JAMES "KIMO" APANA
Mayor

DAVID C. GOODE
Director

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

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

TRACY TAKAMINE, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

JOHN HARDER
Solid Waste Division

BRIAN HASHIRO, P.E.
Highways Division

October 24, 2002

Genevieve Salmonson, Director
Office of Environmental Quality Control
Department of Health
235 S. Beretania Street #702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

SUBJECT: LOWER HONOAPIILANI ROAD IMPROVEMENTS, STP 3080(8)
(HOOHUI ROAD TO NAPILIHAU STREET)

In accordance with the provisions of Chapter 343, Hawaii Revised Statutes, Title 11, Chapter 200 of the Administrative Rules of the State Department of Health, and the National Environmental Policy Act of 1989, a Final Environmental Assessment (EA) has been prepared for the proposed project.

As the approving agency, the County of Maui, Department of Public Works and Waste Management believes that there will be no significant impact as a result of the proposed action and is filing a Finding of No Significant Impact (FONSI).

Enclosed are one (1) copy of the OEQC Publication form and four (4) copies of the Final EA. In addition, please be advised that the Project Summary will be e-mailed to you under separate cover. We respectfully request that notice of the availability of the Final EA be published in the next edition of the Environmental Notice.

Very truly yours,

for DAVID GOODE
Director

DG:tn
cc: Joe Krueger, Department of Public Works and Waste Management
Kent Morimoto, Austin, Tsutsumi & Associates, Inc.
Glenn Tadaki, Munekiyo & Hiraga, Inc.
sta/hpllroad/oeqcltr.003

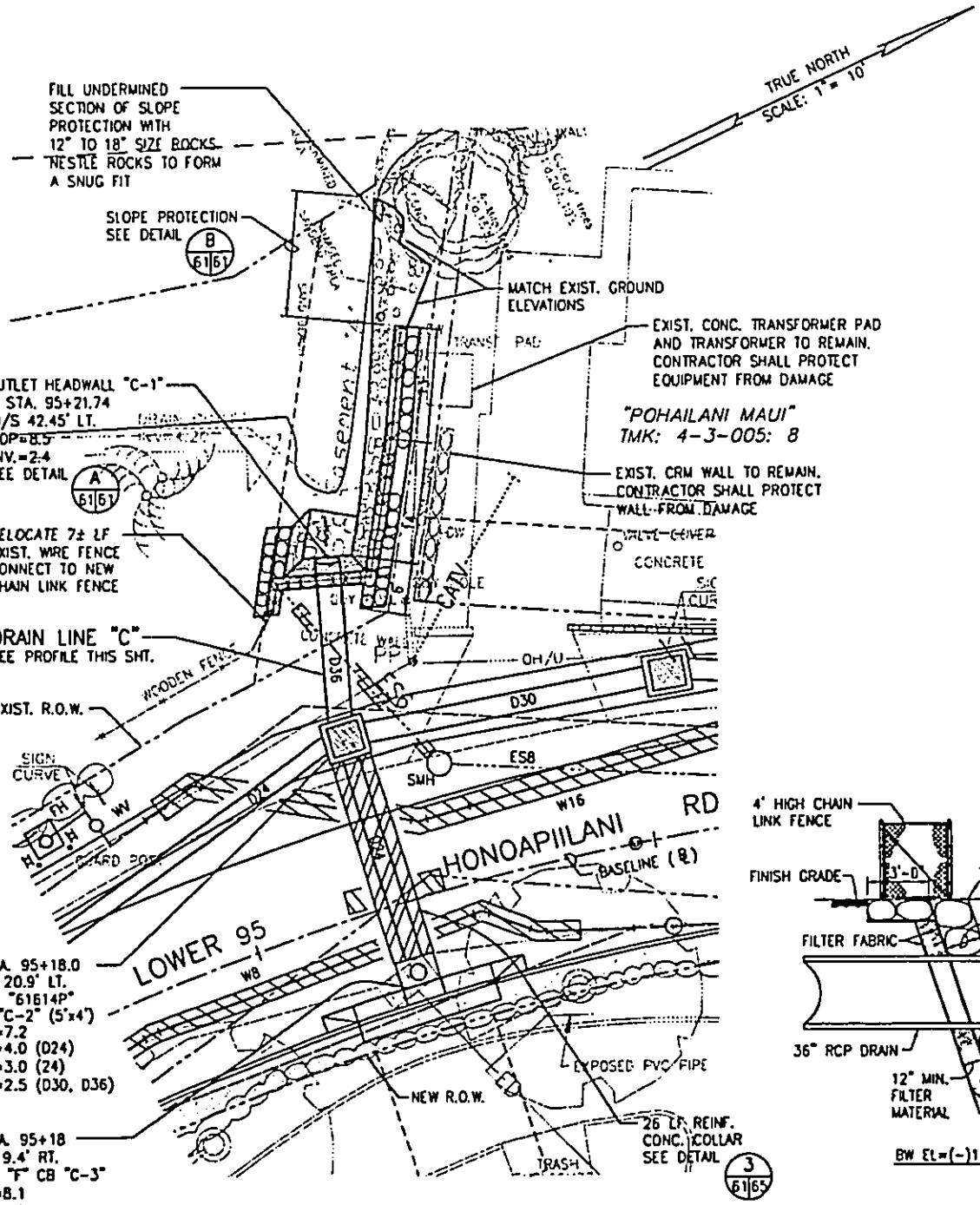
108

Appendix A-1 to A-5

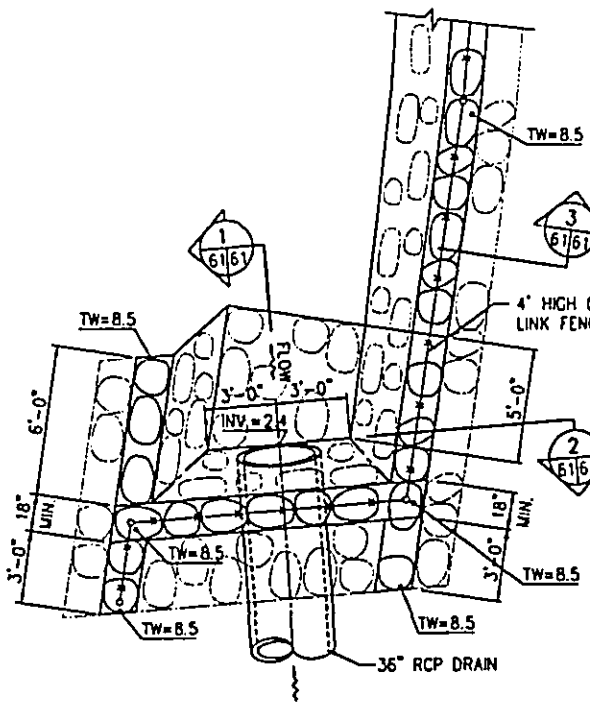
Plans for Drainage Outlet and Bridge Improvements

Appendix A-1

Plans for Repair of Existing 36-Inch Outlet (Drainage Outlet No. 1)

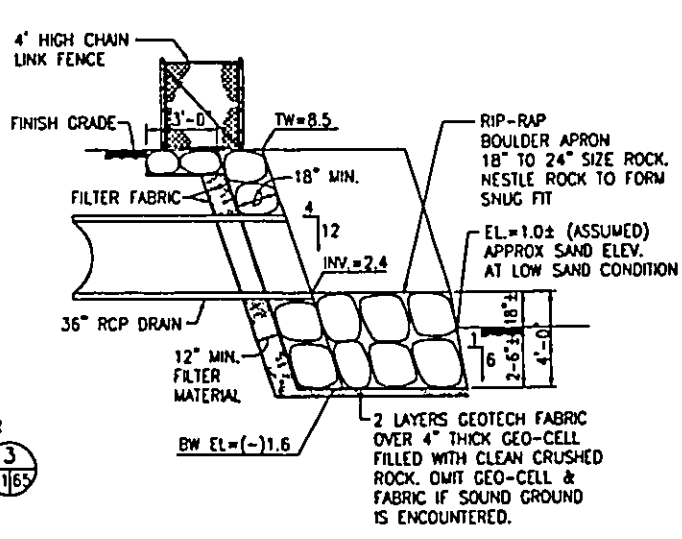


PLAN – DRAIN LINE "C"
SCALE: 1"=10'

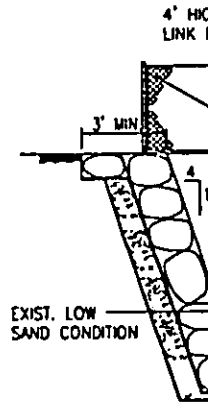


PLAN

OUTLET HEADWALL "C-1" DETAIL
SCALE: 1/4"=1'-0"

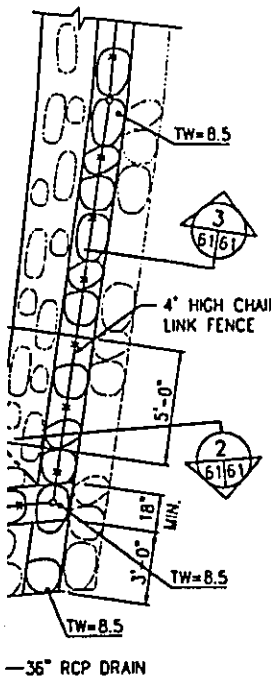


SECTION 1 61|61
SCALE: 1/4"=1'-0"



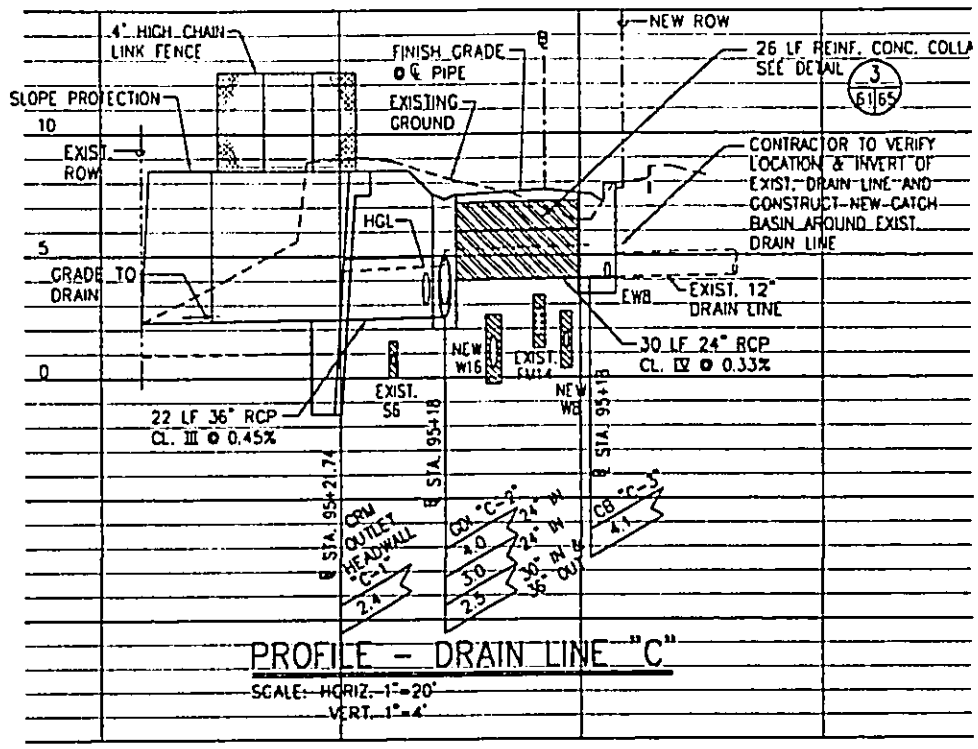
SEC
SCALE

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO
HAWAII	HAW.	STP-3080(8)	2001	61



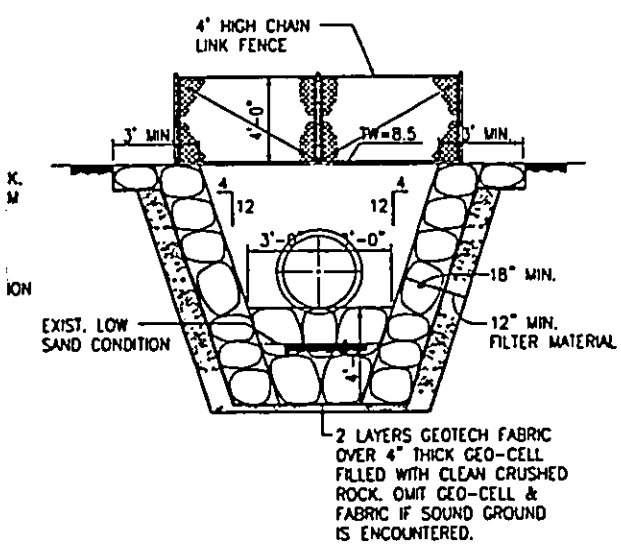
—36" RCP DRAIN

"C-1" DETAIL A 61 61

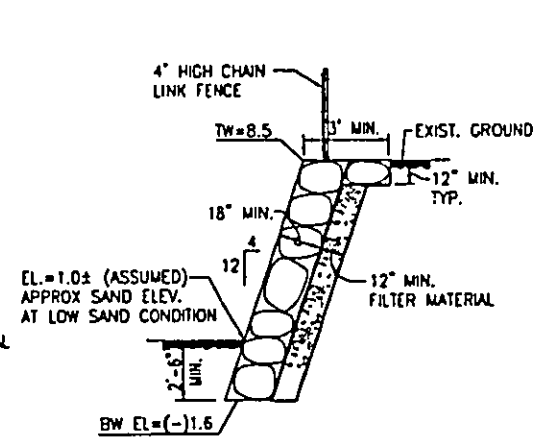


PROFILE – DRAIN LINE "C"

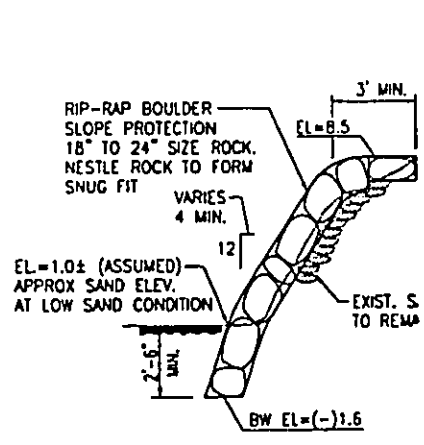
SCALE: HORIZ.–1"=20'
VERT.–1"=4'



SECTION 2
SCALE: 1/4"=1'-0" 61 61



SECTION 3
SCALE: 1/4"=1'-0" 61 61



SLOPE PROTECTION DETAIL
SCALE: 1/4"=1'-0"

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

REVISION	DATE	BRIEF	INITIAL

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

DRAINAGE DETAILS

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE – 4

FED. AID PROJECT No. STP-

DESIGNED BY	DRAWN BY	CHECKED BY

APPROVED

SUBMITTED BY

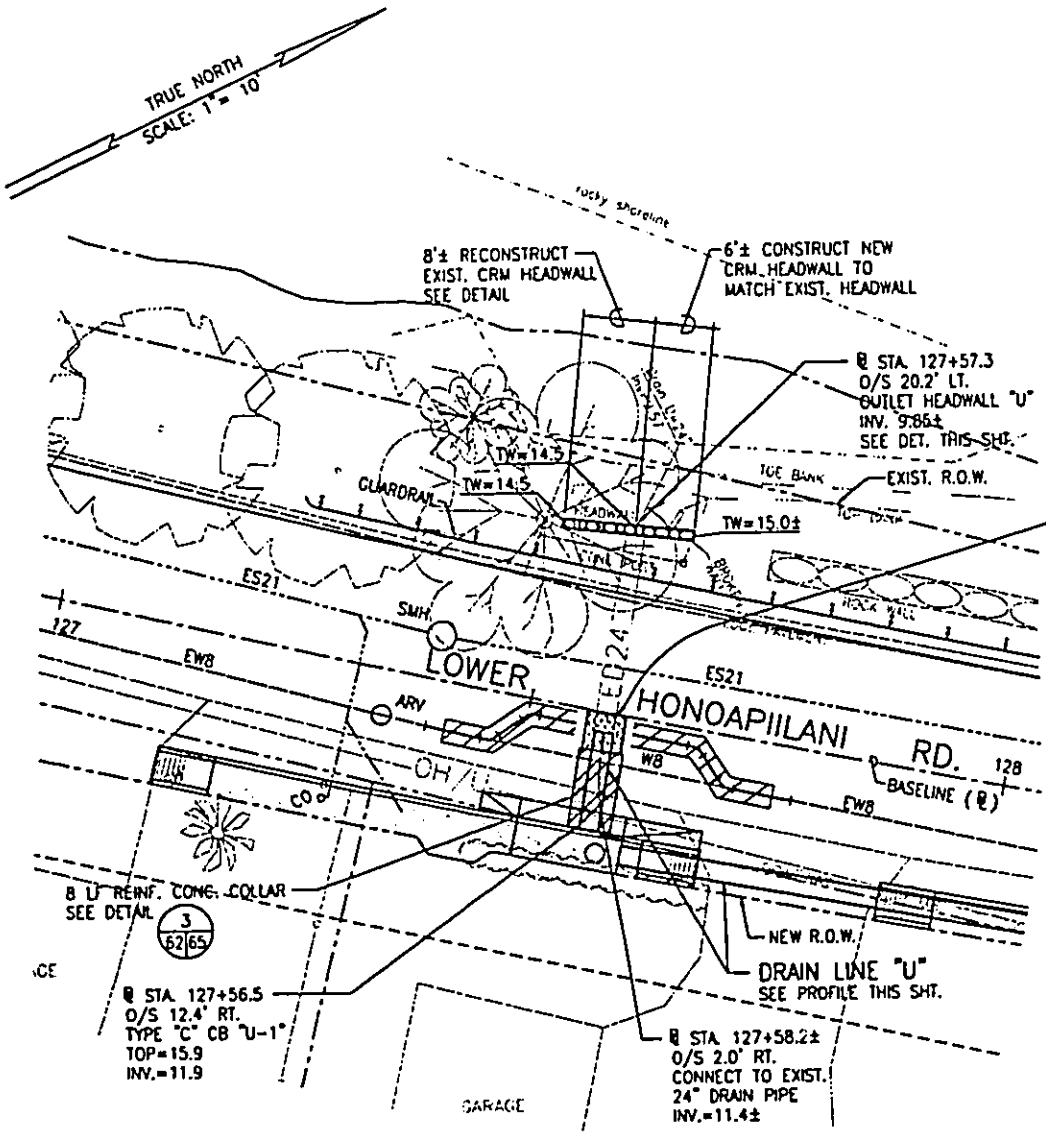
DATE

FILE NUMBER

PRINTED BY ATA
DATE JUN 22 2001

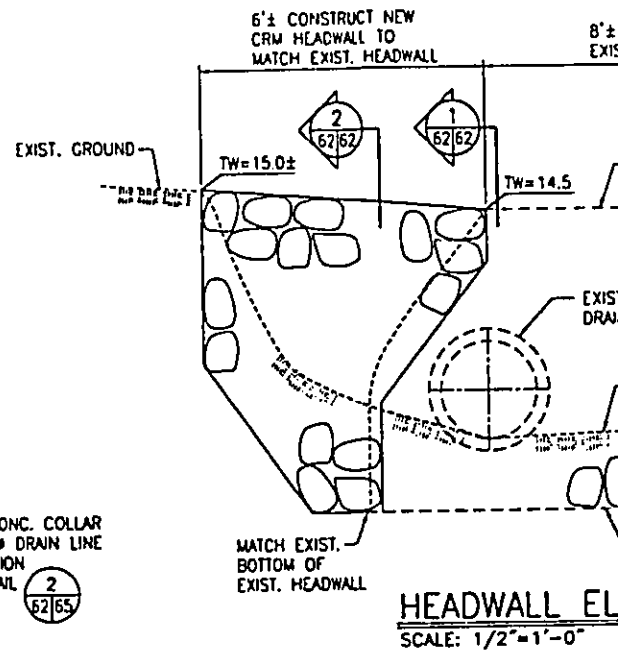
Appendix A-2

Plans for Repair of Existing 24-Inch Outlet (Drainage Outlet No. 3)

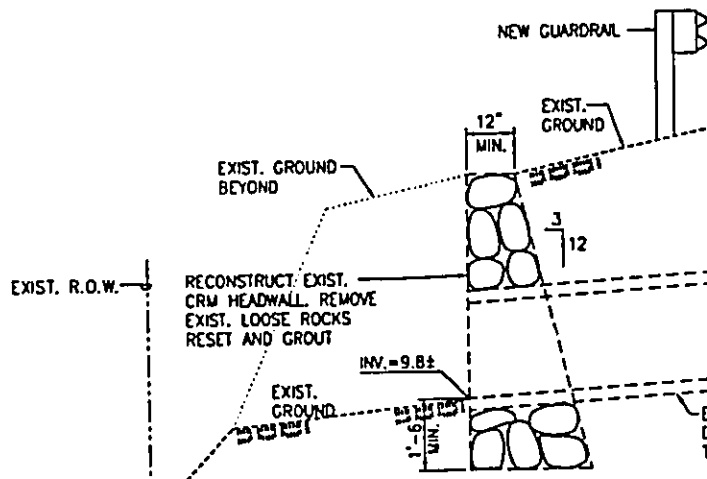


PLAN

OUTLET HEADWALL "U" A 62|62
SCALE: 1"=10'

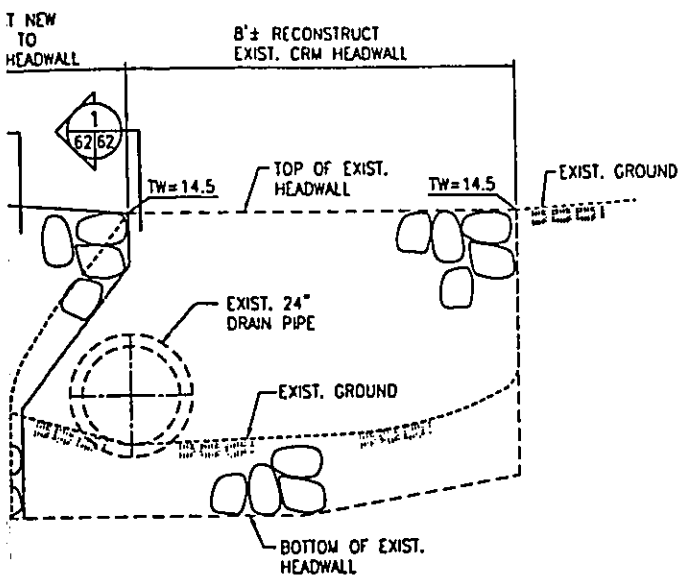


HEADWALL EL
SCALE: 1/2"=1'-0"



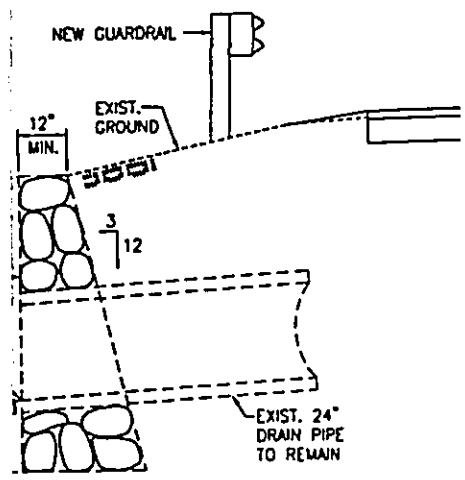
SECTION 1 62|62
SCALE: 1/2"=1'-0"

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO
HAWAII	HAW.	STP-3080(8)	2001	62

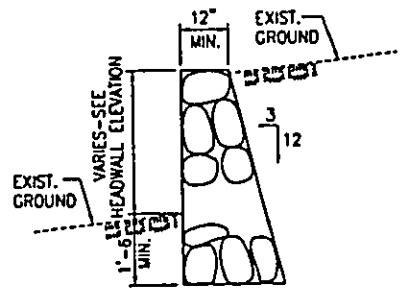


HEADWALL ELEVATION

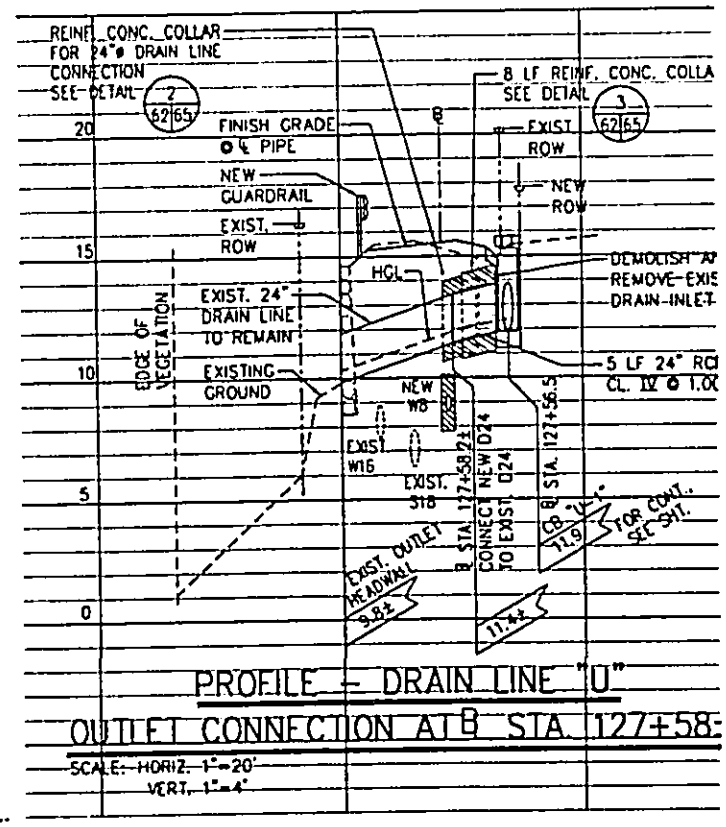
SCALE: 1/2"=1'-0"



ION 1
1/2"=1'-0" 62 62



SECTION 2
SCALE: 1/2"=1'-0" 62 62



PROFILE – DRAIN LINE "U"

OUTLET CONNECTION AT ℄ STA. 127+58±

SCALE: HORIZ. 1"=20'
VERT. 1"=4'

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KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 8974-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

