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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 27, 2018

MAR 23 2018

MEMORANDUM:

TO: Scott Glenn, Director
Office of Environmental Quality Control

FROM: Suzanne D. Case, Chairperson
Board of Land and Natural Resources

OFC. OF ENVIRONMENTAL QUALITY CONTROL
'18 MAR 13 P2:55
RECEIVED

SUBJECT: Draft Environmental Assessment and Anticipated Finding of No Significant Impact for Konohiki Kihapai LLC, Easement on State Lands for Access and Utility Purposes at Kapaa, Puna, Kauai, Tax Map Key: (4) 4-4-006: Portions of 012 & 013.

With this memorandum, the Department of Land and Natural Resources hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the above-referenced project for publication in the next available edition of *The Environmental Notice*.

Enclosed are a completed OEQC Bulletin Publication Form and one (1) hard copy of the DEA-AFONSI, as well as electronic versions of the Publication Form (in Word) and DEA (in pdf) on the enclosed compact disc.

Should you or your staff have any questions, please feel free to call Wesley T. Matsunaga, at the Kauai District Land Office at (808) 274-3491. Thank you.

Enclosures

cc: Land Board Member
Central Files
District Files

18-434

APPLICANT
PUBLICATION FORM

Project Name:	Konohiki Kihapai, LLC, Grant of Easement on State Lands at Kapaa, Kauai.
Project Short Name:	Konohiki Kapaa Easements
HRS §343-5 Trigger(s):	Use of State Lands
Island(s):	Kauai
Judicial District(s):	Kapaa
TMK(s):	(4) 4-4-006: portion of 012 & 013.
Permit(s)/Approval(s):	BLNR approval of the easements. Review and approval of plans by the DLNR Engineering Division.
Approving Agency:	Hawaii State Department of Land and Natural Resources c/o Kauai District Land Office 3050 Eiwa Street, Room 208, Lihue, HI 96766
Contact Name, Email, Telephone, Address	Wesley T. Matsunaga, District Land Agent Wesley.t.matsunaga@hawaii.gov 808-274-3491 3050 Eiwa Street, Room 208, Lihue, HI 96766
Applicant:	Konohiki Kihapai, LLC.
Contact Name, Email, Telephone, Address	Gilles Lebbe gilles@greenenergykauai.com 808-634-8845
Consultant:	
Contact Name, Email, Telephone, Address	

Status (select one)	**Submittal Requirements**
X DEA-AFNSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
____ FEA-FONSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the approving agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
____ FEIS	Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The approving agency simultaneously transmits to both the OEQC and the applicant a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.
____ FEIS Statutory Acceptance	The approving agency simultaneously transmits to both the OEQC and the applicant a notice that it did not make a timely determination on the acceptance or nonacceptance of the applicant's FEIS

under Section 343-5(c), HRS, and therefore the applicant's FEIS is deemed accepted as a matter of law.

____ Supplemental EIS 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 or is not required; no EA is required and no comment period ensues upon publication in the Notice.

____ Withdrawal — Identify the specific document(s) to withdraw and explain in the project summary section.

____ Other — Contact the OEQC if your action is not one of the above items.

Project Summary:

Konohiki Kihapai LLC is applying to the BLNR for four grant of perpetual, non-exclusive easements over State land (a stream, a ditch, & railroad ROW) at Kapaa Homesteads, 2nd Series, Kapaa, for access and utility purposes. Applicant plans to repair/replace and/or construct new bridges for crossing a stream, a ditch, and an abandoned railroad right-of-way. Standard best management practices will be implemented to minimize erosion. No archaeological, cultural or biological resources are present. The existing bridges have previously been in use by the plantation for several decades, but are now in poor condition and require immediate repair/replacement. A total of four easement crossings are required as depicted in the attached illustration. Easement AU-1a (700 s.f.) a section where the stream and railroad right-of-way bisects each other, Easement AU-1b (700 s.f.) to cross the stream, Easement AU-2 (31,799 s.f.), a crossing for where the ditch and railroad bisect each other, and Easement AU-3 (300 s.f.), over the railroad right-of-way.

KONOHIKI KIHAPAI LLC,
a Hawaii limited liability company
6242-B Olohena Road
Kapaa, Kauai, Hawaii 96746
Phone: (808) 634-8845
Email: gilles@greenenergykauai.com

BEFORE THE DEPARTMENT OF LAND AND NATURAL RESOURCES

OF THE

STATE OF HAWAII

In The Matter Of The Application Of KONOHIKI KIHAPAI LLC, a Hawaii limited liability company, for a Grant of Perpetual Non-Exclusive Easement for Access and Utility Purposes over State Right Of Ways situated at Kapaa, Puna, Kauai, Hawaii, identified by Kauai Tax Map Key No. (4) 4-4-006:002 por. (Ditch), (4) 4-4-006:013 (Stream) and (4) 4-4-006:012 (Railroad Right of Way)	**ENVIRONMENTAL ASSESSMENT; EXHIBITS "A" – "F"**

ENVIRONMENTAL ASSESSMENT

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ENVIRONMENTAL ASSESSMENT

The Applicant is in the process of establishing a farm and potentially a seven (7) unit agricultural Condominium Property Regime (the "Project") pursuant to the provisions of Hawaii Revised Statutes ("HRS") Chapter 514B on certain property located in Kapaa, Puna, Kauai, Hawaii, known as Lot 127, Kapaa Homesteads, Second Series, identified by Kauai Tax Map Key No. (4) 4-4-006:002. The Applicants USDA NRCS Soil and Water Conservation Plan for the 29.2 acre farm was approved on September 14, 2015 ***[Exhibit "A-2"].*** No CPR application have been applied for to date. The Applicant has filed a Request For State Lands Application Form with the Department of Land and Natural Resources ("DLNR") for three perpetual, nonexclusive easements ("Easements") for access and utility purposes over three Right Of Ways ("ROW") identified as: the Konohiki Stream right of way containing 0.96 acres [Kauai TMK No. (4) 4-4-006:013 (por.)]; a 15-foot wide ditch right of way ("Ditch") containing 0.46 acres [Kauai TMK (4) 4-4-006:002 (por.)]; and a railroad right of way ("RR/ROW") containing 0.73 acres [Kauai TMK No. (4) 4-4-006:012]. The purpose of the Easements will be to provide access and utilities in favor of the Project across the ROW to Olohena Road (a State road). There is no other possible access to a public road. The Applicant is proposing to make road improvements to the ROW as described herein. The Property has a “grandfathered” access to Olohena Road over a bridge built during pineapple and cane farming times. The bridge is in disrepair and cannot be safely used any more. ***[Exhibit "A-3"]***

The Property is described in and covered by Land Patent Grant #8979. The property is described as the entire lot 127 (31.75 ac) “excepting and reserving therefrom” three right-of-ways (a stream 0.96ac, a ditch 0.46 ac and a railroad right of way 0.73 ac). The Supreme Court of the Territory of Hawaii has interpreted “excepting and reserving therefrom” as being a grant of easement (Henry Waterhouse Trust Co. Ltd. V. Henry Freitas), meaning in this

case Applicant owns the underlying fee in the right of ways, subject to an encumbrance of that fee (the right of way). This is also the interpretation used by the County of Kaua'i.

Nevertheless, the State of Hawaii's interpretation of "excepting and reserving therefrom" is that it grants a fee interest in the right of ways to the State of Hawaii. Because of this claim of ownership the Property's title reads the following defect "Portions of the land have no recorded access to a public roadway over the Stream 0.96ac, Ditch 0.46ac and Railroad Right of Way 0.73ac. This has significant consequences:

- the property is *de facto* rendered landlocked as the only access to a public road is over the stream, ditch and railroad right of way.
- the impossibility to receive any loans for improvements and farming on the land
- the impossibility to develop (CPR) the property

Applicant does not, for the time being, wish to litigate about the ownership as its focus is on farming and its resources and time are limited. The present application does not constitute an acceptance of the State of Hawaii's claim of ownership of the fee interest in the Right of Ways.

The proposed use of State lands may trigger the Environmental Review process as set forth in HRS Section 343-5(a)(1).

The purpose of the GOE application is to rebuild the existing bridge in a better location and outside of the floodway (as determined by a third party flood study ***[Exhibit "A-4"]***) and to use the railroad right of way as an ag road / driveway (existing use).

The E.A. exemption classes ***[Exhibit "A-5"*** **DLNR, Land Division exemptions to HRS Chapter 343]** applicable to the current GOE application are:

a. Class #1: […] repairs […] of existing structures […] involving negligible or no expansion or change of use beyond that previously existing.
b. Class #2: Replacement or reconstruction of existing structures […] located generally on the same site and will have substantially the same purpose, capacity, density, height and dimensions as the structure replaced.
c. Class #3: Construction and location of single, new small facilities and structures […] including but not limited to: […] (d) water, sewage, electrical, gas, telephone and other essential public utility services extensions and (e) accessory or appurtenant structures […]
d. Class #4: Minor cut, fill and grading of state property of less than 50 cubic yards of rock and/or soil where the vertical height of cut or fill does not exceed three feet.

There seems to be uncertainty if the rebuilding of the existing bridge in the more appropriate location 375 feet downstream would be a "replacement of an existing structure located generally on the same site". **To accommodate concerns the DLNR expressed when withdrawing the Easement decision from its January 2016 agenda, the present E.A. has been drafted.**

The Board of Land and Natural Resources of the State of Hawaii ("Land Board"), acting through DLNR, will act as the Accepting Authority of the EA. Pursuant to Hawaii Administrative Rules ("HAR") Section 11-200-12B, both the primary impacts (from the use of the ROW) and the secondary impacts (from the Project) of the proposed action will need to be evaluated.

The Applicant has concluded that neither the use of the ROW nor the development of the Project will result in any significant environmental effects, and anticipates that the Land Board, as Accepting Authority, will make a Finding Of No Significant Impact ("FONSI") and will issue a Negative Declaration in this matter.

SECTION 1. APPLICANT/SUBJECT PROPERTY/OWNER.

1.1 Applicant. The Applicant is KONOHIKI KIHAPAI LLC, a Hawaii limited liability company. The Applicant has authorized Gilles Lebbe to file this Environmental Assessment ("EA") pursuant to the Applicant's Authorization ***[Exhibit "A-1"]***.

1.2 Subject Property. The property over which the Easements are being sought is described as three ROWs of which the State of Hawaii claims ownership and identified as: Easement AU-1a (containing approximately 800 ft^2) and AU-1b (containing approximately 320 ft^2) over the Konohiki Stream right of way of 0.96 acres [Kauai TMK No. (4) 4-4-006:013]; Easement AU-2 (containing approximately 300 ft^2) over the 15-foot wide Ditch of 0.46 acres [Kauai TMK (4) 4-4-006:002 (por.)]; and Easement AU-3 (containing 0.73 ac) over the RR/ROW of 0.73 acres [Kauai TMK No. (4) 4-4-006:012]. The location of the easements is shown in ***Exhibit "C-10"***.

The Applicant is the owner of certain property known as Lot 127, Kapaa Homesteads, Second Series, identified by Kauai Tax Map Key No. (4) 4-4-006:002 (29.247 acres) ("Subject Property"), as shown on Tax Map 4-4-06. The Applicant is in the process of establishing a farm and potentially a seven (7) unit agricultural Condominium Property Regime (the "Project") pursuant to the provisions of HRS Chapter 514B. The Project will contain a farm and potentially seven (7) agricultural units with farms. The purpose of the Easements will be to provide access and utilities in favor of the Project across the ROW to Olohena Road (a State road). There is no other possible access to a public road.

1.3 Ownership. The State claims ownership of the ROW. The Applicant is the owner of the Subject Property, as set forth in the attached Warranty Deed ***[Exhibit "B-1"]***.

SECTION 2. LOCATION AND LAND USE DESIGNATIONS OF PROPERTY.

2.1 Location. The Subject Property and the ROW are located in Kapaa, Puna, Kauai, Hawaii, and is shown on the Location Map ***[Exhibit "C-1"]*** and on Tax Map ***[Exhibit "C-2"]***, and on the Aerial Photograph ***[Exhibit "D-1"]***.

2.2 Land Use Designations. The respective State Land Use Commission ("SLUC"), Kaua'i General Plan, County of Kauai Comprehensive Zoning Ordinance ("CZO"), and other relevant land use designations for the Subject Property and ROW are as follows:

a. SLUC. As shown on the Land Use District Boundary Map ***[Exhibit "C-4"]***, the Subject Property and the ROW are located in the SLUC Agricultural District.

b. Kaua'i General Plan. As shown on the General Plan Map ***[Exhibit "C-5"]***, the Subject Property and the ROW are located in the Kaua'i General Plan Agriculture Land Use Designation.

c. CZO. As shown on the Zoning Map ***[Exhibit "C-3"]***, the Subject Property and the ROW are located in the CZO Open District and CZO Agriculture District.

d. Development Plan Area. The Subject Property and the ROW are located within the Kapaa-Wailua Development Plan Area.

e. Special Management Area. Neither the Subject Property nor the ROW are located within the Special Management Area ("SMA") of the County of Kauai.

f. Violations. There are no existing violations of any land use laws or regulations on the Subject Property.

g. Land Use Conditions. The Subject Property is not subject to any land use conditions.

SECTION 3. PAST, EXISTING AND PROPOSED USES.

3.1 Past and Existing Uses. The Subject Property and lands around the Subject Property have been used for agricultural purposes in the past, including truck crops, and livestock pasture. There were also 2 single family dwellings on the Subject Property in the past. The property was acquired in 2008 by R3BST LLC who obtained a 12 lot subdivision, internal disputes forced them to sell and Applicant purchased the property. Applicant has no intention to subdivide the parcel. At present, the Subject Property is fallow awaiting the GOE to develop a farm. The Konohiki Stream is an active, perennial stream that flows from upper Waipouli to the Waikaea Canal and the Waipouli Canal in Kapaa. The Ditch is an active portion of the East Kauai Water Users' Cooperative which supplies water to the Wailua Houselots Reservoir. The RR/ROW is a remnant that is no longer used for railroad or other public purposes.

3.2 Proposed Uses. The Applicant is in the process of establishing a farm and potentially seven (7) unit agricultural Condominium Property Regime pursuant to the provisions of HRS Chapter 514B, as shown on the enclosed Condominium Map ***[Exhibit "C-10"]***. The Ag Units will range from 1.66 to 7.95 acres. Each Ag Unit will be allocated the right to construct a Farm Dwelling Unit, garage, and agricultural buildings and improvements. The Easements on the ROW will be used for vehicular and pedestrian access from the Ag Units to Olohena Road, and for utility purposes. The Applicant will need to make physical improvements to the ROW to allow vehicular access and utility use.

3.3 Farm Dwellings. Each of the seven Ag Units will have density for one Farm Dwelling which is a single family residence occupied by persons who earn income from agricultural activities on the Ag Unit.

3.4 Agricultural Activities. Agricultural Activities will be allowed on the Ag Units.

3.5 Site Grading. The Project site will require minimal grading. Some grading may be required for building sites, interior service roads and utilities. The Applicant will obtain all necessary grading permits.

3.6 Land Coverage. Each Ag Unit will be limited in Land Coverage to maximum fifty percent (50%) of the unit size in Ag zone and maximum ten percent (10%) in Open zone.

SECTION 4. DESCRIPTION OF SUBJECT PROPERTY AND IDENTIFICATION OF SURROUNDING LANDS.

4.1 Adjacent Property. The Subject Property is located adjacent to, or within 300 feet of, the properties identified on the Adjacent Property Index attached as ***Exhibit "F-1"***, and shown on the Tax Maps attached as ***Exhibits "C-2" and "F-2"*** through ***"F-5"***.

4.2 Natural Environment.

a. General Description. Kaua‘i is one of the oldest Hawaiian Islands, and is a remnant of a huge shield volcano that began its volcanic activity in the early or middle Pliocene epoch of the Tertiary period. The island grew rapidly and volcanic activity ceased around the end of the Pliocene period. Through time and the effects of erosion, faulting, collapse, and weathering, the island’s original shape has been greatly altered.

The topography of the Subject Property varies from flat to gently sloping. The Property is crossed by Konohiki stream, a perennial stream. The Property has been heavily disturbed by

past uses for pineapple and sugarcane. When the latter activities were discontinued, the property was used for livestock and portions were left uncultivated.

b. Soils. The soils on the Subject Property have been heavily disturbed by sugar cane and pineapple production and contain essentially poor, acid, silty clay, as shown on the Soil Survey Map ***[Exhibit "C-6"].***

As shown on the Detailed Land Classification Map (Island of Kauai) (Land Study Bureau, University of Hawaii) ***[Exhibit "C-7"]***, the Overall Productivity Rating for lands within the Subject Property is Class C or less productive.

c. Rainfall. The Subject Property receives approximately 59 to 79 inches of annual rainfall (1500 to 2000 mm).

d. Botanical Resources and Wildlife.

The vegetation throughout nearly all of the Property is that of vegetative regrowth on formerly used agricultural lands. Some parcels were converted to pasture land after cane production was abandoned, and others presumably went fallow and natural processes of succession proceeded with minimal additional disturbance. A few areas (typically small portions of larger, former agricultural land) were too steep for cane production and today support either a mixed secondary forest on hill slopes or *hau* (*Hibiscus tiliaceus*) forest in gulch areas and along the stream and the irrigation ditch.

The former agricultural lands on windward Kaua‘i show a typical reversion to domination by the large African grass known as Guinea grass (*Panicum maximum*; Carpenter, 2008). Rapid growth rate and attainment of large size seem sufficient to eliminate most competing herbs. In the absence of grazing pressure from cattle, clumping Guinea grass quickly exceeds 6ft in height, forming a nearly impenetrable field successfully out-competing most other plant species. The fields are sometimes intermixed with shrubs and small trees, typically satin leaf (*Chrysophyllum oliviforme*), lantana (*Lantana camara*), Koster’s curse (*Clidemia hirta*), button-

weed (*Spermacoce assurgens*), and *Melastoma sanguineum*. Some fields have also been randomly planted in the past with trees: Royal Palm (*Roysonea*), Coconut Palm (*Cocos Nucifera*), Silver Oak (*Grevellia Robusta*), Ironwood (*Casuarina Glauca*), Mango trees (*Mangifera Indica*), Swap Mahogany (*Eucalyptus Robusta)* and other.

On sloping ground, or areas not developed into pasture as along streams and gulches, a Secondary Forest may now be found. This forest is typically dominated by Albizia (*Molucca Falcataria),* Java plum (*Syzygium cuminii*), with other common trees and large shrubs being Koa Haole (*Leucaena leucocephala*) and Christmas berry (*Schinus terebinthefolius*). *Hau* (*Hibiscus tiliaceus*) is ubiquitous in most of the area as monotypic stands **(**Hau Forest) in wet depressions and gulches. No native plants of interest or threatened or endangered plants were found on the Property.

In areas, which are predominantly Guinea grass, there is little habitat to support most avian species. Avian assemblages found in these areas are dominated by esrtildid finches, mynas, doves, and cattle egrets in areas that have been mowed or grazed down to a point that the birds can forage. Though not encountered, the Property features have the potential to host the Hawaiian Goose (*Nēne; Branta sandvicensis*), that is an endemic species and listed as endangered. In secondary forests, the greatest diversity and density of species is found (Rose-ringed Parakeets (*Psittacula krameri*), babblers, and thrushes). Not surprising, as this habitat type is closest to a “normal” forest with varied habitats that can be used by the largest number of species. Though not encountered, the stream and ditch features have the potential to support any or all of the four extant endangered waterbird species on Kaua‘i: Hawaiian Duck (*Anas wyvilliana*), Common Gallinule (*Gallinula galeata sandvicensis*), Hawaiian Coot (*Fulica alai*), and Black-necked Stilt (*Himantopus mexicanus knudseni*).

Mammalian species detected on the property are alien to the Hawaiian Islands (feral pig, feral rat). Though not encountered, the Property features have the potential to host the

Hawaiian hoary bat (*Lasiurus cinereus semotus*). The Hawaiian Hoary Bat is both an endangered and endemic Species, native and unique to Hawai'i, listed under the ESA.

e. Flood Hazard. According to the Federal Insurance Rate Map (Map No. 203), the Subject Property is located in Flood Zone X – Other Area's (Area's determined to be outside of the 0.2% annual chance floodplain). ***[Exhibit "C-8"]***

4.3 Present Uses And Built Environment. The Subject Property lies to the west of Kapaa Town and is undeveloped. There are no existing buildings or structures on the Subject Property. Past agricultural activities on the Subject Property have included livestock pasturing, pineapple and sugar cane. The surrounding area is primarily rural, dominated by a mixture of agricultural and residential uses.

4.4 Potential Future Uses. The Applicant has no present plans to develop the Subject Property, except as described herein.

SECTION 5. PERMITS REQUESTED AND REQUIRED.

5.1 Grant of Easement. The Applicant has filed an Application with the Land Board for a Grant of Easement ("GOE") to use the ROW, which -according to the State- consists of State lands, for access and utility purposes. The Application has been filed pursuant to HRS Section 171-13(2).

5.2 Bridge. The Applicant intends to build a new private bridge for heavy equipment crossing in the most appropriate location (over Easement AU-1a), the location has been accepted by the County of Kaua'i based on the Flood Study ***[Exhibit A-4].*** The bridge will be built outside of the floodway and is not subject to any other permits except if the grading and grubbing would exceed the threshold in the County of Kauai Sediment and Erosion Control Ordinance No. 808. In that case, a Grubbing and Grading Permit will be required and obtained.

The existing bridge located over Easement AU-2b will receive minor repairs and maintenance not subject to permits.

5.3 Roads and utilities. The Applicant intends to improve and construct private roadways and install utilities on the Property. These roadways and adjacent utilities are not subject to permitting except if the grading and grubbing would exceed the threshold in the County of Kauai Sediment and Erosion Control Ordinance No. 808. In that case, a Grubbing and Grading Permit will be required and obtained.

5.4 Farming. The Applicant intends to establish a farm on 29.2 acres of the Property. Applicant has obtained a Soil and Water Conservation Plan from the USDA NRCS, which plan was approved by the East Kauai Water Cooperative on 9/14/2015. This plan was the basis to obtain an Agricultural Exemption from the County of Kauai Sediment and Erosion Control Ordinance No. 808, which was approved on 5/22/2017 ***[Exhibit A-2]***.

5.5 Condominium. The Applicant might establish a seven (7) unit agricultural Condominium Property Regime pursuant to the provisions of HRS Chapter 514B for which the appropriate authorizations will be obtained.

SECTION 6. IMPACTS/MITIGATION.

6.1 Botanical Resources and Wildlife. The existing state of botanical resources and wildlife have been heavily compromised by past agricultural uses on the Subject Property. As a result, there do not appear to be any mammalian or avian species or botanical resources that will be endangered either by the Project or by the proposed use of the ROW. Nevertheless, the ROW's has the potential to host endangered species. The following mitigation measures are proposed to mitigate the potential negative interference of the Project with these species and are recommended by USFWS.

Endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*): The Hawaiian hoary bat roosts in both exotic and native woody vegetation across all islands and will leave young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet or taller are cleared during the pupping season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. Additionally, Hawaiian hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing.

To avoid and minimize impacts to the endangered Hawaiian hoary bat, the following applicable mitigation measures will be implemented:

· No woody plants greater than 15 feet tall will be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15).

· No barbed wire will be used for fencing

Endangered Hawaiian petrel (*Pterodroma sandwichensis*), Threatened Newell's shearwater (*Puffinus auricularis newelli*), and Endangered Band-rumped storm-petrel (*Oceanodroma castro*): Hawaiian seabirds may traverse the project area at night during the breeding season (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.

To avoid and minimize potential project impacts to seabirds the following applicable measures will be implemented:

· Outdoor lights will be fully shielded so the bulb can only be seen from below bulb height and outdoor lights will only be used when necessary.

· Automatic motion sensor switches and controls will be installed on all outdoor lights or lights will be turned off when human activity is not occurring in the lighted area.

· Nighttime construction will be avoided during the seabird fledging period, September 15 through December 15.

Seabirds have been known to collide with fences, powerlines and other structures near colonies. To avoid and minimize the likelihood of collision, the following applicable measures will be implemented:

· Where fences extend above vegetation, three strands of polytape will be incorporated into the fence to increase visibility.

· For powerlines, guywires and other cables, exposure above vegetation height and vertical profile will be minimized.

Endangered Nene (Hawaiian goose, *Branta (=Nesochen) sandvicensis*): Nene are found on the islands of Hawaii, Maui, Molokai, and Kauai predominately, with a small population on Oahu. They are observed in a variety of habitats, but prefer open areas, such as pastures, golf courses, wetlands, natural grasslands and shrublands, and lava flows. Threats to the species include introduced mammalian and avian predators, wind facilities, and vehicle strikes.

To avoid and minimize potential project impacts to Nene, the following applicable measures will be implemented:

· Nene will not be approached, fed, or disturbed.

· If Nene are observed loafing or foraging within the project area during the Nene breeding season (September through April), a biologist familiar with the nesting behavior of Nene will survey for nests in and around the project area prior to the resumption of any work. Surveys will be repeated after any subsequent delay of work of three or more days (during which the birds may attempt to nest).

. All work will be ceased immediately and the USFWS will be contacted for further guidance if a nest is discovered within a radius of 150 feet of proposed work, or a previously undiscovered nest is found within said radius after work begins.

· In areas where Nene are known to be present, a reduced speed limit sign will be posted, and project personnel and contractors will be informed about the presence of endangered species on-site.

Hawaiian coot, *Fulica alai*; Hawaiian gallinule, *Gallinula galeata sandvicensis*; Hawaiian duck, *Anas wyvilliana*): Listed Hawaiian waterbirds are found in fresh and brackish-water marshes and natural or man-made ponds. Hawaiian stilts may also be found wherever ephemeral or persistent standing water may occur. Threats to these species include non-native predators, habitat loss, and habitat degradation. Hawaiian ducks are also subject to threats from hybridization with introduced mallards.

To avoid and minimize potential project impacts to Hawaiian water birds, the following applicable measures will be implemented:

· In areas where water birds are known to be present, reduced speed limits will be posted and project personnel and contractors will be informed about the presence of endangered species on-site.

· If water resources are located within or adjacent to the project site, applicable best management practices regarding work in aquatic environments will be implemented.

· A biologist that is familiar with the species' biology will conduct Hawaiian water bird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to initiation of works. Surveys will be repeated again within three days of work initiation and after any subsequent delay of work of three or more days (during which the birds may attempt to nest). If a nest or active brood is found, the following instructions will be given:

o Contact the Service within 48 hours for further guidance.

o Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.

o Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian water birds and nests are not adversely impacted.

6.2 Historical Resources. The State Historic Preservation Division of the Department of Land and Natural Resources determined that no historic properties will be affected ***[Exhibit "E-2"].*** The Subject Property has been heavily disturbed by past and present agricultural activities. As a result, there do not appear to be any archaeological, cultural or historical resources on the surface of the Subject Property or the ROW which will be affected by the Project or the proposed use of the ROW. In the event of inadvertent historic site or burial

discovery in the future, the Applicant will immediately contact the Historic Preservation Division of the Department of Land and Natural Resources.

6.3 Air Quality/Noise. Neither the Project nor the use of the ROW will have significant impacts on the air quality and ambient noise levels in the area. Air quality and ambient noise levels may be affected at a very minimal level by agricultural activities on the Subject Property. All vehicles or equipment used by the Applicant on either the Subject Property or the ROW will be properly muffled and maintained to reduce any noise impacts or emission impacts. The Environmental Protection Agency (EPA) and State of Hawaii air quality standards will not be exceeded.

6.4 Flooding and Drainage. The Subject Property and the ROW are situated within Flood Zone X – Other area's, as shown on the County of Kauai's flood insurance rate map (Flood Insurance Rate Map 203) ***[Exhibit "C-8"]***. The Project and use of the Subject Property and the ROW will meet all of the requirements of the Flood Plain Management Ordinance of the County of Kauai, as contained in Chapter 15, Article 1, of the Kauai County Code, 1987. Neither the Project nor the use of the ROW will have any impact on flooding on or around either the Subject Property or the ROW. All drainage resulting from construction activities, from agricultural activities, and from the increase in land coverage on the Subject Property will be retained on site and subject to best management practices.

6.5 Utilities.

a. Potable Water. Potable water for the Subject Property will be obtained: either from the Department of Water, County of Kauai; or will be provided from private sources.

b. Electric/Communications. The Subject Property will obtain electric service from Kauai Island Utility Cooperative ("KIUC") and communication services from

Hawaiian Telcom, Inc. Existing electric and communications facilities are presently adequate to provide the demand for such services that will be generated by the proposed Development.

6.6 Wastewater Treatment and Disposal. Farm Dwelling Units on the Subject Property will utilize an Individual Wastewater Systems ("IWS") approved by the State Department of Health.

6.7 Solid Waste Disposal. Solid waste collection will be provided by the County and by private means. Solid waste will be taken to the County's Transfer Stations for disposal in the County Landfill.

6.8 Governmental Services. The Development will have the following impacts on governmental services:

a. Fire and Police Services. Fire and police services in the vicinity are located in Kapaa, approximately five (5) miles from the Subject Property. The proposed use of the Subject Property will not significantly increase the need for existing fire and police services.

b. Schools. The closest schools are Kapaa Elementary School, Kapaa Middle School, and Kapaa High School, all of which are located in Kapaa. The Project will not generate any significant increase in enrollment.

6.9 Economics. The Project will have the following economic impacts:

a. Jobs. Jobs will be generated in the future for farming and the construction of Farm Dwelling Units on the Subject Property.

b. Housing. The creation of jobs related to activities on the Subject Property will not result in the need for additional worker housing. The jobs will be filled by Kauai residents who are already living on Kauai.

c. Property Values. Since the fair market value of real property is based on the value of the land and physical improvements, the completion of the Project will increase the value of the Subject Property. This will result in increased real property taxes on the Subject Property for the County.

6.10 Population. The proposed use of the Subject Property will not result in a significant increase in population.

6.11 Traffic Circulation. The major road which services the Subject Property is Olohena Road, a State road. The Project, in and of itself, will not significantly increase traffic on Olohena Road.

6.12 Heritage Resources. The Subject Property is located within the "Open Space, Parks, Agriculture, Conservation" Heritage Resources Designation (Kaua'i General Plan, November 2000) ***[Exhibit "C-9"]***. The Heritage Resources of Kauai include natural, cultural and scenic resources. The proposed Development will not significantly affect any of these resources.

The public view of the Subject Property will be from parts of Olohena Road. All structures on the Subject Property will be designed to the extent possible to blend harmoniously into the surrounding environment. Building materials and exterior colors will be compatible with the surrounding environment. All of the structures will be landscaped so as to minimize visual impacts.

SECTION 7. SLUC CONSIDERATIONS.

7.1 SLUC Agricultural District. The Subject Property is located within the SLUC Agricultural District. Permitted uses in the SLUC Agricultural District are set forth in HRS Section 205.2(d) and HRS Section 205-4.5(a), which provide in relevant part as follows:

"§**205-2. Districting and classification of lands.**

. . .

(d) Agricultural districts shall include:

. . .

(1) Activities or uses as characterized by the cultivation of crops, crops for bioenergy, orchards, forage, and forestry;

. . .

(7) Bona fide agricultural services and uses that support the agricultural activities of the fee or leasehold owner of the property and accessory to any of the above activities, regardless of whether conducted on the same premises as the agricultural activities to which they are accessory, including farm dwellings as defined in section 205.4.5(a)(4), employee housing, farm buildings, mills, storage facilities, processing facilities…."

"**§205-4.5 Permissible uses within the agricultural districts.**

(a) Within the agricultural district all lands with soil classified by the land study bureau's detailed land classification as overall (master) productivity rating class A or B shall be restricted to the following permitted uses:

. . .

(1) Cultivation of crops, including crops for bioenergy, flowers, vegetables, foliage, fruits, forage, and timber;

. . .

(4) Farm dwellings, employee housing, farm buildings, or activities or uses related to farming and animal husbandry. "Farm dwelling", as used in paragraph, means a single-family dwelling located on and used in connection with a farm, including clusters of single-family farm dwellings permitted within agricultural parks developed by the State, or where agricultural activity provides income to the family occupying the dwelling;

. . .

(10) Buildings and uses, including mills, storage, and processing facilities, maintenance facilities,…and vehicle and equipment storage areas that are normally considered directly accessory to the above-mentioned uses and are permitted under section 205.2(d)…."

7.2 Compliance with SLUC Agricultural District Standards. The proposed uses of the Subject Property include the development of: Agricultural Activities and Farm Dwellings. All of these proposed uses are recognized as permissible uses under HRS Sections 205-2(d) and 205-4.5(a) as explained below:

a. Agricultural Activities. The Agricultural Activities are permitted as an activity characterized by the cultivation of crops. HRS Sections 205-2(d)(1) and 205-4.5(a)(1).

b. Farm Dwelling. The Farm Dwelling is permitted as a farm dwelling unit. HRS Sections 205-2(d)(7) and 205-4.5(a)(4).

SECTION 8. GENERAL PLAN CONSIDERATIONS.

8.1 Kaua'i General Plan Land Use Designation. The Project Area is located in the Kaua'i General Plan Open Land Use Designation. The Policy applicable to uses in the Open Designation is set forth in Section 5.3 of the Kaua'i General Plan, which provides in relevant part as follows:

> "**5.3.1 Policy**
>
> (a) The intent of the Open designation is to preserve, maintain or improve the natural characteristics of non-urban land and water areas that:
>
> (1) are of significant value to the public as scenic or recreation resources;
>
> (2) perform essential physical and ecologic functions important to the welfare of surrounding lands, waters, and biological resources;
>
> (3) have the potential to create or exacerbate soil erosion or flooding on adjacent lands;
>
> (4) are potentially susceptible to natural hazards such as flood, hurricane, tsunami, coastal erosion, landslide or subsidence; or
>
> (5) form a cultural, historic or archaeological resource of significant public value.
>
> (b) Lands designated Open shall include: important landforms such as mountains, coastal bluffs, cinder cones, and stream valleys; native plant and wildlife habitat; areas of predominantly steep slopes (20 percent or greater); beaches and coastal areas susceptible to coastal erosion or hurricane, tsunami,

or storm-wave inundation; wetlands and flood plains; important scenic resources; and known natural, historic and archaeological resources. Open shall also include parks, golf courses, and other areas committed to outdoor recreation.

(c) Lands designated Open shall remain predominantly free of development involving buildings, paving and other construction. With the exception of kuleanas and other small lots of record, any construction that is permitted shall be clearly incidental to the use and open character of the surrounding lands."

