sandy beach shoreline has being relatively stable since 1997 with a minor shoreline recession at the middle section and east side of the sandy beach and some beach widening at the west end of the beach during the past 12-year period.

In summary, the only sand beach in the area is located immediately seaward of the drainage easement. This beach has been relatively stable since 1960. The reason that this beach exists at this location is not well understood, but could be related to local wave refraction at the site and sediment discharge from the drainage. Any changes to the existing drainage characteristics could possibly affect this small beach.

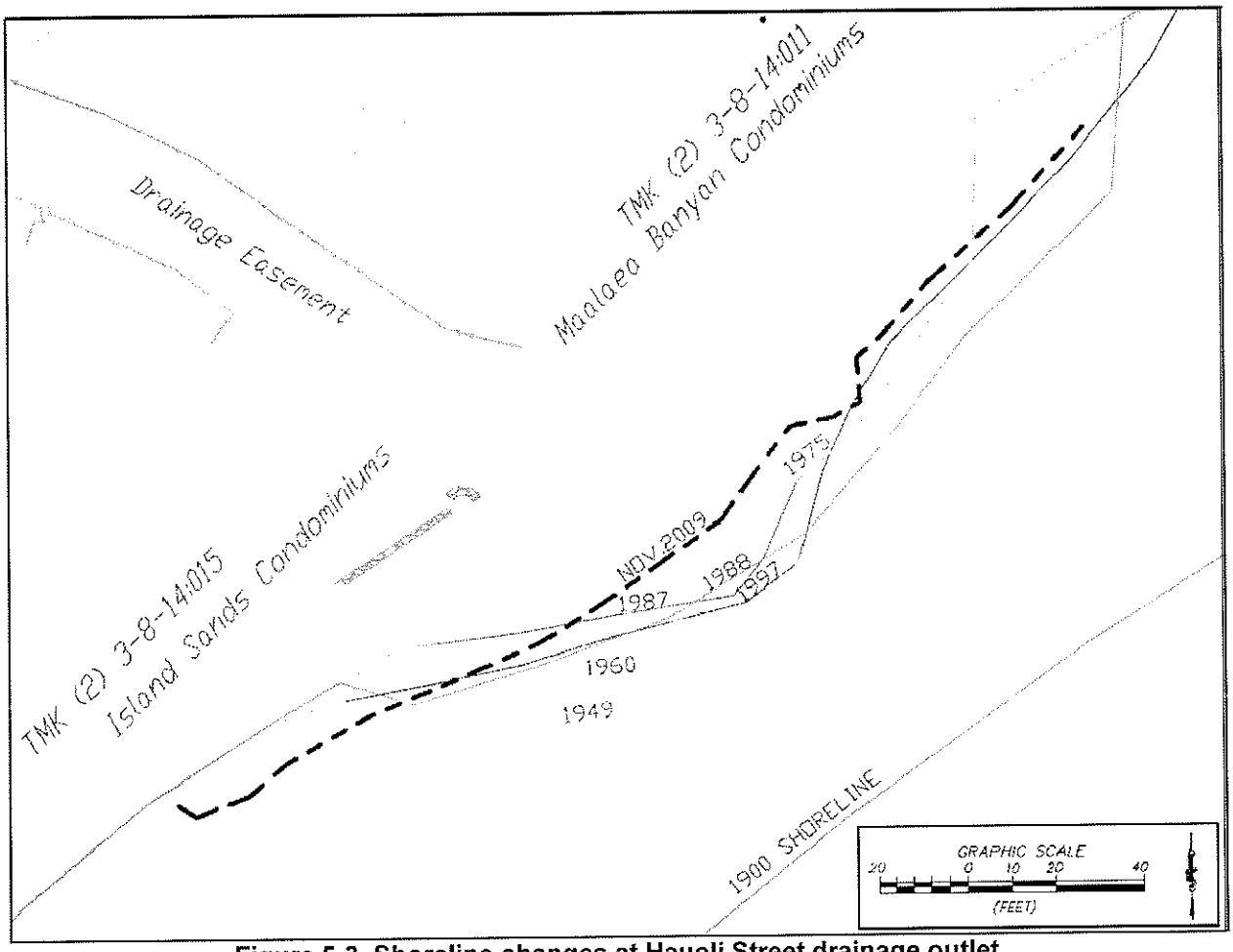


Figure 5-3 Shoreline changes at Hauoli Street drainage outlet

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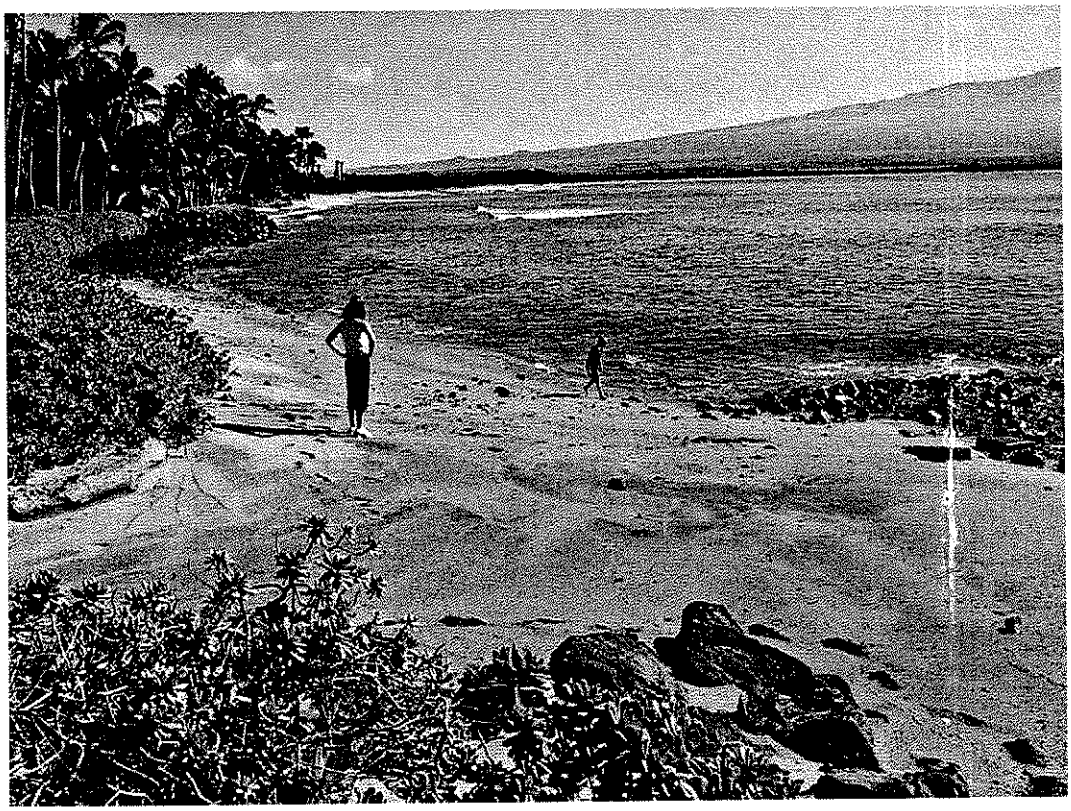
APPENDIX E.

Biological and Water Quality Survey Report

AECOS No. 1177

Biological and water quality surveys in the marine environment fronting a drainage canal in Mā'alaea, Maui



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December 15, 2009

Biological and water quality surveys in the marine environment fronting a drainage canal in Mā'alaea, Maui

December 15, 2009 | ***Draft*** | *AECOS* No. 1177

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Introduction

In October 2009, *AECOS*, Inc. biologists conducted water quality and marine biological surveys of the nearshore marine environment fronting a drainage canal in Mā'alaea, Maui (Fig. 1). The County of Maui, Department of Public Works is planning improvements to an existing drainage system that extends from Hau'oli Street towards the shore between Mā'alaea Harbor and Mā'alaea Beach Park.[1] *AECOS*, Inc. was contracted to ascertain biological resources and assess water quality of the marine environment fronting the proposed project. This report details findings of those surveys.

The proposed project is located 1390 ft (420 m) northeast of Mā'alaea Harbor and approximately 300 ft (91 m) southwest of the Mā'alaea Beach Park along the southern shoreline of the central isthmus of Maui. The Kēalia National Wildlife Refuge is located 1.2 mi (1.9 km) to the east. Plans for the project include:

- Construction of a 100 x 300 ft desilting basin *mauka* (west-northwest) of Hau'oli Street;
- Replacement of the existing trapezoidal, concrete drainage canal with two buried 4 x 8 ft box culverts extending from the desilting basin (beneath Hauoli St.) to the shore.

[1] This document prepared for Munekiyo & Hiraga Associates, Inc will be incorporated into the Environmental Assessment (EA) for the Hauoli Street Drainage Improvement Project and become part of the public record.

Topographic maps (USGS Maalaea Quad., 1996) indicate that the drainage canal serves as the coastal outlet for an unnamed gulch arising at an elevation of 2090 ft (640 m). The typically dry gulch is the northernmost of two gulches that drain the area between Pu'u Hona and the Kealaloloa Ridge in the West Maui mountain. This watershed includes some lands located in the central plain that are currently in agricultural use.

At the project site, a narrow concrete canal, trapezoidal in cross section, extends from Hauoli Street towards the shore. The canal contains a thin layer of terrigenous sediment and some vegetation, mostly grasses growing within the structure. At the terminus of the canal is a small, calcareous sand beach with *naupaka kahakai* (*Scaevola sericea*) growing along the beach (dune) crest. A tidal pool formed in basalt boulders is centered just off the beach. A seawall extends from the sand beach southwest to the harbor, while a small, cobble and boulder beach (*'ili'ili* beach) is located to the northwest. Beyond the boulder beach is a long, sand beach that extends a few miles along the shoreline to the Kīhei area.

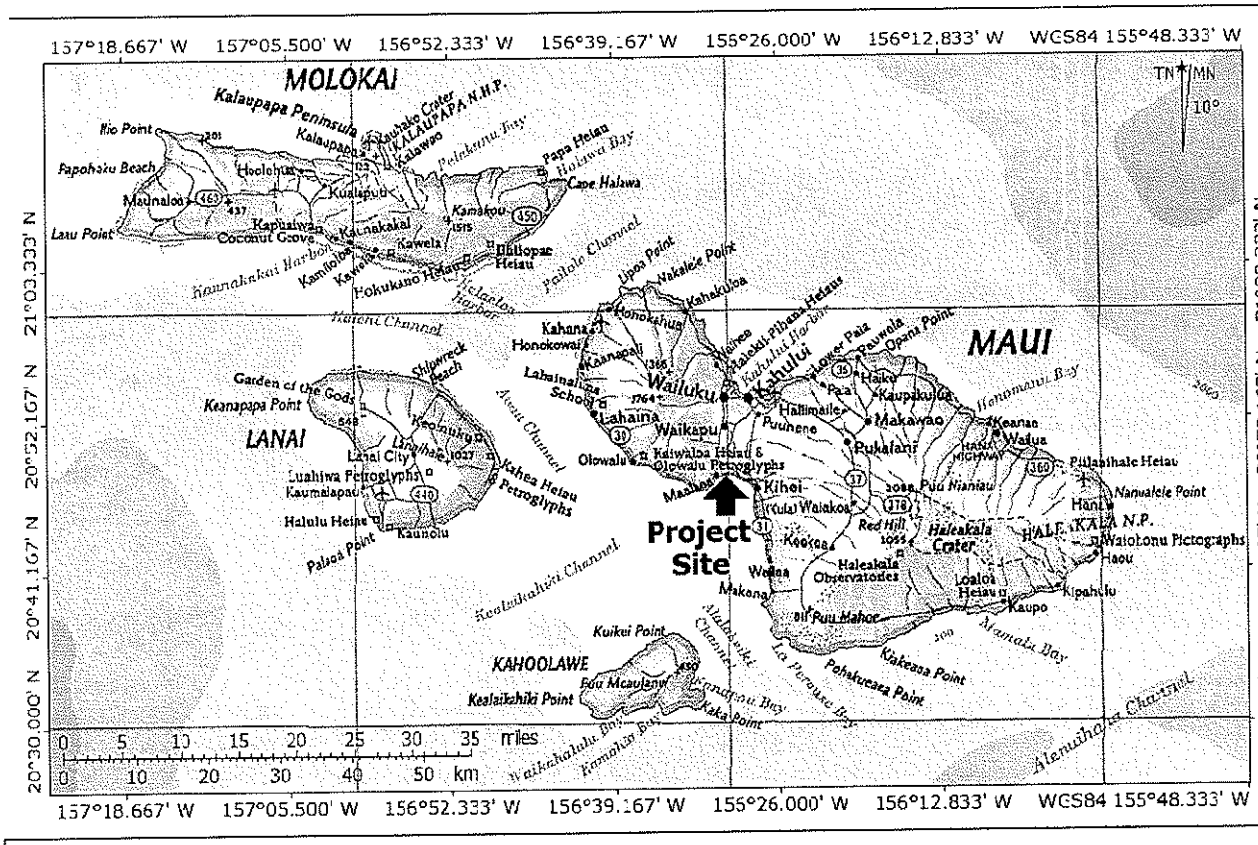

Figure 1. General location of the project site near Ma'alaea, Maui.

Survey Methods

On October 6, 2009, *AECOS*, Inc. biologists surveyed the nearshore marine waters by snorkeling the area and noting the relative abundance of biota encountered. The survey was conducted during an ebbing tide, dropping from a predicted +1.3 ft (+0.4 m) to a low of +0.7 ft (+0.21 m) just before noon (PDC, 2009). Underwater visibility was approximately 10 ft (3 m) with macroalgae fragments suspended in the water column throughout most of the area. Waters within 33 ft (10 m) of the shoreline were turbid with sediment and dense algal mats floating in the water column. The survey area included approximately 7 ac (2.8 ha) of nearshore waters directly seaward of the project site, extending offshore to the 10 ft (3 m) contour. Field measurements of water quality and grab samples were collected in three locations just off the shore. Analytical methods and instrumentation utilized for the analyses are listed in Table 1.

Table 1. Analytical methods and instruments used for October 6, 2009 water quality analyses of nearshore marine waters in Mā'alaea Bay.

Analysis	Method	Reference	Instrument
Ammonia	EPA 350 M	Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Dissolved Oxygen	SM 4500-O G	Standard Methods 20th Edition (1998)	YSI Model 85 DO meter
Nitrate + Nitrite	EPA 353.2 Rev 2.0	EPA (1993)	Technicon AutoAnalyzer II
pH	SM 4500 H+	Standard Methods 20th Edition (1998)	Hannah pocket pH meter
Salinity	SM 2520 B	Standard Methods 20th Edition (1998)	AGE Model 2100 bench salinometer
Temperature	thermister calibrated to NBS cert. thermometer SM 2550 B	Standard Methods 20th Edition (1998)	YSI Model 550A DO meter
Total Nitrogen	persulfate digestion/EPA 353.2	Grasshoff et al (1986)/ EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion/EPA 365.1 Rev 2.0	Grasshoff et al. (1986)/EPA (1993)	Technicon AutoAnalyzer II
Total Suspended Solids	Method 2540 D	Standard Methods 20th Edition (1998)	Mettler H31 balance
Turbidity	EPA 180.1 Rev 2.0	EPA (1993)	Hach 2100N Turbidimeter

Table 1 (continued).

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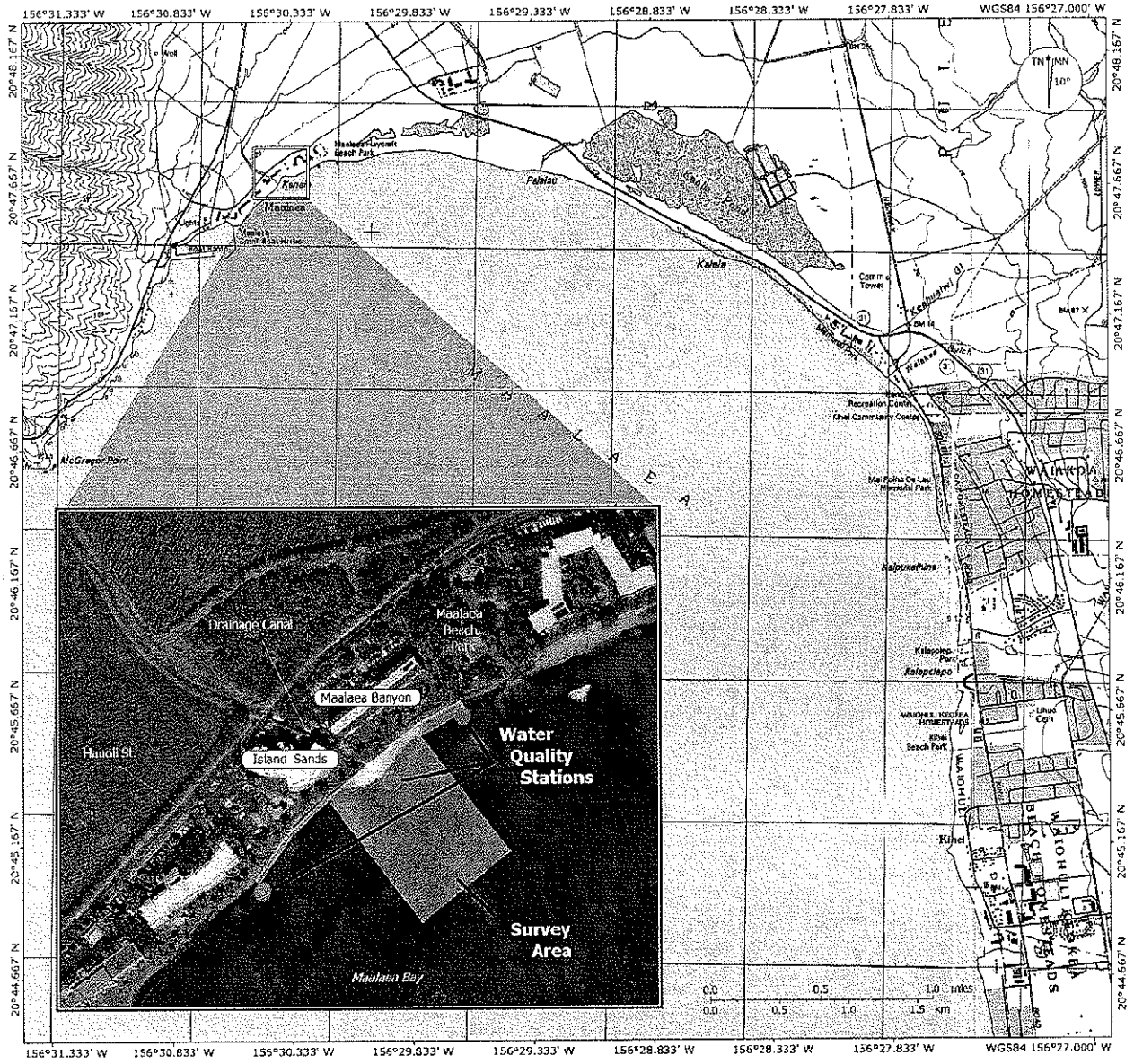

Figure 2. Locations of the biological survey area and water quality sampling stations in Mā'alaea Bay for the October 6, 2009 survey.

Survey Results

Water Quality

Table 2 presents results for all water quality analyses of samples from the nearshore marine waters near the Hauoli St. drainage canal measured or collected on October 6, 2009. Slightly depressed salinity values indicate freshwater inputs at all three stations, despite the absence of surface water runoff exiting from the canal during sampling. Total suspended solids concentrations and turbidity values are generally high, reflecting the turbid nearshore conditions observed during the field visit. Elevated chlorophyll α concentrations reflect the considerable amount of benthic macroalgal fragments in the water column. The abundance of algae is responsible for the high dissolved oxygen (DO) concentrations (saturation values greatly in excess of 100%) measured in the water. Total nitrogen and nitrate-nitrite concentrations are also high for marine waters.

Table 2. Water quality characteristics of marine waters fronting the proposed project site on October 6, 2009.

Station (Sample Time) (hhmm)	Temp. (°C)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (% sat.)	pH --	Salinity (ppt)	TSS (mg/l)
Kealia Side (1151)	27.6	8.17	123	8.12	32.58	37.3
Hauoli Drain (1139)	28.7	8.26	127	8.14	32.86	21.3
Maalaea Side (1208)	27.6	9.92	149	8.15	33.30	17

Station	Turbidity (ntu)	Ammonia (µg N/l)	Nitrate+ Nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)	Chlorophyll (µg /l)
Kealia Side	8.30	<4	347	823	38	2.04
Hauoli Drain	4.44	<4	259	732	33	3.58
Maalaea Side	2.70	8	176	608	25	3.04

Marine Biota

The survey area consists of a small boulder point with a tidal pool, seawalls along the shoreline, and a nearshore rubble field with occasional sand channels that grades into a limestone reef offshore. The boulder and cobble bottom tide pool directly in front of the drainage canal is home to a small assemblage of marine invertebrates typical of intertidal shorelines in the main Hawaiian Islands. Nerite snails (*Nerita picea*), periwinkles (*Littorina pintado*), false *'opihi* (*Siphonaria normalis*) and hermit crabs (Family Diogenidae) are present on boulders in this area. *'Opihi* (*Cellana exarata*) and small sea slugs (*Aplysia parvula*) are present but rare. Some boulders and seawalls nearby, notably to the northeast, are densely covered with the green alga, *Ulva fasciata*. Shallow waters fronting the nearby seawalls have schools of Hawaiian anchovy (*Encrasicholina purpurea*), *āholehole* (*Kuhlia xenura*), and juvenile mullet (*Mugil cephalus*).

The rubble field with sand channels fronting the point contains some consolidated bottom covered with turf and macroalgae, but is mostly comprised of eroded coral fragments. Portunid crabs (including *Thalamita edwardsi*) and pebble crabs (*Liomera supernodosa*) are found hiding beneath the rubble. Crustose coralline algae (*Hydrolithon* spp. and *Peysonnelia rubra*), purse shells (*Isognomon californicum* and *Isognomon perna*), and small sponges (Phylum Porifera) are growing on the bottom side of larger fragments of coral rubble. Sand channels between rubble fields are inhabited by turf tube worms (*Mesochaetopterus sagittarius*) and hermit crabs (Fig. 3).

Near the three-foot (1-m) depth contour, the bottom transitions into a more consolidated limestone reef. In shallower waters algal cover dominates the reef with *Hypnea musciformis, Acanthophora spicifera, Dictyota* spp. and *Ulva* spp. most common. A few urchins are present, with collector urchins (*Tripneustes gratilla*) grazing turf algae and rock boring urchins (*Echinometra mathaei*) found in small burrows in the limestone. *Manini* (*Acanthurus triostegus sandvicensis*), saddle wrasse (*Thalassoma duperrey*), and manybar goatfish (*Parupeneus multifasciatus*) are sighted along this area of algal-covered reef rock.

Further offshore, the limestone bottom is topographically more complex and generally covered with corals and coralline algae (Fig. 4). Rice coral (*Montipora capitata)* and lobe coral are the most common of nine scleratinian coral species identified during the survey. A few large cauliflower corals are present with symbionts like spiny brittle stars (*Ophiocoma erinaceus*), speckled scorpionfish (*Sebastapistes coniorta*), and velvetfish (*Caracanthus typicus*) sheltering among branches. The red pencil urchin (*Heterocentrotus mammillatus*) is occasionally sighted. Many of the coral colonies show evidence of recent fish predation.

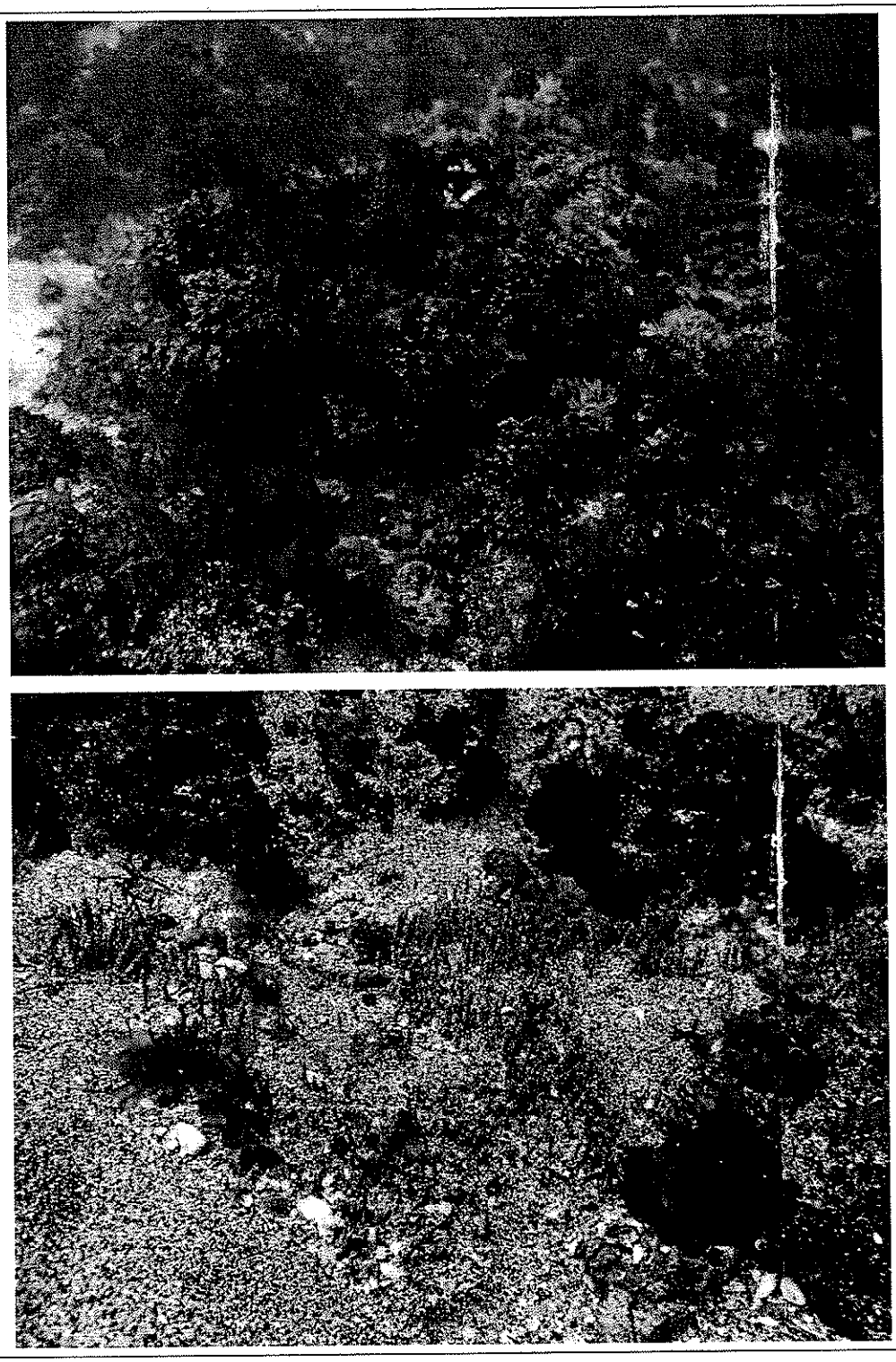

Figure 3. Abundant algal cover (top) and coarse sediments with a turf tube worm species, *Mesochaetopterus sagittarius* (bottom) located at 3-ft (1-m) depth. Note: *Ulva* spp. in the water column.