REVISION	DATE	SHEET	SHEETS

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

DRAINAGE DETAILS

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE – 4

FED. AID PROJECT No. STP-

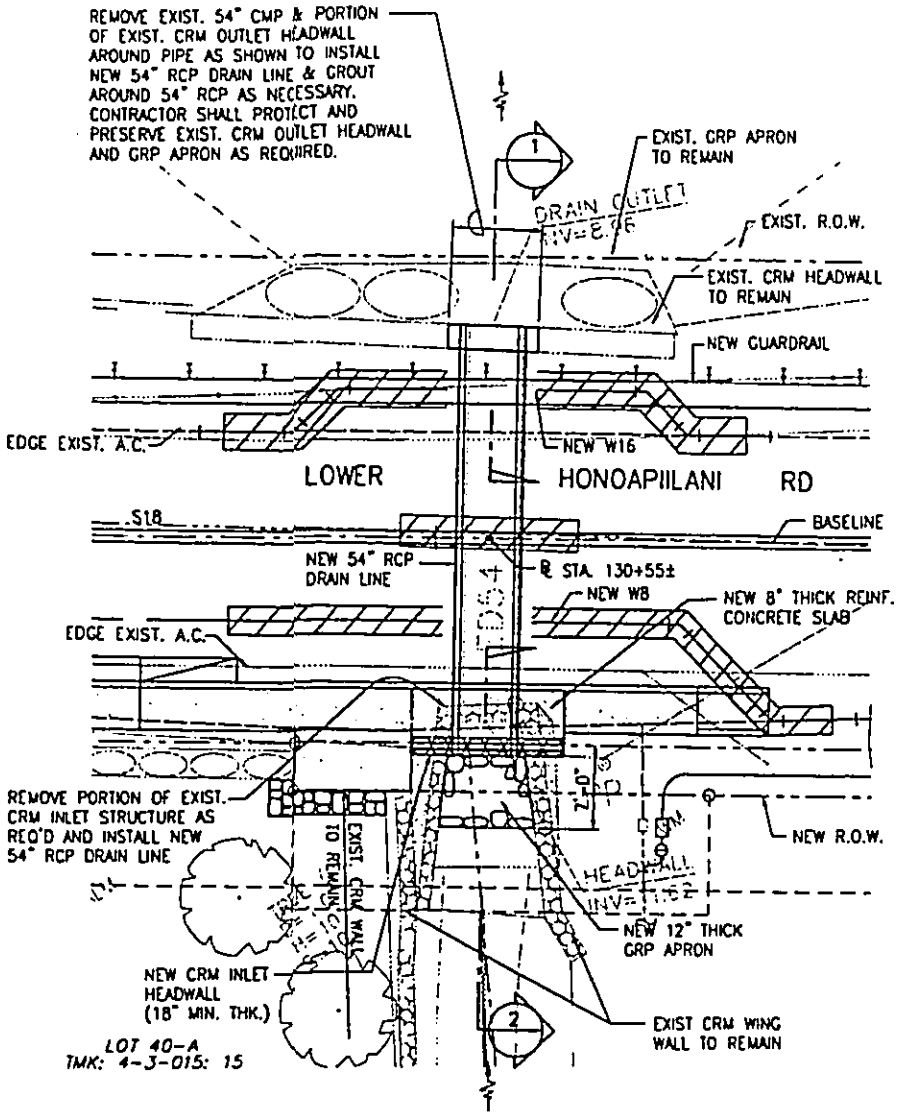
DESIGNED BY	DRAWN BY	CHECKED BY

APPROVED DATE

SUBMITTED BY FOR MANAGER

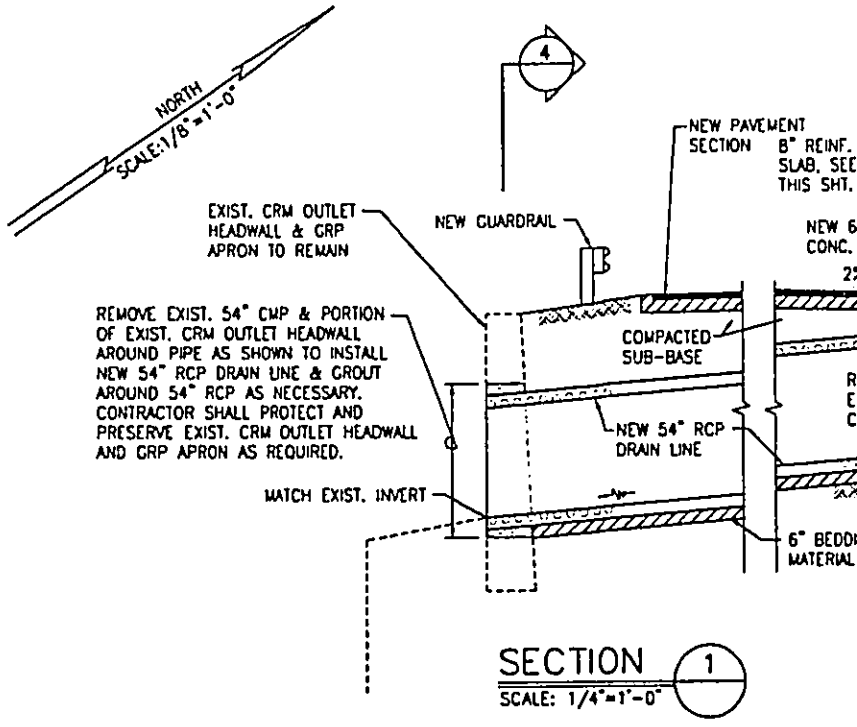
Appendix A-3

Plans for Repair of Existing 54-Inch Outlet (Drainage Outlet No. 4)



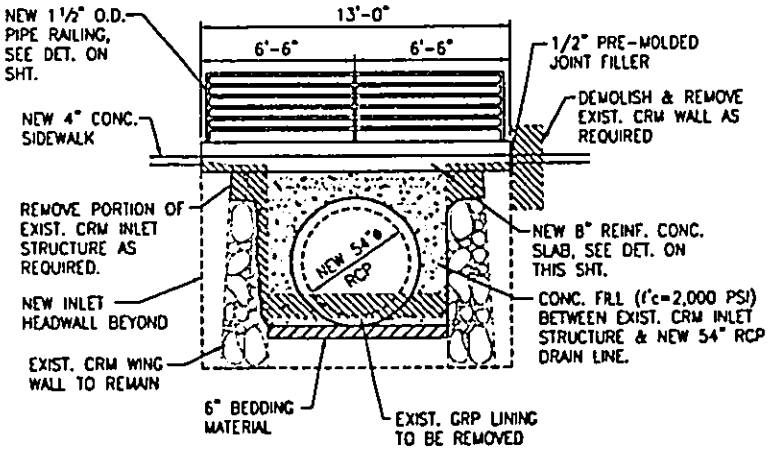
PLAN – DRAIN LINE @ ℄ STA. 130+55±

SCALE: 1/8"=1'-0"



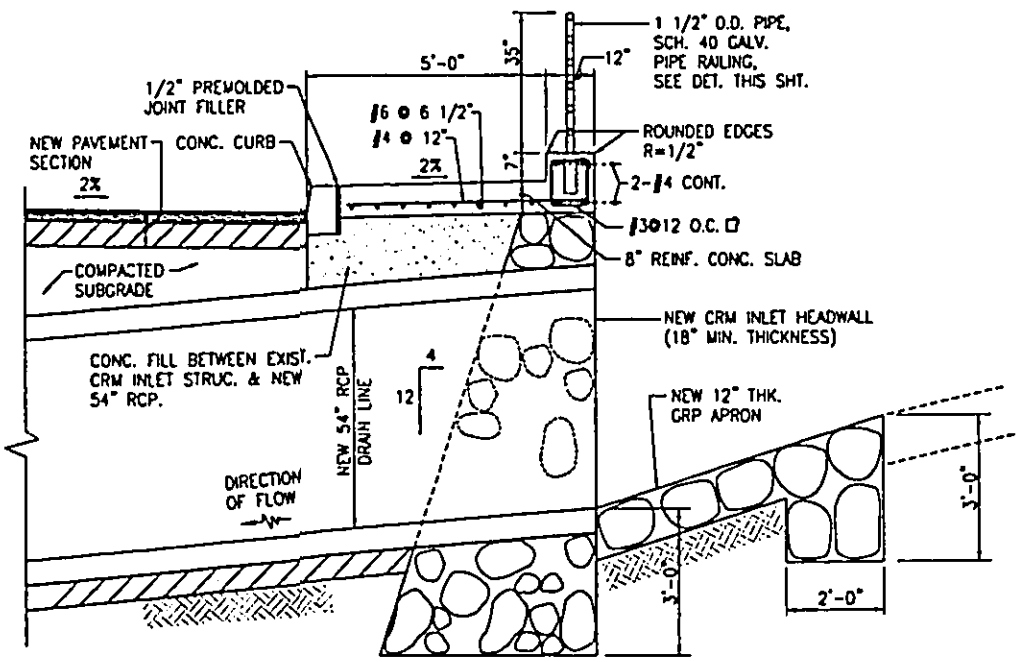
SECTION 1

SCALE: 1/4"=1'-0"



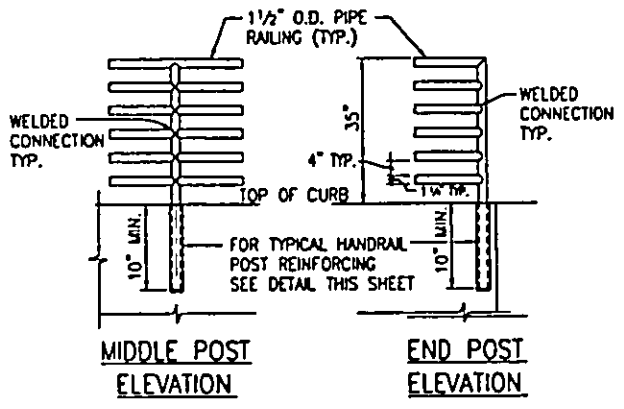
SECTION 3

SCALE: 1/4"=1'-0"



8" AND 10" REINF. CONCRETE SLAB DETAIL

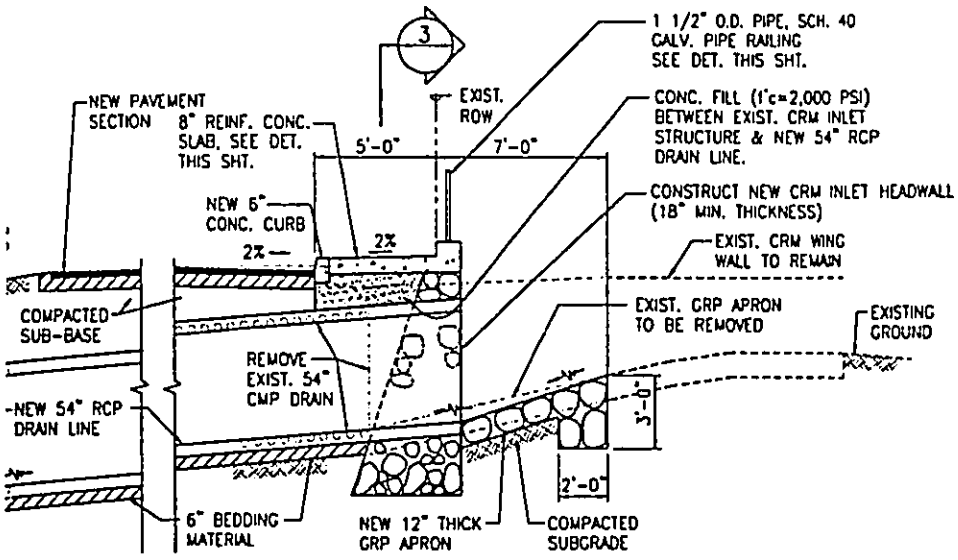
SCALE: 1/2"=1'-0"



POST DETAIL

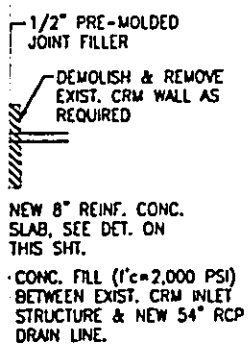
NOT TO SCALE

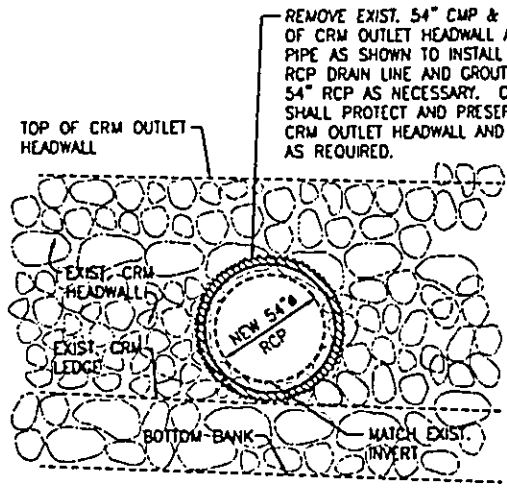
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO
HAWAII	HAW.	STP-3080(8)	2001	63

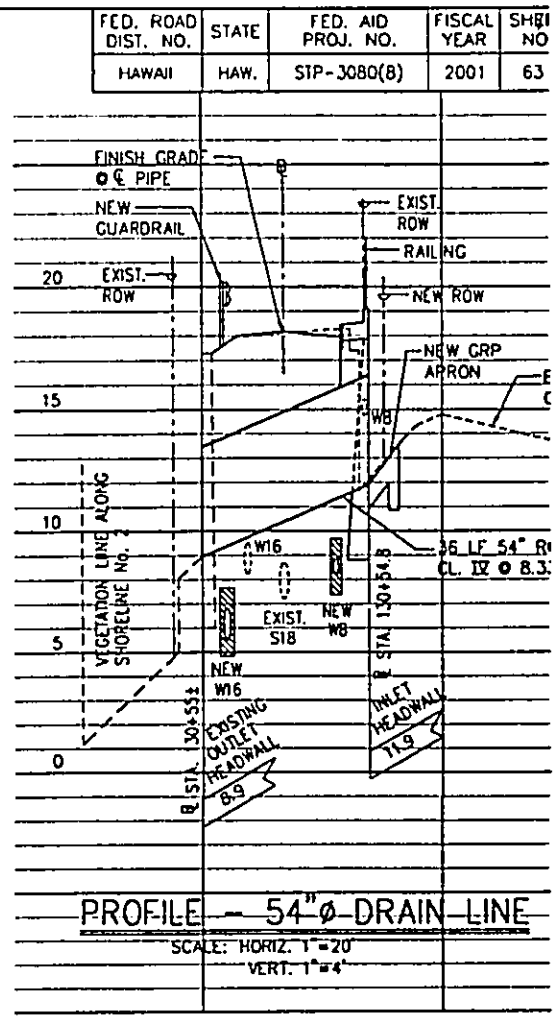


ON 1
=1'-0"

SECTION 2
SCALE: 1/4"=1'-0"







PROFILE – 54"ø DRAIN LINE
SCALE: HORIZ. 1"=20'
VERT. 1"=4'

SECTION 4
SCALE: 1/4"=1'-0"

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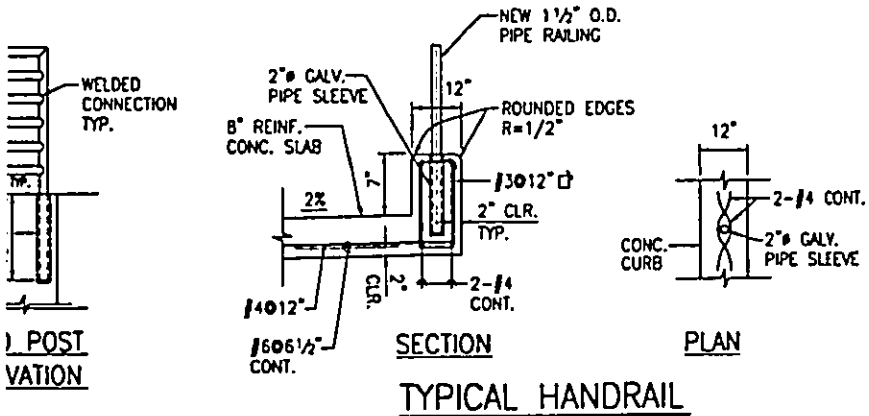


TYPICAL HANDRAIL POST REINFORCING
NOT TO SCALE

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

DRAIN LINE DETAILS

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE – 4

FED. AID PROJECT No. STP-3080(8)

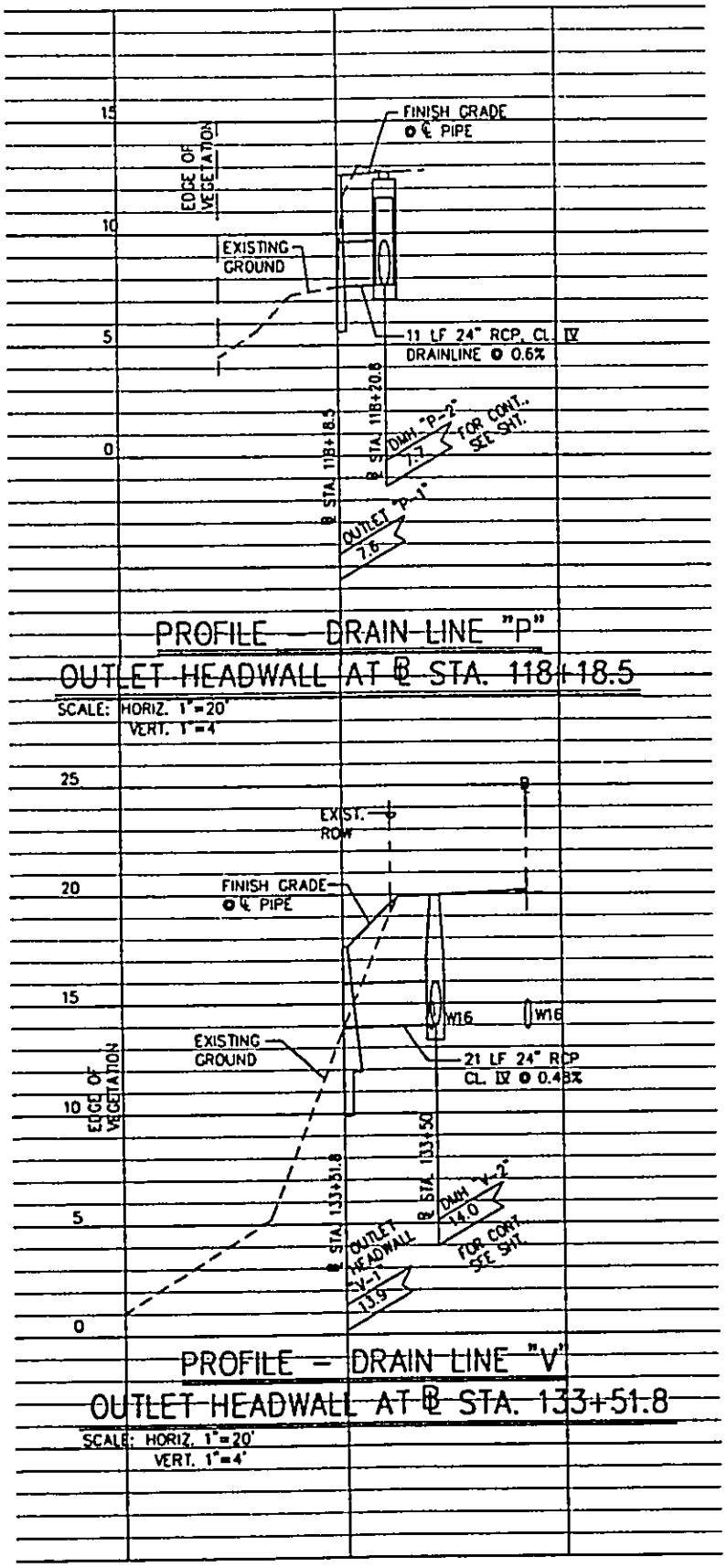
DESIGNED BY KT | DRAWN BY AO | CHECKED BY

APPROVED | SUBMITTED BY

DATE | FOR ENGINEER

Appendix A-4

Plans for Construction of New 30-Inch Outlet and 24-Inch Outlets (Drainage Outlet Nos. 2 and 5)



PROFILE — DRAIN LINE "P"

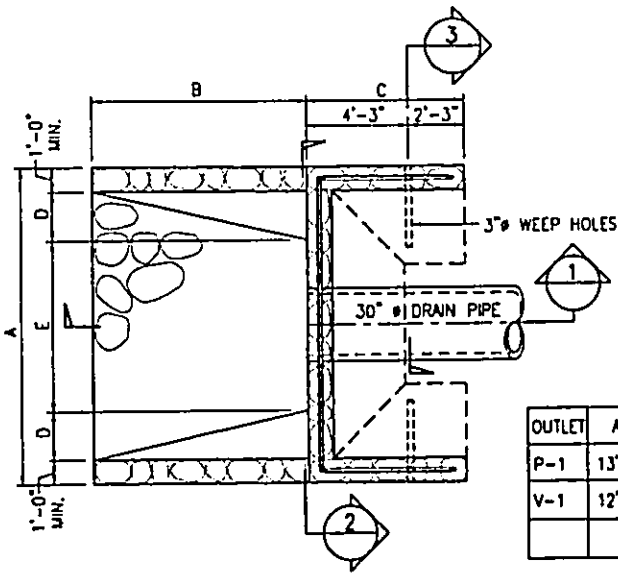
OUTLET HEADWALL AT ℄ STA. 118+18.5

SCALE: HORIZ. 1"=20'
VERT. 1"=4'

PROFILE — DRAIN LINE "V"

OUTLET HEADWALL AT ℄ STA. 133+51.8

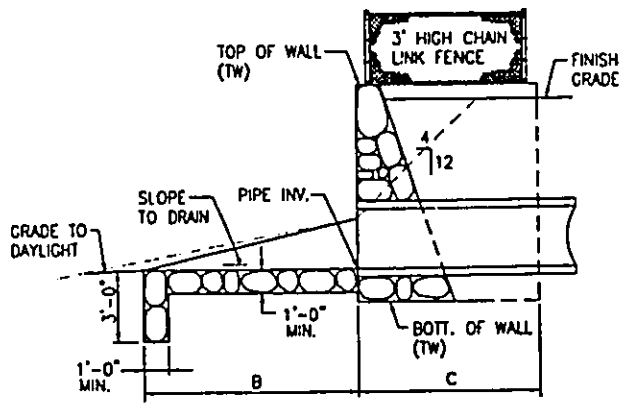
SCALE: HORIZ. 1"=20'
VERT. 1"=4'



OUTLET	A	B	C	D	E
P-1	13'-0"	9'-0"	6'-6"	3'-0"	7'-0"
V-1	12'-0"	5'-0"	7'-6"	3'-9"	4'-6"

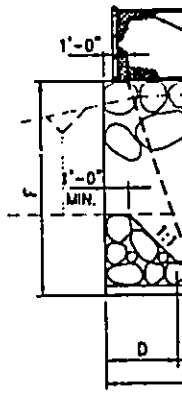
PLAN — CRM OUTLET "P-1" WITH GRP APRON (A)

SCALE: 1/4"=1'-0"



SECTION (1)

SCALE: 1/4"=1'-0"

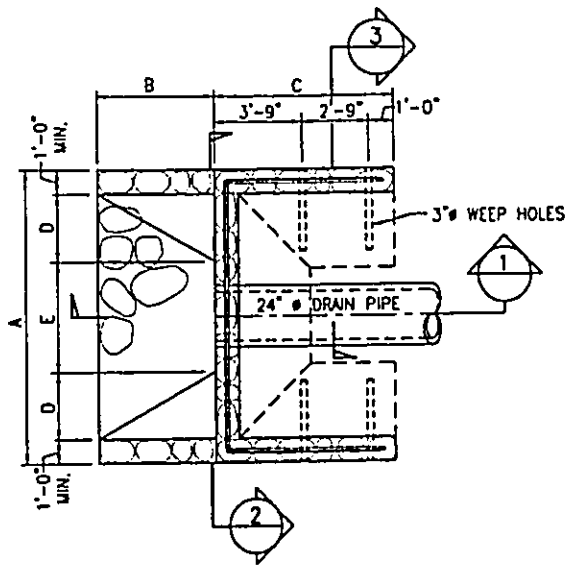


SEC

SCALE

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO
HAWAII	HAW.	STP-3080(8)	2001	64

	B	C	D	E	F	PIPE INVERT	TW	BW
-0	9'-0"	6'-6"	3'-0"	7'-0"	9'-0"	5.9	13.5	4.5
-0	5'-0"	7'-6"	3'-9"	4'-6"	8'-0"	13.9	20.5	12.5

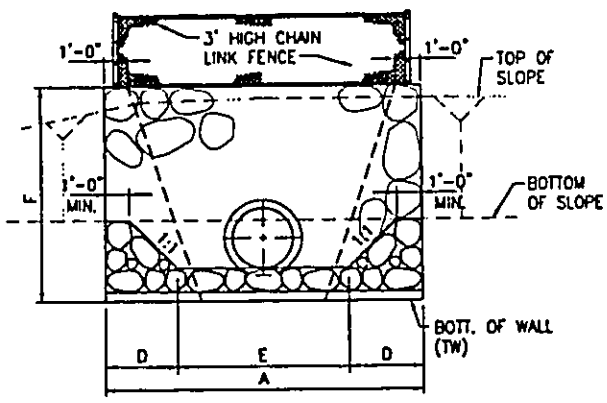


A

PLAN-CRM OUTLET "V-1" WITH GRP APRON

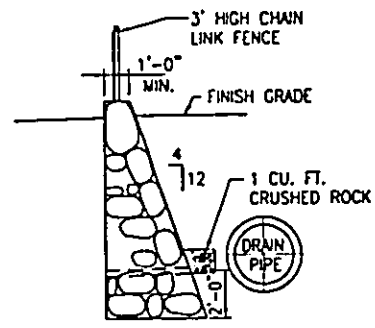
B

SCALE: 1/4"=1'-0"



SECTION 2

SCALE: 1/4"=1'-0"



SECTION 3

SCALE: 1/4"=1'-0"

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DATE JUN 22 2001

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6874-C
HAWAII, U.S.A.

