Bernard P. Carvalho, Jr.
Mayor

Nadine K. Nakamura
Managing Director

Michael A. Dahilig
Director of Planning

Ka'āina S. Hull
Deputy Director of Planning

PLANNING DEPARTMENT
County of Kaua'i, State of Hawai'i
4444 Rice Street, Suite A-473, Līhu'e, Hawai'i 96766
TEL (808) 241-4050 FAX (808) 241-6699

FEB 16 2016

Hon. Scott Glenn, Director
Office of Environmental Quality Control
State of Hawai'i
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

RE: Draft Environmental Assessment (DEA) for Kaua'i County General Plan Redesignation of land use classification from "Agriculture" to "Residential Community" for a parcel located in Kapa'a Homesteads, Kapa'a, Kaua'i, Hawai'i
Tax Map Key: (4) 4-4-013:002

Dear Director:

With this letter, the Kaua'i County Planning Department hereby transmits the draft environmental assessment and anticipated finding of no significant impact (DEA-AFONSI) for the General Plan Amendment, County of Kaua'i, Hawai'i: Re-designate Land Use of Real Property located at Tax Map Key: 4-4-013:002 from Agriculture to Residential Community in the Kawaihau District on the island of Kaua'i for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, two 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.

Sincerely,

FOR MICHAEL A. DAHILIG
Director of Planning

Encl.

cc: Galen T. Nakamura, Esq. (Agent for Applicant)

July 2015 Revision

APPLICANT ACTION SECTION 343-5(e), HRS PUBLICATION FORM

Project Name:

Baird Family Ltd. Partnership

HRS §343-5 Trigger(s): Amendment to County General Plan

Island: Kaua'i

District: Kawaihau

TMK: (4) 4-4-013:002

Permits: General Plan and Zoning Amendment

Approving Agency: County of Kaua'i, Planning Deparment,
4444 Rice Street., Suite A273
Līhu'e , Hawaii 96766

Contact: Dale Cua
Phone: (808) 241-4050

Applicant: Baird Family Ltd. Partnership
4-976 Kūhiō Highway
Kapa'a, HI 96746

Contact: Dr. Mark Baird
Phone: (808) 822-9393

Consultant: Shiramizu, Loo & Nakamura, LLLP
4357 Rice Street, #102
Līhu'e, Hawaii 96766

Contact: Galen T. Nakamura, Esq.
Phone: (808) 632-2267

Status (check one only):

_X_ DEA-AFNSI — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov; a 30-day comment period ensues upon publication in the periodic bulletin.

__ FEA-FONSI — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov; no comment period ensues upon publication in the periodic bulletin.

__ FEA-EISPN — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov; a 30-day consultation period ensues upon publication in the periodic bulletin.

__ Act 172-12 EISPN — Submit the approving agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to

oeqchawaii@doh.hawaii.gov. NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.

__DEIS — The applicant simultaneously transmits to both the OEQC and the approving agency, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqc@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.

__FEIS — The applicant simultaneously transmits to both the OEQC and the approving agency, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqc@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__ Section 11-200-23 Determination — The approving agency simultaneous transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the applicant. No comment period ensues upon publication in the periodic bulletin.

__Statutory hammer Acceptance — The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it failed to timely make a determination on the acceptance or nonacceptance of the applicant's FEIS under Section 343-5(c), HRS, and that the applicant's FEIS is deemed accepted as a matter of law.

__Section 11-200-27 Determination — The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

__Withdrawal (explain)

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

Applicant proposes to re-designate entire parcel's Kauai County General Plan land use designation from *Agriculture* to *Residential Community* instead. This re-designation will then make parcel's State Land Use District designation eligible to be changed from *Agriculture* to *Rural*, and the County's land use zoning district designation eligible to be changed from *Open* and *Agricultural* to *Residential (R-1)*. Upon such re-zoning, subject parcel's total residential density would change from one to three dwellings.

General Plan Amendment

County of Kaua'i, Hawai'i
Re-designate Land Use of Real Property located at
Tax Map Key no. (4) 4-4-013:002 from
Agriculture* to *Residential Community

Draft Environmental Assessment

Submitted Pursuant to Hawai'i Revised Statutes
Chapter 343

Applicant:
Baird Family Ltd. Partnership
4-976 Kūhiō Highway
Kapa'a, HI 96746

Approving Agency:
Mr. Michael Dahilig, Director of Planning
County of Kaua'i
Department of Planning
4444 Rice Street, Suite A-473
Lihue, HI 96766

Prepared by:
Mr. Galen Nakamura
Shiramizu, Loo & Nakamura, LLLP
4357 Rice Street, Suite102
Lihue, HI 96766

February 2016

Project Name:	General Plan Amendment to re-designate land use of real property located at tax map key no. (4) 4-4-013:002 from *Agriculture* to *Residential Community*
Applicant:	Baird Family Ltd. Partnership. 4-976 Kūhiō Highway Kapa'a, HI 96746 Contact: Dr. Mark Baird (808) 635-6316
Project Owner:	Baird Family Ltd. Partnership 4-976 Kūhiō Highway Kapa'a, HI 96746
Accepting Agency:	County of Kaua'i Department of Planning 4444 Rice Street, Suite A-473 Lihue, HI 96766 Contact: Mr. Michael Dahilig, Director of Planning (808) 241-4050
Location:	Kapa'a Homesteads, Kauai
Tax Map Key:	(4) 4-4-013:002
Land Area:	3.38 acres (approximately)
Proposed Action:	Redesignation of entire parcel from General Plan land use designation of *Agriculture* to *Residential Community*.
Present Use:	Current owner/ family reside on subject property.
State Land Use District:	Agricultural
County Zoning:	Agriculture (A) and Open (O)
County General Plan:	Kawaihau Planning District: Agriculture (A)
Anticipated Determination:	Finding of No Significant Impact ("FONSI")

Table of Contents

SECTION 1.0 INTRODUCTION

1.1 Project overview

The Baird Family Ltd. Partnership ("Baird") currently resides on the proposed project parcel located at tax map key no. (4) 4-4-013:002. The purpose of this project is to re-designate the County of Kaua'i ("County") General Plan ("General Plan") land use of this parcel from *Agriculture* to *Residential Community*.

The proposed site, situated in the Kawaihau District of Kaua'i, is in a region that extends from the ocean to the mountains. The town of Kapa'a, beach resorts of Wailua and Waipouli, residential homes, agricultural farms, grazing lands, and large open spaces comprise the region. Most of the uplands are in the district are homestead lands that are in rural and agricultural uses. A mix of long-term residents, newcomers, and visitors populate the region.

Samuel Mahelona Memorial Hospital, Kapa'a High School, Kapa'a Middle School Kapa'a Elementary School, Kapahi Park, and several small light industrial/commercial businesses are located to the east of the project site.

To the east of the project site is the Upper Kapahi Dam which was originally constructed in 1910, and which is slated to be replaced[1] by the State of Hawai'i ("State") with a new box culvert spillway under Kainahola Road. Construction work is currently in progress.

Location of parcel related to the Upper Kapahi Reservoir.

[1] In August 2014, the Applicant for the project was the Department of Accounting and General Services, State of Hawai'i.

SECTION 2.0 PROJECT DESCRIPTION

2.1 Location & TMKs

The Baird Family Ltd. Partnership parcel is located in the district of Kawaihau on the island of Kaua'i. The property is bounded to the north by Kawaihau Road, to the east and south by the Kainahola Road, and to the west by Hoomaha Place. The parcel is located approximately 4.8 miles mauka of Kūhiō Highway.

The project site is located at Tax Map Key (4) 4-4-13:002, a 3.38 acre parcel of land. Currently there is one structure (a dwelling) on the parcel. Concerning the property's County land use zoning designation, the subject parcel is split-zoned; approximately 1.4 acres is within the County *Agriculture (A) District*, and the balance, containing about 1.98 acres, is within the County *Open (O) District*. The property's current County of Kaua'i General Plan designation is *Agriculture*, and the property's State of Hawaii Land Use District ("SLUD") designation is *Agricultural*. The Project Location, Parcel/Tax Map Key, State Land Use District, General Plan, and the County Zoning maps are found in **Exhibits A, B, C, D and E**.

2.2 Proposed Action

The proposed action concerning the subject property will include three separate and independent land use actions:

(1) General Plan Amendment: Revision of subject property's General Plan designation from *Agriculture* to *Residential Community*;
(2) County Zoning Amendment: Re-zoning of entire parcel from *Agriculture* and *Open* to *Residential (R-1)*
(3) SLUD designation: Amending subject property's SLUD designation from Agriculture to *Rural*.

An amendment to the County of Kaua'i General Plan requires an Environmental Assessment.[2]

2.3 Environmental Review Trigger

The proposed amendment to the subject General Plan triggers the environmental review process as defined by Chapter 343, Hawai'i Revised Statutes ("HRS"). Therefore, an Environmental Assessment is required.

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[2] HRS §343-5 *Applicability and requirements.* (a) Except as otherwise provided, an environmental assessment shall be required for actions that: (6) Propose any amendments to existing county general plans where the amendment would result in designations other than agriculture, conservation, or preservation, except actions proposing any new county general plan or amendments to any existing county general plan initiated by a county.

2.4 Land Use Classification and Zoning

The 2010 population of the Kawaihau District was 20,992. Wailua/Kapa'a is the largest populated area on Kaua'i. Areas inland of the coast were subdivided during Territorial Government days for agricultural homesteads; the area is now transitioning from agricultural to residential use. Home building continues to increase as small land holdings are subdivided or submitted to condominium use pursuant to H.R.S. chapter 514B.

As previously stated, the subject property's State Land Use District designation is *Agricultural*, the County of Kaua'i General Plan land use designation is *Agriculture*, and the County zoning designation is *Agriculture* and *Open*. The State Land Use and General Plan maps are found in **Exhibits C** and **D** respectively.

Lands in the general area of the subject property, whose SLUD classification is *Agricultural*, are further classified by the Hawaii State Office of Planning ("Office of Planning") *Land Study Bureau* as ""C" or "D". Further, the Office of Planning's Agricultural Lands of Importance to the State of Hawaii ("ALISH") map classifies land in the general area of the subject property as "Unique" or "Other".

Kaua'i General Plan

The Kaua'i General Plan is a direction-setting policy document that is intended to serve as a guide to help plan and improve the physical environment and quality of life for the people of Kaua'i, and to address the overall development of the island. The General Plan also states the County's vision for Kaua'i and establishes the strategies to help achieve that vision.

According to the General Plan, Section 6.2.4.1, Land Use Map:

> *The Kawaihau Planning District has substantial capacity for additional residential development as described in Section 6.2.3.1 (Build-Out Analysis).*

The General Plan policy for growth is primarily for the Wailua and Kapa'a Homestead areas[3]. On the north side of Kawaihau Road near the subject property are three residentially zoned properties (R-1); one of these properties is across the street from the subject property.

County Comprehensive Zoning Ordinance

The purpose of the County's Comprehensive Zoning Ordinance ("CZO") is to provide regulations and standards for land development and the construction of

[3] Kaua'i General Plan, November 2000, page 6-14.

buildings and other structures in the County of Kaua'i. The regulations and standards prescribed in the CZO are intended to regulate development to ensure its compatibility with the overall character of the island.

The current County zoning for the project site is *Agriculture (A)* and *Open (O.)*

Article 4 of the Kaua'i County Code defines the purpose of *Residential Districts* (R) as:

> *(a) To establish standards governing the development, construction and use of housing and dwelling facilities.*
> ***(b) To provide opportunity for all groups of persons to obtain adequate housing within each area of the County suitable for residential use in relation to other land uses and consistent with the preservation of natural, scenic, and historic resources.*** [emphasis added]
> *(c) To establish the level of minimum services necessary to assure the adequacy of housing.*
> *(d) To encourage a variety of housing types, sizes and densities necessary to meet the needs of all economic groups and to avoid environmental monotony detrimental to the quality of life.*
> ***(e) To maintain the character and integrity of communities within residential districts and support residents in continuing to live and raise their families in these neighborhoods.*** [emphasis added]

2.5 Permits Required and Approvals

As described in Section 2.2 above, the following is a list of major land use approvals and permits required to implement the proposed project.

(1) General Plan Amendment: Revision of subject property's General Plan designation from *Agriculture* to *Residential Community*;
(2) County Zoning Amendment: Re-zoning of entire parcel from *Agriculture* and *Open* to *Residential (R-1)*
(3) State Land Use District ("SLUD") designation: Amending subject property's SLUD designation from *Agriculture*

2.6 Project Schedule & Approximate Cost

Tentative Project Schedule:	
Draft Environmental Assessment ("DEA") published by OEQC[4]	03-23-2016
DEA Public Comment Period (30 days)	03-25-2016
Final Environmental Assessment submitted to OEQC	04-25-2016

[4] "OEQC" means State of Hawaii Office of Environmental Quality Control, an office of the State's Department of Health ("DOH").

Application for GP amendment submitted to PC[5]	05-09-2016
General Plan amendment, Zoning amendment, and SLUD amendment submitted to Council	09-09-2016

At present, there are no construction costs associated with the proposed project.

SECTION 3.0 TECHNICAL CHARACTERISTICS AND PUBLIC SERVICES

3.1 Transportation, Circulation, Vehicular Access

Transportation and vehicular circulation in the Kapa'a area consists of Kūhiō Highway (State Highway No. 56), which is part of the National Highway System going from Kapule Highway in Lihue to Princeville. Roads running inland are under the jurisdiction of the County, providing access to *mauka* properties. The primary County roads exiting Kūhiō Highway to the subject property include Kawaihau Road and Mailihuna Road.

The project area on Kalihiwai Road is about 4.5 miles *mauka* of Kūhiō Highway.

3.2 Fire, Police and Medical Services

The nearest County of Kaua'i fire station, known as Kaiakea, is located on Kūhiō Highway just below Mahelona Hospital, less than 10 miles from the project site. Mahelona Hospital provides inpatient, outpatient, and long-term care services, in addition to emergency room services.

The County's Police Department headquarters are located in Lihue on Kaana Street, while the department's Kapa'a Substation is located at 4670 Kahau Road, also less than 10 miles from the Baird property.

3.3 Sewage Treatment and Disposal

The current residential structure on the parcel was constructed around 1973. It currently has two cesspools. New structures on the parcel would require septic systems to be installed in accordance with applicable State Department of Health ("DOH") requirements.

3.4 Solid Waste

The County maintains an island-wide system of solid waste collection and disposal. Solid waste generated by the current project is picked up by the County and taken to either the Kapa'a Transfer Station[6] or to the County's main landfill in

[5] "PC" means Kauai County Planning Commission.
[6] Refuse from this transfer station is also taken to the County's principal landfill in Kekaha.

Kekaha. There is also a recycling station and a greenwaste diversion site in Kapa'a. The recycling station is one of six around the island operated by private contractors, which receives newspaper, glass, aluminum, and paper products. The recycling stations help relieve the increasing volume of solid waste taken to the County's principal landfill.