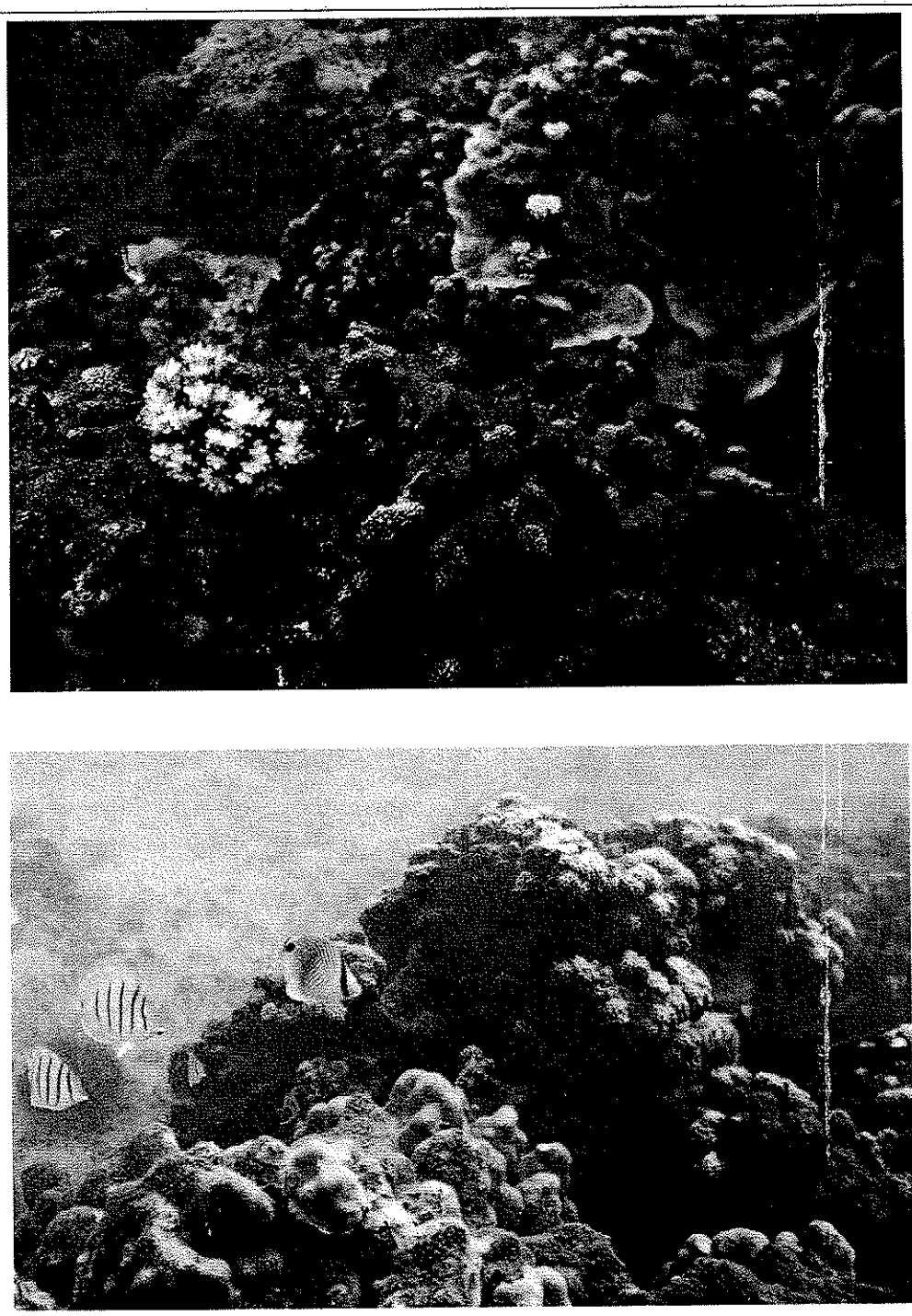

Figure 4. Abundant coral cover (top) and juvenile *manini* and threadfin butterflyfish (*Chaetodon auriga*) swimming near coral colonies (bottom) located near the seaward edge of the survey area. A red pencil urchin is visible as well (bottom, right).

Coral cover ranges from zero to 75% in bottom coverage, and is consistently around 50% near the 6-ft (2-m) depth contour. Fishes commonly encountered near the reef, along the 6- to 8-ft contours, include bright eyed damselfish (*Plectroglyphidodon imparipennis*), Pacific gregory (*Stegastes fasciolatus*), belted wrasse (*Stethojulis balteata*), and *manini.*

Assessment

The nearshore marine waters fronting the drainage canal off Hauoli St. are classified as Class A, Open Coastal Waters (HDOH, 2004). It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters cannot act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class (HDOH, 2004).

Nearby waters appear on the list of impaired waters included in the State of Hawai'i, Water Quality Monitoring and Assessment Report (HDOH, 2006). This listing indicates that the nearshore waters do not meet the Hawai'i Water Quality Standards (Table 3) for a number of parameters. The "Maalaea Beach" station (HI058771) is listed as impaired for turbidity and chlorophyll, while "Maalaea Boat Harbor" (open, coastal station, HI00082) is impaired for turbidity, chlorophyll, total nitrogen, and nitrate-nitrite nitrogen.

Nearshore waters at the project site receive quantities of fresh water through both ground water seepage through porous bedrock and surface discharge of runoff. Water quality at the proposed project site as determined on October 6, 2009 shows turbidity levels and concentrations of total nitrogen, nitrate-nitrite nitrogen, total phosphorus, and chlorophyll elevated with respect to state criteria. A single sampling event is not necessarily representative of nearshore conditions during the season sampled, and compliance with state criteria expressed as geometric mean values (such as turbidity and nutrients) would require computation of a geometric mean based upon a minimum of three samples in a season.

None of the aquatic species observed during *AECOS* surveys is listed as threatened or endangered by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973, as amended, or by the State of Hawaii under its endangered species program (DLNR 1998; USFWS, 2009).

Table 3. State of Hawai'i water quality criteria for Class A, Open Coastal Marine Waters from HAR §11-54-05.2d (HDOH, 2004).

Parameter units	**Turbidity** (NTU)	**Total Nitrogen** (µg N/l)	**Nitrate + Nitrite** (µg N/l)	**Ammonia** (µg N/l)	**Total Phosphorus** (µg P/l)	**Chl. α** (µg/l)
Geometric mean not to exceed given value	0.50*	150.0*	5.0*	3.5*	20.0*	0.30*
	0.20**	110.0**	3.5**	2.0**	16.0**	0.15**
Value not to be exceeded more than 10% of the time	1.25*	250.0*	14.0*	8.5*	40.0*	0.90*
	0.50**	180.0**	10.0**	5.0**	30.0**	0.50**
Value not to be exceeded more than 2% of the time	2.00*	350.0*	25.0*	15.0*	60.0*	1.75*
	1.00**	250.0**	20.0**	9.0**	45.0**	1.00**

- * "Wet" criteria apply when waters receive >3,000,000 g/day/shoreline mile
- **"Dry" criteria apply when waters receive <3,000,000 g/day/shoreline mile
- pH – shall not deviate more than 0.5 units from 8.1, except where freshwater discharge may depress to minimum of 7.0
- Dissolved oxygen – not less than 75% saturation.
- Temperature – shall not vary more than 1 °C from ambient.
- Salinity – shall not vary more than 10 percent

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Appendix A

List of marine species encountered in the nearshore marine waters fronting the Hauoli St. drainage canal on October 6, 2009.

PHYLUM, CLASS, ORDER FAMILY *Genus species*	Common name	Abundance	Status
	ALGAE		
RHODOPHYTA			
Acanthophora pacifica		R	Ind.
Acanthophora spicifera	*limu 'aki'aki*	A	Nat.
Amansia glomerata		O	Ind.
Gracilaria coronipifolia		R	End.
Gracilaria salicornia	gorilla ogo	U	Nat.
Hydrolithon onkodes		O	Ind.
Hydrolithon reinboldii		C	Ind.
Hypnea musciformis	hookweed	C	Nat.
Martensia fragilis		O	Ind.
Peyssonnelia rubra		U	Ind.
Pterocladiella capillacea		O	Ind.
CHLOROPHYTA			
Dictyospaeria cavernosa	bubble algae	R	Ind.
Ulva fasciata	*limu pālahalaha*	A	Ind.
Ulva reticulata		A	Ind.
PHAEOPHTYA			
Dictyota friablis		O	Ind.
Padina australis		O	Ind.
Ralfsia expansa		R	Ind.
Stypopodium flabelliforme		R	Ind.
	INVERTEBRATES		
PORIFERA			
unid.	blue-gray sponge	R	--
MICROCIONIIDAE			
Clathria sp.	vermillion clathria	R	--
CNIDARIA, ANTHOZOA, ZOOANTHINARIA			
ZOOANTHIDAE			
Palythoa caesia	blue-gray zooanthid	R	Ind.
CNIDARIA, ANTHOZOA,SCLERACTINIA			
POCILLOPORIDAE			
Pocillopora damicornis	lace coral	R	Ind.
Pocillopora meandrina	cauliflower coral	O	Ind.

PHYLUM, CLASS, ORDER FAMILY *Genus species*	Common name	Abundance	Status
PORITIDAE			
Porites lobata	lobe coral, *pohaku puna*	C	Ind.
Porites lutea	mound coral	R	Ind.
Porites compressa	finger coral	C	End.
ACROPORIDAE			
Montipora capitata	rice coral	C	Ind.
Montipora flabellata	blue rice coral	R	Ind.
Montipora patula	spreading rice coral	O	Ind.
AGARICIIDAE			
Pavona varians	corrugated coral	R	Ind.
ANNELIDA, POLYCHAETA			
CHAETOPTERIDAE			
Mesochaetopterus sagittarius	turf tube worms	O	Ind.
SERPULIDAE			
Loimia medusa	medusa spaghetti worm	R	Ind.
Spirobranchus giganteus	Christmas-tree worm	R	Ind.
VERMETIDAE			
Serpulorbis variabilis	variable worm snail	R	Ind.
MOLLUSCA, GASTROPODA, PROSOBRANCHIA			
PATELLIDAE			
Cellana exarta	black foot *'opihi*	R	End.
SIPHONARIDAE			
Siphonaria normalis	false 'opihi	O	Ind.
NERITIDAE			
Nerita picea	nerite snail	C	Ind.
LITTORINIDAE			
Littorina pintado	dotted periwinkle	U	Ind.
CERITHIIDAE			
Cerithium zebrum	zebra horn	U	Ind.
THAIDIDAE			
Drupa ricina	spotted drupe	R	Ind.
MOLLUSCA, GASTROPODA, ANASPIDEA			
APLYSIIDAE			
Aplysia parvula	small sea slug	R	Ind.
MOLLUSCA, BIVALVIA			
ISOGNOMIDAE			
Isognomon californicum	black purse shells	U	Ind.
Isognomon perna	brown purse shells	C	Ind.

PHYLUM, CLASS, ORDER FAMILY *Genus species*	Common name	Abundance	Status
ARTHROPODA, CRUSTACEA, DECAPODA			
ALPHEIDAE			
Alpheus deuteropus	petroglyph shrimp	O	Ind.
DIOGENIDAE			
Calcinus seurati	seurat's hermit crab	U	Ind.
PORTUNIDAE			
Thalamita edwardsi	Edward's swimming crab	C	Ind.
XANTHIDAE			
Liomera supernodosa	knotted liomera	R	End.
GRAPSIDAE			
Grapsus tenuicrustatus	thin shelled rock crab *'a'ama*	R	Ind.
ECHINODERMATA, ECHINOIDEA			
DIADEMATIDAE			
Echinothrix calamaris	banded urchin, *wana*	R	Ind.
ECHINOMETRIDAE			
Colobocentrotus atratus	helmet urchin *hā'uke'uke kaupali*	R	Ind.
Echinometra mathaei	rock boring urchin *'ina kea*	C	Ind.
Echinometra oblonga	oblong boring urchin *'ina*	R	Ind.
Heterocentrotus mammillatus	red pencil urchin *hā'uke'uke'ula'ula*	O	Ind.
TOXOPNEUSTIDAE			
Tripneustes gratilla	collector urchin *'hāwa'e po'o hina*	C	Ind.
ECHINODERMATA, OPHIUROIDEA			
OPHIOCOMIDAE			
Ophiocoma erinaceus	spiny brittle star	R	Ind.
ECHINODERMATA, HOLOTHUROIDEA			
HOLOTHURIIDAE			
Holothuria atra	black sea cucumber *loli okuhi kuhi*	R	Ind.

PHYLUM, CLASS, ORDER FAMILY *Genus species*	Common name	Abundance	Status
	FISHES		
ENGRAULIDAE			
Encrasicholina purpurea	Hawaiian anchovy; *nehu*	O	End.
SCORPAENIDAE			
Sebastapistes coniorta	speckled scorpionfish	U	End.
CARACANTHIDAE			
Caracanthus typicus	Hawaiian orbicular velvetfish	R	End.
KUHLIDAE			
Kuhlia xenura	Hawaiian flagtail *āholehole*	O	End.
MUGILIDAE			
Mugil cephalus	striped mullet; *'ama'ama*	O	Ind.
MULLIDAE			
Mulloidichthys flavolineatus	yellowstripe goatfish *weke ā*	U	Ind.
Parupeneus multifasciatus	manybar goatfish *moana*	C	Ind.
CHAETODONTIDAE			
Chaetodon auriga	threadfin butterflyfish *kikākapu*	O	Ind.
Chaetodon lunula	raccoon butterflyfish *kikākapu*	R	Ind.
POMOCENTRIDAE			
Abudefduf abdominalis	Hawaiian sergeant *mamo*	U	Ind.
Dascyllus albisella	Hawaiian dascyllus *'alo'ilo'i*	O	End.
Plectroglyphidodon impairipennis	bright eye damselfish	C	Ind.
Stegastes fasciolatus	Pacific gregory	C	Ind.
LABRIDAE			
Anampses chrysocephalus	psychedelic wrasse	R	End.
Gomphosus varius	bird wrasse *hinālea 'i'iwi*	R	Ind.
Stethojulis balteata	belted wrasse; *'ōmaka*	C	End.
Thalassoma duperrey	saddle wrasse *hinalea lauwili*	C	End.
Thalassoma trilobatum	Christmas wrasse *'āwela*	C	Ind.

PHYLUM, CLASS, ORDER FAMILY *Genus species*	Common name	Abundance	Status
BLENNIDAE			
Blenniella gibbifrons	bullethead rockskipper	R	Ind.
Istiblennius zebra	zebra rockskipper; *pāo'o*	R	End.
GOBIIDAE			
Bathygobius coalitus	whitespotted frill goby *'o'opu ōhune*	R	Ind.
ACANTHURIDAE			
Acanthurus triostegus sandvicensis	convict surgeonfish *manini*	C	End.
Acanthurus nigrofuscus	brown surgeonfish *mā'i'i'i*	U	End.
Naso unicornis	bluespine unicornfish *kala*	O	Ind.
unidentified	juvenile surgeonfish	R	--
BALISTIDAE			
Rhinecanthus rectangulus	reef triggerfish *humuhumu nukunuku apua'a*	R	Ind.
OSTRACIDAE			
Ostracion meleagris	spotted boxfish *moa*	R	End.
TETRADONTIDAE			
Canthigaster jactator	Hawaiian whitespotted toby *o'opu hue*	U	Ind.
Canthigaster amboinesis	ambon toby	U	Ind.

APPENDIX F.

Archaeological Assessment

SCS Project Number 957-4

AN ARCHAEOLOGICAL ASSESSMENT FOR THE PROPOSED HAUOLI STREET DRAINAGE IMPROVEMENTS IN MA`ALAEA, WAIKAPU AHUPUA`A, WAILUKU DISTRICT ISLAND OF MAUI, HAWAI`I

[TMK (2) 3-8-14: pors. 11 and 15; TMK (2) 3-8-05: pors. 03 and 017]

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and
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Revised November 2009

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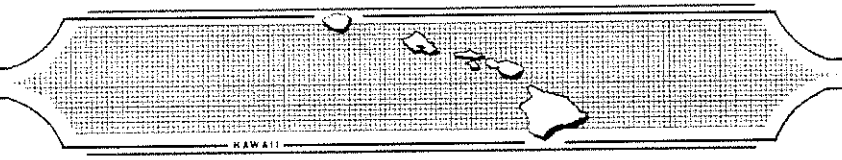
SCIENTIFIC CONSULTANT SERVICES Inc.



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ABSTRACT

At the request of Michael T. Munekiyo, A.I.C.P. of Munekiyo & Hiraga, Inc, for the landowner (A&B Properties), Scientific Consultant Services, Inc. conducted an Archaeological Inventory Survey along the stream bank within Ma`alaea, Waikapu Ahupua`a, Wailuku District, Island of Maui, Hawai`i [TMK (2) 3-8-014: pors. 11 and 15; TMK (2) 3-8-5: pors. 03 and 017]. Work was performed. prior to improvements to (1) an existing 11,500 ft^2 (1,050 m^2) drainage channel on the *makai* (oceanside) or southeast side of Hauoli Street and (2) an upgraded ocean outlet on an approximately 30,000 ft^2 detention (desilting) basin to be constructed *mauka* of Hauoli Street.

No archaeological sites were identified during the pedestrian-based Inventory survey. Backhoe trenching was not feasible due to the extremely uneven terrain, which consists of numerous soil berms and thick vegetation; pieces of large trash (sofa beds, bicycles, etc.) were present; additionally, cut and stockpiled *kiawe* logs prevented access by a backhoe. As such, the current report is being written as an Archaeological Assessment. While the current project yielded negative results, sandy substrate was documented within the *makai* portion of the drainage channel of the project parcel. Sandy substrates have been a high probability of yielding human burials; such matrixes were a common place of during traditional times. Given this fact, it remains possible that subsurface archaeological sites, such as burials and habitation deposits, occur within the project area. Archaeological Monitoring is, thus, recommended as a precautionary measure during all construction related ground altering activities. Should significant historic properties be identified during Monitoring, development will be halted and the completion of an Inventory Survey will be required prior to the resumption of development

TABLE OF CONTENTS

ABSTRACT ii

TABLE OF CONTENTS iii

LIST OF FIGURES iv

INTRODUCTION 1

ENVIRONMENTAL SETTING 4
LOCATION AND LANDFORM 4
Drainage Channel 6
Desilting Basin 7
VEGETATION, SOILS, AND RAINFALL 8
Drainage Channel 9
Desilting Basin 9

TRADITIONAL AND HISTORIC SETTING 11
PRE-CONTACT TO EARLY HISTORIC ERA 11
THE GREAT MĀHELE 12
THE LATE HISTORIC PERIOD AND GROWTH OF THE SUGAR INDUSTRY 13

PREVIOUS ARCHAEOLOGY 14

SETTLEMENT PATTERN 18

EXPECTED FINDINGS 19

METHODOLOGY 20
ARCHIVAL RESEARCH 20
FIELD METHODS 20

RESULTS AND RECOMMENDATIONS 21

REFERENCES 22

APPENDIX A: LAND GRANT AWARDS ..... A

LIST OF FIGURES

Figure 1: USGS Ma`alaea Quadrangle Map Showing Project Area..... 2
Figure 2: Tax Map Key [TMK] Showing Project Area and Land Grants. 3
Figure 3: Ariel Photograph Showing Project Area. 4
Figure 4: Wailuku District Boundaries. 5
Figure 5: Photograph of Drainage Channel from east End. View to West. 6
Figure 6: Photograph of Desilting Basin. View to Southwest. 7
Figure 7: Project Area Soil Type Distribution. (Adapted from Foote, *et al.* 1972: 101.) 8
Figure 8: Photograph Depicting Vegetation and the Drainage Channel. View to West..... 10
Figure 9: Photograph Depicting Vegetation within the Desilting Basin. View to East..... 11
Figure 10: Locations of Selected Previous Archaeological Sites near the Current Project Area. 16

INTRODUCTION

At the request of Michael T. Munekiyo, A.I.C.P., of Munekiyo & Hiraga, Inc., for the landowner (A&B Properties), Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey within Waikapu Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-8-14: pors 11 and 15 and TMK (2) 3-8-5: pors 03 and 17] (Figures 1, 2, and 3). Proposed construction activities involve improvements to an existing drainage channel with an upgraded ocean outlet. The construction project location encompasses two areas. The first involves improvements to an existing 230 lineal feet (70 m) long by approximately 50-feet (15 m) wide (approximately 11,500 ft^2 or 3,505 m^2) concrete-lined drainage channel located on the *makai* (oceanside) or southeast side of Hauoli Street. This drainage channel is located between TMKs 3-8-014: 011 and: 015; these lots are located at the condominiums of Island Sands (150 Hauoli Street) and Ma`alaea Banyans (190 Hauoli Street), respectively. The second area of construction is an approximately 30,000 ft^2 (9,146 m^2) detention (desilting) basin, immediately across from the drainage channel located on the *mauka* (mountainside) or northwest side of Hauoli Street; it is located within portions of TMK (2) 3-8-5: 03 and 017.

After a full pedestrian survey, the current Inventory Survey yielded only negative results. As such, an Archaeological Assessment Report has been produced. Fieldwork was conducted by SCS Archaeologists Allison Chun, B.A., and Ian Bassford, B.A. on May 14 and 15, 2008 and November 9, 2009, respectively, under the supervision of Michael Dega, Ph.D., Principle Investigator.

The Archaeological Assessment Survey was conducted in accordance with the State of Hawaii Department of Land and Natural Resources Historic Preservation Division (SHPD), as outlined in Hawaii Administrative Rules, Title 13, DLNR, Subtitle 13, and State Historic Preservation Rules in order to determine the presence or absence of archaeological sites and features in surface and subsurface contexts through complete systematic survey. The ultimate goals of the survey were to determine the presence or absence of historical sites, to provide adequate recordation and documentation of all historic sites present, to determine the significance of these sites, and to provide recommendations to the SHPD concerning site significance and mitigation prior to improvements on the project area.

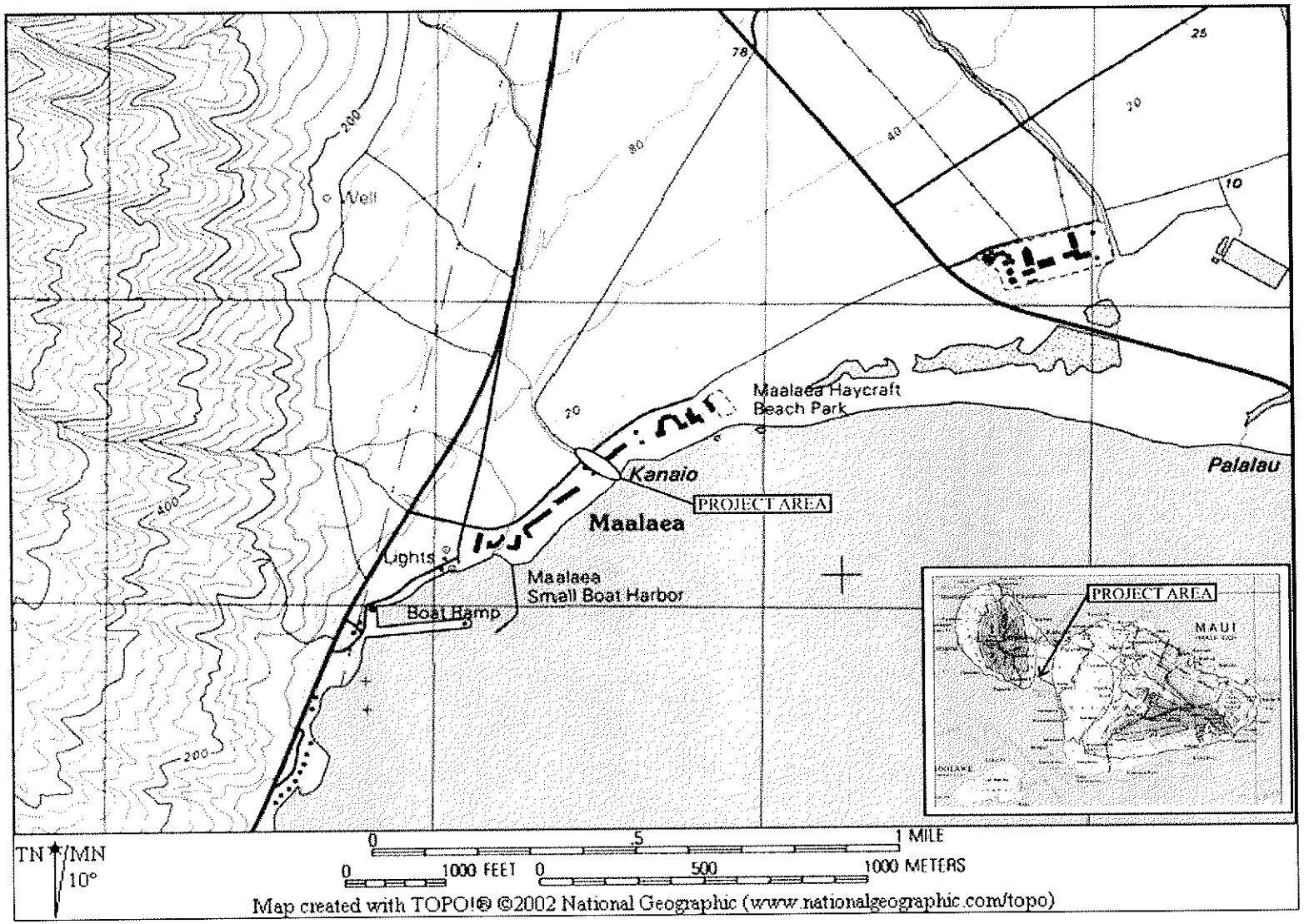

Figure 1: USGS Ma`alaea Quadrangle Map Showing Project Area.