8.2 Compliance with Kaua'i General Plan Standards. The proposed uses of the Subject Property include: Agricultural Activities; and Farm Dwellings. The Project itself will have no significant impact on the surrounding environment. The Project will include residential and agriculturally related uses that are compatible with other uses in the area, as well as with the surrounding environment. As such, the Project complies with the Kaua'i General Plan policy in that it will help to provide low density residential and agricultural uses.

SECTION 9. CZO OPEN DISTRICT CONSIDERATIONS.

9.1 CZO Open District. A portion of the Subject Property is located within the CZO Open District.

The purposes of the CZO Open District are set forth in CZO Article 9, which provides in relevant part as follows:

"**Sec. 8-9.1 Purpose.**

The Open District is established and regulated to create and maintain an adequate and functional amount of predominantly open land to provide for the recreational and aesthetic needs of the community or to provide for the effective functioning of land, air, water, plant and animal systems or communities.

(a) To preserve, maintain or improve the essential characteristics of land and water areas that are:

(1) of significant value to the public as scenic or recreational sources;

(2) important to the overall structure and organization of urban areas and which provide accessible and usable open areas for recreational and aesthetic purposes;

(3) necessary to insulate or buffer the public and places of residence from undesirable environmental factors caused by, or related to, particular uses such as noise, dust, and visually offensive elements.

(b) To preserve, maintain or improve the essential functions of physical and ecological systems, forms or forces which significantly affect the general health, safety and welfare.

(c) To define and regulate use and development within areas which may be potentially hazardous.

(d) To include areas indicated on the County General Plan as open or as parks.

(e) To include areas clearly indicated on the County General Plan or on Zoning maps as "Special Treatment – Open Space" if an applicant represents to government authorities that any properties or areas within a development proposal or subdivision application will remain in either permanent open space or private park areas, or if the Council in the exercise of its zoning power requires as a condition of rezoning that an area be designated for permanent open space or private park. This does not preclude the Council from exercising its zoning authority as provided in Sec. 46-4, Hawai'i Revised Statutes. Within areas so designated, no uses, structures, or development inconsistent with such designation shall be generally permitted or permitted by use permit without express provision to the contrary. The Council is hereby authorized to make such factual determinations as necessary incident to this section.

(f) To provide for other areas which because of more detailed analysis, or because of changing settlement characteristics, are determined to be of significant value to the public."

9.2 Generally Permitted Uses And Structures. CZO Section 8-2.4(s) contains the Permitted Uses within the CZO Open District, which includes the following:

"(1) Accessory uses and structures
(3) Diversified agriculture
. . .
(9) Single family detached dwellings…."

9.3 Development Standards For Construction And Use Within An Open District.

CZO Section 8-9.2 regulated land coverage in the CZO Open District and provides as follows:

"(a) Land Coverage:

(1) The amount of land coverage created, including buildings and pavement, shall not exceed ten per cent (10%) of the lot or parcel area."

9.4 Compliance with CZO Open District Standards. The following proposed uses of the Subject Property are Permitted Uses within the CZO Open District: Farm Dwelling uses; and Agricultural Activities. These are Permitted Uses which are allowed pursuant to CZO Section 8-2.4(s). The Land Coverage on the Subject Property will not exceed ten percent (10%). The Project itself will have no significant impact on the surrounding environment. As such, the Project complies with CZO Section 8-9.1 in that it: will help to preserve, maintain and improve the natural characteristics of the area; will allow the area to remain predominantly free of development; and will be incidental to the use and open character of the surrounding lands.

SECTION 10. CZO AGRICULTURE DISTRICT CONSIDERATIONS.

10.1 CZO Agriculture District. A portion of the area of the Subject Property in which the Development will occur is located within the CZO Agriculture District. The purposes of the CZO Agriculture District are set forth in CZO Article 8, which provides in relevant part as follows:

"**Sec. 8-8.1 Purpose.**

The Agriculture District establishes means by which land needs for existing and potential agriculture can be both protected and accommodated, while providing the opportunity for a wider range of the population to become involved in agriculture by allowing the creation of a reasonable supply of various sized parcels.

(a) To protect the agriculture potential of lands within the County of Kaua'i to insure a resource

base adequate to meet the needs and activities of the present and future.

(b) To assure a reasonable relationship between the availability of agriculture lands for various agriculture uses and the feasibility of those uses.

(c) To limit and control the dispersal of residential and urban use within agriculture lands."

10.2 Generally Permitted Uses And Structures. CZO Section 8-2.4(g) contains the Permitted Uses in the CZO Agriculture District, which include the following:

"(1) Accessory structures and uses

. . .

(3) Diversified agriculture

. . .

(7) Intensive agriculture

. . .

(9) Minor food processing related to agricultural products

. . .

(11) Outdoor recreation

. . .

(15) Single family detached dwellings

(16) Specialized agriculture

. . .

(18) Warehousing, storage and packing of plant products…."

10.3 Development's Compliance with CZO Agriculture District Standards. The following proposed Project uses are Permitted Uses within the CZO Agriculture District: Single Family Detached Dwellings; and the Agricultural Activities. These are Permitted Uses which are allowed pursuant to CZO Section 8-2.4(q). The Development itself will have no significant impact on the surrounding environment. The Development will include uses that are compatible with other uses in the area, as well as with the surrounding environment. As such, the Development complies with CZO Section 8-9.1 in that it: will help to preserve, maintain and improve the natural characteristics of the area; will allow the area to remain predominantly free of

development; and will be incidental to the agricultural uses and the agricultural character of the surrounding lands.

SECTION 11. DEVELOPMENT PLAN CONSIDERATIONS.

11.1 Development Plan Community Objectives. Both the Kapaa-Wailua Development Plan Ordinance (codified in Title IV, Chapter 10, Article 1 of the Kauai County Code, 1987) and the Kapaa-Wailua Development Plan (LMLI Architects/Planners, Inc. and Hawaii Real Estate Research, Inc., December 1973) are focused primarily on makai portions of the Kapaa, Wailua and Waipouli areas. Neither the Ordinance nor the Plan specifically apply to the area in which the Subject Property is located.

11.2 Development's Compliance with Development Plan Standards. The proposed use of the Subject Property will not conflict with any of the Community Objectives contained in the Plan. The design, layout and outside appearance of the Development is and will be compatible with the natural beauty of the area. It will protect the visual resources of the Plan area. It will promote the maintenance of private property in a state of good repair.

SECTION 12. HRS CHAPTER 343 (ENVIRONMENTAL IMPACT STATEMENTS) CONSIDERATIONS.

12.1 HRS Chapter 343. The Applicant's requests for a GOE over the ROW might be subject to the provisions of HRS Chapter 343. HRS Chapter 343 requires the preparation of an Environmental Assessment and/or an Environmental Impact Statement for certain activities. As specified in HRS Section 343-5(a)(1), such activities include the proposed use of State lands.

12.2 Approving Agency/Accepting Authority. Pursuant to HAR Section 11-200-2 and Section 11-200-4B., the Land Board is the Approving Agency (since it will be

responsible for approving the GOE) and, as such, the Accepting Authority. As Accepting Authority, the Land Board has the responsibility to review and accept this EA.

12.3 Anticipated Agency Determination. The Applicant anticipate that pursuant to the provisions of HAR Section 11-200-11.1 and Section 11-200-12, the Land Board will: determine that neither the proposed use of the ROW nor the farm or CPR will have any significant environmental effects; and issue a Finding Of No Significant Impacts or Negative Declaration.

12.4 Anticipated Agency Findings. The Applicant anticipates that the Land Board will find and determine that neither the use of the ROW (as a primarily impact) nor the Farm or CPR of the Subject Property (as a second impact) will result in any significant environmental effects based on the Land Board's evaluation of the following significance criteria contained in HAR Section 11-200-12B:

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

Primary. The proposed use of the ROW is consistent with existing uses and will not result in the loss of any natural or cultural resources.

Secondary. The proposed Project is consistent with existing uses in the area and will not result in the loss of any natural or cultural resources on the Subject Property.

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

Primary. The proposed use of the ROW is consistent with, and will not curtail the range of, the present uses of the ROW.

Secondary. The Project is consistent with other uses in the area and will not curtail any other uses in the area.

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.

Primary. The proposed use of the ROW is consistent with, and will not conflict with, the provisions of HRS Chapter 344, including the Guidelines contained in HRS Section 344-4. In particular, the proposed use is consistent and supportive of the Guidelines contained in HRS Section 344-4(6) (Transportation), Subsection (A), which encourages transportation systems in harmony with the lifestyle and environment of the State.

Secondary. The proposed Project, and the use of the Subject Property for residential (Farm Dwelling) purposes and Agricultural Activities, is consistent with, and will not conflict with, Chapter 344. In particular, the proposed use is supportive of the Guidelines contained in: HRS Section 344-4(5) (Economic Development), Subsection (B) (promoting the agricultural industry and conserving agricultural lands); and HRS Section 344-4(8) (Community life and housing), Subsection (A) (fostering lifestyles compatible with the environment which are traditional to Hawaii).

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

Primary. The proposed use of the ROW is consistent with existing uses and will not affect the economic or social welfare, or cultural practices, of the community or State.

Secondary. The Project is consistent with existing uses in the area and will not affect the economic or social welfare, or cultural practices, of the community or State.

5. Substantially affects public health.

Primary/Secondary. Neither the proposed use of the ROW nor the Project and use of the Subject Property will substantially affect public health.

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

Primary/Secondary. The use of the ROW and its Secondary Impacts related to the Project on the Subject Property have been evaluated and found to have no substantial secondary impacts. In particular, the CPR will not result in any substantial population change or demand on public facilities.

7. Involves a substantial degradation of environmental quality.

Primary/Secondary. Neither the proposed use of the ROW nor the Project on the Subject Property will result in a substantial degradation of environmental quality to the ROW or the surrounding area.

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

Primary/Secondary. Neither the proposed use of the ROW nor the Project on the Subject Property are part of any future, larger action and will have no cumulative impacts.

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

Primary/Secondary. Neither the proposed use of the ROW nor the Project on the Subject Property will substantially affect any rare, threatened or endangered species or habitat.

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

Primary/Secondary. Neither the proposed use of the ROW nor the Project on the Subject Property will detrimentally affect air or water quality, or ambient noise levels.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

Primary/Secondary. Neither the ROW nor the Subject Property are located in an environmentally sensitive area.

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

Primary/Secondary. Neither the ROW nor the Subject Property are located in or near any area identified as having special scenic vistas or view planes in any County or State plans or studies. There will be no scenic or visual impacts resulting from the improvements that are being proposed on the ROW. Any improvements on the Subject Property will be compatible with the scenic qualities of the surrounding area.

13. Requires substantial energy consumption.

Primary/Secondary. Neither the proposed use of the ROW nor the Project on the Subject Property will require substantial energy consumption.

12.5 Alternatives. HAR Section 11-200-9C requires the Applicant to analyze alternatives to any proposed actions ("Alternatives"). The Alternatives in this case are as follows:

a. No Project/No GOE. The First Alternative would be for the Applicant not to establish a Farm or CPR on the Subject Property, and not to request the GOE

over the ROW. This would make most of the agricultural and residential use impossible because there would be no (legal) access to the majority of the acreage.

b. No Project/Request GOE. The Second Alternative would be for the Applicant not to establish a Condominium on the Subject Property, but to request the GOE over the ROW. This would not substantially change the current situation, since the Subject Property would still be entitled to seven Farm Dwelling Units, which would use the ROW for access.

c. Project/No GOE. The Third Alternative would be for the Applicant to establish the Project on the Subject Property but not request a GOE. This would make most of the agricultural and residential use impossible because there would be no (legal) access to the majority of the acreage. .

d. Alternative Access. If some alternative access to a public road were available, then the Subject Property could utilize such access instead of Olohena Road. Unfortunately, there are no other public roads available. The Subject Property is surrounded by private lands, and there is no road access to Olohena Road for the Subject Property except across the ROW.

SECTION 13. NATIVE HAWAIIAN ISSUES.

13.1 Impacts on Traditional or Cultural Practices. The Project would include some minor soil disturbance: small excavation for bridge, roads and dwellings and minor harrowing for the farm. Since the land that would be utilized has historically been utilized for the cultivation of pineapple and sugar cane ***[Exhibit "E-1"]*** and is heavily disturbed, no adverse impacts on significant archaeological, cultural, or historic sites would be anticipated with the implementation of the Project. In addition, based on a record review and several site visits, no significant historic sites occur within the proposed project area. The State Historic Preservation

Division of the Department of Land and Natural Resources determined that no historic properties will be affected ***[Exhibit "E-2"]***

The conclusions is that the Project will have no impact on any known traditional or customary practices of native Hawaiians.

13.2 Subject Property. There are no known traditional or customary practices of native Hawaiians that are presently occurring within the Subject Property that will be affected by the Project. There are no special gathering practices taking place within the Subject Property that will be affected. The Project will not detrimentally affect: access to any streams; access to the shoreline or other adjacent shoreline areas; or gathering along any streams, the shoreline or in the ocean. There are no known religious practices taking place within the Subject Property. The Project will have no negative impact on any cultural or historic sites or resources located within the Subject Property.

13.3 ROW. There are no known cultural or traditional practices taking place on the ROW. To the extent that any cultural or traditional practices are taking place on or associated with the ROW, the additional use by the Applicant will not affect such practices.

SECTION 14. AGENCY/COMMUNITY CONTACTS.

14.1 Contact with Community. The ROW's are within Applicant's land, there is no impact on surrounding land owners or tenants.

14.2 Contact with Agencies. The Applicant has been in contact with the following governmental agencies concerning the ROW and the Project on the Subject Property and following comments were received:

State Agencies:

DOH	BMP for dust control
DLNR – CWRM	Stream Channel Alteration & Stream Diversion Works Permits are required if work inside floodway (not the

	case).
DLNR – Historic Preserv.	No historic properties affected

County Agencies:

County Planning	No objections
Public Works	No objections

Other Agencies:

OHA	No objections
EKWUC	No objections to plans

SECTION 15. CONCLUSION.

The Applicant respectfully requests the Land Board to review this draft Environmental Assessment, determine that the proposed use of the ROW will have no significant primary or secondary environmental effects, and issue a Finding Of No Significant Impacts or Negative Declaration.

DATED: Lihue, Kauai, Hawaii, February 25, 2018.

KONOHIKI KIHAPAI LLC,
a Hawaii limited liability company

By _____

Its Gilles Lebbe, its Managing Member

EXHIBIT LIST

(KONOHIKI KIHAPAI LLC, a Hawaii limited liability company, Environmental Assessment)

EXHIBIT

A. AUTHORIZATION

B. TITLE/LEGAL DESCRIPTIONS

C. MAPS

D. PHOTOGRAPHS

E. HISTORY

F. ADJACENT PROPERTIES

Applicant's authorization.

Undersigned, Konohiki Kihapai LLC, hereby authorizes Gilles Lebbe, to file an Environamental Assessment with the DLNR Land Board in the matter of the application of KONOHIKI KIHAPAI LLC, a Hawaii limited liability company, for a Grant of Perpetual Non-Exclusive Easement for Access and Utility Purposes over State Right Of Ways situated at Kapaa, Puna, Kauai, Hawaii, identified by Kauai Tax Map Key No.(4) 4-4-006:002.

This day of February 28, 2015.

KONOHIKI KIHAPAI, LLC
By: Gilles Lebbe,
Its: Managing Member

Exhibit A-2

Conservation Plan

Date: 9/3/2015

Customer(s): GILLES LEBBE

District: EAST KAUAI SOIL AND WATER CONSERVATION DISTRICT

Approximate Acres: 29.2

Legal Description: TMK: (4) 4-4-006:002

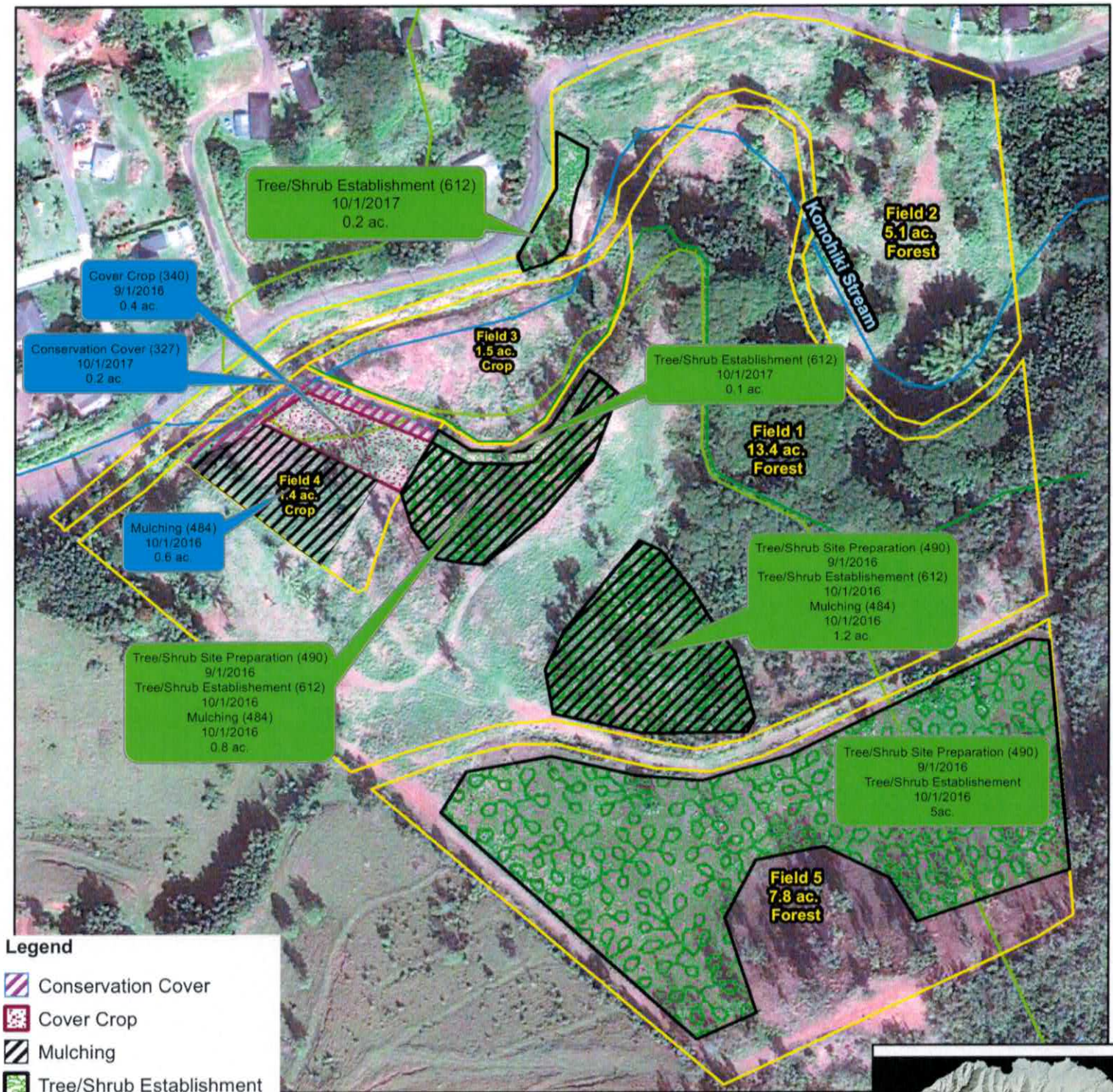
Field Office: LIHUE SERVICE CENTER

Agency: NRCS

Assisted By: Jennifer Scotti

State and County: HI, Kauai County, Hawaii

Land Units: 1-5



Legend

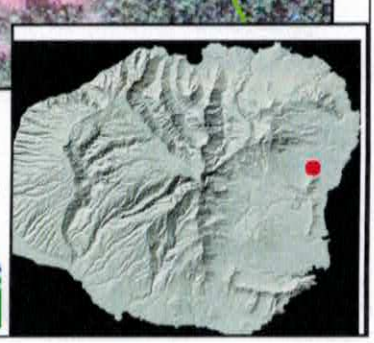
- Conservation Cover
- Cover Crop
- Mulching
- Tree/Shrub Establishment
- Tree/Shrub Site Preparation
- Lebbe_Consplan
- Konohiki Stream
- Original Disch Path
- Current Ditch Path

200 0 200 Feet

1 in = 200 ft

N

USDA



East Kauai
Soil & Water Conservation District

September 14, 2015

Gilles Lebbe
6242 Olohena Rd Unit B
Kapaa, HI 96746

SUBJECT: Agriculture Exemption

Dear Gilles:

We approved your conservation plan for the **TMK: (4) 4-4-006:002 (approx. 29.2 acres)** at the East Kauai Soil and Water Conservation District Board meeting on September 14, 2015. Your copy of the conservation plan will be sent to you by the NRCS. Please notify us if the TMK # shown in this letter is incorrect or if you notice any other errors that need to be corrected. By completing a conservation plan, you are demonstrating a commitment to soil and water conservation, and we appreciate that.

In issuing this conservation plan, the East Kauai Soil & Water Conservation District relied on the information and data which you provided to us. If, subsequent to the issuance of this approved conservation plan, such information and data prove to be false, incomplete or inaccurate, this approval may be modified, suspended or revoked, in whole or in part. Before you do anything to your property that is not included in your plan, it is necessary that you notify us. We can assist you in revising your conservation plan.

It is your responsibility to make sure that no historic sites are damaged by your activities. Your NRCS soil conservationist can advise you when a historic preservation review is required, if you are applying for federal assistance programs. In the event any unanticipated sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings or walls are encountered, you and/or your contractors shall stop work and contact the State Historic Preservation Division (SHPD) immediately by calling 808-692-8015.

This conservation plan does not supersede any Kauai County, State and Federal ordinances or regulations. It is your responsibility to obtain any required permits, and to comply with any zoning requirements. If you are applying for an agricultural exemption to Kauai County's Sediment and Erosion Control Ordinance, obtain an application form from Kauai County Department of Public Works. Note that if your plan proposes to use the land in the same way as it has been used in the past (limited to the same acreage, depth of tilling, and proposed use types), the agricultural exemption does not require a SHPD review of your plan. Implementation of conservation practices scheduled in your plan may require additional engineering design and specifications. This assistance can be provided by the USDA-NRCS office or by a private consultant.

We wish you success in your agricultural endeavors! If you have any questions, please contact the East Kauai District office at 245-6513, ext. 117.

Sincerely,

Ed Kawamura, Jr.
Chairman
East Kaua`i SWCD

cc: USDA-NRCS, Kaua`i County Department of Public Works, Kaua`i County Planning Department, and SHPD

Bernard P. Carvalho, Jr.
Mayor

Wallace G. Rezentes, Jr.
Managing Director

Lyle Tabata
Acting 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

May 31, 2017

Gilles Lebbe
6242B Olohena Road
Kapa'a, HI 96746

SUBJECT: AGRICULTURAL EXEMPTION NO. AE-2017-2 FROM THE SEDIMENT AND EROSION CONTROL ORDINANCE NO.808, KAWAIHAU DISTRICT
TMK: 4-4-006:002

Dear Mr. Lebbe:

We are exempting the grading, grubbing, and stockpiling operations for the captioned property under Section 22.7.6 of the County's Sediment and Erosion Control Ordinance No. 808. We are granting an agricultural exemption for the area and conservation practices specifically shown on your conservation plan that was approved by the East Kaua'i Soil and Water Conservation District on September 14, 2017. Grading, grubbing, and stockpiling permits are not required as long you are working with the East Kaua'i Soil & Water Conservation District and implementing the conservation practices in your plan to the standards and specifications set by the National Resources Conservation Service. Enclosed is the approved agricultural exemption which is subject to the conditions as noted.

Should you have any questions, please contact Paul Togioka at (808) 241-4889.

Sincerely,

MICHAEL MOULE, P.E.
Chief, Engineering Division

SI/PT
Attachment
cc: Design & Permitting
Planning Department
Department of Finance
Ms. Jenna Dunn, USDA/NRCS, 4334 Rice Street, Suite 207, Līhu'e, HI 96766
Mr. Ed Kawamura., WK-SWCD, 4334 Rice Street, Suite 207, Līhu'e, HI 96

APPLICATION NO. AE-2017-2

COUNTY OF KAUA'I
Department of Public Works
Engineering Division

APPROVAL OF AGRICULTURAL EXEMPTION FROM THE COUNTY OF KAUA'I'S SEDIMENT AND EROSION CONTROL ORDINANCE NO. 808, KAWAIHAU DISTRICT, TMK: 4-4-006:002

TO: Gilles Lebbe
6242B Olohena Road
Kapa'a, HI 96746

This is to inform you that your Application No. AE-2017-2 for an Agricultural Exemption from the County of Kaua'i's Sediment and Erosion Control Ordinance No. 808 is approved subject to the following conditions:

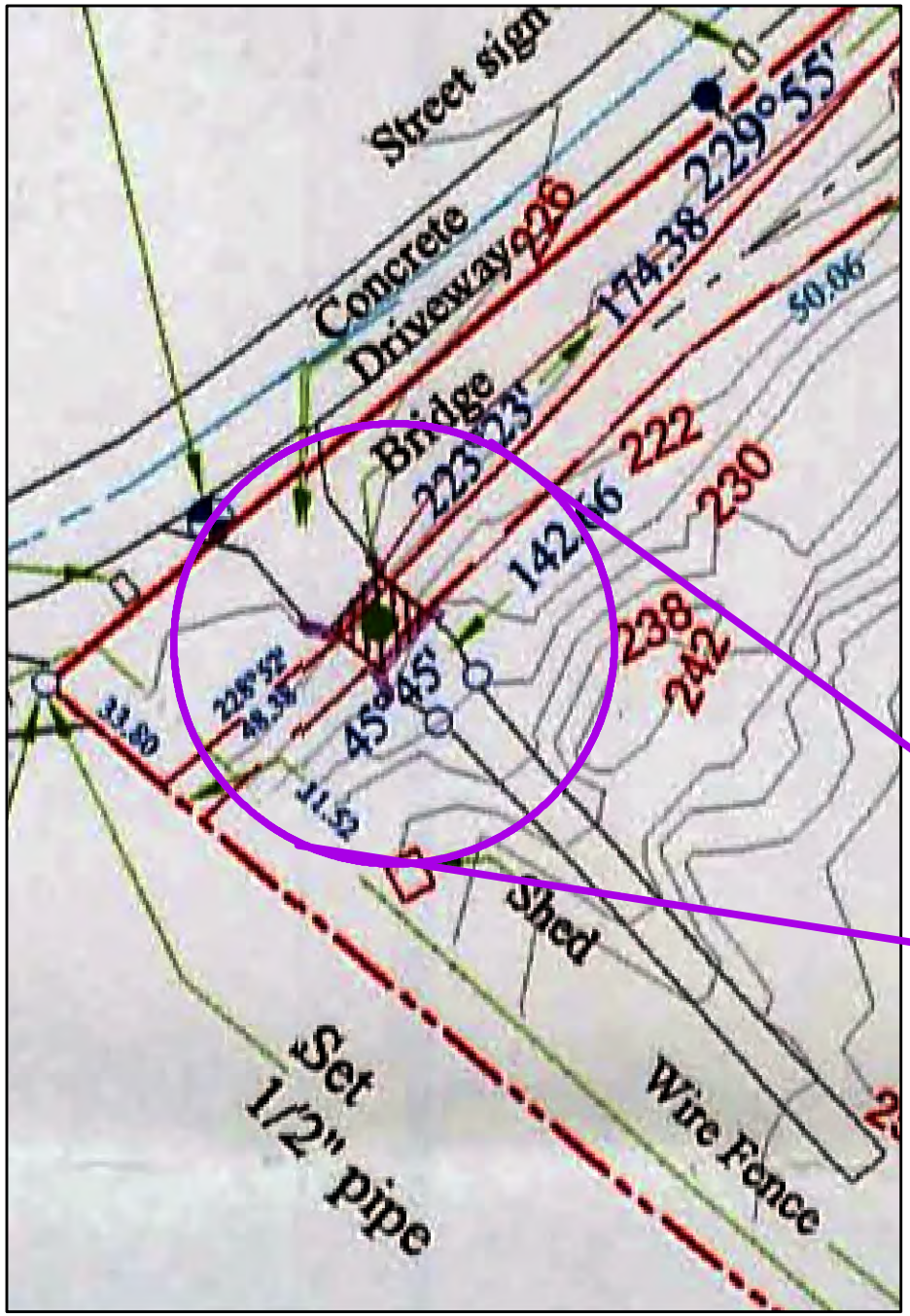
1. The graded or grubbed area is to be used exclusively for agricultural production.
2. The applicant agrees to continue or establish the agricultural operations within one year and agrees further not to take actions to change from the specified agricultural operations to a different type of land use for the period of time stated.
3. This exemption shall be good for ten (10) years from the date of approval unless revoked sooner for non-compliance of conditional requirements or the conservation plan is terminated sooner by the appropriate Soil and Water Conservation District Board.
4. This Agricultural Grading Exemption is specific to the applicant and TMK listed and is non-transferable.
5. Best agricultural management practices (Conservation Practices) shall be implemented at all times to the maximum extent practicable to prevent damage by sedimentation, erosion or dust to streams, water courses, natural areas and the property of others. It shall be the permittee's and the property owner's responsibility to ensure that best agricultural management practices (Conservation Practices) are satisfactorily implemented.

Date of Issue: 5/22/2017

Issued By: _____
Design and Permitting Section

cc: Design & Permitting
Planning Department
Jenna Dunn, USDA/NRCS
Mr. Ed Kawamura, Jr., Chairman East Kaua'i SWCD

Exhibit A-3 : Existing bridge



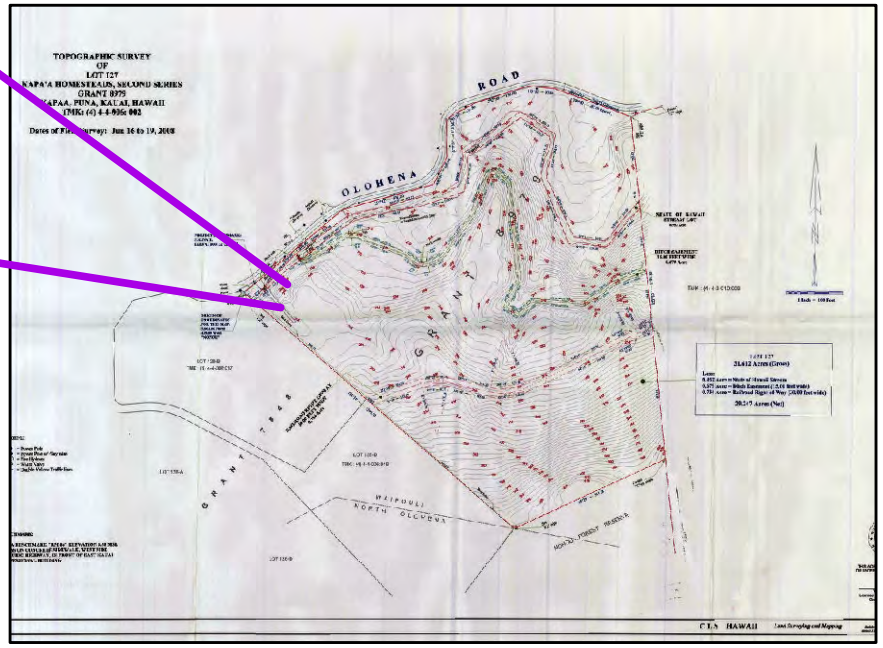


Exhibit A-4

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

October 27, 2015

Mr. Armalin Richardson, District Land Agent
State of Hawai'i
Department of Land and Natural Resources
3060 Eiwa Street, Room 208
Līhu'e, Hawai'i 96766

SUBJECT: Request for Grant of Easement – Konohiki Kihapai LLC
Tax Map Key: (4) 4-4-006: 012 and 013, Kapaa, Kaua`i, Hawai'i

Dear Mr. Richardson:

Mr. Gilles Lebbe, Managing Director of Konohiki Kihapai, LLC, requested that the Engineering Division of the Department of Public Works review the subject Request for Grant of Easement and provide comment on the proposed location of the easement. The requested easement will provide access across State of Hawai'i controlled properties. The easement will cross Konohiki Stream, a Railroad ROW, and a ditch.

In support of his request, Mr. Lebbe provided the Engineering Division with a copy of the report titled "Flood Study for Lot 127", which was prepared by Esaki Surveying and Mapping, Inc. and is dated September 2015. The report states that several factors were considered when selecting the crossing and that after evaluating several options the proposed location would be the most reasonable location for the bridge.

We have reviewed the Flood Study For Lot 27 and based on its recommendations have no objections to the location of the proposed bridge crossing.

If you have any questions or need additional information, please contact Stanford Iwamoto, Engineering Division at (808) 241-4896 or siwamoto@kauai.gov.

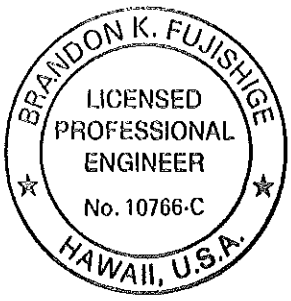
Very truly yours,

MICHAEL MOULE, P.E.
Chief of Engineering

MM/SI
Copy to: Design and Permitting

FLOOD STUDY
LOT 127

Client: Gilles Lebbe
Tax Map Key: (4) 4-4-06: 02
Date: September 2015



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

ESAKI SURVEYING & MAPPING, INC.
1610 Haleukana Street
Līhu`e, Kaua`i, Hawai`i 96766

TABLE OF CONTENTS

I. FACTS SHEET

FACTS SHEET

General Location and Description

1. Name of town: Waipouli
2. Tax Map Key: (4) 4-4-06: 02
3. Names of local streets within and adjacent to the proposed project: Olohena Road
4. Identification of major and local drainageways, facilities, and/or easements within and adjacent to the proposed project: see Drainage Basin Maps (sheets 10 and 27)
5. Names of surrounding developments: subject property is located in Kapa`a Homesteads; Nonou Development and Sleeping Giant Half Acres to the southwest
6. Flood Information: See this report
7. Property Boundaries: see Location Map (sheet 7)
8. Area of property in acres: 29.60 acres
9. Ground cover (type of trees, shrubs, vegetation, general soil conditions, topography and average slope): typical undeveloped agricultural lot; see Drainage Basin Maps for topography and slope
10. General project description: the project involves determining flood limits to locate future house sites
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.