3.5 Water Supply Facilities

The County's Department of Water provides potable water service throughout the island. Water lines are generally located in the streets and distribute potable water for domestic and commercial consumption as well as fire protection. The existing transmission lines in the project area connect to these municipal systems. Concerning the subject parcel, two new, recently installed ⅝" water meters are available to serve the two new possible parcels that are proposed to ultimately result from the land use changes resulting from this project.[7] Any new service lines required in the future will be designed and constructed in accordance with the applicable standards and conditions of the County's Department of Water.

3.6 Utilities: Electrical, Telephone, and Cable

Kaua'i Island Utility Cooperative ("KIUC") provides power to the entire island. The Kawaihau region is served by a tap off the *mauka* transmission line that connects to the Wainiha Hydroelectric Plant on the north shore and with Port Allen to the west. The tap provides power to Kapa'a Town, other developed coastal areas, and residential communities in the Kapa'a and Wailua homestead areas.

Hawaiian Telcom has telephone lines along Kūhiō Highway and up Kawaihau Road. Cable television is provided by Oceanic Time-Warner. Both Hawaiian Telcom and Oceanic Time-Warner provide internet service in the Kapa'a area, including service to the subject area.

3.7 Schools, Libraries and Recreational Facilities

There are several public schools in the Kapa'a area including Kapa'a Elementary, Middle, and High School. The Kapa'a Public Library is located on Kūhiō Highway in Kapa'a town.

Lydgate Park, a regional park, is located in Wailua. On Kawaihau Road, about two miles makai of the project is the Kapahi Park. Located within this park are a little league and soccer field, playground equipment, and a comfort station.

[7] A total of three ⅝" water meters currently serve the entire subject parcel.

SECTION 4.0 SOCIO-ECONONIC CHARACTERISTICS

4.1 Demographic Data

The 2010 population for Kaua'i was 67,091 persons, and the population in the Kawaihau District was 20,992 persons. Within the Kapa'a Census Designated Place ("CDP") area, there were 10,699 persons.[8]

Kapa'a Census Designated Place (CDP 403)	2010 Census Data:
Households	3,501 households
Persons per household 2009-2013	2.97 persons
Median Household Income 2009-2013	$60,362

In 2010 the Kapa'a white-alone population was 38%, the population of two or more races was 29%, and the population of Asian-alone was 27%.

4.2 Historic, Cultural and Archaeological Resources

Kapa'a's modern history roots were with the sugar plantations, and later, with rice and pineapple cultivation, and finally with small businesses. Sugar was introduced in 1877 and a mill was constructed in Kapa'a. The mill was later abandoned with the consolidation of sugar operations at the Makee Sugar Company mill in Kealia. Swampy lands in Kapa'a owned by the government were leased by rice farmers in the 1920s. As the sugar industry declined and worker contracts expired, private and government land became available for homesteading.[9]

No known historic or archaeological resources occur on the site. As the project moves forward through the permitting process, the State Historic Preservation Division ("SHPD") of the Department of Land and Natural Resources ("DLNR") will be consulted.

In the Kapa'a area, listed on the State and National Register of Historic Places are: the Opaekaa Road Bridge, the Pu'u'opae Bridge, and the Seto Building.

SECTION 5.0 ENVIRONMENTAL CHARACTERISTICS

5.1 Air Quality and Noise

According to the State Department of Health, the current air quality on Kauai is characterized as "good". The DOH maintains an air quality monitoring station approximately 10 miles south of the project area. Minimal noise occurs from local residential traffic and activities from some nearby residences and farmlands.

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[8] State of Hawai'i 2010 Data Book: http://dbedt.hawaii.gov/economic/databook/2010-individual/_01/

[9] Wilcox, Carol, *The Kaua'i Album*. Kaua'i Historical Society, 1981.

Potential Impacts and Mitigation Measures

The proposed amendment to the General Plan will not affect air quality or substantially affect noise in the area. If and when additional dwellings or other structures are constructed on the subject property as a result of the land use designation changes sought, there may however be short-term temporary increases in noise and dust during construction of such dwellings or structures.

5.2 Biological, Flora, and Fauna Resources

A biological survey in the area of the Upper Kapahi Dam Replacement Project situated at tax map key no. (4) 4-6-007-011 (which is adjacent to the project site) was conducted AECOS, Inc. a Hawaii environmental consulting firm.[10] The survey identified 105 plant taxa, only three of which were native plants common in Hawai'i: *hau*, *hala*, and possibly a small grass (*manienie*). Several grass species were abundant in the surveyed area. Fauna detected in the surveyed area included 21 species, with two endemic waterbird species listed as endangered under both federal and state endangered species statutes. The two species were the Hawaiian Coot (*Fulica alai*) and the Common Gallinule (*Gallinula galeata sandvicensis*).

Potential Impacts and Mitigation Measures

The project area itself has been subjected to disturbance for many years by agricultural uses, traditional maintenance of the residential structure, introduced landscaping, and various yard and property maintenance activities. No known rare, threatened or endangered floral or faunal species or their habitats are known to exist on the site. Other than landscaping with native or indigenous drought tolerant species, no significant impacts to flora or fauna species are anticipated, and no mitigation measures are proposed.

5.3 Climate, Rainfall and Wind

The last month of the year 2013 saw most of the gages on Kauai reporting near to above average rainfall totals. The U.S. Geological Survey's ("USGS") gage atop Mount Waialeale recorded the highest monthly total of 18.81 inches (62 percent of average) and the highest daily total of 4.38 inches on December 1, 2013. Port Allen's total of 12.04 inches marked the wettest month at this site since December 2008.

Rainfall totals for 2013 ended up in the near average range at most of Kauai's rain gages. Mount Waialeale's 316.70 inches (80 percent of average) was the highest

[10] The "Biological Surveys for Upper Kapahi Dam Replacement Project" was conducted in December 2013 and January 2014. Available online at: http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Kauai/2010s/2014-08-23-KA-5B-FEA-Upper-Kapahi-Reservoir-Dam.pdf . See page 230 for report.

annual total in the state, though it also marked the seventh consecutive year where the running 30-year average has decreased.[11] For the Kapahi area the annual average was 97.43 inches.

The project site faces the predominant northeast tradewinds of the Kapa'a coastline. These winds are typically breezy; the air is generally warm with temperatures averaging 70°F throughout the year.

Potential Impacts and Mitigation Measures
The proposed project is not expected to have an impact on climate conditions; as such, no climate mitigation measures are planned.

5.4 Hazards: Flooding, Hurricanes and Tsunami

All developments in the State are subject to the risk of natural hazards such as earthquakes, volcanic eruptions, flooding, and hurricanes. Since 1982, the State of Hawai'i, and especially Kaua'i as the northernmost in the main island chain, has been affected twice by devastating hurricanes, Iwa in 1982 and Iniki in 1992. While it is difficult to predict these natural occurrences, it is reasonable to assume that these events could recur.

The project area is no more or less vulnerable that the rest of the island to the destructive winds and torrential rains associated with hurricanes.

Flood hazards are primarily identified by the Flood Insurance Rate Map ("FIRM")[12] prepared by the Federal Emergency Management Agency ("FEMA"). The project site is outside the FEMA flood designations and is listed on the FIRM map as Zone X. Zone X is an area determined to be outside of the 0.2% annual chance floodplain. No base flood elevations or depths are shown within these zones. It is not in a tsunami inundation zone.

A *Flood Study*[13] of the project area was prepared by Hawai'i licensed engineers to determine flood limits, drainage ways, and building setback lines applicable to the subject property. This study is attached as **Appendix A. Attached as Appendix B** is a July 28, 2015 letter from the County's Department of Public Works' ("DPW") Engineering Division accepting the *Flood Study* as final.

Potential Impacts and Mitigation Measures
Although hurricanes and earthquakes cannot be prevented, their impacts will be mitigated, and any future subdivision of the property or submission of the

[11] Pacific Region Headquarters, National Oceanic and Atmospheric Administration. Available at: http://www.prh.noaa.gov/hnl/hydro/pages/dec13sum.php

[12] National Flood Insurance Program, flood maps available at: http://gis.hawaiinfip.org/FHAT/

[13] See *Final Flood Study Mark Baird (August 2015).*

property to a condominium property regime and construction of new dwellings will comply with applicable law, including the Uniform Building Code adopted by the County. County and State civil defense requirements will be adhered to as to evacuation procedures, and building specifications of future dwellings and other improvements will conform to the County's Uniform Building Code.

Future dwellings and other improvements will accommodate the flood limits and other recommendations, if any, described in the *Flood Study* attached as **Appendix A**.

Increased runoff from additional structures will be mitigated by including on-site retention/detention basins or other drainage features, if deemed necessary as a matter of engineering judgment or because of requirements imposed by government regulatory agencies. Additional information regarding flooding, drainage ways, etc. concerning the subject property is provided in **Appendix A**.[14]

5.5 Geology, Topography, Soils

The Hawaiian Islands are at the southeast end of a chain of volcanic seamounts and islands that began to form more than 70 million years ago.

Kaua'i, the oldest of the major Hawaiian Islands and the most weathered or eroded geologically, consists of at least one extinct volcano. Lavas from the shield, post shield, and rejuvenated stages formed the island. Over time, numerous landslides and long-term erosion have modified Kaua'i's northern, northeaster, eastern and southern flanks.

The topography of the project area generally slopes from its western elevation of about 400 feet to the eastern elevation of about 350 feet.[15]

The project is situated on the eastern side of Kaua'i, west (mauka) of Kūhiō Highway. According to the *General Soil Map*[16] for Kaua'i, soil associations in the general area the project site may have the following characteristics:

> *Kapa'a-Pooku-Halii-Makapili association: Deep, nearly level to steep, well drained and moderately well drained soils that have a fine textured or moderately fine textured subsoil; on uplands.*

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[14] The *Flood Study* describes, among other matters, local drainageways, facilities, and/or easements within and adjacent to the proposed project, flood information, and determines flood limits on the subject property.

[15] See Appendix A. Elevations on the parcel are described in the *Final Flood Study Mark Baird (August 2015)* prepared by Esaki Surveying & Mapping, Inc.

[16] U.S. Department of Agriculture Soil Conservation Service *General Soil Map*, Kaua'i Island, Hawai'i, available at: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/hawaii/islandsHI1972/maps/gsm_1.pdf

The elevation ranges from 100 to 1,000 feet. The annual rainfall is 70 to 200 inches. The mean annual soil temperature is between 72° and 74° F. This association is used for sugarcane, pasture, pineapple, woodland, wildlife habitat, and water supply. Pooku and Makapili soils are used mainly for pasture, Kapa'a soils for sugarcane, and Halii soils for water supply. Upland game birds and wild pigs are the principal kinds of wildlife.

Rough mountainous land-Rough broken land-Rock outcrop association: Well-drained to excessively drained, very steep to precipitous lands of mountains and gulches.

The elevation ranges from near sea level to 5,170 feet. The annual rainfall amounts to as little as 22 inches in leeward lowlands and as much as 450 inches over windward slopes of Mr. Waialeale. The association is used for water supply, pasture, woodland, and wildlife habitat. Rough mountainous land and Rock outcrop serve mainly as watershed.

Potential Impacts and Mitigation Measures

The project area has been subject to man-made maintenance activities for many years. Significant adverse impacts to soils, geology, and natural water features are not expected from this project.

No water resources are expected to be affected by the project. No measures to mitigate impacts to water resources are proposed or planned, unless such measures are deemed necessary as a matter of engineering judgment or because of requirements imposed by government regulatory agencies.

A watering program will be implemented during construction to minimize soil loss through fugitive dust emission. Landscaping and yard maintenance of the current parcel will continue so as to reduce any potential for soil erosion. Other mitigation measures generally associated with best management practices will be followed.

SECTION 6.0 ALTERNATIVES TO THE PROPOSED ACTION

"No Action" Alternative

The purpose of the amendment to the General Plan is to change the designation of subject property from *Agriculture* to *Residential Community*. This revision will then allow the parcel's SLUD to be eligible to be changed from *Agriculture* to *Rural* , and the property's County land use zoning designation to be eligible to be changed from *Agriculture* and *Open* to *Residential (R-1)*. Upon such changes, the subject parcel would have density of two dwellings in addition to the parcel's existing dwelling. Applicant desires his property to have a total density of three

dwellings for estate planning purposes.[17] Upon achieving the desired land use zoning changes, Applicant may also consider subdividing his property or submitting it to a condominium property regime pursuant to H.R.S. chapter 514B, again for estate planning purposes.

A "No Action" alternative would prevent the subject parcel's density from being increased from one to a total of three dwellings, and frustrate Applicant's estate planning intentions with regard to this property.

Preferred Alternative

The preferred alternative is to change the subject parcel's General Plan designation from *Agriculture* to *Residential Community* to facilitate the Applicant's ability to then attempt to change the parcel's SLUD and County zoning designations as previously described.

Allowing the subject parcel's General Plan designation to be changed to *Residential Community* will facilitate Applicant's desire to achieve his estate planning goals.

Again, Applicant ultimately seeks to change the subject parcel's County land use zoning designation to *R-1*; noteworthy is that other parcels in the area of the subject parcel, including a parcel across the street from the subject parcel, are zoned *R-1*. As such, rezoning of the subject parcel to *R-1* is not inconsistent with the existing land use zoning of some other parcels in the area.

As some other parcels in the general area have been re-zoned to *Residential District*, the desired land use zoning changes would provide opportunities for landowners and families, such as the Applicant, to provide housing for members of our community.

SECTION 7.0 SIGNIFICANT DETERMINATION

The impacts of the proposed action have been assessed. The proposed project is not anticipated to cause significant negative impacts to the environment. Therefore, a Finding of No Significant Impact ("FONSI") is anticipated to be found. The determination of a FONSI is based on the following:

1. ***The proposed action does not involve an irrevocable commitment to loss or destruction of any natural or cultural resources;***
   No significant natural or cultural resources have been identified on the property since the construction of the existing residence in 1974.

[17] Currently, Applicant's ultimate plan contemplates dividing the subject property into three subdivided lots or condominium units to facilitate Applicant's ability to convey three separate lots or units to each of his offspring, with accompanying density of one dwelling for each of the lots or units so created.

2. ***The proposed action will not curtail the range of beneficial uses of the environment;***
   The proposed action is only to change the subject parcel's General Plan designation from *Agriculture* to *Residential Community*; this change is not expected to curtail the range of beneficial uses of the environment.

3. ***The proposed action does not conflict with the State's long-term goals or guidelines as expressed in Chapter 344, HRS, the State Environmental Policy;***
   This proposed action is consistent with the State's guidelines and will not have any significant negative effects on the environment.

4. ***The proposed action does not substantially affect the economic or social welfare of the community or state;***
   The proposed action will not substantially affect the economic or social welfare of the community or state.

5. ***The proposed action does not substantially affect public health;***
   A *General Plan* re-designation of the subject parcel from *Agriculture* to *Residential Community* will not have any effects on public health, as the proposed action involves only a change in the parcel's General Plan land use designation only.