REVISION	DATE	SHEET	NO.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

DRAIN LINE DETAILS

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY KT | DRAWN BY AO | CHECKED BY

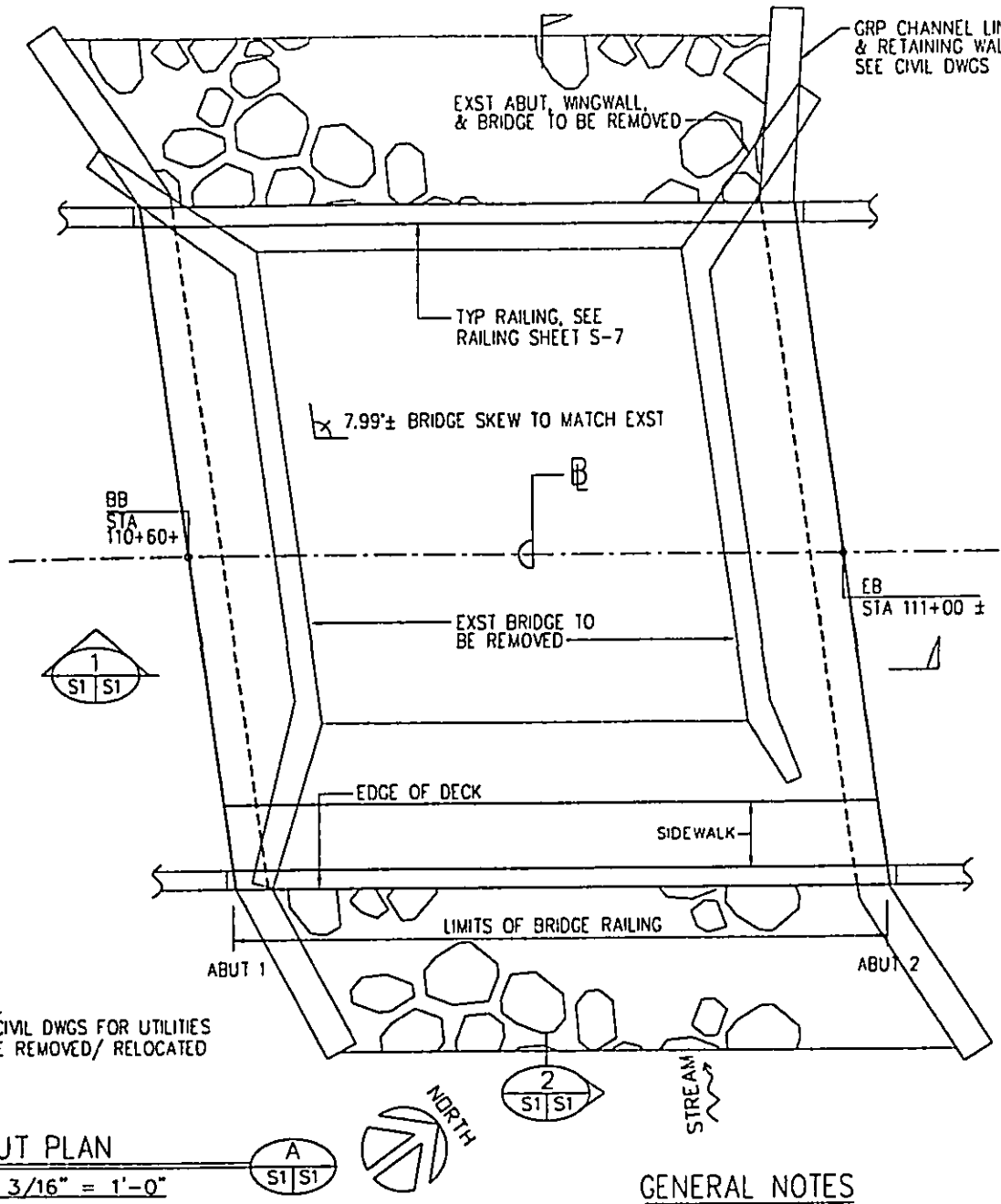
APPROVED

SUBMITTED BY

DATE FIRM NAME

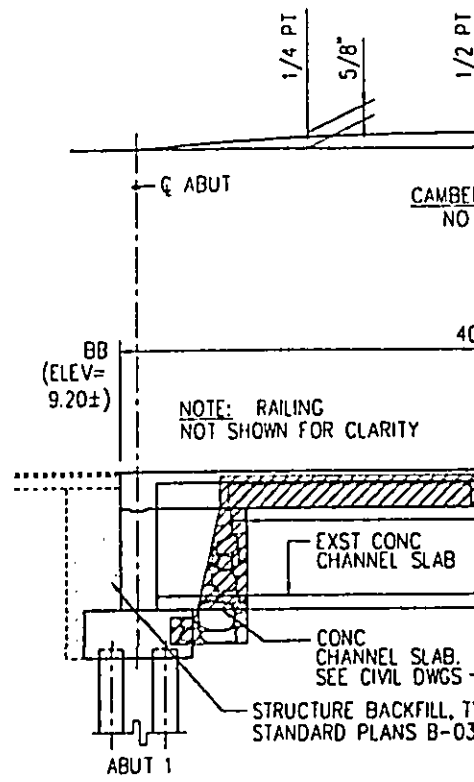
Appendix A-5

Plans for Reconstruction of Kahananui Bridge



LAYOUT PLAN (A S1 S1)

SCALE 3/16" = 1'-0"



LONGITUDINAL SECTION

SCALE 3/16" = 1'-0"

GENERAL NOTES

DESIGN SPECIFICATIONS (AASHTO):

LRFD BRIDGE DESIGN SPECIFICATIONS (2ND EDITION)
WITH SUBSEQUENT INTERIM SPECIFICATIONS.

DESIGN LOADS:

LIVE LOAD: HL-93
ACCELERATION COEFFICIENT: 0.25

MATERIALS:

1. STRUCTURAL CONCRETE: (SEE DET 2 S1 S5)
   A.

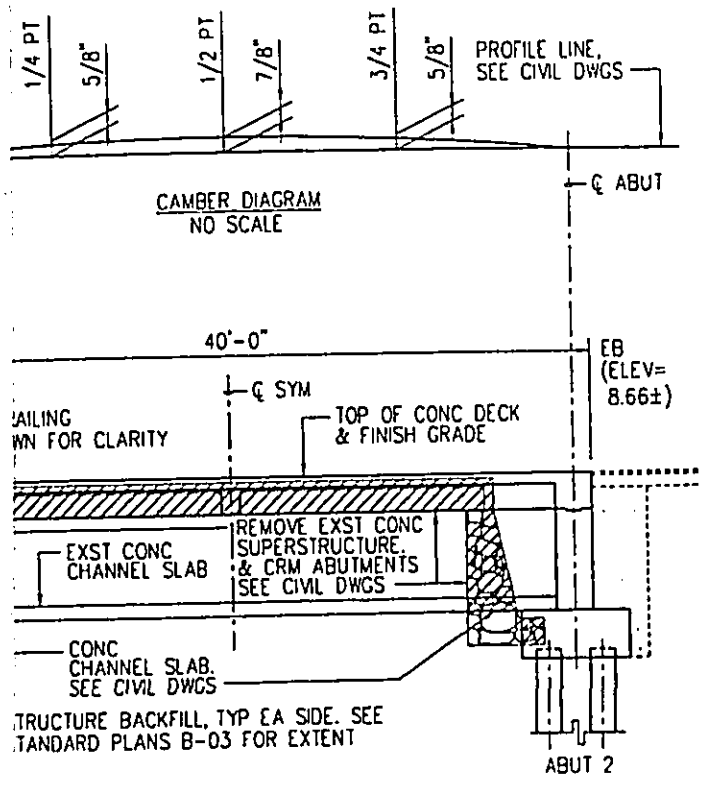
USE	F'C (28 DAYS)	MAX WATER: CEMENT RATIO	MAX AGGREGATE SIZE:
DECK SLAB, GIRDERS, ABUTMENTS, DIAPHRAGMS, PILE CAPS & RAILINGS	4000 PSI	0.40	3/4"

   B. ALL PREMOLDED JOINT FILLER MATERIAL INCIDENTAL TO CONCRETE AND WILL NOT BE PAID FOR SEPARATELY.
   C. PROVIDE CORROSION INHIBITOR ADMIXTURE TO ALL CONCRETE (30% CALCIUM NITRITE SOLUTION @ 4 GALLONS/CY MIN). SEE STANDARD SPECIFICATIONS FOR ADDITIONAL ADMIXTURE REQUIREMENTS IN CONCRETE.
2. REINFORCING STEEL:
   UNLESS NOTED OTHERWISE, ASTM A615, GRADE 60.

CONSTRUCTION REQUIREMENTS:

1. EXCEPT AS OTHERWISE NOTED ON PLANS, CONSTRUCTION SHALL CONFORM TO THE LATEST EDITION OF HAWAII STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND PUBLIC WORKS CONSTRUCTION (STANDARD SPECIFICATIONS) AND SPECIAL PROVISIONS.
2. TOP OF CONCRETE DECK OF SUPERSTRUCTURE SHALL BE CONSTRUCTED TO FOLLOW THE FINISH ROADWAY VERTICAL AND HORIZONTAL CURVES AND GRADES.
3. FOR CONCRETE FINISH, SEE STANDARD SPECIFICATIONS.
4. CAST-IN-PLACE CONCRETE DECK AND GIRDERS TO BE POURED MONOLITHICALLY.
5. FILL OR BACKFILL BEHIND ABUTMENTS SHALL NOT BE PLACED UNTIL CONCRETE SUPERSTRUCTURE HAS ATTAINED A COMPRESSION STRENGTH OF 3,000 PSI. THE BACKFILL AT EACH ABUTMENT SHALL BE PLACED SIMULTANEOUSLY AND UNIFORMLY TO AVOID UNEQUAL LATERAL EARTH PRESSURE.
6. UNLESS NOTED OTHERWISE, CHAMFER ALL EXPOSED CONCRETE EDGES 3/4".
7. FOR STEEL REINFORCING, STAGGER ALL SPLICES WHERE POSSIBLE
8. STEEL REINFORCING SHALL BE DETAILED, SUPPORTED AND PLATED AS PER THE ACI DETAILING MANUAL, 1994

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO
HAWAII	HAW.	STP-3080(8)	2001	



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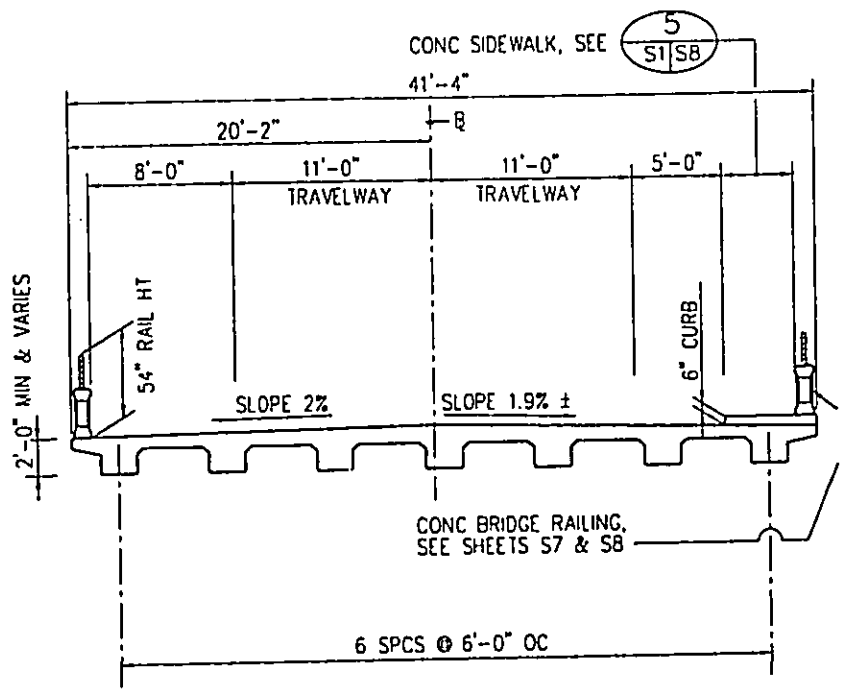

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REFERENCE:

1. REFER TO STATE OF HAWAII, D.O.T. STANDARD PLANS FOR ADDITIONAL DETAILS NOT COVERED BY DRAWINGS.
2. STANDARD PLANS DRAWING SHT. NOS. B-01, B-03, B-12, & B-13 INCLUSIVE REFERS TO STRUCTURE IN GENERAL EXCEPT FOR MODIFICATIONS AS MAY BE REQUIRED BY SPECIAL CONDITIONS.

GENERAL:

1. ALL ITEMS NOTED INCIDENTAL SHALL NOT BE PAID FOR SEPARATELY.
2. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL EXISTING UTILITY LINES AND NOTIFY THEIR RESPECTIVE OWNERS BEFORE COMMENCING WITH WORK.
3. VERIFY ALL EXISTING DIMENSIONS & CONDITIONS PRIOR TO COMMENCING WORK AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

PRINTED BY ATA
DATE JUN 22 2001

GRAPHIC SCALE
0' 2' 4' 8' 12' 16'
SCALE: 3/16" = 1'-0"

ENGINEERING DESIGN GROUP, INC
CONSULTING ENGINEERS
1525 Young Street
Honolulu, Hawaii 96822
Phone (808) 942-4400

GARRICK H. KOGA
LICENSED PROFESSIONAL ENGINEER
No. 7957-S
HAWAII, U.S.A.

This work was prepared by me or under my supervision.

REVISION	DATE	BY	SHEET

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

LAYOUT PLAN & GENERAL NOTES

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP- 3080(8)

DESIGNED BY BK	DRAWN BY MO	CHECKED BY

APPROVED

SUBMITTED BY

DATE

FOR ENGINEER

Appendix B

Archaeological Inventory Survey

Archaeological Inventory Survey of The Lower Honoapi`ilani Road Improvements Project Corridor (TMK 4-3-03; 4-3-05; 4-3-10; 4-3-15) Lahaina District, Maui Island

Prepared for:

County of Maui
Department of Public Works
and Waste Management

Prepared by:

Xamanek Researches
Pukalani, Hawaii

Erik M. Fredericksen
Demaris L. Fredericksen

December 5, 1999
(Revised February 26, 2000)

ABSTRACT

Xamanek Researches conducted an archaeological inventory survey for the proposed Lower Honoapi'ilani Road improvements project on West Maui in early 1999. Our survey of this c. 1.4-mile long corridor located 3 previously unrecorded archaeological sites. These historic properties were assigned SIHP No. 50-50-03-4797, 4798 and 4799. The sites include a precontact habitation area (Site 4797), a road retaining wall and shoulder barrier wall (Site 4798), and a second retaining wall (Site 4799). The 2 latter sites are associated with the old Lower Honoapi'ilani Road and are post-contact resources.

All 3 sites qualify for significance under Criterion "D" of State and Federal historic preservation guidelines. Site 4797 yielded a precontact date of AD 1420 to 1660. This site is a rare example of a surviving precontact habitation area on this part of the developed West Maui coastline. It appears probable that this precontact site extends under the existing road. Therefore, archaeological monitoring is recommended for all earth moving activities that take place in the vicinity of Site 4797. In contrast, Sites 4798 and 4799 are no longer considered to be significant for their information content. Consequently, no further work is recommended for these 2 sites.

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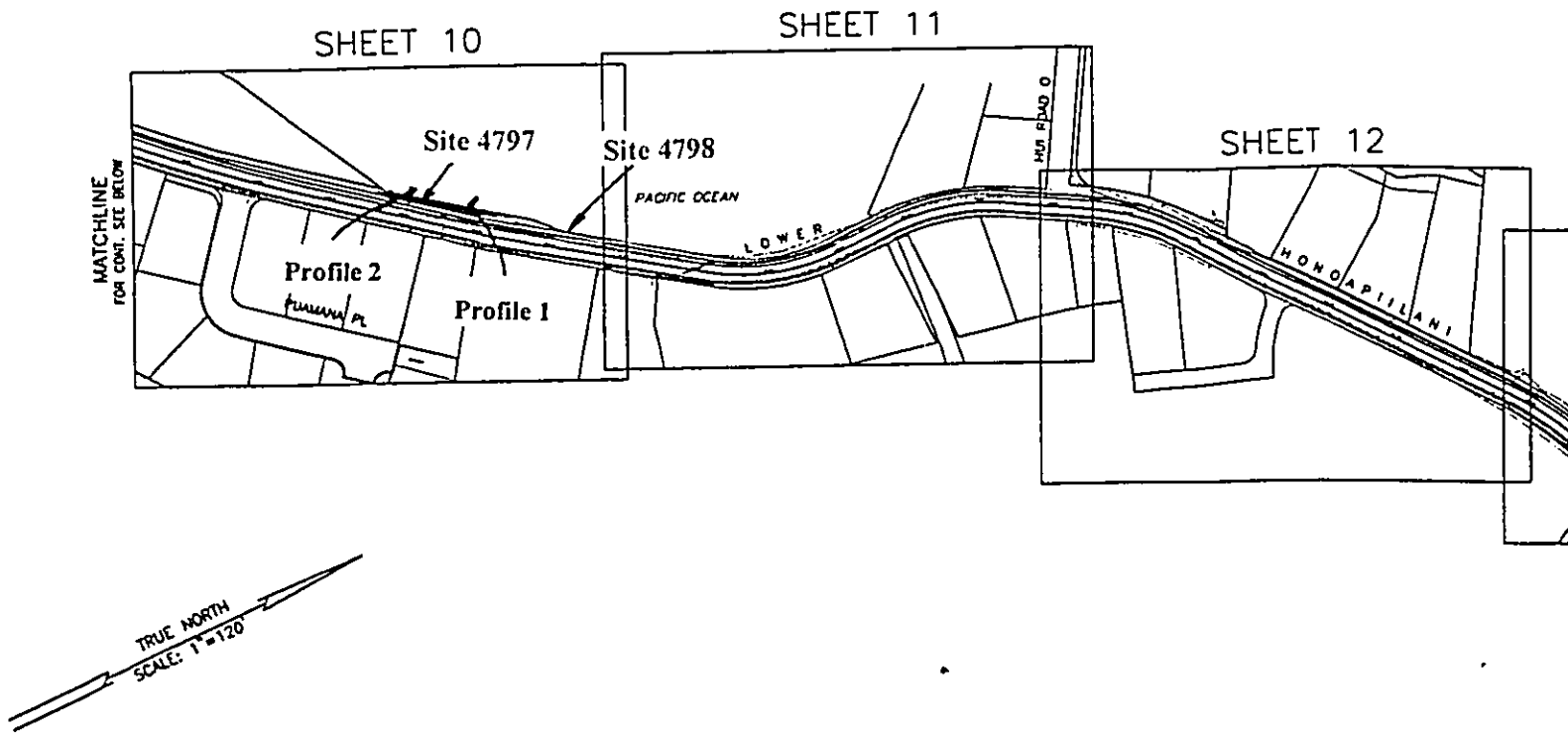
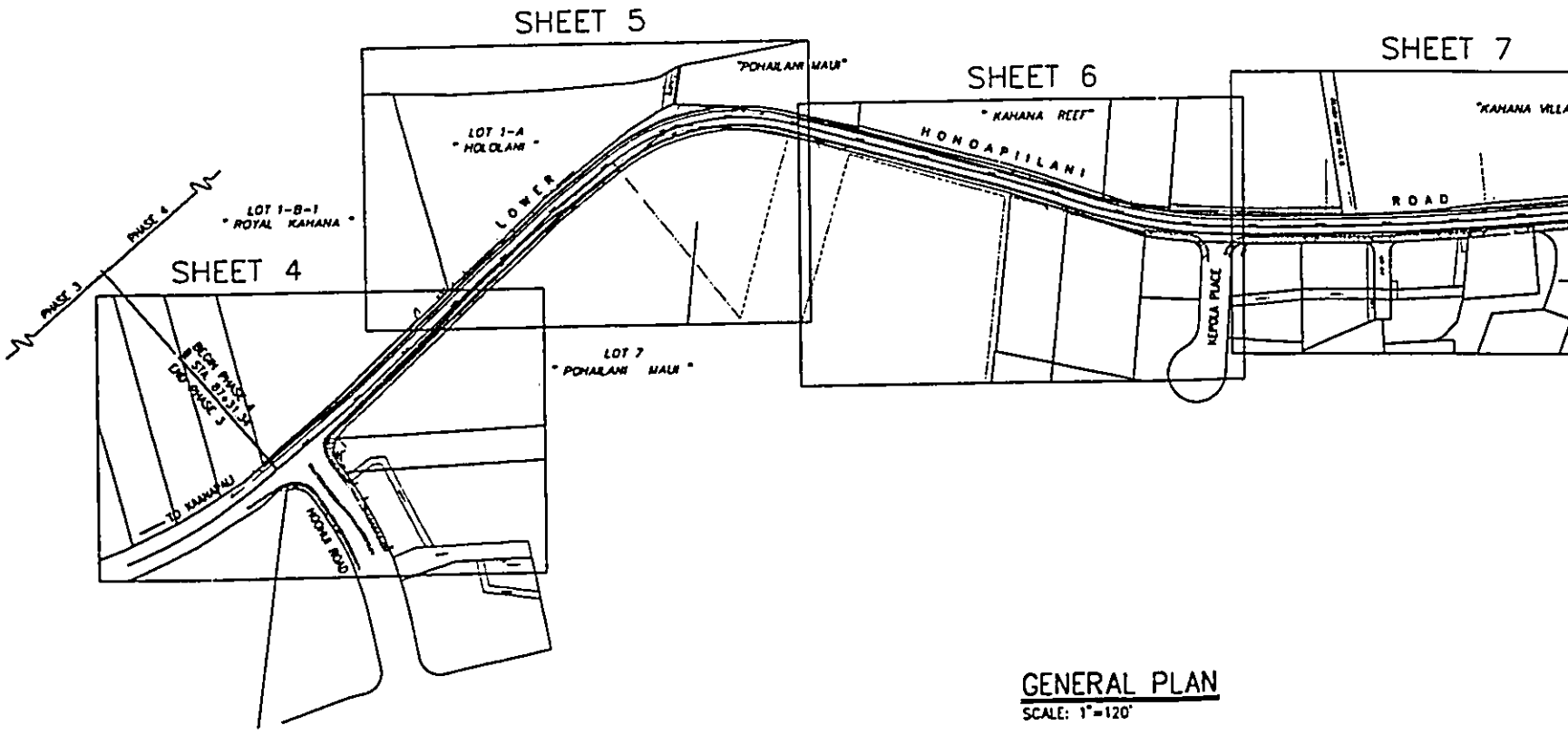


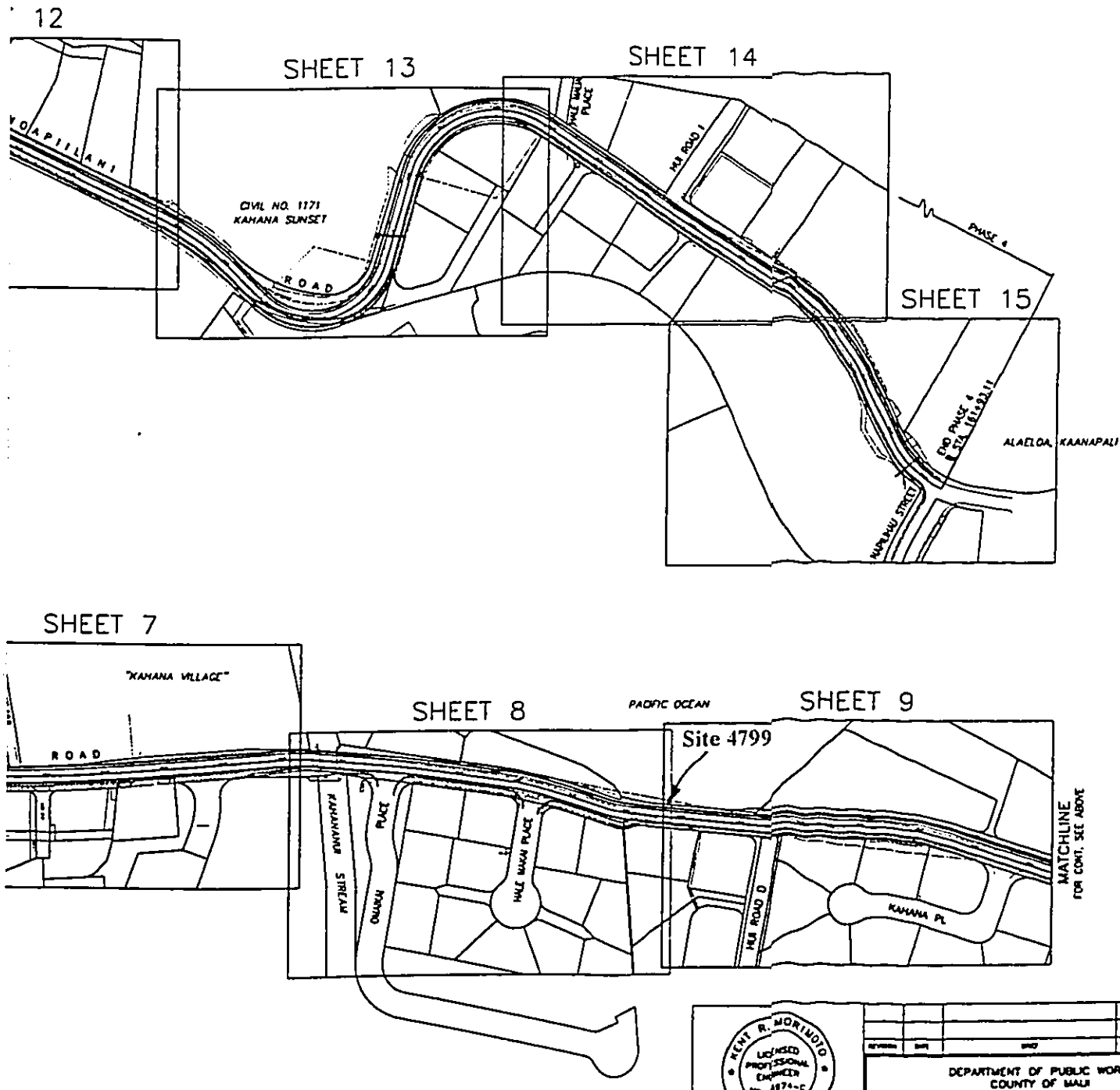


GENERAL PLAN
SCALE: 1"=120'

Map 3 – Corridor

JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	·	2000	·	·



KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 8874-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

GENERAL PLAN

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

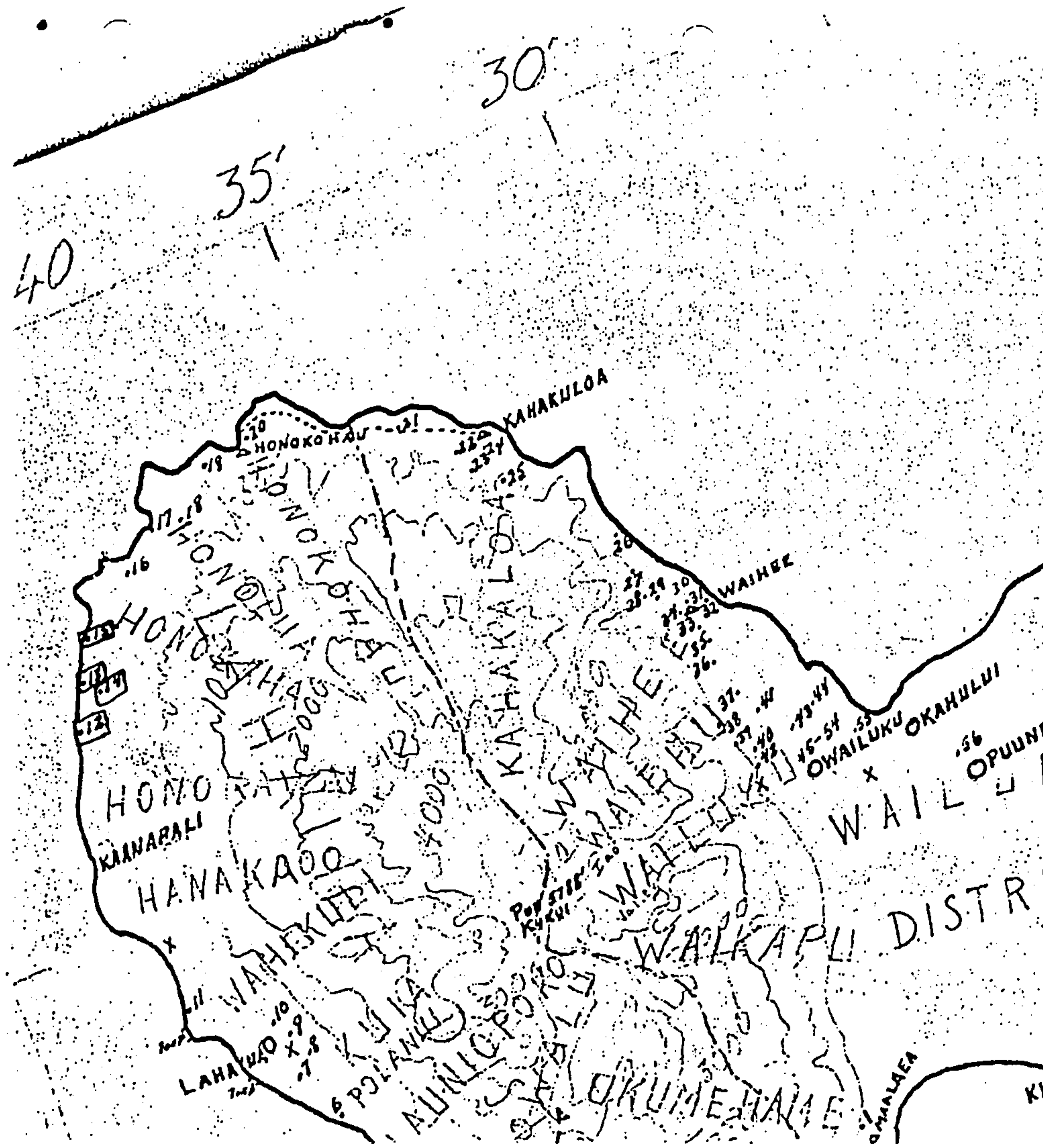
FED. AID PROJECT No. STP-

APPROVED

SUBMITTED BY

SHEET . OF .