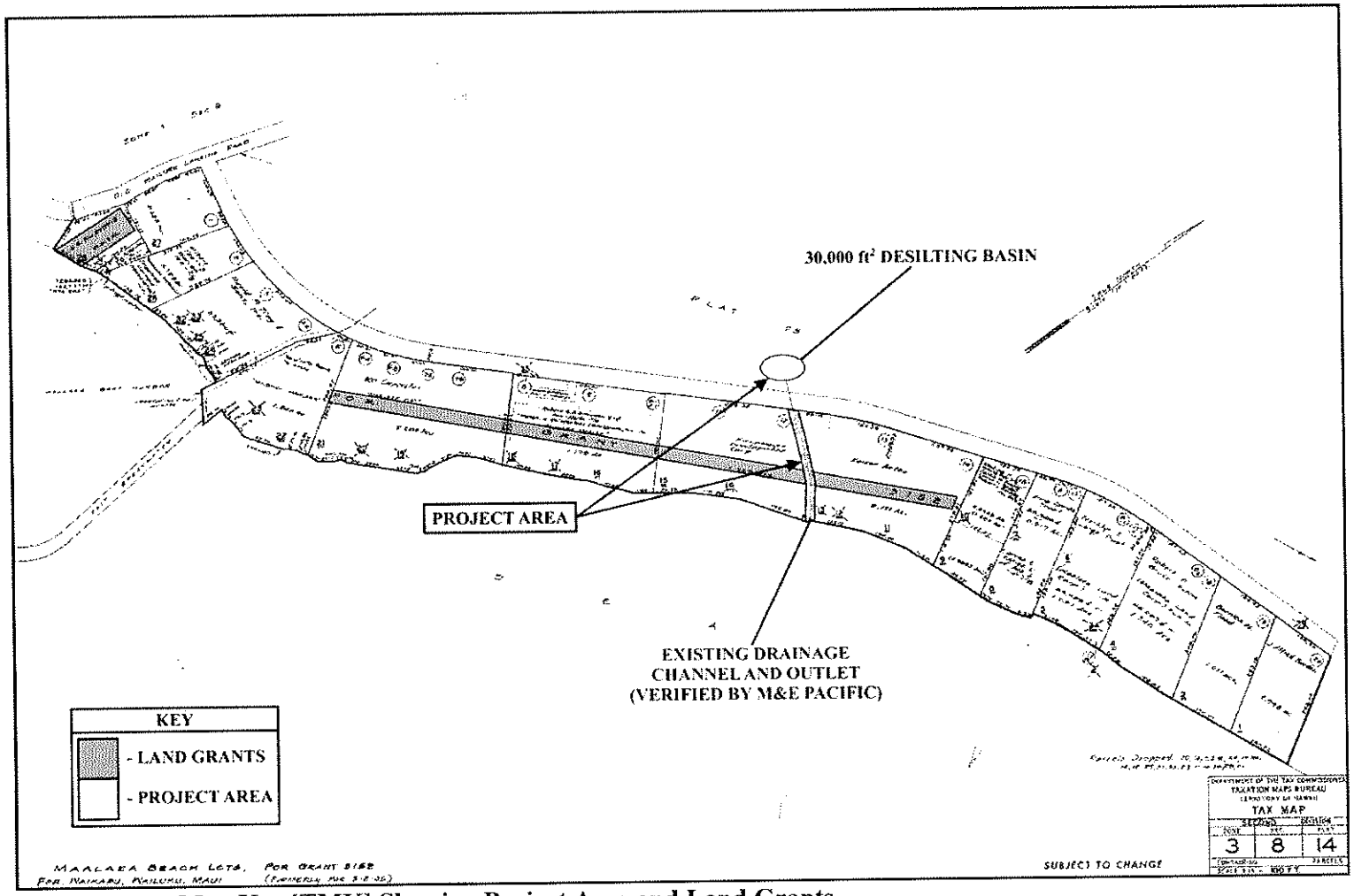

Figure 2: Tax Map Key [TMK] Showing Project Area and Land Grants.

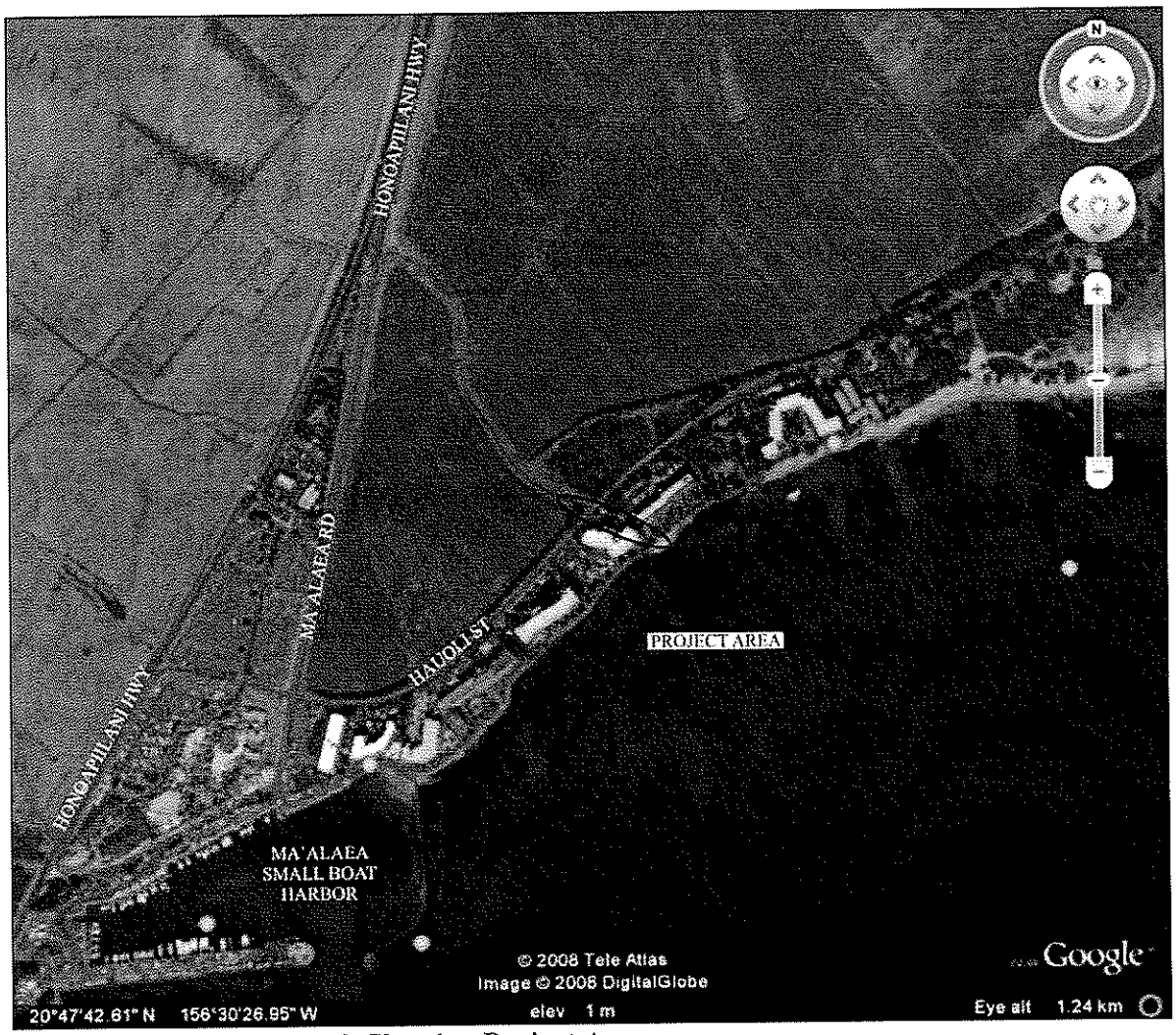

Figure 3: Ariel Photograph Showing Project Area.

ENVIRONMENTAL SETTING

LOCATION AND LANDFORM

Maui, the second largest island within the Hawaiian Island chain, was formed by two shield volcanoes. The West Maui Mountains, the older of the two volcanoes, has been eroded and cut with rift and fracture zones that radiate north to southeast from the caldera. The larger, but younger volcano, Haleakalā in East Maui rises to an elevation of just over 10,000 feet to form Haleakala. One ridge separates Lahaina District from Wailuku District. Maui is known as the "Valley Isle" because of the large fertile isthmus that separates its two volcanoes. The isthmus was formed by relatively recent lava flows and erosion of material from the steep slopes of the volcanoes. It is at the southwest portion of this isthmus that the current project area is located.

Maui's Wailuku District encompasses an area from the eastern half of the West Maui Mountains, north to Kahului Bay, south to Ma`alaea Bay, and includes the entire Kahului Isthmus (Figure 4). Near the southwestern corner of Wailuku District, the boundary separating Ukumehame Ahupua`a and Waikapu Ahupua`a runs from *mauka* to *makai* (roughly west to east). At an elevation of approximately 55 meters (180 feet), the *ahupua`a* boundary sharply angles south toward Ma`alaea Bay. Ma`alaea is situated on the southern coast of the isthmus between East and West Maui.

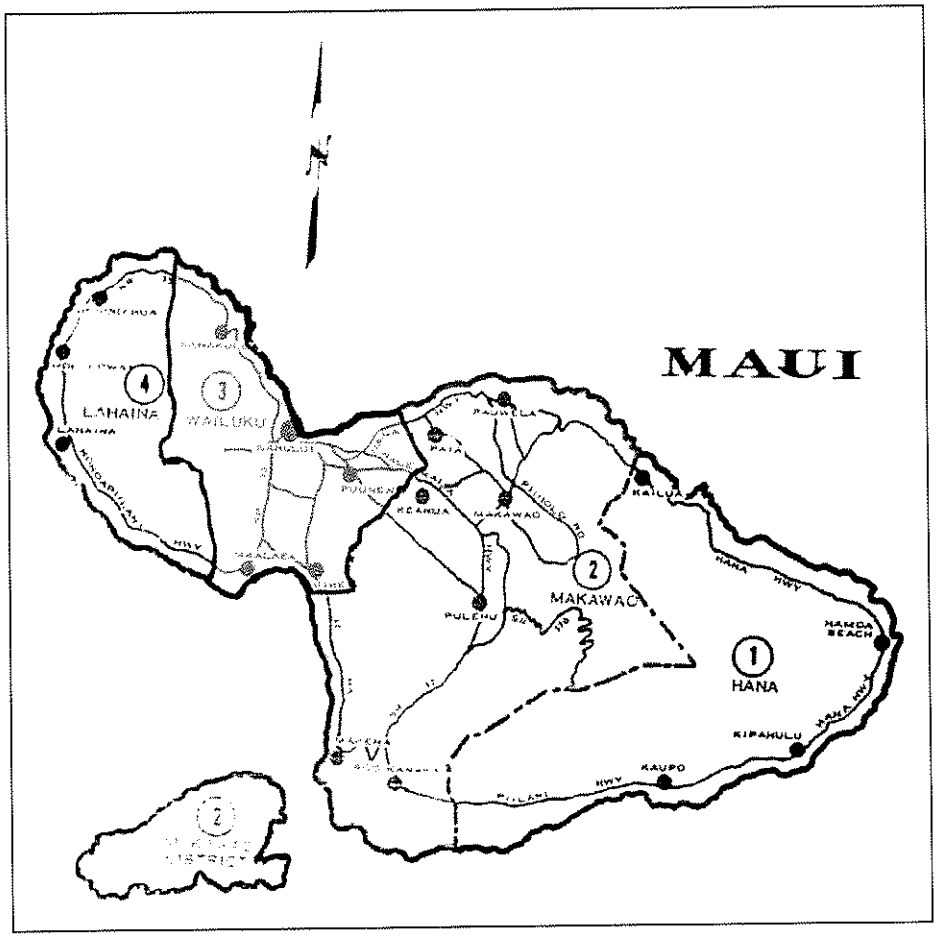

Figure 4: Wailuku District Boundaries.

The proposed construction activities encompass two areas. The first involves improvements to an existing concrete-lined drainage channel located on the *makai* (Oceanside) or southeast side of Hauoli Street. It is approximately 230 lineal feet (70 m) long by 50 ft (15 m) wide totaling to an area of 11,500 ft^2 (3,505 m^2). The other is construction of an approximately 30,000 ft^2 (9,146 m^2) detention (desilting) basin, located on the *mauka* (mountainside) or

northwest side of Hauoli Street, immediately across from the drainage channel on Hauoli Street. The exact location has not yet been determined by the developer. Note that the *mauka* side of the drainage channel goes under Hauoli Street and continues on the *mauka* side of the street as a dirt ditch, approximately 2 m deep and with no concrete lining.

Drainage Channel

In a memorandum from Munekiyo & Hiraga, Inc., measurements for the drainage channel were given as 230 ft (70 m) long by 20 ft (6 m) wide (4,600 ft^2 or 1,402 m^2); the channel is located on the *makai* (oceanside) or southeast portion of the project area (Figure 5). It is entirely concrete-lined and the bottom of the channel is relatively level with this ground surface. The bottom is approximately 1 m long and the sides slope outwards and upwards to a width of approximately 4 m. The channel ends approximately 5.5 m from the sandy beach. The intervening area is mostly flat and consists of bare loamy soil. The sides of the channel continue as soil berms on either side and are vegetated with a variety of domestic and weedy plants (see VEGETATION, SOILS, AND RAINFALL Section below). There is a large flat basalt boulder in the ground at the transition to the sandy beach; no other structures were visible. The channel runs approximately east to west; however, no compass bearings were taken. The ocean outlet is on the east end, the west end is a culvert or pipe which extends westward under Hauoli Street. The drainage channel continues as a dirt ditch on the *mauka* (west side) of the street.

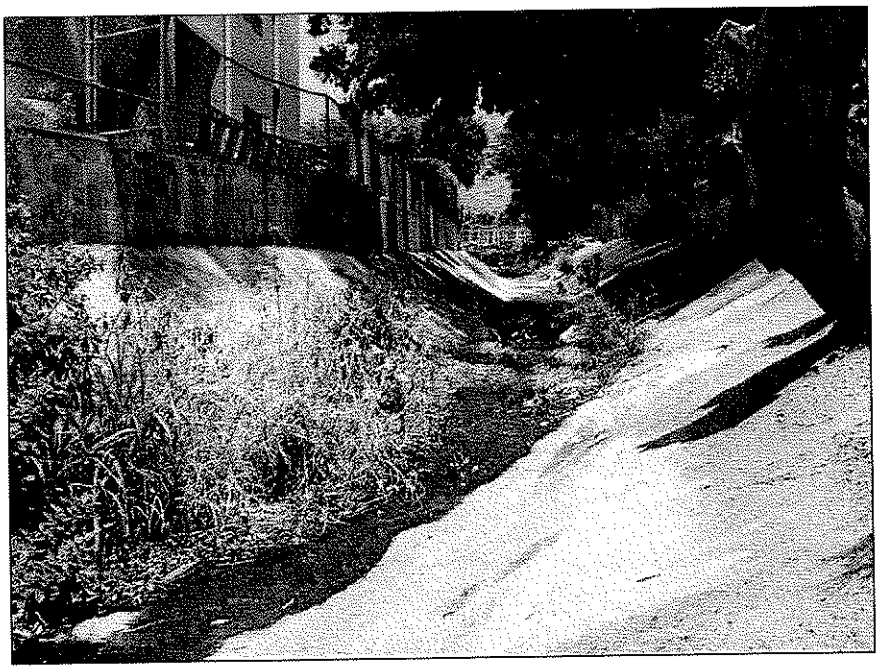

Figure 5: Photograph of Drainage Channel from east End. View to West.

Desilting Basin

The desilting basin, which is located on the *mauka* (mountainside) or northwest side of Hauoli Street, is an area that is extremely varied in topography (Figure 6). The main feature in the area is the dirt drainage ditch that runs approximately east to west from the culvert/pipe under Hauoli Street. A dirt access road (cane road) runs east to west along the south side of the dirt ditch and runs north to south between the cane field and the landscaped area. The ditch, which is not concrete-lined, measures approximately 2 m deep and 1 to 2 m wide. The area is extremely overgrown with giant guinea grass (*Panicum maximum*), bufflegrass (*Cenchrus ciliaris*), and *koa haole* (*Leucaena leucocephala*). There did not appear to be any shoring-up or rock lining or any other structures within the ditch. Soil in the ditch is loamy with many medium to large cobbles.

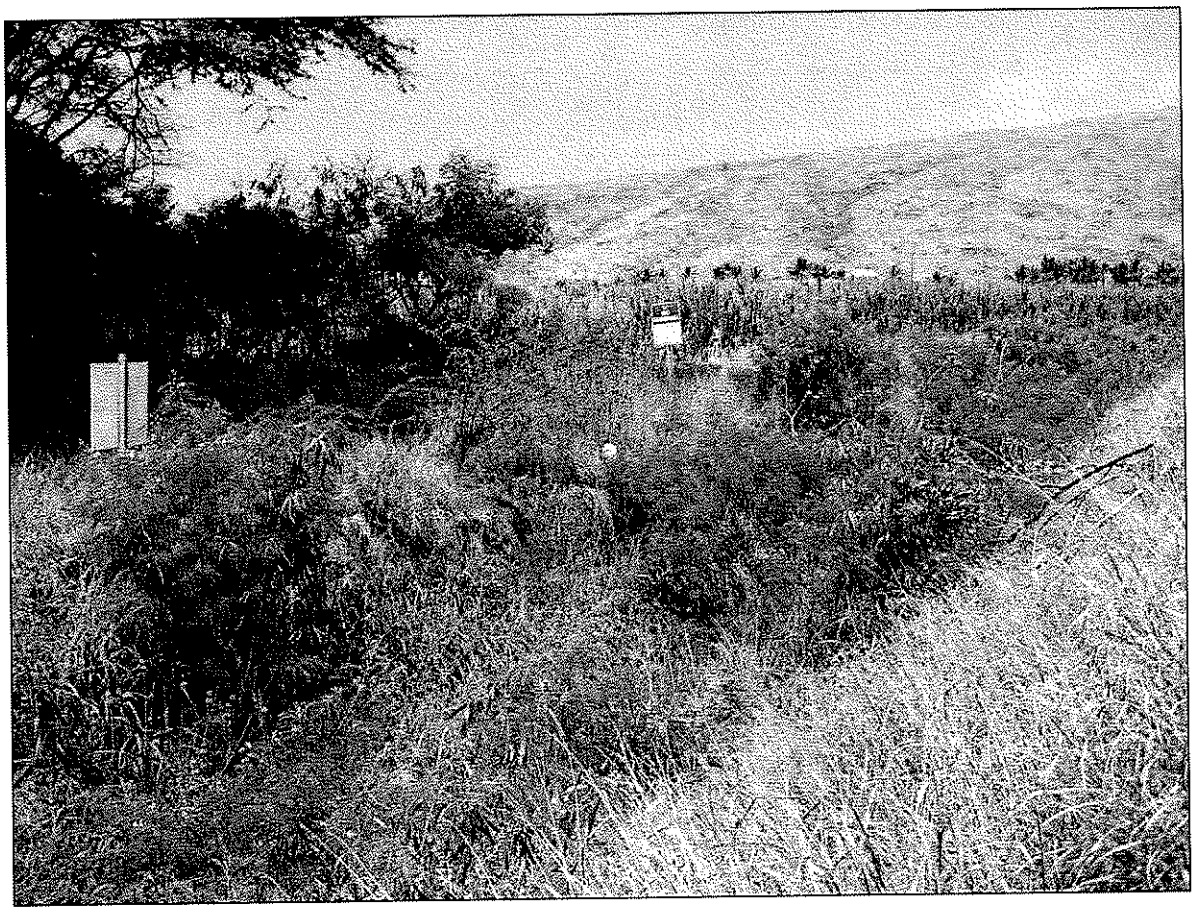

Figure 6: Photograph of Desilting Basin. View to Southwest.

Although the cane road and cane field are mostly flat, the wooded area is extremely uneven with numerous soil bulldozer berms throughout the area and particularly along the side of Hauoli Street. These berms are presumably to prevent unauthorized access to the area from Hauoli Street; Hawaiian Commercial and Sugar (HC&S) has posted a "No Trespassing" sign. The area is also littered with modern trash (old sofa bed and mattress, broken bottles, etc.). Soil throughout the area is a loamy soil typical of cane fields. Again, the topography in this area is very uneven with many bulldozer berms throughout and particularly along the roadside of Hauoli Street. There is also a high soil berm (approx. 1.5 m high) running from east to west along the outskirts of the woodland and parallel to the ditch. This area is also littered with modern trash (bottles, old bicycle, etc.).

VEGETATION, SOILS, AND RAINFALL

As determined by Foote *et al.* (1972), soils in the project area are classified within the Ewa Series, more specifically the Ewa silty Clay (EsB), which occur on slopes between three and seven percent. Foote *et al* (1972: 29–30) describes these soils as "well-drained soils in basins and on alluvial fans of the islands". Typically these soils are nearly level to moderately sloping with an elevation range from near sea level to 150 feet (46 m) (Figure 7). Permeability is moderate and runoff slow within this soil type. In addition, the erosion hazard is slight and "available water capacity is about 1.3 inches per foot in the surface layer and 1.4 inches per food in the subsoil," (*ibid*: 29).

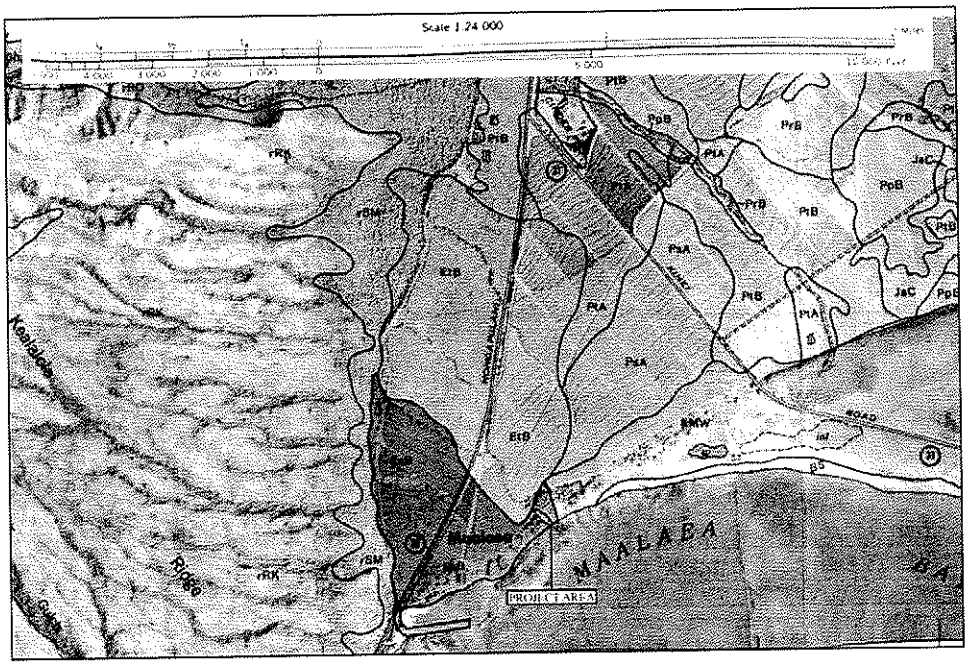

Figure 7: Project Area Soil Type Distribution. (Adapted from Foote, *et al.* 1972: 101.)

Hydrology of the project area is through rainfall. Foote *et al.* (1972) project these types of soil as receiving between 10 and 30 inches of rain annually; this is further supported by Armstrong (1983: 62) with his given projection of annual rainfall ranging between 10 and 15 inches. Rainfall studies of Maui conducted by Giambelluca *et al.* (1986: 19,112–124) reveal that during the winter months, this region of Maui receives most of its rain, with the months of November, through April receiving over 100 mm monthly of rain. The months from May to October receive up to 25 mm of rainfall per month (*ibid*: 19).

Vegetation in the project area and the immediate surrounds consists of mostly introduced, post-Contact species. Described by Armstrong (1983: 70), the project area lies within the "Kiawe and lowland shrubs" zone typical below 1,000 feet (305 m) in altitude. Characteristically, the vegetation in this zone contains *kiawe (Prosopis pallida)*, *koa haole*, finger grass (*Eustachys* spp.), and *pili* grass (*Heteropogon contours*) (*ibid.*).

Drainage Channel

Vegetation along the drainage channel is mostly domestic cultivars and weeds which occur mostly along the tops of the channel on the Ma`alaea Banyans side. These include yellow oleander (*Casabela thevetia*), several varieties of hibiscus (*Hibiscus* spp.), bougainvillea (*Bougainvillea* spp.), Chinese banyan (*Ficus microcarpa*), ironwood (*Casuarina* spp.), *koa haole*, klu (*Acacia farnesiana*), castor bean (*Ricinis communis*), lion's ear (*Leonotis nepetifolia*), abutilon (*Abutilon grandifolium*), bufflegrass, giant guinea grass, and *naupaka* (*Scaevola sericea*), which is found near the beach end on the soil berms (Figure 8).