6. ***The proposed action does not involve substantial secondary effects;***
   No substantial secondary effects from the General Plan re-designation are anticipated to occur.

7. ***The proposed action does not involve substantial degradation of environmental quality;***
   The proposed action on this application does not involve substantial degradation of environmental quality.

8. ***The proposed action does not cumulatively have a considerable effect on the environment or involve a commitment to larger actions;***
   The proposed project will not cumulatively have a considerable effect on the environment. Inasmuch as the proposed action is only the first step amongst additional discretionary government regulatory approvals and steps needed to achieve Applicant's ultimate goal- to re-zone applicant's property to *R-1*, the proposed action does not involve a commitment to larger actions.

9. ***The proposed action does not affect a rare, threatened, or endangered species or its habitat;***

Rare, threatened, or endangered species or its habitat will not be affected by this proposed action, inasmuch as none have been identified on the subject parcel.

10. ***The proposed action does not detrimentally affect air or water quality or ambient noise levels;***
The proposed action will not detrimentally affect air or water quality or substantially affect ambient noise levels. *See* Section 5.1 of this document.

11. ***The proposed action does not affect an environmentally sensitive area;***
The project site is not considered an environmentally sensitive area. There are no rare, threatened, or endangered native plants species specifically located on the subject parcel.

12. ***The proposed action does not substantially affect scenic vistas and view planes; and***
The subject parcel has not been specifically identified as a scenic resource; therefore the proposed action will not substantially affect scenic vistas and view planes.

13. ***The proposed action does not require substantial energy consumption.***
The current proposed project will not require substantial energy consumption.

SECTION 8.0 CONSULTED PARTIES

County of Kaua'i, Department of Planning
Kapa'a Public Library
Līhu'e Public Library

SECTION 9.0 REFERENCES

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SECTION 10.0 EXHIBITS

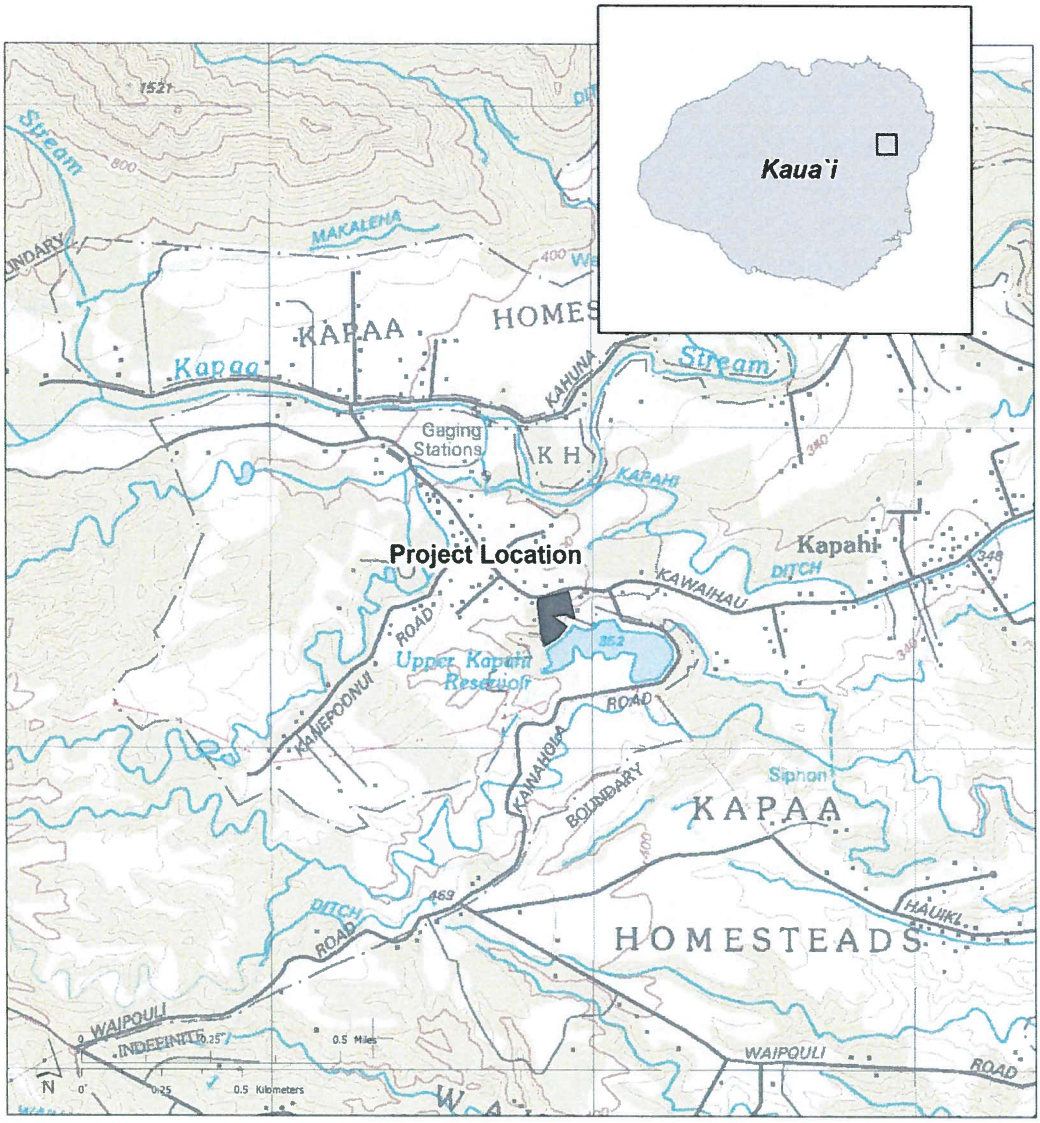
A - Location Map
B - Parcel Map/Tax Map Key (4) 4-4-013:002
C - State of Hawai'i Land Use District Map
D - County of Kaua'i General Plan Map
E - County of Kaua'i Zoning Map

SECTION 11.0 APPENDICES

Appendix A: *Final Flood Study Mark Baird*, Esaki Surveying & Mapping, August 2015.

Appendix B: County of Kaua'i, Department of Public Works letter dated July 28, 2015, regarding acceptance of the *Final Flood Study Mark Baird*.