Map 3 – Corridor map showing location of historic sites.



Map 4 – Portion of Walker's map, showing locations of Sites 12-15.

INTRODUCTION

The County of Maui, Department of Public Works, issued a call for proposals to participate in a Federal Aid project for improvements on Lower Honoapi`ilani Road in July of 1997. The work was to include road widening, installation of curbs and gutters, sidewalks, and relocation of utilities and drainage improvements. An archaeological inventory survey was needed as part of the Special Management Area (SMA) permit application. We were contacted by Mr. Glen Tadaki of Munekiyo, Arakawa and Hiraga, Inc., and asked to submit a bid for the survey. Fieldwork for the inventory survey was undertaken early in 1999.

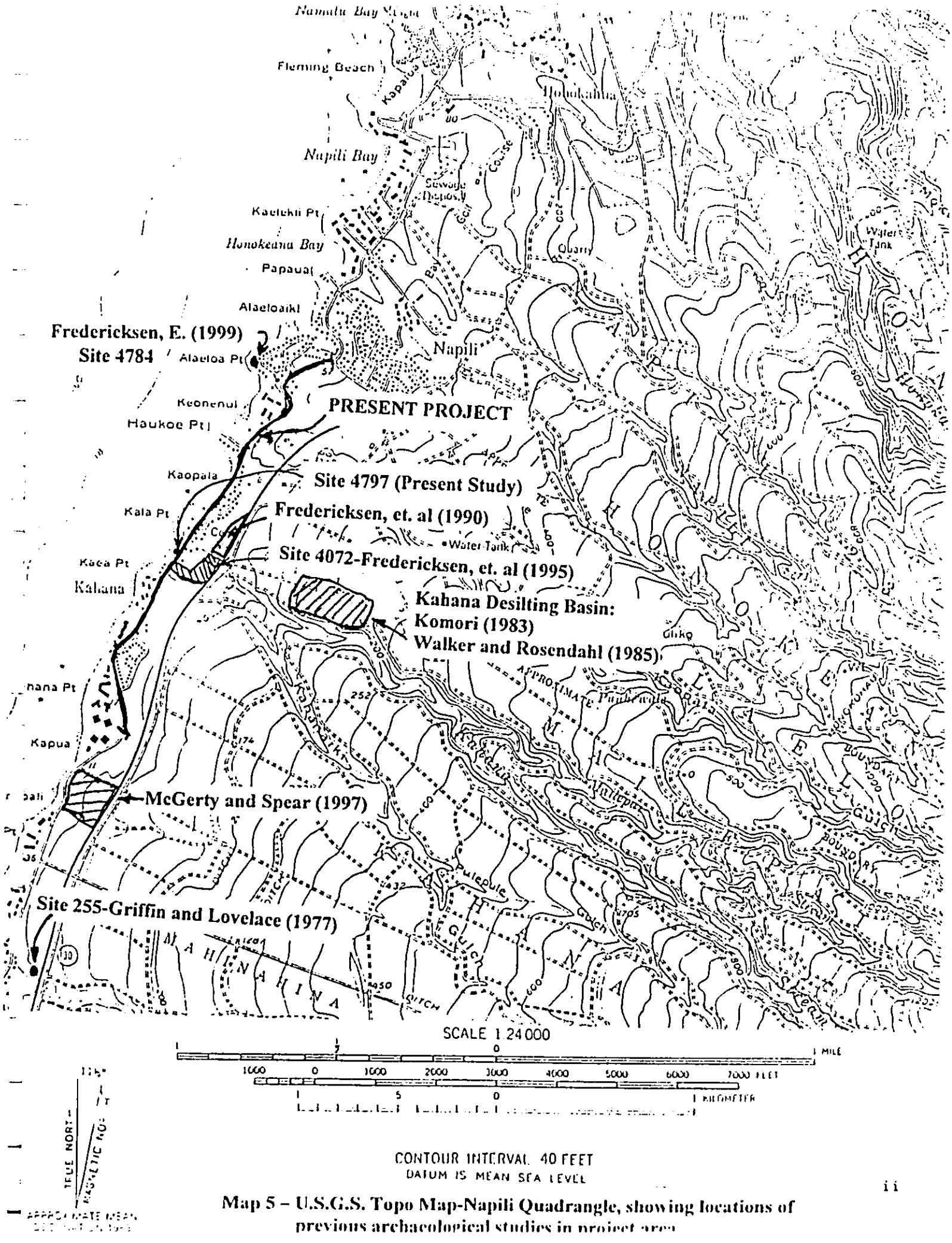
The project is located along the northwestern flank of West Maui (Map 1). It consists of a c. 1.4-mile long, 40-foot wide corridor that extends from Napilihau Street to Ho`ohui Road. Portions of the Lower Honoapi`ilani Road right-of-way run quite close to the existing shoreline area, where it crosses the modified drainage areas of Kaopala Gulch and Kahana Stream.[1] The survey corridor also traverses 3 *ahupua`a*—Alaeloa, Mailepai and Kahana. Finally, it crosses a large Land Commission Award (LCA 5524, R.P. 1663, Apana 3 & 4) to L. Konia. The project area is located near the shoreline and ranges from c. 7 to c. 40 feet AMSL, and crosses 4 tax map plat areas—4-3-03, 4-3-05, 4-3-10, and 4-3-15.

SURVEY AREA

Natural History

Much of the coast of West Maui consists of late stage lava flows, such as the Lahaina series (University of Hawaii, 1983, pp. 38-43). *Mugearite* and *trachyte* are basic rock structures resulting from the West Maui lava flows, and these rocks are more alkaline than the East Maui (Haleakala) lava-formed rocks. Foote (1972, p. 28) describes beaches "....as sandy, gravely, or cobbly areas on all the islands in the survey area They are washed and rewashed by ocean waves. The beaches consist mainly of light-colored sands derived from coral and seashells. A few of the beaches, however, are dark colored because their sands are from basalt and andesite." Directly inland from the beaches, the soils are classified Pulehu soils (PpA), which are the result of eroded igneous rocks.

[1] Mailepai Stream and Kahanaiki Gulch drainages feed into Kahana Stream.



Map 5 – U.S.G.S. Topo Map-Napili Quadrangle, showing locations of previous archaeological studies in project area

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42 Jeremy K. Loview & Wf
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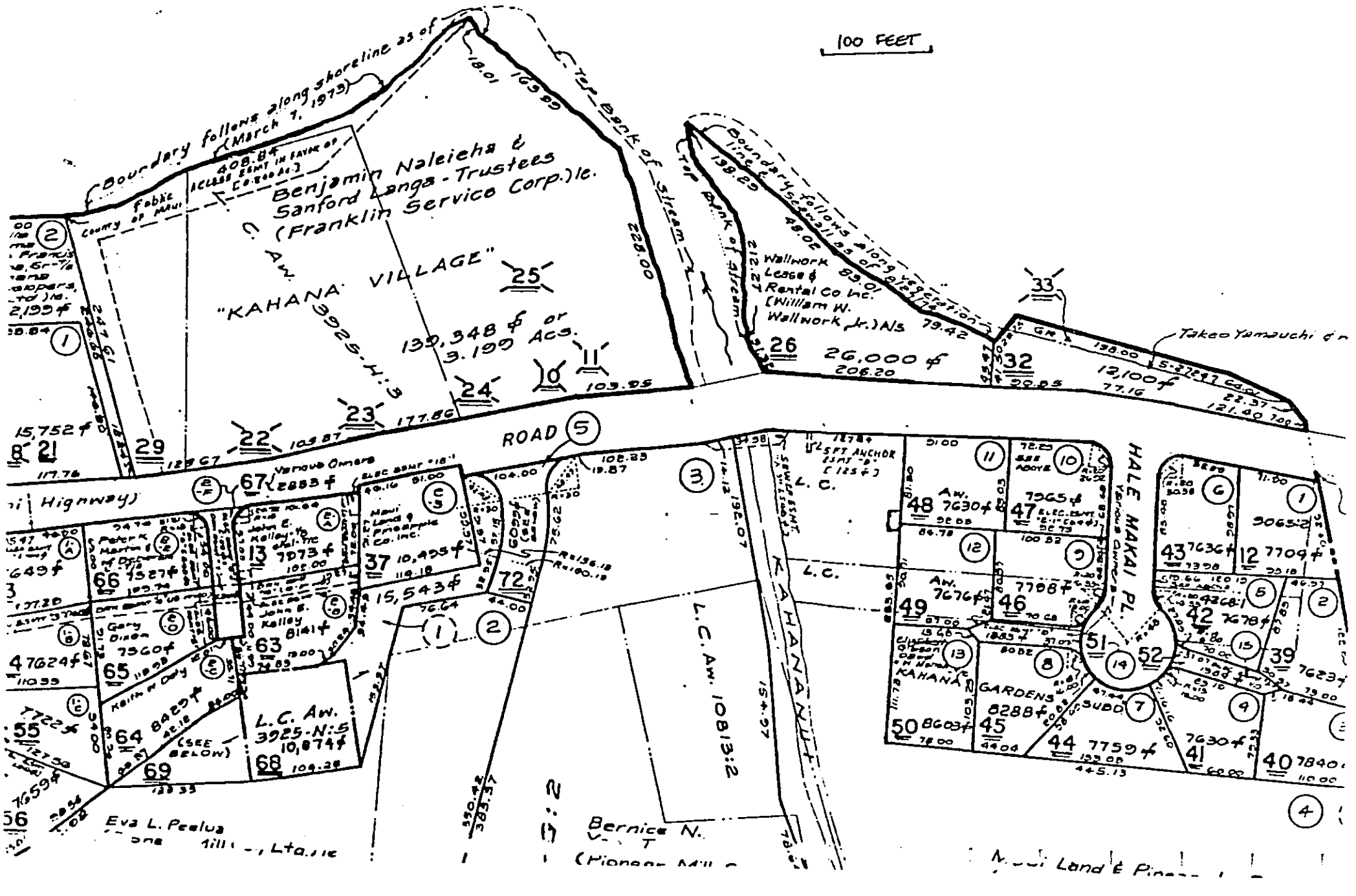
Map 6 – Portion of Tax Map 4-3-05, showing 4 LCAs near the mouth of Kahananui Stream illustrated on Table 1.



Post-Contact Land Use

Although no specific documentation was found, it is assumed that land use activity characteristic of precontact times, continued into early historic times, i.e. coastal resource exploitation and small gardening plots. Historic records reveal that the small Land Commission Awards or *kuleana*, that are found in the coastal areas of these *ahupua`a*, fall into the general types granted for the production of dry-land taro (*kalo kula*), and/or sweet potatoes (*kula uala)* and houselots and lay *mauka* of the beach. There were also LCAs granted inland in valleys with sufficient water to maintain taro production. In the inland plains situated between valleys, relatively few sites are identified, either because they did not exist in precontact times, or because they were destroyed by post-contact agricultural activity.

The *ahupua`a* of Alaeloa (LCA 5524—823 acres, Mailepai (LCA 5524—798 acres) were awarded to L. Konia. Most of Kahana, was purchased from the government by Baldwin, Pogue, and Bishop (Land Patent Grant 1166) in 1853. A total of 11 LCAs are found in Kahana. Four located near the mouth of Kahananui Stream (c. 220 meters south of Site 4797—Map 3), illustrate the types of coastal land usage (Refer to Table 1). The Alexander Map of 1885 showed land north of Honokowai designated as "grazing land". Ranching continued in Kahana until around 1915, when pineapple cultivation extended south (McGerty and Spear, 1997, pp. 8-9).

Sugarcane cultivation began in West Maui in 1859. Henry Dickinson, a Lahaina shop keeper, formed the Lahaina Sugar Company, which consisted of 1,000 acres of land for cultivation, and a small sugar mill to process the cane. A year or so later, Pioneer Mill Company was founded by three partners--James Campbell, Henry Turton, and James Dunbar, on land deeded to them by Benjamin Pittman. In 1863, Lahaina Sugar Company was sold to Pioneer Mill Company after going bankrupt. A third plantation was attempted by Lot Kamehameha and partners in 1870, but was also bought out by Pioneer Mill Company a couple of years later. In 1877, a German ex-ship captain H. Hackfield took over as manager of the plantation and represented assets of $500,000 in 1883 (Simpich, 1974, as cited in Graves, 1993, p. A-5).

One of the historic features that roughly parallels Lower Honoapi`ilani Highway about 100 meters inland, is the old Pioneer Railroad line. This railroad ran from the northern most field (Field #34—consisting of 280 acres) of Pioneer Mill lands to Pioneer Mill in Lahaina.[4]

Henry Turton, one of the originators of Lahaina Sugar plantation, received permission from the Minister of the Interior of the Kingdom of Hawaii in May of 1882, to proceed with the railroad, with the condition: "In accepting the right hereby granted, you will observe, that in case of damages you must be responsible, and that when the public weal require the use of the road or highway occupied by your or your successors you will deliver the same up peaceably free of charge." (Ibid., p. 252) By July of 1883 the railroad had progressed 4 ½ miles north from the mill, just past Black Rock (Ka`anapali). It was not until 1919, that the railroad was extended to Kahana and

[4] It appears that the agricultural activity of the region changed from sugarcane to pineapple growth at this juncture.

Table 1

Sample of LCAs[5] in Coastal Kahana (Kahananui)

LCA #	Awarded to[6]	Date	Royal Patent	Land Usage	Size
4268: 1	Koiku	10/13/1857	4698	*Pahale & kula* (Houselot and adjoining land)	1.75 acres
9065: 2	Kuoioi	10/13/1857	5037	Pahale ma Kahananui	1.42 acres
10813: 2	L. Palina	10/13/1857	8602	Pahale a kula	7.35 acres
3925-G: 2	Apolo	5/12/1857	4587	Pahale a kula	13.23 acres

beyond. In 1921, $45,169 was spent on a 23-top Porter locomotive called Kahana, the heaviest on the line (Conde and Best, 1973, p. 254).

The 1931 annual report for Pioneer Mill Company notes that "...cane is delivered to the factory via the 30" gauge railroad, 36.3 miles in length; 30.95 miles owned by the Pioneer Mill Company and 5.35 miles owned by the Baldwin Packers (Ibid.).

In 1946, the annual report notes only that "#6 (Kahana), acquired in 1921 was retired" and nothing more (Ibid.). Operational changes were occurring rapidly during this period on the plantation, and an article in The Maui News on December 10 1952 provided information of the final shut down of railway operations at Pioneer Mill. The equipment was sold—usable ties to ranchers for use as fence posts; electric locomotive #10 to Lihue Plantation o Kauai; track, rails and switches to a San Francisco company; and the remaining bits and pieces as scrap metal to an unspecified buyer. Finally, the old railway bed was to be leveled, cindered and rolled into truck hauling roads, thus providing for 100% of the cane harvested in 1953 to be delivered to the mill via trucks (Ibid., p. 255).

Up until the mid-1960s, sugar and pineapple cultivation have occupied much of the land on the western side of the island. Since the 1960s, commercial and residential use of land has come to dominate this coastal strip along Lower Honoapi'ilani Highway from Kaanapali to Kapalua. Sugar and pineapple are still produced inland of the coastal strip, *mauka* of the "new" Honoapi'ilani Highway.

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[5] This information was obtained from DLNR, Bureau of Conveyances, Land Management Division photocopies.

[6] These awards illustrate the pattern of permanent housing situated close to the ocean. Other apana within some of the LCAs were noted as *kula uala ma Kahananui* or sweet potato land, probably located farther inland.

PREVIOUS ARCHAEOLOGICAL RESEARCH

The first systematic survey in this area of Maui was done by W. Walker in 1930. He noted several *heiau* sites in the general vicinity: Site #12 at Kahana Point, which was totally destroyed; Site #13 at Mailepai Point which was washed away; and Site #14 named Hihiho, which was located along a county road near Kalaeokaea Point, which was destroyed to build the road. Another *heiau*, Site #15, located on the bluff at the south side of the rocky cove between Alaeloa and Papaua Points is described as follows: "Small rectangular enclosure measuring 50 by 66 feet. Has rough stone walls about 3 feet high with an opening at the west end. In the S.W. corner is what appears to be a platform of small stones and pebbles. Use unknown. Several people thought it was a cattle pen." (Walker, 1931, p. 118).

Subsequent archaeological work in the general area was undertaken when the "new" Honopi`ilani Highway corridor was surveyed by Griffin and Lovelace in 1975. This survey extended across 4 *ahupua`a*—Mahainahina, Kahana, Mailepai, and Alaeloa. The survey concentrated in the gulches, since the flat lands between gulches had been heavily impacted by commercial agriculture. Salvage work was done at Site 255, found in Mahinahina Gulch. The site consisted of an extensive buried midden deposit, which was first occupied about the thirteenth century (Griffin and Lovelace, 1977).

In Kahana Gulch seven archaeological sites including terrace features, a midden deposit, stone alignments, an enclosure, a small rock shelter and several wall segments were identified. Two were considered to be precontact, while the others were deemed historic (Komori, 1983). When the Honolua Watershed in Kahana was surveyed in 1984 by PHRI, the data suggested to them that Kahana Gulch was used by native Hawaiians for cultivation of sweet potatoes in both precontact and early post-contact times (Walker and Rosendahl, 1985).

The present authors undertook an inventory survey on a 10-acre parcel of land *mauka* (northeast) of the study corridor (Fredericksen, et. al., July 1990). Over 50% of the property contained fallow pineapple fields. No surface archaeological features or artifacts were observed during the reconnaissance of the survey parcel. The bed of the Pioneer Mill Railroad ran along the *makai* border of the property, and was the only historic feature noted.

In 1995, Xamanek Researches conducted an inventory survey for Kahana-Kai Subdivision, adjacent to and *mauka* (east) of the present study corridor. Two historic sites were identified—a Hawaiian cemetery—Site 4072--belonging to the Rodrigues family, and historic bridge footings on either side of Kahananui Stream, possibly associated with the Pioneer Mill Railroad bed, which crossed the *mauka* portion of the

property (Site 4069). The cemetery is maintained by the family, and was set off from the subdivision by a wrought-iron fence (Fredericksen, et. al., 1995).

Xamanek Researches was contacted about an inadvertent burial find on Alaeloa Point on July 26, 1999. The burial was in flexed position, and was associated with a cultural deposit that contained marine shellfish remains, *kukui* nut shell, some coral and scattered charcoal flecking. It is interpreted as a native Hawaiian individual and the find was assigned SIHP number 50-50-04-4784. This burial, which lies c. 100 meters *makai* (west) of the existing road corridor, has been preserved in place.

An archaeological inventory survey done by PHRI in 1991 (Jensen, 1991) along the 7.0 mile-long proposed Lahaina Bypass Corridor Alignment, covered land *mauka* of the present study corridor. One site, Site 2847 was located on a narrow finger ridge separating two branches of Honokowai Stream. It is a semi-circular stone enclosure, consisting of a rubble wall ranging in height from 1 to 2.5 meters, enclosing an area c. 67 meters east-west by 57 meters north-south. Oral testimony supplied by local informants suggested that the walled enclosure may have been a corral. Wall segments radiate from the enclosure in two places, and may represent boundary walls. No surface cultural remains were found (Ibid., p. 17).

A 12-acre parcel in Kahana *ahupua'a* was surveyed in 1997 by Scientific Consultant Services, Inc. It lies between the present study corridor and the "new" Honoapi'ilani Highway. No sites were located within the parcel, and further work was not recommended (McGerty and Spear, 1997).

Considerable archaeological work has been undertaken farther north in Napili and Honokahua *ahupua'a*. The most notable studies centered around the development of the Ritz-Carlton Hotel Complex at Kapalua, and the mitigation of Site 1342, Honokahua Burial Site, and Site 2015, the trail segment (e.g. Donham, 1986, 1989; Guerriero, Charvet-Pond, and Goodfellow, 1993). The burial site contained over 1000 individuals, and eventually these human remains were reinterred and the burial site preserved. The hotel complex was moved to another location farther inland. This work is noted because of the impact it had on the treatment and mitigation of native Hawaiian burials throughout the island of Maui. No information about the route of the *Alaloa* (Long Trail) which was identified in Kapalua, could be found. However, in other areas of Maui the *Aupuni*, or Government Road followed its course (Handy and Handy, 1972, p. 489).

Settlement Patterns and expectation of findings

The report of the positioning of several coastal *heiau* in the general region (Walker, 1931) suggests relatively intense precontact usage of this area. This would be consistent with the hypothesis that in the coastal areas, there existed settled communities that exploited marine resources.

The precontact settlement pattern in this region of Maui was most likely made up of permanent and temporary habitation sites located in the coastal region. In the inland

valleys, *lo`i* systems provided significant amounts of taro. The extensive burial ground at Honokahua also suggests a sizable precontact population. The precontact population was likely considerably larger than it was in the mid-1800s, as people were drawn to such economic centers as Lahaina, located to the south.

The typical subsistence economy probably included the exploitation of marine resources as well as inland dry agriculture near the coast. The exploitation of inland resources, available in the valleys and mountains, was undoubtedly undertaken as was typical in the general *ahupua`a* patterns of the Hawaiian Islands.

The kinds of sites that might be expected along this coastal strip, which comprise the study area, would include features associated with habitation such as stone structures (enclosures), midden deposits, sites flanking the old coastal trail, and burial areas. As far as the inland area between valleys is concerned, this region has been under sugarcane and pineapple cultivation for decades. Prior to that, cattle grazing occurred. While these areas were no doubt utilized in precontact times for gathering of forest products, and perhaps some dry land cultivation, it would not be expected to find much remaining evidence of these activities. Such areas, however, lie outside the focus of this inventory survey, which concentrated on a narrow (c. 45-foot wide) corridor that included Lower Honoapi`ilani Highway.

ARCHAEOLOGICAL METHODS

Xamanek Researches carried out an archaeological inventory survey of the c. 1.4 mile project corridor during early 1999. The entire project area was covered by a pedestrian survey. All road bank cuts in the road corridor were visually inspected. In addition, all wave-cut banks present in the road right-of-way and two culvert areas were also inspected. It was not possible to conduct any subsurface testin the the project corridor, due to safety considerations, and the close proximity of privately owned landscaped property along the roadway.[7] Descriptive notes were made in the field, and photographs were taken with color film. Mapping was undertaken with a hand-held compass and metric survey tapes.

One precontact and 2 post-contact sites were identified during our survey—Sites 4797, 4798 and 4799. Three charcoal samples were recovered from Site 4797 deposits and placed in aluminum foil. One sample was submitted to Beta Analytic, Inc. for radiometric analysis. Field personnel included Erik M. Fredericksen, project archaeologist, and Hugh Coflin, field archaeologist. Walter M. Fredericksen and Demaris L. Fredericksen were the senior directors.

[7] The existing shoulder of the Lower Honoapi`ilani road is typically less than 1 meter in width and often less. Other portions of the corridor are on private property and have either hedges or walls placed as a barrier along the roadway, precluding any opportunity for subsurface investigation.

ARCHAEOLOGICAL FINDINGS

Three previously unrecorded historic sites were identified during our inventory level field survey (See Map 3 for locations). These include a precontact habitation area in the general vicinity of the Kaopala Gulch culvert and road crossing (Site 50-50-03-4797); the retaining wall associated with that crossing (Site 50-50-03-4798); and a retaining wall associated with the crossing at the channelized Kahana Stream (Site 50-50-03-4798).

Site 4797

The first site was located when we inspected a wave cut along the *makai* (western) portion of the corridor. The site was first noted in an eroding cut bank within about 3 meters west of Lower Honoapi'ilani Highway, the surface of which lies at c. 8 feet AMSL (Photo 1). Vegetation in the vicinity of Site 4797 consists of indigenous *milo* (Thespesia populnea) trees, and various alien grasses and succulent weeds. The exposed portion of the site extends from Station 126 + 20 to Station 128 + 30. The wave-cut bank itself extends onto Kaia Point (Photo 2). A cobble beach lies at the base of much of this bank. Placed basalt boulders obscure much of the wave-cut bank on the point itself.

The bulk of the exposed portion of the site extends south from a small culvert (c. 60 cm. in diameter) for about 60 meters to the placed boulders. A small section of the site deposit was also noted eroding out of a wave-cut area c. 30 meters to the north of the culvert (Photo 3). It appears probable that the site extends onto the point itself. However, this portion of the point lies west (*makai*) of the project limits and we did not further explore this section of coastline.

The inspected portion of Site 4797 lies between a wave-cut band that begins about 30 meters north of the culvert and the placed boulders to the south. In general, the cultural deposit is located between 0.9 and 1.4 meters below the top of the exposed bank. It appears that some of this overlying soil may be fill. Two portions of the cultural deposit were profiled (Figures 1 and 2).

The first 2-meter section was located c. 12 meters (40 feet) south of the culvert, while the second section was recorded c. 35 meters (115 feet) to the south of the drain. No attempt was made to undertake excavation, as the bank appeared to be unstable and possibly located on private property.[8] Other portions of the corridor in the vicinity of

[8] While a portion of this exposed site lies within the right-of-way, a privately owned fence and hedge separates the land from Lower Honoapi'ilani Highway.