Desilting Basin

The portion of the basin to the south of the ditch includes both commercial sugar cane (HC&S) as well as a partially landscaped area overgrown by dense *kiawe* woodland (*Prosopis pallida*) (Figure 9). The southwest portion of the basin area is under sugar cane cultivation. The landscaped area is planted with yellow oleander but has been overgrown with more weedy species including *kiawe*, klu, Christmas berry (*Schinus terebinthefolius*), and *koa haole*, with a thick understory of bufflegrass, and giant guinea grass. The area is also choked with other smaller weeds including lion's ear , castor bean, chenopodium (*Chenopodium* spp.), slender mimosa (*Desmanthus virgatus*), partridge pea (*Chamaechrista nictitans*), *maile hohono* (*Ageratum conyzoides*), *`uhaloa* (*Waltheria indica*), and abutilon.

The portion of the basin to the north of the ditch is similarly vegetated by dense *kiawe* woodland with a dense understory of giant guinea grass and bufflegrass. Additionally, there has been a fair amount of kiawe wood cut and roughly stacked throughout the area. Soil again is loamy soil with small to medium cobbles.

Figure 8: Photograph Depicting Vegetation and the Drainage Channel. View to West

Figure 9: Photograph Depicting Vegetation within the Desilting Basin. View to East.

TRADITIONAL AND HISTORIC SETTING

PRE-CONTACT TO EARLY HISTORIC ERA

Wailuku District is frequently mentioned in historical texts and oral tradition as being politically, ceremonially, and geographically important during traditional times (Cordy 1981, 1996; Kirch 1985). Wailuku was considered a "chiefly center" (Sterling 1998:90) with many of the chiefs and much of the area's population residing near or within portions of `Īao Valley and lower Wailuku. The importance of the district is reflected by the relatively large number of *heiau* (place of worship) that were reportedly present in pre-Contact times. Oral tradition accounts surrounding these *heiau* provide examples of how religion tied into political power in the traditional Wailuku setting. Indeed, the period immediately preceding contact with the Europeans was one of considerable upheaval and conflict. Wailuku, meaning 'water of destruction,' succinctly describes the area in the late 1700s (Pukui *et al* 1989: 225). Political power emanating from Moloka`i was an active element during the mid-eighteenth century. The resulting battle at Kalae`ili`ili (A.D. 1765) led to the expulsion of Ke`eaumoku and the Moloka`i

ali`i (chief) and marked the beginning of Kahekili's reign (Kamakau 1992). Kahekili successfully defended his capital in Wailuku throughout the 1770s, until his defeat at the hands of Kamehameha I.

Closer to the current project area, in the southwest corner of Wailuku District, pre-Contact settlement was not as dense as concentrations to the north. Climate had much to do with that trend, as the Ma`alaea area is a more arid environment than the rain-soaked fields to the north. According to Tomonari-Tuggle and Tuggle (1991), the majority of the pre-Contact population was located southwest of the project area, near what is now Ukumehame Beach State Park. Settlement was also probable north of Keālia Pond in Waikapu Ahupua`a. Handy and Handy (1972:496) report that before the historic sugarcane plantations in this region, water from Waikapu Stream "was diverted into lo`i [irrigated terraces] and its overflow was dissipated on the dry plains of the broad isthmus between West and East Maui".

Wailuku District would see drastic change after Captain James Cook's 1778 arrival in Kahului Bay. The reign of Kamehameha I was intertwined with the increasing presence of Europeans within the Hawaiian Islands. By 1821, American missionaries had established a foothold in Lahaina and first arrived in Wailuku a year later. The religion of the Hawaiian people began to wane under the influence of Christianity. Fredericksen and Fredericksen (2002:4) point to a girls' seminary (Central Female Boarding School), established in Wailuku in 1836, as one of the initial steps in the conversion of Hawaiian language and customs in Maui.

THE GREAT MĀHELE

In 1848, commissioners of the Great *Māhele* (Division) instigated an extreme modification to traditional land tenure on all islands that resulted in a division of lands and a system of private ownership. The *Māhele* was based upon the principles of Western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society into that of a market economy (Kuykendall Vol. I 1938:145, footnote 47, *et passim*; Daws 1968:111; Kame`eleihiwa 1992:169–170, 176). The dramatic shift from a redistributive economy to a market economy resulted in drastic changes to land tenure, among other things. As a result, foreigners demanded private ownership of land to ensure their investments (Kuykendall Vol. I, 1938:145, *et passim*; Kame`eleihiwa 1992:178; Kelly 1998:4).

Once lands were made available and private ownership was instituted, native Hawaiians, including the *maka`āinana* (commoners), were able to claim land plots upon which they had

been cultivating and living. Oftentimes, foreigners were simply just given lands by the *ali`i*. However, commoners would often only make claims if they had first been made aware of the foreign procedures (*kuleana* lands, or Land Commission Awards [LCAs]). These claims could not include any previously cultivated or currently fallow land, *okipu*, stream fisheries, or many other natural resources necessary for traditional survival (Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). Awarded parcels were labeled as Land Commission Awards (LCAs). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming house lots in Honolulu, Hilo, and Lāhainā were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16).

During the Māhele, Wailuku District was declared Crown Land and approximately 129 Land Commission Awards were awarded within Waikapu Ahupua`a alone; however, only three of these were claimed within Ma`alaea (Waihona `Aina 2008). A handful of foreigners (*i.e.*, Anthony Catalena, James Louzada, and E. Bailey) gained control of large parcels of lands that would later be used for mass cultivation of sugar. Significantly, the majority of LCAs were awarded to Hawaiians, a gauge that can be used to measure pre-Contact settlement, since there was little overall change in traditional land use among Hawaiians prior to 1853 (Creed 1993:38). One nearby LCA, claim number 2939, is located just west of the current project area. The current project area, however, located within a portion of the Land Grant 3152, which is further discussed below (see Figure 2).

THE LATE HISTORIC PERIOD AND GROWTH OF THE SUGAR INDUSTRY

Another influence that brought change to Maui was foreign commercialism. Two Chinese brothers, Ahung and Atai, of Honolulu's Hungtai Company arrived in Wailuku to explore the possibility of setting up one of its earliest sugar mills in 1828. Atai soon created a plant that processed sugarcane cultivated by Hawaiians, named the Hungtai Sugar Works (Dorrance and Morgan 2000:15–16). Ahung later joined Kamehameha III's sugar producing enterprise; although by 1844, both operations had ceased. The Wailuku Sugar Company was the next to follow, in 1862, and would expand sugar production over the next 126 years of its existence—4,450 acres by 1939, still more than three decades before its maximum production levels.

As it expanded its territory, the Wailuku Sugar Company first appeared on maps just west of the project area in the in the 1920s (Bureau of Conveyances, Grant 9794). Successive grants (Grant 10294 through to Grant S-13975) would follow in decades following and fully encompass

the Ukumehame Ahupua`a, the *ahupua`a* to the west of the project area, in Wailuku Sugar land. Kennedy and Trimble (1992:4) summarize the history of the Waikapu Ahupua`a by detailing its acquisition from the state government on November 18, 1875 by Henry Cornwell (Grant 3152). This Land Grant is described below:

> ...this day, granted and given, absolutely, in Fee Simple unto Henry Cornwell his faithful and loyally disposed subject for the consideration of Fifteen Thousand and Fifty Dollars ($15050.x) paid into the Royal Exchequer paid to the Board of Education, all that piece of Land situated at Waikapu, in the District of Wailuku, in the Island of Maui," (Waihona `Aina website, 2008; also Appendix A).

Cornwell subsequently sold the business to Claus Spreckels, and by the turn of the century, the entire project area was under sugarcane cultivation.

Wailuku Sugar Company ended production in 1988, having averaged over 30,000 tons of sugar produced annually at its pinnacle in the 1970s (Dorrance and Morgan 2000:66). Owner C. Brewer & Company, Ltd. shut down sugar cultivation on the project area, which was then used almost entirely for pineapple cultivation starting no later than 1992 (Kennedy and Trimble 1992:1). The lands were under pineapple for at least the next three years (Tomonari-Tuggle 1995:11)—probably slightly longer—before transitioning to smaller-scale "garden" plots.

PREVIOUS ARCHAEOLOGY

As no other previous archaeology has been conducted within the current project area this section will focus on the nearby important archaeological studies which will lend in drawing a larger picture of the land use and settlement patterns of pre-Contact and post-Contact populations within this region of Maui.

In terms of general projects in the Wailuku-Waikapū environs, the earliest archaeological endeavors on Maui were undertaken by Thrum (1909), Stokes (1918), Emory (1921), and Walker (1931). Although none of their archaeological finds directly pertain to the current project area, their data allows for a deeper understanding of the traditional use of the Wailuku-Waikapū area.

In an area north and inland of the project area, Thrum mentions that two *heiau* may have possibly existed within the *ahupua`a* of Waikapū, but evidence of the two sites no longer remains (1909–1918:59). A group of approximately 45 house and shelter sites (State Sites 50-

50-09-1441, the McGregor Point C-shaped structures, and 50-50-09-1287, the Mā`alaea Complex) was identified by Walker (1931) to the west of Mā`alaea. Chronology for these sites has yet to be determined (Creed 1993). Walker (1931:58) also described a *koa*, or fishing shrine, and two petroglyph fields with an associated *heiau* (State Site numbers 50-50-09-1169 and -1199) at Mā`alaea. The *koa* was not assigned a State Site number, nor has it been relocated.

The harbor area of Ma`alaea has several documented historical archaeological sites within the vicinity including the Lahaina Pali Trail's ending/beginning just *mauka* of the current project area, several habitation sites, a *heiau* and petroglyphs. Several studies on file within the SHPD-Kapolei archives summarize the most relevant previous archaeology within the vicinity of the current project area. Figure 10 illustrates the locations of these studies in relation to the current project area. Examination of the archaeological record helped to form the expected findings.

Kailihiwa *et al.* (2005, as cited in Young 2006) conducted an Inventory Survey in three distinct areas in preparation of proposed Ma`alaea Small Boat Harbor improvements [TMK (2) 3-6-001: portions of 002; 049; 050 and 3-8-014: portions of 027; 028; 030]. During this survey, Pacific Legacy identified previously recorded historic sites within or immediately adjacent to the harbor. SIHP 50-50-09-1440, a pre-Contact Hawaiian site containing two large boulders known as *piko* stone and a large sharpening stone referred to as the "King's Table" or "Adze". These stones collectively have been referred to as "Pohaku `O Ma`alaea"; they have been moved from their original positions and are currently preserved in front of Buzz's Wharf restaurant Site -1604, a Japanese Shrine, known as the "Ma`alaea Ebisu Jinja" was probably constructed in the early twentieth century. Site -3553 and -3554 consisted of human burials (Young 2006).

In addition, the Survey conducted by Kailihiwa *et al* (2005, as cited in Young, 2006) documented one newly identified site, SIHP 50-50-09-5645, historic bridge remnant, which consisted of three features within Area 1: a basalt boulder alignment, which may represent historic roadway cubing; a concrete pad with basalt boulders indeterminate of origin and/or

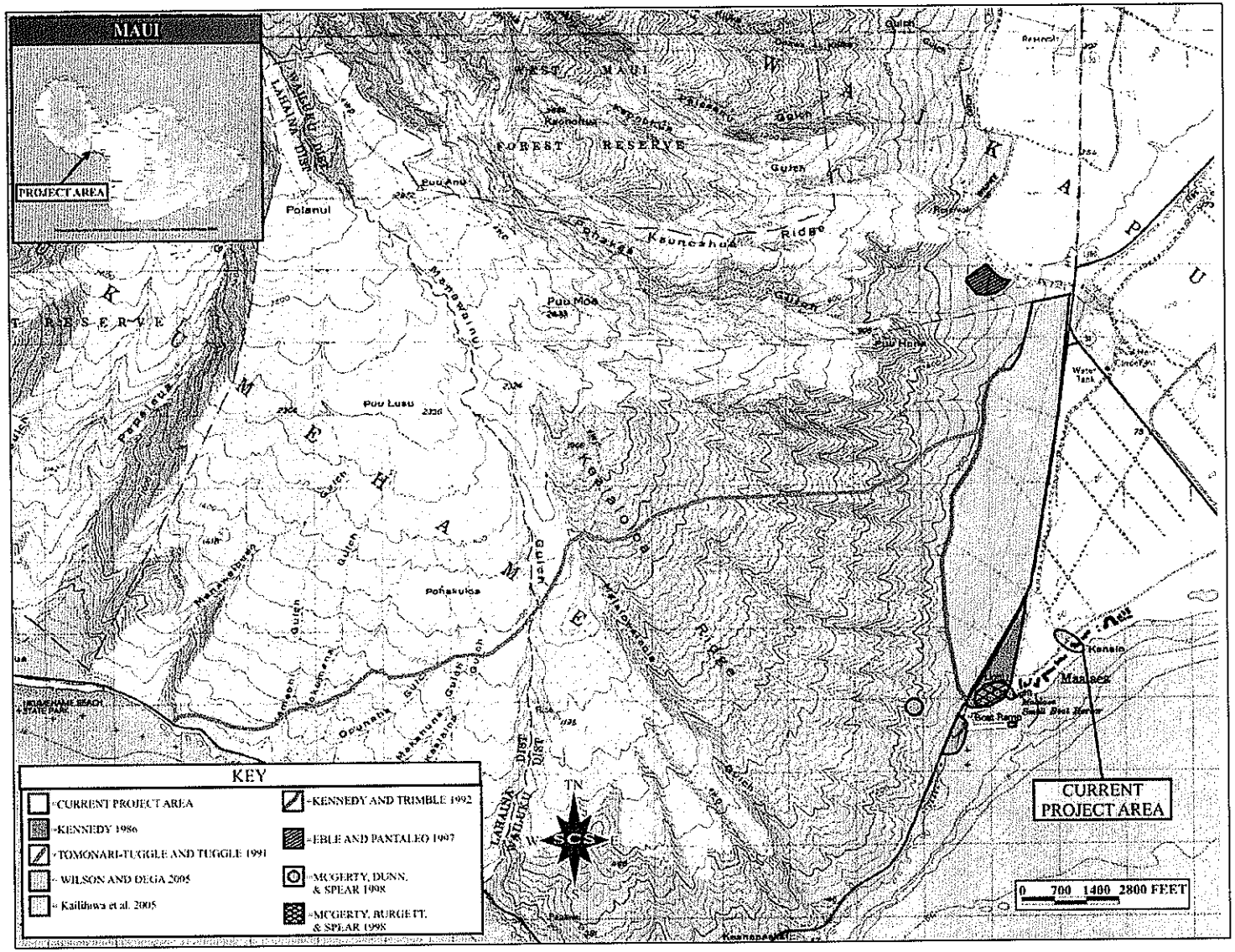

Figure 10: Locations of Selected Previous Archaeological Sites near the Current Project Area.

function; and a modern brass memorial plaque cemented to a boulder. This site was recommended to be preserved.

Wilson and Dega (2005) conducted an Inventory Survey on a 259.903-acre land parcel in Ma`alaea [TMK: (2) 3-6-01:18]. Three historic sites, all related to sugarcane agriculture, were identified and assigned SIHP numbers: Site 50-50-09-5657 (clearing mounds), Site 50-50-09-5658 (irrigation modifications), and Site 50-50-09-5659 (dirt road). The full pedestrian survey revealed that no prehistoric sites existed on the surface of the project area. Subsurface testing, which consisted of 20 backhoe trenches (a volume of approximately 292 cubic meters), did not reveal any subsurface pre-Contact or post-Contact cultural materials. Rather, excavation confirmed the extent, both in physical and temporal depth, of historic and modern agricultural activity within the project area. No burial features or human remains were observed during pedestrian survey or encountered during subsurface testing.

Kennedy and Trimble (1992) surveyed an area that overlaps State Site 50-50-09-5659 (historic dirt road-discussed above in Wilson and Dega, 2005), first recorded in this study. While Kennedy and Trimble also note the lack of archaeological features in their project area due to the obvious history of intense agriculture, their 1992 report does not consider the road upon which their survey takes place to be a potential historic agricultural feature. The project area detailed in their study is no more than five meters wider than the dirt road itself, and concludes that "No artifacts, midden, or structures of historic or prehistoric significance were identified on the subject property" (1992:11).

The Lahaina Pali Trail is five miles long and crosses the southern slopes of the West Maui Mountains between Olowalu and Ma`alaea. The start of this trail, now a demonstration trail as part of the Na Ala Hele Trail System, is located roughly less than a mile northwest of the current project area. By the historic period in which the trail's significance as a probable prehistoric route was realized, the portion *makai* of the current trail head was already destroyed by sugarcane cultivation. A 1991 study by Tomonari-Tuggle and Tuggle documented 18 sites upon the trail, the majority of historic origin.

An earlier Kennedy report (1986) entitled *Letter Report: Walk-Through Examination of the Proposed Maalaea Triangle, Maui (TMK: 3-6-01:1)* also concluded with negative results. This project area is located on the *makai* side of Honoapiilani Highway and extends to the

coastline. This was the first archaeological study performed on that parcel and Kennedy does mention (1986: 2) nearby sites that are detailed in later studies.

Monitoring within a smaller section of the same project area described by Kennedy (1986) resulted in a single site—a previously disturbed historic burial: State Site 50-50-09-4480 (McGerty, Burgett, and Spear 1998). As described in the report, a pearl shell button was found with the burial. The location of Site -4480 is of interest to the current study as its position is approximately 200 m *makai* of the current project area's southern corner. As subsequent subsurface testing would prove, however, the sandy matrix McGerty *et. al* experienced in the Maui Ocean Center monitoring contrasted the reddish clay of the current project area, rendering the likelihood of encountering burials much less. Nonetheless, the McGerty *et. al* (1998) study also mentions two more burials found not far to the north from Site -4480.

McGerty, Dunn, and Spear (1998) conducted Data Recovery in an area of five traditional sites documented by Moore and Kennedy (1995). These sites (50-50-09-3555, -4022, -4137, -4138, -4139) consisted of 28 features, including petroglyphs, subsurface firepits, agricultural terracing, rock mounds, and a C-shape. Testing at Sites -4138 and -4139 did not produce any significant artifacts; however, radiocarbon analysis of a charcoal sample produced a date of A.D. 1390 to 1650. This sample was recovered from the C-shape (Site -4139, Feature C) which was determined to be a pre-Contact temporary habitation. This site is less than 300 m *mauka* of the current project area's southern point.

SETTLEMENT PATTERN

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations eventually settling into drier leeward areas at later periods (Kirch, 1985). Archaeological dates for initial occupation of the Hawaiian Islands far pre-date accepted ranges gathered from palynological data. A more conservative estimate for initial occupation of the islands is the A.D. ninth century (Athens 1997), if one is to lay more credibility with the pollen record than the archaeological record. In the Waihe`e and Waiehu areas of Wailuku, Kirch (1985:87) notes that "a number of coastal dune midden sites have been reported, and at least one of these contained pearl-shell fishhooks similar to those from the Bellows Site, eroding from the wave-cut midden." (The Bellows site, located on the windward coast of O`ahu, has yielded the controversial data of occupation dates from A.D. 300 to 600 [Pearson *et al.* 1971], one of the earliest dated sites in the

Hawaiian Islands. For the most part, these dates have now been diagnosed as problematic and are no longer considered valid.)

More recent research within Wailuku District indicates that Wailuku Ahupua`a was likely settled between A.D. 1100 (Kirch 1985:142) and A.D. 1200 (Fredericksen and Fredericksen 1996), whereas *ahupua`a* to the northeast have produced slightly earlier date ranges and *ahupua`a* to the southwest have later settlement dates. The earliest populations purportedly used local resources and seldom ventured into upland valleys. Cordy (in Creed 1993) suggests, however, that upper valley areas on windward coasts were likely populated before the A.D. 1100s. Coastal settlement was still dominant, but populations began exploiting and living in more upland *kula* (plain, pasture) zones. Population expansion to inland areas did not occur until the A.D. twelfth century but continued through the sixteenth century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands. Upland areas of Maui such as the Waiohuli-Kula area contained large garden enclosures, ceremonial structures, and permanent habitation sites by *c.* A.D. 1600.

Nearer the coast in lands like the current project area (*c.* 0–6 meters above mean sea level [amsl]), *taro* was cultivated along stream courses, dryland *taro* was grown on *kula* lands, and populations settled there as well. In the current parcel, however, no LCA records exist that might link pre-Contact agriculture to historically documented practice.

EXPECTED FINDINGS

Based on all available physiographic, archaeological, and historical evidence, the following expectations guided this study:

- Given the small size of the project area and its geological restriction to the stream bed, limited historic and pre-Contact significant materials including surface features, particularly those pertaining to Historic period sugarcane agriculture and drainage practices, were expected to be identified outside of the previously documented concrete-lined drainage channel.

- A variety of traditional Hawaiian sites have been documented at locations within 500 meters of the project area. The probability of encountering prehistoric archaeological surface features within the project area was considered low.

- The probability of discovery of pre-Contact or post-Contact burials, either marked or unmarked, was considered low. However, burials have been located within the sandy

matrix of the nearby parcels *makai* of Honoapiilani Highway (*i.e.*, during construction activities at the Maui Ocean Center; see McGerty, Burgett, and Spear 1998), and therefore remained a possibility especially when in the *makai* sections of the drainage ditch where sandy substrate has been documented. The lack of burial sites immediately *mauka* of the highway can be attributed to three main factors: (1) the types of soils found here were generally less favored in pre-Contact burial practices, (2) the lands have been subject to continual agricultural activity for nearly a century, and in some cases, longer, and (3) the geology of the current project area is limited to the stream bed, in the case of any remains being present, the stream would wash any remains down and out into the ocean.

METHODOLOGY

In addition to analysis, interpretation, and preparation of this document, the work described in this Archaeological Assessment report consisted of archival research and fieldwork. No laboratory work was necessary. Specifics on all of these research activities are described in detail below.

ARCHIVAL RESEARCH

In addition to referencing available resources at SCS, archival research was conducted at the SHPD library facility (Kapolei, HI) and on the SHPD website before, during, and after the fieldwork described in this report. Archival work consisted of general research on the history and archaeology of the project area, as well as specific searches of previous archaeological studies in and around the subject parcel. Historic land use data, maps, and narrative information were obtained from the Hawaii Bureau of Conveyances as well as the Waihona 'Aina Corporation.

FIELD METHODS

The level of work done by SCS was Inventory Survey. Under the supervision of Michael Dega, Ph.D., SCS archaeologist Allison Chun, Ph.D. performed a pedestrian survey on May 14 and 15, 2008. Chun surveyed the entire 230 lineal feet (70 m) x 50 ft (15 m) wide length of the drainage basin *makai* portion and examined its ocean outlet. The desilting basin area was a bit more problematic as its exact location has not been determined; however, there were surveyors on site with M & E Pacific. These surveyors were conducting topographical work on the subject areas, including an area on the desilting basin area on the *mauka* side of the road which was approximately 100 ft (about 30 m) west of the road and 60 ft (about 18 m) to either side (60 ft to the north and 60 ft to the south) of the dirt drainage ditch which is an extension of the existing drainage channel on the *mauka* side of the road. The total dimensions of this area were 100 ft

(30 m) by 120 ft (6 m) for a total area of about 12,000 ft^2 (3,658 m^2). This area was taken to be an appropriate approximation of the proposed desilting basin and surveyed as per usual.

Backhoe trenching was not feasible due to the extremely uneven terrain, which consists of numerous soil berms and thick vegetation; pieces of large trash (sofa beds, bicycles, etc.) were present; additionally, cut and stockpiled *kiawe* logs prevented access by a backhoe.

RESULTS AND RECOMMENDATIONS

No surface features were observed in any of the areas surveyed. Soil in all areas was loam with small to large cobbles. No cultural material was observed in the soil or in the exposed sides of the ditch that were accessible (it was heavily overgrown). Backhoe trenching was not feasible as the extremely uneven terrain, which consists of numerous soil berms, thick vegetation, and pieces of large trash (sofa beds, bicycles, etc.) were present. In addition, cut and stockpiled *kiawe* logs prevented access by a backhoe. Monitoring for the initial phase of excavation is recommended due to proximity to beach as well as nature of the known sites in the vicinity of the project area. In addition, should the proposed project continue into areas not subject to the current Inventory Survey-level investigations, an acceptable Inventory Survey (or addendum) will need to be conducted prior to any development of the area. Finally, as subsurface testing was not conducted herein, in the event that significant historic properties are identified during Monitoring, development will be halted and the completion of an Inventory Survey will be required prior to the resumption of development.

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APPENDIX A: LAND GRANT AWARDS

Land Grants Documents

Grant Number(LG)	**3152**	Source Book:	**15**
Grantee:	**Cornwell, Henry**	Acreage::	**0** Acs
Ahupua'a	**Waikapu Ahupuaa**	Year	
District:	**Wailuku**	Cancelled	**False**
Island	**Maui**	TMK	
Miscellaneous			

No. 3152, Cornwell, Henry, Waikapu Ahupuaa, District of Wailuku, Island of Maui, Vol. 14 pps. 369-370 [LG Reel 5, 00454-00455]

No. 3152
Royal Patent

~~Kamehameha IV~~ Kalakaua, By the Grace of God, King of the Hawaiian Islands, by this His Royal Patent, makes known unto all men, that he has, for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Henry Cornwell his faithful and loyally disposed subject for the consideration of Fifteen Thousand and Fifty Dollars ($15050.x), ~~paid into the Royal Exchequer~~ paid to the Board of Education, all that piece of Land situated at Waikapu, in the District of Wailuku, in the Island of Maui, and described as follows:

The land known as the Ahupuaa of Waikapu saving and excepting grants hitherto made within the said Ahupuaa by the Government, or sales made by the Board of Education.

Native rights reserved.

[Page 370]

Containing [left blank] Acres, more or less; excepting and reserving to the Hawaiian Government, all mineral or metallic Mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Henry Cornwell, his Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this eighteenth day of November 1875.

Kalakaua R.
By the King
The Minister of the Interior,

William L. Moehonua

[Land Patent Grant No. 3152, Cornwell, Henry, Waikapu Ahupuaa, District of Wailuku, Island of Maui, ?? Acres, 1875]

APPENDIX F-1.