EXHIBITS A – E



Baird Family Ltd. Partnership.
4-976 Kūhiō Highway
Kapa'a, HI 96746

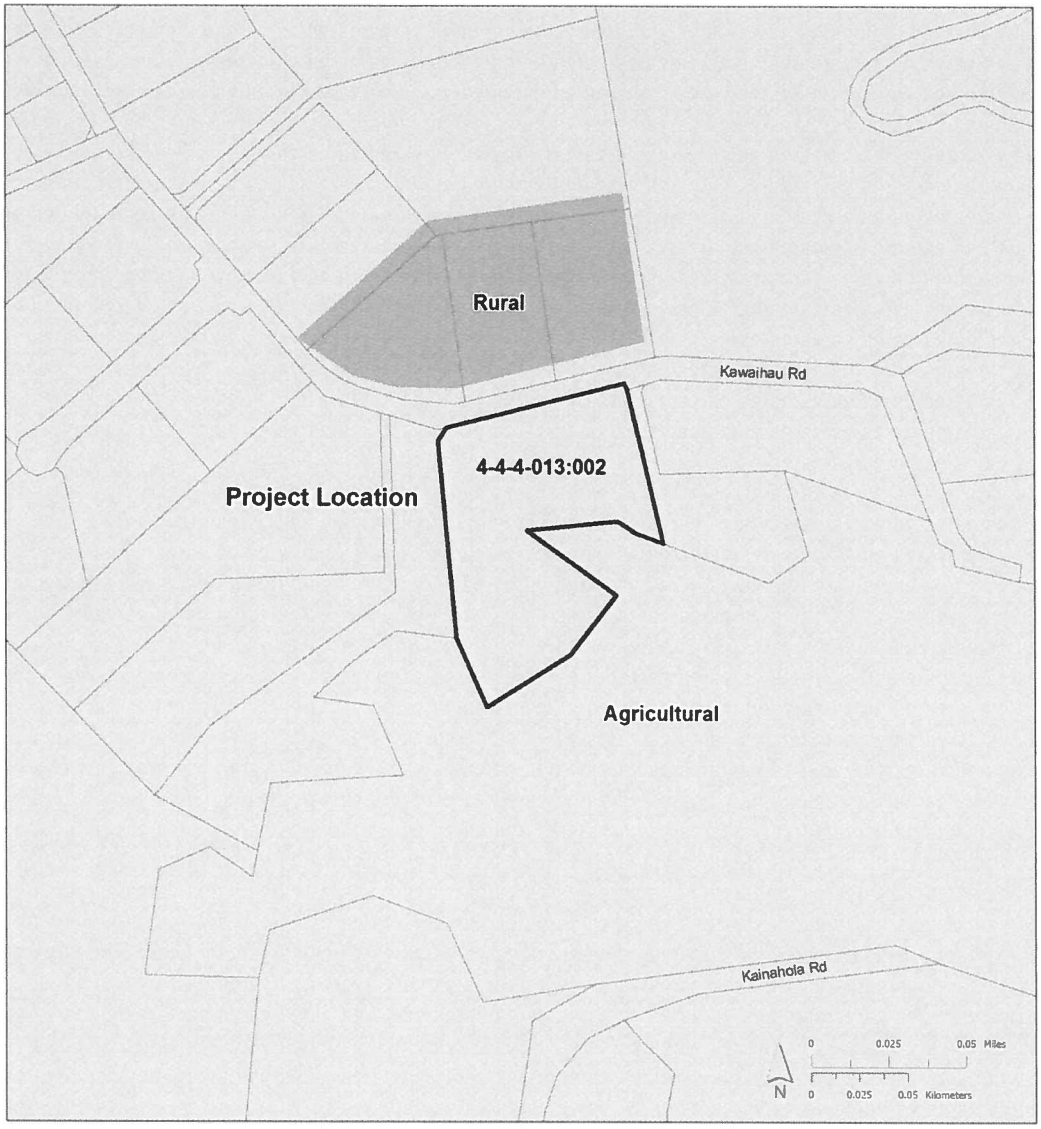
Exhibit A

Location Map

Baird Family Ltd. Partnership.
4-976 Kūhiō Highway
Kapa'a, HI 96746

Exhibit B

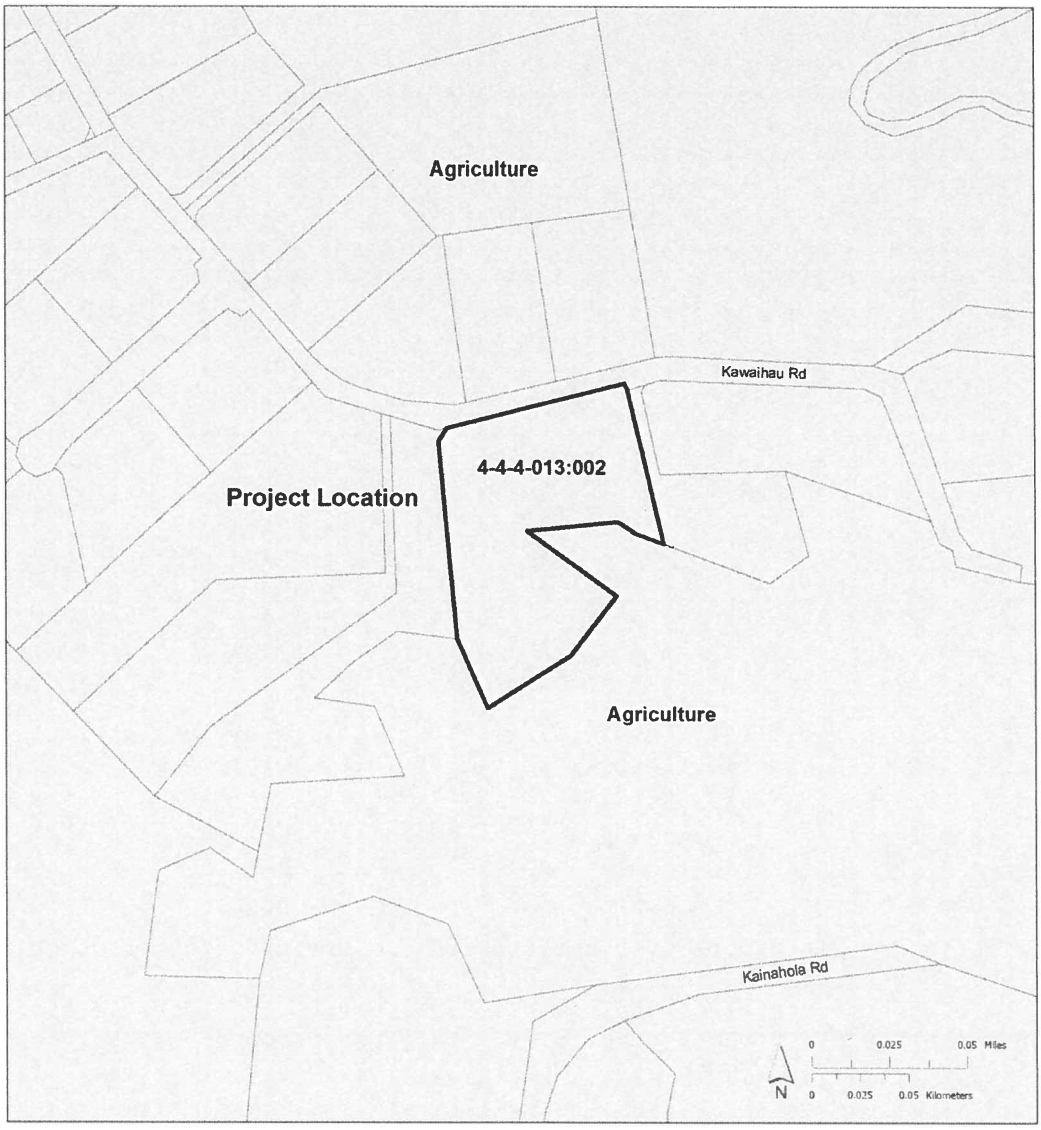
TMK (4) 4-4-013:002 Map



Baird Family Ltd. Partnership.
4-976 Kūhiō Highway
Kapa'a, HI 96746

Exhibit C

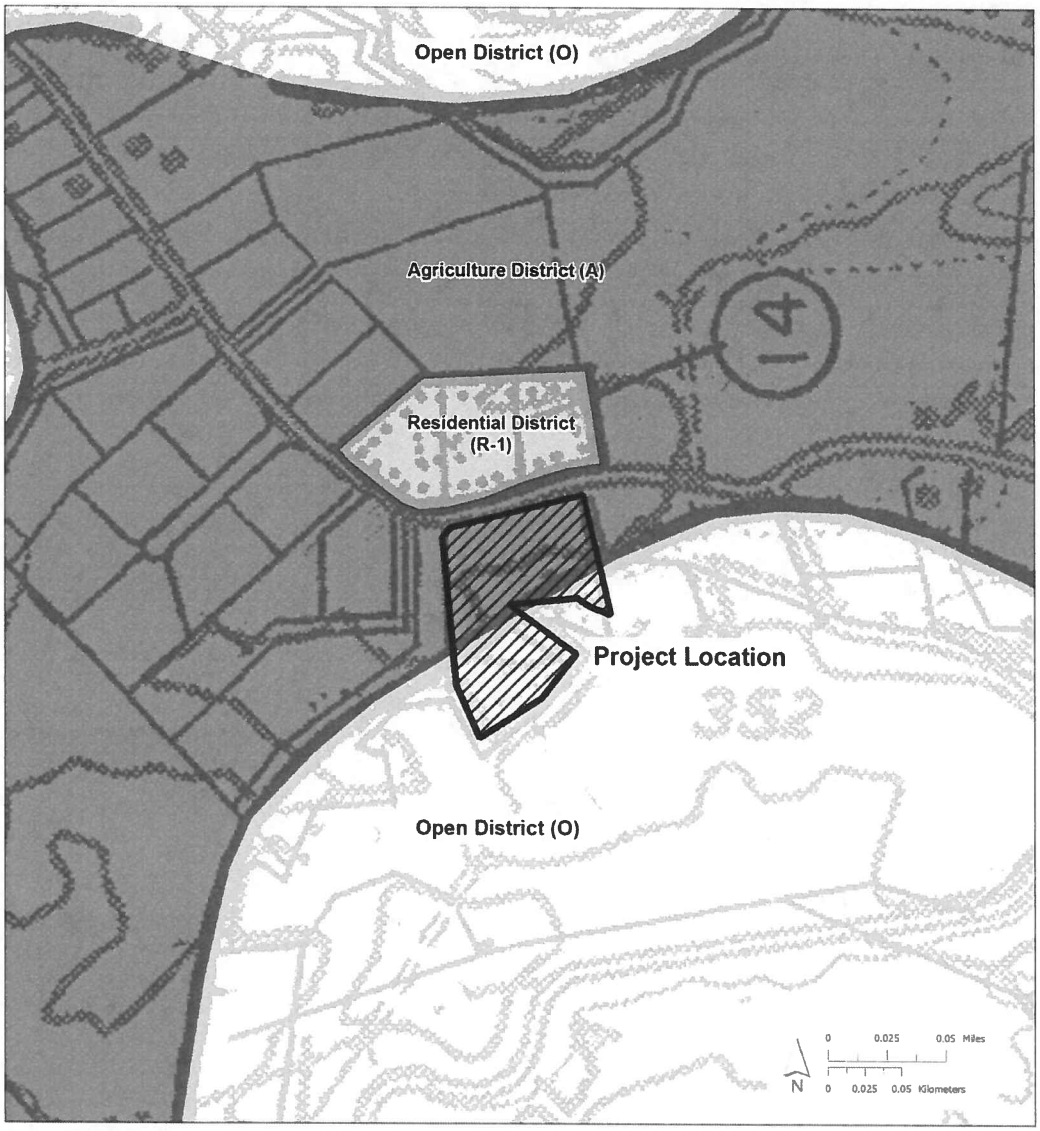
State of Hawai'i
Land Use District Map



Baird Family Ltd. Partnership.
4-976 Kūhiō Highway
Kapa'a, HI 96746

Exhibit D

County of Kaua'i
General Plan Map



Baird Family Ltd. Partnership.
4-976 Kūhiō Highway
Kapa'a, HI 96746

Exhibit E

County of Kaua'i
Zoning Map

APPENDICES "A" & "B"

Appendix A

Final Flood Study- Mark Baird

Esaki Surveying & Mapping, Inc.
August 2015

FINAL FLOOD STUDY
MARK BAIRD

Owner: Mark Baird
Tax Map Key: (4) 4-4-13: 02
Date: August 2015

Brandon K. Fujishige

This work was prepared by
me or under my supervision
Expires: April 30, 2016

ESAKI SURVEYING & MAPPING, INC.
1610 Haleukana Street
Lihue, Kauai, Hawaii 96766

TABLE OF CONTENTS

I. FACTS SHEET

FACTS SHEET

General Location and Description

1. Name of town: Kapa`a
2. Tax Map Key: (4) 4-4-13: 02
3. Names of local streets within and adjacent to the proposed project: Kawaihau Road
4. Identification of major and local drainageways, facilities, and/or easements within and adjacent to the proposed project: see Flood Limits Map (sheet 24)
5. Names of surrounding developments: the project is located within Kapa`a Homesteads, Second Series
6. Flood Information: See this report
7. Property Boundaries: see Location Map (sheet 7)
8. Area of property in acres: 3.377 acres
9. Ground cover (type of trees, shrubs, vegetation, general soil conditions, topography and average slope): typical agricultural lot; see Flood Limits Map (sheet 24) for topography and slope
10. General project description: the project involves determining flood limits on the subject property
11. Proposed land use: agricultural

Hydrologic map and data for the existing drainage condition

See this report

Hydrologic map and data for the proposed onsite and offsite drainage improvements

N/A

Drainage Report Items

1. Plan and profile of proposed onsite and offsite drainage improvements: N/A
2. Drainage sub-areas and discharges: Yes
3. Catch basin/drain inlet interception and bypass rates: N/A
4. Street flooding or dry pavement widths: N/A
5. Design flows between manholes and catch basin inlets: N/A
6. Hydraulic grade lines in culverts, manholes and catch basin inlets: N/A

7. Hydraulic grade lines and velocities at outlet structures: N/A

8. Detention basin hydrology and hydraulics: N/A

9. Drainageway and building setback lines and/or floodway, flood fringe and flood elevation lines: Yes

10. Description of changes to existing drainage patterns on adjacent and downstream properties and "unreasonable risk": N/A

Conclusions

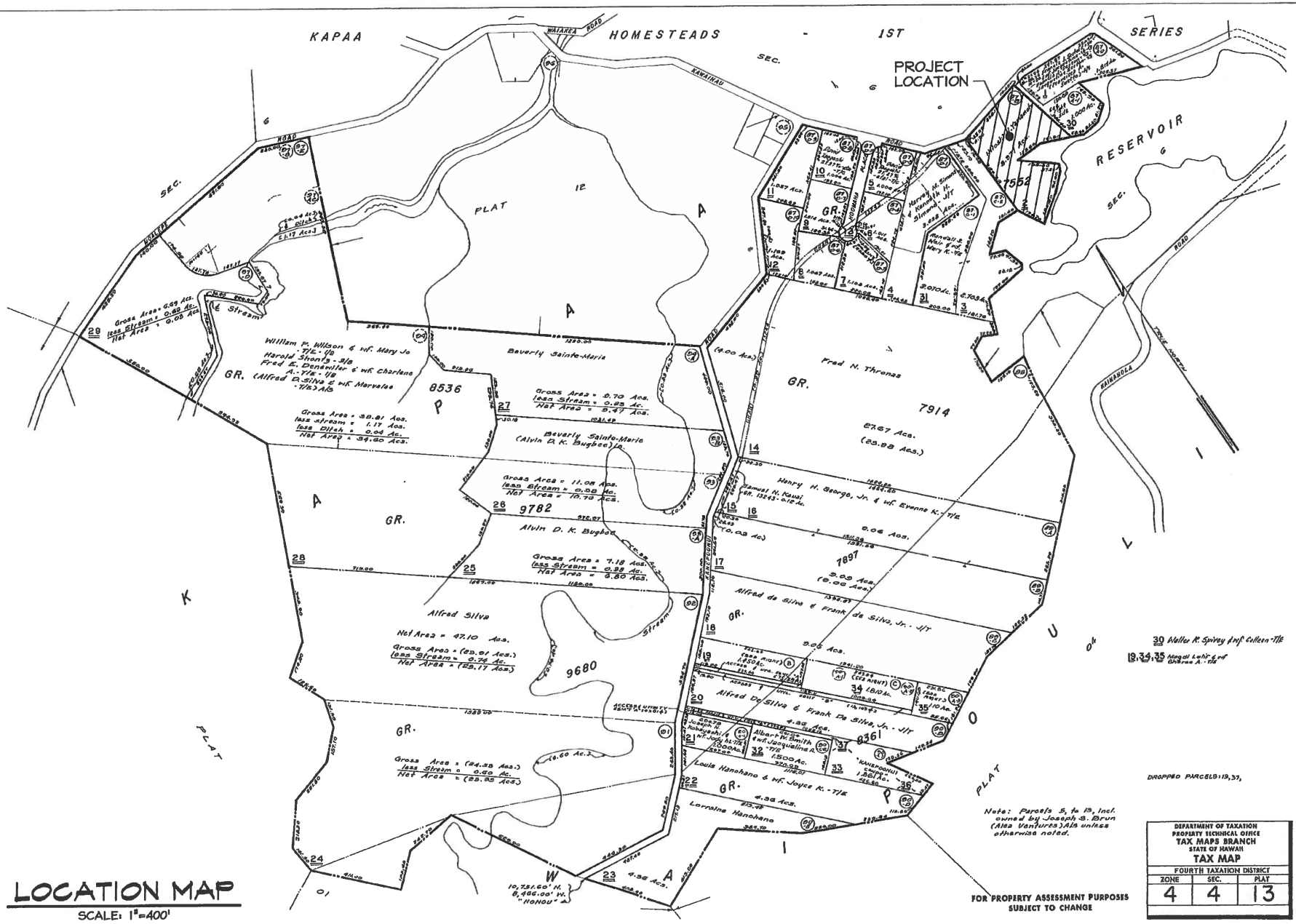
1. Compliance with the MANUAL: Yes

2. The Drainage Concept will not adversely affect adjacent and downstream properties: Yes

II. PURPOSE

PURPOSE

This report is being done to determine flood limits on the subject property.



LOCATION MAP

SCALE: 1"=400'

DEPARTMENT OF TAXATION
PROPERTY TECHNICAL OFFICE
TAX MAPS BRANCH
STATE OF HAWAII

TAX MAP

FOURTH TAXATION DISTRICT

ZONE	SEC.	PLAT
4	4	13

III. RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS

The Rational Method was used to compute the runoff from the drainage basins (see Drainage Basin Map, sheet 10).

Rational Method: $Q(cfs) = C \times i \times i_{CF} \times A$

Q = Flow Rate in cubic feet per second
C = Runoff Coefficient
i = 1-Hour Rainfall for the design recurrence interval
i_{CF} = Intensity Correction Factor
A = Drainage Area in acres

Runoff Coefficient (C):

Residential (R-1)
$C_{100} = 0.40$

Rainfall Intensity (i):

$i_{100} = 5.9$ inches

Intensity Correction Factor (i_{CF}):

A minimum of 6 minutes Time of Concentration was used in determining the Intensity Correction Factor.

$i_{CF;1} = 2.5$
$i_{CF;2} = 1.9$

Area (A):

$A_1 = 6.70$ acres
$A_2 = 66.26$ acres

Runoff (Q):

$Q_1 = C_{100} \times i_{100} \times i_{CF;1} \times A_1$
$= 0.40(5.9)(2.5)(6.70)$
$= 39.53$ cfs
$Q_2 = C_{100} \times i_{100} \times i_{CF;2} \times A_2$
$= 0.40(5.9)(1.9)(66.26)$
$= 297.11$ cfs

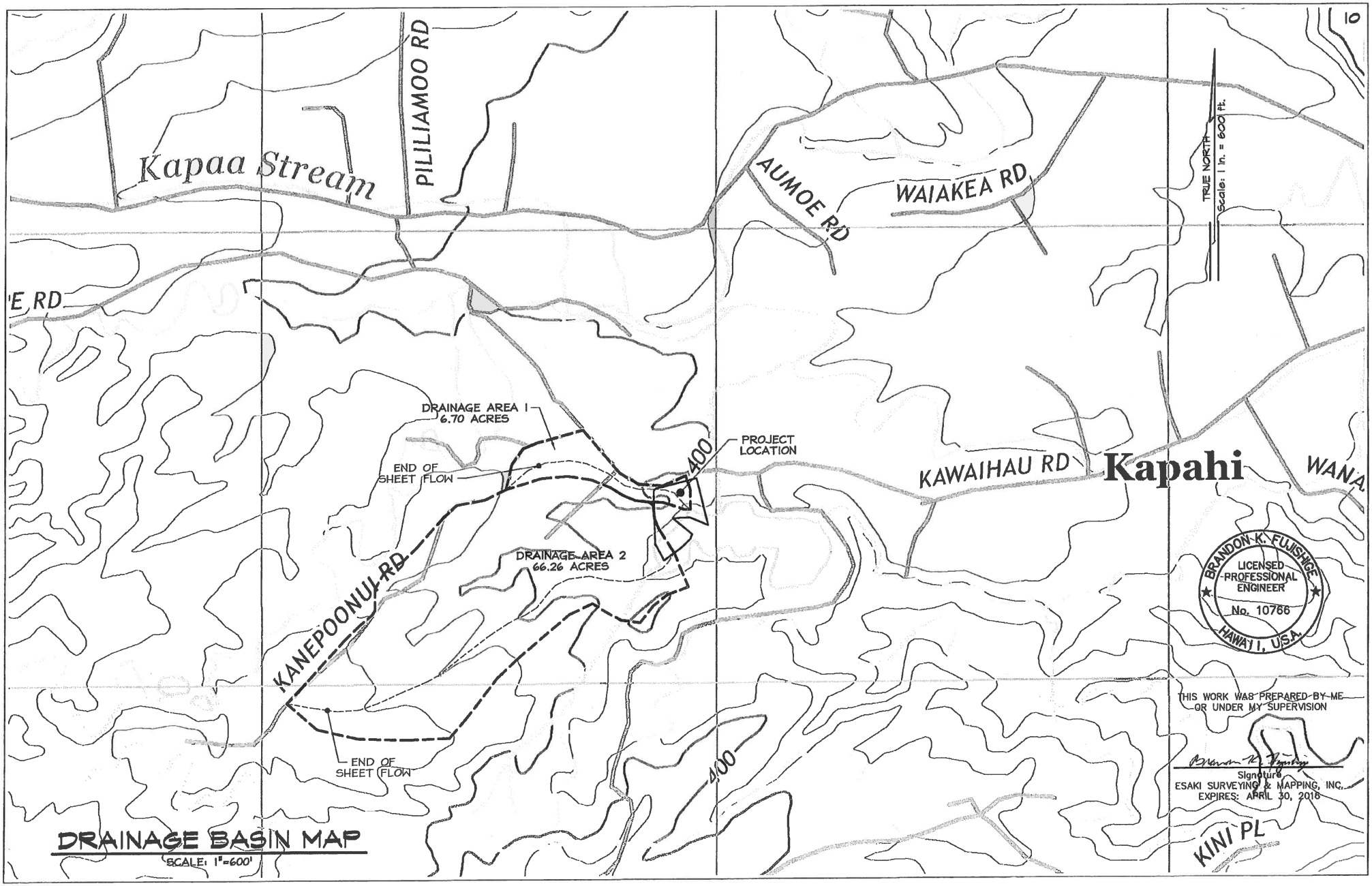

10
Kapaa Stream
PILILIAMOO RD
AUMOE RD
WAIAKEA RD
TRUE NORTH
Scale: 1 in. = 600 ft.
E RD
DRAINAGE AREA 1
6.70 ACRES
END OF
SHEET FLOW
PROJECT
LOCATION
400
KAWAIHAU RD
Kapahi
WANA
DRAINAGE AREA 2
66.26 ACRES
KANEPOONUI RD
END OF
SHEET FLOW
400
KINI PL
BRANDON K. FUJISHIGE
LICENSED
PROFESSIONAL
ENGINEER
No. 10766
HAWAII, U.S.A.
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
Signature
ESAKI SURVEYING & MAPPING, INC.
EXPIRES: APRIL 30, 2018
DRAINAGE BASIN MAP
SCALE: 1"=600'