Site 4797 could not be tested due to safety considerations (heavy traffic) and the close proximity of private property.

Profile 1

This profile was chosen as a representative example of the cultural deposit where no subsurface features are present. A total of 6 soil strata were noted in this 2.7 meter high section of wave-cut bank (Figure 1). Layer I consisted of brown (7.5 YR 4/3) clay, consistent with materials used for fill in road building. This compact stratum contained a few rocks and appeared to have been disturbed relatively recently in its upper 20 centimeters. A few pieces of bottle glass were noted in this disturbed portion. Layer I was up to 70 centimeters thick and is interpreted as road fill.

Layer II consisted of brown (7.5 YR 4/4) silty clay loam. This slightly compact stratum was up to 60 cm. thick, and contained a few subangular basalt pebbles. In addition, some slight charcoal flecking was noted in the lower portion of the layer, which is typical of soils used in sugarcane production, i.e. burning of cane during harvest. Finally, a grayish brown (10 YR 5/2) lens of sandy silt was present near the south edge of the profile section. This lens did not appear to contain any material culture remains—and is probably a concentration of decayed organic materials.

Layer III consisted of a c. 8 to 10 cm. thick sandy silt deposit. This light yellowish brown (10 YR 6/4) layer extended to a maximum depth of 1.1 mbs. This thin layer did not appear to contain any material culture remains, and may have been water deposited.

Layer IV was more compact than Layer II. This deeper stratum extended from c. 1.35 to 1.55 mbs. No material culture remains were noted in this reddish brown (5 YR 5/3) soil which rested on an *in situ* cultural deposit. Layer V consisted of strong brown (7.5 YR 4/6) clay loam. A few pieces of marine shellfish including *opihi* (Cellana sp.), *pipipi* (Nerita picea), and cowrie (Cypraea sp.) were noted during profile cleaning. In addition, a fire-cracked rock and a piece of coral were present in the profile, along with moderate amounts of charcoal. Layer V was up to 45 cm. thick in this portion of the project area.

Layer VI was encountered at c. 2 mbs. This very compact, reddish brown (2.5 YR 4/4) clay appeared to be sterile and extended to c. 2.7 mbs. It was not possible to determine if Layer VI extended below the existing cobble beach.

Profile 2

The second profile was located c. 20 m. to the south, near the *makai* (western) edge of the right-of-way. While stratigraphy was somewhat similar to Profile Section 1, 3 subsurface pit features were associated with the cultural deposit in this location (Photo 4).

Layer I was composed of the common brown (7.5 YR 4/3) clay. This compact layer also appeared to have been relatively recently disturbed in the upper 20 to 30 centimeters. One piece of clear bottle glass was observed near the surface of this wave cut bank. The stratum was up to 65 cm. thick in this portion of the bank, and is probably fill.

Layer II was made up of reddish brown (5 YR 5/3) silty loam and very dark gray (5 YR 3/1) basalt sand. No material culture remains were noted in this 8 to 12 cm. thick layer. It remains unclear whether or not this stratum was water deposited. Layer III extended from c. 0.7 to 1.1 meters below the existing surface. This strong brown (7.5 YR 4/6) silty loam was slightly compact and did not appear to contain any cultural materials. Layer IV consisted of strong brown (7.5 YR 5/6) sandy silt with small pieces of river gravel. This c. 20 cm. thick stratum appears to have been water deposited. No cultural materials were located during profile cleaning.

The brown (7.5 YR 4/4) LayerV cultural deposit extended from c. 1.2 to 1.52 meters below the existing surface in this location. Scattered flecks of charcoal, a few fragments of marine shellfish such as cowrie and conus, and a piece of coral were visible in the prepared profile.[9] In addition, 3 subsurface features extended from the cultural deposit into the underlying stratum.

Feature 2.1 is a small basin-shaped pit that extends up to 22 cm. below the cultural deposit. This grayish brown (10 YR 5/2) feature contained a traces of charcoal. Its function is somewhat unclear, and it was truncated by a second pit feature.

Feature 2.2 is interpreted as a fire hearth. This basin-shaped pit is intrusive to Feature 2.1, and is a maximum of 89 cm. in width. Two fire-cracked rocks, scattered shellfish remains and quantities of charcoal were present in this dark gray (10 YR 4/1) pit. A charcoal sample was obtained from this pit and was subsequently submitted to Beta Analytic, Inc. for radiometric analysis. The sample yielded a conventional radiocarbon age of 370 +/- 70 RCYBP [see Appendix A]. The calibrated date range, at 2 sigma (95%) probability, was AD 1420 to 1660, with an intercept date of AD 1490.[10]

Feature 2.3 is adjacent to and south of Feature 2.2. This third basin-shaped pit is a maximum of 82 cm. in diameter and up to 25 cm. deep. Scattered flecks of charcoal and a fire-cracked rock were noted in the profile of this dark grayish brown (10 YR 4/2) pit. This feature is tentatively interpreted as a refuse pit. All three features extended into the underlying stratum. Layer V consisted of reddish brown (2.5 YR 4/4) clay. No cultural materials were noted in this compact layer that continues at least to the level of the existing cobble beach.

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[9] The wave-cut bank was trimmed to vertical in this location, in order to obtain a more accurate profile and to remove wave-deposited rock and debris.

[10] Intercept of the radiocarbon age with the calibration curve.

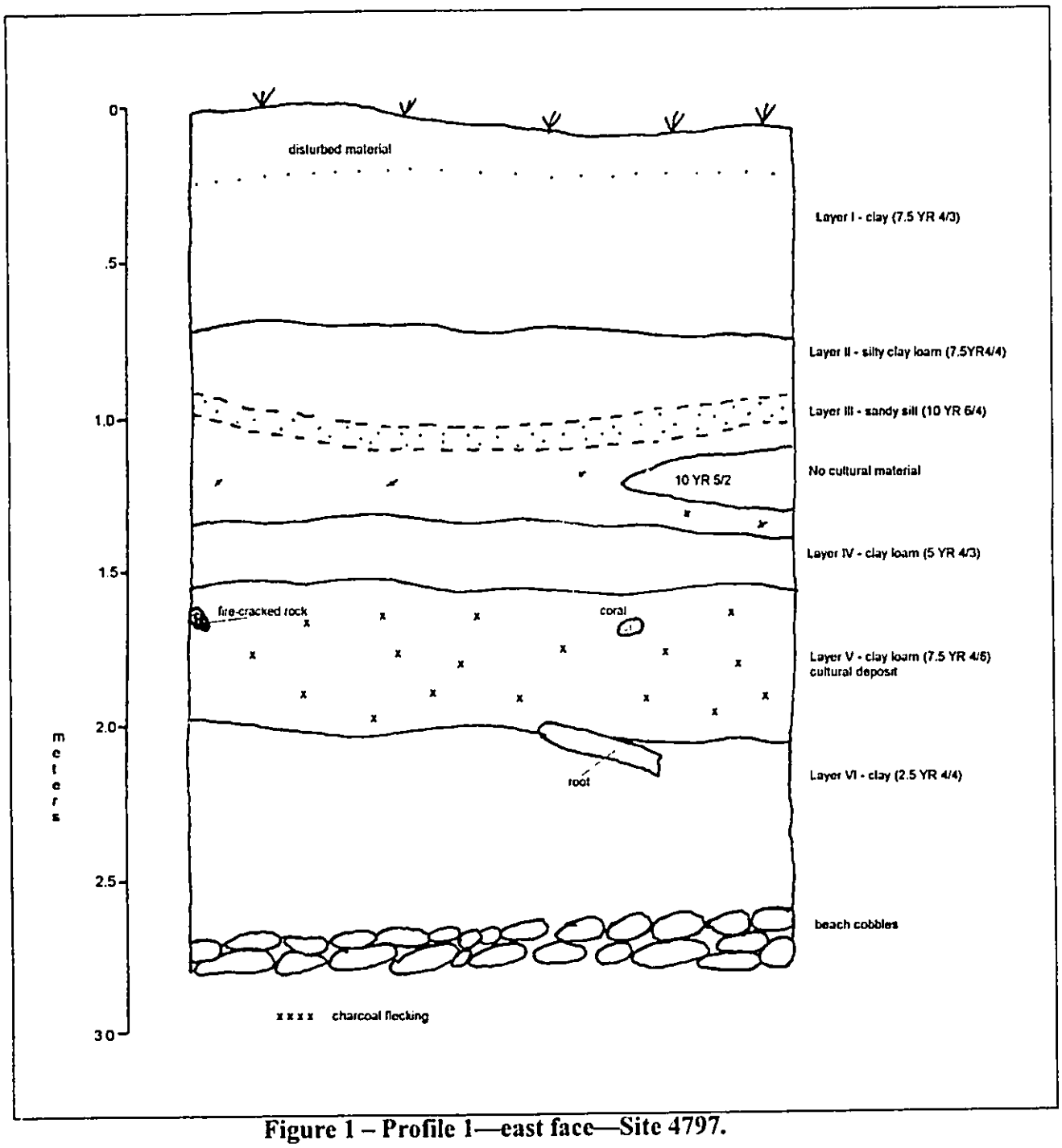

Figure 1 – Profile 1—east face—Site 4797.

Discussion

While it was not possible to conduct subsurface testing at Site 4797, the radiocarbon date obtained from the Feature 2.2 hearth is significant, in that no other precontact radiocarbon dates have been recorded for this coastal area of Maui. This site represents a precontact, coastal occupation area, some of which has been washed away by

wave action. Based on an inspection of the c. 50 meters of exposed wave-cut bank, it appears that the site continues further onto Kaia Point. However, boulders placed along the point effectively prevented further inspection of the area. In addition, this area lies outside the project corridor.

The coastal location of Site 4797 strongly suggests that this occupation area was associated with marine resource exploitation. The relative proximity of fresh water sources likely made the area additionally suitable for habitation. It was not possible to conduct subsurface testing on the inland portion of the Site 4797 habitation area, because of heavy traffic on the road creating hazardous conditions for personnel, and the fact that much of this area is on private property. It appears that the site extends inland under the existing road. From what we were able determine from the inspection of the exposed portions of this site, it appears to represent a relatively large habitation area. While there was not sufficient evidence to determine whether Site 4797 is a permanent or a temporary habitation area, the extend of the exposed section of the site suggests that it may have been the latter. However, no post-hole features were noted in the bank at the time of the inventory survey.

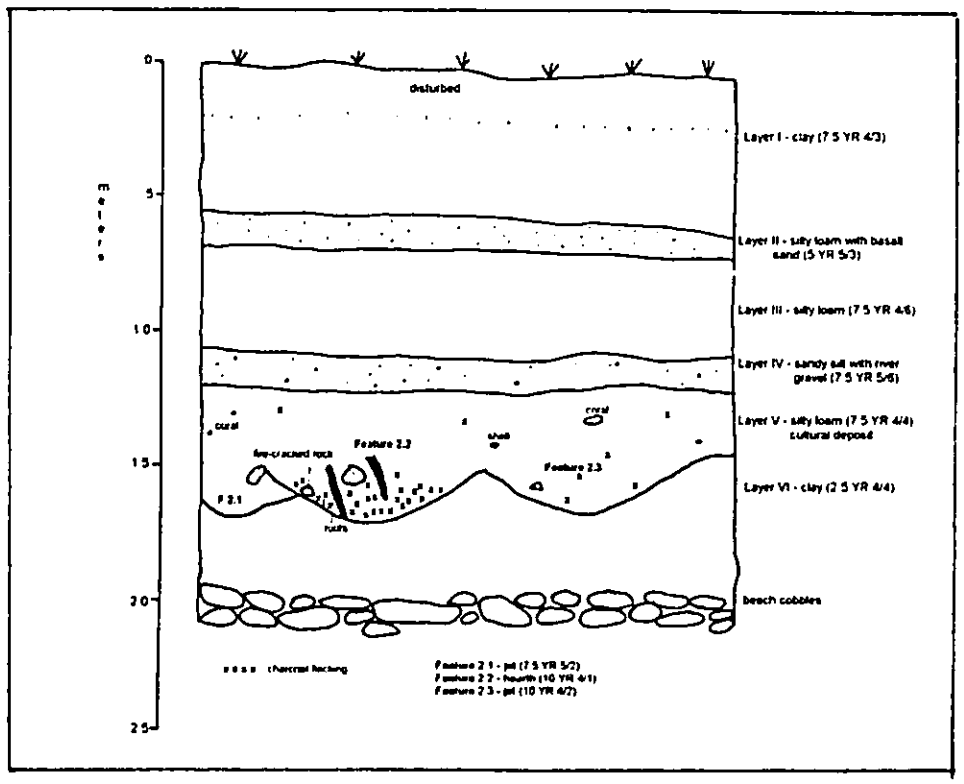

Figure 2 – Profile 2—east face—Site 4797.

Site 4798

The second site extends to the north of Site 4797. Site 4798 is interpreted as an old retaining wall and shoulder wall for the Lower Honoapi'ilani Highway. This retaining wall is c. 75 meters long and ranges in height from 2 to 4 metes. It is constructed from subangular basalt boulders, and is in generally fair condition. Construction style is rough and it does not appear to have been carefully built. A relatively recently constructed culvert (c. 20 to 30 years old) is located near the mid-portion of the retaining wall (Photo 5). This c. 1.2 meter diameter culvert serves to drain flow water from Kaopala Gulch. Cement was visible in this newer portion of Site 4798.

The road shoulder barrier consists of a fairly well-built wall that ranges from 0.4 to 0.9 meters in height by 0.5 meters in width. This portion of the site ranges from poor to fair condition and may have once spanned the open shoulder of the road between the culvert (Station 127 + 65) and Station 133 + 50. It is constructed from subangular basalt cobbles ranging from 10 to 30 cm. in diameter. Much of the wall is obscured by a thick covering of night blooming cerus (Hylocereus undatus).

Site 4799

This third site consists of a retaining wall or the *makai* (western) site of Lower Honoapi'ilani Highway (Photos 7 & 8). It covers much of the distance between Station 116 + 50 and Station 118 + 50. This retaining wall is relatively well constructed and is in generally fair condition. It ranges from c. 0.8 to 1.2 meters in height. No mortar was observed in the exposed portions of the retaining wall. Sections of the wall appear to have been impacted by high surf in the past.

Summary and Conclusions

The historic properties identified during this inventory survey include a precontact habitation site (Site 4797) dating from 15th century, and two historic sites that are associated with the construction of Lower Honoapi'ilani Highway in the 1940s. One is a road retaining wall and shoulder wall (Site 4798); and the second is a road retaining wall (Site 4799).

Site 4797 was exposed in a wave cut bank, *makai* (west) of the roadway. The full extent of the site remains unclear. It is obscured by boulders on Kaia Point, and vegetation and boulders associated with the Site 4798 retaining wall which runs to the north. Site 4797 appears to extend at least 90 meters along the shoreline,[11] and under Lower Honoapi'ilani Road. However, it remains unclear how far to the east (*mauka*) of the road the site extends.

Our expectation of findings was confirmed with the identification of this large precontact habitation site, which is being actively eroded from the shoreline by wave action.

[11] A portion of the site has been truncated by the placement of a road culvert.

Site Significance Assessments

All 3 sites qualify for significance under Criterion "D" of the State and Federal historic preservation guidelines. They are considered important for the information that they have yielded or are likely to yield.

Site 4797, the precontact habitation area, is considered to be the most significant historic property located during our inventory survey. This site represents one of the few surviving precontact habitation sites on this heavily developed portion of the West Maui coast, and qualifies for significance under Criterion "C"—being an excellent example of a precontact coastal site. It also qualifies for Criterion "A"—being associated with broad patterns of history in this area of Maui.

While this site remains significant under multiple criteria, both Sites 4798 and 4799 are no longer deemed important for their information content. Both sites are clearly post-contact features associated with the construction of Lower Honoapi'ilani Road. In addition, the road retaining walls will not be impacted because construction plans apparently call for widening the road on the *mauka* (eastern) side of the corridor.

Mitigation Recommendations

As noted above, Site 4797 remains significant under Criteria "A", "C" and "D". While the full extent of this subsurface cultural deposit remains unknown, it appears very probable that it continues under the existing Lower Honoapi'ilani Road. Given the importance of this rare coastal site, data recovery of a portion of the site is recommended. Further investigation of Site 4797 can provide important information about precontact coastal habitation patterns in this part of Maui. If subsurface excavation is to occur along Lower Honapi'ilani Road, it will be necessary for safety concerns to be addressed by the County of Maui. In addition, it will also be necessary to obtain permission to test on what is presently private property. It is very probable that archaeological monitoring will need to occur after data recovery has been completed on Site 4797. This subsequent mitigation action is necessary because the possibility exists that human burials may be associated with this habitation area.[12]

No further archaeological work is recommended for the existing road retaining walls (Sites 4798 and 4799). The County of Maui plans to incorporate them in the road improvement project.

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[12] Site 4784, a precontact burial within a cultural deposit lies c. 850 meters northeast of the Site 4797 habitation area. This burial is located c. 100 meters west (makai) of the road corridor, and in similar soil on Alaeloa Point.

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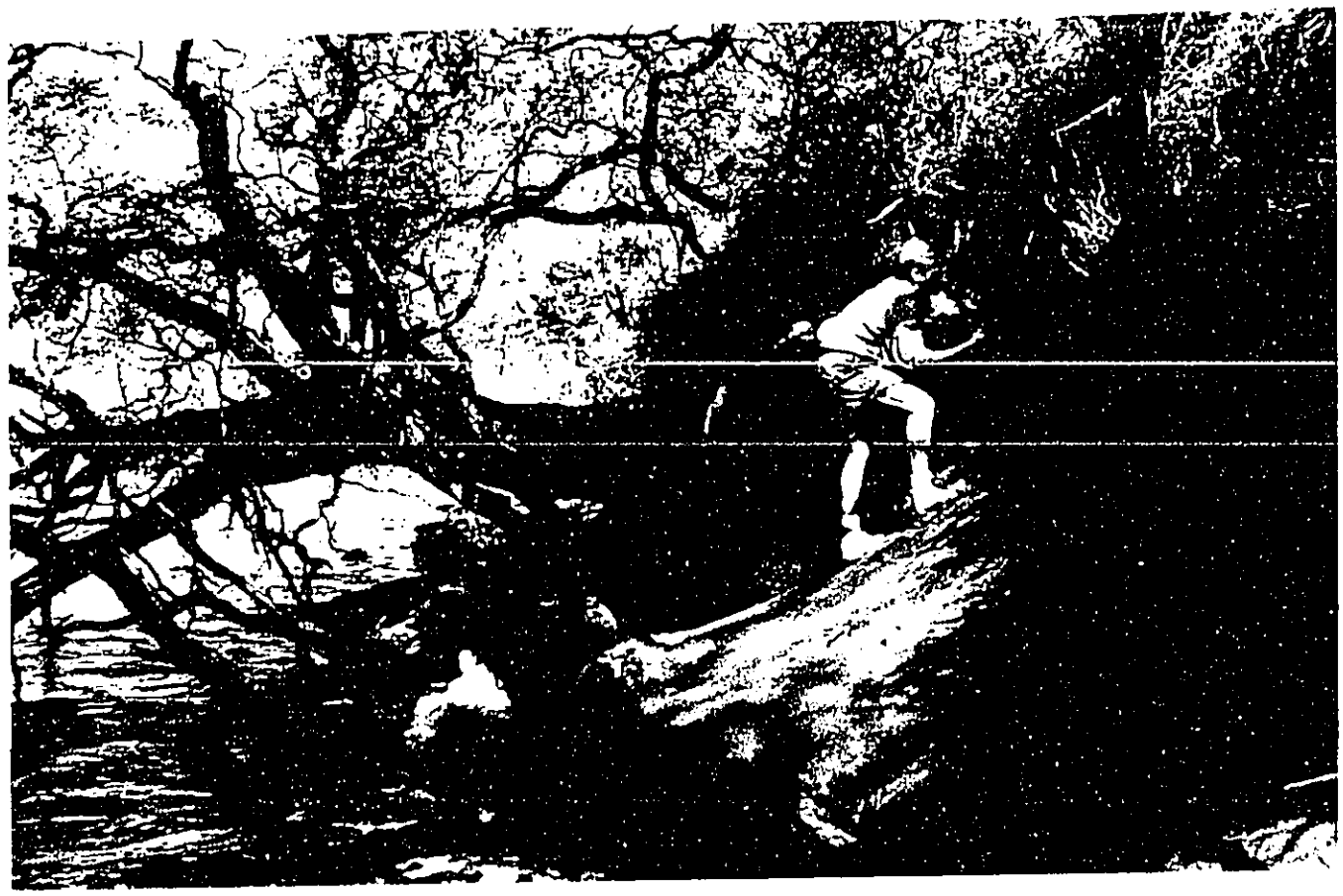


Photo 1 – Inspection of cut bank to the north of Site 4797. View to the northeast.

Photo 2 – Inspection of Site 4797 cultural deposit adjacent to road culvert. View to the south.

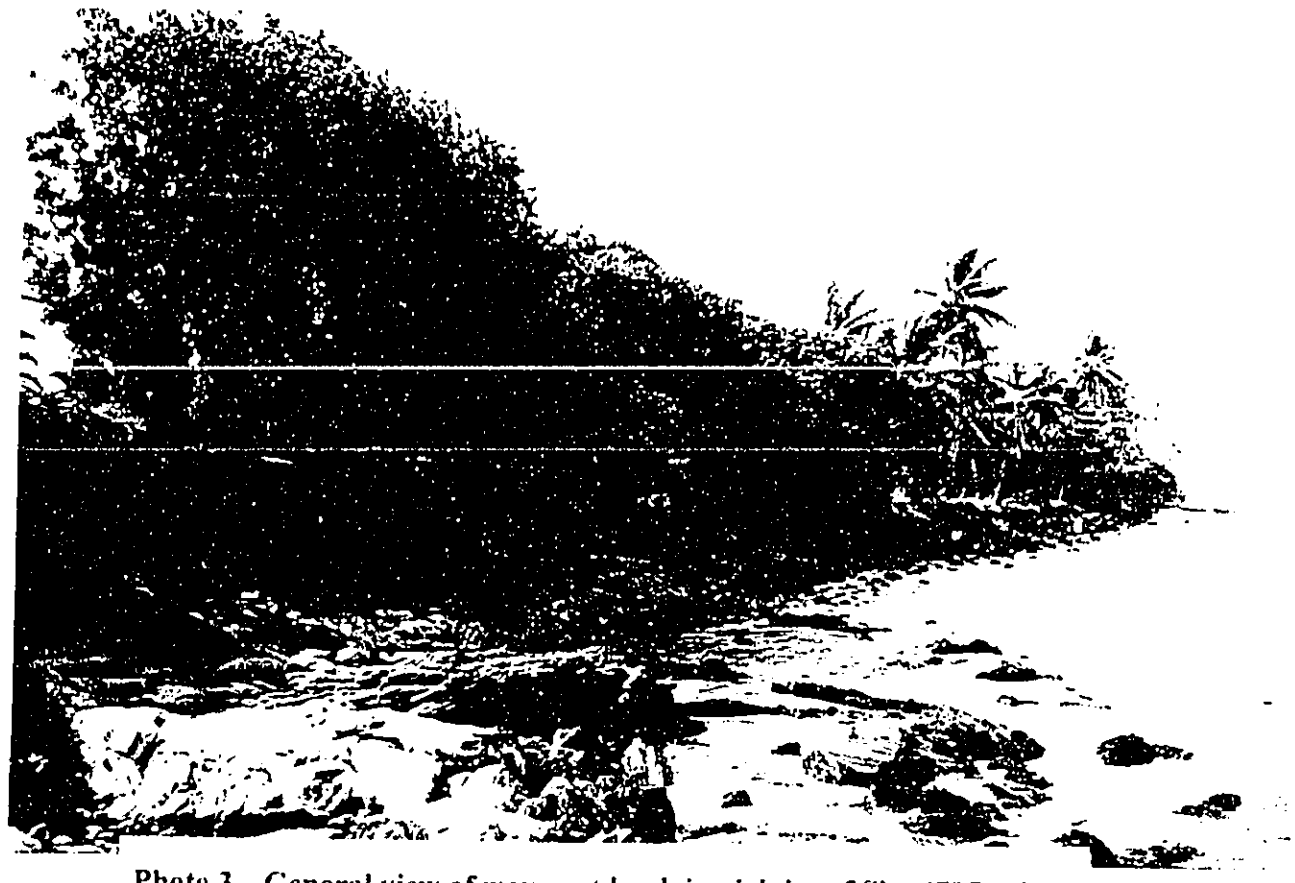


Photo 3 – General view of wave-cut bank in vicinity of Site 4797. View to the south.

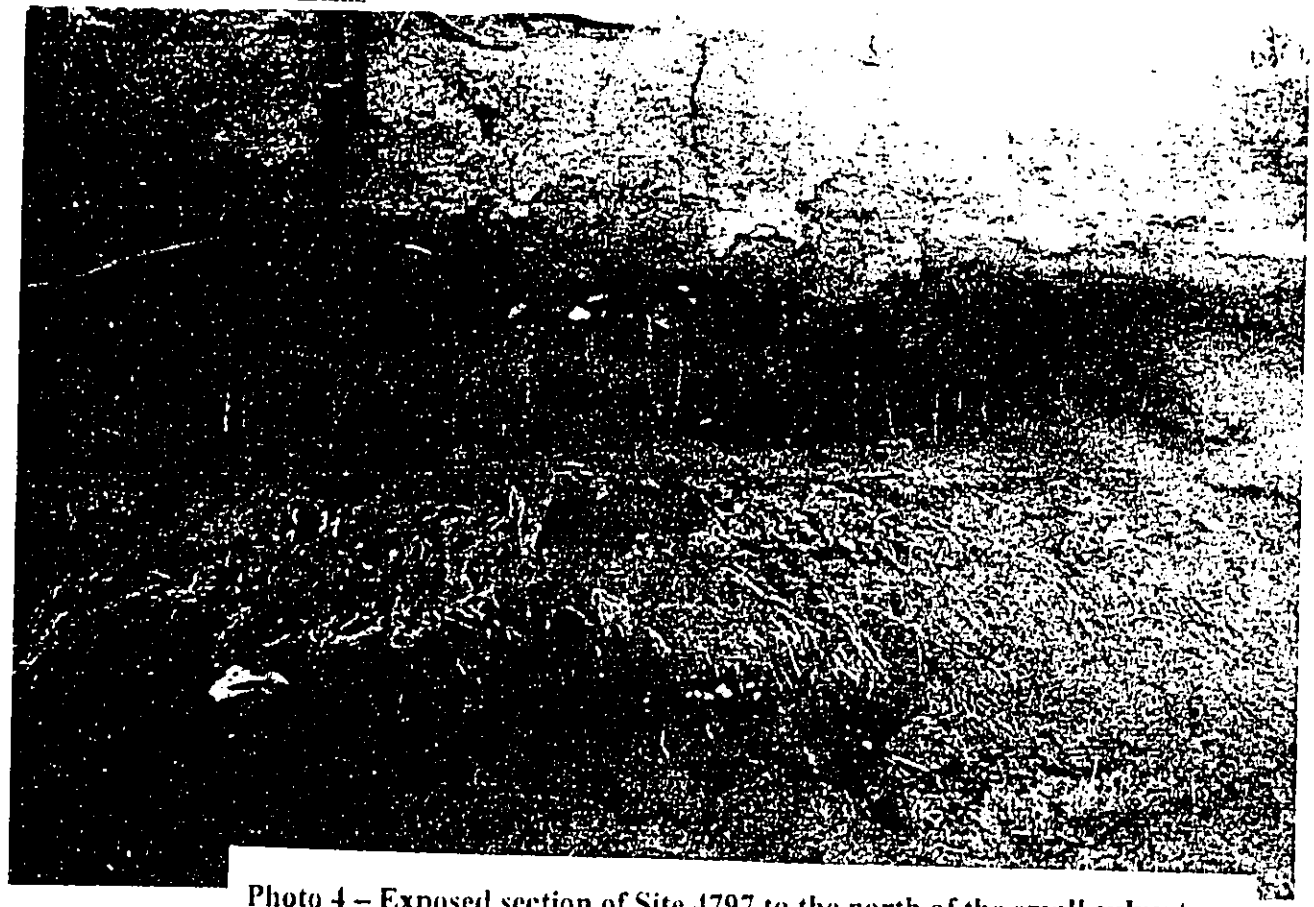


Photo 4 – Exposed section of Site 4797 to the north of the small culvert. View to the east. Note ground surface of sloping bank at upper right of photograph.