State Historic Preservation Division Approval Letter of Archaeological Assessment

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
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November 16, 2009

Michael F. Dega, Ph.D.
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711 Kapiolani Boulevard, Suite 975
Honolulu, Hawai'i 96813
shpdreply@scshawaii.com

LOG NO: 2009.4360
DOC NO: 0911PC26
Archaeology

SUBJECT: **Chapter 6E-42 Historic Preservation Review – REVISED**
Archaeological Assessment for the Proposed Hauoli Street Drainage Improvements
Waikapu Ahupua'a, Wailuku District, Island of Maui
TMK: (2) 3-8-005:003 por. and 017 por.; (2) 3-8-014: 011 por. and 015 por.

Thank you for the opportunity to again review this revised report, which our staff received in PDF format on November 12 (Cordle and Dega 2009): *An Archaeological Assessment for the Proposed Hauoli Street Drainage Improvements*...Scientific Consultant Services, Inc. Although an earlier revised version of the report was accepted on August 26 of 2008 (SHPD LOG NO: 2008.3836; DOC NO: 0808PC40), the most recent version was proactively revised to include additional field survey to accommodate a change in construction scale for the project.

The report was first reviewed by SHPD staff on August 16 of 2008, resulting in a requested revision regarding the identity of the subject parcel owner (SHPD LOG NO: 2008.2681; DOC NO: 0808PC20). This also allowed us to correct our initial assumption that because of the nature of the project, it was associated with county or state funding. A revised copy of the report was subsequently accepted on August 26 of 2008 (SHPD LOG NO: 2008.3836; DOC NO: 0808PC40), with the most recent version submitted to reflect additional survey work undertaken on November 9 of this year due to a revised (larger) construction footprint for the proposed detention basin. No culturally or historically significant surface architecture or evidence of such subsurface deposits were identified during either phase of field work.

The report contains the required information as specified in HAR §13-276-5 regarding report documentation of inventory level field work resulting in an absence of culturally significant finds in general and is acceptable.

As stated in both previous report review letters, we concur that regardless of a lack of culturally significant finds, precautionary archaeological monitoring is warranted during all future ground altering disturbance within the subject parcels included in all versions of the archaeological assessment report. *Additionally, because exploratory subsurface testing in the form of backhoe trenching or even manual excavation was not conducted for the current project, the identification of any culturally or historically significant find during ground altering disturbance in these areas may require, upon recommendation of*

this office, construction work to be halted and the completion of an inventory survey prior to such work resuming.

We are in receipt of a revised monitoring plan for the project, which will be reviewed under separate cover.

Now that the proactively revised archaeological assessment report has been accepted pursuant to HAR §13-276, please send one hardcopy, clearly marked **FINAL** *(the revised electronic copy does not need to be sent again)* to the attention of "**SHPD Library**" at the Kapolei SHPD office.

Aloha,

Nancy A. McMahon

Nancy McMahon, Deputy SHPO/State Archaeologist
State Historic Preservation Division

c: Jeff Hunt, Director, Dept. of Planning, FAX (808) 270-7634
Maui CRC. Dept. of Planning, 250 S. High Street, Wailuku, Hawai'i 96793

APPENDIX G.

Archaeological Monitoring Plan

SCS Project Number 957AMP-4

ARCHAEOLOGICAL MONITORING PLAN FOR THE PROPOSED HAUOLI STREET DRAINAGE IMPROVEMENTS IN MA`ALAEA, WAIKAPU AHUPUA`A, WAILUKU DISTRICT ISLAND OF MAUI, HAWAI`I

[TMK (2) 3-8-14: pors. 11 and 15; TMK (2) 3-8-05: pors. 03 and 017]

Prepared by:
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Revised November 2009

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SCIENTIFIC CONSULTANT SERVICES Inc.

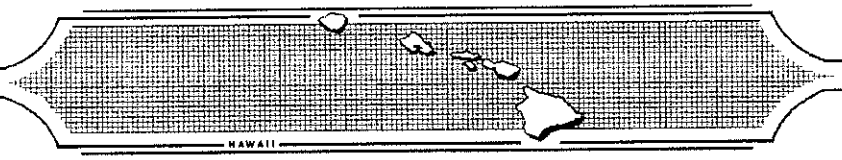

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TABLE OF CONTENTS

TABLE OF CONTENTS ii

LIST OF FIGURES iii

INTRODUCTION 1

ENVIRONMENTAL SETTING 5
LOCATION AND LANDFORM 5
Drainage Channel 6
Desilting Basin 6
VEGETATION, SOILS, AND RAINFALL 8
Drainage Channel 9
Desilting Basin 9

TRADITIONAL AND HISTORIC SETTING 11
PRE-CONTACT TO EARLY HISTORIC ERA 11
THE GREAT MĀHELE 12
THE LATE HISTORIC PERIOD AND GROWTH OF THE SUGAR INDUSTRY 13

PREVIOUS ARCHAEOLOGY 14
CURRENT PROJECT AREA: INVENTORY SURVEY (CORDLE AND DEGA 2008) 18

SETTLEMENT PATTERN 19

EXPECTED FINDINGS 20

MONITORING CONVENTIONS AND METHODOLOGY 20

LABORATORY ANALYSIS 22

CURATION 22

REPORTING 23

REFERENCES 24

APPENDIX A: LAND GRANT AWARDS ..... A

LIST OF FIGURES

Figure 1: USGS Ma`alaea Quadrangle Map Showing Project Area..... 2
Figure 2: Tax Map Key [TMK] Showing Project Area and Land Grants. 3
Figure 3: Ariel Photograph Showing Project Area. 4
Figure 4: Wailuku District Boundaries. 5
Figure 5: Photograph of Drainage Channel from east End. View to West. 7
Figure 6: Photograph of Desilting Basin. View to Southwest. 7
Figure 7: Project Area Soil Type Distribution. (Adapted from Foote, *et al.* 1972: 101.) 8
Figure 8: Photograph Depicting Vegetation and the Drainage Channel. View to West..... 10
Figure 9: Photograph Depicting Vegetation within the Desilting Basin. View to East..... 11
Figure 10: Locations of Selected Previous Archaeological Sites near the Current Project Area. 16

INTRODUCTION

At the request of Michael T. Munekiyo, A.I.C.P., of Munekiyo & Hiraga, Inc., for the landowner (A&B Properties), Scientific Consultant Services, Inc. (SCS) has prepared this Archaeological Monitoring Plan (AMP) for construction work to occur in Waikapu Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-8-14: pors. 11 and 15 and TMK (2) 3-8-5: pors. 03 and 017] (Figures 1, 2, and 3). Proposed construction activities involve improvements to an existing drainage channel with an upgraded ocean outlet. The construction encompasses two areas. The first involves improvements to an existing 230 lineal feet (70 m) long by approximately 50-feet (15 m) wide (approximately 11,500 ft^2 or 3,505 m^2) concrete-lined drainage channel located on the *makai* (oceanside) or southeast side of Hauoli Street. This drainage channel is located between TMKs 3-8-014: 011 and: 015; these lots are located at the condominiums of Island Sands (150 Hauoli Street) and Ma`alaea Banyans (190 Hauoli Street), respectively. The second area of construction is an approximately 30,000 ft^2 (9,146 m^2) detention (desilting) basin, immediately across from the drainage channel, located on the *mauka* (mountainside) or northwest side of Hauoli Street; it is located within portions of TMK (2) 3-8-5: 03 and 017.

SCS conducted Archaeological Inventory Survey of the entire work area in 2008 (Cordle and Dega 2008) with negative results. This report (an Archaeological Assessment due to the absence of culturally significant/historic properties) was accepted by the State Historic Preservation Division (SHPD) in August, 2008 [LOG NO: 2008.3836; DOC NO:0808PC40]. However, given the location of the project area near several known sites, as well as potential for additional sites in the area, SCS recommended Monitoring be conducted during ground altering activity. The SHPD concurred with this recommendation. The SHPD acceptance letter noted above also added that should the proposed project involve an area not surveyed during the current project, an acceptable Inventory Survey of that area will need to be conducted prior to any development-related ground altering disturbance. Additionally, because exploratory subsurface testing in the form of backhoe trenching or even manual excavation was not conducted for the current project, the identification of any culturally significant finds during ground altering disturbance in these areas may require, upon recommendation of the SHPD, development work to be halted and the completion of an Inventory Survey prior to such work resuming.

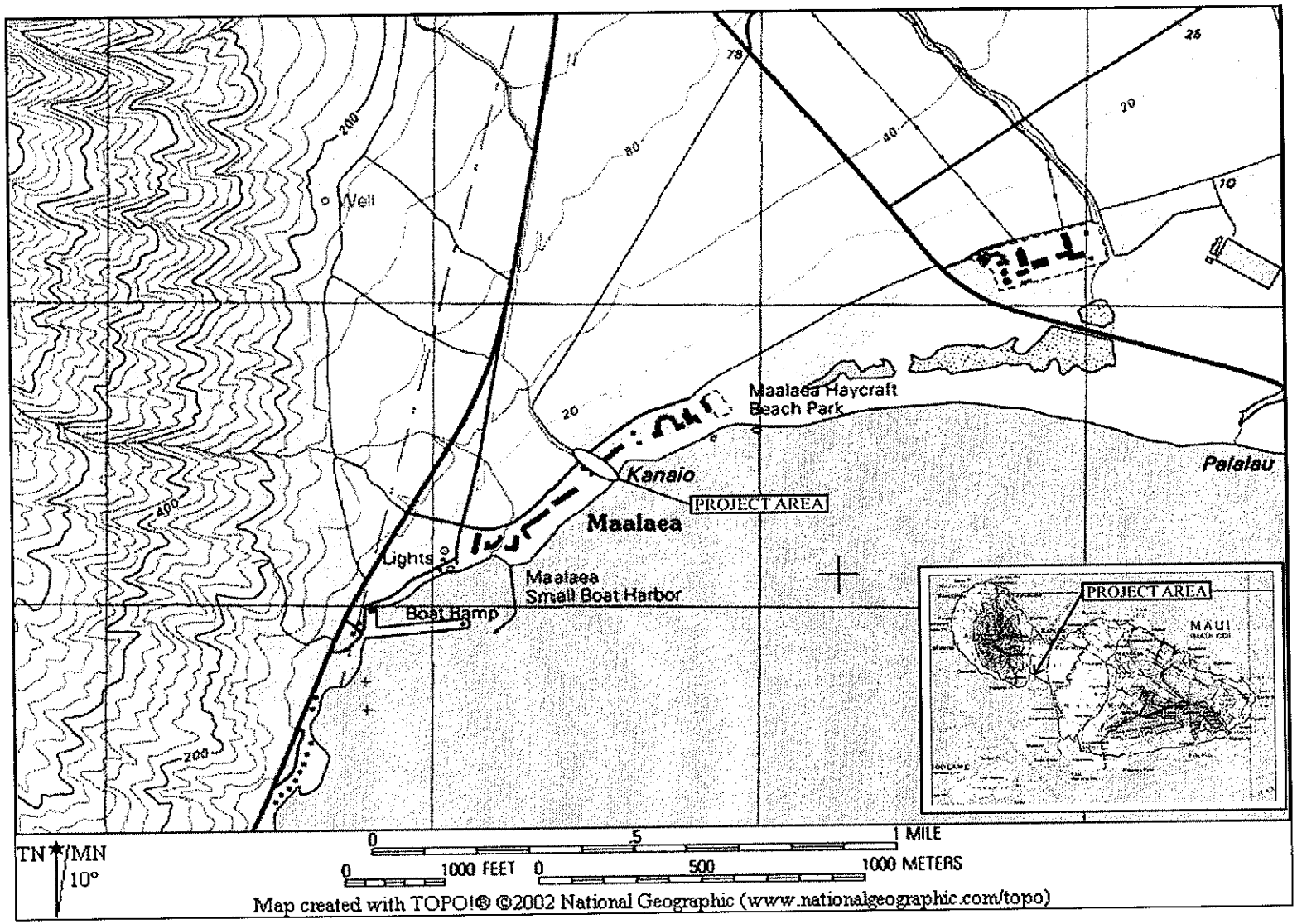

Figure 1: USGS Ma`alaea Quadrangle Map Showing Project Area.

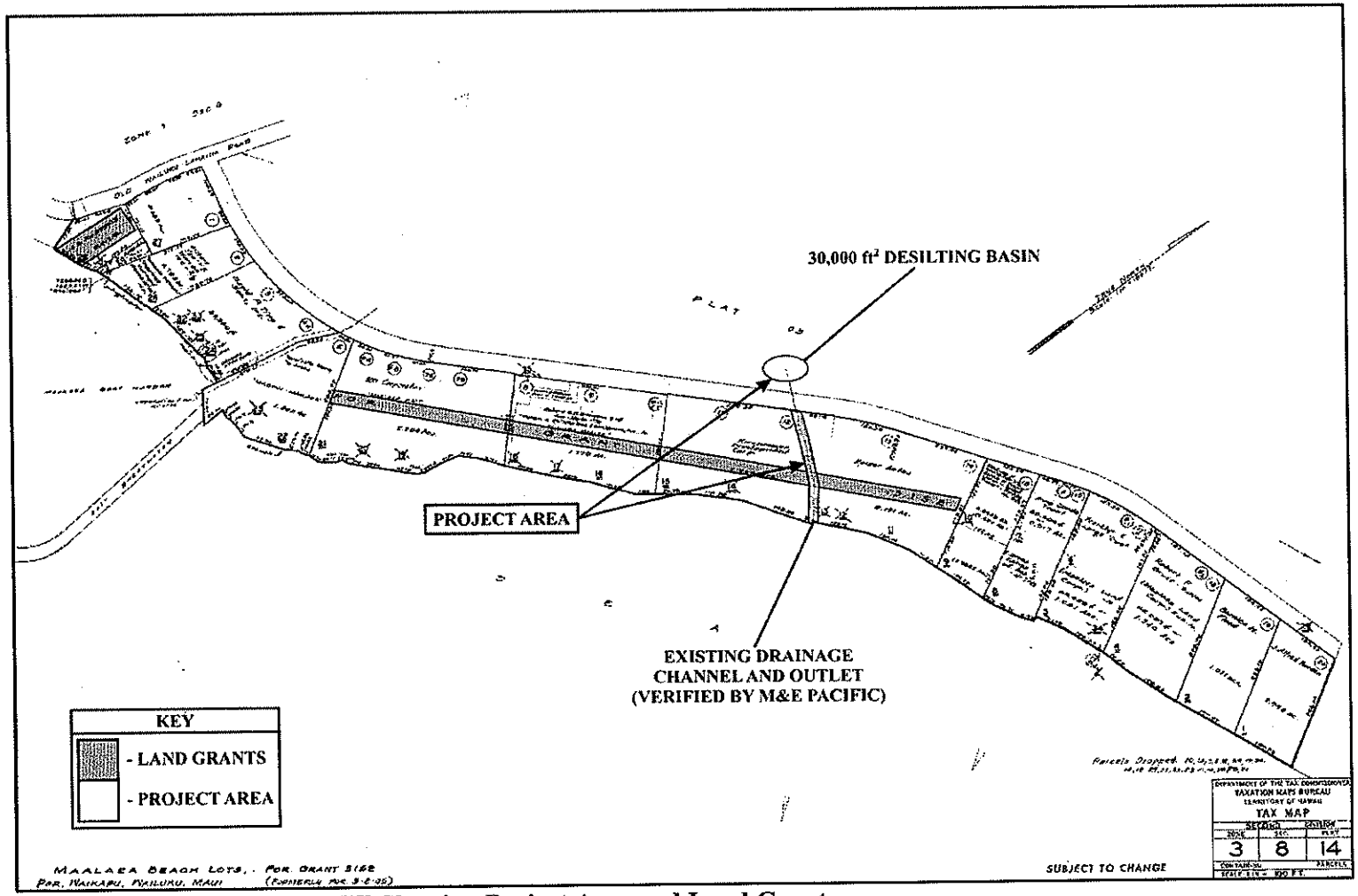

Figure 2: Tax Map Key [TMK] Showing Project Area and Land Grants.

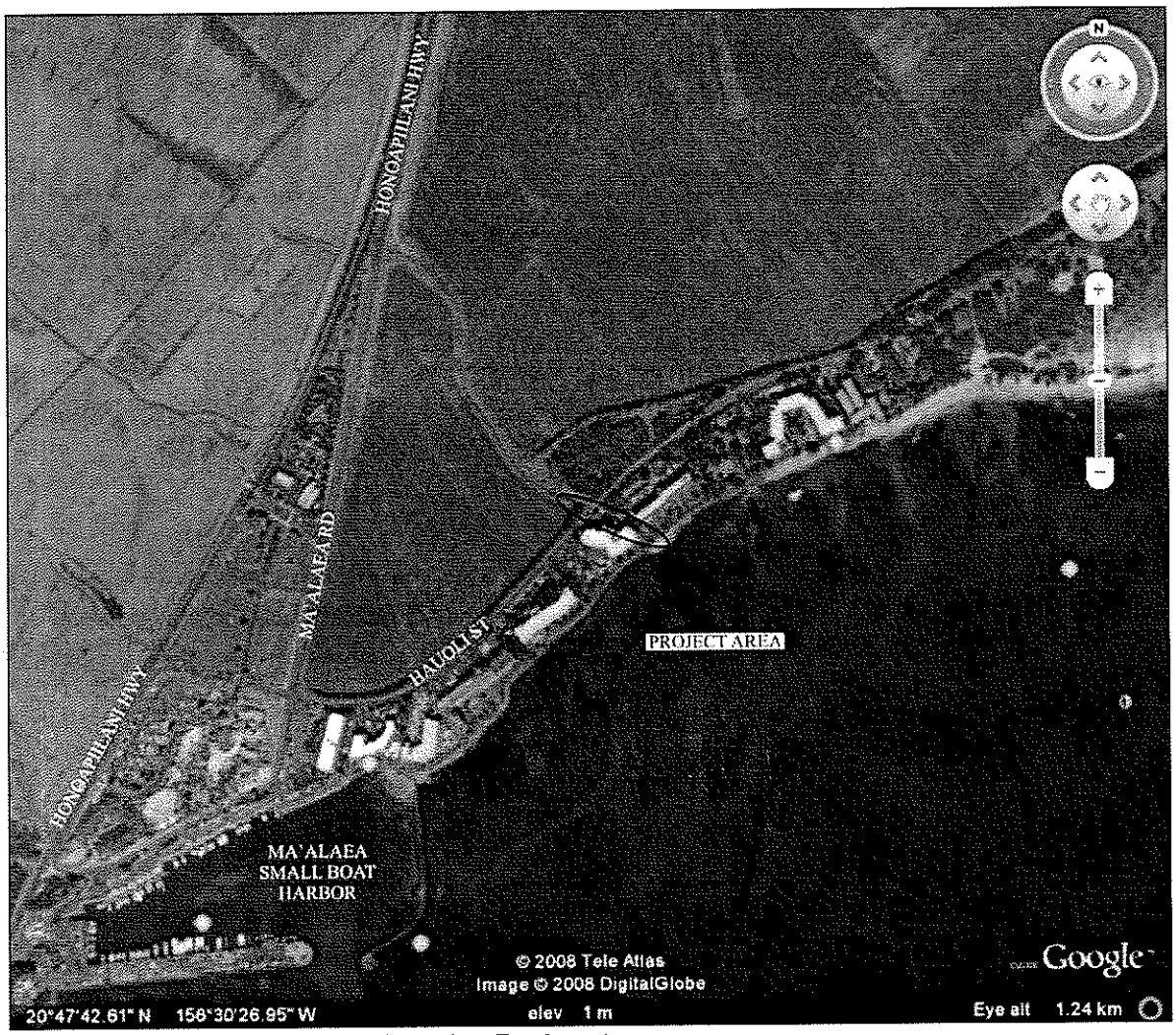

Figure 3: Aerial Photograph Showing Project Area.

This Monitoring program will ensure that if human remains are identified during subsurface work, appropriate and lawful protocol concerning the Inadvertent Discovery of Human Remains (pursuant to 13-300-40a, b, c, HAR) is followed. Archaeological Monitoring will also ensure that identified significant cultural resources are sampled, documented, and evaluated for their historical significance, per State Historic Preservation Division (SHPD) recommendations.

This AMP is being prepared for Munekiyo & Hiraga, Inc. and will require the approval of the SHPD prior to the commencement of any excavation activities on the parcel. The following text provides more detailed information on the reasons for monitoring, potential site types to be encountered during excavation, monitoring conventions and methodology for both field and laboratory work, and curation and reporting.

ENVIRONMENTAL SETTING

LOCATION AND LANDFORM

Maui, the second largest island within the Hawaiian Island chain, was formed by two shield volcanoes. The West Maui Mountains, the older of the two volcanoes, has been eroded and cut with rift and fracture zones that radiate north to southeast from the caldera. The larger, but younger volcano, Haleakalā in East Maui rises to an elevation of just over 10,000 feet to form Haleakala. One ridge separates Lahaina District from Wailuku District. Maui is known as the "Valley Isle" because of the large fertile isthmus that separates its two volcanoes. The isthmus was formed by relatively recent lava flows and erosion of material from the steep slopes of the volcanoes. It is at the southwest portion of this isthmus that the current project area is located.

Maui's Wailuku District encompasses an area from the eastern half of the West Maui Mountains, north to Kahului Bay, south to Ma`alaea Bay, and includes the entire Kahului Isthmus (Figure 4). Near the southwestern corner of Wailuku District, the boundary separating Ukumehame Ahupua`a and Waikapu Ahupua`a runs from *mauka* to *makai* (roughly west to east). At an elevation of approximately 55 meters (180 feet), the *ahupua`a* boundary sharply angles south toward Ma`alaea Bay. Ma`alaea is situated on the southern coast of the isthmus between East and West Maui.

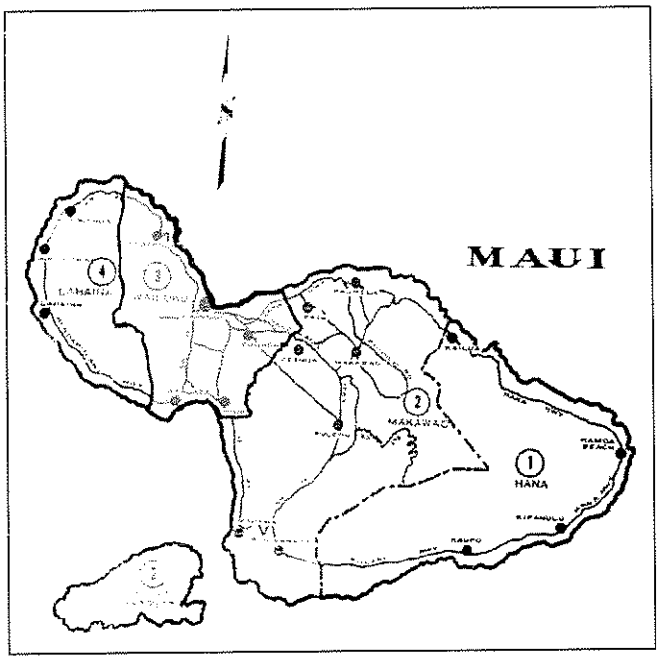

Figure 4: Wailuku District Boundaries.

The proposed construction activities encompass two areas. The first involves improvements to an existing concrete-lined drainage channel located on the *makai* (Oceanside) or southeast side of Hauoli Street. It is approximately 230 lineal feet (70 m) long by 50 ft (15 m) wide totaling to an area of 11,500 ft^2 (3,505 m^2). The other is construction of an approximately 30,000 ft^2 (9,146 m^2) drainage desilting basin, located on the *mauka* (mountainside) or northwest side of Hauoli Street, immediately across from the drainage channel on Hauoli Street within TMK: (2) 3-8-5:03 and 017. Note that the *mauka* side of the drainage channel goes under Hauoli Street and continues on the *mauka* side of the street as a dirt ditch, approximately 2 m deep and with no concrete lining.

Drainage Channel

In a memorandum from Munekiyo & Hiraga, Inc., measurements for the drainage channel were given as 230 ft (70 m) long by 20 ft (6 m) wide (4,600 ft^2 or 1,402 m^2); the channel is located on the *makai* (oceanside) or southeast portion of the project area (Figure 5). It is entirely concrete-lined and the bottom of the channel is relatively level with this ground surface. The bottom is approximately 1 m long and the sides slope outwards and upwards to a width of approximately 4 m. The channel ends approximately 5.5 m from the sandy beach. The intervening area is mostly flat and consists of bare loamy soil. The sides of the channel continue as soil berms on either side and are vegetated with a variety of domestic and weedy plants (see VEGETATION, SOILS, AND RAINFALL Section below). There is a large flat basalt boulder in the ground at the transition to the sandy beach; no other structures were visible. The channel runs approximately east to west; however, no compass bearings were taken. The ocean outlet is on the east end, the west end is a culvert or pipe which extends westward under Hauoli Street. The drainage channel continues as a dirt ditch on the *mauka* (west side) of the street.

Desilting Basin

The desilting basin, which is located on the *mauka* (mountainside) or northwest side of Hauoli Street, is an area that is extremely varied in topography (Figure 6). The main feature in the area is the dirt drainage ditch that runs approximately east to west from the culvert/pipe under Hauoli Street. A dirt access road (cane road) runs east to west along the south side of the dirt ditch and runs north to south between the cane field and the landscaped area. The ditch, which is not concrete-lined, measures approximately 2 m deep and 1 to 2 m wide. The area is extremely overgrown with giant guinea grass (*Panicum maximum*), bufflegrass (*Cenchrus ciliaris*), and *koa haole* (*Leucaena leucocephala*). There did not appear to be any shoring-up or rock lining or any other structures within the ditch. Soil in the ditch is loamy with many medium to large cobbles.