VICINITY MAP

SCALE: 1"=1200'

KAPAA HOMESTEADS 1ST SERIES

SEC. 6

KAPAA HOMESTEADS SECOND SERIES

WAILUA HOMESTEADS

KAPAA

WAILUA

NORTH OLOHENA

KEALIA FOREST RESERVE (See Insert)

NONOU FOREST RESERVE SEC 2

SEC. 2

SEC. 3

PROJECT LOCATION

PROPOSED RESERVOIR

RESERVOIR

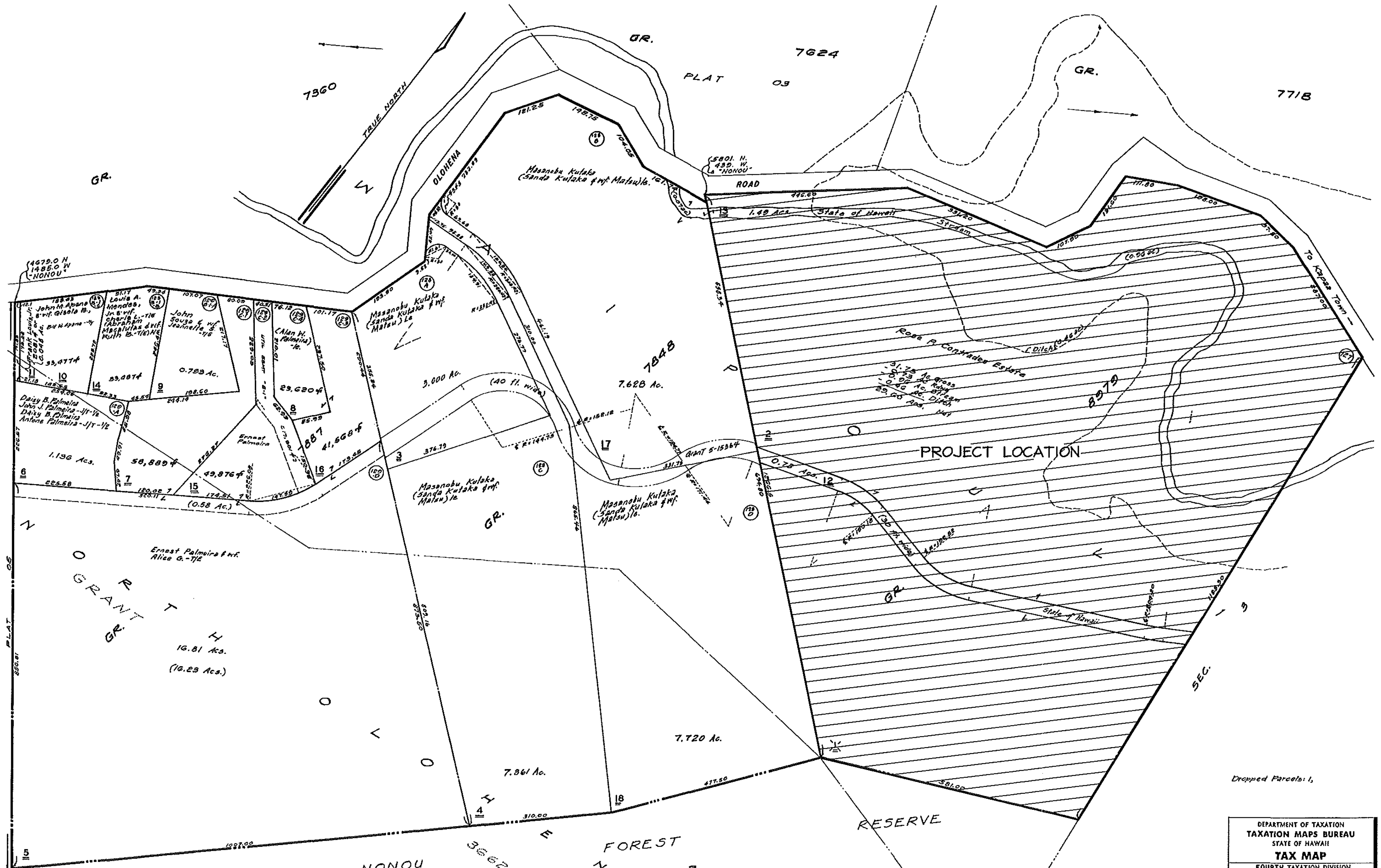
KAWAIHAU — KAUAI.

TRUE NORTH

TAXATION MAPS
BUREAU
TERRITORY OF HAWAII
TAX MAP

FOURTH DIVISION	
ZONE	SEC.
4	4
CONTAINING	PLATS

SUBJECT TO CHANGE



LOCATION MAP

SCALE: 1"=200'

POR. WAIPOULI & NORTH OLOHENA, KAUAI, KAPAA HOMESTEADS, 2ND SERIES (Formerly por. 4-4-02).

FOR REAL PROPERTY TAXATION PURPOSES
SUBJECT TO CHANGE

DEPARTMENT OF TAXATION
TAXATION MAPS BUREAU
STATE OF HAWAII
TAX MAP
FOURTH TAXATION DIVISION

ZONE	SEC.	PLAT
4	4	06

III. RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS

The TR-55 Method was used to compute runoff for Drainage Area A (see Drainage Basin Map #1, sheet 10) because the drainage basin is greater than 100 acres. The Rational Method was used to compute runoff for Drainage Area B (see Drainage Basin Map #2, sheet 27) because the drainage basin is less than 100 acres.

Drainage Area A

Area = 765.11 acres
CN = 71
i_{100} = 19.2 inches
T_C = 0.56 hour

Q_{100} = 4,813 cfs

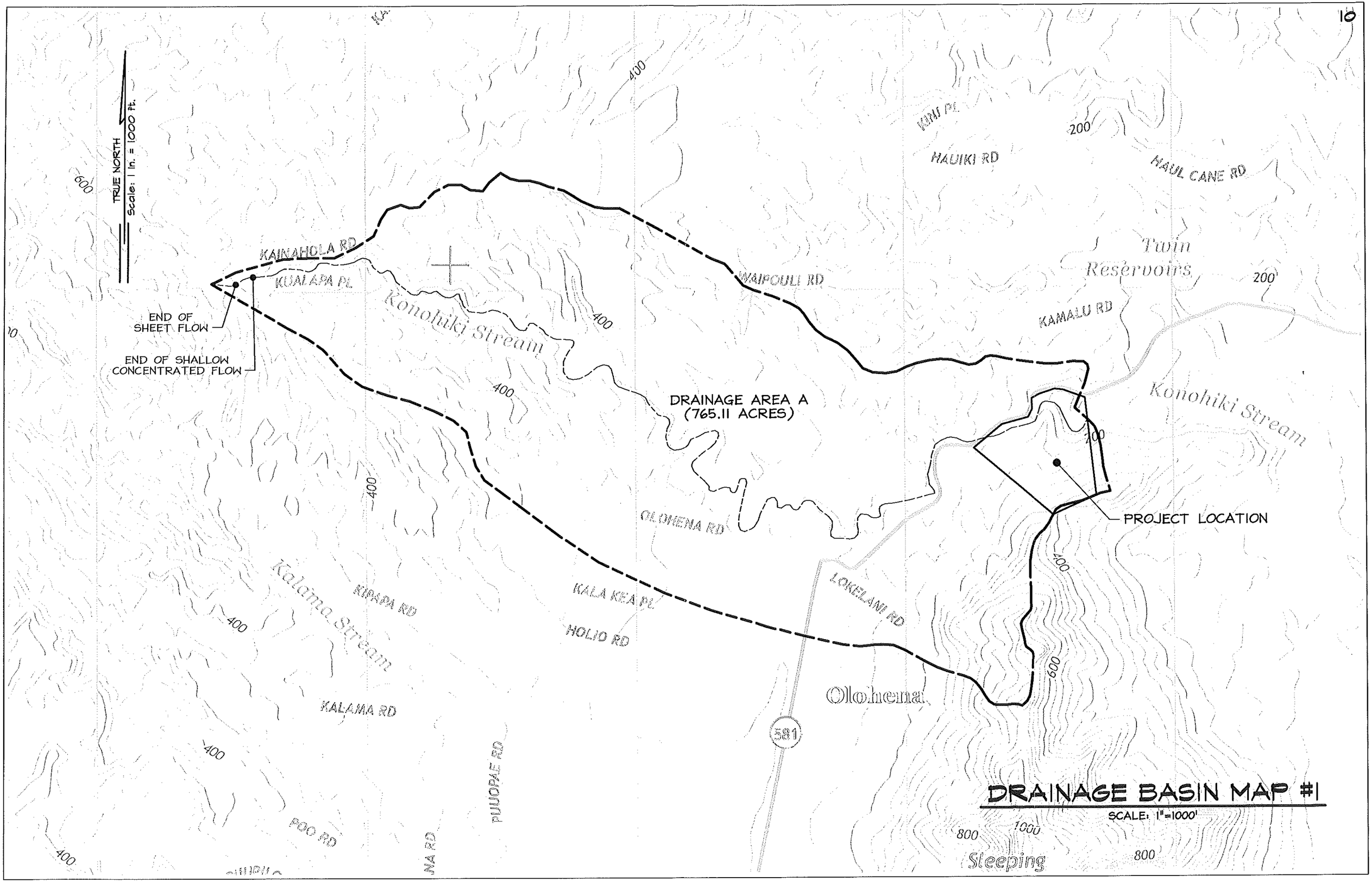
Drainage Area B

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

C_{100} = 0.40
i_{100} = 5.8 inches
i_{CF} = 2.7
A = 9.98 acres

$Q_{100} = C_{100} i_{100} i_{CF} A$
$= 0.40(5.8)(2.7)(9.98)$
$= 62.51$ cfs



DRAINAGE BASIN MAP #1

SCALE: 1"=1000'

TRUE NORTH

Scale: 1 in. = 1000 ft.

TYPE C SOIL
(218.99 ACRES)

DRAINAGE AREA
765.11 ACRES

TYPE B SOIL
(546.12 ACRES)

PROJECT LOCATION

KAHAPOLA ROAD

Twin Reservoirs

SOILS MAP

SCALE: 1"=1000'

Quick TR-55 Ver.5.47 S/N:
Executed: 10:59:45 03-23-2015

Gilles Libbe Flood Study

RUNOFF CURVE NUMBER DATA

Composite Area:

SURFACE DESCRIPTION	AREA (acres)	CN	
Residential-1 ac.-Type B soil	546.12	68	
Residential-1 ac.-Type C soil	218.99	79	
COMPOSITE AREA --->	765.11	71.1	(71)

Quick TR-55 Ver.5.47 S/N:
Executed: 10:57:48 03-23-2015 15-13.TCT

Gilles Libbe Flood Study

Tc COMPUTATIONS FOR:

SHEET FLOW (Applicable to Tc only)

Segment ID			
Surface description			
Manning's roughness coeff., n		0.2400	
Flow length, L (total < or = 300)	ft	300.0	
Two-yr 24-hr rainfall, P2	in	7.900	
Land slope, s	ft/ft	0.0683	
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.22	= 0.22

SHALLOW CONCENTRATED FLOW

Segment ID			
Surface (paved or unpaved)?		Unpaved	
Flow length, L	ft	233.3	
Watercourse slope, s	ft/ft	0.1752	
$Avg.V = Csf * (s)^{0.5}$	ft/s	6.7534	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.01	= 0.01

CHANNEL FLOW

Segment ID			
Cross Sectional Flow Area, a	sq.ft	364.35	
Wetted perimeter, Pw	ft	68.63	
Hydraulic radius, r = a/Pw	ft	5.309	
Channel slope, s	ft/ft	0.0232	
Manning's roughness coeff., n		0.0500	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	%13.8133	
Flow length, L	ft	16514	
T = L / (3600*V)	hrs	0.33	= 0.33

::

TOTAL TIME (hrs) 0.56

Quick TR-55 Version: 5.47 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

Gilles Libbe Flood Study

CALCULATED .GPD
DISK FILE: 15-13 .GPD

Drainage Area	(acres)	765.11--->	1.1955 sq.mi.	
Runoff Curve Number	(CN)	71		
Time of Concentration,Tc	(hrs)	.56		
Rainfall Distribution	(Type)	I		
Pond and Swamp Areas	(%)	0 --->	0.0 acres	

	Storm #1	Storm #2	Storm #3
Frequency (years)	100		
Rainfall, P, 24-hr (in)	19.2		
Initial Abstraction, Ia (in)	0.817	0.817	0.817
Ia/p Ratio	0.043	0.000	0.000
Unit Discharge, * qu (csm/in)	268	0	0
Runoff, Q (in)	15.04	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	4813	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.306	0.000	0.000
C1	#1	-0.514	0.000	0.000
C2	#1	-0.117	0.000	0.000
qu (csm)	#1	267.642	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.306	0.000	0.000
C1	#2	-0.514	0.000	0.000
C2	#2	-0.117	0.000	0.000
qu (csm)	#2	267.642	0.000	0.000
* qu (csm)		268	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Soil Properties Related to Erosion and Sedimentation
For the islands of
Kauai, Oahu, Maui, Molokai, and Lanai 1/
July 1993

Soil Symbol 2/	Soil Series or Miscellaneous Land Type	Erosion Factors K	Erosion Factors T (t/a/yr)	Hydrologic Group	Erosion Resistance Group
HdC	HALEIWA	0.10	5	B	II
HeA	HALEIWA	0.17	5	B	II
HeB	HALEIWA	0.17	5	B	II
HfB	HALII	0.10	5	B	I
HfC	HALII	0.10	5	B	I
HfD2	HALII	0.10	5	B	I
HfE2	HALII	0.10	5	B	I
HgB	HALIIHAILE	0.17	5	B	II
HgC	HALIIHAILE	0.17	5	B	II
HhB	HALIIHAILE	0.17	5	B	II
HhC	HALIIHAILE	0.17	5	B	II
HkC2	HALIIHAILE	0.15	5	B	II
HlB	HAHAKUAPOKO	0.10	5	B	I
HlC	HAHAKUAPOKO	0.10	5	B	I
HlC2	HAHAKUAPOKO	0.10	5	B	I
HmA	HANALEI	0.17	5	C	II
HnA	HANALEI	0.17	5	C	II
HnB	HANALEI	0.17	5	C	II
HoB	HANALEI	0.15	5	C	II
HpA	HANALEI	0.10	5	C	II
HrB	HANALEI	0.17	5	C	II
HsB	HANAHAULU	0.10	5	B	I
HsC	HANAHAULU	0.10	5	B	I
HsD	HANAHAULU	0.10	5	B	I
HsE	HANAHAULU	0.10	5	B	I
HtE	HANAHAULU	0.10	5	B	I
HuE	HANAHAULU	0.10	5	B	I
HvA	HOLOMUA	0.28	5	B	III
HvB	HOLOMUA	0.28	5	B	III
HvB3	HOLOMUA	0.28	5	B	III
HvC	HOLOMUA	0.28	5	B	III
HvC3	HOLOMUA	0.28	5	B	III
HwC	HONOLUA	0.10	5	B	I
HwD	HONOLUA	0.10	5	B	I
HxA	HONOULIULI	0.28	5	D	II
HxB	HONOULIULI	0.28	5	D	II
HyB3	HOOLEHUA	0.17	4	B	II
HzA	HOOLEHUA	0.17	5	B	II
HzB	HOOLEHUA	0.17	5	B	II
HzC	HOOLEHUA	0.17	5	B	II
HzE	HOOLEHUA	0.17	5	B	II
ISD	IO	0.20	5	B	IV
IaA	IAO	0.17	5	B	II
IaB	IAO	0.17	5	B	II
IbB	IAO	0.15	5	B	II
IbC	IAO	0.15	5	B	II
IcB	IAO	0.17	5	B	II
IcC	IAO	0.17	5	B	II
IoB	IOLEAU	0.10	5	C	I
IoC	IOLEAU	0.10	5	C	I
IoD2	IOLEAU	0.10	5	C	I

Soil Properties Related to Erosion and Sedimentation
for the islands of
Kauai, Oahu, Maui, Molokai, and Lanai 1/
July 1993

Soil Symbol 2/	Soil Series or Miscellaneous Land Type	Erosion Factors K	Erosion Factors T (t/a/yr)	Hydrologic Group	Erosion Resistance Group
IoE2	IOLEAU	0.10	5	C	I
JL	BLOWN-OUT LAND	0.17	2	B	
JL	JAUCAS	0.10	5	A	IV
JaC	JAUCAS	0.10	5	A	IV
JcC	JAUCAS	0.10	5	A	IV
JfB	JAUCAS	0.10	5	A	IV
JkB	JAUCAS VARIANT	0.10	5	A	IV
KASD	KAHANUI	0.10	3	C	I
KATD	KAHANUI	0.10	3	C	I
KBID	KAILUA	0.05	5	A	I
KCXD	KAIHU	0.02	3	A	I
KDIE	KAIPOIOI	0.17	5	B	III
KDVE	KAIPOIOI	0.17	5	B	III
KDVE	ROCK OUTCROP	0.02	1	D	
KEHF	KALAPA	0.10	5	B	I
KEHF	ROCK OUTCROP	0.02	1	D	
KFID	KALAUPAPA	0.17	1	D	IV
KFID	ROCK OUTCROP	0.02	1	D	
KGKC	KAMAOLE	0.10	2	B	III
KGLC	KAMAOLE	0.10	2	B	III
KHHC	KANEOHE	0.10	5	B	I
KHHE	KANEOHE	0.10	5	B	I
KHHF	KANEOHE	0.10	5	B	I
KHOF	KANEOHE	0.10	5	B	I
KIG	KAPAA	0.10	5	B	II
KKTC	KAPUNIKANI	0.10	2	D	II
KLUD	KAUPO	0.10	3	A	IV
KLVD	KAUPO	0.10	3	A	IV
KMW	KEALIA	0.17	5	D	IV
KNXD	KEAWAKAPU	0.10	3	B	II
KOYE	KEKAHA	0.10	5	B	III
KPZ	BADLAND	0.49	3	C	
KPZ	KEHOO	0.17	5	B	II
KRL	BADLAND	0.49	3	C	
KRL	KOELE	0.17	5	B	II
KRX	KOELE	0.17	5	B	II
KRX	ROCK OUTCROP	0.02	1	D	
KSKE	KOKEE	0.10	3	B	I
KSKF	KOKEE	0.10	3	B	I
KTKE	KOKOKAHI	0.10	5	D	II
KUL	KOLOKOLO	0.10	5	B	II
KVSB	KOOLAU	0.05	3	C	I
KVSE	KOOLAU	0.05	3	C	I
KZC	KUNUMEIA	0.05	5	B	I
KaB	KAENA	0.28	5	D	II
KaC	KAENA	0.28	5	D	II
KaeB	KAENA	0.17	5	D	II
KaeC	KAENA	0.17	5	D	II
KaeD	KAENA	0.17	5	D	II
KanE	KAENA	0.10	5	D	II
KavB	KAENA VARIANT	0.28	5	D	II

Soil Properties Related to Erosion and Sedimentation
For the Islands of
Kauai, Oahu, Maui, Molokai, and Lanai 1/
July 1993

Soil Symbol 2/	Soil Series or Miscellaneous Land Type	Erosion Factors K	Erosion Factors T (t/a/yr)	Hydrologic Group	Erosion Resistance Group
KavC	KAENA VARIANT	0.28	5	D	II
KbB	KAHANA	0.17	5	B	II
KbC	KAHANA	0.17	5	B	II
KbD	KAHANA	0.17	5	B	II
KcB	KALAE	0.10	5	B	I
KcC	KALAE	0.10	5	B	I
KcC3	KALAE	0.10	5	B	I
KcD3	KALAE	0.10	5	B	I
KcE3	KALAE	0.10	5	B	I
KdD	KALAPA	0.10	5	B	I
KdE	KALAPA	0.10	5	B	I
KdF	KALAPA	0.10	5	B	I
Ke	KALIHI	0.28	5	D	II
Kf	KALOKO	0.17	5	D	II
Kfa	KALOKO	0.17	5	D	II
Kfb	KALOKO VARIANT	0.17	5	D	II
KgB	KANEOHE	0.10	5	B	I
KgC	KANEOHE	0.10	5	B	I
KhB	KANEPUU	0.17	5	B	II
KhB2	KANEPUU	0.17	5	B	II
KhC	KANEPUU	0.17	5	B	II
KhC2	KANEPUU	0.17	5	B	II
KkB	KAPAA	0.10	5	B	I
KkC	KAPAA	0.10	5	B	I
KkD	KAPAA	0.10	5	B	I
KkE	KAPAA	0.10	5	B	II
KlA	KAWAIHAPAI	0.17	5	B	II
KlB	KAWAIHAPAI	0.17	5	B	II
KlC	KAWAIHAPAI	0.17	5	B	II
KlaA	KAWAIHAPAI	0.15	5	B	II
KlaB	KAWAIHAPAI	0.15	5	B	II
KlbC	KAWAIHAPAI	0.10	5	B	II
KlcB	KAWAIHAPAI	0.17	5	B	II
KmA	KEAAU	0.28	3	D	II
KmaB	KEAAU	0.17	3	D	II
KmbA	KEAAU	0.28	3	D	II
KnB	KEAHUA	0.17	5	B	II
KnC	KEAHUA	0.17	5	B	II
KnaB	KEAHUA	0.15	5	B	II
KnaC	KEAHUA	0.15	5	B	II
KnaD	KEAHUA	0.15	5	B	II
KnbD	KEAHUA	0.10	5	B	II
KncC	KEAHUA	0.17	5	B	II
KnhC	KEAHUA	0.15	5	B	II
KnsC	KEAHUA	0.15	5	B	II
KoA	KEKAHA	0.17	5	B	III
KoB	KEKAHA	0.17	5	B	III
KobA	KEKAHA	0.17	5	B	III
KpB	KEHOO	0.17	5	B	II
KpC	KEHOO	0.17	5	B	II
KpD	KEHOO	0.17	5	B	II

Soil Properties Related to Erosion and Sedimentation
For the islands of
Kauai, Oahu, Maui, Molokai, and Lanai 1/
July 1993

Soil Symbol 2/	Soil Series or Miscellaneous Land Type	Erosion Factors K	T (t/a/yr)	Hydrologic Group	Erosion Resistance Group
KpE	KEHOO	0.17	5	B	II
KpF	KEHOO	0.17	5	B	II
KrB	KOELE	0.17	5	B	II
KrC	KOELE	0.17	5	B	II
KrD	KOELE	0.17	5	B	II
KsB	KOKO	0.17	3	B	IV
KsC	KOKO	0.17	3	B	IV
KsD	KOKO	0.17	3	B	IV
KtC	KOKOKAHI	0.28	5	D	II
KuB	KOLEKOLE	0.17	3	C	III
KuC	KOLEKOLE	0.17	3	C	III
KuD	KOLEKOLE	0.17	3	C	III
KvB	KOLOA	0.15	2	C	I
KvC	KOLOA	0.15	2	C	I
KvD	KOLOA	0.15	2	C	I
Kw	KOLOKOLO	0.17	5	B	II
KxC	KULA	0.17	3	B	IV
KxD	KULA	0.17	3	B	IV
KxaD	KULA	0.15	3	B	IV
KxbE	KULA	0.17	3	B	IV
KxbE	ROCK OUTCROP	0.02	1	D	
KyA	KUNIA	0.17	5	B	II
KyB	KUNIA	0.17	5	B	II
KyC	KUNIA	0.17	5	B	II
LHE	LAUHAIA	0.17	5	B	III
LHF	LAUHAIA	0.17	5	B	III
LhE	LAUHAIA	0.10	5	B	III
LPE	LUALUALEI	0.10	5	D	II
LaA	LAHAINA	0.17	5	B	II
LaB	LAHAINA	0.17	5	B	II
LaB3	LAHAINA	0.17	5	B	II
LaC	LAHAINA	0.17	5	B	II
LaC3	LAHAINA	0.17	5	B	II
LaD	LAHAINA	0.17	5	B	II
LaD3	LAHAINA	0.17	5	B	II
LaE3	LAHAINA	0.17	5	B	II
LcB	LAWAI	0.10	5	B	I
LcC	LAWAI	0.10	5	B	I
LcD	LAWAI	0.10	5	B	I
LeB	LEILEHUA	0.10	5	B	I
LeC	LEILEHUA	0.10	5	B	I
LhB	LIHUE	0.15	5	B	II
LhC	LIHUE	0.15	5	B	II
LhD	LIHUE	0.15	5	B	II
LhE2	LIHUE	0.15	5	B	II
LlB	LIHUE	0.15	5	B	II
LlC	LIHUE	0.15	5	B	II
LoB	LOLEKAA	0.10	5	B	I
LoC	LOLEKAA	0.10	5	B	I
LoD	LOLEKAA	0.10	5	B	I
LoE	LOLEKAA	0.10	5	B	I

Soil Properties Related to Erosion and Sedimentation
For the islands of
Kauai, Oahu, Maui, Molokai, and Lanai 1/
July 1993

Soil Symbol 2/	Soil Series or Miscellaneous Land Type	Erosion Factors K	Erosion Factors T (t/a/yr)	Hydrologic Group	Erosion Resistance Group
PbC	PAALOA	0.10	5	B	I
PcB	PAIA	0.17	5	B	II
PcC	PAIA	0.17	5	B	II
PcC2	PAIA	0.17	5	B	II
PdA	PAKALA	0.17	5	B	II
PdC	PAKALA	0.17	5	B	II
PeB	PAUHALU	0.10	5	B	I
PeC	PAUHALU	0.10	5	B	I
PeD	PAUHALU	0.10	5	B	I
PeE	PAUHALU	0.10	5	B	I
PeF	PAUHALU	0.10	5	B	I
PfB	PAUWELA	0.10	5	B	I
PfC	PAUWELA	0.10	5	B	I
PfD	PAUWELA	0.28	5	D	II
Ph	PEARL HARBOR	0.17	5	B	III
PkB	POHAKUPU	0.17	5	B	III
PkC	POHAKUPU	0.10	5	B	I
PlB	POOKU	0.10	5	B	I
PlD	POOKU	0.10	5	B	I
PmB	POOKU	0.10	5	B	I
PmC	POOKU	0.10	5	B	I
PmD	POOKU	0.10	5	B	I
PmE	POOKU	0.10	5	B	I
PnA	PUHI	0.10	5	B	I
PnB	PUHI	0.10	5	B	I
PnC	PUHI	0.10	5	B	I
PnD	PUHI	0.17	5	B	III
PnE	PUHI	0.15	5	B	III
PoB	PULEHU	0.17	5	B	III
PoaB	PULEHU	0.17	5	B	III
PpA	PULEHU	0.15	5	B	III
PpB	PULEHU	0.15	5	B	III
PrA	PULEHU	0.17	5	B	III
PrB	PULEHU	0.15	5	B	III
PsA	PULEHU	0.15	5	B	III
PtA	PULEHU	0.15	5	B	III
PtB	PULEHU	0.10	5	B	I
PuB	PULEHU	0.10	5	B	I
PvC	PULEHU	0.10	5	B	I
PwC	PUU OPAE	0.10	5	A	IV
PwD	PUU OPAE	0.10	5	A	IV
PwE	PUU OPAE	0.10	5	A	IV
TAE	TANTALUS	0.10	5	A	IV
TAF	TANTALUS	0.10	5	D	
TCC	TANTALUS	0.17	5	B	III
TCE	TANTALUS	0.05	5	A	IV
TR	TROPAQUEPTS	0.05	5	A	IV
ULD	ULUPALAKUA	0.02	1	D	
UHE	UHA				
UHF	UHA				
URD	ROCK OUTCROP				

Soil Properties Related to Erosion and Sedimentation
For the islands of
Kauai, Oahu, Maui, Molokai, and Lanai 1/
July 1993

Soil Symbol 2/	Soil Series or Miscellaneous Land Type	Erosion Factors K	Erosion Factors T (t/a/yr)	Hydrologic Group	Erosion Resistance Group
WxB	WAINEE	0.10	5	B	II
WxC	WAINEE	0.10	5	B	II
WyB	WAINEE	0.10	5	B	II
WyC	WAINEE	0.10	5	B	II
WzA	WAIPAHU	0.28	5	C	II
WzB	WAIPAHU	0.28	5	C	II
WzC	WAIPAHU	0.28	5	C	II
rAAE	ALAKAI	0.05	5	D	I
rAMD	AMALU	0.05	2	D	I
rAOO	AMALU	0.05	2	D	I
rAOO	OLOKUI	0.05	2	D	I
rCI	CINDER LAND	0.02	5	A	
rHOO	HONOHANU	0.05	5	A	I
rHR	AMALU	0.05	2	D	I
rHR	HONOHANU	0.05	5	A	I
rHT	HYDRANDEPTS	0.05	5	B	
rHT	TROPAQUODS	0.05	2	D	
rLW	LAVA FLOWS, AA	0.02	1	A	
rRH	RIVERWASH	0.05	4	A	
rRK	ROCK LAND	0.10	1	D	
rRO	ROCK OUTCROP	0.02	1	D	
rRR	ROUGH BROKEN LAND	0.05	2	C	
rRS	ROUGH BROKEN AND STONY LAND	0.05	2	C	
rRT	ROUGH MOUNTAINOUS LAND	0.20	1	D	
rRU	RUBBLE LAND	0.02	1	A	
rSL	SANDY ALLUVIAL LAND	0.17	5	A	
rSM	STONY ALLUVIAL LAND	0.10	5	B	
rSN	STONY BLOWN-OUT LAND	0.15	2	B	
rSO	STONY COLLUVIAL LAND	0.10	5	B	
rST	STONY LAND	0.10	5	B	
rSY	STONY STEEP LAND	0.10	5	B	
rTO	TROPAQUODS	0.05	2	D	
rTP	DYSTRANDEPTS	0.10	3	B	
rTP	TROPOHUMULTS	0.10	4	C	
rVS	VERY STONY LAND (MAUI)	0.10	1	C	
rVS	VERY STONY LAND	0.10	2	C	
rVT2	VERY STONY LAND, ERODED	0.10	2	C	
rWAF	WAIALEALE	0.05	3	D	I

1/ Replaces Table 14 in Erosion and Sediment Control Guide for Hawaii (1981).

2/ A soil symbol that is repeated indicates the soil map unit has two or more components. See the soil survey to obtain percentage of each component, or make on-site determination.

Table 2-2a.—Runoff curve numbers for urban areas[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1]Average runoff condition, and I_a = 0.2S.

[2]The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3]CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4]Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5]Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overton and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007\ (nL)^{0.8}}{(P_2)^{0.5}\ s^{0.4}} \qquad \text{[Eq. 3-3]}$$

Table 3-1.—Roughness coefficients (Manning's n) for sheet flow

Surface description	n[1]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses[2]	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:[3]	
Light underbrush	0.40
Dense underbrush	0.80

[1]The n values are a composite of information compiled by Engman (1986).
[2]Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.
[3]When selecting n, consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

where

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1),
L = flow length (ft),
P_2 = 2-year, 24-hour rainfall (in), and
s = slope of hydraulic grade line (land slope, ft/ft).

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

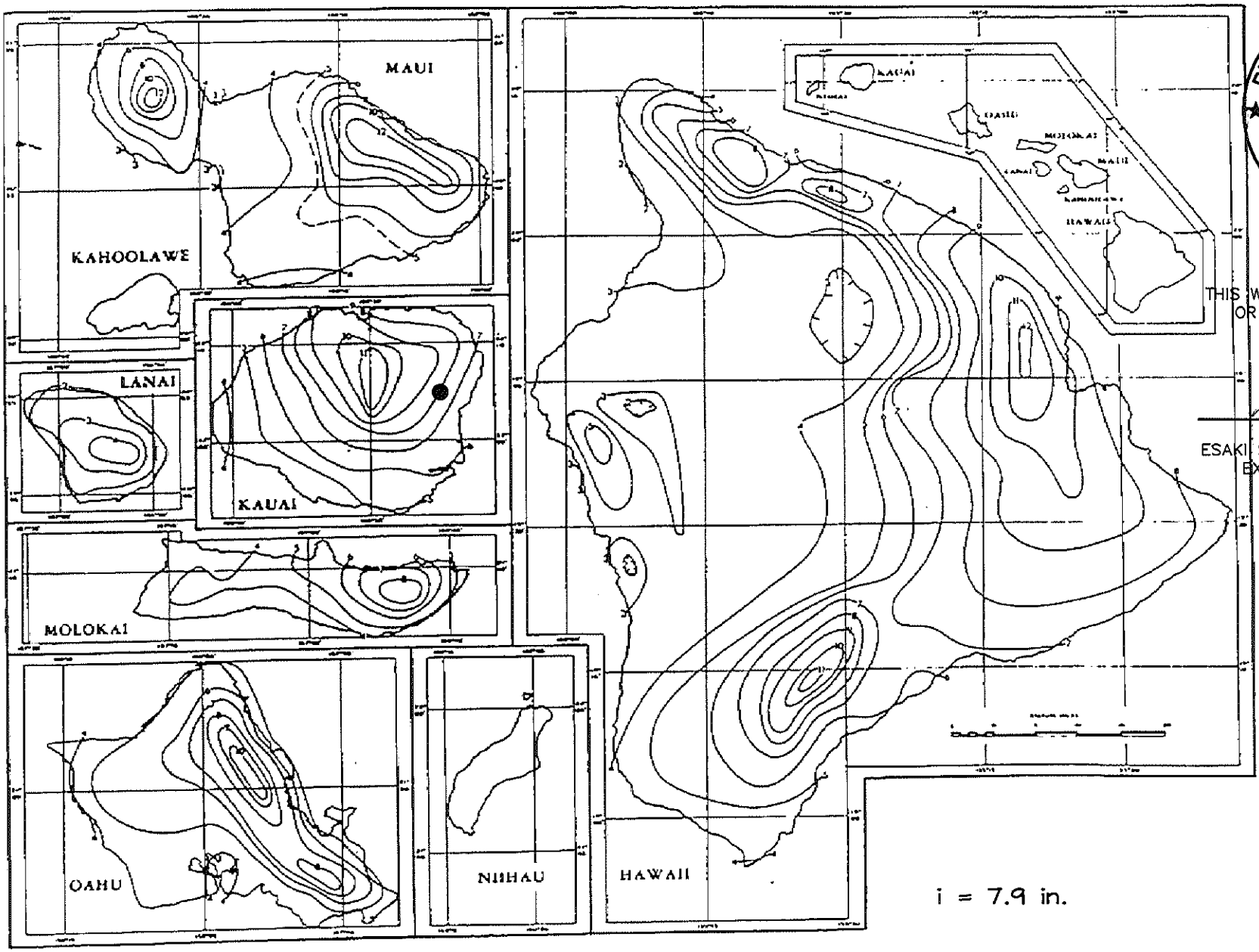
Shallow concentrated flow

After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bank-full elevation.



2-Year 24-Hour Rainfall (in.)

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LICENSED PROFESSIONAL ENGINEER
No. 10766
HAWAII, U.S.A.