Photo 5 – General view of eroding Site 4797 cultural deposit prior to profile cleaning and root removal. Note Feature 2.1 near left center—view to the southeast.

Photo 6 – General view of a portion of Site 4798. Note newer culvert at left of photograph. View to the southeast—Site 4797 to the right.

Photo 7 – General view of intact portion of Site 4799 retaining wall—view to east.

Photo 8 – General view of Site 4799 retaining wall next to Lower Honoapi'ilani Road. View to the northeast.

APPENDIX A

Radiometric data sheets
Beta Analytic, Inc.
Miami, Florida

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Dr. Walter Fredericksen

March 31, 1999

Xamanek Researches

April 9, 1999

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-129442	360 +/- 70 BP	-24.6 o/oo	370 +/- 70 BP

SAMPLE #: HONOKAWAI
ANALYSIS: radiometric-PRIORITY
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.6:lab mult.=1)

Laboratory Number: Beta-129442

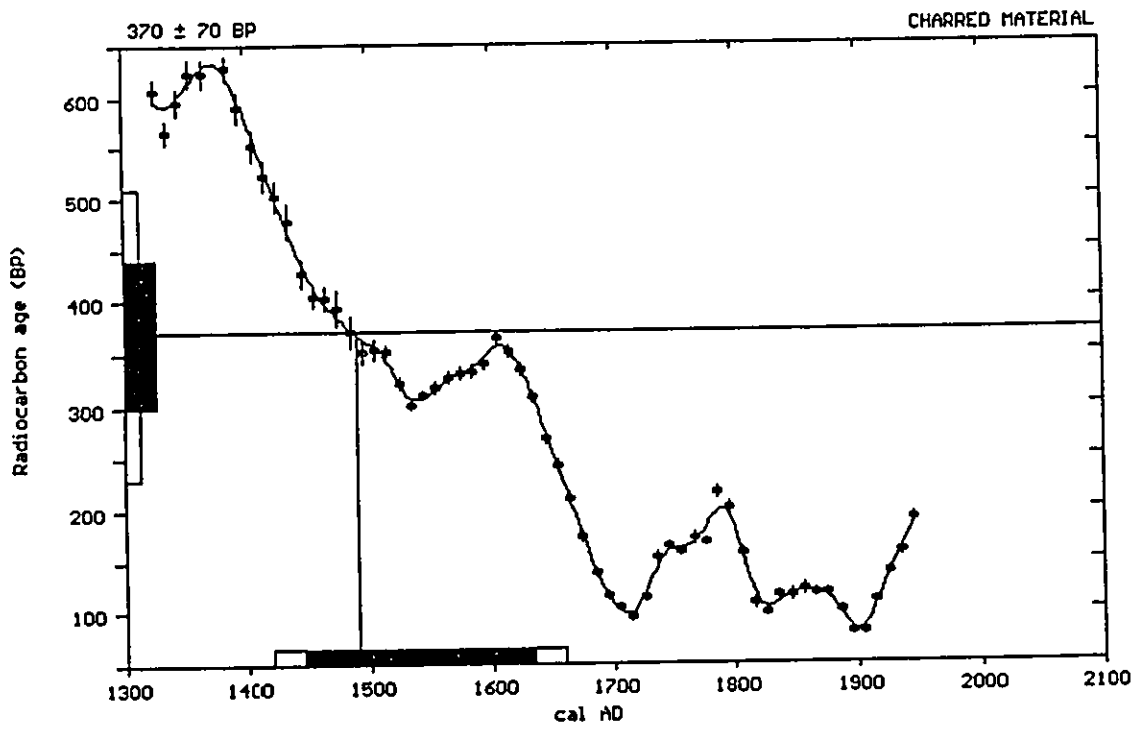
Conventional radiocarbon age: **370 ± 70 BP**

Calibrated results: **cal AD 1420 to 1660 (Cal BP 530 to 290)**
(2 sigma, 95% probability)

Intercept data:

Intercept of radiocarbon age with calibration curve: cal AD 1490 (Cal BP 460)

1 sigma calibrated results: cal AD 1445 to 1635 (Cal BP 505 to 315)
(68% probability)



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Calibration Database

Editorial Comment

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INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

Appendix B-1

Additional Archaeological Inventory Level Work for Site 4797

Additional Archaeological Inventory Level Work for Site 50-50-03-4797, Lower Honoapi`ilani Road Improvements Project Corridor; Alaeloa, Mailepai and Kahana *Ahupua`a* Lahaina District, Maui Island (TMK: 4-3-15)

Prepared for:

County of Maui
Department of Public Works
And Waste Management

Prepared by:

Xamanek Researches
Pukalani, Maui

Erik M. Fredericksen
Demaris L. Fredericksen

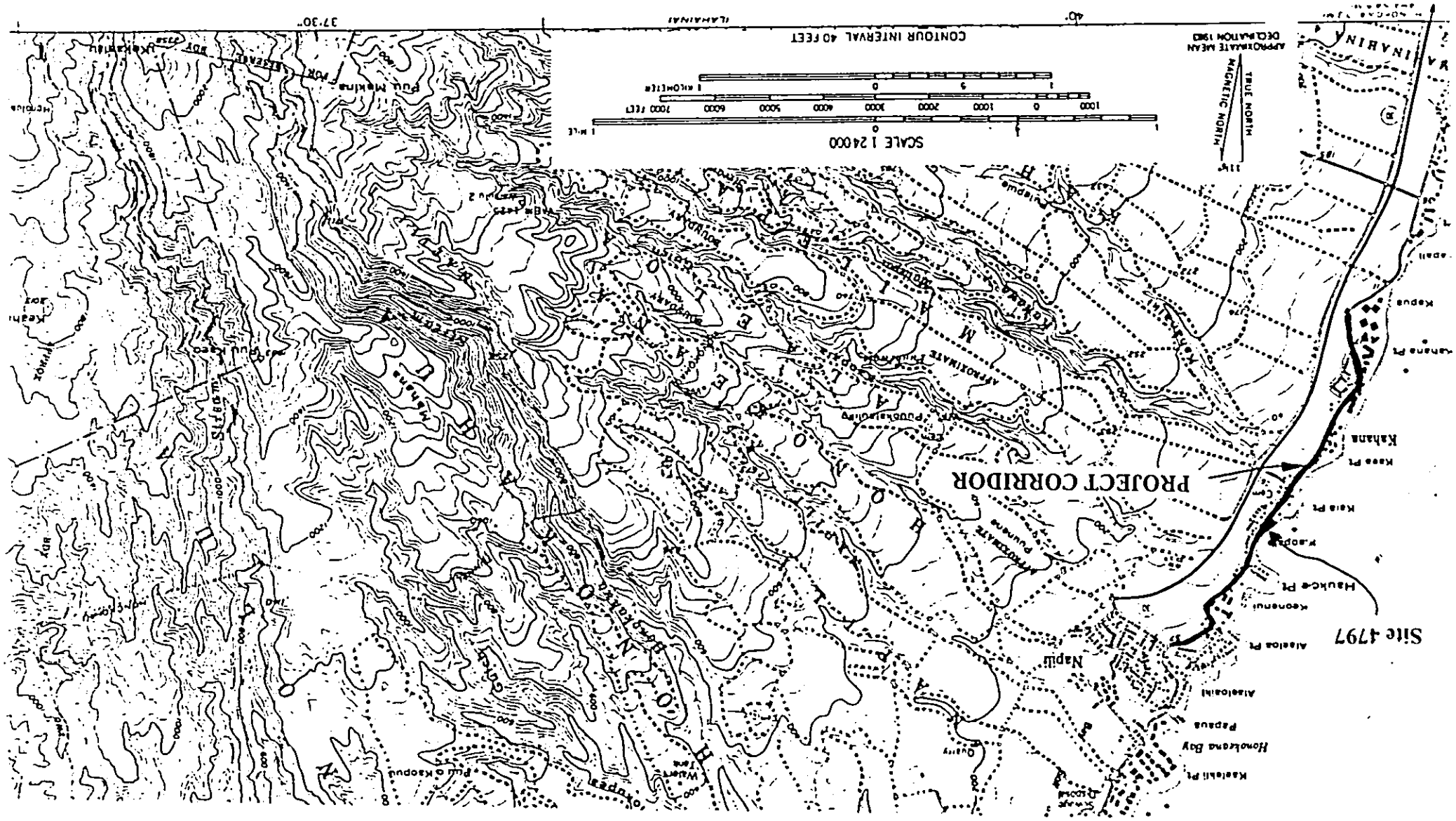
10 April 2001

ABSTRACT

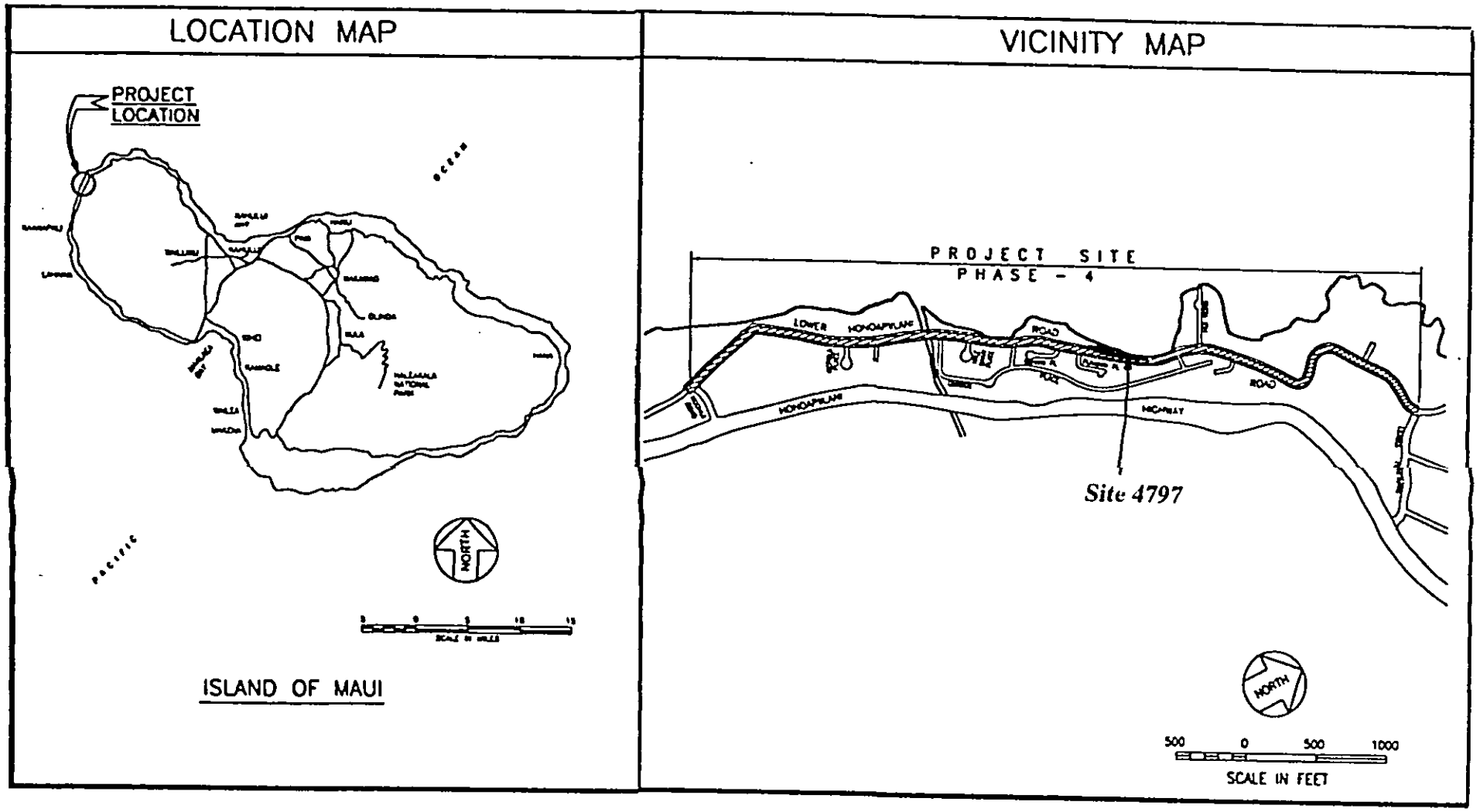
Xamanek Researches conducted additional archaeological inventory level work on a coastal habitation area (Site 50-50-03-4797) in Mailepai *ahupua`a*, Lahaina District (TMK: 4-3-15) during February 2001. Future improvements scheduled for Lower Honoapi'ilani Road will impact a portion of this site. Subsurface testing was conducted in the existing County of Maui right-of-way along the road. Site 4797 was found to extend for at least 150 meters along this portion of the West Maui coastline, at a depth of c. 1.1 to 1.5 meters. While this report details the additional work that has been conducted on this coastal site, the site still retains its significance under Criteria "a", "c", and "d" of Federal and State historic preservation guidelines. Consequently, further investigation is recommended for this site. However, existing utilities, driveways, walls, fences and hedges that lie in the proposed County of Maui right-of-way road easement complicate additional testing at this time.

It is therefore recommended that supplemental inventory survey work be carried out on Site 4797 after the County of Maui has obtained an SMA permit for this road improvement project, and has access (through condemnation) to the portions of the residential properties that border the road. It is further recommended that the supplemental work take the form of "pre-digging", and should be conducted prior to actual road construction in this area. A single piece of equipment could be utilized and would be more cost effective. This methodology will effectively recover additional information about Site 4797, as well as identify any burials that might be associated with this buried habitation layer. When actual construction begins, the work can proceed at a normal pace, since any finds that might have been impacted will already have undergone mitigation.

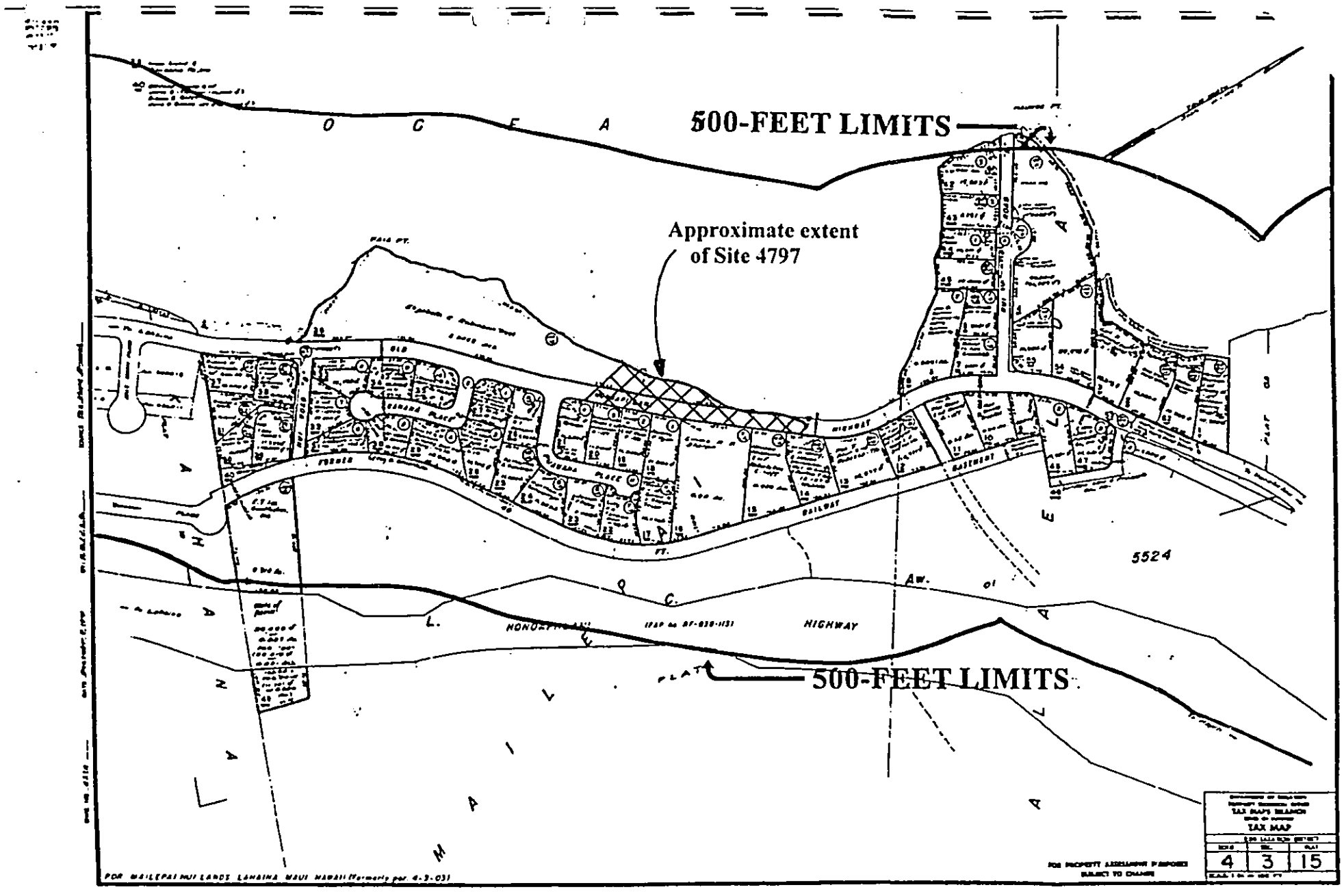
Table of Contents



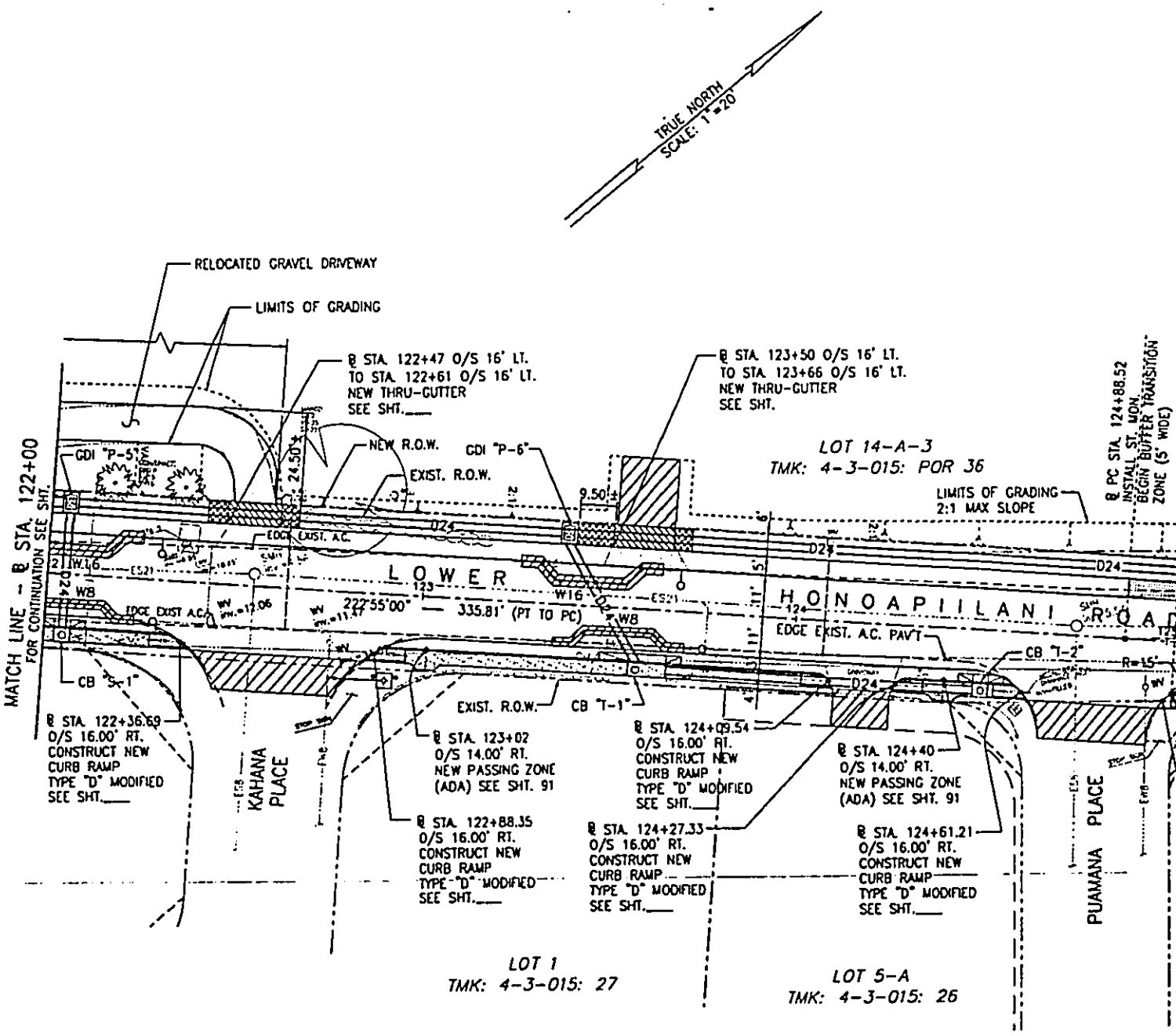
Map 1 – U.S.G.S. Topographic Map, Napili Quadrangle, 1983.



Map 2 – Location and Vicinity Maps.



Map 3 – Tax Map, Zone 4, Section 3, Plat 15, State of Hawaii Tax Division.
Note approximate extent of Site 4797.



LEGEND

- PROVIDE SMOOTH TRANSITION 5 LF MIN.
- NEW THRU-GUTTER
- PROVIDE SMOOTH RIDING TRANSITION TO NEW PAVEMENT SECTION. RECONSTRUCT EXIST. PAVEMENT SECTIONS ONLY AS NOTED.
- NEW CONC. SIDEWALK
- B1 ⊕ APPROXIMATE LOCATION OF BORINGS

IMPROVEMENT PLAN – ℄ STA. 122+00 TO ℄ STA.

SCALE: 1"=20'

Map 4 – Improvement plan—STA. 122+00 to 127+00. Note location Backhoe Trenches 1 and 2, and Profile 2.

℄ CURVE DATA						
NO.	Δ	Δ/2	R	T	Ch	Lc
⑪	7°57'00"	3°58'30"	2500.00'	173.72'	346.61'	346.88'

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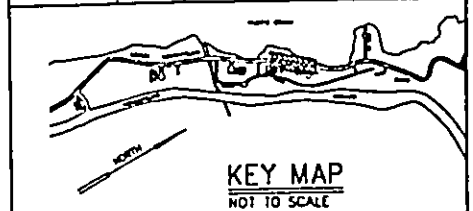
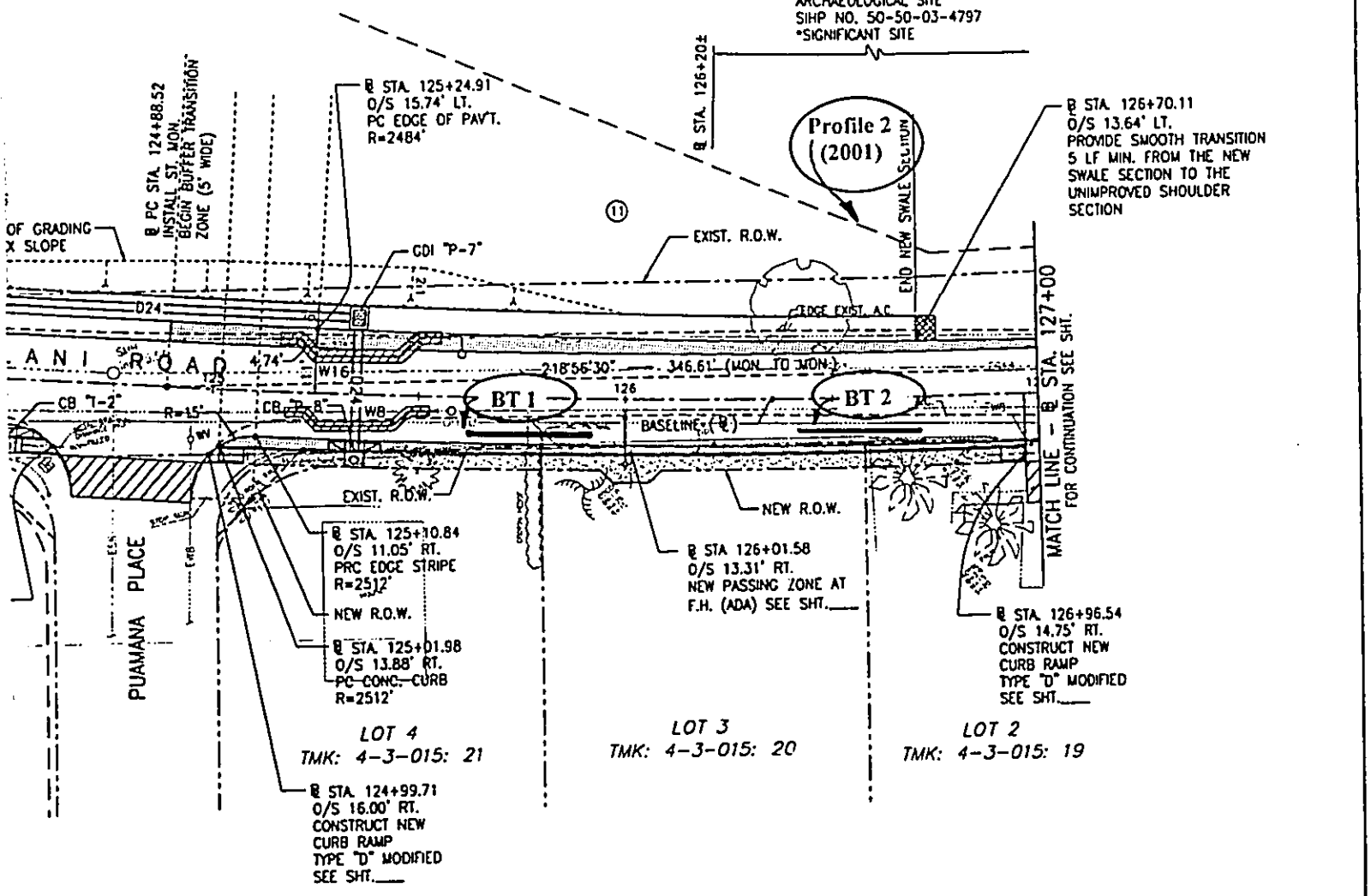
HAWAII	HAW.	STP-3080(8)	2001	·





2+00 TO ℄ STA. 127+00

+00. Note locations of

NOTES:

1. STEP FOOTING DETAIL FOR TYPES "C" AND "D" WALLS SEE DPW STD. DET. R-31
2. PROVIDE SMOOTH RIDING CONNECTIONS AND TRANSITIONS TO ALL CURB RAMPS, GUTTERS, SIDEWALKS, CURB RETURNS, DRIVEWAYS, AND ROADWAY INTERSECTIONS. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.