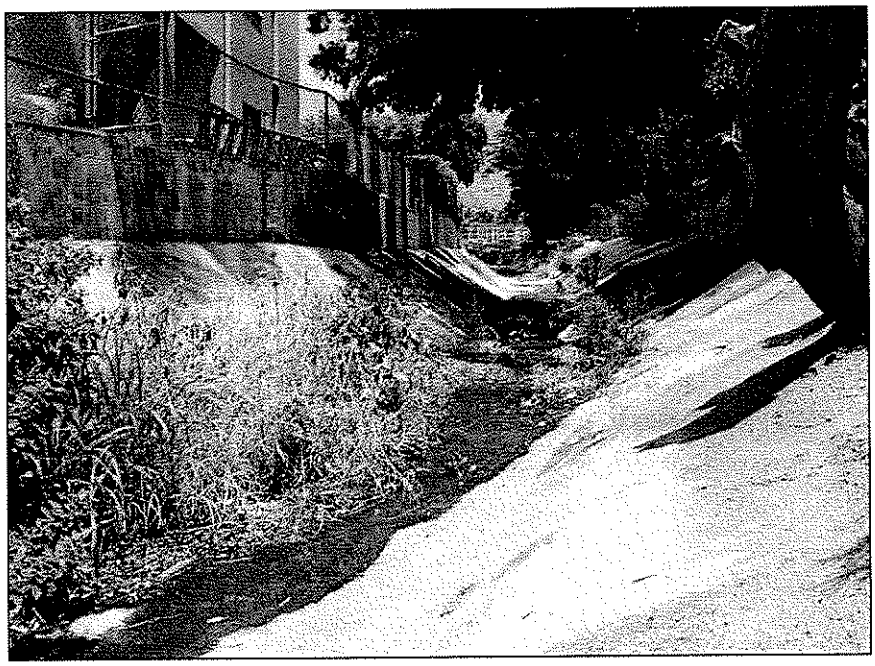

Figure 5: Photograph of Drainage Channel from east End. View to West.

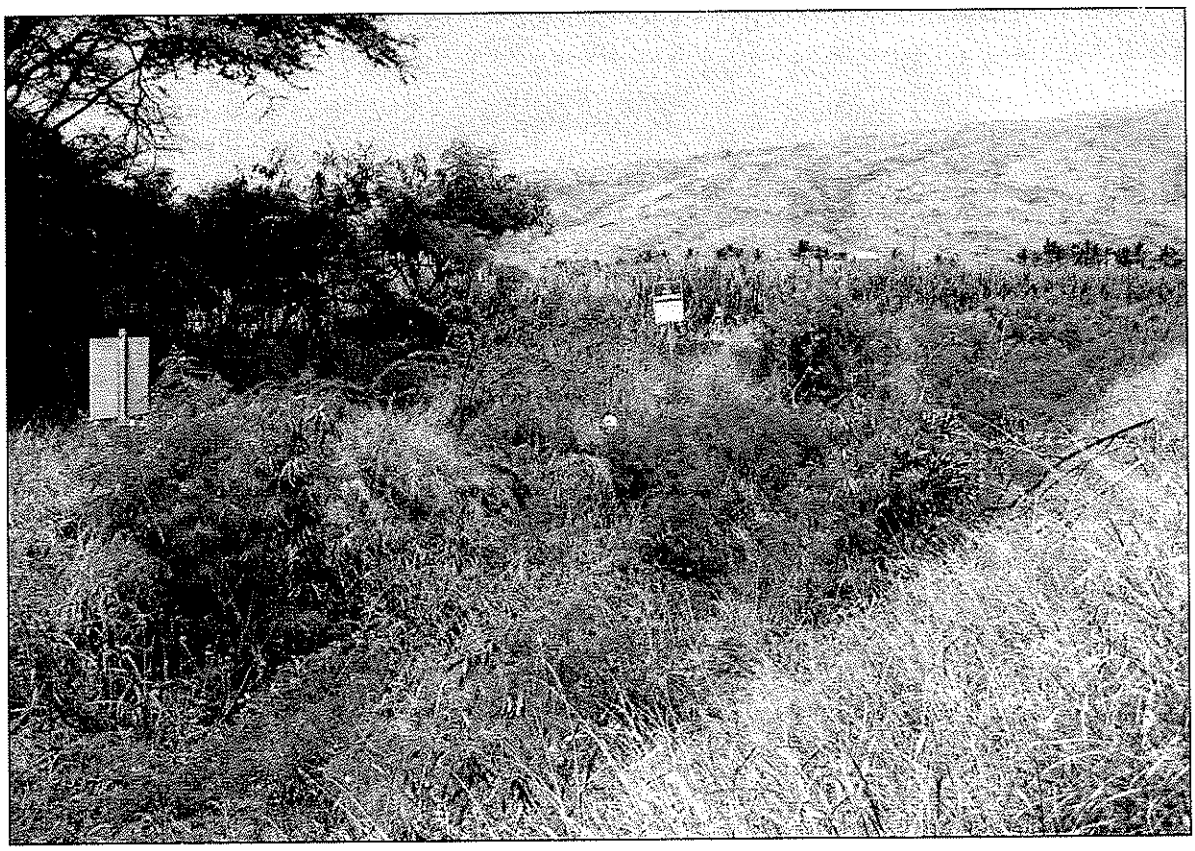

Figure 6: Photograph of Desilting Basin. View to Southwest.

Although the cane road and cane field are mostly flat, the wooded area is extremely uneven with numerous soil bulldozer berms throughout the area and particularly along the side of Hauoli Street. These berms are presumably to prevent unauthorized access to the area from Hauoli Street; Hawaiian Commercial and Sugar (HC&S) has posted a "No Trespassing" sign. The area is also littered with modern trash (old sofa bed and mattress, broken bottles, etc.). Soil throughout the area is a loamy soil typical of cane fields. Again, the topography in this area is very uneven with many bulldozer berms throughout and particularly along the roadside of Hauoli Street. There is also a high soil berm (approx. 1.5 m high) running from east to west along the outskirts of the woodland and parallel to the ditch. This area is also littered with modern trash (bottles, old bicycle, etc.).

VEGETATION, SOILS, AND RAINFALL

As determined by Foote *et al.* (1972), soils in the project area are classified within the Ewa Series, more specifically the Ewa silty Clay (EsB), which occur on slopes between three and seven percent. Foote *et al* (1972: 29–30) describes these soils as "well-drained soils in basins and on alluvial fans of the islands". Typically these soils are nearly level to moderately sloping with an elevation range from near sea level to 150 feet (46 m) (Figure 7). Permeability is moderate and runoff slow within this soil type. In addition, the erosion hazard is slight and "available water capacity is about 1.3 inches per foot in the surface layer and 1.4 inches per food in the subsoil," (*ibid*: 29).

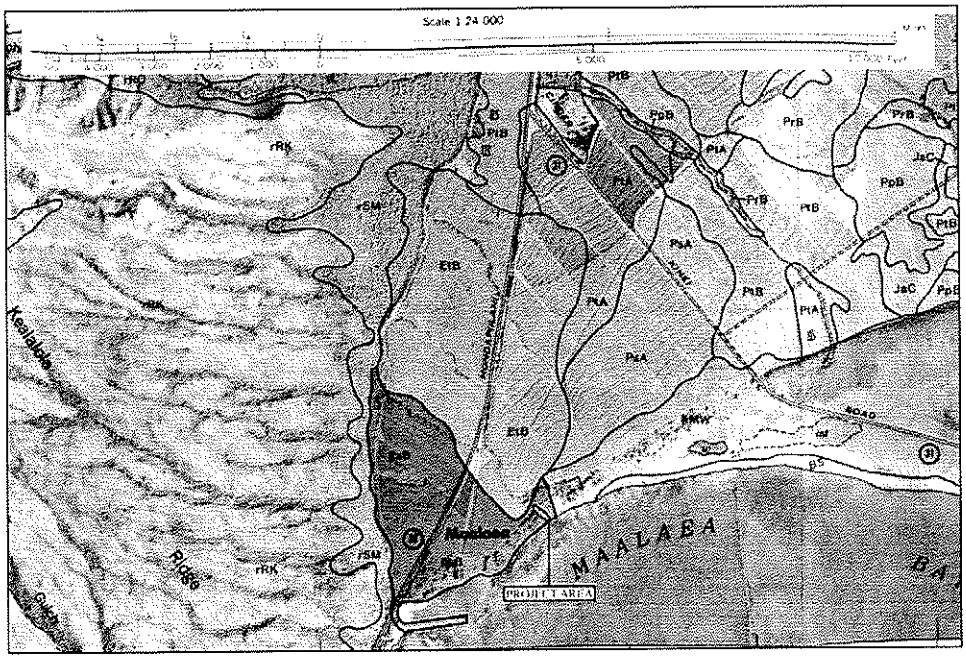

Figure 7: Project Area Soil Type Distribution. (Adapted from Foote, *et al.* 1972: 101.)

Hydrology of the project area is through rainfall. Foote *et al.* (1972) project these types of soil as receiving between 10 and 30 inches of rain annually; this is further supported by Armstrong (1983: 62) with his given projection of annual rainfall ranging between 10 and 15 inches. Rainfall studies of Maui conducted by Giambelluca *et al.* (1986: 19,112–124) reveal that during the winter months, this region of Maui receives most of its rain, with the months of November, through April receiving over 100 mm monthly of rain. The months from May to October receive up to 25 mm of rainfall per month (*ibid*: 19).

Vegetation in the project area and the immediate surrounds consists of mostly introduced, post-Contact species. Described by Armstrong (1983: 70), the project area lies within the "Kiawe and lowland shrubs" zone typical below 1,000 feet (305 m) in altitude. Characteristically, the vegetation in this zone contains *kiawe (Prosopis pallida)*, *koa haole*, finger grass (*Eustachys* spp.), and *pili* grass (*Heteropogon contours*) (*ibid.*).

Drainage Channel

Vegetation along the drainage channel is mostly domestic cultivars and weeds which occur mostly along the tops of the channel on the Ma`alaea Banyans side. These include yellow oleander (*Casabela thevetia*), several varieties of hibiscus (*Hibiscus* spp.), bougainvillea (*Bougainvillea* spp.), Chinese banyan (*Ficus microcarpa*), ironwood (*Casuarina* spp.), *koa haole*, klu (*Acacia farnesiana*), castor bean (*Ricinis communis*), lion's ear (*Leonotis nepetifolia*), abutilon (*Abutilon grandifolium*), bufflegrass, giant guinea grass, and *naupaka* (*Scaevola sericea*), which is found near the beach end on the soil berms (Figure 8).

Desilting Basin

The portion of the basin to the south of the ditch includes both commercial sugar cane (HC&S) as well as a partially landscaped area overgrown by dense *kiawe* woodland (*Prosopis pallida*) (Figure 9). The southwest portion of the basin area is under sugar cane cultivation. The landscaped area is planted with yellow oleander but has been overgrown with more weedy species including *kiawe*, klu, Christmas berry (*Schinus terebinthefolius*), and *koa haole*, with a thick understory of bufflegrass, and giant guinea grass. The area is also choked with other smaller weeds including lion's ear , castor bean, chenopodium (*Chenopodium* spp.), slender mimosa (*Desmanthus virgatus*), partridge pea (*Chamaechrista nictitans*), *maile hohono* (*Ageratum conyzoides*), *`uhaloa* (*Waltheria indica*), and abutilon.

The portion of the basin to the north of the ditch is similarly vegetated by dense *kiawe* woodland with a dense understory of giant guinea grass and bufflegrass. Additionally, there has been a fair amount of kiawe wood cut and roughly stacked throughout the area. Soil again is loamy soil with small to medium cobbles.

Figure 8: Photograph Depicting Vegetation and the Drainage Channel. View to West

Figure 9: Photograph Depicting Vegetation within the Desilting Basin. View to East.

TRADITIONAL AND HISTORIC SETTING

PRE-CONTACT TO EARLY HISTORIC ERA

Wailuku District is frequently mentioned in historical texts and oral tradition as being politically, ceremonially, and geographically important during traditional times (Cordy 1981, 1996; Kirch 1985). Wailuku was considered a "chiefly center" (Sterling 1998:90) with many of the chiefs and much of the area's population residing near or within portions of ʻĪao Valley and lower Wailuku. The importance of the district is reflected by the relatively large number of *heiau* (place of worship) that were reportedly present in pre-Contact times. Oral tradition accounts surrounding these *heiau* provide examples of how religion tied into political power in the traditional Wailuku setting. Indeed, the period immediately preceding contact with the Europeans was one of considerable upheaval and conflict. Wailuku, meaning 'water of destruction,' succinctly describes the area in the late 1700s (Pukui *et al* 1989: 225). Political power emanating from Moloka`i was an active element during the mid-eighteenth century. The resulting battle at Kalae`ili`ili (A.D. 1765) led to the expulsion of Ke`eaumoku and the Moloka`i

ali`i (chief) and marked the beginning of Kahekili's reign (Kamakau 1992). Kahekili successfully defended his capital in Wailuku throughout the 1770s, until his defeat at the hands of Kamehameha I.

Closer to the current project area, in the southwest corner of Wailuku District, pre-Contact settlement was not as dense as concentrations to the north. Climate had much to do with that trend, as the Ma`alaea area is a more arid environment than the rain-soaked fields to the north. According to Tomonari-Tuggle and Tuggle (1991), the majority of the pre-Contact population was located southwest of the project area, near what is now Ukumehame Beach State Park. Settlement was also probable north of Keālia Pond in Waikapu Ahupua`a. Handy and Handy (1972:496) report that before the historic sugarcane plantations in this region, water from Waikapu Stream "was diverted into lo`i [irrigated terraces] and its overflow was dissipated on the dry plains of the broad isthmus between West and East Maui".

Wailuku District would see drastic change after Captain James Cook's 1778 arrival in Kahului Bay. The reign of Kamehameha I was intertwined with the increasing presence of Europeans within the Hawaiian Islands. By 1821, American missionaries had established a foothold in Lahaina and first arrived in Wailuku a year later. The religion of the Hawaiian people began to wane under the influence of Christianity. Fredericksen and Fredericksen (2002:4) point to a girls' seminary (Central Female Boarding School), established in Wailuku in 1836, as one of the initial steps in the conversion of Hawaiian language and customs in Maui.

THE GREAT MĀHELE

In 1848, commissioners of the Great *Māhele* (Division) instigated an extreme modification to traditional land tenure on all islands that resulted in a division of lands and a system of private ownership. The *Māhele* was based upon the principles of Western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society into that of a market economy (Kuykendall Vol. I 1938:145, footnote 47, *et passim*; Daws 1968:111; Kame`eleihiwa 1992:169–170, 176). The dramatic shift from a redistributive economy to a market economy resulted in drastic changes to land tenure, among other things. As a result, foreigners demanded private ownership of land to ensure their investments (Kuykendall Vol. I, 1938:145, *et passim*; Kame`eleihiwa 1992:178; Kelly 1998:4).

Once lands were made available and private ownership was instituted, native Hawaiians, including the *maka`āinana* (commoners), were able to claim land plots upon which they had been cultivating and living. Oftentimes, foreigners were simply just given lands by the *ali`i*.

However, commoners would often only make claims if they had first been made aware of the foreign procedures (*kuleana* lands, or Land Commission Awards [LCAs]). These claims could not include any previously cultivated or currently fallow land, *okipu*, stream fisheries, or many other natural resources necessary for traditional survival (Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). Awarded parcels were labeled as Land Commission Awards (LCAs). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming house lots in Honolulu, Hilo, and Lāhainā were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16).

During the Māhele, Wailuku District was declared Crown Land and approximately 129 Land Commission Awards were awarded within Waikapu Ahupua`a alone; however, only three of these were claimed within Ma`alaea (Waihona `Aina 2008). A handful of foreigners (*i.e.*, Anthony Catalena, James Louzada, and E. Bailey) gained control of large parcels of lands that would later be used for mass cultivation of sugar. Significantly, the majority of LCAs were awarded to Hawaiians, a gauge that can be used to measure pre-Contact settlement, since there was little overall change in traditional land use among Hawaiians prior to 1853 (Creed 1993:38). One nearby LCA, claim number 2939, is located just west of the current project area. The current project area, however, located within a portion of the Land Grant 3152, which is further discussed below (see Figure 2).

THE LATE HISTORIC PERIOD AND GROWTH OF THE SUGAR INDUSTRY

Another influence that brought change to Maui was foreign commercialism. Two Chinese brothers, Ahung and Atai, of Honolulu's Hungtai Company arrived in Wailuku to explore the possibility of setting up one of its earliest sugar mills in 1828. Atai soon created a plant that processed sugarcane cultivated by Hawaiians, named the Hungtai Sugar Works (Dorrance and Morgan 2000:15–16). Ahung later joined Kamehameha III's sugar producing enterprise; although by 1844, both operations had ceased. The Wailuku Sugar Company was the next to follow, in 1862, and would expand sugar production over the next 126 years of its existence—4,450 acres by 1939, still more than three decades before its maximum production levels.

As it expanded its territory, the Wailuku Sugar Company first appeared on maps just west of the project area in the in the 1920s (Bureau of Conveyances, Grant 9794). Successive grants (Grant 10294 through to Grant S-13975) would follow in decades following and fully encompass the Ukumehame Ahupua`a, the *ahupua`a* to the west of the project area, in Wailuku Sugar land. Kennedy and Trimble (1992:4) summarize the history of the Waikapu Ahupua`a by detailing its

acquisition from the state government on November 18, 1875 by Henry Cornwell (Grant 3152). This Land Grant is described below:

> ...this day, granted and given, absolutely, in Fee Simple unto Henry Cornwell his faithful and loyally disposed subject for the consideration of Fifteen Thousand and Fifty Dollars ($15050.x) paid into the Royal Exchequer paid to the Board of Education, all that piece of Land situated at Waikapu, in the District of Wailuku, in the Island of Maui," (Waihona 'Aina website, 2008; also Appendix A).

Cornwell subsequently sold the business to Claus Spreckels, and by the turn of the century, the entire project area was under sugarcane cultivation.

Wailuku Sugar Company ended production in 1988, having averaged over 30,000 tons of sugar produced annually at its pinnacle in the 1970s (Dorrance and Morgan 2000:66). Owner C. Brewer & Company, Ltd. shut down sugar cultivation on the project area, which was then used almost entirely for pineapple cultivation starting no later than 1992 (Kennedy and Trimble 1992:1). The lands were under pineapple for at least the next three years (Tomonari-Tuggle 1995:11)—probably slightly longer—before transitioning to smaller-scale "garden" plots.

PREVIOUS ARCHAEOLOGY

As only one archaeological project has been conducted within the current project area, this section will also focus on nearby, important archaeological studies which will lend in drawing a larger picture of the land use and settlement patterns of pre-Contact and post-Contact populations within this region of Maui.

In terms of general projects in the Wailuku-Waikapū environs, the earliest archaeological endeavors on Maui were undertaken by Thrum (1909), Stokes (1918), Emory (1921), and Walker (1931). Although none of their archaeological finds directly pertain to the current project area, their data allows for a deeper understanding of the traditional use of the Wailuku-Waikapū area.

In an area north and inland of the project area, Thrum mentions that two *heiau* may have possibly existed within the *ahupua`a* of Waikapū, but evidence of the two sites no longer remains (1909–1918:59). A group of approximately 45 house and shelter sites (State Sites 50-50-09-1441, the McGregor Point C-shaped structures, and 50-50-09-1287, the Mā`alaea Complex) was identified by Walker (1931) to the west of Mā`alaea. Chronology for these sites

has yet to be determined (Creed 1993). Walker (1931:58) also described a *koa*, or fishing shrine, and two petroglyph fields with an associated *heiau* (State Site numbers 50-50-09-1169 and -1199) at Mā`alaea. The *koa* was not assigned a State Site number, nor has it been relocated.

The harbor area of Ma`alaea has several documented historical archaeological sites within the vicinity including the Lahaina Pali Trail's ending/beginning just *mauka* of the current project area, several habitation sites, a *heiau* and petroglyphs. Several studies on file within the SHPD-Kapolei archives summarize the most relevant previous archaeology within the vicinity of the current project area. Figure 10 illustrates the locations of these studies in relation to the current project area. Examination of the archaeological record helped to form the expected findings.

Kailihiwa *et al.* (2005, as cited in Young 2006) conducted an Inventory Survey in three distinct areas in preparation of proposed Ma`alaea Small Boat Harbor improvements [TMK (2) 3-6-001: portions of 002; 049; 050 and 3-8-014: portions of 027; 028; 030]. During this survey, Pacific Legacy identified previously recorded historic sites within or immediately adjacent to the harbor. SIHP 50-50-09-1440, a pre-Contact Hawaiian site containing two large boulders known as *piko* stone and a large sharpening stone referred to as the "King's Table" or "Adze". These stones collectively have been referred to as "Pohaku `O Ma`alaea"; they have been moved from their original positions and are currently preserved in front of Buzz's Wharf restaurant Site -1604, a Japanese Shrine, known as the "Ma`alaea Ebisu Jinja" was probably constructed in the early twentieth century. Site -3553 and -3554 consisted of human burials (Young 2006).

In addition, the Survey conducted by Kailihiwa *et al* (2005, as cited in Young, 2006) documented one newly identified site, SIHP 50-50-09-5645, historic bridge remnant, which consisted of three features within Area 1: a basalt boulder alignment, which may represent historic roadway cubing; a concrete pad with basalt boulders indeterminate of origin and/or function; and a modern brass memorial plaque cemented to a boulder. This site was recommended to be preserved.

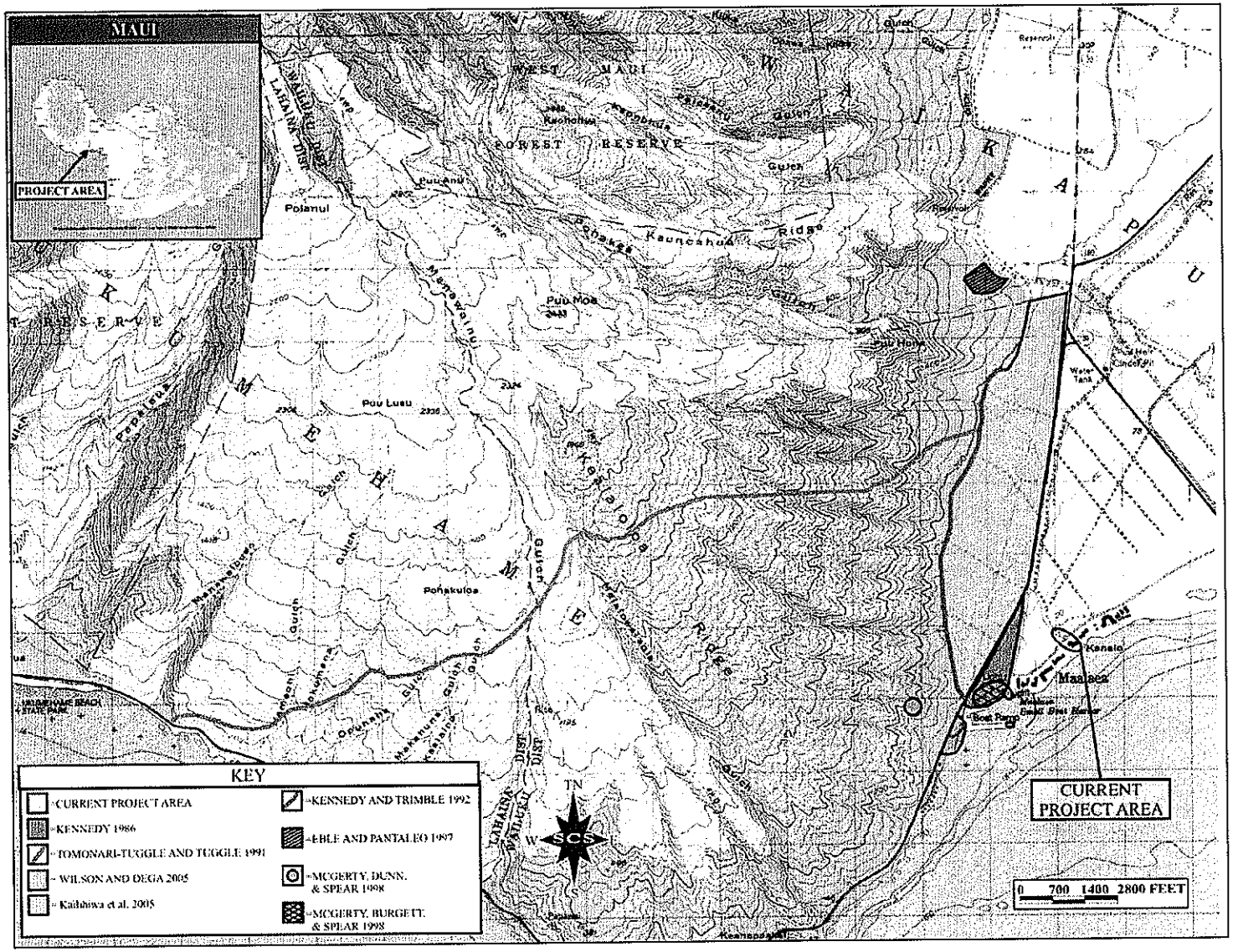

Figure 10: Locations of Selected Previous Archaeological Sites near the Current Project Area.

Wilson and Dega (2005) conducted an Inventory Survey on a 259.903-acre land parcel in Ma`alaea [TMK: (2) 3-6-01:18]. Three historic sites, all related to sugarcane agriculture, were identified and assigned SIHP numbers: Site 50-50-09-5657 (clearing mounds), Site 50-50-09-5658 (irrigation modifications), and Site 50-50-09-5659 (dirt road). The full pedestrian survey revealed that no prehistoric sites existed on the surface of the project area. Subsurface testing, which consisted of 20 backhoe trenches (a volume of approximately 292 cubic meters), did not reveal any subsurface pre-Contact or post-Contact cultural materials. Rather, excavation confirmed the extent, both in physical and temporal depth, of historic and modern agricultural activity within the project area. No burial features or human remains were observed during pedestrian survey or encountered during subsurface testing.