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Plate 5

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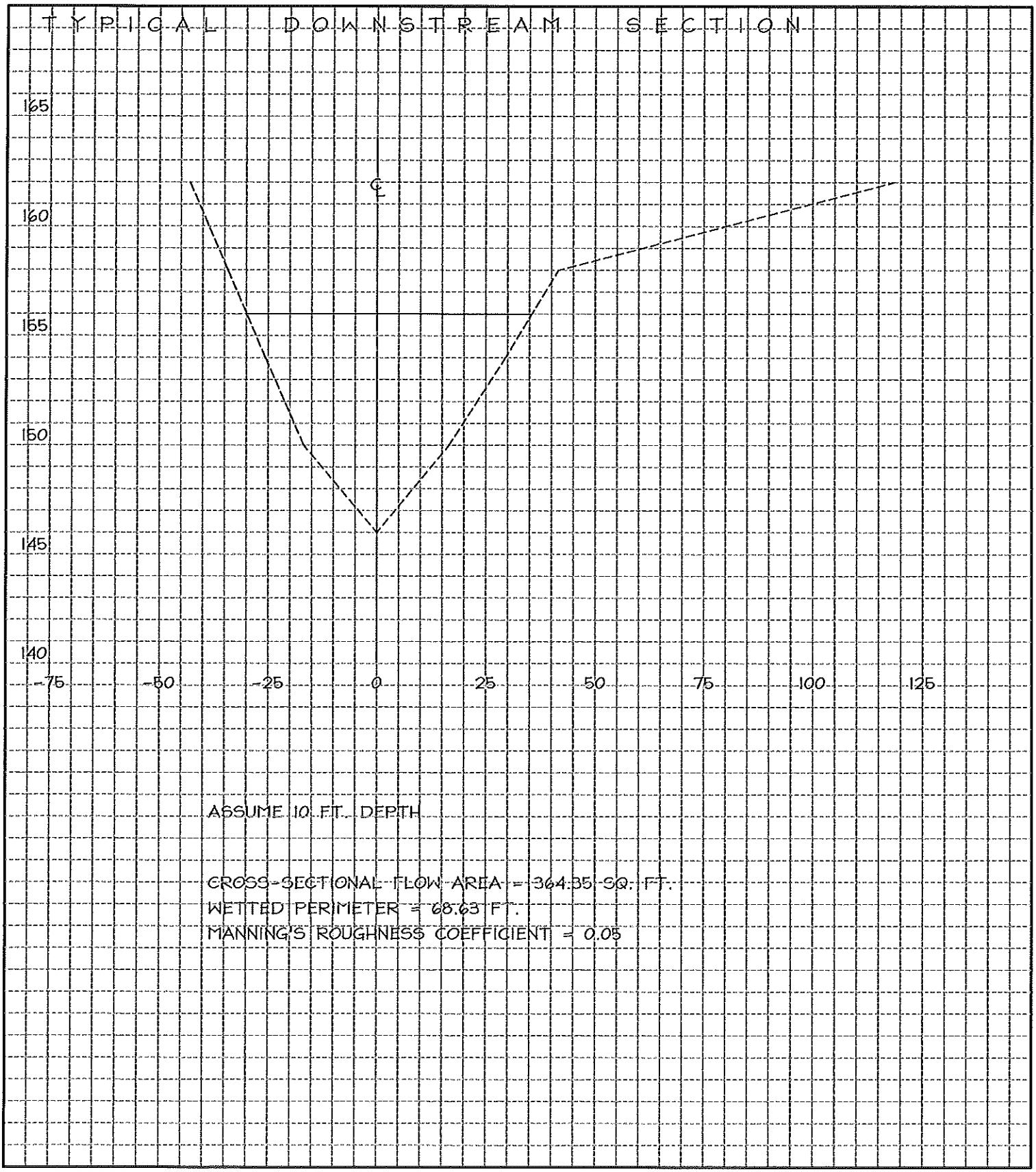
AND MAPPING, INC.
1610 Haleukana Street
Līhu'e, Kaua'i, Hawai'i 96766

PROJECT TITLE GILLES LIBBE FLOOD STUDY

STREAM KONOHIKI STREAM

CROSS SECTION STATION TYP. DOWNSTREAM

SCALE Horizontal: 1"=30'
Vertical: 1"=6'



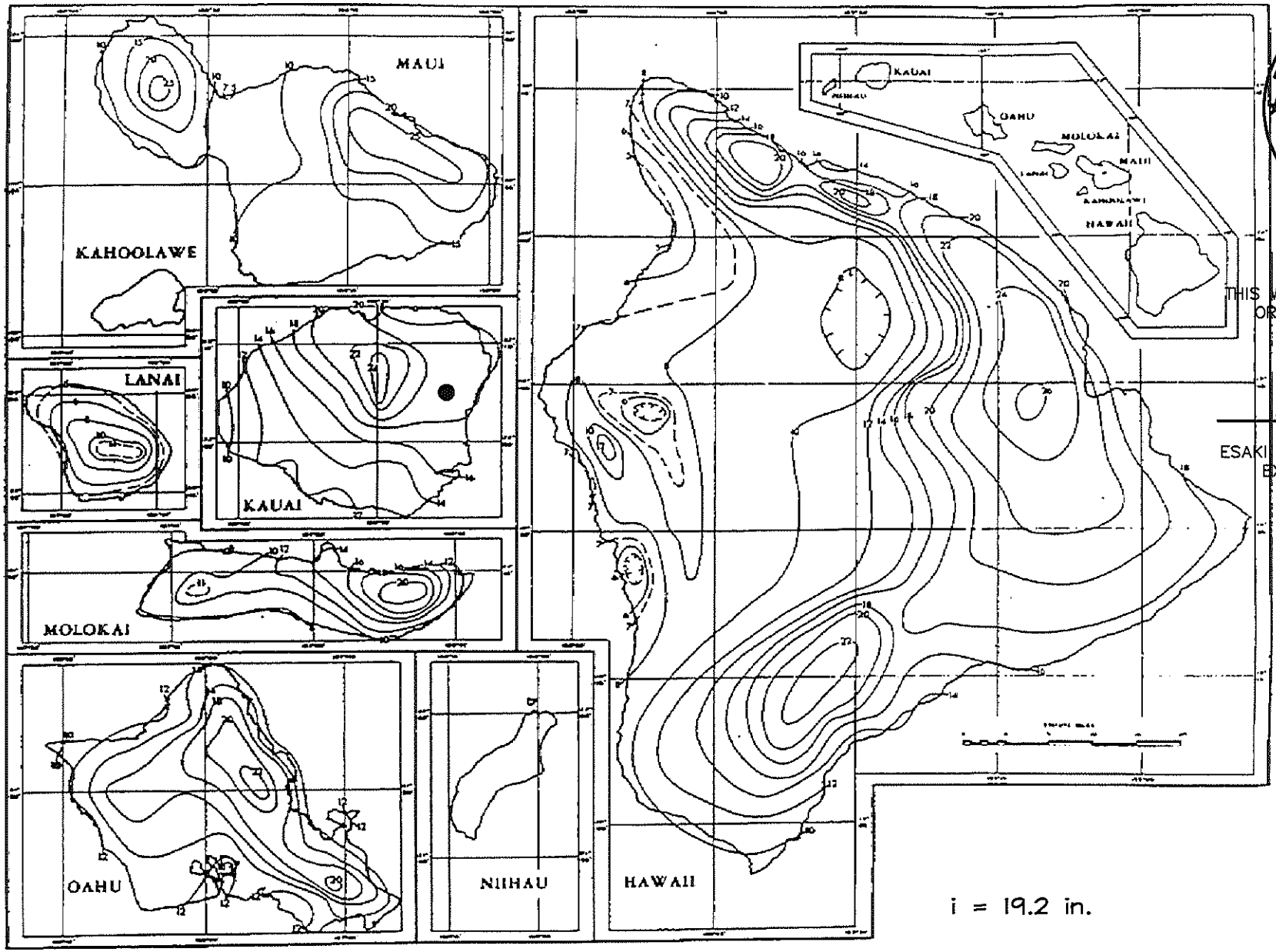
ASSUME 10 FT. DEPTH

CROSS-SECTIONAL FLOW AREA = 364.35 SQ. FT.
WETTED PERIMETER = 68.63 FT.
MANNING'S ROUGHNESS COEFFICIENT = 0.05

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.



i = 19.2 in.

100-Year 24-Hour Rainfall (in.)

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Plate 6

TRUE NORTH
Scale: 1 in. = 200 ft.

OLOHENA ROAD

PROJECT LOCATION

200

DRAINAGE AREA B
(9.98 ACRES)

END OF
SHEET FLOW

DRAINAGE BASIN MAP #2

SCALE: 1"=200'

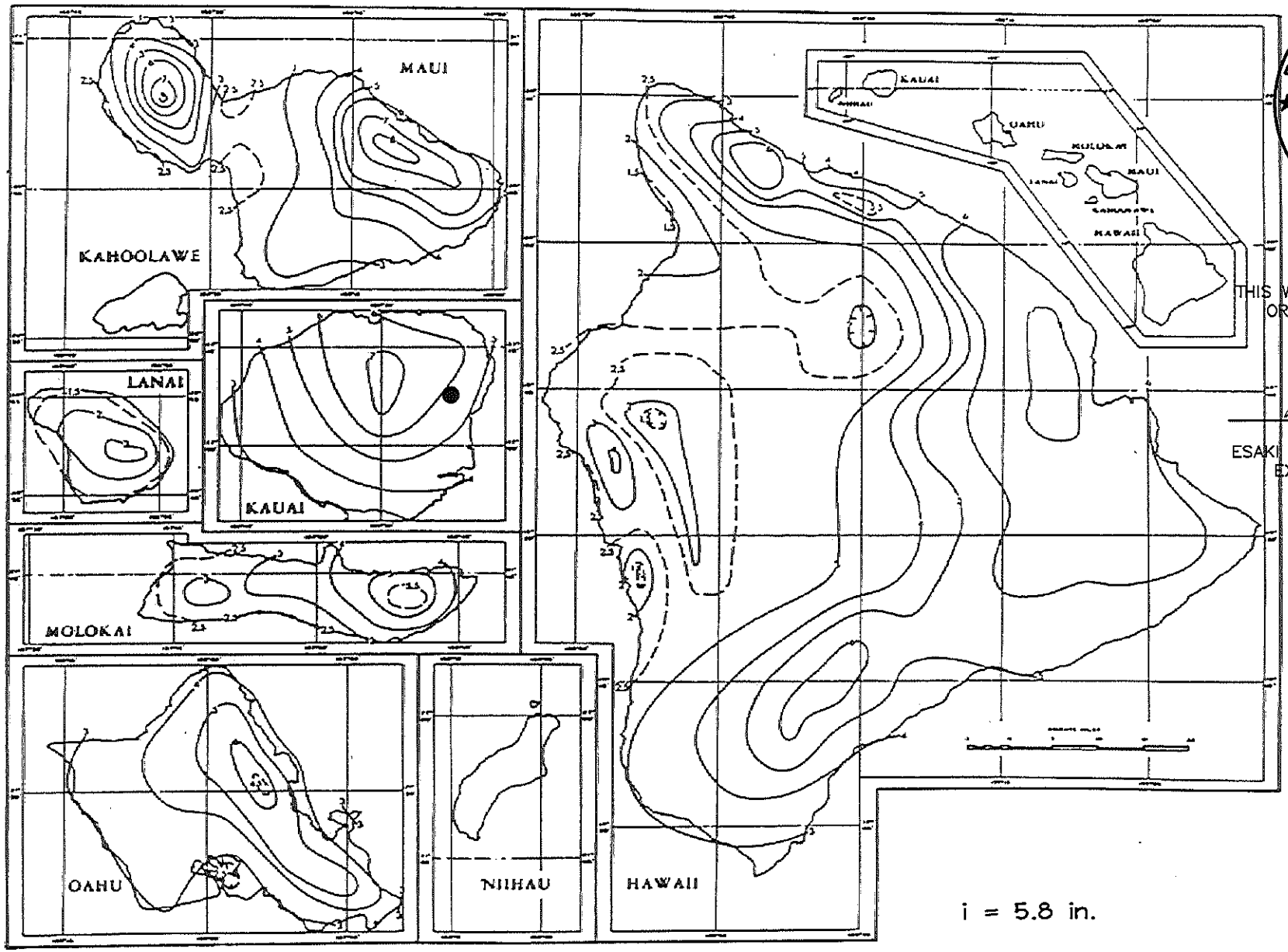
Table 1

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.**



100-Year 1-Hour Rainfall (in.)

i = 5.8 in.

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Plate 4

PLATE 1

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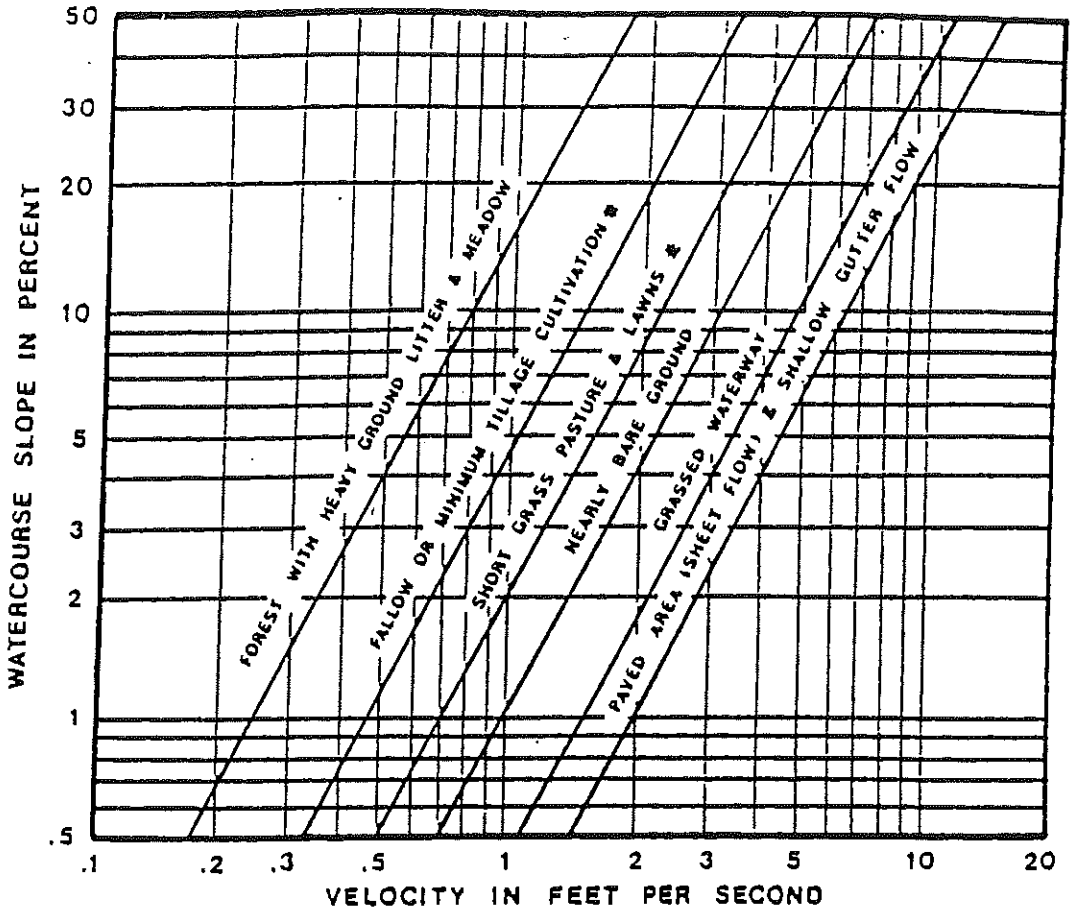
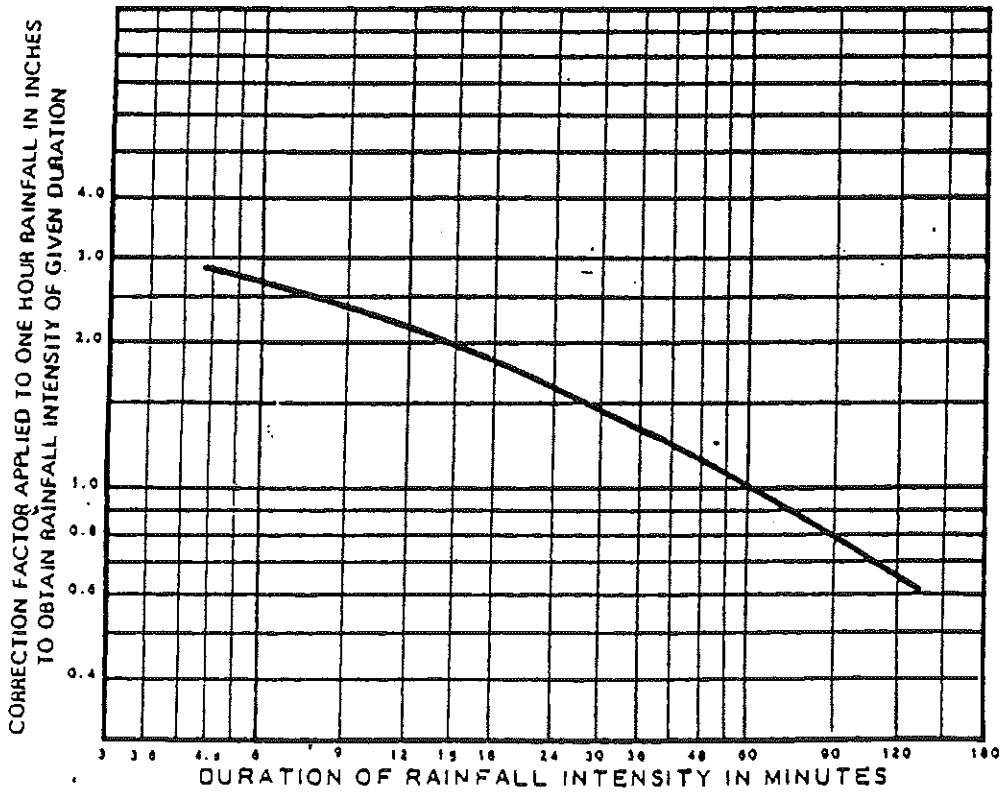
L_{Total} = 1,492 ft.
S_1 = 0.3701 ft./ft.
L_1 = 300 ft.
Fallow or Minimum Tillage Cultivation
V = 2.90 fps
$T_{C;1}$ = 1.72 minutes
S_2 = 0.2299 ft./ft.
L_2 = 1,192 ft.
Grassed Waterway
V = 7.36 fps
$T_{C;2}$ = 2.70 minutes
$T_{C;Total}$ = 4.42 minutes
Use $T_{C;\ min.}$ = 6.0 minutes



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

PLATE 2



T_C = 6.0 minutes
I_{CF} = 2.7

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

TO BE USED FOR AREA LESS THAN 100 ACRES

IV. FLOOD LIMITS DETERMINATION

FLOOD LIMITS DETERMINATION

In order to determine the 100-Year Flood Limits and Building Setback Line, sections were taken at various points along the drainage ways. The Flood Limits Map (sheet 56) will be used to evaluate proposed development. Future development on the subject property will consist of roadways, driveways, buildings, utilities, and a bridge crossing.

According to the guidelines in the County of Kauai's Storm Water Runoff System Manual, the flood limits and base flood elevations can be established through a backwater analysis or by using Manning's equation and adding freeboard (normal depth). For this analysis, a normal depth approach was used to compute the water surface elevation and 3 feet freeboard was added to establish the base flood elevations. This method was selected because it is more conservative for determining building locations and heights.

In addition to new buildings, a bridge crossing will also be proposed in order to access areas of the site located on the south side of Konohiki Stream. An analysis of the bridge using HEC-RAS backwater modeling will be presented under a separate report; however, upon request by the County, a discussion regarding the proposed bridge location is summarized below.

There were several factors to consider when selecting the location of the crossing including: 1) compliance with County, State, and Federal regulations 2) length of time and costs associated with permitting 3) site distance 4) bridge design and construction and 5) future roadway design to building sites. After evaluating various options, it was determined that Section I would be the most reasonable location for the bridge.

The primary consideration was compliance with the County's Floodplain Management Ordinance which states that encroachments are prohibited unless certified that it will not cause a rise in the base flood elevations (BFE). At the proposed location, there is a drop in the stream and a pond which creates a wider cross-section and lower water surface elevation. Therefore, the bridge could span the floodway and be constructed above the water surface elevation with a practical slope from the edge of pavement. At other locations, the bridge could not be reasonably constructed above the water surface elevation because it would be too high and the initial grade would be steep. On the other hand, if the bridge is constructed below the water surface elevation, then based on our analysis, it would cause a rise in the BFE and a compensation measure would be necessary. Compensating for the rise would involve excavation within the floodway portion of the stream as well as compliance with additional State and Federal regulations. Therefore, it was decided to choose a location that would not involve work within the stream. Furthermore, the proposed bridge location is also suitable for site distance as well as future roadway design to building sites.

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: BF
DATE: 04-28-2015

STREAM: ***Konohiki Stream***
CROSS SECTION STATION: ***Section A***

GIVEN:

DISCHARGE (Q) = 4813 CFS
SLOPE (s) = 0.0232 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 202.6 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 4813(0.0500) / (0.0232)^{1/2}(1.486)$
$= 1063.2$

CROSS SECTION PTS:

DIST	ELEV	
-95.7	215.3	LEFT
-70.3	214.0	LEFT
-63.0	213.4	LEFT
-37.0	211.0	LEFT
-18.6	209.2	LEFT
-9.9	208.3	LEFT
-8.3	207.3	LEFT
-4.4	202.7	LEFT
0.0	202.6	CENTER LINE
4.4	202.7	RIGHT
11.3	207.2	RIGHT
26.3	208.4	RIGHT
51.7	211.5	RIGHT
62.4	212.1	RIGHT
74.9	212.3	RIGHT
87.5	225.3	RIGHT

FLOOD LIMITS:

COMPUTED :
DEPTH (d) = 10.4 FT
AREA (A) = 471.3 SF
WETTED PERIMETER (WP) = 138.3 FT
HYDRAULIC RADIUS (R) = A/WP = 471.3/138.3 = 3.4
$AR^{2/3} = (471.3)(3.4)^{2/3} = 1067.5$
Q = 4832 CFS

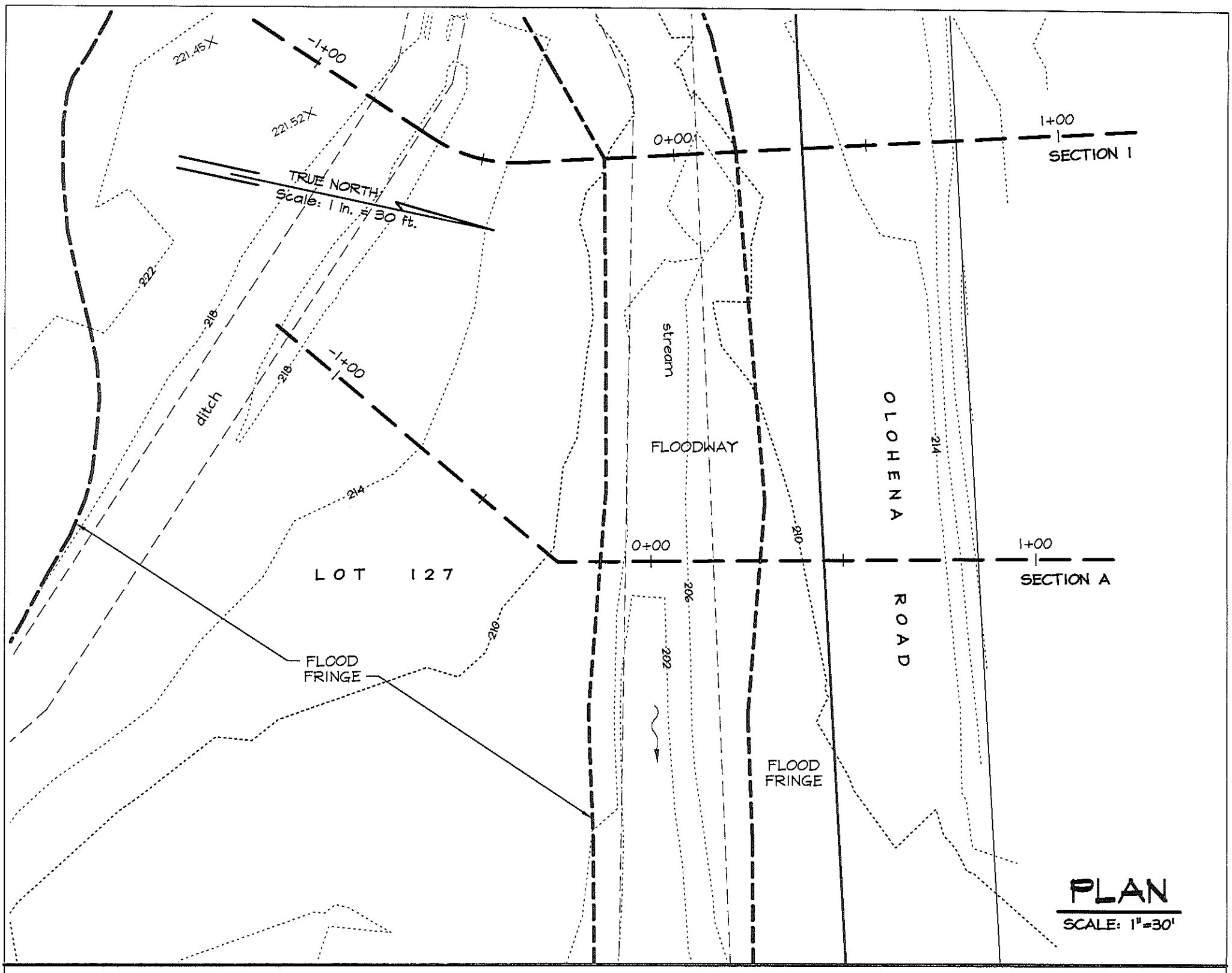
RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 202.6 + 10.4 = 213.0 FT
VELOCITY = Q/A = 4813.0/ 471.3 = 10.2 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(10.2)(10.4)^{1/3}$
$= 2.6$ FT 3.0
SETBACK ELEVATION = WSE + FB = 213.0 + ~~2.6~~ = ~~215.6~~ 216.0 FT

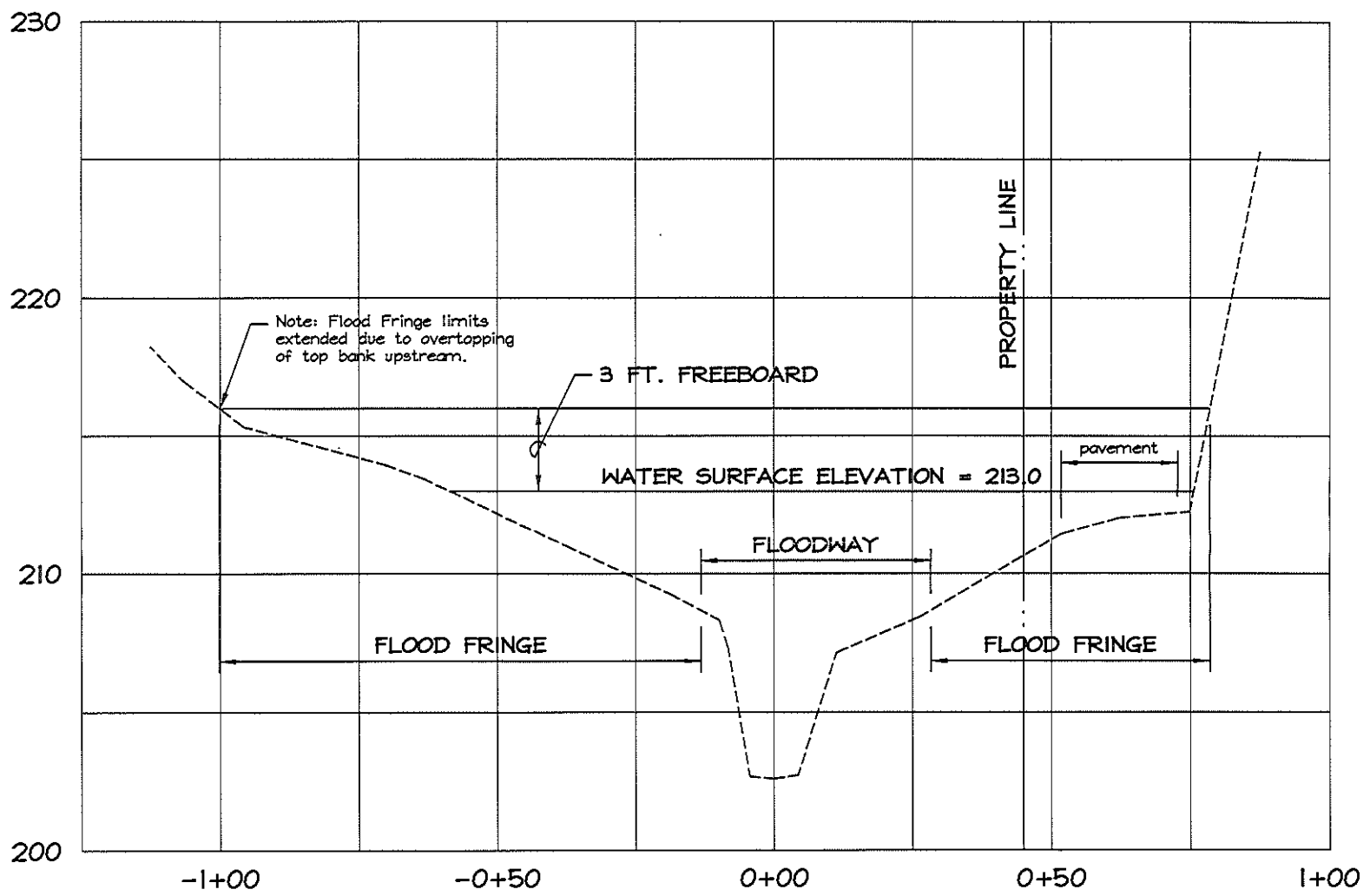
FLOODWAY:

COMPUTED :
DEPTH (d) = 11.4 FT
AREA (A) = 327.6 SF
WETTED PERIMETER (WP) = 55.9 FT
HYDRAULIC RADIUS (R)= A/WP = 327.6/ 55.9 = 5.9
$AR^{2/3} = (327.6)(5.9)^{2/3} = 1064.7$

Q = 4820 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 202.6 + 11.4 = 214.0 FT
VELOCITY = Q/A = 4813.0 / 327.6 = 14.7 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -13.2 FT
DISTANCE RIGHT OF CENTER LINE = 28.3 FT





SECTION A

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: BF
DATE: 03-24-2015

STREAM: ***Konohiki Stream***
CROSS SECTION STATION: ***Section B***

GIVEN:

DISCHARGE (Q) = 4813 CFS
SLOPE (s) = 0.0388 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 162.0 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 4813(0.0500) / (0.0388)^{1/2}(1.486)$
$= 822.2$

CROSS SECTION PTS:

DIST	ELEV	
-91.3	174.0	LEFT
-58.5	170.0	LEFT
-31.4	166.0	LEFT
0.0	162.0	CENTER LINE
23.3	166.0	RIGHT
51.6	170.0	RIGHT
79.7	174.0	RIGHT

FLOOD LIMITS:

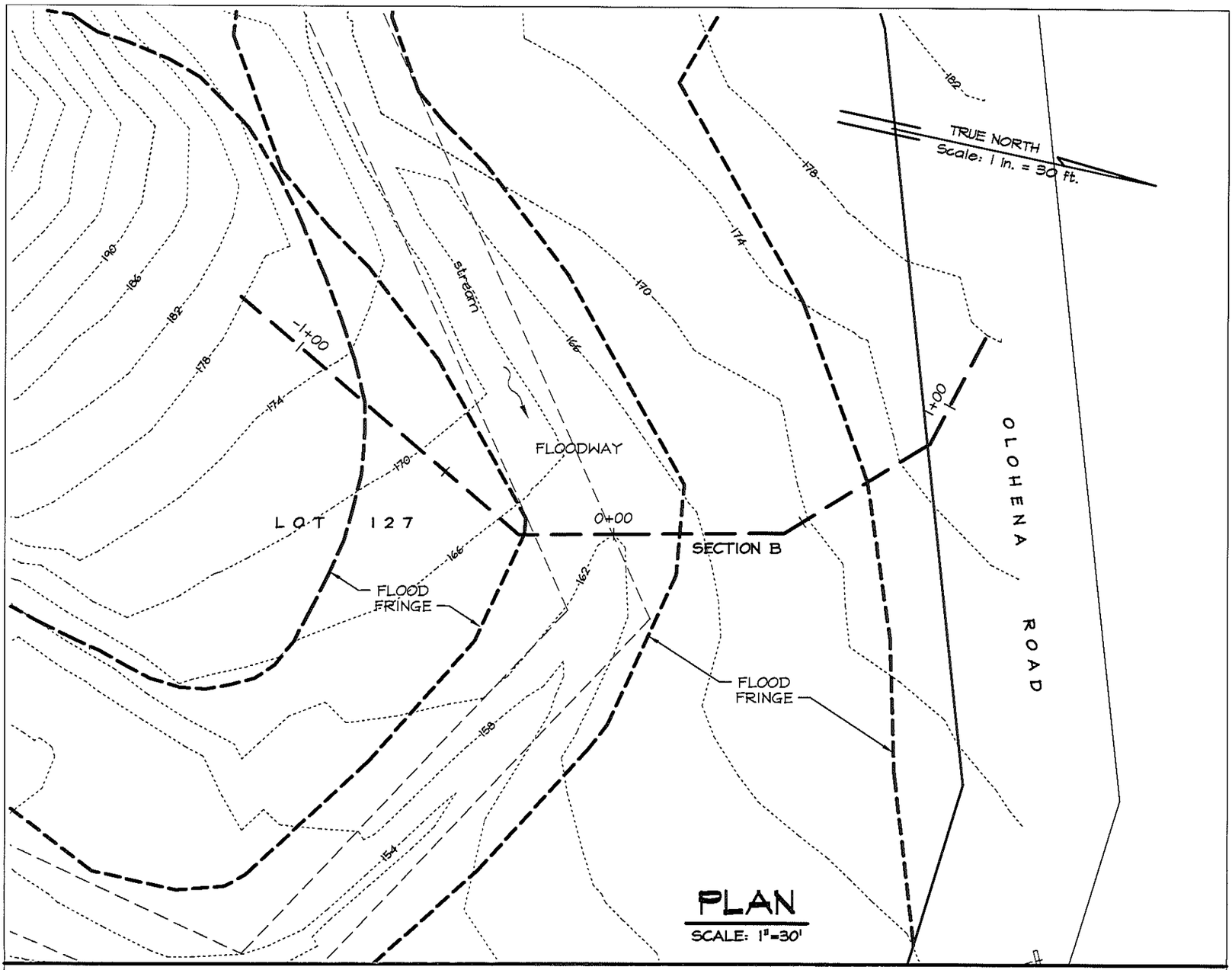
COMPUTED :
DEPTH (d) = 7.2 FT
AREA (A) = 354.4 SF
WETTED PERIMETER (WP) = 99.9 FT
HYDRAULIC RADIUS (R) = A/WP = 354.4/ 99.9 = 3.5
$AR^{2/3} = (354.4)(3.5)^{2/3} = 824.0$
Q = 4824 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 162.0 + 7.2 = 169.2 FT
VELOCITY = Q/A = 4813.0/ 354.4 = 13.6 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(13.6)(7.2)^{1/3}$
$= 2.7$ FT 3.0
SETBACK ELEVATION = WSE + FB = 169.2 + ~~2.7~~ = ~~171.9~~ 172.2 FT