APR 0 6 2001

C-29

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6874-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

IMPROVEMENT PLAN
STA. 122+00 TO STA. 127+0

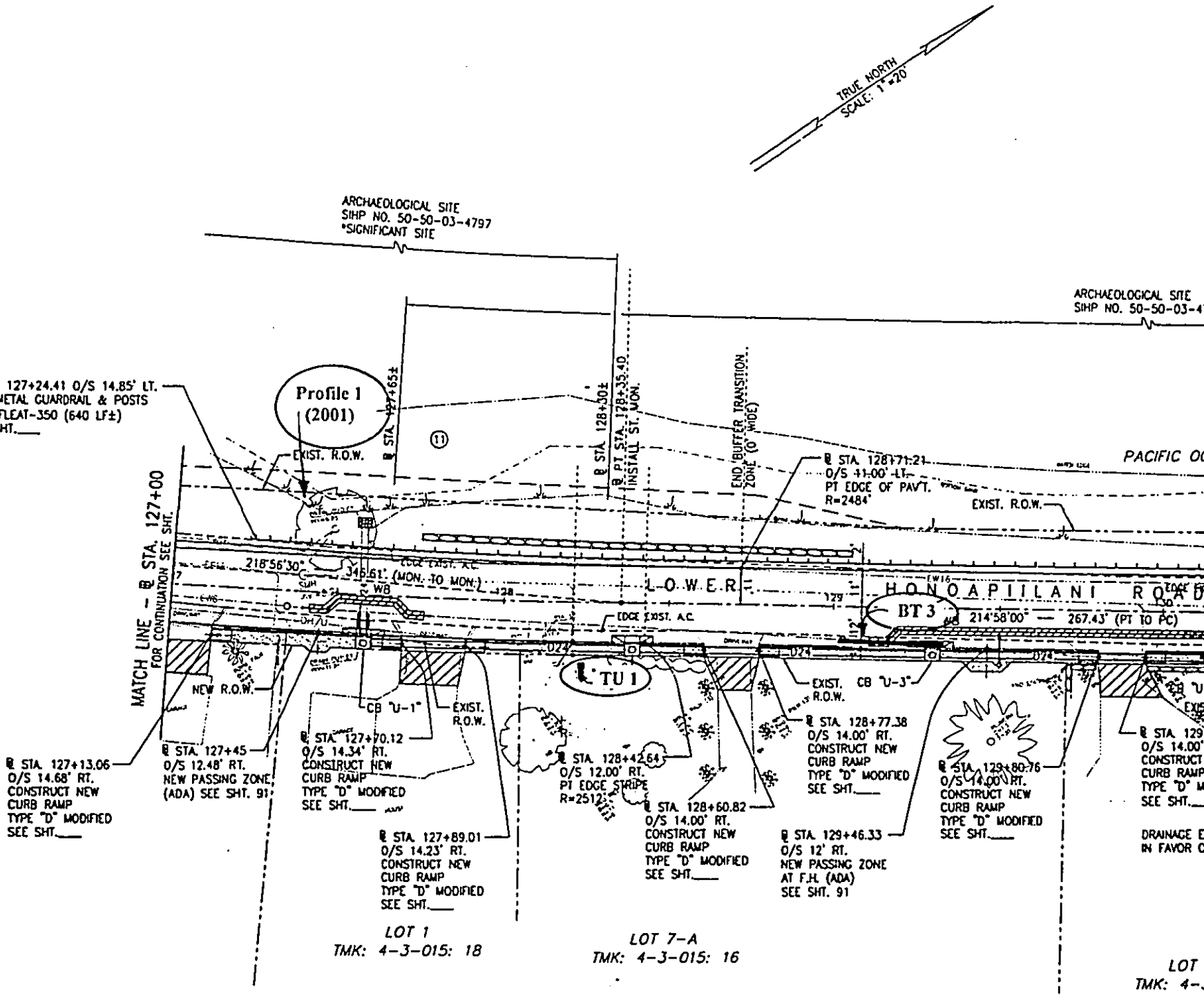
LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY KT | DRAWN BY AO | CHECKED BY

APPROVED | SUBMITTED BY

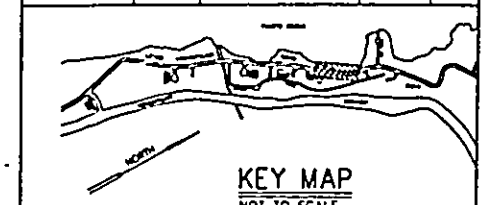
DATE | FILE NUMBER

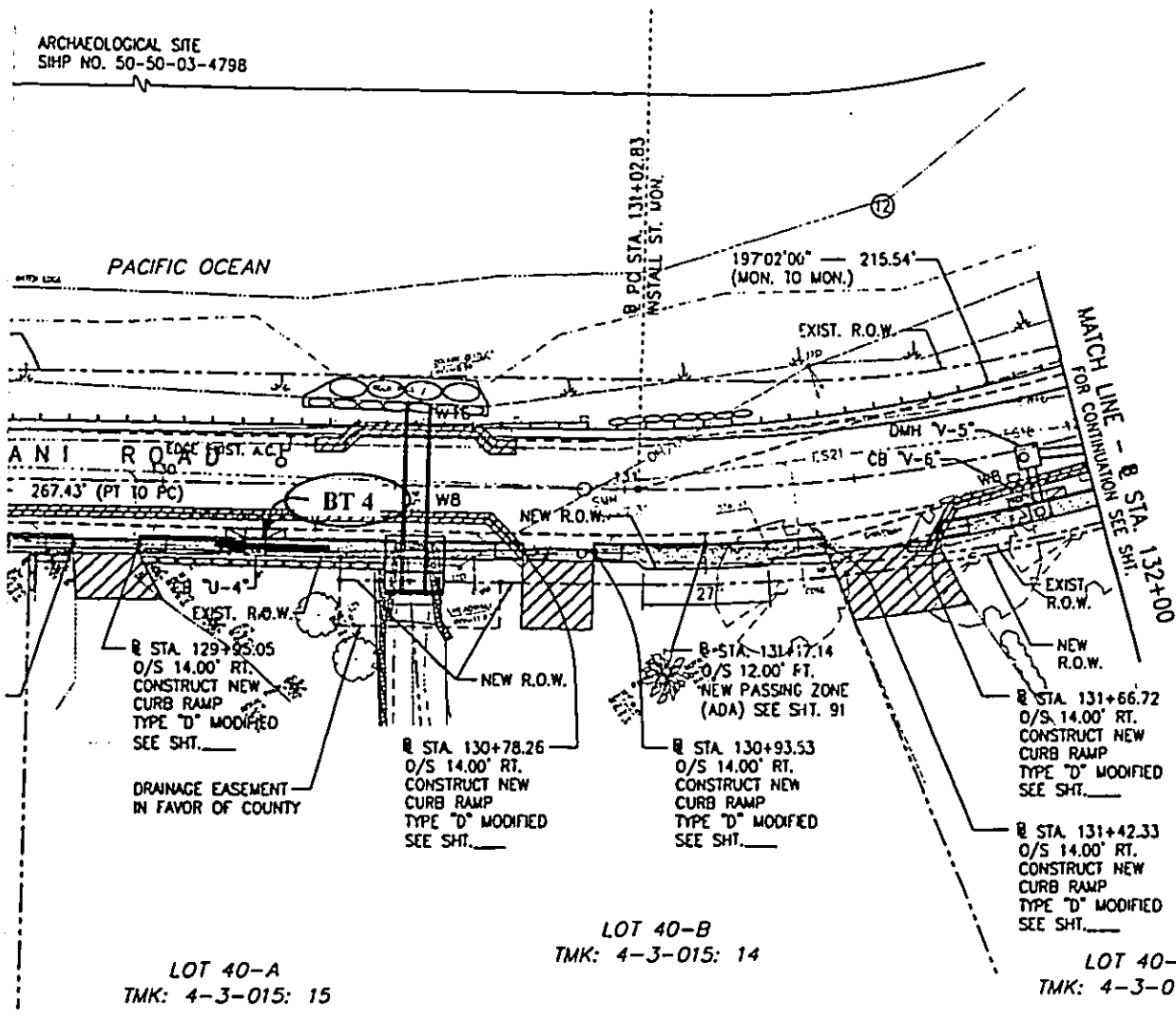


Map 5 – Improvement plan—STA. 127+00 to 132+00. Note locati Backhoe Trenches 3 and 4, Test Unit 1, and Profile 1.

℄ CURVE DATA						
NO.	Δ	Δ/2	R	T	Ch	Lc
⑪	7°57'00"	3°58'30"	2500.00'	173.72'	346.61'	346.88'
⑫	35°52'00"	17°56'00"	350.00'	113.27'	215.54'	219.10'

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.
HAWAII	HAW.	STP-3080(8)	2001	·





℄ STA. 127+00 TO ℄ STA. 132+00

2+00. Note locations of and Profile 1.

NOTES:

1. STEP FOOTING DETAIL FOR TYPES "C" AND "D" WALLS SEE DPW STD. DET. R-31
2. PROVIDE SMOOTH RIDING CONNECTIONS AND TRANSITIONS TO ALL CURB RAMPS, GUTTERS, SIDEWALKS, CURB RETURNS, DRIVEWAYS, AND ROADWAY INTERSECTIONS. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.

APR 0 6 2001

C-30

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 8874-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

REVISION	DATE	BY	MADE

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

IMPROVEMENT PLAN
STA. 127+00 TO STA. 132+0

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE – 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY KT	DRAWN BY AO	CHECKED BY

APPROVED — SUBMITTED BY

DATE — FOR MAYOR

INTRODUCTION

Xamanek Researches was originally contacted about a County of Maui, Department of Public Works Project for improvements on Lower Honoapi'ilani Road in July 1997. The original scope of this project, which is partially paid for with Federal funds, called for road widening, installation of curbs, gutters and sidewalks, and the relocation of utilities and drainage improvements. It is estimated that the impact zone for some of the improvements will be in excess of 2 meters in depth. An archaeological inventory survey was needed for the Special Management Area (SMA) permit application process. We were requested to submit a proposal for the required survey. Our proposal was subsequently accepted, and we were retained to conduct the inventory survey.

The archaeological inventory survey was carried out for this c. 1.4-mile (2.25-km) long, 40-foot (12-meter) wide corridor in early 1999 (Map 1). Three previously unrecorded historic properties were located during the inventory survey. These sites included a precontact habitation area—Site 4797, and two walls associated with Lower Honoapi'ilani Road—Sites 4798 and 4799 (Fredericksen and Fredericksen, February 2000). At the time of the inventory survey, it was not possible to carry out subsurface testing at Site 4797, due to safety considerations and private property access issues.[1] A draft inventory survey report was prepared and submitted to the State Historic Preservation (SHPD) division for review in December 1999. It was subsequently determined that additional inventory level work in the form of subsurface testing needed to be undertaken on Site 4797 (Doc. No.: 0002RC30). The following addendum inventory survey report presents the results of supplemental work at Site 4797.

[1] The road shoulder in the vicinity of Site 4797 is less than two meters wide and vehicular traffic is relatively heavy. In addition, several residential properties border Lower Honoapi'ilani Road. All of these properties have landscaping and/or fences or walls along their roadside boundaries, and it was necessary to obtain permission from the property owners to do subsurface testing on their lands.

BACKGROUND INFORMATION

Original fieldwork was carried out on Site 4797—a coastal habitation area—in 1999. As previously noted, it was not possible to conduct subsurface testing along the *mauka* side of the highway at the time of the original survey. The reader is referred to this earlier report for additional information (see Fredericksen and Fredericksen, 26 February 2000). While it was originally not possible to undertake subsurface testing at this site, we were able to recover a charcoal sample for radiometric analysis from an exposed pit feature in a wave cut bank. This sample was submitted to Beta Analytic, Inc. in Florida for analysis, and yielded a conventional radiocarbon age of AD 370±70. The calibrated date range at 2 Sigma (95% probability) was AD 1420 to 1660, while the intercept of the radiocarbon age with the calibration curve was AD 1490.

Site 4797 was interpreted as a coastal habitation area that was likely associated with marine resource utilization. As such, it represents one of the few surviving precontact sites of its type on this heavily developed portion of the West Maui coastline. It was deemed important under three Federal and State historic significance criteria: Criterion "a" because of its likely association with broad patterns of history in this region; Criterion "c" because it is considered to be an excellent example of a surviving precontact coastal site in this portion of West Maui; and Criterion "d" because of the site's information content. As previously mentioned, it was not possible to determine site extent at the time of the 1999 survey, due to safety considerations and access to privately owned parcels fronting Lower Honoapi`ilani road.

Over the course of the past year and a half, the County of Maui Department of Public Works and Waste Management has attempted to gain access to adjoining parcels along Lower Honoapi`ilani Road. This effort has been undertaken, in order to facilitate subsurface testing along the *mauka* side of the road. It was finally determined that testing would primarily take place in the County of Maui right-of-way, due to continued access problems. Subsequent access difficulties and the presence of several mature Monkeypod (Albizia saman) trees prompted the Department of Public Works and Waste Management to narrow the planned width of the planned road improvements in the general vicinity of Site 4797. The results of our additional inventory level work at Site 4797 are presented below.

ARCHAEOLOGICAL METHODS

Xamanek Researches carried out additional inventory level work on Site 4797 during February 2001. The wave cut bank area *makai* (west) of the road was first inspected prior to subsurface testing on the *mauka* (eastern) side. This inspection was undertaken, in order to reexamine site stratigraphy and assess additional wave-generated erosion of the site. Two additional wave-cut bank profiles were recorded. Subsurface investigation consisted of a 1.0 by 1.0 meter hand excavated test unit on a private parcel, and four backhoe trenches in the County of Maui right-of-way. All soil from the manually excavated unit was screened through 1/8-inch mesh hardware cloth, and all material culture remains were collected for subsequent analysis on Maui. Field notes were kept and photographs were taken with color film. Mapping was carried out with metric survey tapes and hand held compasses. No cultural materials were transported off-island, and standard laboratory methods were used.

Hugh Coflin and Erik Fredericksen conducted the supplemental fieldwork at Site 4797. Erik Fredericksen was also the project director, while Walter and Demaris Fredericksen were senior advisors. The County of Maui provided the use of a backhoe for subsurface testing along Lower Honoapi`ilani Road (Photos 4 and 5).

RESULTS OF ADDITIONAL WORK

The goal of this additional inventory level work was to obtain information about the extent of Site 4797. The wave cut bank west or *makai* of Lower Honoapi'ilani Road was examined, in order to identify likely stratigraphy that might underlay the road shoulder. Subsurface testing was confined to areas that were accessible—the western side of Parcel 16, and the portions of the County of Maui right-of-way that were free of driveways, walls, hedges and/or utilities. The results of this supplemental phase of inventory work are discussed below.

Exposed portion of Site 4797

Site 4797 was first noted in 1999 in a wave cut bank to the *makai* (west) of Lower Honoapi'ilani Road. At the time of the original survey, it was determined that the site extended at least from Station 126+20 to 128+30 (Fredericksen and Fredericksen, February 1999). Large, placed water worn boulders obscured the areas to the north and south.[2] The exposed portion of the wave cut bank was again examined in February 2001. This reexamination provided additional information about the Site 4797 cultural layer. Recent storm wave erosion revealed more of the cultural layer and additional information about the general stratigraphy of the area. Of particular interest was a terrestrial sand and gravel layer that was found to essentially overlay the Site 4797 cultural layer throughout the portion of the exposed wave cut bank. Two sample profiles were drawn and are discussed below.

Profile 1 (Figure 1; Photo 1)

This first profile section was recorded just to the southeast of an existing drainage culvert that passes under the road.[3] This portion of the bank had been previously cut away during the installation of the culvert a number of years ago. Some of the bank had collapsed since the last inspection of the area in 1999, revealing additional information about the Site 4797 cultural layer. A terrestrial sand layer (Layer IV) was noted here, and was found throughout the bulk of the exposed and eroded wave cut bank. This layer is notable, because it appears to cap the Site 4797 cultural deposit. A total of six strata were noted during recordation in this location (Figure 1).

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[2] These boulders were earlier placed to prevent wave erosion.

[3] This drainage culvert was used as a reference point during backhoe testing on the *mauka* side of Lower Honoapi'ilani Road.

Layer I (c. 0 to 52 cmbs) was composed of brown (7.4 YR 4/3) sandy silt. This relatively compact stratum appeared to have been previously disturbed—possibly by road construction. A few pieces of scattered, broken brown bottle glass (modern) were noted elsewhere in this layer. Layer II was composed of a thin band of brown (7.5 YR 5/4) sandy silt. This compact layer extended from c. 50 to 57 cmbs. No material culture remains were noted in this band. Layer III was made up of brown (7.5 YR 4/4) silty clay that was very compact. This stratum extended from c.55 to 82 cmbs. This layer also appeared to be sterile.

Layer IV (c, 80 to 111 cmbs) consisted of strong brown (7.5 YR 5/6) terrestrial silty sand. This relatively loose stratum contained generally fine grains of water worn basalt sand. A few pieces of scattered charcoal flecks were noted in this stratum. As previously noted, Layer IV essentially caps the Site 4797 cultural layer along inspected portions of the wave cut bank

Layer V represents the Site 4797 cultural deposit. This relatively compact stratum extended from c. 1.10 to 1.42 mbs. Generally low amounts of material culture remains were observed in this brown (7.5 YR 4/4) silty clay layer. Observer cultural materials included scattered charcoal, a fire-cracked rock, and a small piece of weathered cowry shell (Cypraea spp.). In addition, a subsurface feature was noted.

Feature 1.1 consisted of a small basin-shaped pit that extended from c.1.38 to 1.57 mbs. This dark brown (7.5 YR ¼) pit was charcoal stained, but did not have any visible material culture remains in it. Its function remains unclear.

Layer VI (c. 1.41 to 2.3 mbs) was made up of reddish brown (2.5 YR 5/3) clay This very compact stratum was sterile and overlaid weathered bedrock.

Profile 2 (Figure 3)

This second profile was located c. 12-m southwest of the drainage culvert noted in the Profile 1 section. Stratigraphy in this location was similar to that present in the previous profiled location. Profile 2 was included, because a conical coral abrader was found during the inspection of the profile. A total of seven strata were present in Profile 2.

Layer I was (c. 0 to 39 cmbs) was composed of brown (7.5 YR 4/3) clay fill. One piece of rusted metal, along with a piece of clear bottle glass were observed in this relatively compact layer. Layer II was made up of brown (7.5 YR 5/4) sandy silt. This apparently sterile layer was up to 11 cm thick. Layer III (c. 50 to 93 cmbs) consisted of brown (7.5 YR 4/4) silty clay that was also sterile.

Layer IV (c. 89 to 120 cmbs) was made up of strong brown (7.5 YR 5/6) terrestrial sand. This slightly compact stratum did not appear to contain any material culture remains. However, this stratum did overlie the Site 4797 cultural deposit.

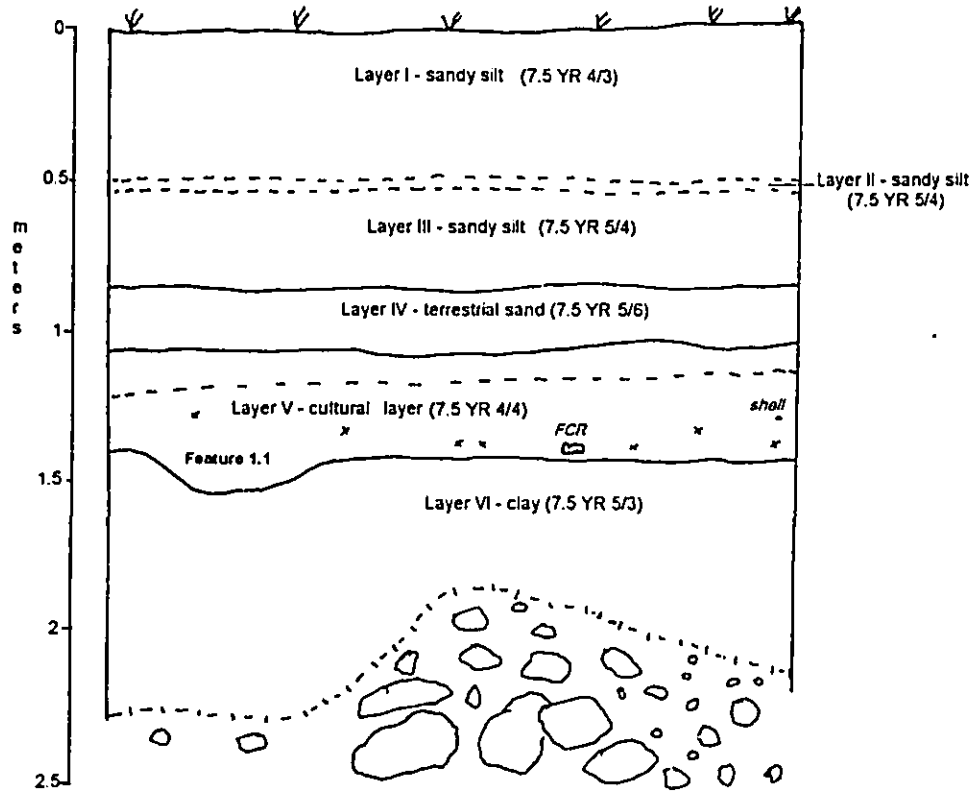

Figure 1 - SE face of Profile 1—Site 4797—near existing culvert.

Layer V (c.1.14 to 1.72 mbs) was composed of a similar brown (7.5 YR 5/3 to 4/4) silty clay deposit noted at the Profile 1 location. Scattered flecks of charcoal and a fire-cracked rock were observed, along with a conical coral abrader at c. 1.18 mbs. This coral abrader (Artifact #1) is c. 54 mm long by 29 cm wide and weighs 2.9 g (Figure 2). This artifact exhibits signs of chemical weathering likely due to the acidic soil. However, it nevertheless retains its shape and appears to have been well utilized in the past.

Layers VI and VII were composed of reddish brown (2.5 YR 4/4 and 5/4, respectively) clay. No material culture remains were noted in either compact stratum.

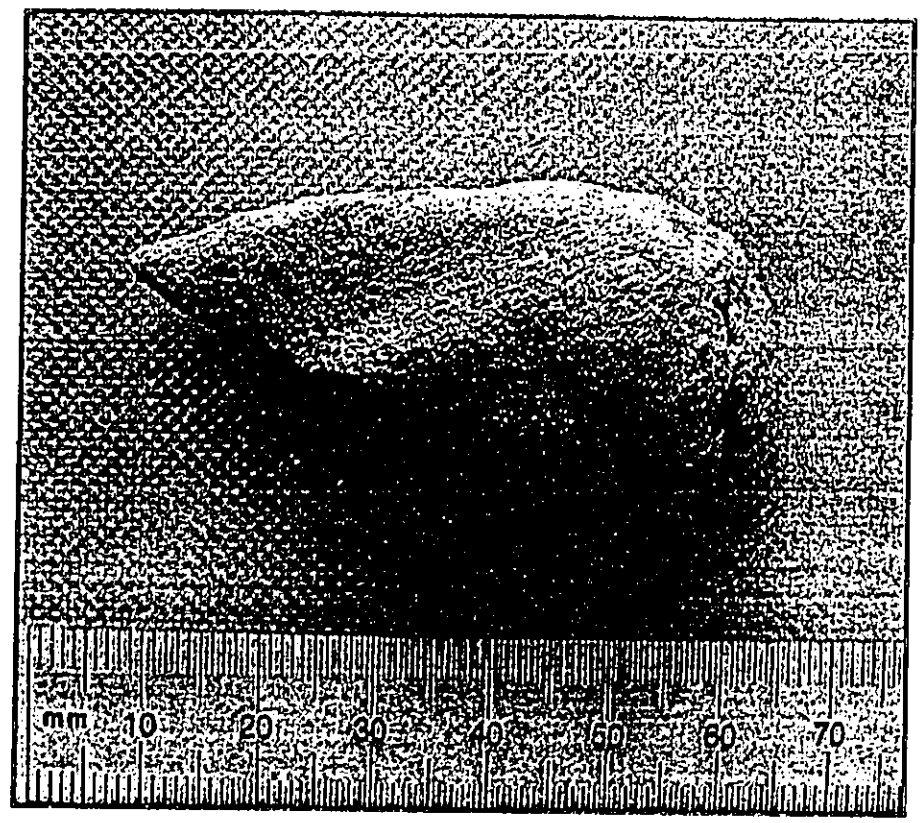

Figure 2 – Coral abrader recovered from exposed wave cut bank—Profile 2.