Kennedy and Trimble (1992) surveyed an area that overlaps State Site 50-50-09-5659 (historic dirt road-discussed above in Wilson and Dega, 2005), first recorded in this study. While Kennedy and Trimble also note the lack of archaeological features in their project area due to the obvious history of intense agriculture, their 1992 report does not consider the road upon which their survey takes place to be a potential historic agricultural feature. The project area detailed in their study is no more than five meters wider than the dirt road itself, and concludes that "No artifacts, midden, or structures of historic or prehistoric significance were identified on the subject property" (1992:11).

The Lahaina Pali Trail is five miles long and crosses the southern slopes of the West Maui Mountains between Olowalu and Ma`alaea. The start of this trail, now a demonstration trail as part of the Na Ala Hele Trail System, is located roughly less than a mile northwest of the current project area. By the historic period in which the trail's significance as a probable prehistoric route was realized, the portion *makai* of the current trail head was already destroyed by sugarcane cultivation. A 1991 study by Tomonari-Tuggle and Tuggle documented 18 sites upon the trail, the majority of historic origin.

An earlier Kennedy report (1986) entitled *Letter Report: Walk-Through Examination of the Proposed Maalaea Triangle, Maui (TMK: 3-6-01:1)* also concluded with negative results. This project area is located on the *makai* side of Honoapiilani Highway and extends to the coastline. This was the first archaeological study performed on that parcel and Kennedy does mention (1986: 2) nearby sites that are detailed in later studies.

Monitoring within a smaller section of the same project area described by Kennedy (1986) resulted in a single site—a previously disturbed historic burial: State Site 50-50-09-4480 (McGerty, Burgett, and Spear 1998). As described in the report, a pearl shell button was found with the burial. The location of Site -4480 is of interest to the current study as its position is approximately 200 m *makai* of the current project area's southern corner. As subsequent subsurface testing would prove, however, the sandy matrix McGerty *et. al* experienced in the Maui Ocean Center monitoring contrasted the reddish clay of the current project area, rendering the likelihood of encountering burials much less. Nonetheless, the McGerty *et. al* (1998) study also mentions two more burials found not far to the north from Site -4480.

McGerty, Dunn, and Spear (1998) conducted Data Recovery in an area of five traditional sites documented by Moore and Kennedy (1995). These sites (50-50-09-3555, -4022, -4137, -4138, -4139) consisted of 28 features, including petroglyphs, subsurface firepits, agricultural terracing, rock mounds, and a C-shape. Testing at Sites -4138 and -4139 did not produce any significant artifacts; however, radiocarbon analysis of a charcoal sample produced a date of A.D. 1390 to 1650. This sample was recovered from the C-shape (Site -4139, Feature C) which was determined to be a pre-Contact temporary habitation. This site is less than 300 m *mauka* of the current project area's southern point.

CURRENT PROJECT AREA: INVENTORY SURVEY (CORDLE AND DEGA 2008)

Fieldwork conducted by SCS within the project area consisted of Inventory Survey, although no testing was completed during the fieldwork. Backhoe trenching was not feasible due to the extremely uneven terrain, which consists of numerous soil berms and thick vegetation; pieces of large trash (sofa beds, bicycles, etc.) were present; additionally, cut and stockpiled *kiawe* logs prevented access by a backhoe. Fieldwork yielded negative results. Due to the absence of sites/historic properties, the project was written as an Archaeological Assessment (Cordle and Dega 2008).

In summary, no surface features were observed in any of the areas surveyed. Soil in all areas was composed of loam with small to large cobbles. No cultural material was observed in the soil or in the exposed sides of the ditch that were accessible (it was heavily overgrown). Backhoe trenching was not feasible, as noted above. As no testing was completed during this project, Archaeological Monitoring was recommended due to geographical proximity to the beach as well as known sites in the vicinity of the project area.

SETTLEMENT PATTERN

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations eventually settling into drier leeward areas at later periods (Kirch, 1985). Archaeological dates for initial occupation of the Hawaiian Islands far pre-date accepted ranges gathered from palynological data. A more conservative estimate for initial occupation of the islands is the A.D. ninth century (Athens 1997), if one is to lay more credibility with the pollen record than the archaeological record. In the Waihe`e and Waiehu areas of Wailuku, Kirch (1985:87) notes that "a number of coastal dune midden sites have been reported, and at least one of these contained pearl-shell fishhooks similar to those from the Bellows Site, eroding from the wave-cut midden." (The Bellows site, located on the windward coast of O`ahu, has yielded the controversial data of occupation dates from A.D. 300 to 600 [Pearson *et al.* 1971], one of the earliest dated sites in the Hawaiian Islands. For the most part, these dates have now been diagnosed as problematic and are no longer considered valid.)

More recent research within Wailuku District indicates that Wailuku Ahupua`a was likely settled between A.D. 1100 (Kirch 1985:142) and A.D. 1200 (Fredericksen and Fredericksen 1996), whereas *ahupua`a* to the northeast have produced slightly earlier date ranges and *ahupua`a* to the southwest have later settlement dates. The earliest populations purportedly used local resources and seldom ventured into upland valleys. Cordy (in Creed 1993) suggests, however, that upper valley areas on windward coasts were likely populated before the A.D. 1100s. Coastal settlement was still dominant, but populations began exploiting and living in more upland *kula* (plain, pasture) zones. Population expansion to inland areas did not occur until the A.D. twelfth century but continued through the sixteenth century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands. Upland areas of Maui such as the Waiohuli-Kula area contained large garden enclosures, ceremonial structures, and permanent habitation sites by *c.* A.D. 1600.

Nearer the coast in lands like the current project area (*c.* 0–6 meters above mean sea level [amsl]), *taro* was cultivated along stream courses, dryland *taro* was grown on *kula* lands, and populations settled there as well. In the current parcel, however, no LCA records exist that might link pre-Contact agriculture to historically documented practice.

EXPECTED FINDINGS

Based on all available physiographic, archaeological, and historical evidence, the following expectations provide potential site types to be encountered during this project:

- Given the small size of the project area and its geological restriction to the stream bed, limited historic and pre-Contact significant materials including surface features, particularly those pertaining to Historic period sugarcane agriculture and drainage practices, were expected to be identified outside of the previously documented concrete-lined drainage channel.

- A variety of traditional Hawaiian sites have been documented at locations within 500 meters of the project area. The probability of encountering prehistoric archaeological surface features within the project area was considered low.

- The probability of discovery of pre-Contact or post-Contact burials, either marked or unmarked, was considered low. However, burials have been located within the sandy matrix of the nearby parcels *makai* of Honoapiilani Highway (*i.e.*, during construction activities at the Maui Ocean Center; see McGerty, Burgett, and Spear 1998), and therefore remained a possibility especially when in the *makai* sections of the drainage ditch where sandy substrate has been documented. The lack of burial sites immediately *mauka* of the highway can be attributed to three main factors: (1) the types of soils found here were generally less favored in pre-Contact burial practices, (2) the lands have been subject to continual agricultural activity for nearly a century, and in some cases, longer, and (3) the geology of the current project area is limited to the stream bed, in the case of any remains being present, the stream would wash any remains down and out into the ocean.

MONITORING CONVENTIONS AND METHODOLOGY

This AMP has been prepared in accordance with DLNR-SHPD rules governing standards for Archaeological Monitoring (13-279). SCS monitors will adhere to the following guidelines during monitoring:

1. A qualified archaeologist familiar with the project area and the results of previous archaeological work conducted in the project area will monitor subsurface construction activities on the parcel. If significant deposits or features are identified and additional field personnel are required, the archaeologist will notify the contractor or representatives before additional personnel are brought to the site.

2. Monitoring will be conducted during all ground altering excavations on the subject parcel, whether it be in natural or disturbed contexts. One archaeological monitor will be present for each piece of ground altering machinery.

3. If features or cultural deposits are identified during Monitoring, the on-site archaeologist will have the authority to temporarily suspend construction activities at the significant location so that the cultural feature(s) or deposit(s) may be fully evaluated and appropriate treatment of the cultural deposit(s) is conducted. The SHPD will be contacted to establish feature significance and potential mitigation procedures. Treatment activities primarily include documenting the feature/deposit by plotting its location on an overall site map, illustrating a plan view map of the feature/deposit, profiling the deposit in three dimensions, photographing the finds—with the exception of human burials, collecting any artifacts and/or significant soil samples, and triangulating the finds. Construction work and/or back-filling of excavation pits or trenches will only continue in the sample location when all documentation has been completed.

4. Control stratigraphy in association with subsurface cultural deposits will be noted and photographed, particularly those containing significant quantities or qualities of cultural materials. If deemed significant by SHPD and the contracting archaeological firm, these deposits will be sampled.

5. In the event that human remains are encountered, all work in the immediate area of the find will cease; the area will be secured from further activity until burial protocol has been completed. The SHPD Maui-island archaeologist and SHPD- Maui Island Culture History branch will both be immediately contacted about the inadvertent discovery of human remains on the property. Notification of the inadvertent discovery will also be made to the Maui/Lanai Islands Burial Council by either SHPD or the contracting archaeologist. A determination of the minimum number of individuals (MNI), age(s), and ethnicity of the burial(s) will be ascertained in the field. Rules outlined in Chapter 6e, Section 43 shall be followed. Profiles, plan view maps, and illustrative documentation of skeletal parts will be recorded to document the burial(s). The burial location will be identified and marked. If a burial is mechanically displaced, materials excavated from the vicinity of the burial(s) will be manually screened through 1/8-inch wire mesh screens to recover any displaced skeletal material. If the remains are to be removed, the work will be in compliance with HRS 6.E-43.6, Procedures Relating to the Inadvertent Discovery of Human Remains after approval from all parties (SHPD, Burial Council).

6. To ensure that contractors and the construction crew are aware of this Archaeological Monitoring Plan and possible site types to be encountered on the parcel, a brief coordination meeting will be held between the construction team and monitoring archaeologist prior to initiation of the project. The construction crew will also be informed as to the possibility that human burials could be encountered and how they should proceed if they observe such remains.

7. The archaeologist will provide all coordination with the contractor, SHPD, and any other group involved in the project. The archaeological firm will coordinate all monitoring and sampling activities with the safety officers to ensure that proper safety regulations and protective measures meet compliance. Close coordination will also be

maintained with construction representatives in order to adequately inform personnel of the possibility that open archaeological units or trenches may occur in the project area.

8. As necessary, verbal reports will be made to SHPD and any other agencies as requested.

LABORATORY ANALYSIS

All samples collected during the project, except human remains, will undergo analysis at the SCS laboratory in Honolulu. In the event that human remains are identified and the SHPD and Maui/Lanai Islands Burial Council authorize their removal, they will be curated on Maui.

Photographs, illustrations, and all notes accumulated during the project will be curated at the Honolulu laboratory. All retrieved artifact and midden samples will be thoroughly cleaned, sorted, and analyzed. Significant artifacts will be photographed, sketched, and classified (qualitative analysis). All metric measurements and weights will be recorded (quantitative analysis). These data will be presented in tabular form within the final monitoring report. Midden samples will be minimally identified to major class (*e.g.*, bivalve, gastropod mollusk, echinoderm, fish, bird, mammal). All data will be clearly recorded on standard laboratory forms, which also include number and weight (as appropriate) of each constituent category. These counts will also be included in the final report.

Should any samples amenable to dating be collected from a significant cultural deposit, they will be prepared in the SCS laboratory and submitted for specialized radiocarbon analysis. While primary emphasis for dating is placed on charcoal samples, we do not preclude the use of other material such as marine shell or nonhuman bone materials. SCS will consult with SHPD and the client if radiocarbon dates are deemed necessary.

All stratigraphic profiles will be drafted for presentation in the final report. Representative plan view sketches showing the location and morphology of identified sites/features/deposits will be compiled and illustrated.

CURATION

If requested by the land owner, the archaeological firm will curate all recovered materials (except human remains, which would remain on-site in a secure area) until a permanent, more suitable curation center is identified. The land owner may request to curate all recovered cultural materials once analysis has been completed.

REPORTING

An Archaeological Monitoring report documenting the project findings and interpretation, following SHPD guidelines for Archaeological Monitoring reports, will be prepared and submitted 180 days after the completion of fieldwork. This time line is requested to account for any radiocarbon age determinations (typically 30–45 days), if necessary.

If cultural features or deposits are identified during fieldwork, the sites will be evaluated for historical significance and assessed under State and Federal Significance Criteria. The Archaeological Monitoring report will be drafted until accepted by SHPD and will be submitted to both SHPD and to the client.

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APPENDIX A: LAND GRANT AWARDS

Land Grants Documents

Grant Number(LG)	**3152**	Source Book:	**15**
Grantee:	**Cornwell, Henry**	Acreage::	**0 Acs**
Ahupua'a	**Waikapu Ahupuaa**	Year	
District:	**Wailuku**	Cancelled	**False**
Island	**Maui**	TMK	
Miscellaneous			

No. 3152, Cornwell, Henry, Waikapu Ahupuaa, District of Wailuku, Island of Maui, Vol. 14 pps. 369-370 [LG Reel 5, 00454-00455]

No. 3152
Royal Patent

~~Kamehameha IV~~ Kalakaua, By the Grace of God, King of the Hawaiian Islands, by this His Royal Patent, makes known unto all men, that he has, for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Henry Cornwell his faithful and loyally disposed subject for the consideration of Fifteen Thousand and Fifty Dollars ($15050.x), ~~paid into the Royal Exchequer~~ paid to the Board of Education, all that piece of Land situated at Waikapu, in the District of Wailuku, in the Island of Maui, and described as follows:

The land known as the Ahupuaa of Waikapu saving and excepting grants hitherto made within the said Ahupuaa by the Government, or sales made by the Board of Education.

Native rights reserved.

[Page 370]

Containing [left blank] Acres, more or less; excepting and reserving to the Hawaiian Government, all mineral or metallic Mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Henry Cornwell, his Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this eighteenth day of November 1875.

Kalakaua R.
By the King
The Minister of the Interior,

William L. Moehonua

[Land Patent Grant No. 3152, Cornwell, Henry, Waikapu Ahupuaa, District of Walluku, Island of Maui, ?? Acres, 1875]

APPENDIX G-1.

State Historic Preservation Division Approval Letter of Archaeological Monitoring Plan

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

November 16, 2009

Michael F. Dega, Ph.D.
Scientific Consultant Services, Inc.
711 Kapiolani Boulevard, Suite 975
Honolulu, Hawai'i 96813
shpdreply@scshawaii.com

LOG NO: 2009.4361
DOC NO: 0911PC27
Archaeology

SUBJECT: **Chapter 6E-42 Historic Preservation Review – REVISED Archaeological Monitoring Plan for the Proposed Hauoli Street Drainage Improvements Waikapu Ahupua'a, Wailuku District, Island of Maui**
TMK: (2) 3-8-005:003 por. and 017 por.; (2) 3-8-014: 011 por. and 015 por.

Thank you for the opportunity to again review this revised plan, which our staff received in PDF format on November 12 (Chaffee and Dega 2009): *Archaeological Monitoring Plan for the Proposed Hauoli Street Drainage Improvements*...Scientific Consultant Services, Inc. An earlier revised version of the plan was accepted on October 31 (SHPD LOG NO: 2009.4342; DOC NO: 0910PC39). However, the most recent version was proactively revised to include additional field survey to accommodate a change in construction scale for the project, for which a revised archaeological assessment report was recently accepted (SHPD LOG NO: 2009.4360; DOC NO: 0911PC26).

The plan was prepared upon completion of a revised archaeological inventory survey (assessment) during which no culturally significant historic properties were identified, but precautionary archaeological monitoring was recommended for future ground altering disturbance (SHPD LOG NO: 2008.2681/DOC NO: 0808PC20; SHPD LOG NO: 2008.3836/DOC NO: 0808PC40; SHPD LOG NO: 2009.4360/DOC NO: 0911PC26). The project involves improvements to an existing 230 foot long by 50 foot wide concrete-lined drainage channel and a 30,000 square foot detention basin across from the drainage channel.

As specified in the monitoring plan, there will be one archaeological monitor on site for each piece of ground altering machinery in operation during the proposed project. A coordination meeting with the construction crew and all other pertinent parties to explain monitoring procedures and that the monitoring archaeologist has the authority to halt work in the vicinity of a culturally significant find will be undertaken, and should anything of cultural significance be identified, the SHPD will be consulted for mitigation recommendations. The plan further states that in the event human remains are inadvertently exposed, both the SHPD and Maui/Lana'i Islands Burial Council (MLIBC) will be notified and appropriate burial protocol followed once jurisdictional determination has been made. *No human remains will be collected or removed from the project area unless specifically authorized by the SHPD.* A report detailing the findings of the monitoring activity will be prepared and submitted to our office for review within 180 days after the completion of the project.

The plan contains the required information as specified in HAR §13-279-4(a) regarding monitoring plans in general and is acceptable.

Now that the archaeological monitoring plan has been accepted pursuant to HAR §13-279, please send one hardcopy, clearly marked **FINAL** *(the revised electronic copy does not need to be sent again)* to the attention of "**SHPD Library**" at the Kapolei SHPD office.

Please keep in mind that as stated in the acceptance letters for the archaeological assessment: *because exploratory subsurface testing in the form of backhoe trenching or even manual excavation was not conducted for the current project, the identification of any culturally or historically significant find during ground altering disturbance in these areas may require, upon recommendation of this office, construction work to be halted and the completion of an inventory survey prior to such work resuming.*

Aloha,

Nancy A. McMahon

Nancy McMahon, Deputy SHPO/State Archaeologist
State Historic Preservation Division

c: Jeff Hunt, Director, Dept. of Planning, FAX (808) 270-7634
Maui CRC, Dept. of Planning, 250 S. High Street, Wailuku, Hawai'i 96793

APPENDIX H.

Cultural Impact Assessment

SCS Project Number 958-CIA-3

A CULTURAL IMPACT ASSESSMENT FOR THE PROPOSED HAUOLI STREET DRAINAGE IMPROVEMENTS OF APPROXIMATELY 1 ACRE, MA`A LAEA, WAIKAPU AHUPUA`A, WAILUKU DISTRICT, ISLAND OF MAUI, HAWAI`I

[TMK (2) 3-8-005: 003 and 017 (pors.); TMK (2) 3-8-014:011 and 015 (pors.)]

Prepared by:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.

Revised Jan 2010

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TABLE OF CONTENTS

TABLE OF CONTENTS ii

LIST OF FIGURES ii

INTRODUCTION 1

METHODOLOGY 5
ARCHIVAL RESEARCH 6
INTERVIEW METHODOLOGY 6
PROJECT AREA AND VICINITY 8

CULTURAL HISTORICAL CONTEXT 8
PAST POLITICAL BOUNDARIES 8

TRADITIONAL SETTLEMENT PATTERNS 10
WAHI PANA AND MO`OLELO (LEGENDARY PLACES AND STORIES) 10
THE *MĀHELE* 11

SUMMARY 12

CIA INQUIRY RESPONSE 14

CULTURAL ASSESSMEMNT 15

REFRENCES CITED 16

APPENDIX A: CONSULTATION INQUIRIES ..... A

APPENDIX B: PUBLIC ANNOUNCEMENT ..... B

LIST OF FIGURES

Figure 1: USGS Quadrangle Map Showing Project Area. 2
Figure 2: Plan of Extended Detention Outlet Structure Detail 3
Figure 3: General Site Plan View Map. 9

INTRODUCTION

Scientific Consultant Services (SCS), Inc. has been contracted by Munekiyo & Hiraga, Inc. to conduct a Cultural Impact Assessment (CIA) for the proposed Hauoli Street drainage improvements of four land parcel measuring a total of one acre in Ma`alaea, Waikapu ahupua`a, Wailuku District, Island of Maui. There is a possibility that the project area could be expanded to include the water quality detention basin site on the *mauka* side of Hau`oli Street (Figures 1 and 2).

The Constitution of the State of Hawai`i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua`a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778" (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to native Hawaiian *ahupua`a* tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, "native Hawaiian rights...may extend beyond the *ahupua`a* in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

Act 50, enacted by the Legislature of the State of Hawaii (2000) with House Bill 2895, relating to Environmental Impact Statements, proposes that:

> ...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights... [H.B. NO. 2895].

Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs and practices, and resources of native Hawaiians, as well as other ethnic groups. Act 50 also requires state agencies and other developers to assess the effects of proposed land use or shore line developments on the "cultural practices of the community and State" as part of the HRS Chapter 343 environmental review process (2001).

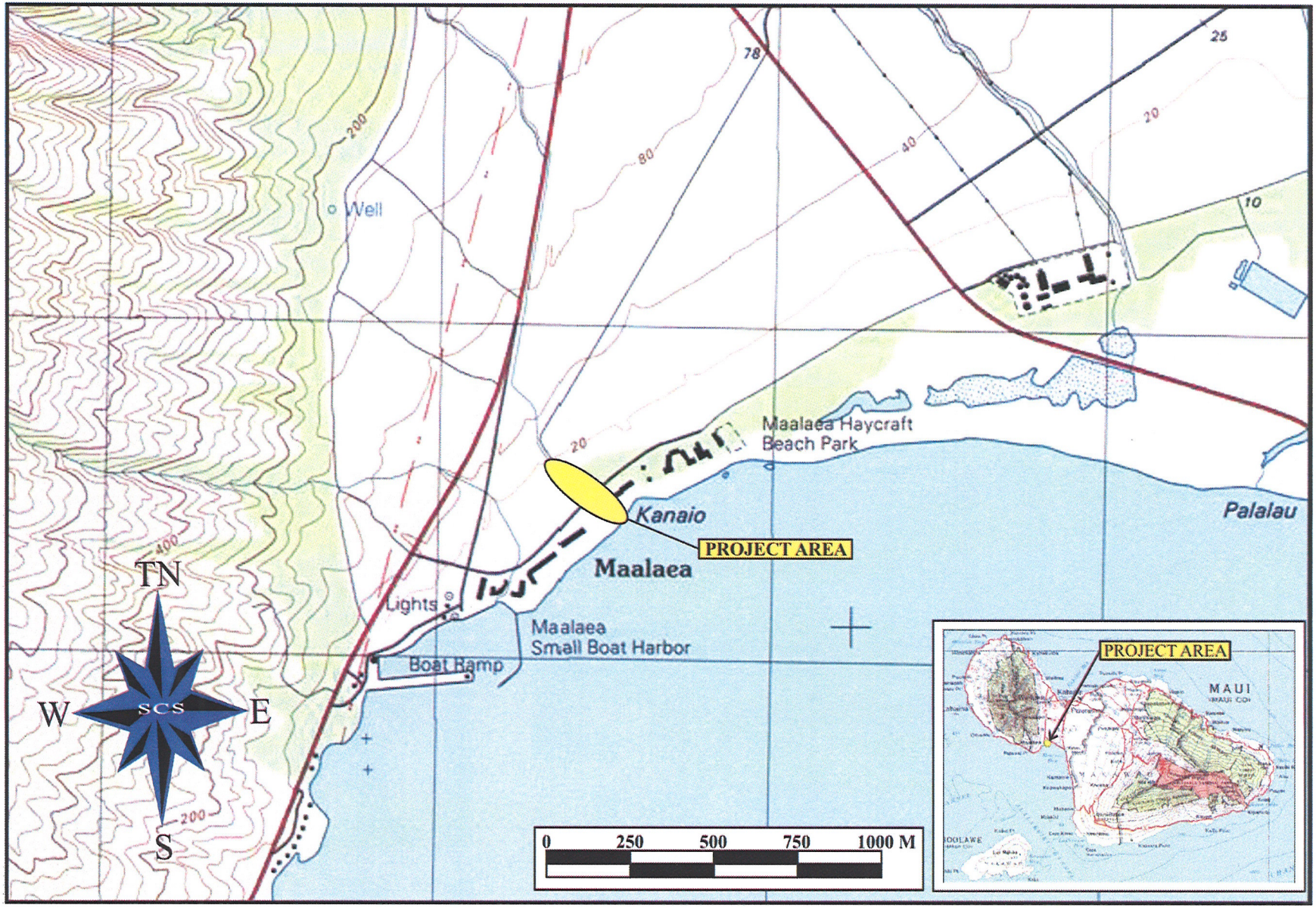

Figure 1: USGS Quadrangle Map Showing Project Area.