FLOODWAY:

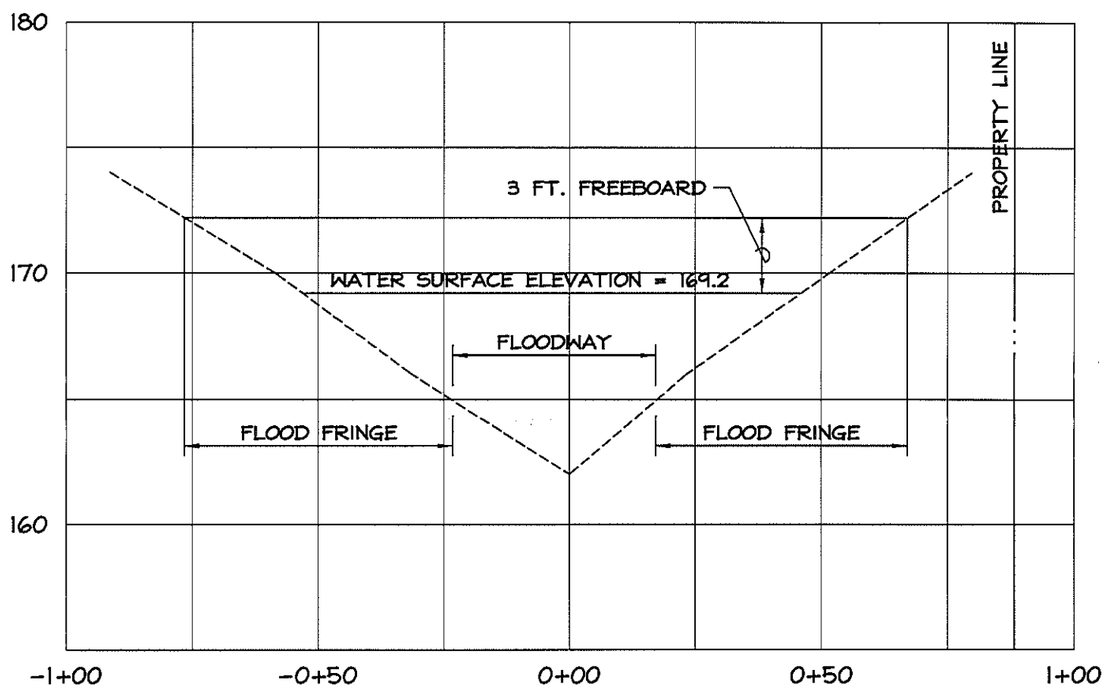
COMPUTED :
DEPTH (d) = 8.2 FT
AREA (A) = 271.6 SF
WETTED PERIMETER (WP) = 51.4 FT
HYDRAULIC RADIUS (R)= A/WP = 271.6/ 51.4 = 5.3
$AR^{2/3} = (271.6)(5.3)^{2/3} = 824.2$
Q = 4825 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 162.0 + 8.2 = 170.2 FT
VELOCITY = Q/A = 4813.0 / 271.6 = 17.7 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -23.2 FT
DISTANCE RIGHT OF CENTER LINE = 17.2 FT



PLAN

SCALE: 1"=30'



SECTION B

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: BF
DATE: 03-24-2015

STREAM: ***Konohiki Stream***
CROSS SECTION STATION: ***Section C***

GIVEN:

DISCHARGE (Q) = 4813 CFS
SLOPE (s) = 0.0231 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 146.0 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 4813(0.0500) / (0.0231)^{1/2}(1.486)$
$= 1065.5$

CROSS SECTION PTS:

DIST	ELEV	
-34.2	158.0	LEFT
-25.6	154.0	LEFT
-16.8	150.0	LEFT
0.0	146.0	CENTER LINE
16.6	150.0	RIGHT
29.5	154.0	RIGHT
41.6	158.0	RIGHT

FLOOD LIMITS:

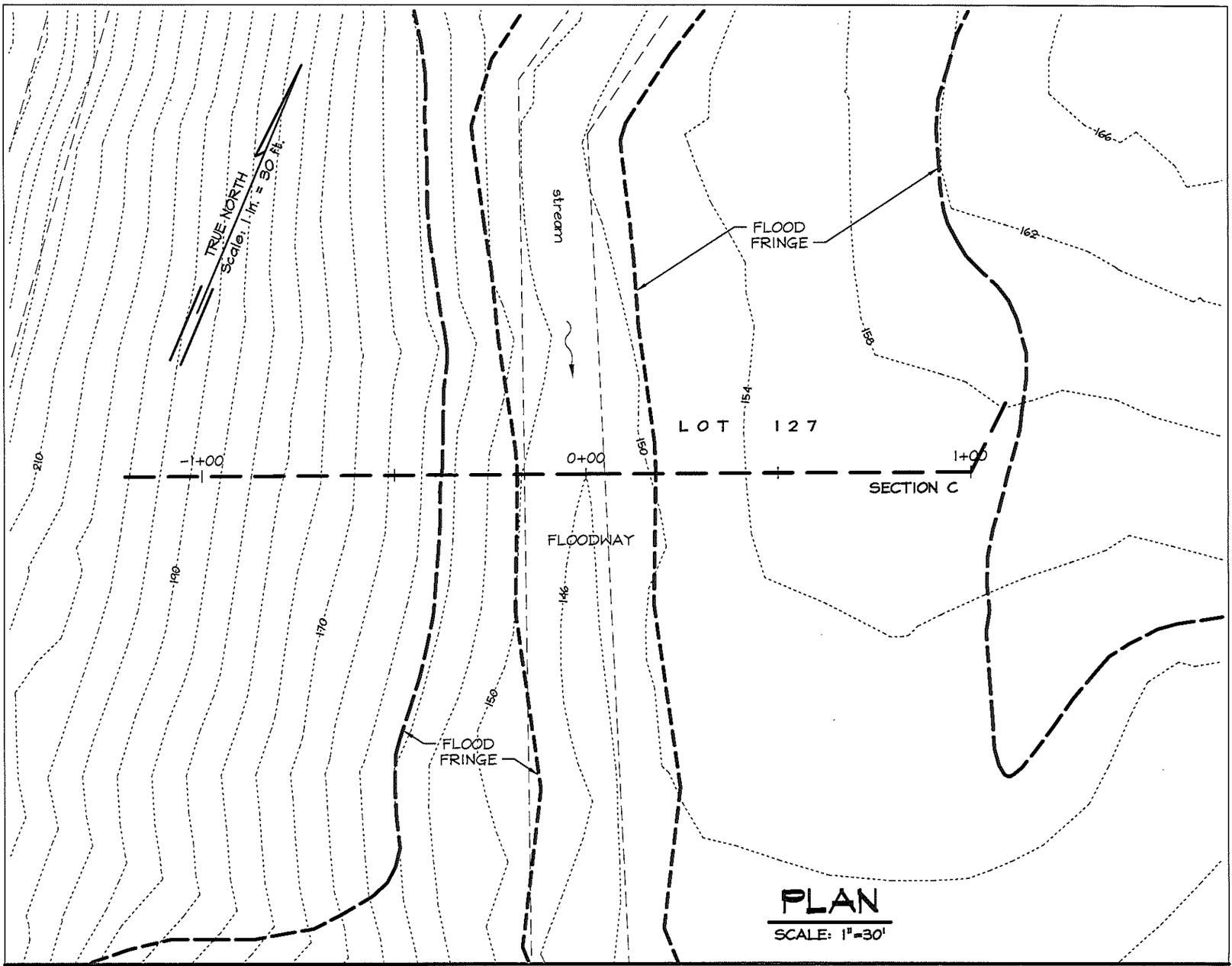
COMPUTED :
DEPTH (d) = 9.8 FT
AREA (A) = 353.9 SF
WETTED PERIMETER (WP) = 67.7 FT
HYDRAULIC RADIUS (R) = A/WP = 353.9/ 67.7 = 5.2
$AR^{2/3} = (353.9)(5.2)^{2/3} = 1065.7$
Q = 4814 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 146.0 + 9.8 = 155.8 FT
VELOCITY = Q/A = 4813.0/ 353.9 = 13.6 FT/SEC
FREEBOARD (FB) $= 2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(13.6)(9.8)^{1/3}$
$= 2.7$ FT 3.0 158.8
SETBACK ELEVATION = WSE + FB = 155.8 + ~~2.7~~ = ~~158.5~~ FT

FLOODWAY:

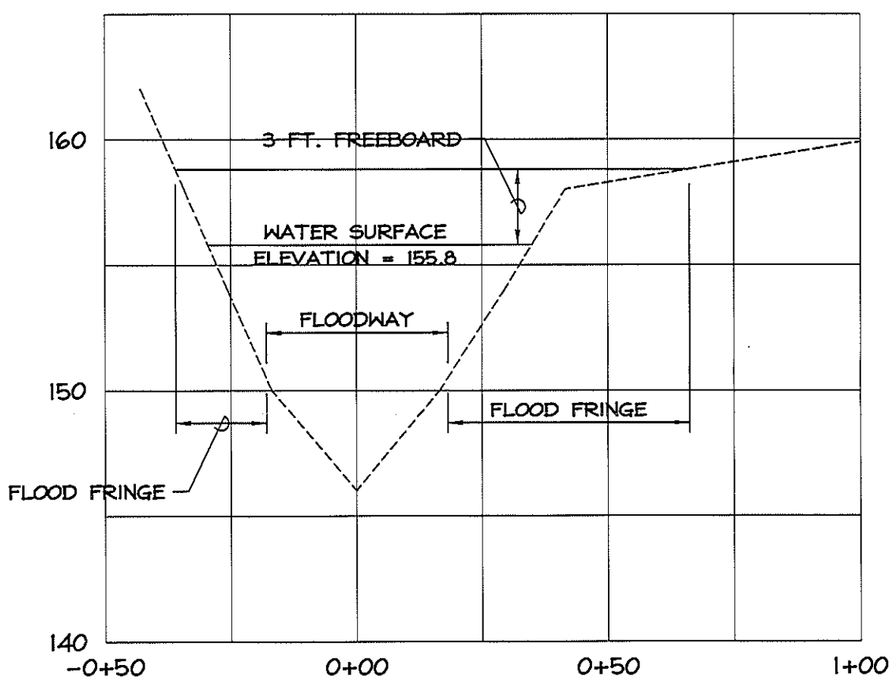
COMPUTED :
DEPTH (d) = 10.8 FT
AREA (A) = 313.5 SF
WETTED PERIMETER (WP) = 50.0 FT
HYDRAULIC RADIUS (R)= A/WP = 313.5/ 50.0 = 6.3
$AR^{2/3} = (313.5)(6.3)^{2/3} = 1066.4$
Q = 4817 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 146.0 + 10.8 = 156.8 FT
VELOCITY = Q/A = 4813.0 / 313.5 = 15.4 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -17.9 FT
DISTANCE RIGHT OF CENTER LINE = 18.2 FT



PLAN

SCALE: 1"=30'



SECTION C

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: BF
DATE: 04-28-2015

STREAM: ***Konohiki Stream***
CROSS SECTION STATION: ***Section D***

GIVEN:

DISCHARGE (Q) = 4813 CFS
SLOPE (s) = 0.0320 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 226.4 FT

$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 4813(0.0500) / (0.0320)^{1/2}(1.486)$
$= 905.3$

CROSS SECTION PTS:

DIST	ELEV	
-88.2	241.5	LEFT
-59.0	235.8	LEFT
-49.5	233.8	LEFT
-26.9	229.0	LEFT
-19.5	227.0	LEFT
-15.7	226.8	LEFT
-7.0	226.5	LEFT
0.0	226.4	CENTER LINE
21.5	226.7	RIGHT
36.9	227.5	RIGHT
48.4	227.9	RIGHT
75.1	228.0	RIGHT
78.7	228.1	RIGHT
90.1	228.3	RIGHT
97.0	231.4	RIGHT
97.1	241.5	RIGHT

FLOOD LIMITS:

COMPUTED :
DEPTH (d) = 4.4 FT
AREA (A) = 420.3 SF
WETTED PERIMETER (WP) = 132.3 FT
HYDRAULIC RADIUS (R) = A/WP = 420.3/132.3 = 3.2
$AR^{2/3} = (420.3)(3.2)^{2/3} = 908.2$
Q = 4828 CFS

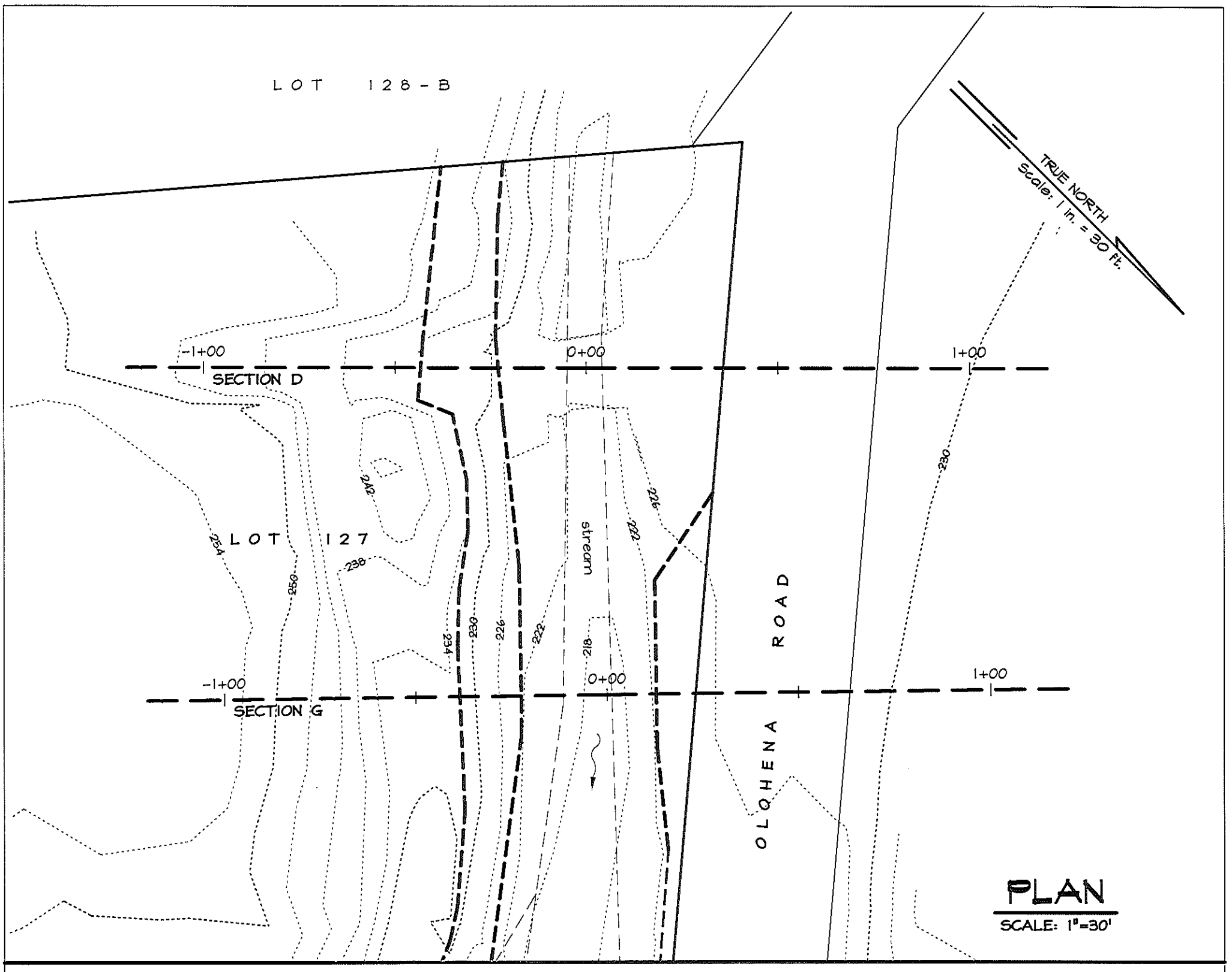
RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 226.4 + 4.4 = 230.8 FT
VELOCITY = Q/A = 4813.0/ 420.3 = 11.5 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(11.5)(4.4)^{1/3}$
= 2.5 FT 3.0
SETBACK ELEVATION = WSE + FB = 230.8 + ~~2.5~~ = ~~233.3~~ 233.8 FT

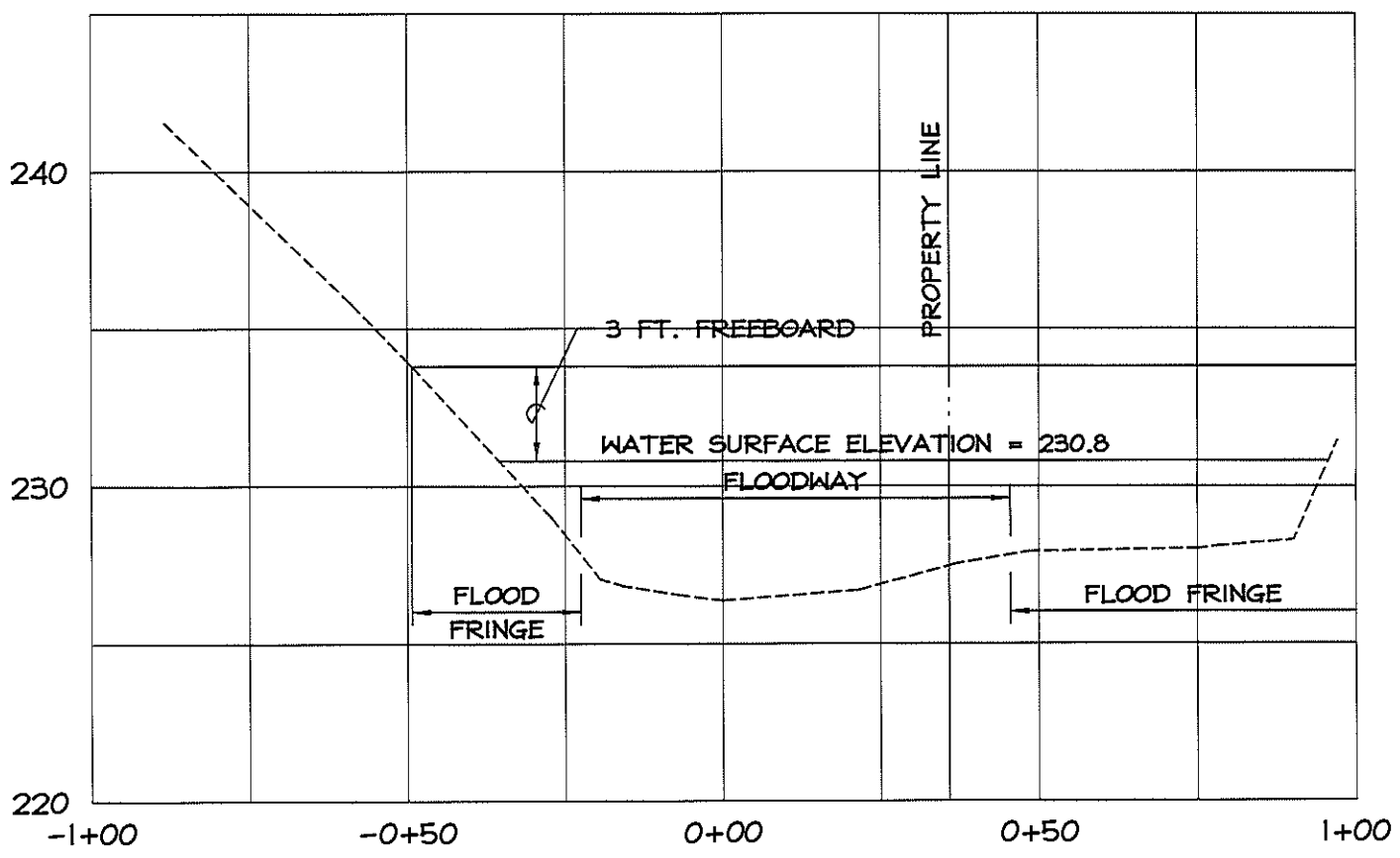
FLOODWAY:

COMPUTED :
DEPTH (d) = 5.4 FT
AREA (A) = 337.0 SF
WETTED PERIMETER (WP) = 76.2 FT
HYDRAULIC RADIUS (R)= A/WP = 337.0/ 76.2 = 4.4
$AR^{2/3} = (337.0)(4.4)^{2/3} = 908.0$

Q = 4827 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 226.4 + 5.4 = 231.8 FT
VELOCITY = Q/A = 4813.0 / 337.0 = 14.3 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -22.5 FT
DISTANCE RIGHT OF CENTER LINE = 45.5 FT





SECTION D

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: BF
DATE: 03-25-2015

STREAM: ***Unnamed Gulch***
CROSS SECTION STATION: ***Section E***

GIVEN:

DISCHARGE (Q) = 63 CFS
SLOPE (s) = 0.2026 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 190.0 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 63(0.0500) / (0.2026)^{1/2}(1.486)$
$= 4.7$

CROSS SECTION PTS:

DIST	ELEV	
-23.3	198.0	LEFT
-12.2	194.0	LEFT
0.0	190.0	CENTER LINE
12.2	194.0	RIGHT
20.0	198.0	RIGHT

FLOOD LIMITS:

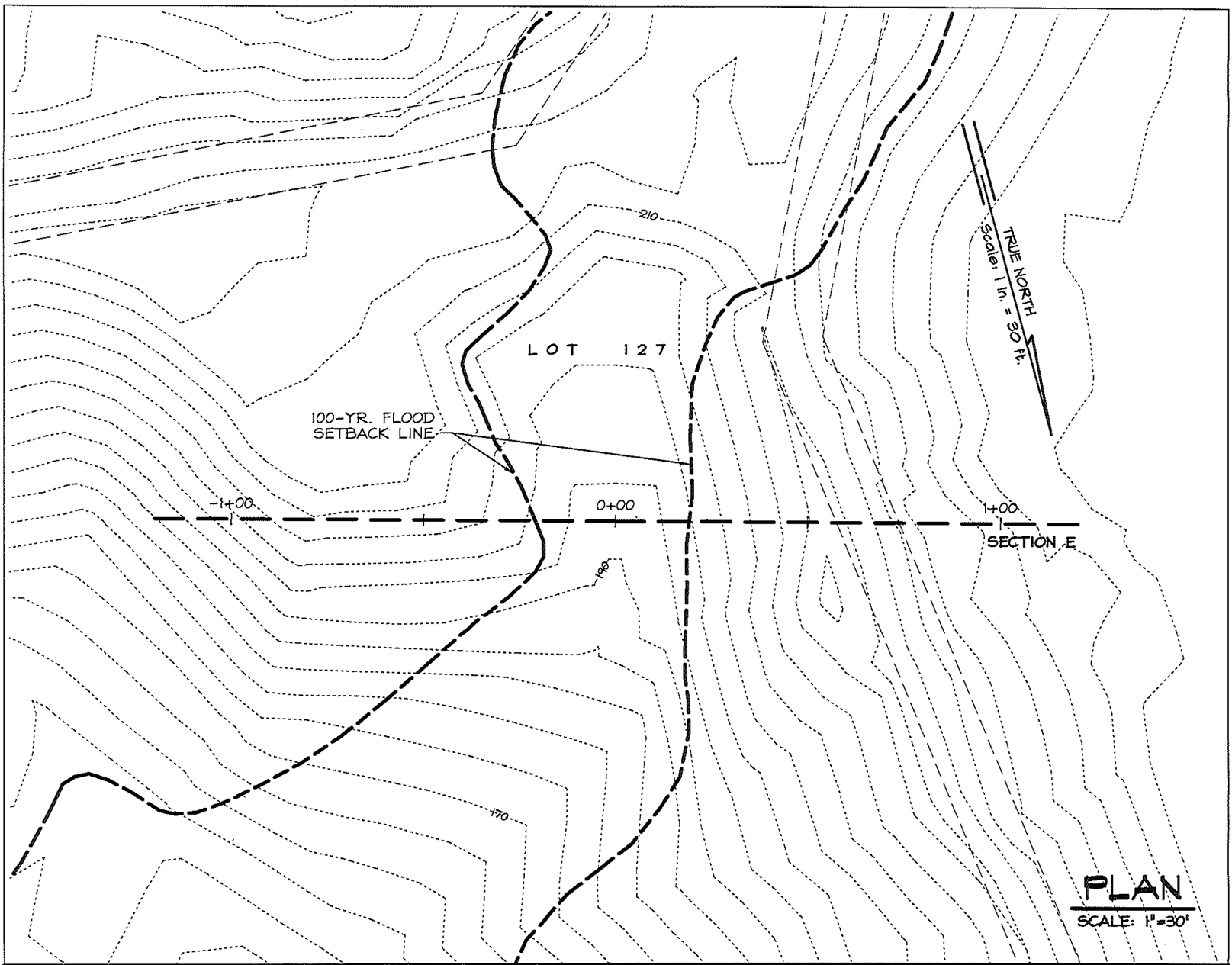
COMPUTED :
DEPTH (d) = 1.4 FT
AREA (A) = 6.2 SF
WETTED PERIMETER (WP) = 9.1 FT
HYDRAULIC RADIUS (R) = A/WP = 6.2/ 9.1 = 0.7
$AR^{2/3} = (6.2)(0.7)^{2/3} =$ 4.7
Q = 63 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 190.0 + 1.4 = 191.4 FT
VELOCITY = Q/A = 63.0/ 6.2 = 10.2 FT/SEC
FREEBOARD (FB) = $2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(10.2)(1.4)^{1/3}$
= 2.3 FT 3.0
SETBACK ELEVATION = WSE + FB = 191.4 + ~~2.3~~ = ~~193.7~~ 194.4 FT

FLOODWAY:

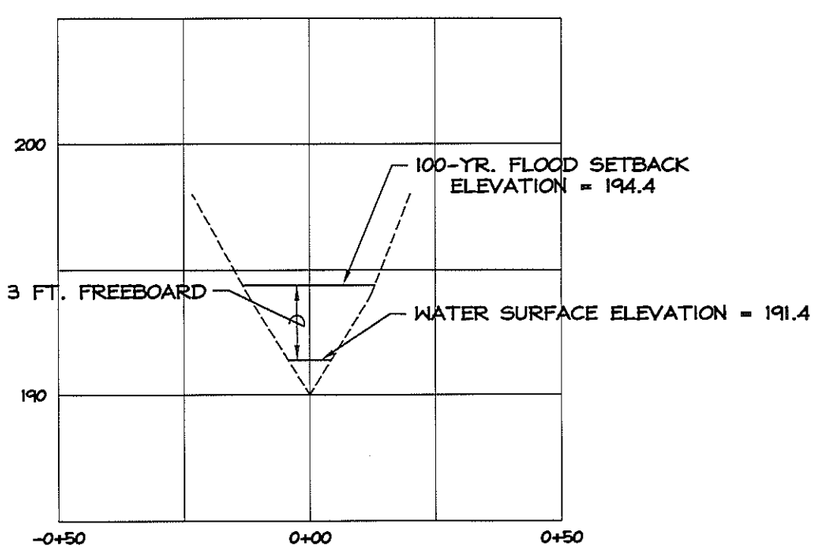
COMPUTED :
DEPTH (d) = 2.4 FT
AREA (A) = 5.4 SF
WETTED PERIMETER (WP) = 6.6 FT
HYDRAULIC RADIUS (R)= A/WP = 5.4/ 6.6 = 0.8
$AR^{2/3} = (5.4)(0.8)^{2/3} =$ 4.7
Q = 63 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 190.0 + 2.4 = 192.4 FT
VELOCITY = Q/A = 63.0 / 5.4 = 11.6 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -1.2 FT
DISTANCE RIGHT OF CENTER LINE = 1.2 FT



PLAN

SCALE: 1"=30'



SECTION E

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: BF
DATE: 03-25-2015

STREAM: *Unnamed Gulch*
CROSS SECTION STATION: *Section F*

GIVEN:

DISCHARGE (Q) = 63 CFS
SLOPE (s) = 0.1794 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 218.0 FT

$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 63(0.0500) / (0.1794)^{1/2}(1.486)$
$= 5.0$

CROSS SECTION PTS:

DIST	ELEV	
-21.5	226.0	LEFT
-12.3	222.0	LEFT
0.0	218.0	CENTER LINE
12.4	222.0	RIGHT
22.3	226.0	RIGHT

FLOOD LIMITS:

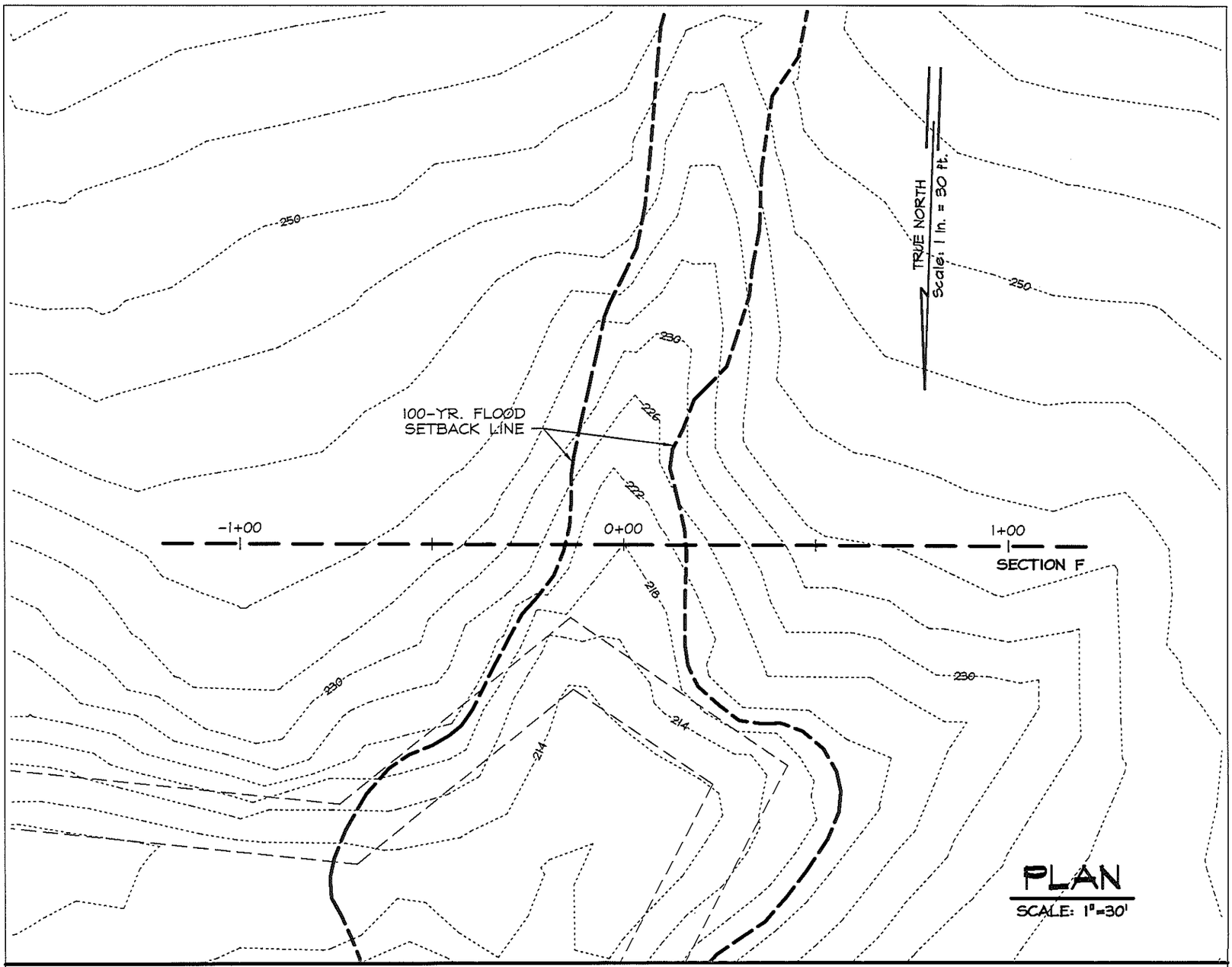
COMPUTED :
DEPTH (d) = 1.5 FT
AREA (A) = 6.5 SF
WETTED PERIMETER (WP) = 9.4 FT
HYDRAULIC RADIUS (R) = A/WP = 6.5/ 9.4 = 0.7
$AR^{2/3} = (6.5)(0.7)^{2/3} =$ 5.1
Q = 64 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 218.0 + 1.5 = 219.5 FT
VELOCITY = Q/A = 63.0/ 6.5 = 9.7 FT/SEC
FREEBOARD (FB) $= 2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(9.7)(1.5)^{1/3}$
$= 2.3$ FT
SETBACK ELEVATION = WSE + FB = 219.5 + ~~2.3~~ 3.0 = ~~221.8~~ 222.5 FT

FLOODWAY:

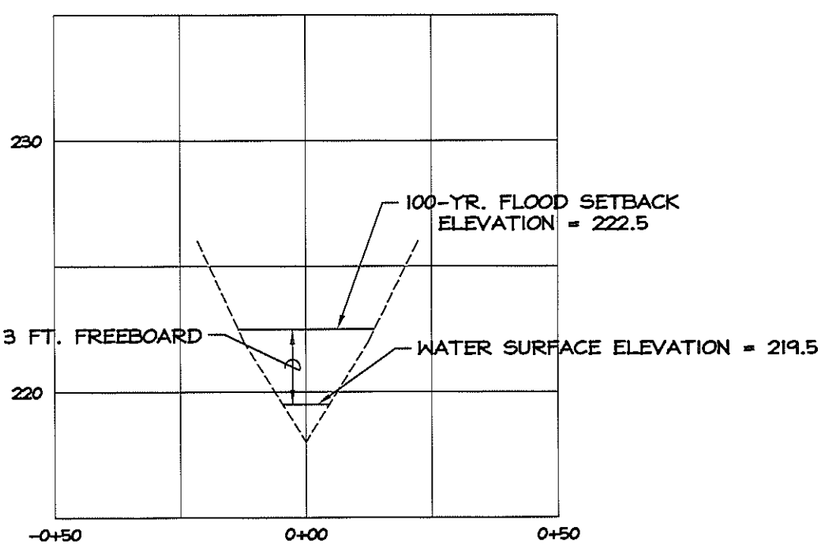
COMPUTED :
DEPTH (d) = 2.5 FT
AREA (A) = 5.7 SF
WETTED PERIMETER (WP) = 6.7 FT
HYDRAULIC RADIUS (R)= A/WP = 5.7/ 6.7 = 0.8
$AR^{2/3} = (5.7)(0.8)^{2/3} =$ 5.1
Q = 64 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 218.0 + 2.5 = 220.5 FT
VELOCITY = Q/A = 63.0 / 5.7 = 11.1 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -1.3 FT
DISTANCE RIGHT OF CENTER LINE = 1.3 FT