Table 1

TYPICAL RUNOFF COEFFICIENTS FOR BUILT-UP AREAS

LAND USE OR SURFACE CHARACTERISTICS	AVERAGE* PERCENT IMPERVIOUS	STORM FREQUENCY "C" 2	100
Business:			
General Commercial	90	0.82	0.84
Neighborhood Commercial	70	0.60	0.80
Residential:			
R-1	10	0.20	0.40
R-2	20	0.38	0.55
R-4	50	0.43	0.70
R-6	50	0.45	0.75
R-10	50	0.50	0.80
R-20	50	0.55	0.80
5 Acre Lot	8	0.15	0.30
Industrial:			
Limited Industrial	80	0.71	0.82
General Industrial	90	0.80	0.90
Parks, Cemeteries:	7	0.10	0.45
Playgrounds:	13	0.15	0.50
Schools:	50	0.45	0.70
Streets:			
Paved	100	0.87	0.93
Unpaved	95	0.80	0.90
Driveways and Walks:	96	0.87	0.93
Roofs:	90	0.80	0.90
Lawns, Sandy Soil:	0	0.00	0.20
Lawns, Clayey Soil:	0	0.05	0.50

NOTE: (These Rational formula coefficients may not be valid for large basins. These coefficients are also average values and may require adjustments depending on the surface characteristics, soil type, slope, infiltration, evaporation, depression storage, etc. The Engineer shall use sound engineering judgement in selecting the proper coefficient(s).) For composite drainage areas compute "weighted" Rational formula coefficient(s).

*** Average impervious areas do not correlate directly to allowable impervious area.**

PLATE 1

Drainage Area 1

BRANDON K. FUJISHIGE
LICENSED PROFESSIONAL ENGINEER
No. 10766-C
HAWAII, U.S.A.

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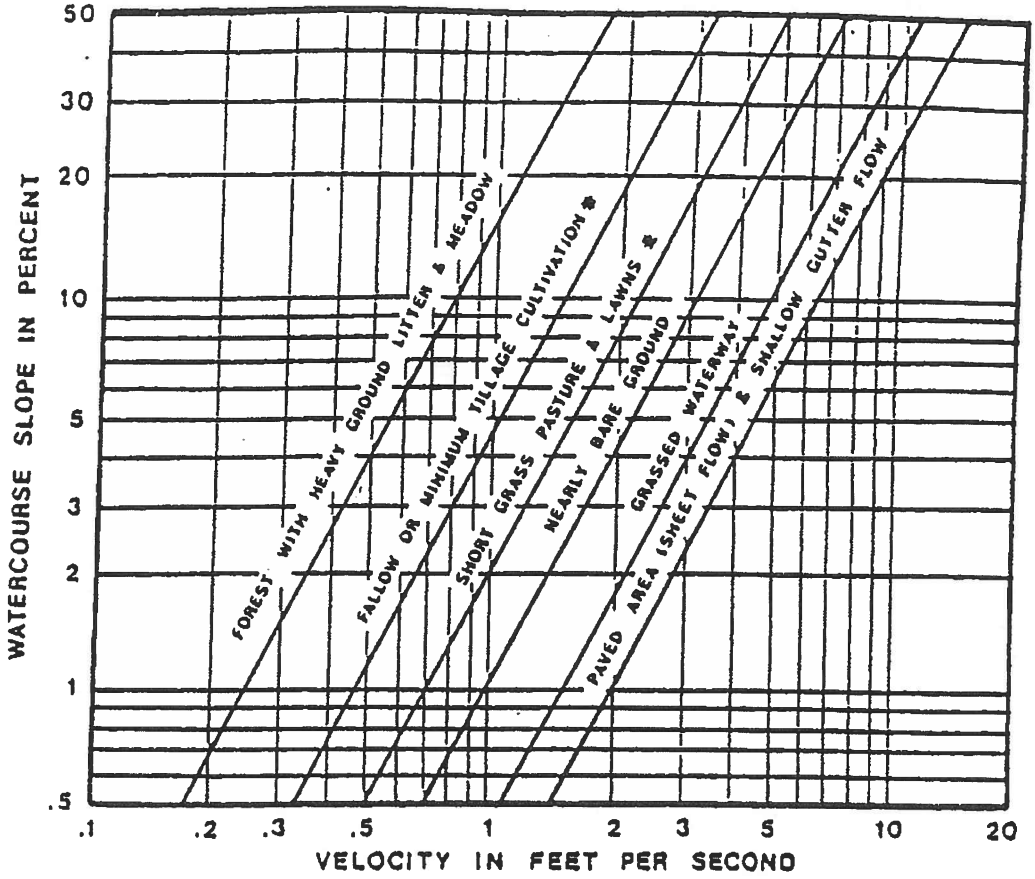
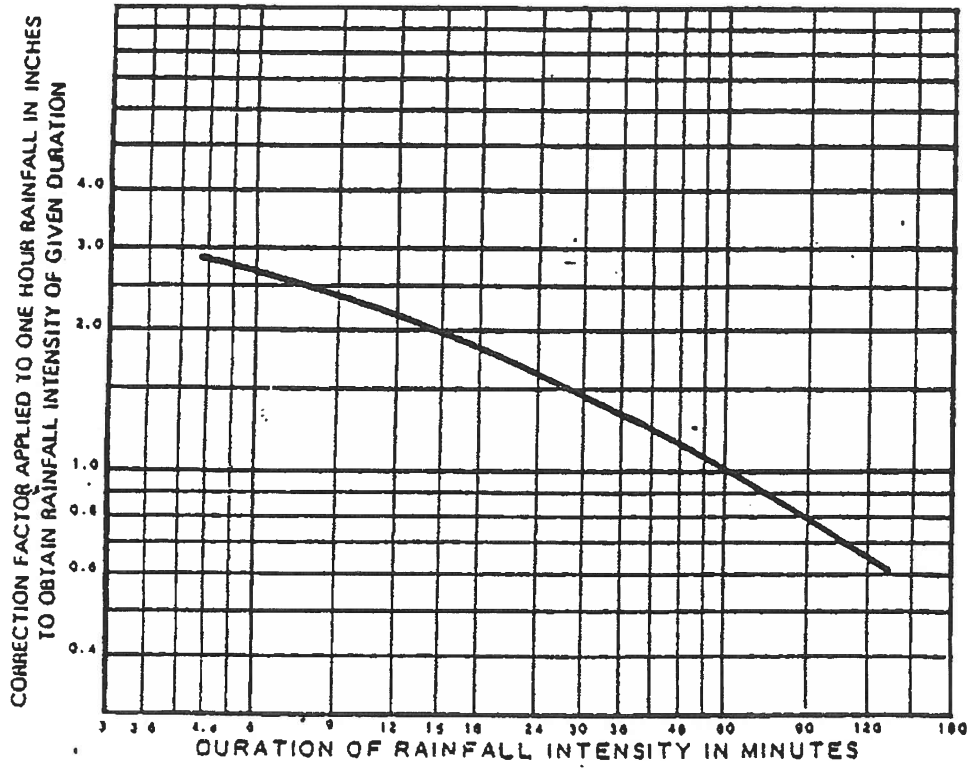
L_{Total} = 1,517 ft.
S_1 = 0.0393 ft./ft.
L_1 = 300 ft.
Nearly Bare Ground
V = 1.95 fps
$T_{C,1}$ = 2.56 minutes
S_2 = 0.0625 ft./ft.
L_2 = 1,217 ft.
Grassed Waterway
V = 3.82 fps
$T_{C,2}$ = 5.31 minutes
$T_{C,Total}$ = 7.87 minutes



ESTIMATE OF AVERAGE FLOW VELOCITY FOR USE WITH THE RATIONAL FORMULA.

PLATE 2



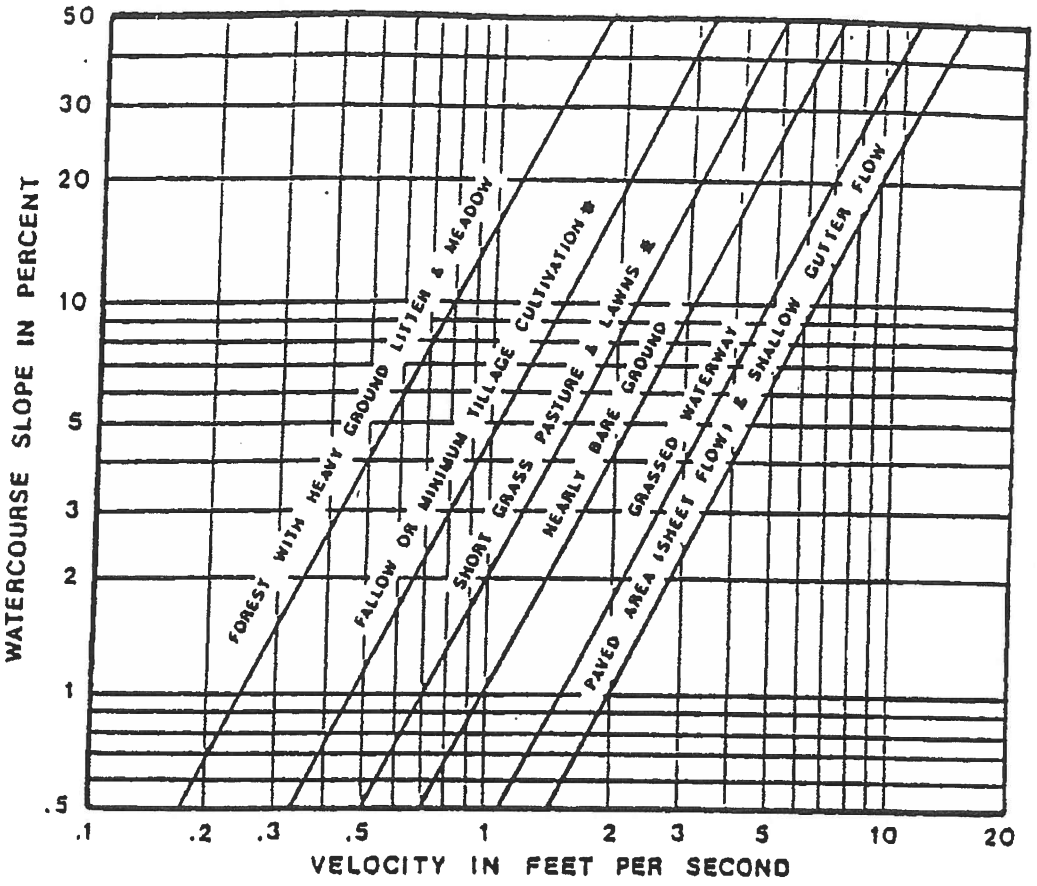
T_C = 7.87 minutes
I_{CF} = 2.5

CORRECTION FACTOR
FOR CONVERTING 1 HR. RAINFALL TO RAINFALL INTENSITY OF VARIOUS DURATIONS

TO BE USED FOR AREA LESS THAN 100 ACRES

PLATE 1

Drainage Area 2



ESTIMATE OF AVERAGE FLOW VELOCITY FOR USE WITH THE RATIONAL FORMULA.

BRANDON K. FUJISHIGE
LICENSED PROFESSIONAL ENGINEER
No. 10766-C
HAWAII, U.S.A.

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L_{Total} = 3,196 ft.

S_1 = 0.0423 ft./ft.

L_1 = 300 ft.

Nearly Bare Ground

V = 2.00 fps

$T_{C;1}$ = 2.50 minutes

S_2 = 0.0514 ft./ft.

L_2 = 2,896 ft.