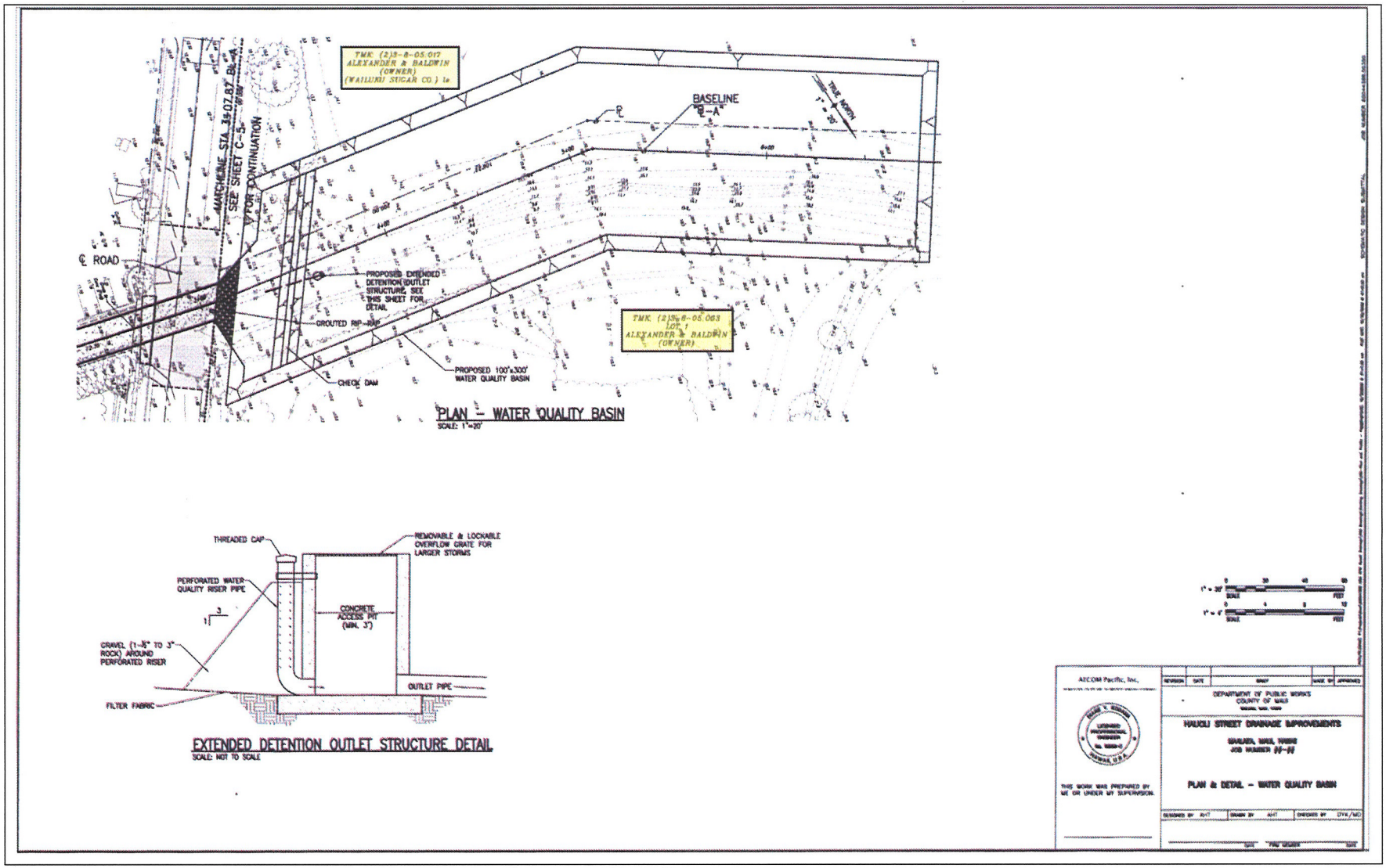

Figure 2: Plan of Extended Detention Outlet Structure Detail

It also re-defined the definition of "significant effect" to include "the sum of effects on the quality of the environment including actions impact a natural resource, limit the range of beneficial uses of the environment, that are contrary to the State's environmental policies. . . or adversely affect the economic welfare, social welfare or cultural practices of the community and State" (H.B. 2895, Act 50, 2000). Cultural resources can include a broad range of often overlapping categories, including places, behaviors, values, beliefs, objects, records, stories, etc. (H.B. 2895, Act 40, 2000).

Thus, Act 50 requires an assessment of any cultural practices and the possible impacts of a proposed action to be included in the Environmental Assessments and the Environmental Impact Statements, and to be taken into consideration during the planning process. The concept of geographical expansion is recognized by using, as an example, "the broad geographical area, e.g. district or *ahupua`a*" (OEQC 1997). It was decided that the process should identify 'anthropological' cultural practices, rather than 'social' cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of "traditional" was explained in *National Register Bulletin*:

> Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations', usually orally or through practice. The traditional cultural significance of a historic property, then is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. . . . [Parker and King 1990:1]

METHODOLOGY

This Cultural Impact Assessment was prepared in accordance with the suggested methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 1997). In outlining the "Cultural Impact Assessment Methodology", the OEQC stated that "...information may be obtained through scoping, community meetings, ethnographic interviews and oral histories..." (1997).

The report contains archival and documentary research, as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. This Cultural Impact Assessment was prepared in accordance with the methodology and content protocol suggested in the Guidelines for Assessing Cultural Impacts (OEQC 1997), when possible. The assessment concerning cultural impacts should make efforts to address the following matters:

(1) a discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints of limitations with might have affected the quality of the information obtained;

(2) a description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken;

(3) ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained;

(4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;

(5) a discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken, as well as the particular perspective of the authors, if appropriate, any opposing views, and any other relevant constraints, limitations or biases;

(6) a discussion concerning the cultural resources, practices and beliefs identified, and for the resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site;

(7) a discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project;

(8) an explanation of confidential information that has been withheld from public disclosure in the assessment;

(9) a discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs;

(10) an analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place, and;

(11) the inclusion of bibliography of references, and attached records of interviews, which were allowed to be disclosed.

Based on the inclusion of the above information, assessments of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps and land records such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts, and previous archaeological project reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws, and guidelines, when knowledgeable individuals are able to identify cultural practices in, or in close proximity to the project area. If they have knowledge of traditional stories, practices and beliefs associated with a project area, or if they know of historical properties within the project area, they are approached for additional consultation and interviews. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share the relevant information. Often people are recommended for

their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs (OHA), Historical Societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input, and suggest further avenues of inquiry, as well as specific individuals to interview.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the information available for this study. When telephone interviews occur, a summary of the information is usually sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

Initial letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Thelma Shimaoka, Maui representative of OHA; Hinanao Rodrigues, Cultural Historian for SHPD; Maui Planning Dept., Cultural Resources Committee; Central Maui Hawaiian Civic Club; Kamika Kepa`a, Native Hawaiian Preservation Council; Nā Kupuna O Maui; Ke`ekaumoku Kapu; and Charles Maxwell, Maui/Lāna`i Island Burial Council (Appendix A).

In addition, a Cultural Impact Assessment Notice was published on May 6, 7, and 10 2009 in *The Honolulu Advertiser* and *The Maui News* (Appendix B). This notice requested information of cultural resources or activities in the area of the project area, gave the TMK number and where to respond with information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

When a cultural resource is previously unknown, but identified within a project area, or in a proximity that will be affected by the project, it may be necessary to contact the island Branch OHA office, or other ethnic organizations and individuals who possess the requisite capacity to determine whether any site evaluated meets the criteria for having an important cultural value to the native Hawaiian people as well as those of other ethnic groups.

PROJECT AREA AND VICINITY

The project area is located in Ma`alaea, at the southwestern corner of the Wailuku District and where the boundary separating Ukumehame and Waikapū Ahupua`a was placed (Figure 3). The project involves assessments of an area supporting an existing drainage channel on the *makai* side of Hauoli Street, as well as an ocean outlet on approximately 30,000 ft² drainage/de-silting basin to be constructed *mauka* of Hau`oli Street.

CULTURAL HISTORICAL CONTEXT

The island of Maui ranks second in size of the eight main islands in the Hawaiian Archipelago. The Island was formed by two volcanoes, Mount Kukui in the west and Haleakalā in the east. The younger of the two volcanoes, Haleakalā, soars 2,727 m (10,023 feet) above sea level and embodies the largest section of the island. Unlike the amphitheater valleys of West Maui, the flanks of Haleakalā are distinguished by gentle slopes. Although it receives more rain than its counterpart in the east, the permeable lavas of the Honomanū and Kula Volcanic Series prevent the formation of rain-fed perennial streams. The few perennial streams found on the windward side of Haleakalā, originate from springs located at low elevations. Valleys and gulches were formed by intermittent water run-off. The project area is located on the leeward side of Pu`u Kukui.

PAST POLITICAL BOUNDARIES

Traditionally, the division of Maui's lands into districts (*moku*) and sub-districts was performed by a *kahuna* (priest, expert) named Kalaiha`ōhia, during the time of the *ali`i* Kaka`alaneo (Beckwith 1940:383; Fornander places Kaka`alaneo at the end of the 15th century or the beginning of the 16th century [Fornander 1919-20, Vol. 6:248]). Land was considered the property of the king or *ali`i `ai moku* (the *ali`i* who eats the island/district), which he held in trust for the gods. The title of *ali`i `ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land.

In general, several terms, such as *moku, ahupua`a, `ili* or *`ili`āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*), which customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were therefore, able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying

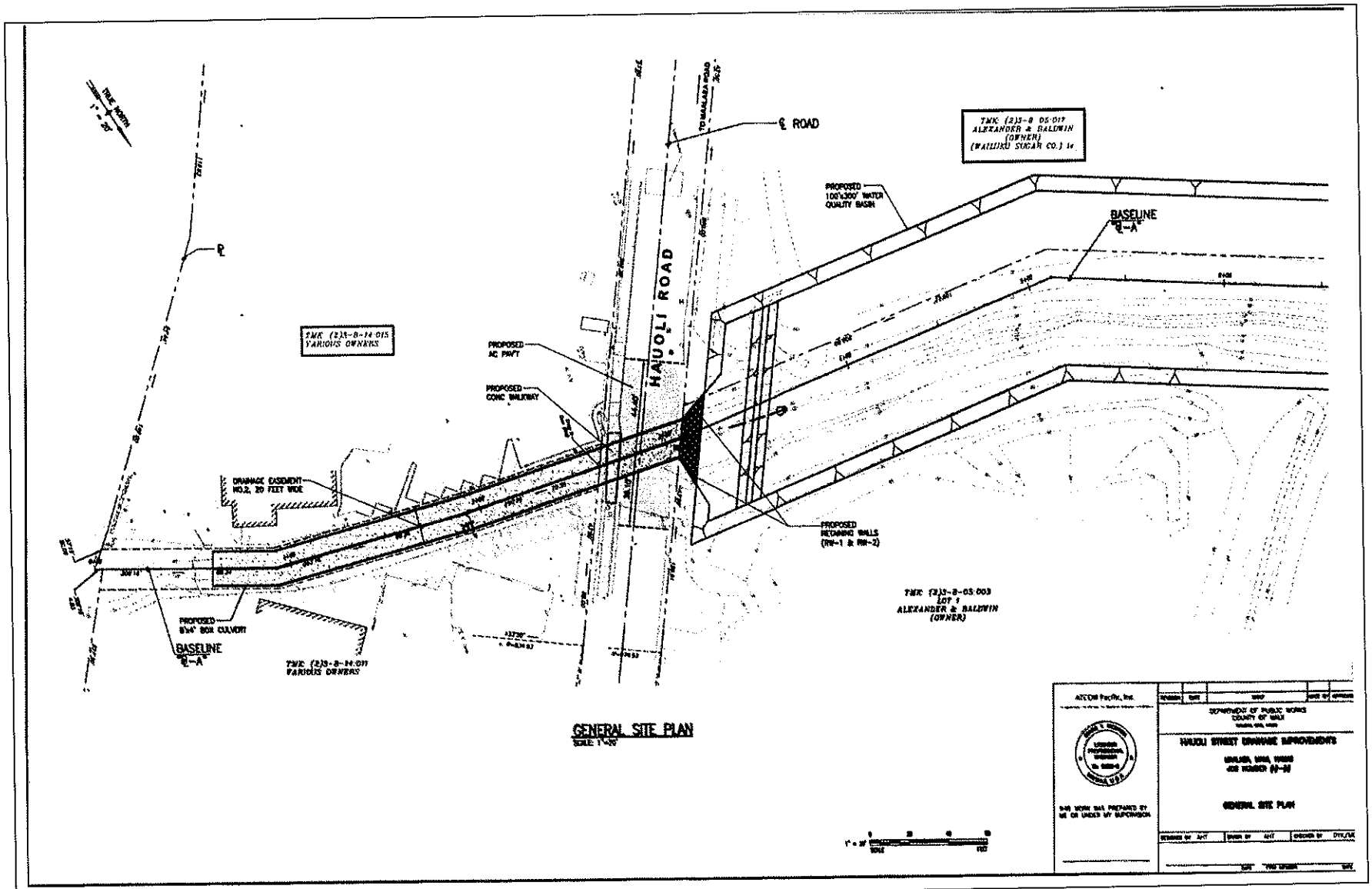

Figure 3: General Site Plan View Map.

needed resources from different environmental zones (Lyons 1875). The *`ili `āina* or *`ili* were smaller land divisions next to importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located *(Ibid.*; Lucas 1995). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa `āina* residing in an *ahupua`a* was called a *kuleana* (Lucas 1995).). The project area is located in the far south of Waikapū Ahupua`a, meaning "*water of the conch*" (possibly referring to a special conch shell in the legend of Puapualenalena; Pukui *et al.*:223).

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. On O`ahu, deep river valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai`a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *`uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Agricultural development on the leeward side of Maui was likely to have begun early in what is known as the Expansion Period (A.D. 1200–1400 [Kirch 1985]).

WAHI PANA AND MO`OLELO (LEGENDARY PLACES AND STORIES)

Scattered amongst the agricultural and habitation sites were other places of cultural significance to the *kama`āina* including *heiau* and fishing *ko`a* (shrine) along the shore. It was said, "Waikapu, a district known for its majesty and splendid living, whose native songs gather flowers in the dew and weave wreaths of ohelo berries" [Nailiili 1865].

One *mo`olelo* associates the name "Waikapū" with the conch shell used by Kamehameha to assemble his forces for battle while fighting Kalanikūpule, son of Kahekili, for Maui. Another, with the dog Puapualenalena's efforts to find and steal a conch hidden in a cave in the valley, hence its name "Water of the Conch" (Sterling 1998).

Waikapū was an old *`okana* (land division) of what was called Na Wai `Eha, or "The four Streams", which included the deep valleys of Waihe`e, Wai`ehu, Wailuku, and Waikapū (Handy and Handy 1972). The waters from the four great streams gave rise in ancient times to the

largest continuous area of wetland taro in the islands. Terraces for agriculture extended from the sand dunes far up into the deep valley and many were still cultivated into the 1930s (*ibid.*).

The present project area is located at the bottom of the slope of Pu`u Hele at the most southwestern tip of Waikapū Ahupua`a which is much drier than the major portion of the *ahupua`a* to the north that receive as much as twenty times the level of precipitation. Air temperatures are consistently slightly warmer here than the Maui seasonal high and low averages, mostly due to the lower, coastal elevation. Four *mauka-makai* drainages cross close to the project area. In traditional times, it is likely that these narrow watercourses only flowed in times of heavy rains providing some moisture for marginal agriculture.

In this far corner of the Wailuku District, prehistoric settlement was not as dense as concentrations to the north. Climate had much to do with that trend, as the Ma`alaea area is a more arid environment than the rain-soaked fields to the north. According to Tomonari-Tuggle and Tuggle (1991), the majority of the pre-Contact population was located west of the project area, near what is now Ukumehame Beach State Park. Settlement was also probably found north of Kealia Pond in Waikapū Ahupua`a. Handy and Handy reported that before the historic sugar cane plantations were established in this region, water from Waikapū Stream "was diverted into lo`i and its overflow was dissipated on the dry plains of the broad isthmus between West and East Maui" (1972:496).

THE *MĀHELE*

In the 1840s, a drastic change in the traditional land tenure resulted in a division of island lands and a system of private ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Daws 1968; Kuykendall Vol. I, 1938:145 *et passim*; Kame`eleihiwa 1992). Among other things, the foreigners demanded private ownership of land to insure their investments (Kuykendall Vol. I, 1938:138 *et passim*; Kame`eleihiwa 1992; Kelly 1998). Once lands were made available and private ownership was instituted, native Hawaiians—including the *maka`āinana* (commoners)—were able to claim the plots they were cultivating and living on, if they had been made aware of the foreign procedures (*kuleana* lands, LCAs). This land division, or Māhele, occurred in 1848. The awarded parcels were called Land Commission Awards (LCA). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of

the property (Chinen 1961). No *kuleana* were awarded in the project area or in its immediate vicinity.

Sugar was to be the economic future of Hawai`i and as early as 1828, two Chinese brothers, Ahung and Atai, of Honolulu's Hungtai Company, arrived in Wailuku to explore the possibility of setting up one of its earliest sugar mills. Atai soon created a plant that processed sugar cane cultivated by Hawaiians, named the Hungtai Sugar Works (Dorrance and Morgan 2000:15–16). Ahung then joined Kamehameha III's sugar producing enterprise, although by 1844 both operations had ceased. The Wailuku Sugar Company was the next to follow, in 1862, and would expand sugar production over the next 126 years of its existence—4,450 acres by 1939, still more than three decades before its maximum production levels.

As it expanded its territory, the Wailuku Sugar Company first appeared on maps in the project area in the1920s (Bureau of Conveyances, Grant 9794), although their acquisition of land *mauka* of Honoapi`ilani Highway may have been as early as the turn of the century (Kennedy and Trimble 1992:4). Kennedy and Trimble (1992:4) summarize the sugar cane history of the project area in Waikapū Ahupua`a (*makai* of the highway) by detailing its acquisition from the state government on November 18, 1875 by Henry Cornwell (Grant 3152). Cornwell subsequently sold to Claus Spreckels, and by the turn of the century, the entire project area was under sugar cane cultivation. Wailuku Sugar Company ended production in 1988, having averaged over 30,000 tons of sugar produced annually at its pinnacle in the 1970s (Dorrance and Morgan 2000:66).

SUMMARY

The "level of effort undertaken" to identify the potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who may be affected by the project or who know its history, research identifying sensitive areas and previous land use, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sometimes the developer might decide to hold meetings in which the public is invited to testify and provide information. As a CIA is not an archaeological study, sending inquiring letters to organizations concerning development of a piece of property that has already been used for previous contemporary activities and is located in an already developed industrial area may be a "good faith effort". If there had been cultural resources and activities in the region, it is likely that they

have already been seriously impacted to the point of extinction. However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the present parcel, letters of inquiry were sent to organizations whose expertise would include the project area. Consultation was sought from Thelma Shimaoka, Maui representative of OHA; Hinanao Rodrigues, Cultural Historian for SHPD; Maui Planning Dept., Cultural Resources Committee; Central Maui Hawaiian Civic Club; Kamika Kepa`a, Native Hawaiian Preservation Council; Nā Kupuna O Maui; Ke`ekaumoku Kapu; and Charles Maxwell, Maui/Lāna`i Island Burial Council.

In addition, a Cultural Impact Assessment Notice was published on May 6, 7, 10 2009 in *The Honolulu Advertiser* and *The Maui News*. This notice requested information of cultural resources or activities in the area of the project area, gave the TMK number and where to respond with information.

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of the report. Such scholars as `I`i, Kamakau, Beckwith, Chinen, Kame`eleihiwa, Fornander, Kuykendall, Kelly, Handy and Handy, Puku`i and Elbert, Thrum, Sterling, and Cordy have contributed, and continue to contribute to our knowledge and understanding of Hawai`i, past and present. The works of these and other authors were consulted and incorporated in the report where appropriate. Land use document research was supplied by the Waihona `Aina 2009 Data base.

Although no archaeological projects have been carried out within the project area, some were completed in the vicinity and were reviewed. The earliest archaeological surveys on Maui took place in the early 1900s and were conducted by Thrum (1909), Stokes (1918), Emory (1921) and Walker (1931). According to Thrum, north and inland of the project area were two *heiau* possibly within the *ahupua`a* of Waikapū (1909-1918:59). Walker recorded approximately 45 house and shelter sites and C-shaped structures at McGregor Point, as well as a feature complex to the west of Ma`alaea (1931). Walker also identified a fishing *ko`a* and two petroglyph fields associated with a *heiau* at Ma`alaea (*Ibid.*). The Lahaina Pali Trail is located *mauka* of the project area along with several habitation sites, a *heiau* and petroglyphs (Tomonari-Tuggle and Tuggle 1991).

Three historical sites related to sugar cane were identified in a 259,903-acre survey east of the project area (Wilson and Dega 2005). An investigation southwest of the project area found no cultural remains of either historic or pre-historic significance (Kennedy and Trimble 1992). Data Recovery (McGerty, Dunn, and Spear 1998) of five traditional sites previously documented in 1995 (Moore and Kennedy 1995), included the investigation of petroglyphs, sub-surface fire pits, agricultural terracing, rock mounds, and a C-shape.A charcoal sample produced a date of A.D. 1390 to 1650. This site is approximately 300 meters west/*mauka* of the present project's southern point.

Archaeology deals with material remains, and although cultural beliefs are often reflected through some sort of architecture, like *heiau*, or *ko`a,* there are many examples of cultural associations still important to the community with no physical structures to mark their significance. One such place, *Ulukukui O Lanikāula*, located on Moloka`i, is considered an extremely sacred spot. Another might be Kīlauea and Halema`uma`u, home of Pele on Hawai`i Island. These places have become important sites supporting a traditional belief system still held by the many peoples of Hawai`i. They contain no identified archaeological features, however they are highly meaningful "...because of [their] association with cultural practices or beliefs of a living community . . ." (King 2003:3).

CIA INQUIRY RESPONSE

No specific suggestions of further contacts were received from Thelma Shimaoka, Coordinator of the Maui branch of the Office of Hawaiian Affairs; the Central Maui Hawaiian Civic Club; Hinano Rodrigues, Cultural Historian with State Historic Preservation Division; the Maui Planning Department, Cultural Resources Commission; the History and Cultural Branch of DLNR; Charles Maxwell; or Nā Kupuna O Maui in response to the letters of inquiry sent in April of 2009 or from the two newspaper notices, published in May of 2009.

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a requirement of the OEQC (No. 10, 1997). To our knowledge, the project area has not been used for traditional cultural purposes within recent times.

CULTURAL ASSESSMEMNT

Based on historical research and the lack of response from the above listed organizations and individuals, it is reasonable to conclude that Hawaiian rights, or those of any ethnic group related to gathering, access, or other customary activities within the project area will not be affected by developmental activities on this parcel. Because there were no cultural activities identified within the project area, there are no adverse effects.

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APPENDIX A: CONSULTATION INQUIRIES

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

County of Maui
Department of Planning
Cultural Resources Commission
250 S. High Street
Wailuku, HI 96793

Dear Sir or Madam:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma'alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs…The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs…

We are asking you for any information that might contribute to the knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The assessment results are dependent on the response and contributions made by individuals and organizations such as yours. Enclosed is a map showing the proposed project area. Please contact me at our SCS Honolulu office at (808) 597-1182; my cell phone, 225-2355; home, (808) 637-9539; or e-mail: leann@scshawaii.com, with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

Patty Nishiyama
Nā Kupuna O Maui
320 Kaeo Place
Lahaina, Hawaii 96761

Dear Ms. Nishiyama:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma'alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

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Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

Ke`eaumoku and U`i Kapu
Kuleana Kuikahi, LLC.
P.O. Box 11524
Lahaina, Maui 96791

Dear Mr. and Mrs. Kapu:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma`alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

Kamika Kepa'a
Native Hawaiian Preservation Council
606 Kalo Place
Lahaina, HI 96761

Dear Mr. Kepa'a:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma'alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, INC.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

Thelma Shimaoka
c/o Office of Hawaiian Affairs
140 Hoohana St.
Suite 206
Kahului, HI 96732

Dear Ms. Shimaoka:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma'alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

Hinano Rodrigues, Cultural Historian
DLNR Maui Office
130 Mahalani Street
Wailuku, HI 96791

Dear Hinano:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma'alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

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Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

Central Maui
Hawaiian Civic Club
310 Ka'ahumanu Ave.
Kahului, Maui 96732

Dear Members:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma'alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 30, 2009

Mr. Charles Maxwell
157 Aiea Place
Pukalani, HI 96768

Dear Mr. Maxwell:

Scientific Consultant Services, Inc. (SCS) has been contracted by Munekiyo & Hiraga, Inc., to conduct a Cultural Impact Assessment (CIA) of an existing drainage channel on the *makai* side of Hauoli Street and an upgraded ocean outlet on approximately 12,000 ft² drainage desilting basin to be constructed *mauka* of Hauoli Street, Ma'alaea, Wailuku District, Island of Maui. According to documents supplied by Munekiyo & Hiraga, SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity.

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

APPENDIX B: PUBLIC ANNOUNCEMENT

AFFIDAVIT OF PUBLICATION

958

STATE OF HAWAII, }
County of Maui. } ss.

Rhonda M. Kurohara being duly sworn deposes and says,that she is in Advertising Sales of the Maui Publishing Co., Ltd., publishers of THE MAUI NEWS, a newspaper published in Wailuku, County of Maui, State of Hawaii; that the ordered publication as to

CULTURAL IMPACT ASSESSMENT NOTICE

of which the annexed is a true and correct printed notice, was published 3 times in THE MAUI NEWS, aforesaid, commencing on the 6th day of May, 2009, and ending on the 10th day of May, 2009, (both days inclusive), to-wit: on

May 6, 7, 10, 2009

and that affiant is not a party to or in any way interested in the above entitled matter.

This 1 page Cultural Impact, dated May 6, 7, 10, 2009, was subscribed and sworn to before me this 11th day of May, 2009, in the Second Circuit of the State of Hawaii, by Rhonda M. Kurohara.

Notary Public, Second Judicial Circuit, State of Hawaii
LEILA ANN L. LEONG
My commission expires 11-23-11

LEILA ANN L. LEONG NOTARY PUBLIC No. 03-691 STATE OF HAWAII

CULTURAL IMPACT ASSESSMENT NOTICE:
Information requested by SCS of cultural resources or on-going cultural activities on or near this parcel in Ma'alaea, Maui, TMK: 3-8-014:11, 15 and 3-8-5:32. Please respond within 30 days to SCS at (808) 597-1182
(MN: May 6, 7, 10, 2009)

IN THE MATTER OF
CULTURAL IMPACT ASSESSMENT NOTICE

(953)

CULTURAL IMPACT ASSESSMENT NOTICE:
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AFFIDAVIT OF PUBLICATION

STATE OF HAWAII
City and County of Honolulu ss.

Valerie I. Yanagihara being duly sworn deposes and says that she is a clerk, duly authorized to execute this affidavit of THE HONOLULU ADVERTISER, a division of GANNETT PACIFIC CORPORATION, that said newspaper is a newspaper of general circulation in the State of Hawaii, and that the attached notice is a true notice as was published in the aforereferenced newspaper as follows

05/06/2009 The Honolulu Advertiser
05/07/2009 The Honolulu Advertiser
05/10/2009 The Honolulu Advertiser

and that affiant is not a party to or in any way interested in the above entitled matter.

Subscribed and sworn to before me this 10th day of May A.D. 2009

ELSIE A. MARUYAMA NOTARY 88-127 PUBLIC STATE OF HAWAII

Elsie A. Maruyama
Notary Public of the First Judicial Circuit
State of Hawaii
My commission expires March 7, 2012

NOTARY PUBLIC CERTIFICATION

Elsie A. Maruyama First Judicial Circuit
Document Description: Affidavit of Publication
No. of Pages 1 Date of Doc. 5/10/2009
Elsie A. Maruyama 5/14/2009
Notary Signature Date

ELSIE A. MARUYAMA NOTARY 88-127 PUBLIC STATE OF HAWAII

673982