PLAN

SCALE: 1"=30'



SECTION F

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: BF
DATE: 04-29-2015

STREAM: ***Konohiki Stream***
CROSS SECTION STATION: ***Section G***

GIVEN:

DISCHARGE (Q) = 4813 CFS
SLOPE (s) = 0.0140 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 216.9 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 4813(0.0500) / (0.0140)^{1/2}(1.486)$
$= 1368.7$

CROSS SECTION PTS:

DIST	ELEV	
-39.7	233.4	LEFT
-21.5	221.8	LEFT
-10.7	220.7	LEFT
-4.4	217.0	LEFT
0.0	216.9	CENTER LINE
4.4	217.8	RIGHT
15.9	224.4	RIGHT
19.3	224.7	RIGHT
29.2	226.1	RIGHT
39.4	226.7	RIGHT
67.7	226.8	RIGHT
77.4	231.6	RIGHT

FLOOD LIMITS:

COMPUTED :
DEPTH (d) = 12.2 FT
AREA (A) = 513.5 SF
WETTED PERIMETER (WP) = 117.8 FT
HYDRAULIC RADIUS (R) = A/WP = 513.5/117.8 = 4.4
$AR^{2/3} = (513.5)(4.4)^{2/3} = 1370.2$
Q = 4818 CFS

RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 216.9 + 12.2 = 229.1 FT
VELOCITY = Q/A = 4813.0/ 513.5 = 9.4 FT/SEC
FREEBOARD (FB) $= 2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(9.4)(12.2)^{1/3}$
$= 2.5$ FT 3.0
SETBACK ELEVATION = WSE + FB = 229.1 + ~~2.5~~ = ~~231.6~~ 232.1 FT

FLOODWAY:

COMPUTED :
DEPTH (d) = 13.2 FT
AREA (A) = 373.5 SF
WETTED PERIMETER (WP) = 53.2 FT
HYDRAULIC RADIUS (R)= A/WP = 373.5/ 53.2 = 7.0
$AR^{2/3} = (373.5)(7.0)^{2/3} = 1369.1$
Q = 4814 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 216.9 + 13.2 = 230.1 FT

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VELOCITY = Q/A =  4813.0 /  373.5 =  12.9  FT/SEC
FLOODWAY WIDTH :
   DISTANCE LEFT OF CENTER LINE =  -22.8 FT
   DISTANCE RIGHT OF CENTER LINE =   12.9 FT
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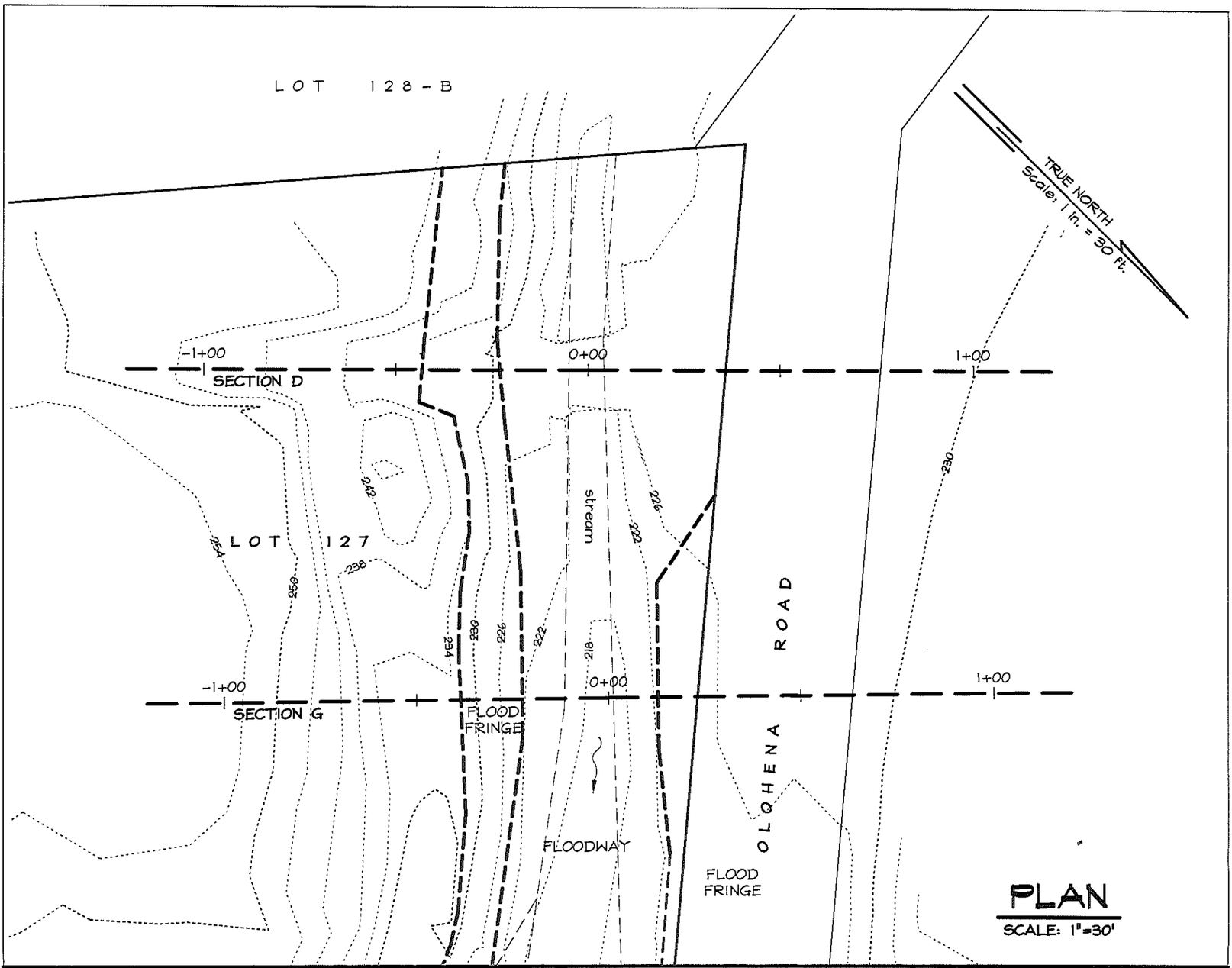
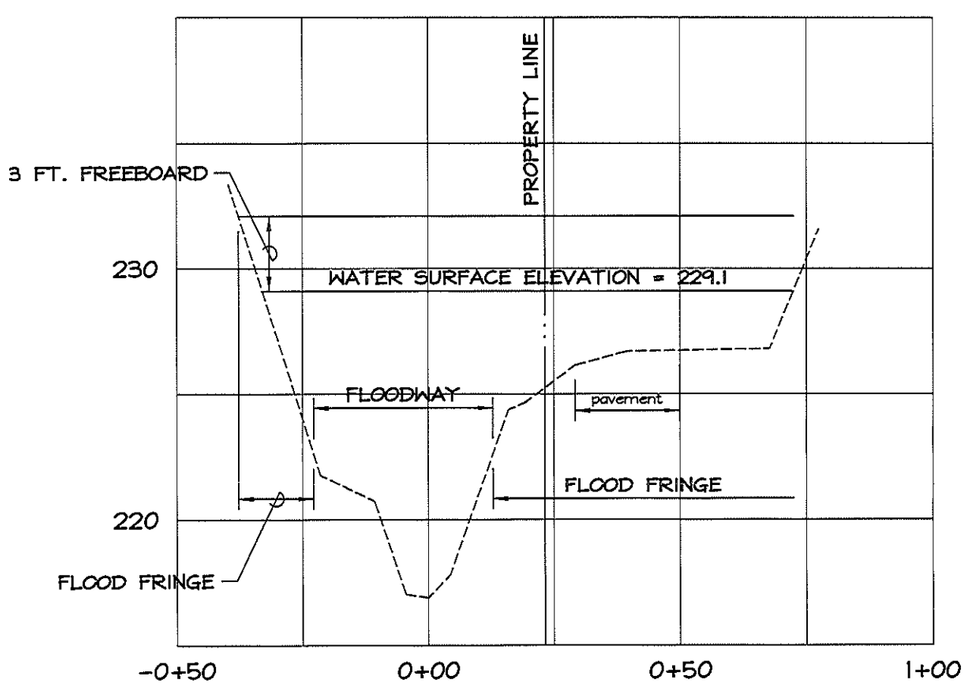


PLAN

SCALE: 1"=30'



SECTION G

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: ME
DATE: 06-17-2015

STREAM: ***Konohiki Stream***
CROSS SECTION STATION: ***Section H***

GIVEN:

DISCHARGE (Q) = 4813 CFS
SLOPE (s) = 0.0326 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 210.8 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 4813(0.0500) / (0.0326)^{1/2}(1.486)$
$= 896.9$

CROSS SECTION PTS:

DIST	ELEV	
-49.2	223.9	LEFT
-43.0	218.4	LEFT
-29.7	218.3	LEFT
-28.8	218.2	LEFT
-20.2	217.9	LEFT
-9.8	216.5	LEFT
-9.4	216.4	LEFT
-9.2	216.3	LEFT
-2.8	210.9	LEFT
0.0	210.8	CENTER LINE
2.7	211.5	RIGHT
6.8	214.3	RIGHT
10.0	217.8	RIGHT
12.2	218.1	RIGHT
14.2	218.2	RIGHT
26.3	218.8	RIGHT
38.3	219.2	RIGHT
43.6	219.4	RIGHT
49.6	219.7	RIGHT
53.6	220.0	RIGHT
75.5	220.1	RIGHT
84.0	222.5	RIGHT

FLOOD LIMITS:

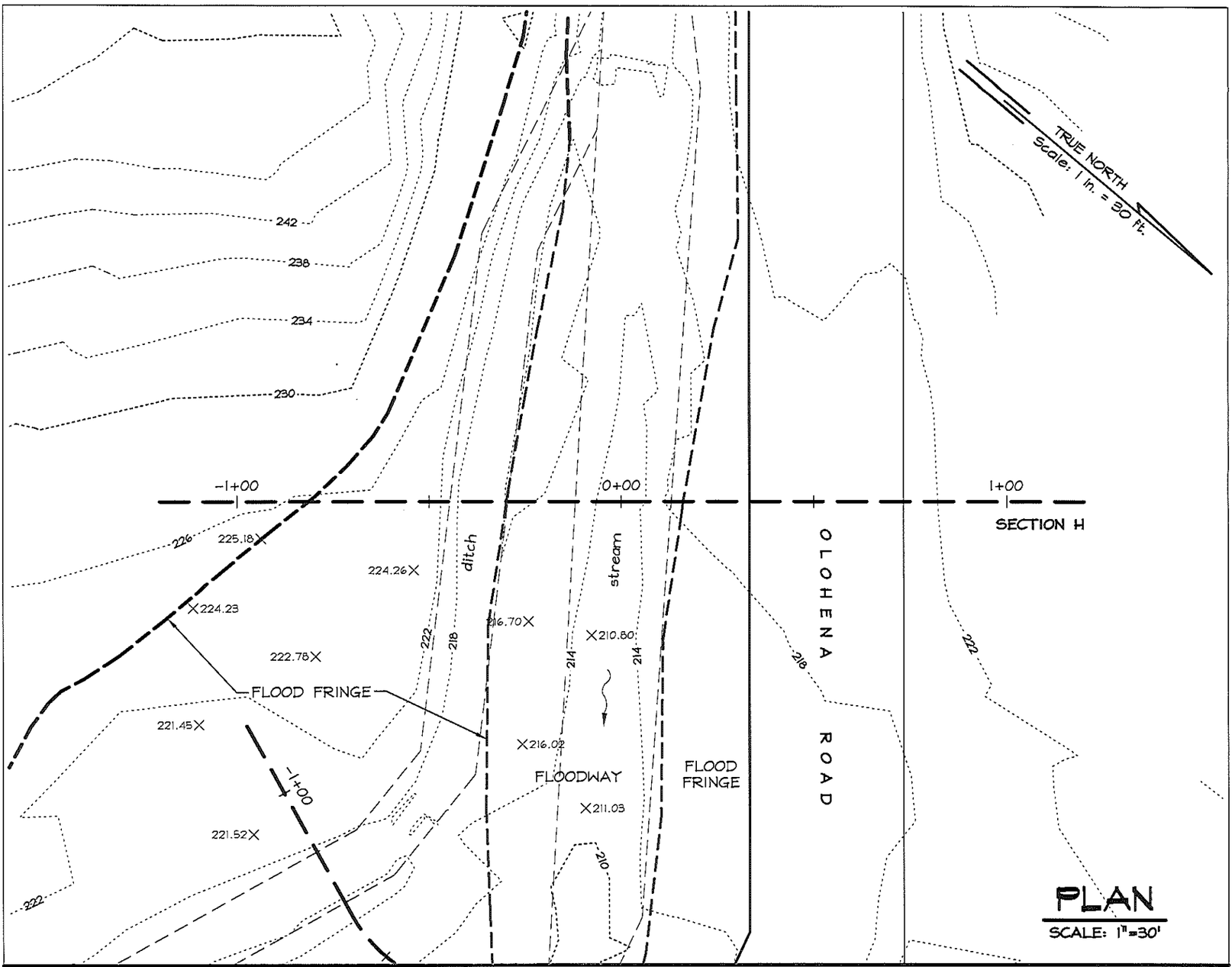
COMPUTED :
DEPTH (d) = 10.6 FT
AREA (A) = 418.2 SF
WETTED PERIMETER (WP) = 132.3 FT
HYDRAULIC RADIUS (R) = A/WP = 418.2/132.3 = 3.2
$AR^{2/3} = (418.2)(3.2)^{2/3} = 900.7$
Q = 4833 CFS

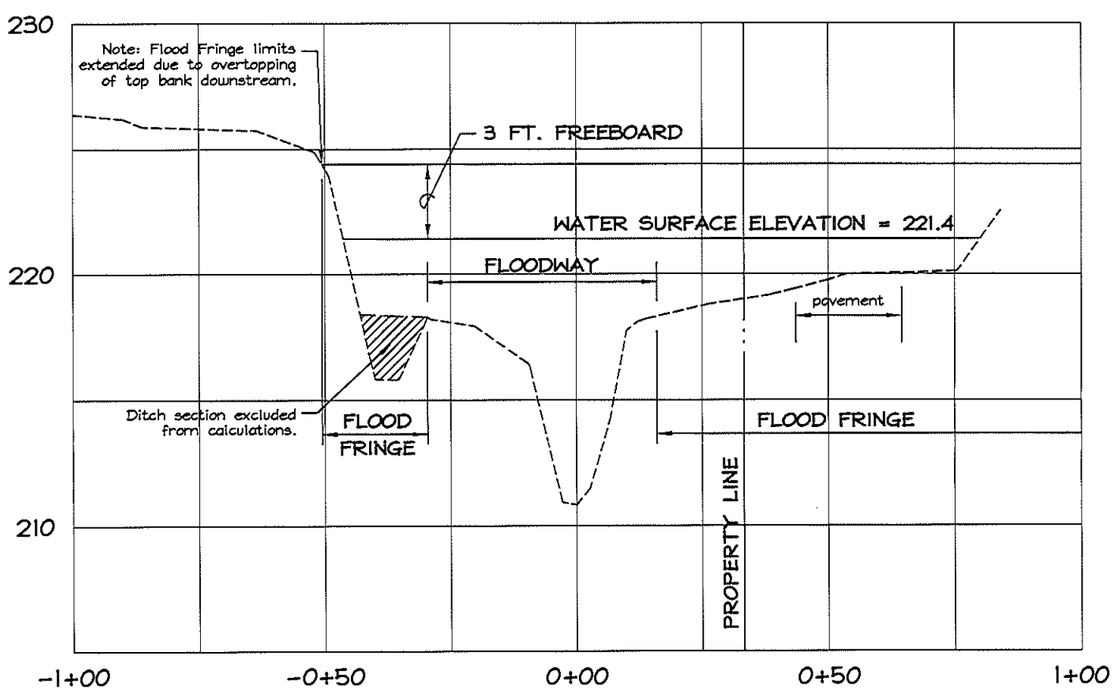
RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 210.8 + 10.6 = 221.4 FT
VELOCITY = Q/A = 4813.0/ 418.2 = 11.5 FT/SEC
FREEBOARD (FB) $= 2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(11.5)(10.6)^{1/3}$
$= 2.6$ FT 3.0
SETBACK ELEVATION = WSE + FB = 221.4 + ~~2.6~~ = ~~224.0~~ 224.4 FT

FLOODWAY:

COMPUTED :
DEPTH (d) = 11.6 FT
AREA (A) = 301.1 SF
WETTED PERIMETER (WP) = 58.4 FT
HYDRAULIC RADIUS (R)= A/WP = 301.1/ 58.4 = 5.2
$AR^{2/3}$ = (301.1)(5.2)$^{2/3}$ = 898.8
Q = 4823 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 210.8 + 11.6 = 222.4 FT
VELOCITY = Q/A = 4813.0 / 301.1 = 16.0 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -29.6 FT
DISTANCE RIGHT OF CENTER LINE = 16.0 FT





SECTION H

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL

PROJ TITLE: Gilles Lebbe Flood Study
LOCATION: Waipouli
ITEM : HYDRAULIC CALCULATIONS

JOB NO.: 15-13
PREPARED BY: ME
DATE: 06-17-2015

STREAM: ***Konohiki Stream***
CROSS SECTION STATION: ***Section I***

GIVEN:

DISCHARGE (Q) = 4813 CFS
SLOPE (s) = 0.0392 FT/FT
n VALUE = 0.0500
INVERT ELEV. = 205.5 FT
$AR^{2/3} = Qn/s^{1/2}(1.486)$
$= 4813(0.0500) / (0.0392)^{1/2}(1.486)$
$= 817.9$

CROSS SECTION PTS:

DIST	ELEV	
-49.1	214.7	LEFT
-42.5	213.9	LEFT
-40.7	213.7	LEFT
-31.4	212.8	LEFT
-25.6	211.2	LEFT
-18.1	210.4	LEFT
-12.6	206.7	LEFT
-10.6	206.3	LEFT
0.0	205.5	CENTER LINE
9.1	205.6	RIGHT
15.9	209.5	RIGHT
16.7	210.7	RIGHT
21.3	212.0	RIGHT
36.6	213.3	RIGHT
40.6	213.8	RIGHT
48.8	214.4	RIGHT

FLOOD LIMITS:

COMPUTED :
DEPTH (d) = 8.6 FT
AREA (A) = 342.3 SF
WETTED PERIMETER (WP) = 92.6 FT
HYDRAULIC RADIUS (R) = A/WP = 342.3/ 92.6 = 3.7
$AR^{2/3} = (342.3)(3.7)^{2/3} = 818.5$
Q = 4816 CFS

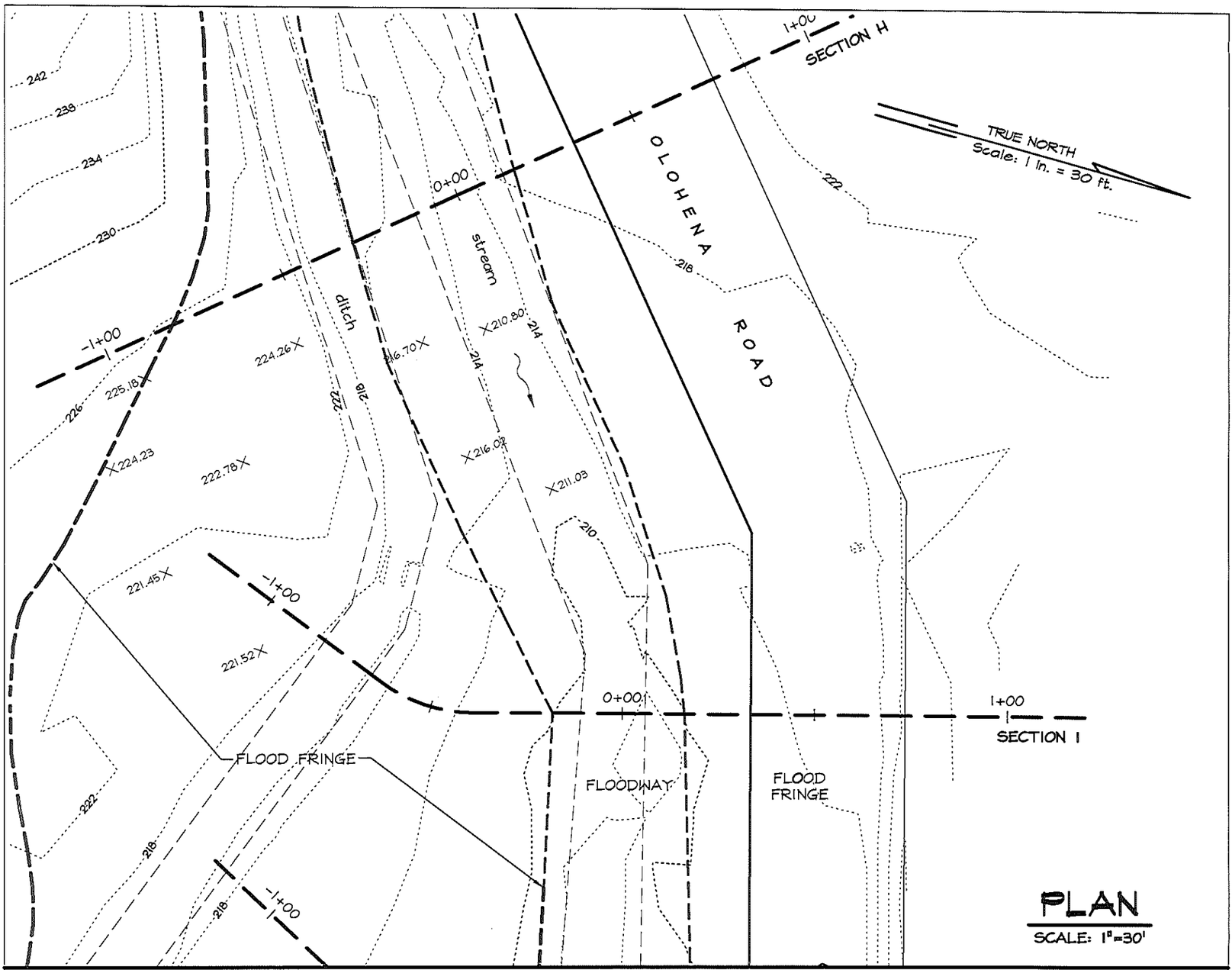
RESULTS:
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 205.5 + 8.6 = 214.1 FT
VELOCITY = Q/A = 4813.0/ 342.3 = 14.1 FT/SEC
FREEBOARD (FB) $= 2 + 0.025(V)d^{1/3}$
$= 2 + 0.025(14.1)(8.6)^{1/3}$
$= 2.7$ FT 3.0 217.1
SETBACK ELEVATION = WSE + FB = 214.1 + ~~2.7~~ = ~~216.8~~ FT

FLOODWAY:

COMPUTED :
DEPTH (d) = 9.6 FT
AREA (A) = 263.0 SF
WETTED PERIMETER (WP) = 47.9 FT
HYDRAULIC RADIUS (R)= A/WP = 263.0/ 47.9 = 5.5
$AR^{2/3} = (263.0)(5.5)^{2/3} = 818.7$

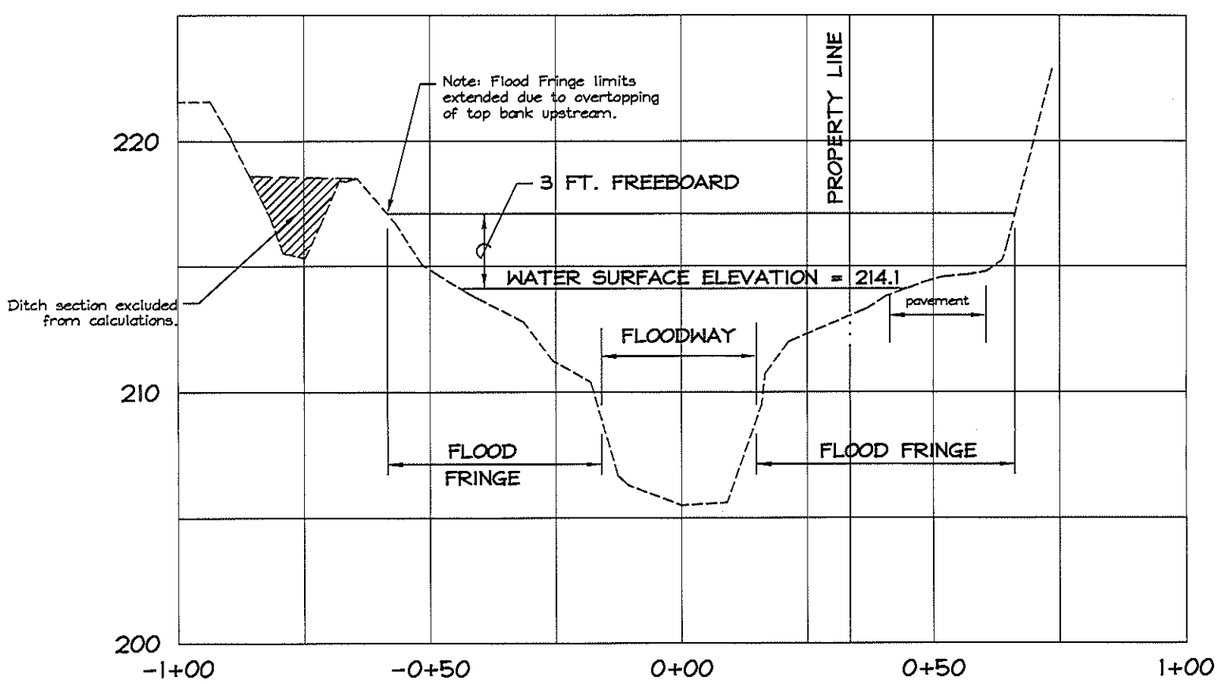
Q = 4818 CFS

RESULTS :
WATER SURFACE ELEVATION (WSE) = INV ELEV + d = 205.5 + 9.6 = 215.1 FT
VELOCITY = Q/A = 4813.0 / 263.0 = 18.3 FT/SEC
FLOODWAY WIDTH :
DISTANCE LEFT OF CENTER LINE = -14.6 FT
DISTANCE RIGHT OF CENTER LINE = 14.9 FT



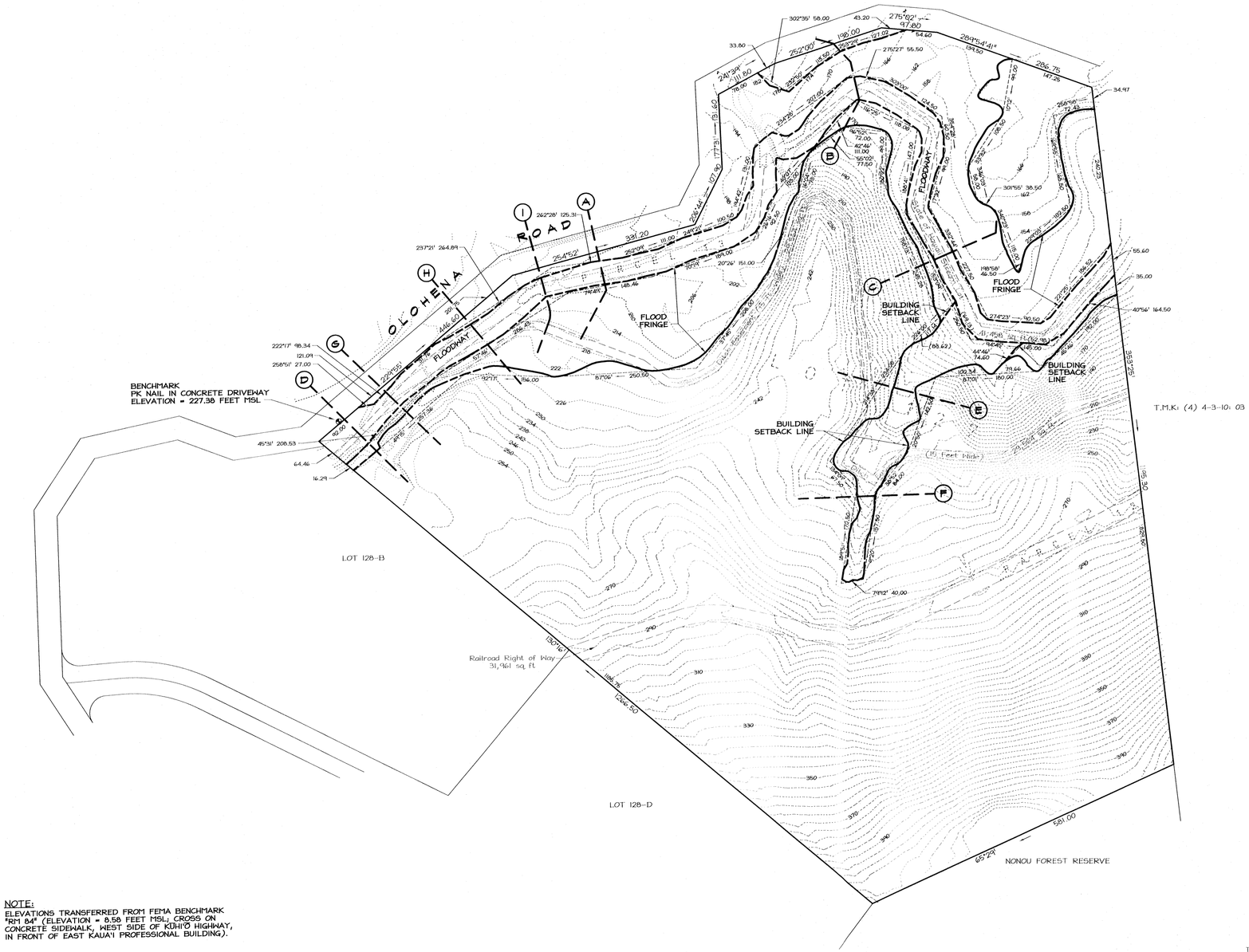
PLAN

SCALE: 1"=30'



SECTION I

SCALE: 1"=30' HORIZONTAL
1"=6' VERTICAL



NOTE:
ELEVATIONS TRANSFERRED FROM FEMA BENCHMARK "RM 84" (ELEVATION = 8.58 FEET MSL; CROSS ON CONCRETE SIDEWALK, WEST SIDE OF KŪHIʻŌ HIGHWAY, IN FRONT OF EAST KAUAʻI PROFESSIONAL BUILDING).

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

FLOOD LIMITS MAP
LOT 127
Kapa'a Homesteads, Second Series
Being Also Land Patent Grant Number 8979 to Martha K. Cummings
WAIPOULI, KAWAIHAU, KAUA'I, HAWAI'I
Tax Map Key: (4) 4-4-06: 02
Client: Gilles Lebbe
Date: September 4, 2015

Exhibit A-5

FILE COPY

APPROVED EIS EXEMPTION LIST FOR DIVISION OF LAND MANAGEMENT DEPARTMENT OF LAND AND NATURAL RESOURCES

April 28, 1986

Exemption Class #1: Operations, repairs or maintenance of existing structures, facilities, equipment or topographical features, involving negligible or no expansion or change of use beyond that previously existing.

The exempt items below are not applicable in lands classified Conservation.

1. Routine maintenance of state lands to remove weeds, brushes, grass and other unwanted overgrowths.

2. Routine and emergency removal of boulders, rocks, fallen trees and other debris necessary to maintain state lands in a safe condition.

3. Trimming and removal of overhanging tree branches or roots encroaching into abutting private properties.

4. Repair, maintenance and renovation of existing structures on leased state lands.

5. Routine and emergency repair and restoration of existing structures and facilities on state lands involving negligible or no expansion or change of use beyond that previously existing.

6. Maintenance of house and lot repurchased by State.

7. Burning of rubbish and debris to maintain state lands, with required permit.

8. Maintenance of state-owned right-of-way other than public rights-of-way.

9. Maintenance and repair of state-owned bridges and flumes.

10. Maintenance of waterways (canal, auwai, ditches) and drainage.

11. Cleaning river and stream mouths of debris and sand.

Exemption Class #2: Replacement or reconstruction of existing structures and facilities where the new structure will be located generally on the same site and will have substantially the same purpose, capacity, density, height and dimensions as the structure replaced.

The exempt items below are not applicable in lands classified Conservation.

1. Replacement/reconstruction of facilities on leased state lands destroyed or rendered unsafe or unusable by fire, earthquake, tsunami or other natural disaster.

2. Replacement/reconstruction of single family dwelling acquired or built by State.

3. Replacement of State-owned bridges and flumes.

Exemption Class #3: Construction and location of single, new small facilities or structures and the alteration and modification of same and installation of new, small, equipment and facilities and the alteration and modification of same including but not limited to: (a) single family residences not in conjunction with the building of two (2) or more such units; (b) multi-unit structures designed for not more than four (4) dwelling units if not in conjunction with the building of two (2) or more such structures; (c) stores, offices and restaurants designed for total occupant load of twenty (20) persons or less, if not in conjunction with the building of two (2) or more such structures; (d) water, sewage, electrical, gas, telephone, and other essential public utility services extensions to serve such structures or facilities; and (e) accessory or appurtenant structures including garages, carports, patios, swimming pools, and fences.

The exempt items below are not applicable in lands classified Conservation.

1. Construction of new structures on leased state lands and fee simple lands sold on installment payment basis:

a. Single family residence not in conjunction with the building of two (2) or more such units,

b. Multi-unit structure designed for not more than four (4) dwelling units if not in conjunction with the building of two (2) or more such structure.

c. Stores, offices and restaurants designed for total occupant load of twenty (20) persons or less, if not in conjunction with the building of two (2) or more such structures.

d. Water, sewage, electrical, gas, telephone and other essential public utility services extensions to serve such structures or facilities.

e. Accessory or appurtenant structures including water collection, distribution and storage systems, garages, carports, patios, swimming pools, driveways and swales.