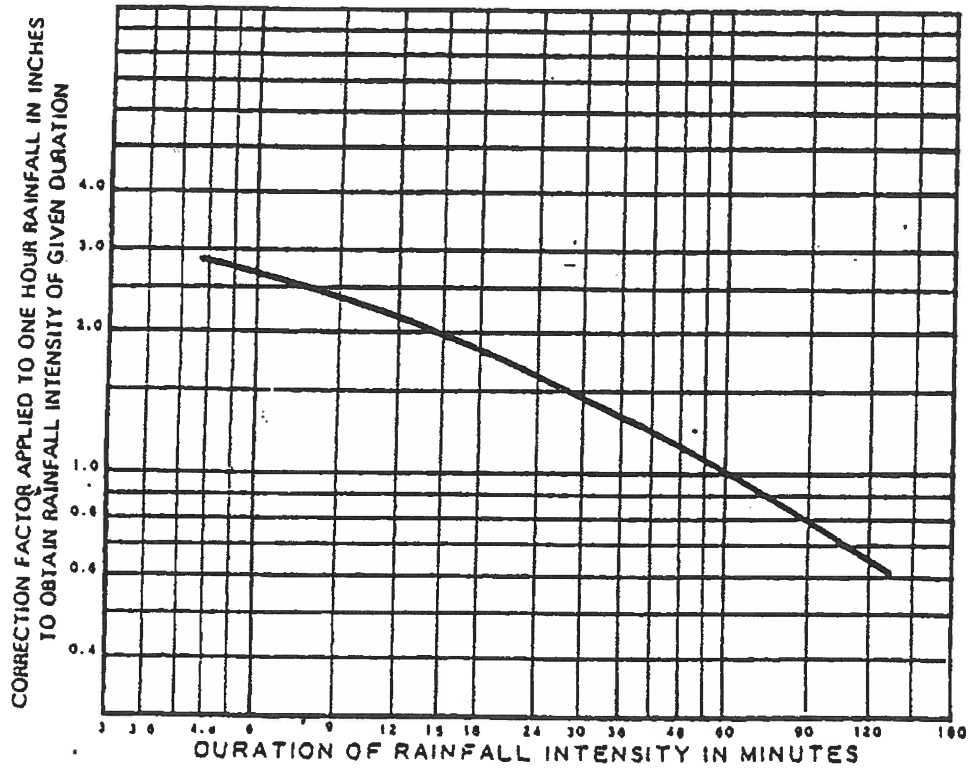
Grassed Waterway

V = 3.47 fps

$T_{C;2}$ = 13.91 minutes

$T_{C;Total}$ = 16.41 minutes

PLATE 2



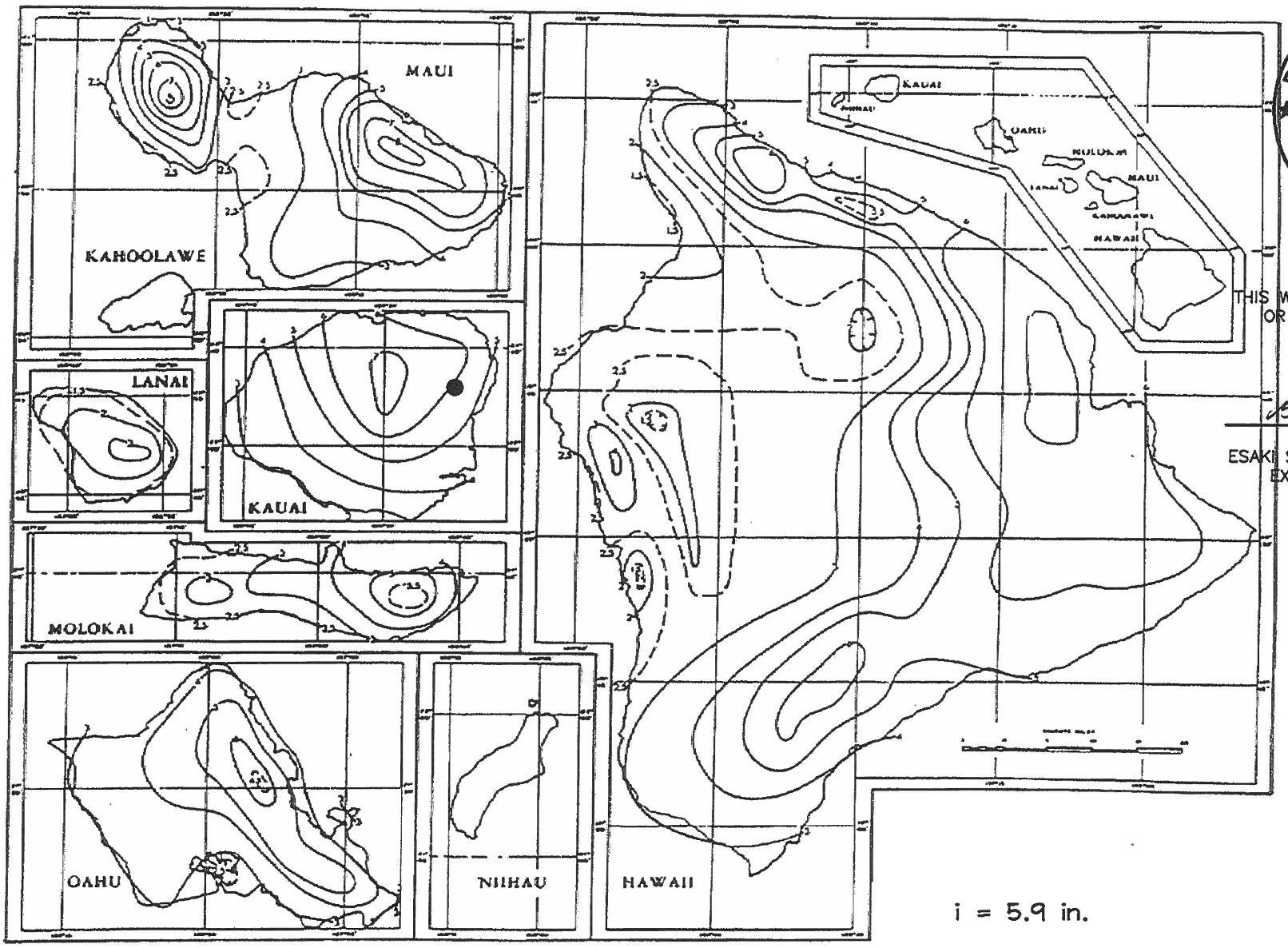
T_C = 16.41 minutes

I_{CF} = 1.9

CORRECTION FACTOR

FOR CONVERTING 1 HR. RAINFALL TO RAINFALL INTENSITY OF VARIOUS DURATIONS

TO BE USED FOR AREA LESS THAN 100 ACRES



100-Year 1-Hour Rainfall (in.)

i = 5.9 in.

BRANDON K. FUJISHIGE
LICENSED PROFESSIONAL ENGINEER
No. 10766
HAWAII, U.S.A.

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ESAKI SURVEYING & MAPPING, INC.
EXPIRES: APRIL 30, 2016

Plate 4

IV. FLOOD LIMITS DETERMINATION

FLOOD LIMITS DETERMINATION

100-Year Building Setback Line and Drainageway shall be based on multiple sections on the subject property.

PROJ TITLE: Mark Baird Flood Study
LOCATION: Kapa`a
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 11-47
PREPARED BY: BF
DATE: 04-24-2015

STREAM: ***Drainage Area 1***
CROSS SECTION STATION: ***Section A***

GIVEN:

DISCHARGE (Q) = 40 CFS
SLOPE (s) = 0.1055 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 376.0 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 40(0.0500) / (0.1055)^{1/2}(1.486)$
$= 4.1$

CROSS SECTION PTS:

DIST	ELEV	
-28.7	382.0	LEFT
-23.0	380.0	LEFT
-16.9	378.0	LEFT
0.0	376.0	CENTER LINE
21.4	378.0	RIGHT
26.5	380.0	RIGHT
31.5	382.0	RIGHT

FLOOD LIMITS:

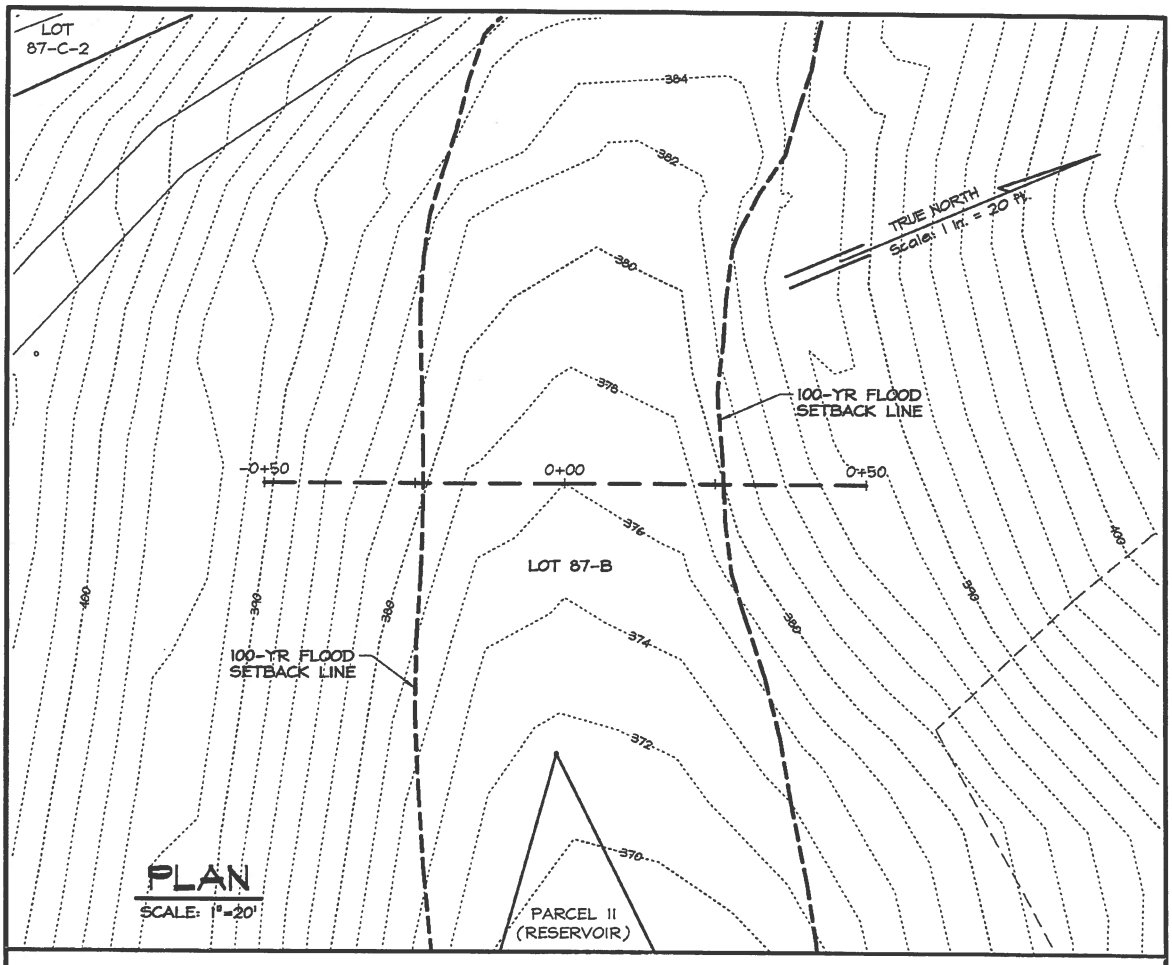
COMPUTED :
DEPTH (d) = 0.9 FT
AREA (A) = 7.2 SF
WETTED PERIMETER (WP) = 16.8 FT
HYDRAULIC RADIUS (R) = A/WP = 7.2/ 16.8 = 0.4
$AR^{2/3} = (7.2)(0.4)^{2/3} =$ 4.1
Q = 40 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 376.0 + 0.9 = 376.9 FT
VELOCITY = Q/A = 40.0/ 7.2 = 5.5 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(5.5)(0.9)^{1/3}$
= 2.1 FT 3.0 379.9
SETBACK ELEVATION = WSE + FB = 376.9 + ~~2.1~~ = ~~379.0~~ FT

FLOODWAY:

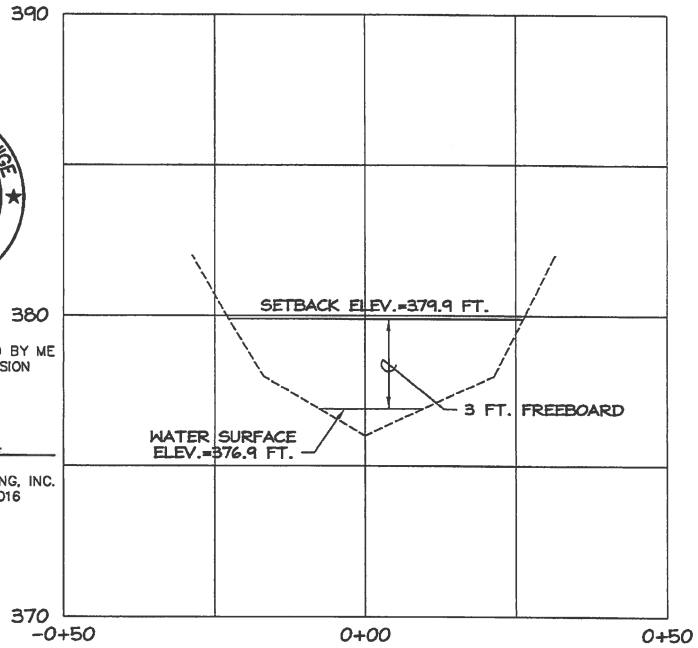
COMPUTED :
DEPTH (d) = 1.9 FT
AREA (A) = 5.2 SF
WETTED PERIMETER (WP) = 6.3 FT
HYDRAULIC RADIUS (R)= A/WP = 5.2/ 6.3 = 0.8
$AR^{2/3} = (5.2)(0.8)^{2/3} =$ 4.5
Q = 43 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 376.0 + 1.9 = 377.9 FT
VELOCITY = Q/A = 40.0 / 5.2 = 7.8 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -1.3 FT
DISTANCE RIGHT OF CENTER LINE = 1.6 FT



PLAN

SCALE: 1"=20'



SECTION A

SCALE: 1"=20' HORIZONTAL
1"=4' VERTICAL

BRANDON K. FUJISHIGE
LICENSED PROFESSIONAL ENGINEER
No. 10766
HAWAII, U.S.A.

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Signature

ESAKI SURVEYING & MAPPING, INC.
EXPIRES: APRIL 30, 2016

PROJ TITLE: Mark Baird Flood Study
LOCATION: Kapa`a
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 11-47
PREPARED BY: BF
DATE: 04-24-2015

STREAM: ***Drainage Area 1***
CROSS SECTION STATION: ***Section B***

GIVEN:

DISCHARGE (Q) = 40 CFS
SLOPE (s) = 0.0705 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 362.0 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 40(0.0500) / (0.0705)^{1/2}(1.486)$
$= 5.1$

CROSS SECTION PTS:

DIST	ELEV	
-38.1	368.0	LEFT
-33.1	366.0	LEFT
-27.0	364.0	LEFT
0.0	362.0	CENTER LINE
34.7	364.0	RIGHT
41.7	366.0	RIGHT
48.6	368.0	RIGHT

FLOOD LIMITS:

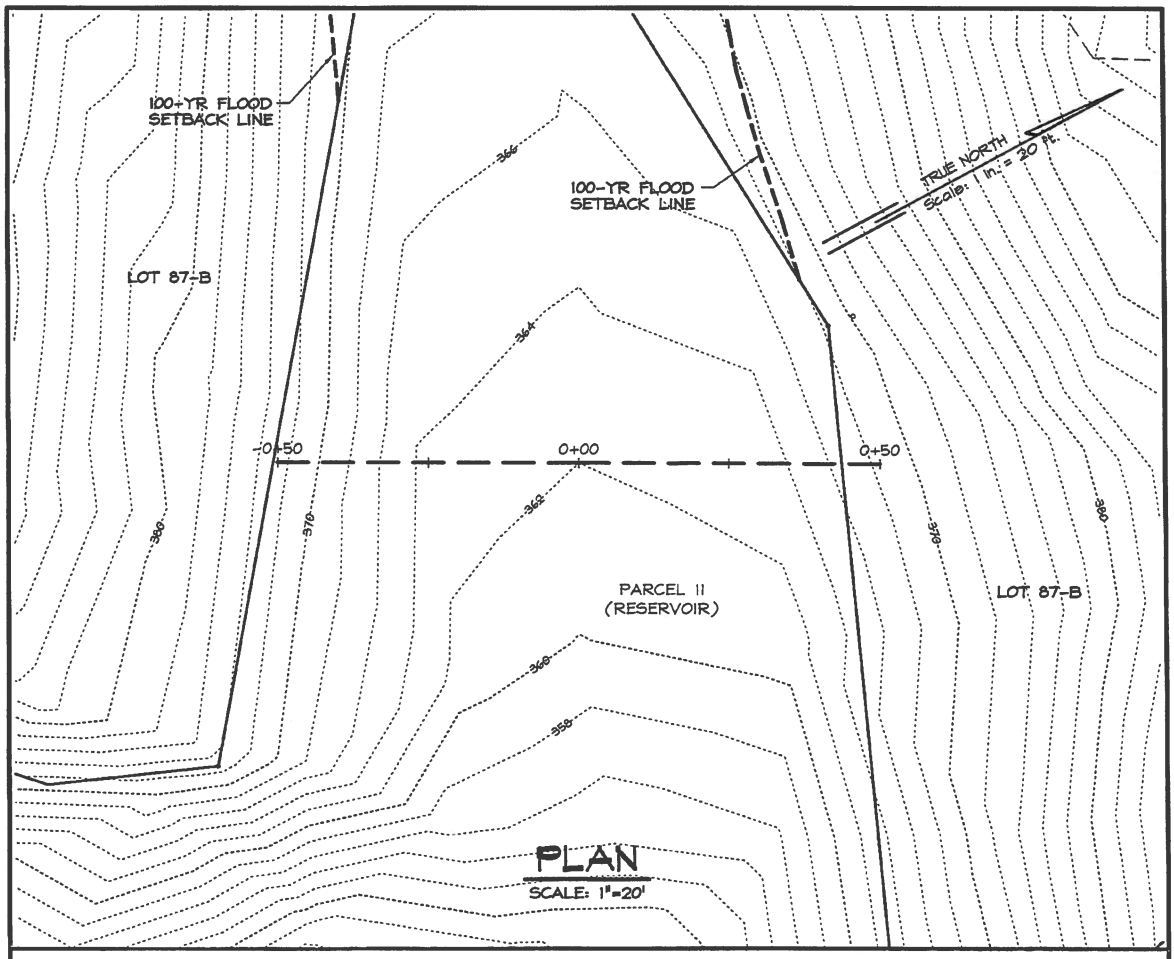
COMPUTED :
DEPTH (d) = 0.8 FT
AREA (A) = 9.6 SF
WETTED PERIMETER (WP) = 24.4 FT
HYDRAULIC RADIUS (R) = A/WP = 9.6/ 24.4 = 0.4
$AR^{2/3} = (9.6)(0.4)^{2/3} =$ 5.2
Q = 41 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 362.0 + 0.8 = 362.8 FT
VELOCITY = Q/A = 40.0/ 9.6 = 4.2 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(4.2)(0.8)^{1/3}$
$= 2.1$ FT 3.0
SETBACK ELEVATION = WSE + FB = 362.8 + ~~2.1~~ = ~~364.9~~ 365.8 FT

FLOODWAY:

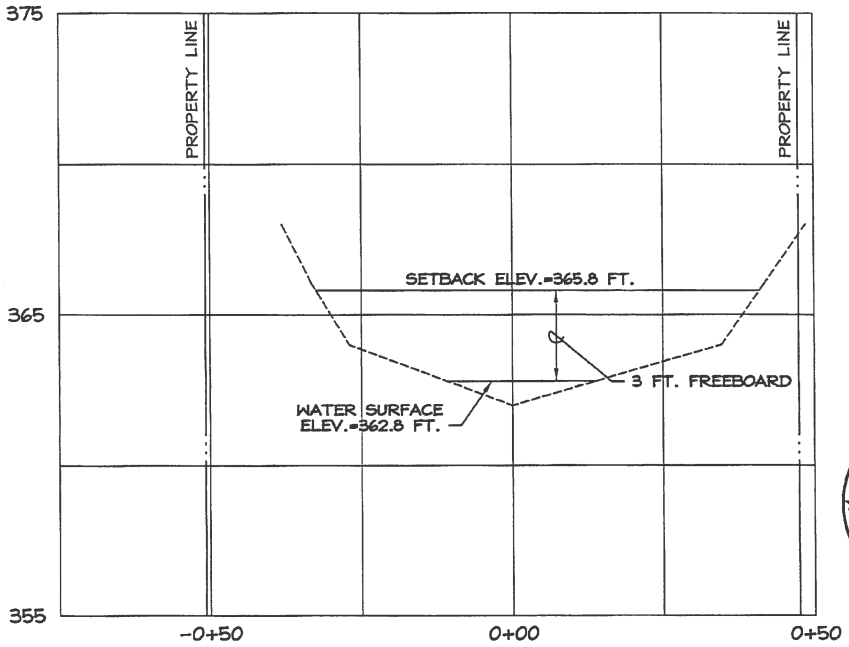
COMPUTED :
DEPTH (d) = 1.8 FT
AREA (A) = 5.9 SF
WETTED PERIMETER (WP) = 6.8 FT
HYDRAULIC RADIUS (R)= A/WP = 5.9/ 6.8 = 0.9
$AR^{2/3} = (5.9)(0.9)^{2/3} =$ 5.4
Q = 42 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 362.0 + 1.8 = 363.8 FT
VELOCITY = Q/A = 40.0 / 5.9 = 6.8 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -1.5 FT
DISTANCE RIGHT OF CENTER LINE = 1.9 FT



PLAN

SCALE: 1"=20'



SECTION B

SCALE: 1"=20' HORIZONTAL
1"=4' VERTICAL

BRANDON K. FUJISHIGE
LICENSED PROFESSIONAL ENGINEER
No. 10766
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature
ESAKI SURVEYING & MAPPING, INC.
EXPIRES: APRIL 30, 2016

PROJ TITLE: Mark Baird Flood Study
LOCATION: Kapa`a
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 11-47
PREPARED BY: BF
DATE: 04-24-2015

STREAM: ***Drainage Area 2***
CROSS SECTION STATION: ***Section C***

GIVEN:

DISCHARGE (Q) = 298 CFS
SLOPE (s) = 0.0123 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 342.5 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 298(0.0500) / (0.0123)^{1/2}(1.486)$
$= 90.4$

CROSS SECTION PTS:

DIST	ELEV	
-101.4	352.0	LEFT
-71.2	350.0	LEFT
-40.2	348.0	LEFT
-9.2	346.7	LEFT
-3.6	343.9	LEFT
0.0	342.5	CENTER LINE
3.6	342.6	RIGHT
44.0	380.6	RIGHT

FLOOD LIMITS:

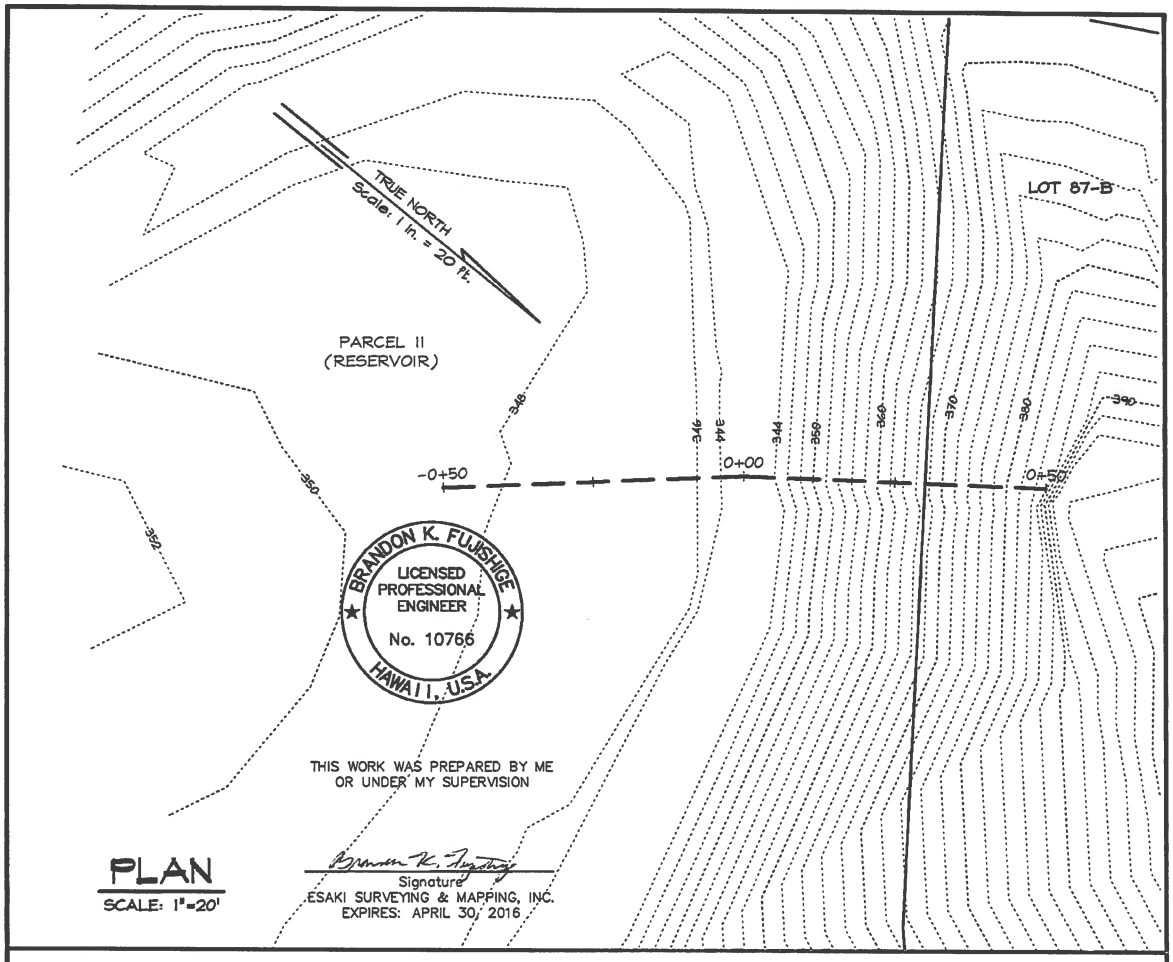
COMPUTED :
DEPTH (d) = 5.0 FT
AREA (A) = 64.9 SF
WETTED PERIMETER (WP) = 39.2 FT
HYDRAULIC RADIUS (R) = A/WP = 64.9/ 39.2 = 1.7
$AR^{2/3} = (64.9)(1.7)^{2/3} = 90.8$
Q = 299 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 342.5 + 5.0 = 347.5 FT
VELOCITY = Q/A = 298.0/ 64.9 = 4.6 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(4.6)(5.0)^{1/3}$
$= 2.2$ FT 3.0
SETBACK ELEVATION = WSE + FB = 347.5 + ~~2.2~~ = ~~349.7~~ 350.5 FT

FLOODWAY:

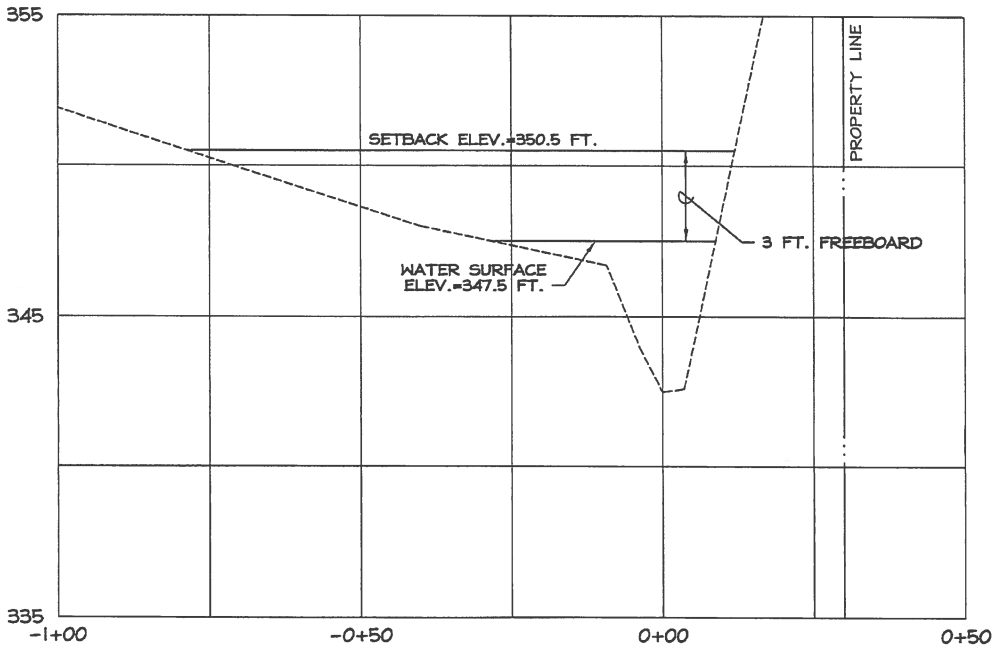
COMPUTED :
DEPTH (d) = 6.0 FT
AREA (A) = 48.1 SF
WETTED PERIMETER (WP) = 18.6 FT
HYDRAULIC RADIUS (R)= A/WP = 48.1/ 18.6 = 2.6
$AR^{2/3} = (48.1)(2.6)^{2/3} = 90.6$
Q = 299 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 342.5 + 6.0 = 348.5 FT
VELOCITY = Q/A = 298.0 / 48.1 = 6.2 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -3.7 FT
DISTANCE RIGHT OF CENTER LINE = 5.0 FT



PLAN

SCALE: 1"=20'



SECTION C

SCALE: 1"=20' HORIZONTAL
1"=4' VERTICAL

PROJ TITLE: Mark Baird Flood Study
LOCATION: Kapa`a
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 11-47
PREPARED BY: BF
DATE: 07-01-2015

STREAM: ***Drainage Area 1***
CROSS SECTION STATION: ***Section D***

GIVEN:

DISCHARGE (Q) = 40 CFS
SLOPE (s) = 0.1904 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 396.0 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 40(0.0500) / (0.1904)^{1/2}(1.486)$
$= 3.1$

CROSS SECTION PTS:

DIST	ELEV	
-24.3	400.0	LEFT
-11.7	398.0	LEFT
0.0	396.0	CENTER LINE
16.9	398.0	RIGHT
24.3	400.0	RIGHT

FLOOD LIMITS:

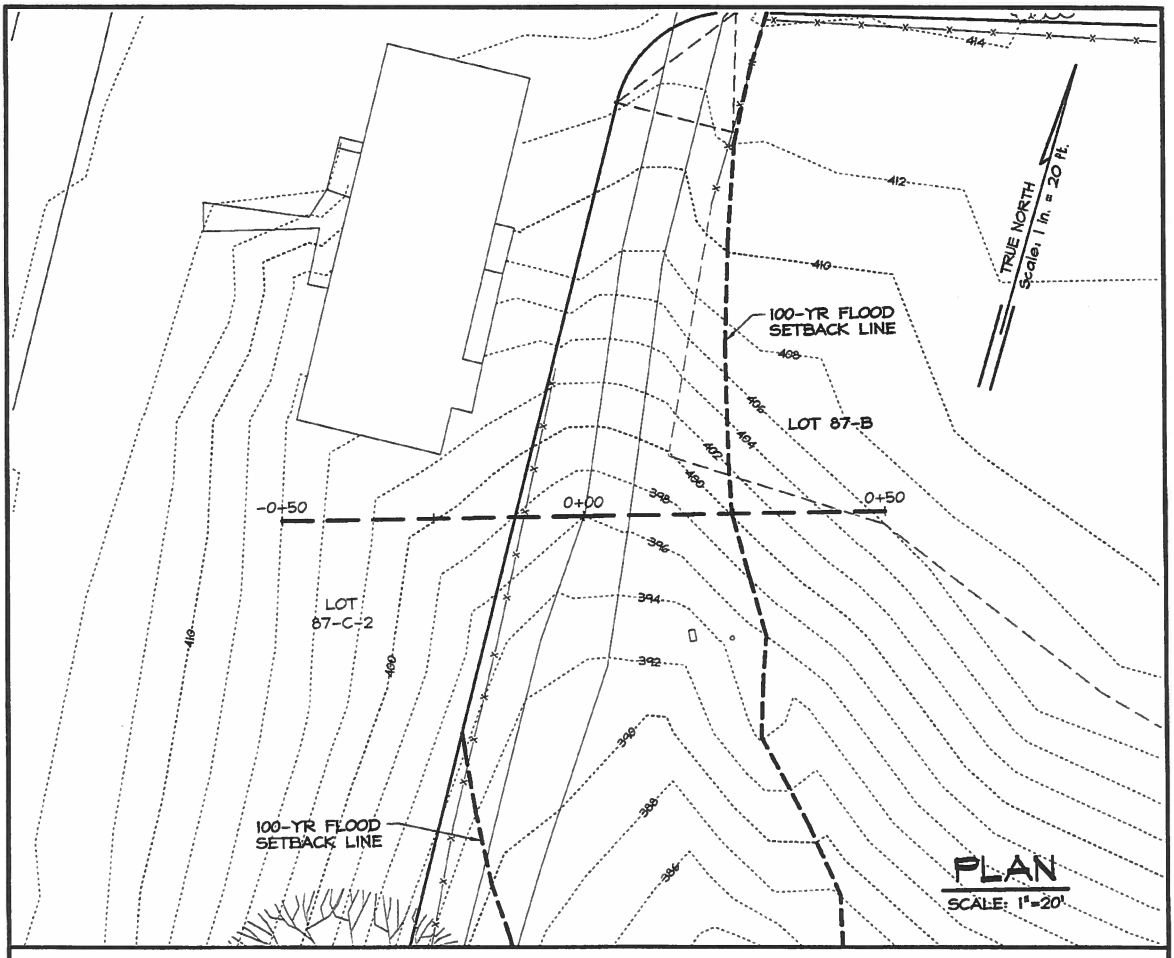
COMPUTED :
DEPTH (d) = 0.9 FT
AREA (A) = 5.4 SF
WETTED PERIMETER (WP) = 12.6 FT
HYDRAULIC RADIUS (R) = A/WP = 5.4/ 12.6 = 0.4
$AR^{2/3} = (5.4)(0.4)^{2/3} =$ 3.1
Q = 40 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 396.0 + 0.9 = 396.9 FT
VELOCITY = Q/A = 40.0/ 5.4 = 7.4 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(7.4)(0.9)^{1/3}$
$= 2.2$ FT 3.0
SETBACK ELEVATION = WSE + FB = 396.9 + ~~2.2~~ = ~~399.1~~ 399.9 FT

FLOODWAY:

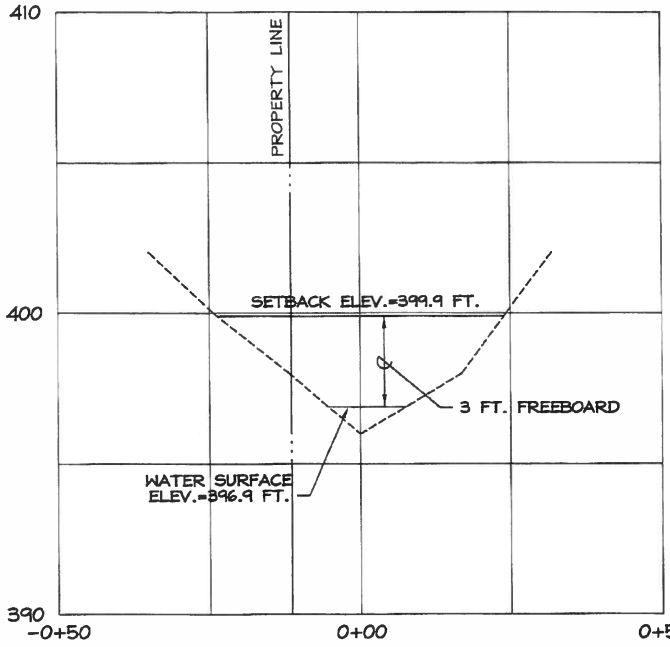
COMPUTED :
DEPTH (d) = 1.9 FT
AREA (A) = 4.1 SF
WETTED PERIMETER (WP) = 5.7 FT
HYDRAULIC RADIUS (R)= A/WP = 4.1/ 5.7 = 0.7
$AR^{2/3} = (4.1)(0.7)^{2/3} =$ 3.3
Q = 42 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 396.0 + 1.9 = 397.9 FT
VELOCITY = Q/A = 40.0 / 4.1 = 9.8 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -0.9 FT
DISTANCE RIGHT OF CENTER LINE = 1.4 FT



PLAN

SCALE: 1"=20'



SECTION D

SCALE: 1"=20' HORIZONTAL
1"=4' VERTICAL

BRANDON K. FUJISHIGE
LICENSED
PROFESSIONAL
ENGINEER
No. 10766
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION

Signature
ESAKI SURVEYING & MAPPING, INC.
EXPIRES: APRIL 30, 2016

Job Number: 11-47 BF
Drawing File: 11-47Flood.dwg

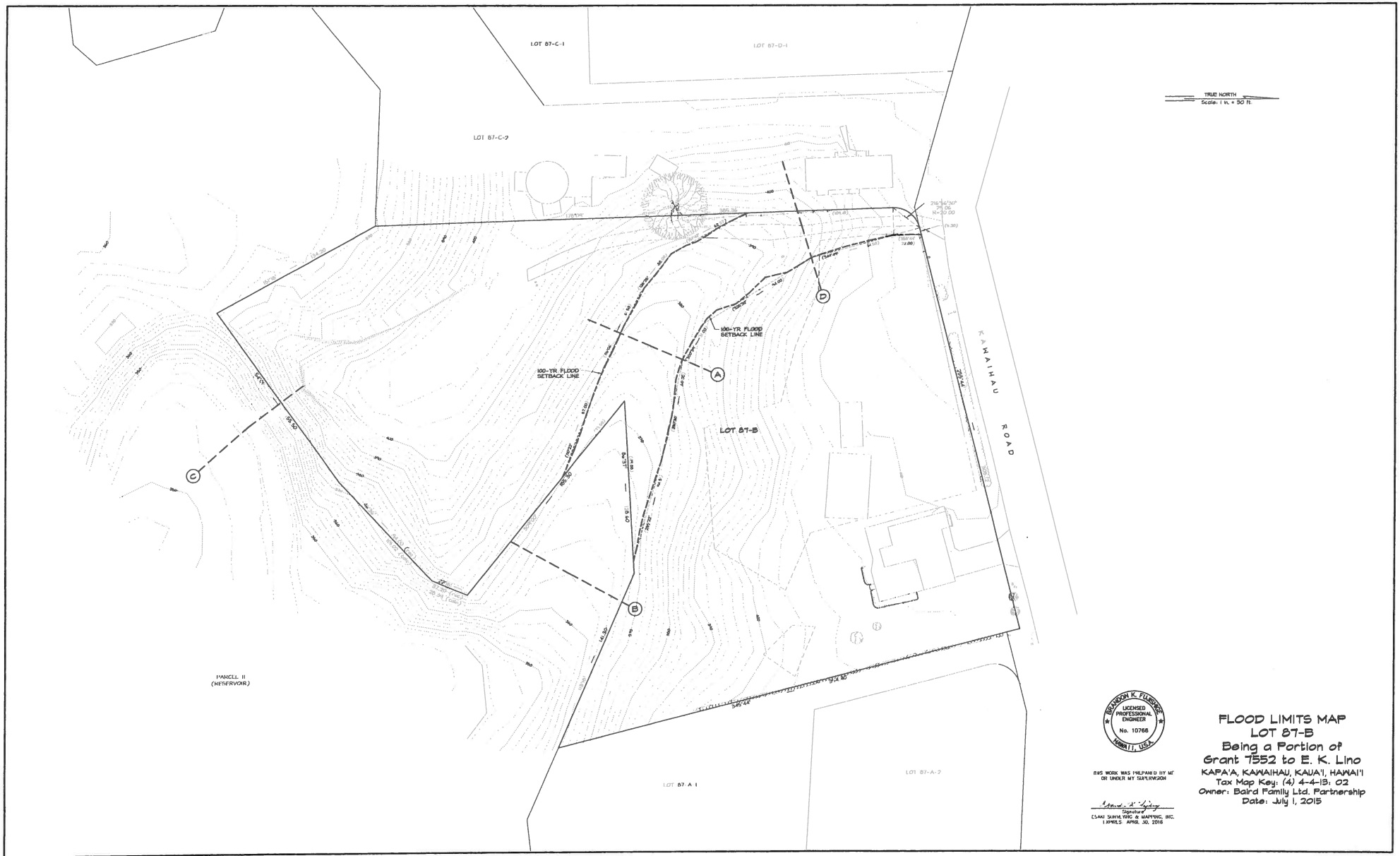
ESAKI SURVEYING & MAPPING, INC.
Civil Engineers - Land Surveyors - Planners

1610 Haleukana Street
Lihue, Hawaii 96766

Values of n to Be Used with the Manning Equation

Surface	Best	Good	Fair	Bad
Uncoated cast-iron pipe	0.012	0.013	0.014	0.015
Coated cast-iron pipe	0.011	0.012*	0.013*	
Commercial wrought-iron pipe, black	0.012	0.013	0.014	0.015
Commercial wrought-iron pipe, galvanized	0.013	0.014	0.015	0.017
Smooth brass and glass pipe	0.009	0.010	0.011	0.013
Smooth lockbar and welded "OD" pipe	0.010	0.011*	0.013*	
Riveted and spiral steel pipe	0.013	0.015*	0.017*	
Vitrified sewer pipe	0.010 0.011	0.013*	0.015	0.017
Common clay drainage tile	0.011	0.012*	0.014*	0.017
Glazed brickwork	0.011	0.012	0.013*	0.015
Brick in cement mortar; brick sewers	0.012	0.013	0.015*	0.017
Neat cement surfaces	0.010	0.011	0.012	0.013
Cement mortar surfaces	0.011	0.012	0.013*	0.015
Concrete pipe	0.012	0.013	0.015*	0.016
Wood stave pipe	0.010	0.011	0.012	0.013
Plank Flumes:				
Planed	0.010	0.012*	0.013	0.014
Unplaned	0.011	0.013*	0.014	0.015
With battens	0.012	0.015*	0.016	
Concrete-lined channels	0.012	0.014*	0.016*	0.018
Cement-rubble surface	0.017	0.020	0.025	0.030
Dry-rubble surface	0.025	0.030	0.033	0.035
Dressed-ashlar surface	0.013	0.014	0.015	0.017
Semicircular metal flumes, smooth	0.011	0.012	0.013	0.015
Semicircular metal flumes, corrugated	0.0225	0.025	0.0275	0.030
Canals and Ditches:				
Earth, straight and uniform	0.017	0.020	0.0225*	0.025
Rock cuts, smooth and uniform	0.025	0.030	0.033*	0.035
Rock cuts, jagged and irregular	0.035	0.040	0.045	
Winding sluggish canals	0.0225	0.025*	0.0275	0.030
Dredged earth channels	0.025	0.0275*	0.030	0.033
Canals with rough stony beds, weeds on earth banks	0.025	0.030	0.035*	0.040
Earth bottom, rubble sides	0.028	0.030*	0.033*	0.035
Natural Stream Channels:				
(1) Clean, straight bank, full stage, no rifts or deep pools	0.025	0.0275	0.030	0.033
(2) Same as (1), but some weeds and stones	0.030	0.033	0.035	0.040
(3) Winding, some pools and shoals, clean	0.033	0.035	0.040	0.045
(4) Same as (3), lower stages, more ineffective slope and sections	0.040	0.045	0.050	0.055
(5) Same as (3), some weeds and stones	0.035	0.040	0.045	0.050
(6) Same as (4), stony sections	0.045	0.050	0.055	0.060
(7) Sluggish river reaches, rather weedy or with very deep pools	0.050	0.060	0.070	0.080
(8) Very weedy reaches	0.075	0.100	0.125	0.150

* Values commonly used in designing.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature
ESAKI SURVEYING & MAPPING, INC.
LICENSE EXPIRES: APRIL 30, 2016

FLOOD LIMITS MAP
LOT 87-B
Being a Portion of
Grant 7552 to E. K. Lino

KAPA'A, KAWAIHAU, KAUA'I, HAWAI'I
Tax Map Key: (4) 4-4-13: 02
Owner: Baird Family Ltd. Partnership
Date: July 1, 2015

Job Number: 11-47 BF
Drawing File: 11-47flood.dwg

ESAKI SURVEYING & MAPPING, INC.
Civil Engineers - Land Surveyors - Planners

1610 Haleukana Street
Lihue, Hawaii 96766

Appendix B

Letter dated July 28, 2015
from County of Kaua'i, Department of Public Works
accepting *Final Flood Study- Mark Baird* (August 2015)

Bernard P. Carvalho, Jr.
Mayor

Nadine K. Nakamura
Managing Director

Larry Dill, P.E.
County Engineer

Lyle Tabata
Deputy County Engineer

DEPARTMENT OF PUBLIC WORKS
County of Kaua'i, State of Hawai'i
4444 Rice Street, Suite 275, Līhu'e, Hawai'i 96766
TEL (808) 241-4992 FAX (808) 241-6604

July 28, 2015

Wayne Wada, P.E.
Esaki Surveying & Mapping, Inc.
1610 Haleukana Street
Līhu'e, HI 96766

SUBJECT: Mark Baird Flood Study
Kapaa Homesteads
Kapaa, Kaua'i, Hawai'i
TMK: 4-4-013: 002

PW 07.15.038

Dear Mr. Wada;

We reviewed the revised flood study that was submitted with your transmittal letter dated July 2, 2015. The revised flood study is acceptable. You may label the Flood Study as "**FINAL**" and submit two (2) sets of the flood study along with a CD in pdf format with the above corrections.

Please note that an approval of the County does not relieve the owner, engineer, or designer of the responsibility for ensuring that the calculations, plans, specifications, construction, and as-built drawings are in compliance with the Manual (Storm Water Runoff System Manual, July 2001) and that the necessary or desired drainage objectives will be accomplished. Should you have any questions, or need additional information, please contact Stanford Iwamoto at (808) 241-4896 or by email at siwamoto@kauai.gov.

Sincerely,

MICHAEL MOULE, P.E.
Chief, Engineering Division

MM/SI
copy: Design and Permitting