Exemption Class #4: Minor alteration in the conditions of land, water, or vegetation.

The exempt items below are not applicable in land classified Conservation.

1. Minor grading and grubbing of lands in preparation for construction of structure exempt under Exempt Class No. 3.

2. Chemical control of vegetation using Roundup, Rodeo, and Dowpon applied in strict conformance with label instructions and not where otherwise prohibited.

3. One time, short term (14 days or less) use of state lands, i.e., Huli-Huli chicken, carnivals, state fair.

4. Minor cut, fill and grading of state property of less than 50 cubic yards of rock and/or soil where the verticle height of cut or fill does not exceed three feet.

5. Filling of unusable cesspools with required permit.

Exemption Class #5: Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource.

The exempt items below are not applicable in lands classified Conservation.

1. Permission to enter state lands for the purpose of basic data collection, research, experimental management and resources evaluation activities such as archaeological survey, topographic survey, test borings for soil test, ground cover survey inspection of property for appraisal and development feasibility study purposes.

2. Appraisal of real property for:

   a. Land exchange proposals

   b. Determination of acquisition/sales price

   c. Rental establishment

   d. Establishment of royalties

Exemption Class #9: Demolition of structures, except those structures located on any historic site as designated in the National Register or Hawaii Register as provided for in the Historic Preservation Act of 1966, Public Law 89-665, or Chapter 6, Hawaii Revised Statutes.

The exempt items below are not applicable in lands classified Conservation.

1. Demolition and removal of unusable structures from state lands controlled by the State.

2. Removal of abandoned private property from state lands.

3. Removal of unauthorized improvements from state property.

Exemption Class #10: Zoning variances except: use, density, height, parking requirements and shoreline set-back variances.

The exempt items below are not applicable in lands classified Conservation.

Application for zoning variance for use of state lands disposed to private parties or to governmental agencies.

NOTE: As stipulated by EIS Regulation 1:33(b), all exemptions under this list are inapplicable when the cumulative impact of planned successive actions of the same type, in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.

Exhibit B-1

STATE OF HAWAII
BUREAU OF CONVEYANCES
RECORDED
February 26, 2015 8:01 AM
Doc No(s) A-55350422

/s/ NICKI ANN THOMPSON
REGISTRAR

1 1/5 CGG Conveyance Tax: $5,100.00

B-32591902

AFTER RECORDATION, RETURN BY MAIL (X) PICKUP ( ):

KONOHIKI KIHAPAI, LLC
6242-B OLOHENA RD
Kapaa, HI 96746

TG: 201456368
TGE: 24114052134
Jeri Miyaji-Ventura

TITLE OF DOCUMENT: This document contains 8 pages

WARRANTY DEED

PARTIES TO DOCUMENT

Grantor: R3BST, LLC
841 Bishop Street, #860
Honolulu, HI 96813, as fee owner

Grantee: Konohiki Kihapai, LLC
6242-B Olohena Road
Kapaa, HI 96746

PROPERTY DESCRIPTION:
Tax Map Key No.: (4) 4-4-006-002

WARRANTY DEED

THIS DEED, made this 23rd day of February, 2015, by R3BST, LLC, a Delaware limited liability company, as fee owner, hereinafter called the "Grantor," in favor of KONOHIKI KIHAPAI, LLC, a limited liability company formed under the laws of the State of Hawaii, whose mailing address is 6242-B Olohena Road, Kapaa, HI 96746, hereinafter called the "Grantee;"

WITNESSETH:

That for TEN AND NO/100 DOLLARS ($10.00) and other valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, the Grantor does hereby grant, bargain, sell and covey unto the Grantee, in fee simple, as TENANT IN SEVERALTY, all of the real property more particularly described in Exhibit "A" attached hereto and made a part hereof, subject to the exceptions noted therein.

And the reversions, remainders, rents, issues and profits thereof and all of the estate, right, title and interest of the Grantor, both at law and in equity, therein and thereto;

TO HAVE AND TO HOLD the same, together with all buildings, improvements, rights, easements, privileges and appurtenances thereon and thereto belonging or appertaining or held and enjoyed therewith, unto the Grantee according to the tenancy herein set forth, forever.

AND, in consideration of the premises, the Grantor does hereby covenant with the Grantee that the Grantor is seized of the property herein described in fee simple; that said property is free and clear of and from and liens and encumbrances, except for the lien of real property taxes not yet by law required to be paid, and except as may be specifically set forth herein; that the Grantor has good right to sell and convey said property, as aforesaid; and, that the Grantor will WARRANT AND DEFEND the same unto the Grantee against the lawful claims and demands of all persons, except as aforesaid.

The conveyance herein set forth and the warranties of the Grantor concerning the same are expressly declared to be in favor of the Grantee, as TENANT IN SEVERALTY, and the Grantee's heirs, personal representatives and assigns. The Grantee hereby accepts the property described in Exhibit "A".

The parties hereto agree that this instrument may be executed in counterparts, each of which shall be deemed an original, and said counterparts shall together constitute one and the same agreement, binding all of the parties hereto, notwithstanding all of the parties are not signatory to the original or same counterparts. For all purposes, including, without limitation, recordation and delivery of this instrument, duplicate unexecuted and unacknowledged pages of the counterparts may be discarded and the remaining pages assembled as one document.

The terms "Grantor" and "Grantee," as and when used herein, or any pronouns used in place thereof, shall mean and include the masculine, feminine or neuter, the singular or plural number, individuals, partnerships, trustees or corporations and their and each of their respective successors, heirs, personal representatives, successors in trust and assigns, according to the context thereof. All covenants and obligations taken by two or more persons shall be deemed to be joint and several unless a contrary intention is clearly expressed elsewhere herein.

IN WITNESS WHEREOF, the Grantor has executed these presents on the day and year first above written.

(Acknowledgements below)

R3BST, LLC,
a Delaware limited liability company
By its general partner Ing Family Partnership, a Hawaii Limited Partnership

BY: _____
Name: RICHARD K. M. ING,
Title: General Partner

GRANTOR

STATE OF HAWAI'I)
) SS.
COUNTY OF OAHU)

On this 18th day of February 2015 before me, Kathryn MacDowell, Notary Public, State of Hawaii, personally appeared RICHARD K. M. ING, General Partner, R3BST, LLC, a Delaware limited liability company, Grantor, to me personally known, who being duly sworn and affirmed, did say he executed the foregoing Warranty Deed, dated ____ and consisting of 8 pages, as his free act and deed in the capacity shown, in the County of Oahu of the State of Hawaii, having been duly authorized to execute such instrument in such capacity.

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

_____
Name: Kathryn MacDowell
Notary Public, State of Hawai'i
My Commission expires: January 7, 2018

LS

Kathryn MacDowell, First Circuit Doc Date ____
Pages 8 Doc Description _____
_____ 2/18/2015
Notary Signature Date

LS

KONOHIKI KIHAPAI, LLC,
a limited liability company formed
under the laws of the State of Hawaii

BY: _____
Name: GILLES LEBBE
Title: Managing Member

GRANTEE

STATE OF HAWAI'I)
) SS.
COUNTY OF KAUAI)

On this 23rd day of February, 2015 before me, Judi Young, Notary Public, State of Hawaii, personally appeared GILLES LEBBE, Managing Member, KONOHIKI KIHAPAI, LLC, a limited liability company formed under the laws of the State of Hawaii, Grantee, to me personally known, who being duly sworn and affirmed, did say he executed the foregoing Warranty Deed, dated 2/23/15 and consisting of 8 pages, as his free act and deed, in the County of Kauai of the State of Hawaii, having been duly authorized to execute such instrument in such capacity.

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

_____
Name: Judi Young
Notary Public, State of Hawaii
My Commission expires: April 28, 2017

EXHIBIT A

All of that certain parcel of land (being all of the land(s) described in and covered by Land Patent Grant Number 8979 to Martha K. Cummings) situate, lying and being at Kapaa, District of Puna, Island and County of Kauai, State of Hawaii, being LOT 127 of the "KAPAA HOMESTEADS, SECOND SERIES", and thus bounded and described:

Beginning at a + on stone at the west corner of this lot and on the south side of Olohena Road (40 feet wide) the coordinates of said point of beginning referred to Government Survey Trig. Station "NONU" being 5,801 feet north and 439 feet west, as shown on Government Survey Registered Map No. 2452, and running by true azimuths:

1.	229° 55'	446.6	feet along Olohena Road to a + on stone;
2.	254° 52'	331.2	feet along Olohena Road to a + on stone;
3.	206° 44'	107.9	feet along Olohena Road to a + on stone;
4.	177° 31'	131.6	feet along Olohena Road to a + on stone;
5.	241° 39'	111.8	feet along Olohena Road to a + on stone;
6.	252° 00'	198.0	feet along Olohena Road to a + on stone;
7.	275° 02'	97.8	feet along Olohena Road to a + on stone;
8.	290° 00'	287.0	feet along Olohena Road to a + on stone;
9.	353° 25'	1195.3	feet along the Makee Sugar Co's land to a + on stone;
10.	65° 29'	581.0	feet along Government Land to a pipe;
11.	130° 16'	1266.5	feet along Lot 128 to the point of beginning and containing an area of 31 75/100 acres, more or less.

Excepting and reserving therefrom a right-of-way 15 feet wide across this lot for the ditch, said right-of-way containing an area of 46/100 acres; Also excepting and reserving therefrom that portion of the stream within this lot area (96/100) acre and all riparian and other rights in or to this stream and the waters thereof.

Also excepting and reserving therefrom the railroad right-of-way across this lot,

described as follows:

Railroad right-of-way (30 feet wide) thru Lot 127, Kapaa Homesteads, 2nd Series, Puna, Kauai, the center line of which is described as follows:

Beginning at the boundary between Lots 127 and 128, the azimuth and distance to a + on stone at the west corner of Lot 127 and on the south side of Olohena Road being 130° 16' 583.7 feet, as shown on Government Survey Registered Map No. 2452, and running by true azimuths:

1. 251° 52' 192.3 feet to point of curve;

2. Thence along a curve to the right with a radius of 190.18 feet the direct azimuth and distance being: 267° 23' 100.8 feet;

3. 282° 54' 145.5 feet to point of curve;

4. Thence along a curve to the left with a radius of 199.52 feet, the direct azimuth and distance being 263° 34' 132.1 feet;

5. 244° 14' 395.2 feet to point of curve;

6. Thence along a curve to the left with a radius of 500.2 feet, the direct azimuth and distance being: 241° 52' 30" 41.1 feet;

7. 239° 31' 54.8 feet to the east boundary of Lot 127, the azimuth and distance to a + on stone at the east corner of Lot 127 being: 353° 25' 469.0 feet, containing an area of 0.73 acre.

Leaving a net area of 29.60 acres, more or less.

BEING THE PREMISES ACQUIRED BY DEED

GRANTOR : SLEEPING GIANT WOODS, LLC, a Delaware limited liability company

GRANTEE : R3BST, LLC, a Delaware limited liability company

DATED : as of October 31, 2008, but shall not be effective until November 3, 2008

RECORDED : Document No. 2008-168799

SUBJECT TO:

1. Real Property Taxes, if any, that may be due and owing, including possible rollback or retroactive property taxes to which the property may be subject.

   Tax Key: (4) 4-4-006-002 Area Assessed: 29.600 acres

2. Mineral and water rights of any nature in favor of the State of Hawaii.

3. Ditch as referenced on Tax Map.

4. Free flowage of stream.

5. Portions of the land have no recorded access to a public roadway over the Stream 0.96 acre, Ditch 0.46 acre and Railroad Right of Way 0.73 acre mentioned in Schedule C herein.

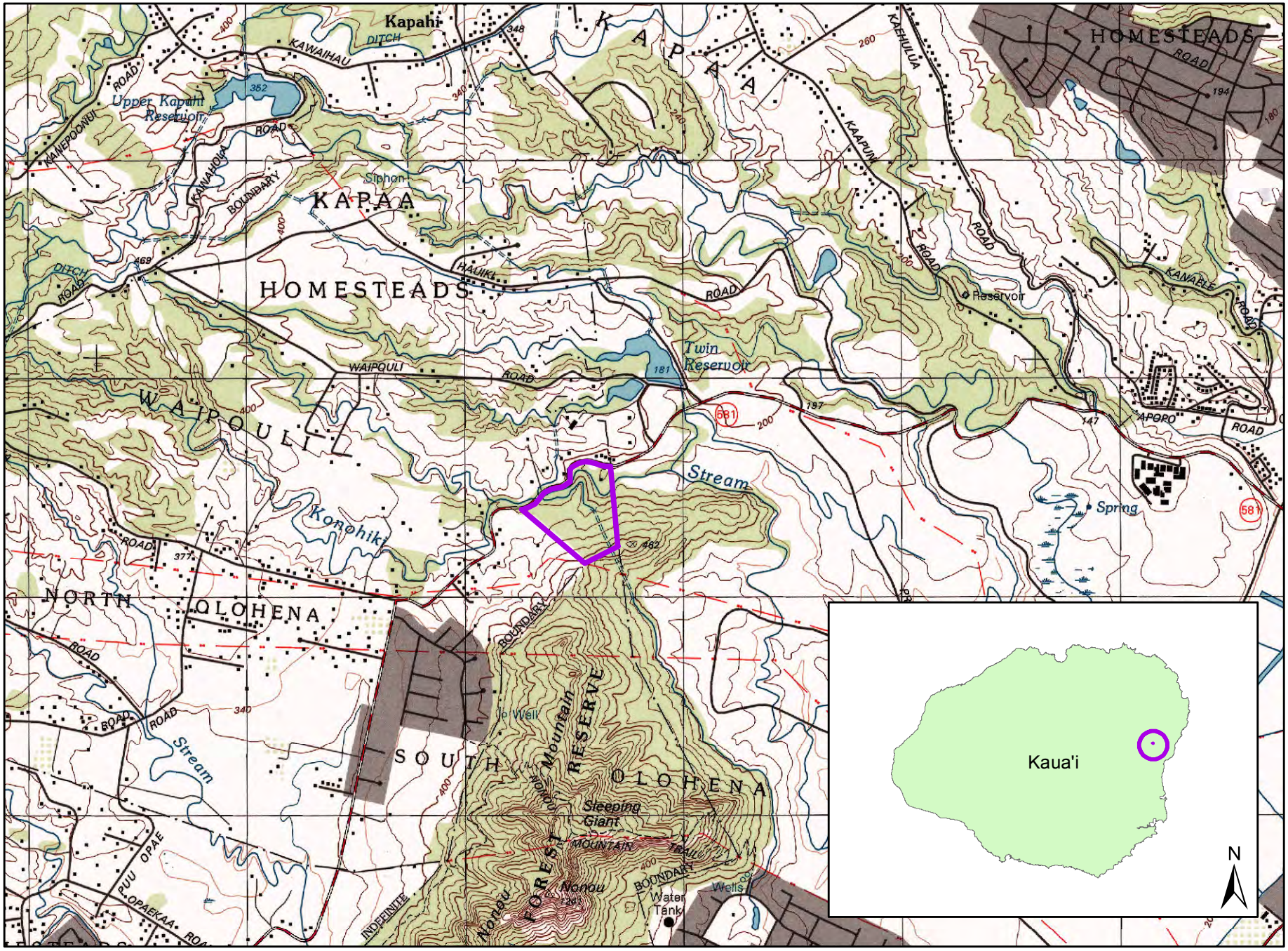
6. Claims arising out of customary and traditional rights and practices, including without limitation those exercised for subsistence, cultural, religious, access or gathering purposes, as provided for in the Hawaii Constitution or the Hawaii Revised Statutes.

7. Any unrecorded leases and matters arising from or affecting the same.

8. Discrepancies, conflicts in boundary lines, shortage in area, encroachments or any other matters which a correct survey or archaeological study would disclose.

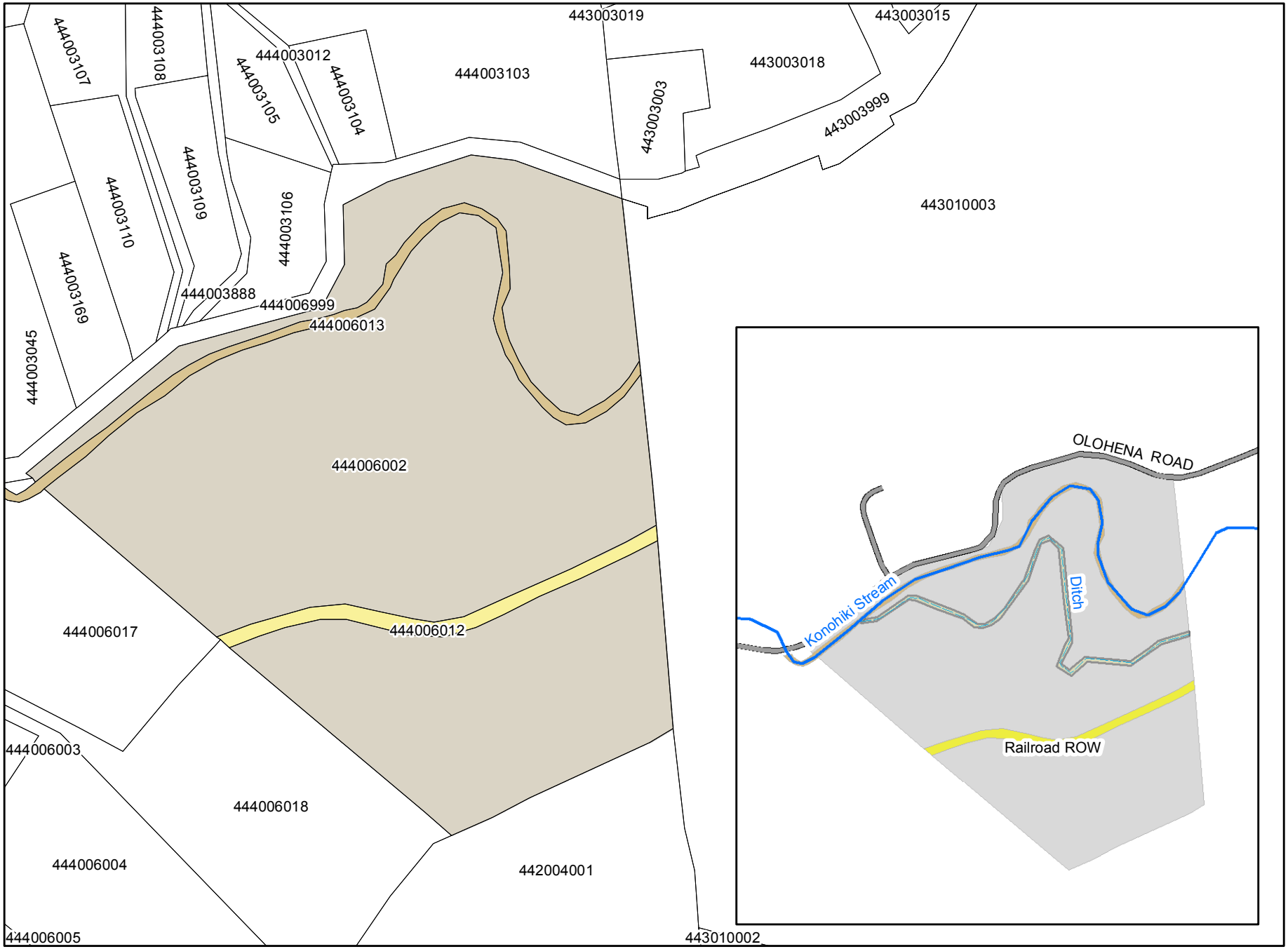
END OF EXHIBIT A

Exhibit C-1 Location Map



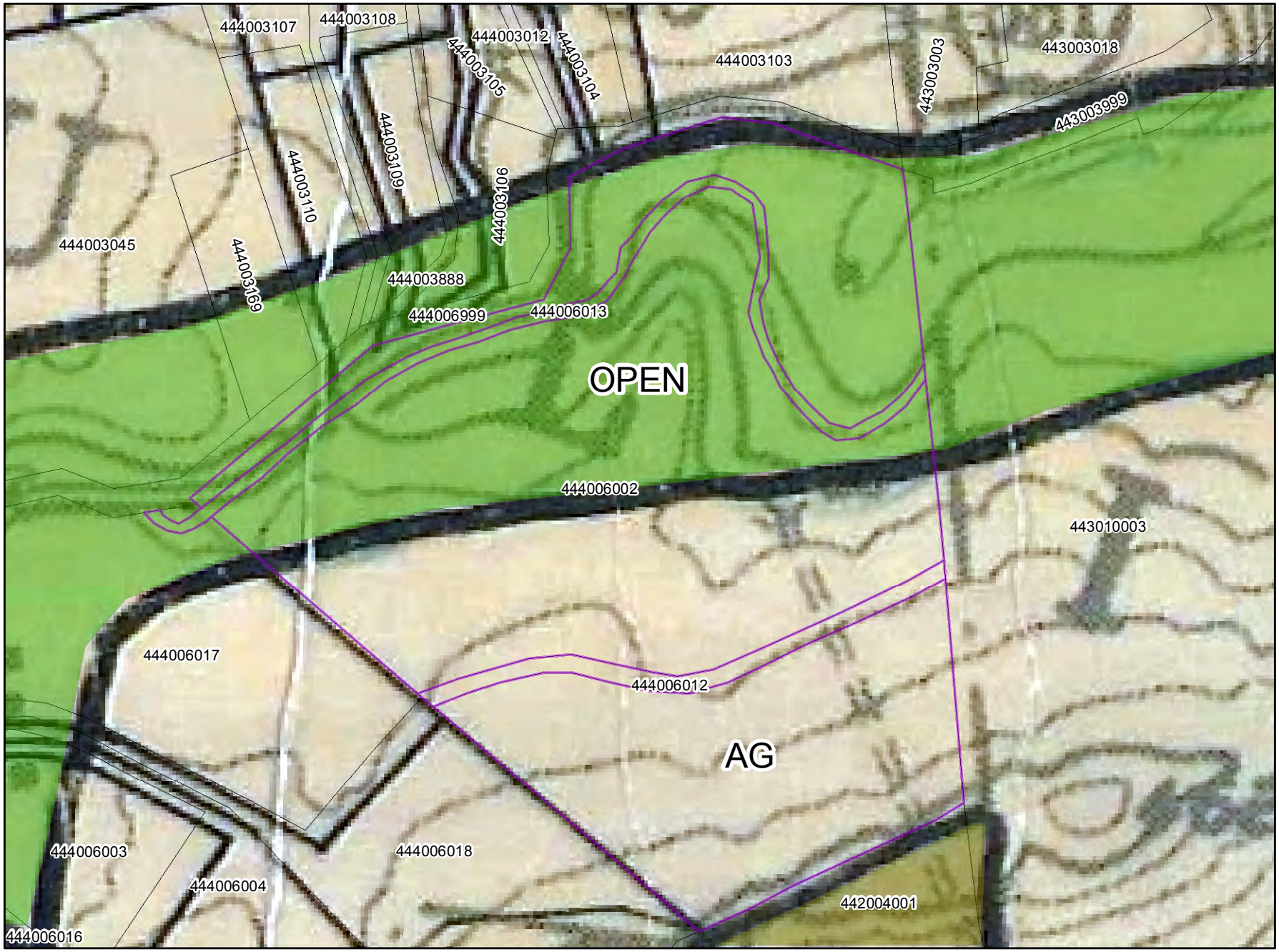
Source: US Geological Survey - State of Hawaii - Office of Planning - GIS program

Exhibit C-2 Tax Map



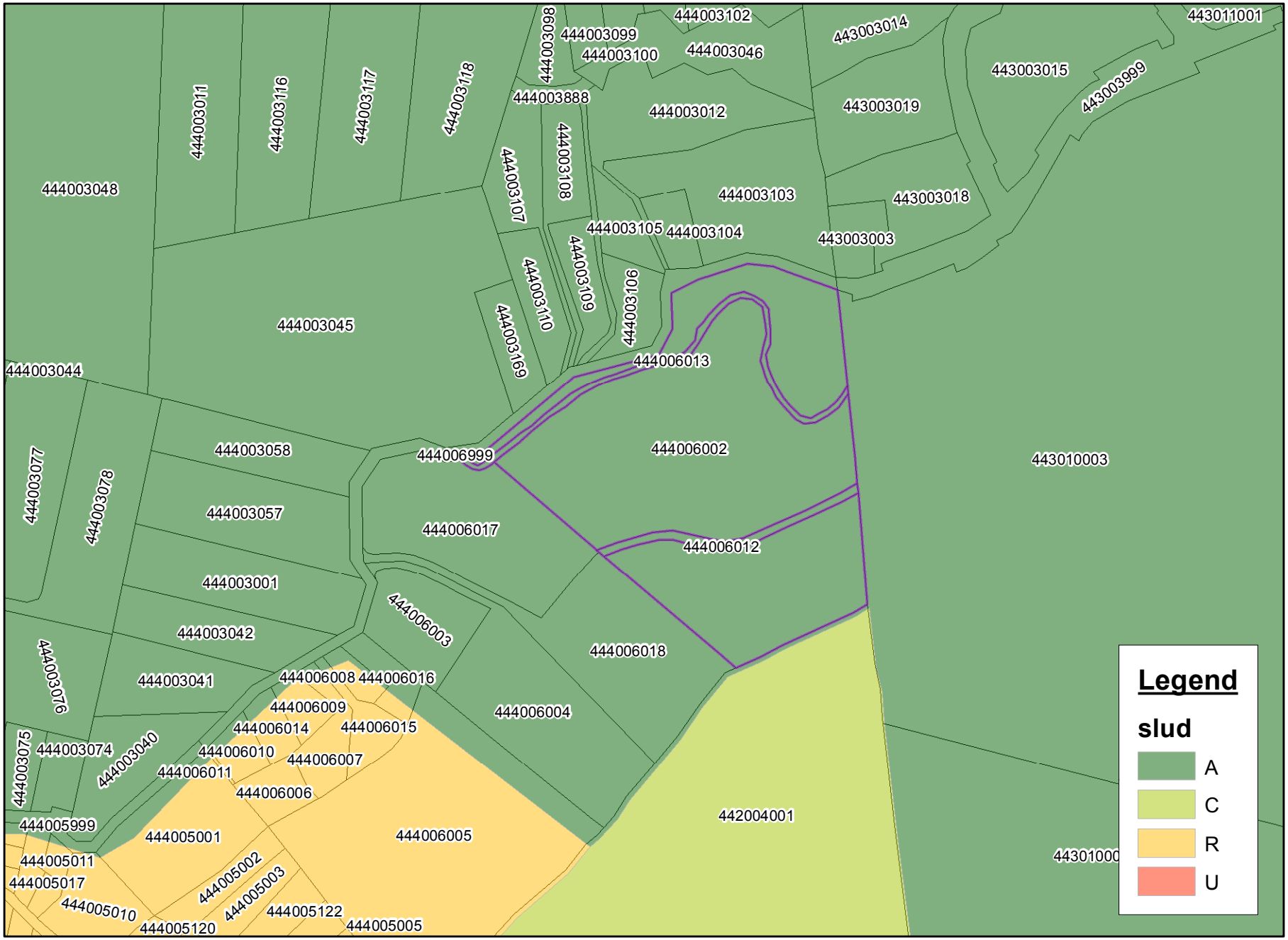
Source: State of Hawaii - Office of Planning - GIS program

Exhibit C-3: County Zoning Ordinance (CZO) Map



Source: County of Kauai - Planning Commission — State of Hawaii, Offiice of Planning, GIS Program

Exhibit C-4: State Land Use District Boundary (SLUD) Map



Source: State of Hawaii, Office of Planning, GIS program

Exhibit C-5 Kaua'i General Plan Map

Kawaihau Planning District Land Use Map

2000 0 2000 4000 6000 8000 Feet

N

Legend

Land Use Designation

- Urban Center
- Resort
- Residential Community
- Agriculture
- Open
- Park
- Transportation
- Military
- Town Centers
- Major Roads
- Minor Roads
- Planned Roads*

Public Facilities

- Airport
- Civic Center
- Commercial Harbor
- Community College
- Correctional Center
- Electric Power Plant
- Electric Power (future)
- Small Boat Harbor
- Elementary School
- Intermediate/Middle School
- High School
- Landfill
- Hospital
- Sugar Mill
- Wastewater Treatment Plant

* actual alignment to be determined

Moloaa Bay

Anahola

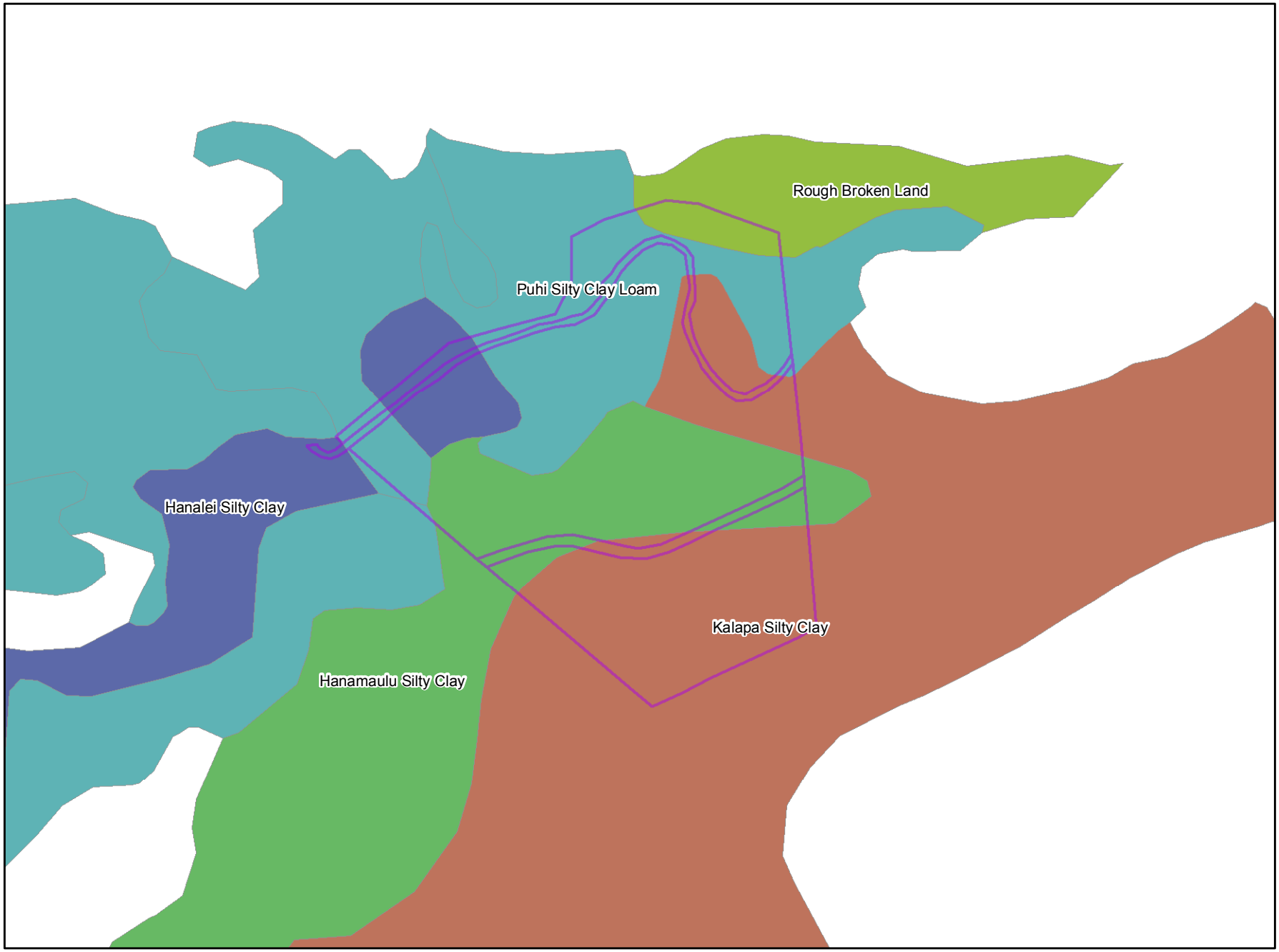
Kamalomalo

Kealia

Kapaa

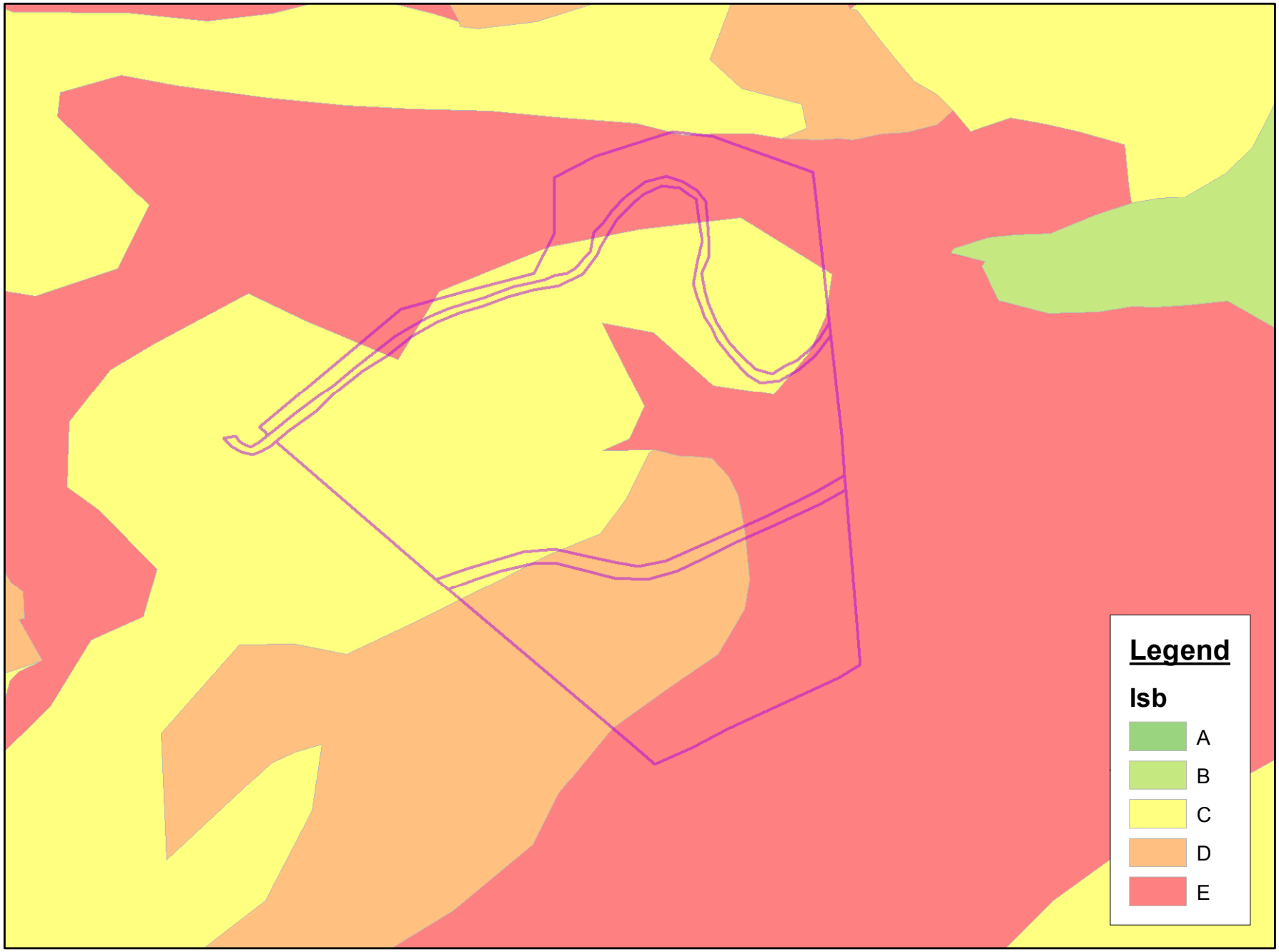
Wailua

Exhibit C-6: Soil Survey Map



Source: State of Hawaii - Office of Planning - GIS program

Exhibit C-7: Land Classification Map (Land Study Bureau, UH)



Source: State of Hawaii - Office of Planning - GIS program

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator zone 4N. The **horizontal datum** was NAD83, GRS_1980 spheroid. Differences in datum, spheroid, projection or Universal Transverse Mercator zone 4N zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the NGVD29. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current description, elevation, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Digital Globe, Inc. This information was photogrammetrically derived from mosaicked 2-foot resolution satellite imagery that meets 1:12,000 scale horizontal accuracy standards. This information was collected between July 2002 and January 2004.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables (which contain authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

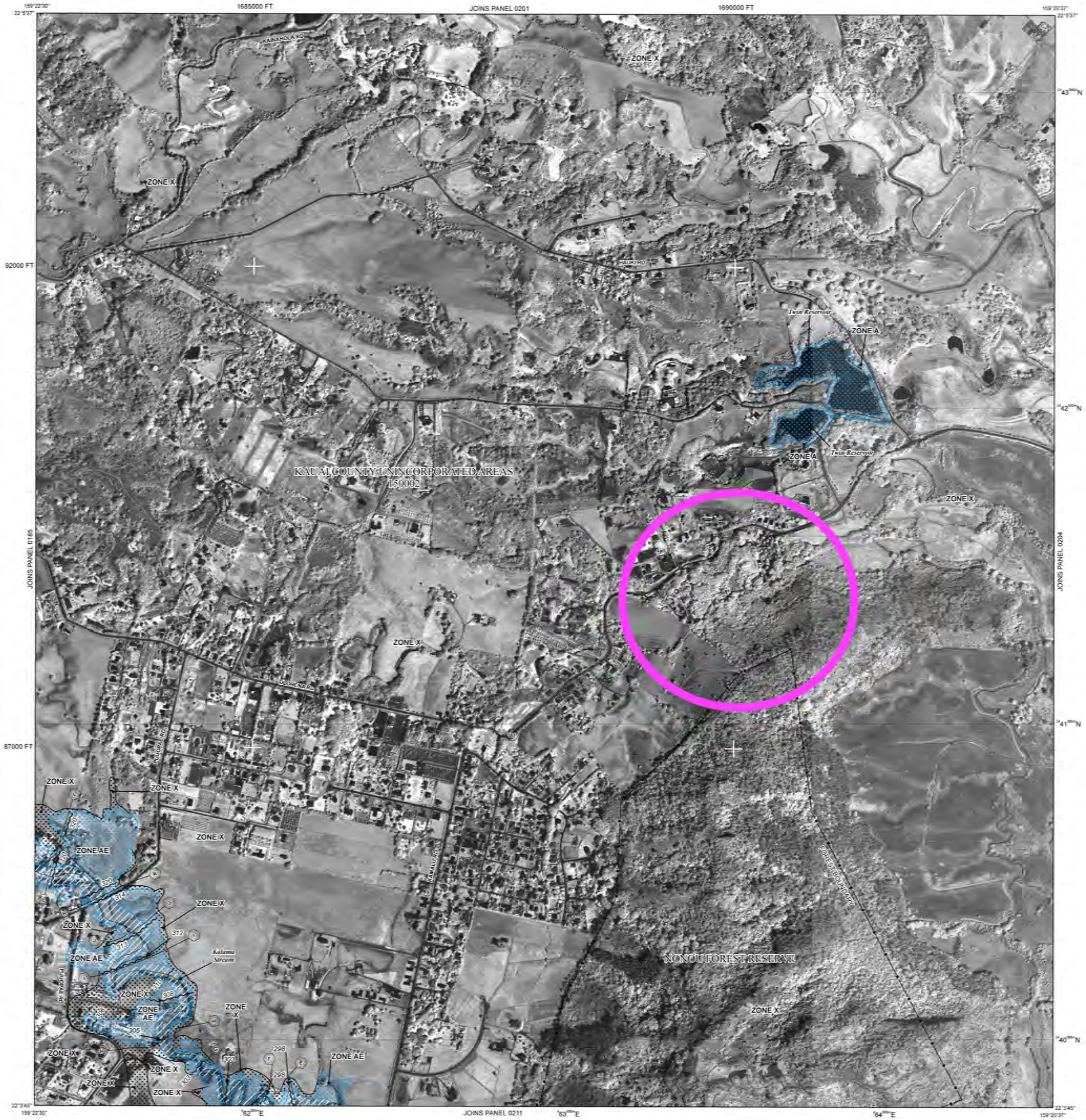
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map showing the layout of map panels for this jurisdiction.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at www.fema.gov/msc.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov.

Exhibit C-8 FIRM map



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% 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% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4276000 FT N — 1000-meter Universal Transverse Mercator grid values, zone 4N
- 600000 FT — 5000-foot grid ticks: Hawaii State Plane coordinate system, zone 4 (FIPSZONE 5104), Transverse Mercator projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Kauai County, Dept. of Public Works, Engineering Division
4021 Umi Street, Lihue, Hawaii 96766
(Maps available for reference only, not for distribution.)

INITIAL NFIP MAP DATE
December 20, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS
December 20, 1977

FLOOD INSURANCE RATE MAP EFFECTIVE
November 4, 1981

FLOOD INSURANCE RATE MAP REVISIONS
March 4, 1987
September 30, 1996
October 16, 2002

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0203E

FIRM

FLOOD INSURANCE RATE MAP

KAUAI COUNTY, HAWAII

PANEL 203 OF 356

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KAUAI COUNTY	150002	0203	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
1500020203E

MAP REVISED
September 16, 2005

Federal Emergency Management Agency

Exhibit C-9

Kawaihau Planning District Heritage Resources

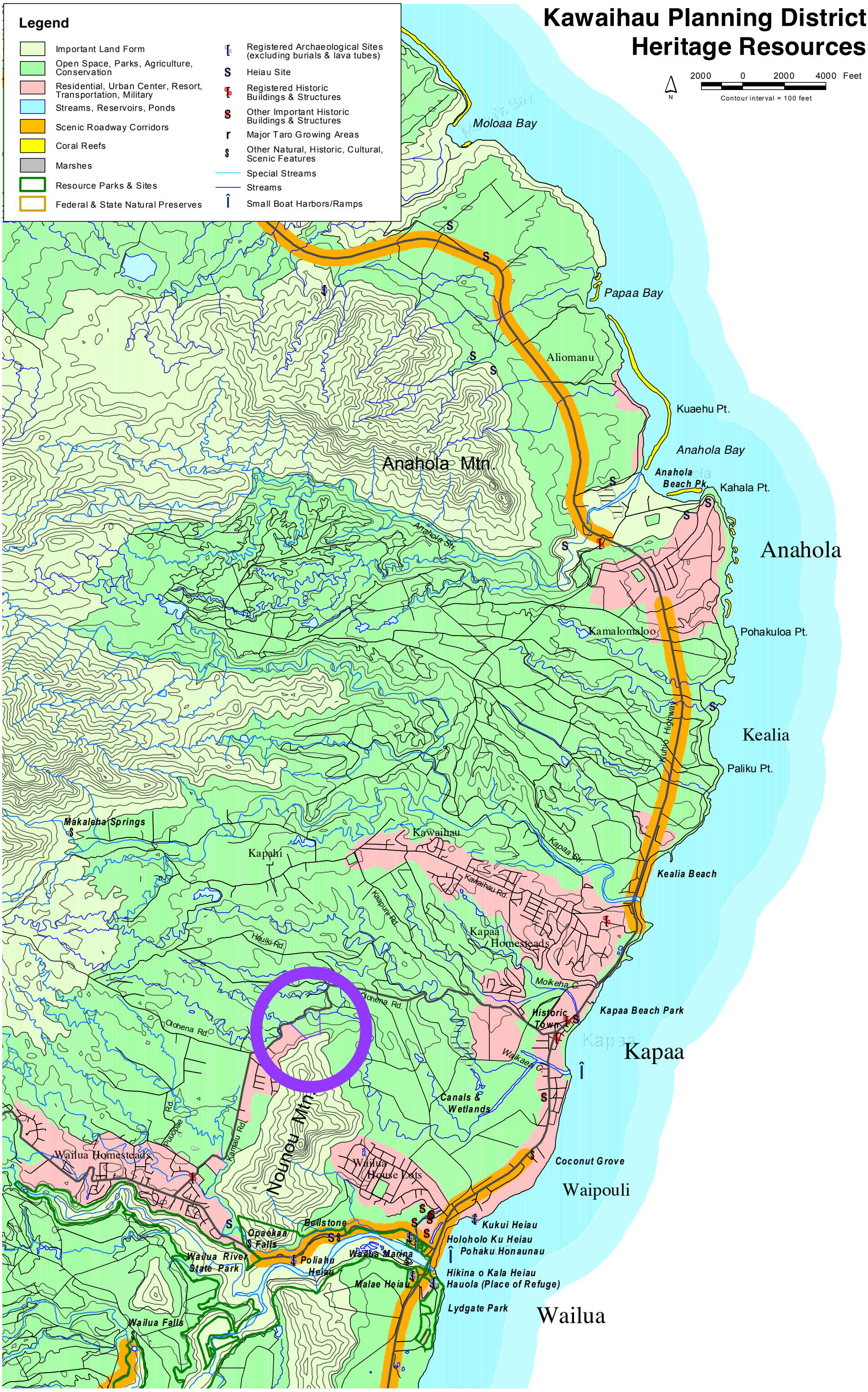


Exhibit C-10

CONDOMINIUM MAP

for

Lot 127

Kapa'a Homesteads, second series

Grant 8979

Kapa'a, Puna, Kaua'i, Hawai'i

T.M.K.: (4) 4-4-006:002

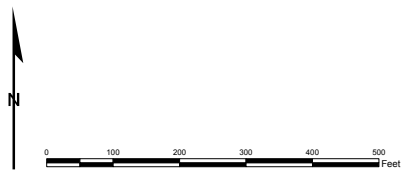


Exhibit E-1


MAP OF THE
LIHUE PLANTATION
LIHUE - KAWAIHAU, KAUAI
SCALE — 1 INCH = 2000 FEET
APRIL, 1939
REVISED FEB. 1965
KOAI FOREST RESERVE
KEALIA FOREST RESERVE
AIRPORT
O C E A N

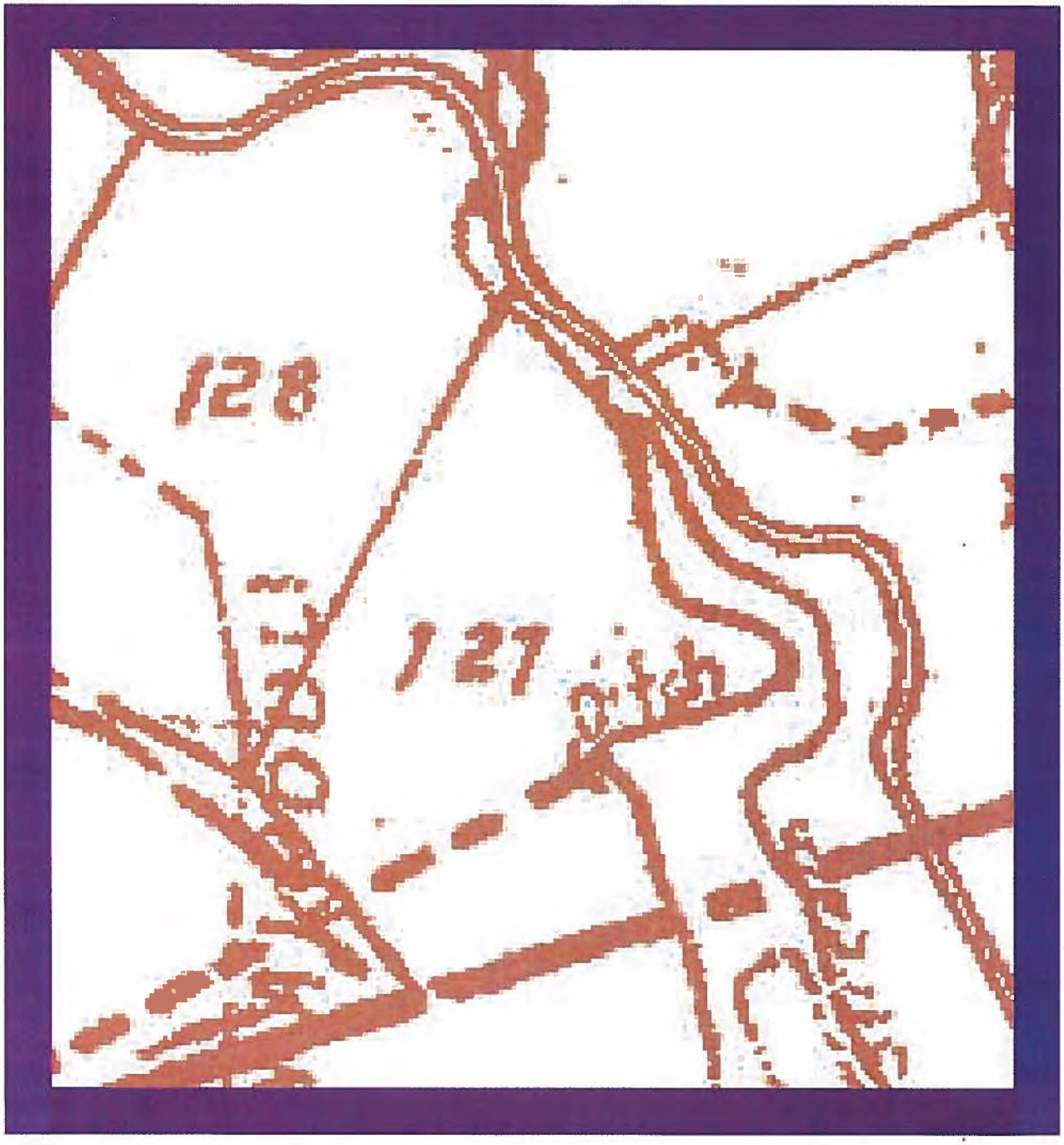

128
127

Exhibit E-2

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

JEFFREY T. PEARSON
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
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

April 28, 2017

Paul Togioka
County of Kauai
Public Works, Engineering Division
4444 Rice Street, Suite 275
Lihue, Hawaii 96766

Log No. 2017.00606
Doc. No. 1704LS13
Archaeology

Dear Mr. Togioka:

SUBJECT: **Chapter 6E-42 Historic Preservation Review**
Clearinghouse Application, CL-2017-010
Olohena Rd., Kapa'a – Grading Permit
Owner Name: Konohiki Kihapai, LLC
Waipouli Ahupua'a, Puna District, Island of Kaua'i
TMK: (4) 4-4-006:002

Thank you for the opportunity to review and comment on this County of Kaua'i Clearinghouse Application for an agricultural exemption from Sediment and Erosion Control Ordinance 808.to conduct farming activities on land in Wailua Homesteads along Olohena Road. The property totals 29.6 acres. The submittal included an application for an Agricultural Exemption from Ordinance 808, the Lihue Plantation/Amfac map of former sugar fields, and an approved Conservation Plan for Gilles Lebbe. The State Historic Preservation Division (SHPD) received this submittal on March 31, 2017.

Our records indicate that no archaeological inventory survey has been conducted, and that no archaeological historic properties have been identified within the subject parcel. The USDA identifies the soils within the property as Hanalei silty clay, 0-6% slopes (HrB), Hanamaulu sitly clay, 25-40% slopes (HsE), Kalapa silty clay, 40-70% slopes (KdF), Puhi silty clay loam, 8-15% slopes (PnC), Puhi silty clay loam, 15-25% slopes (PnD), Puhi silty clay loam, 25-40% slopes (PnE), and Rough broken land (rRR) (Foote et al. 1972).

Based on the previous disturbance from sugarcane and pineapple production on the entire parcel and the information provided, **SHPD's determination is no historic properties affected**. The permit issuance process may proceed.

Please attach to permit: In the unlikely event that subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, artifacts, sand deposits, or sink holes are identified during the demolition and/or construction work, cease work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division, at (808) 692-8015.

Please contact me at Susan.A.Lebo@hawaii.gov or at (808) 692-8019 for any concerns regarding this letter.

Aloha,

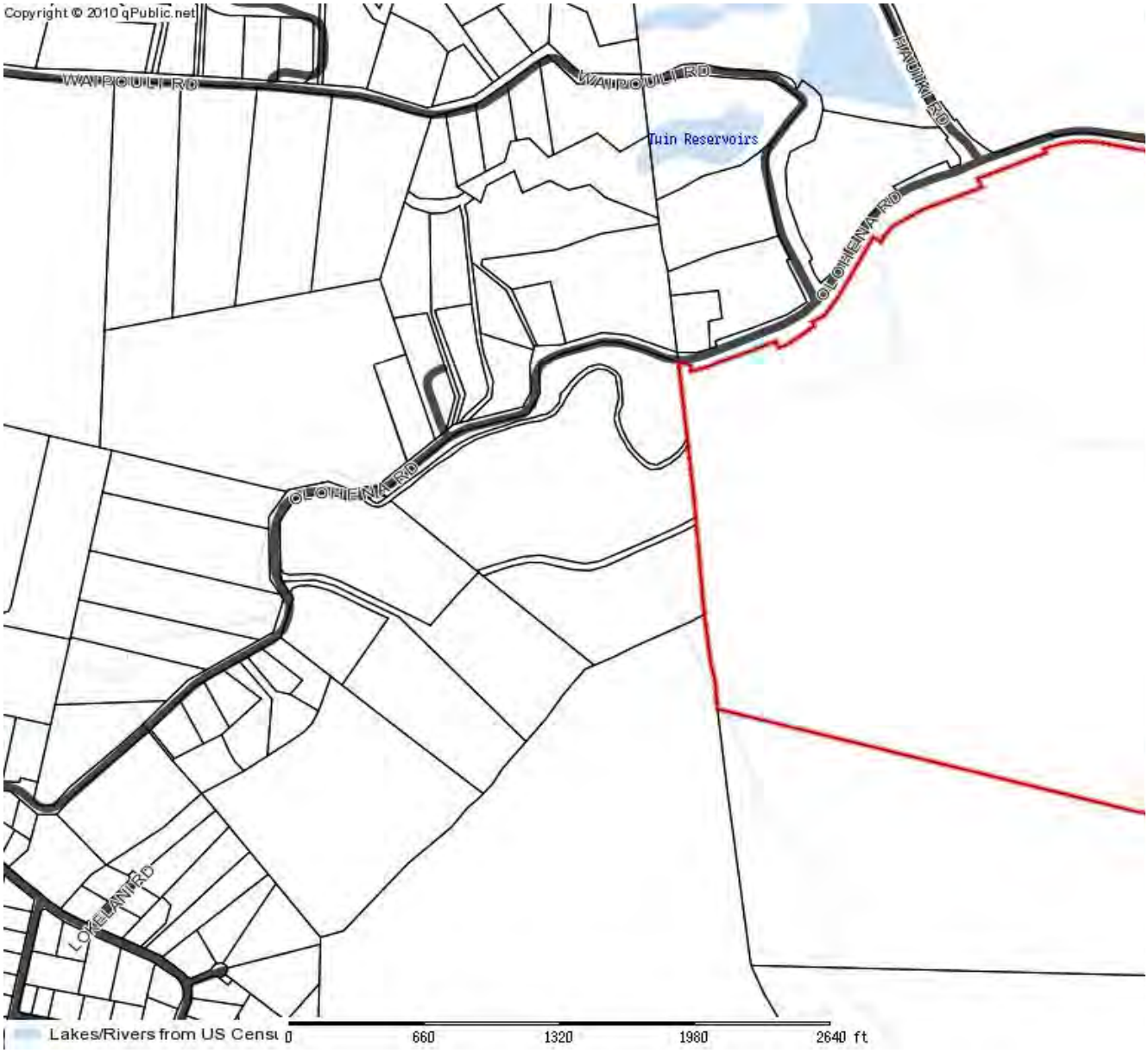
Susan A. Lebo

Susan A. Lebo, PhD
Archaeology Branch Chief

Exhibit F-1: Adjacent Property Index

Tax Map Key	Owner
(4)43-010-003	My Kapaa LLC
(4)42-004-001	State of Hawaii
(4)44-006-018	Kutaka, Meilyn M
(4)44-006-017	Kutaka, Claude K Trust

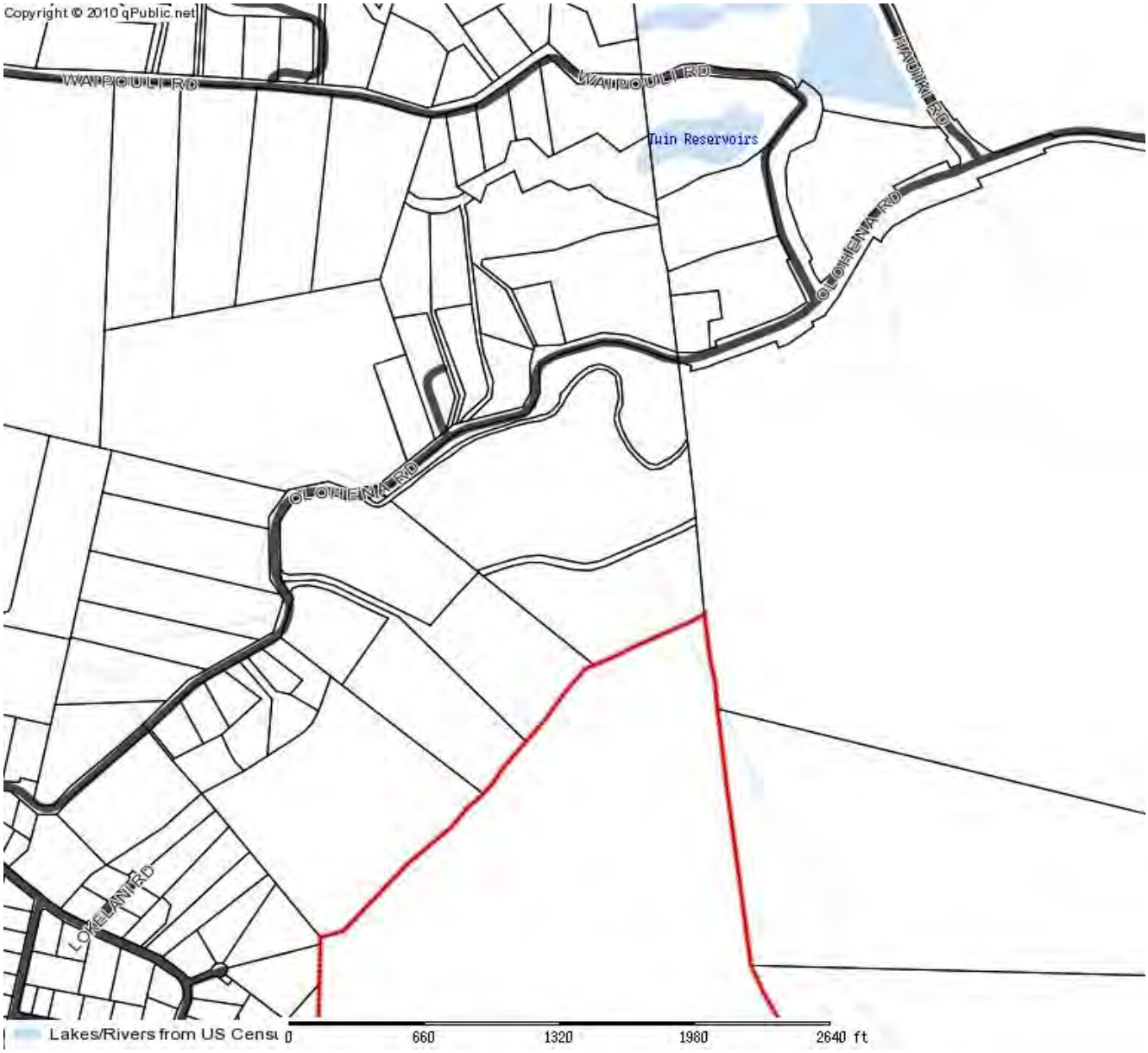
Exhibit F-2: Tax Map (4)43-010-003



Kauai County Assessor			
Parcel: 430100030000 Acres: 379.308			
Name:	MY KAPAA LLC	Land Value	
Site:	KUHIO HWY	Building Value	
Sale:	$4,100,400 on 2014-10-20 Reason= Qual=	Misc Value	
Mail:	700 12TH AVE S STE 201 NASHVILLE, TN 37203	Just Value	
		Assessed Value	0
		Exempt Value	0
		Taxable Value	0

Date printed: 03/01/15 : 18:29:09

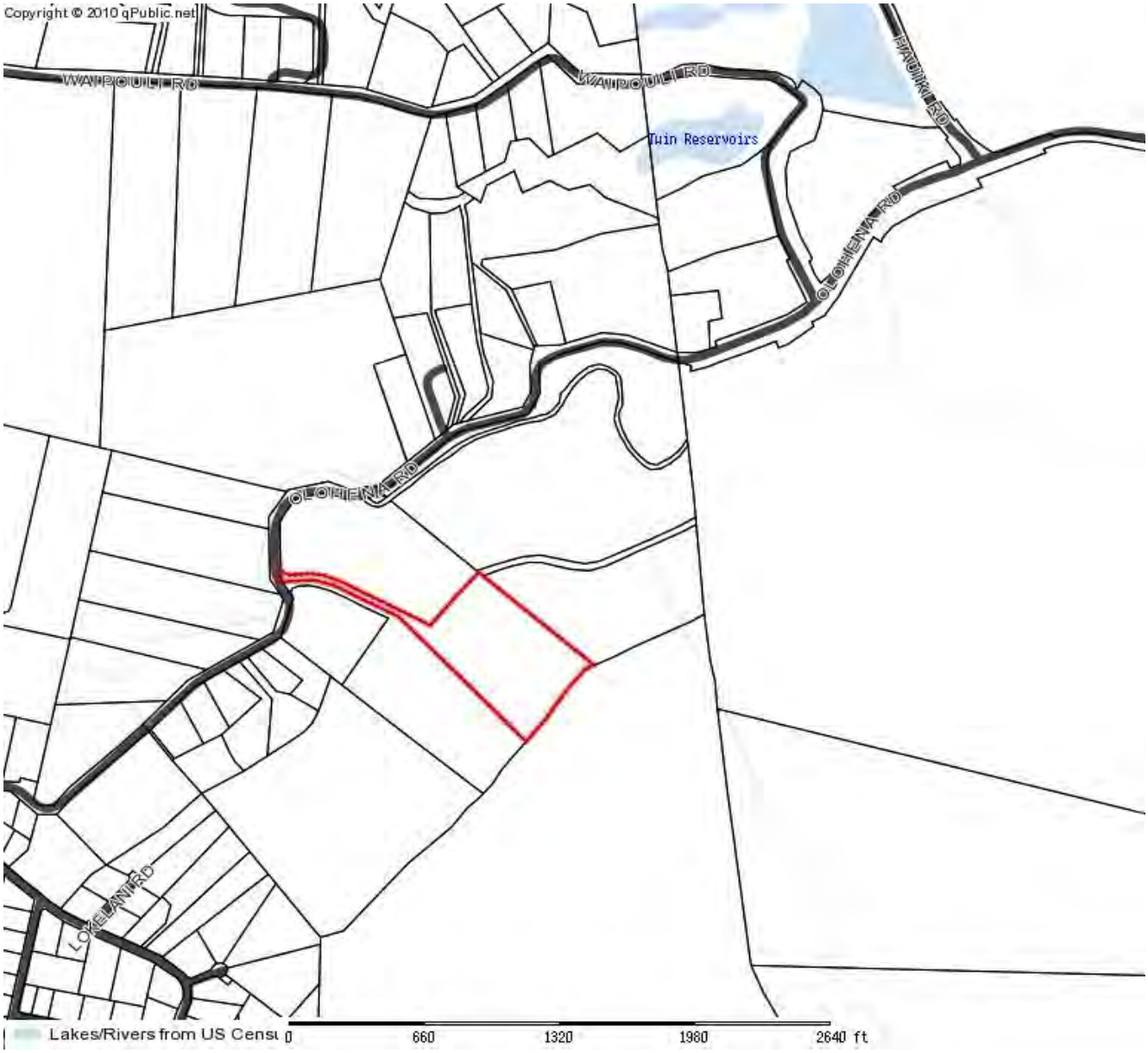
Exhibit F-3: TMK (4)-42-004-001



Kauai County Assessor			
Parcel: 420040010000 Acres: 722.33			
Name:	STATE OF HAWAII	Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:	,	Just Value	
		Assessed Value	0
		Exempt Value	0
		Taxable Value	0

Date printed: 03/01/15 : 18:28:26

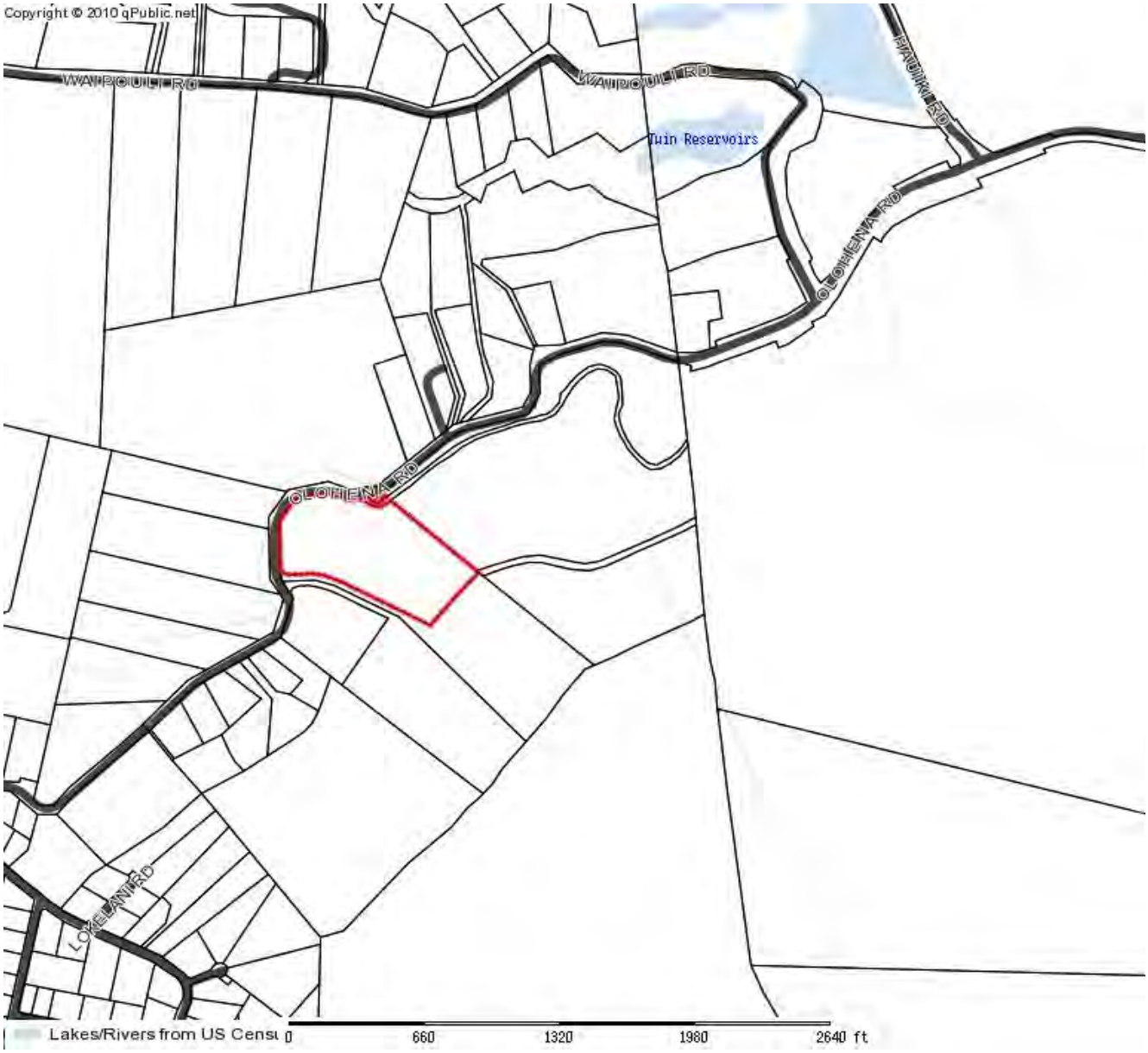
Exhibit F-4: TMK (4)44-006-018



Kauai County Assessor			
Parcel: 440060180000 Acres: 7.72			
Name:	KUTAKA,MEILYN M	Land Value	
Site:	OLOHENA RD	Building Value	
Sale:		Misc Value	
Mail:	7025 KAMILO ST HONOLULU, HI 96825	Just Value	
		Assessed Value	0
		Exempt Value	0
		Taxable Value	0

Date printed: 03/01/15 : 18:26:49

Exhibit F-5: TMK (4)44-006-017



Kauai County Assessor			
Parcel: 440060170000 Acres: 7.628			
Name:	KUTAKA,CLAUDE K TRUST	Land Value	
Site:	5817 OLOHENA RD	Building Value	
Sale:		Misc Value	
Mail:	45 896 LUANA PL KANEOHE, HI 96744	Just Value	
		Assessed Value	0
		Exempt Value	0
		Taxable Value	0