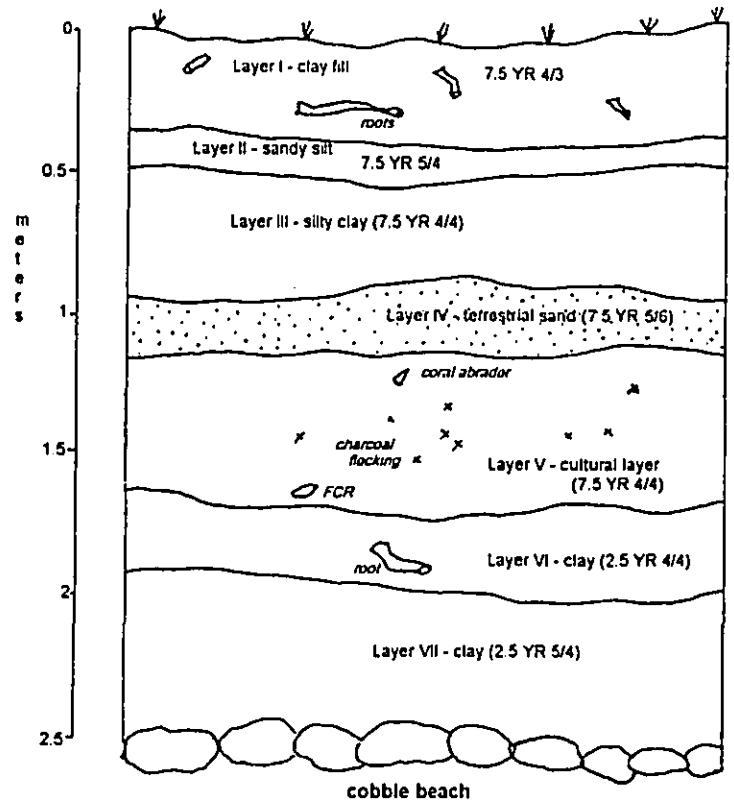

Figure 3 – east face of wave cut bank—Profile 2—Site 4797.

Discussion

The inspection of the wave-cut bank, nearly two years after the initial fieldwork, produced additional information about the stratigraphy of the Site 4797 general area. Of particular interest is the terrestrial silty sand stratum (Layer IV). This layer was found to overlay all exposed portions of Layer V (Site 4797) in the wave-cut bank *makai* of the road. This information was useful for the subsequent subsurface testing portion of the supplemental inventory work on Site 4797.

Subsurface testing along Lower Honoapi'ilani Road

As noted earlier, one manual test unit and four backhoe test trenches were utilized to sample subsurface conditions along the *mauka* side of Lower Honoapi'ilani Road. The test unit was excavated on a portion of a residential parcel that was in the original

proposed County of Maui right-of-way. This expanded right-of-way was subsequently abandoned, due to ongoing access problems.[4] Subsurface results are presented below.

Test Unit 1 (Photos 2 & 3)

This test unit was excavated near the southwestern corner of Parcel 16 in an existing lawn. Test Unit 1 was excavated to a maximum depth of 1.4 mbs and it was oriented N-S. A total of three strata were located in the unit before it was abandoned due to very hard subsurface conditions. No further testing was attempted because of a reduction in the width right-of-way easement *mauka* (southeast) of Lower Honoapi`ilani Road. This reduction decreased the proposed encroachment onto the residential properties, to essentially include only areas under existing walls, fences and hedges.

Layer I consisted of brown (7.5 YR 4/3) to dark brown (7.5 YR 3/2) silty clay. This very hard stratum is interpreted as landscaping fill soil. Modern materials noted in this fill included a piece of milled lumber, a fragment of rusted metal, and two pieces of bottle glass. This fill layer was up to 60 cm thick in this location.

Layer II was composed of brown (7.5 YR 4/4) sandy silty clay. This compact stratum extended from 60 to 89 cmbs. Material culture remains included a Planaxis shell, scattered charcoal, and a cement fragment at 87 cmbs. An old trench was located at c. 60 cmbs in the southern portion of the unit. It was subsequently determined that this disturbance was associated with the placement of electrical conduit. Consequently, the southern half of TU 1 was abandoned at c. 95 cmbs. Layer II in this location appeared to have been previously disturbed by trenching activities.

Layer III extended from c. 88 cmbs to the bottom of the unit at 140 cmbs. This strong brown (7.5 YR 5/6) silty clay deposit was sterile.

Discussion

Subsurface investigation on this portion of Parcel 16 did not yield any evidence of Site 4797. Layers I was associated with landscaping efforts on this parcel, while Layer II appeared to have been previously disturbed. Layer III appeared to be intact, but did not yield any material culture remains.

Backhoe Trench 1 (Figure 4)

This first backhoe trench was placed between the corner of Puamana Place and a utility pole. Trench dimensions were c. 5.5 m long by 2.3 m deep by 0.7 m wide. A sewer line lateral and associated trench were located in the northern end of the trench. A total of five of the six soil layers noted in the two *makai* profiles were encountered before the trench was halted at a maximum depth of 2.3 mbs .

[4] The proposed right-of-way would have extended over 10 feet into some residential lots. This right-of-way has been narrowed to less than 4 feet.

Layer I was composed of road fill that was up to 50 cm. thick. This dark brown (7.5 YR ¾) silty clay contained scattered modern materials including broken bottle glass, rusted metal, and plastic. Layer II was absent. Layer III (c. 35 to 80 cmbs) consisted of brown (7.5 YR 4/3) silty clay that was sterile.

Layer IV, the terrestrial silty sand stratum, was encountered between 80 to 100 cmbs. No material culture remains were noted in this slightly compact stratum.

Layer V was present from c.0.95 to 1.8 mbs. The upper (i.e. c. 0.95 to 1.4 mbs) portion of this compact silty clay stratum was slightly lighter brown (7.5 YR 5/4) than the lower half of the layer (7.5 YR 4/4). The upper Layer Va did not appear to contain any material culture remains, while the lower Layer Vb contained scattered cultural materials including flecks of charcoal and a piece of weathered coral. No subsurface features were noted in the SE profile of the trench.[5]

Layer VI was encountered at c. 1.7 mbs and extended to the bottom of the excavation at 2.3 mbs. This very compact stratum was sterile and weathered bedrock was located beyond 2 mbs.

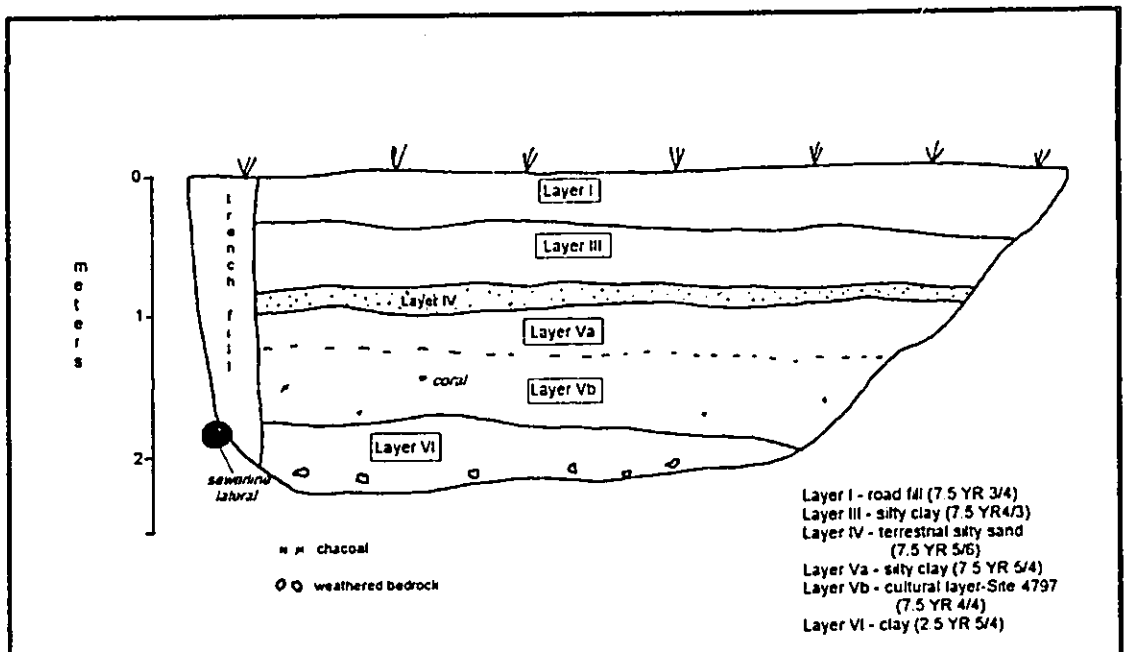

Figure 4 - ESE profile of BT 1 showing Layer Vb—Site 4797.

Backhoe Trench 2 (Figure 5)

This second trench was located near the *mauka* intake for the culvert that opens to the ocean near Profile 1 along the wave-cut bank. Trench dimensions were c. 5.5 m in

[5] The northwest profile of the trench revealed fill soil associated with an existing 8-inch County of Maui water line.

length by 2.4 m in depth by 0.7 m in width. The SW profile.of the trench revealed fill associated with the existing water line. Five of the six strata found in the *makai* wave-cut bank profiles were noted in the NE trench profile.

Layer I was up to 80 cm in thickness and was composed of brown (7.5 YR 4/4) and dark brown (7.5 YR 4/6) silty clay fill associated with the construction of Lower Honoapi`ilani Road. Scattered modern materials such as plastic, rusted metal, and broken brown bottle glass were noted in this fill layer. Layer III extended from c. 70 to 115 cmbs. This brown (7.5 YR 4/3) silty clay appeared to be sterile.

Layer IV (c. 1.1 to 1.35 mbs) consisted of fine silty terrestrial sand. This strong brown (7.5 YR 5/6) semi-compact stratum did not appear to contain any material culture remains.

Layer V (c. 1.35 to 2.3 mbs) was composed of a slightly lighter brown (10 YR 5/4) silty clay designated Layer Va and a slightly darker brown (7.5 YR 4/4) designated Layer Vb. No material culture remains were observed in Layer Va, while scattered cultural materials were noted in Layer Vb. Observed cultural materials included

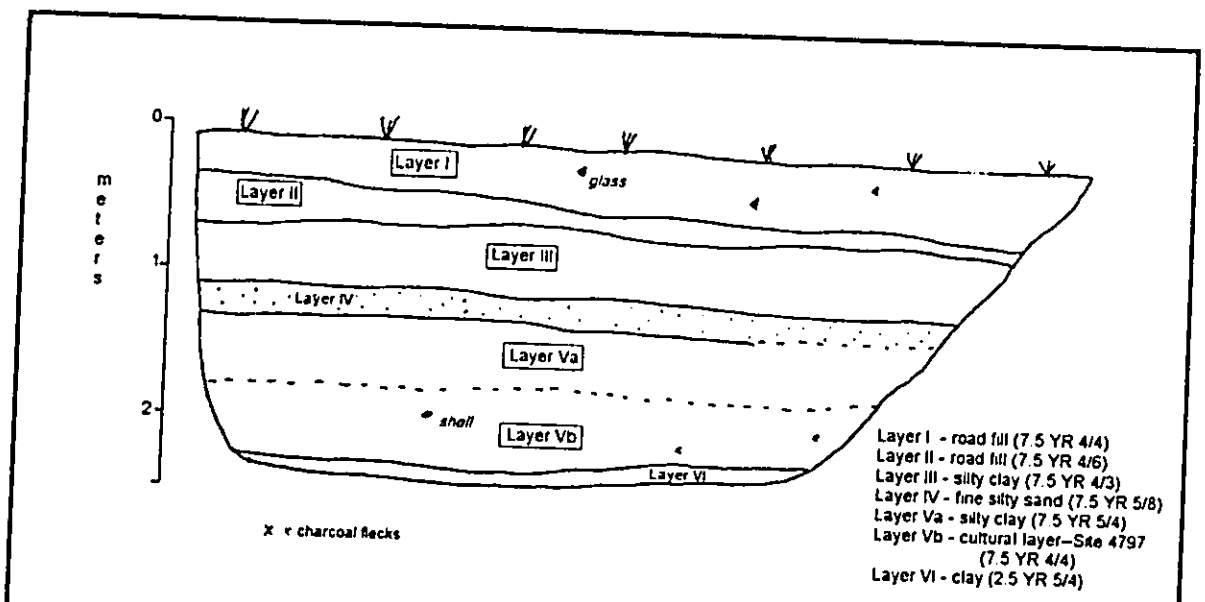

Figure 5 - WNW profile of BT 2, showing Layer Vb—Site 4797.

scattered flecks of charcoal, and a piece of weathered *opihi* (Cellana spp.) shell. No recognizable subsurface features were present in this locale.

Layer VI consisted of the common reddish brown (2.5 YR 5/4) clay subsoil. This compact stratum appeared to be sterile.

Backhoe Trench 3 (Figure 6)

This third trench was placed in front of Parcel 16, c. 25 meters northwest of the previously excavated Test Unit 1. Trench dimensions were 5.5 m in length by 2.7 m in depth by 0.7 m in width. The *makai* or northwest profile of this trench revealed previously disturbed soil associated with the previously mentioned County of Maui water line. Four of the common soil layers were present in the intact face of the backhoe trench.

Layer I (0 to 45 cmbs) was composed of brown (7.5 YR 5/4) silty clay fill associated with the previous construction of Lower Honoapi'ilani Road. This compact fill layer contained scattered modern cultural materials including plastic, clear bottle glass and rusted metal. Layer II was absent. Layer III extended from c. 35 to100 cmbs. This strong brown (7.5 YR 4/6) silty clay stratum was very compact and appeared to be sterile.

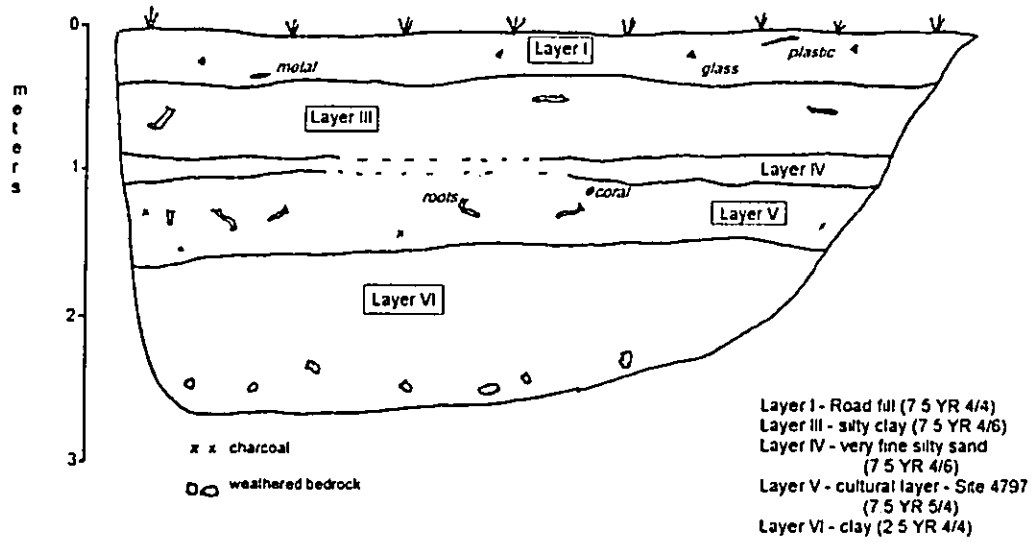

Figure 6 - ESE profile of BT 3, showing Layer V—Site 4797.

Layer IV (c. 95 to 115 cmbs) was made up of the common terrestrial sand. This very fine brown (7.5 YR 5/4) silty terrestrial sand was slightly compact and did not appear to contain any material culture remains.

Layer V (c. 1.1 to 1.7 mbs) consisted brown (7.5 YR 5/4) silty clay. Inspection of the profile of this compact stratum revealed scattered amounts of charcoal flecks, one piece of weathered coral, and a water worn pebble. No subsurface features were observed in the southeastern face of BT 3.

The common reddish brown (7.5 YR 4/4) Layer VI extended from 1.6 mbs to the bottom of the trench at 2.7 mbs. This very compact stratum was sterile.

Backhoe Trench 4 (Figure 7; Photos 4 & 5)

This fourth trench was placed c. 10 meters to the southeast of an existing 54-inch drainage culvert. Subsurface stratigraphy encountered here was somewhat different from the other backhoe trenches in the project area. Layer VI was composed of what is interpreted as a marginal portion of a former streambed. Backhoe Trench 4 was a maximum of 6 m long by 2.5 m deep by 0.7 m wide. A total of four layers were located in BT 4 before it was abandoned.

Layer I consisted of silty clay fill associated with previous road construction. This dark brown (2.5 YR ¾) soil contained a few pieces of modern bottle glass and rusted metal. In addition, the backhoe bucket exposed a ½-inch diameter PVC irrigation pipe. Layers II and III were absent in this location.

As previously noted, Layer IV was composed of what appears to be a former streambed or bank. This brown (7.5 YR 5/2) alluvial deposit contained fine through coarse basalt sand and gravel as well as water worn pebbles and cobbles. This deposit extended from 0.6 to 1.5 mbs.

A remnant of a probable cultural layer was noted in the southern end of BT 4. An approximately 2 meter long section of this brown (7.5 YR 4/4) stratum was capped by the previously noted stream deposit. The visible portion of Layer V extended from c. 1 to1.3 mbs. Scattered charcoal flecks and a fire-cracked rock were noted in this relatively compact layer. It was not possible to extend the trench further to the south due to the proximity of a driveway that services three occupied dwellings. It is interesting to note that a c. 15-cm thick lens of terrestrial sand directly underlaid a portion of Layer V. This sand was sterile, and its context remains unknown. A single basalt artifact was recovered from the fill from this test. This rectangular abrader/file (Artifact #2) measures 100.9 mm. in length, 32.2 mm. in width, and is a maximum of 15.7 mm. thick. It is roughly triangular in cross-section, and the thin edge shows flaking scars and wear. The blunt end also shows signs of flaking and wear. It weighs 76.3 g. (Figure 8).

Layer VI was encountered at c. 1.3 mbs and extended to the bottom of BT 4 at 2.6 mbs. This very compact red (2.5 YR 4/6) clay was sterile. The edge of the existing County of Maui water line was exposed in the northwestern end of the trench at c. 1.5 mbs and due care was exercised through the rest of the excavation process.

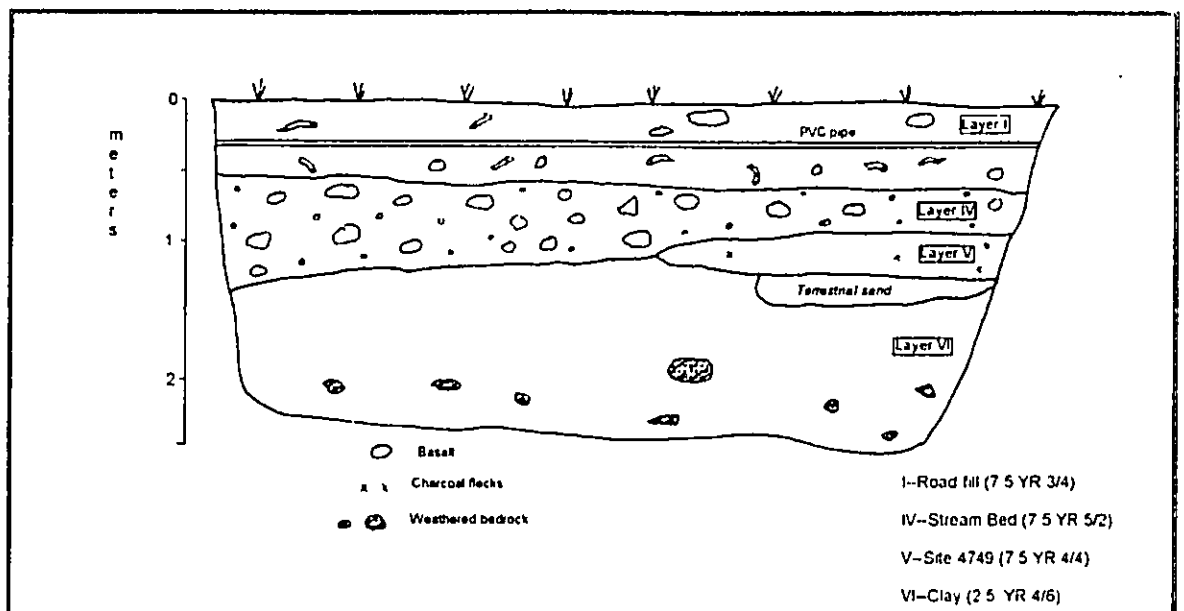

Figure 7 -ESE profile of BT 4, showing old stream bed and remnant of Layer V—Site 4797.

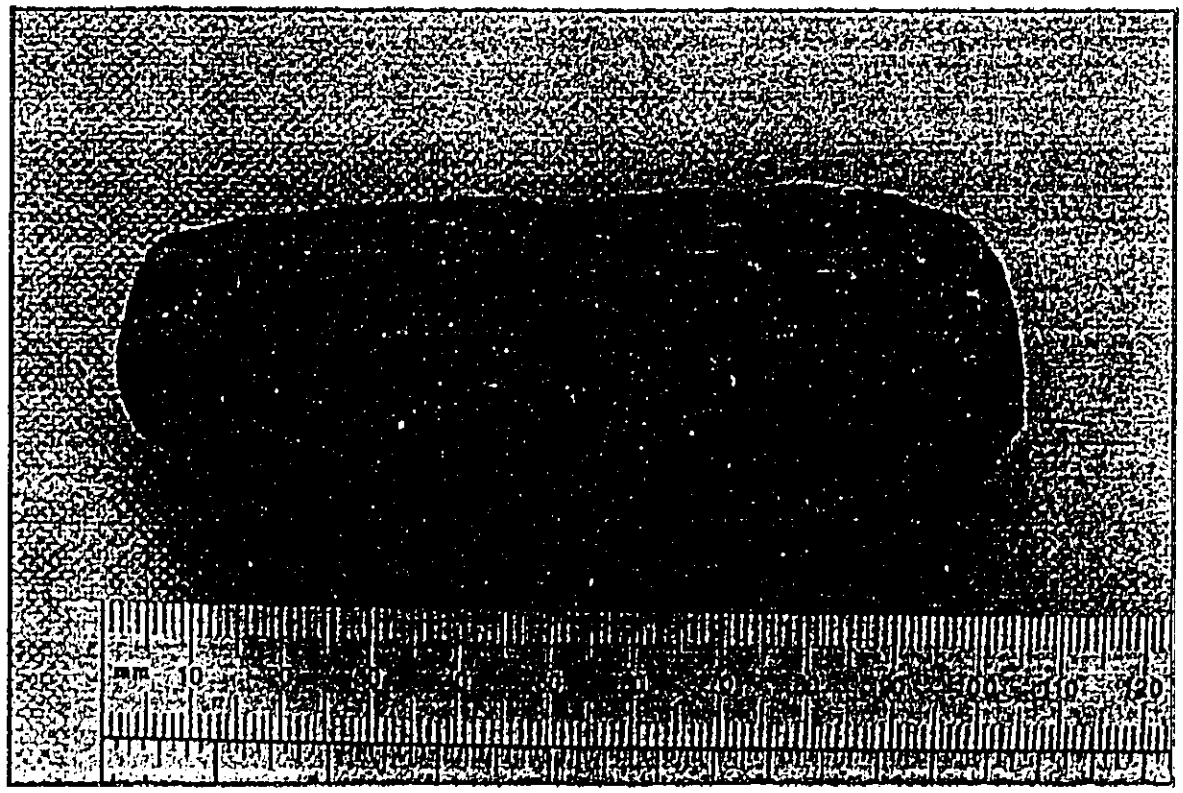

Figure 8 – Basalt abrader/file recovered from Backhoe Trench 4 (Artifact #2).

Discussion

Backhoe testing undertaken during additional inventory level work along Lower Honoapi'ilani Road revealed subsurface conditions somewhat similar to those noted in the wave-cut bank area. Fill associated with previous road construction was present in all four test instances. The Layer IV terrestrial sand stratum was present in Backhoe Trenches 1, 2 and 3, and a streambed deposit was located in BT 4. Layer V was present in the first three trenches, while a possible remnant of this stratum was noted in BT 4. Scattered charcoal flecking, occasional fire-cracked rocks, and isolated pieces of marine shellfish were noted in the *mauka* profiles of the trenches.[6] This layer was underlain by sterile subsoil.

SUMMARY AND CONCLUSIONS

Supplemental inventory level testing yielded important information about the extent of Site 4794. A cultural layer—interpreted as the Site 4797 deposit—was located on the *mauka* side of Lower Honoapi'ilani Road at c. 1.1 to 1.5 meters below surface. Based on our backhoe testing results, it appears that the site extends along the coast, at least from STA 125+60 to possibly as far northeast as STA 130+50 (c. 150 meters). While no subsurface features were noted during the inspection of the four *mauka* trench profiles, it is important to note that feature density in the exposed portion of Site 4797 *makai* of Lower Honoapi'ilani Road is relatively low. A total of 5 recognizable pit features and 2 possible features were noted in the wave-cut profile that spans a distance of c. 78 meters. It appears quite possible that our backhoe tests may simply have missed subsurface features that are associated with this site. Relatively few portable remains were noted in inspections of Layer V along the wave-cut bank and in the backhoe trenches. The few marine shells that were observed were very weathered, a reflection of the very acidic soil conditions on this part of West Maui.

It is important to note that this supplemental inventory survey was conducted under very challenging conditions. Traffic on Lower Honoapi'ilani Road is relatively heavy, and the shoulder of the road is typically from c.1 to less than 2 meters wide (See Photos 4 and 5).

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[6] The *makai* profiles of all trenches extended into the trench associated with a preexisting County of Maui 8-inch water line.

Site Significance Assessment

Additional information has been gained about site extent, and Site 4797 remains significant under multiple significance criteria. This coastal site appears to be relatively extensive and still qualifies for significance under Criterion "a", Criterion "c", and Criterion "d". As noted in the 2000 initial inventory survey report, this site is a rare example of a surviving coastal habitation site along this heavily developed portion of the West Maui coastline.

Mitigation Recommendations

This coastal site retains its significance under Criteria "a", "c" and "d". Further work is needed on the site, yet it is important to stress that any future investigation will be further complicated by the close proximity of Lower Honoapi`ilani Road, several paved driveways, Puamana Place, utilities (both above and below surface), and private properties along with their associated landscaping, walls and fences.

As noted earlier, the County of Maui has reduced the width of the proposed right-of-way easement in response to concerns raised by private property owners. While this decision reduces the amount of land that will be condemned by the County, it also places the area that will be impacted under existing hedges, walls, fences and driveways. It is now essentially impossible to test this area without destroying these improvements.

We propose that additional inventory level investigations be carried out in the portion of the road corridor that crosses Site 4797 after the SMA permit has been granted, and the County of Maui has access to all residential lots that will be impacted by the right-of-way construction. It is recommended that this supplemental work be carried out prior to the advent of actual road construction. This can be accomplished with a "pre-digging" methodology[7] that would be conducted with a single piece of equipment such as a backhoe. This approach would be more cost-effective in the long run, and would not hinder a road construction crew. This methodology has worked well in other challenging situations where pavement and/or utilities and other obstacles are present (i.e. Fredericksen and Fredericksen, 2000—Wai`ehu Kou 2 sewer line project). It is felt that this approach will effectively recover additional information about Site 4797, as well as identify any burials that might be associated with this buried occupation layer.

[7] This involves trenching the area to be impacted prior to actual construction. Any finds can be dealt with at that time, thus allowing subsequent construction work to proceed at a normal pace.

References

Fredericksen, Erik M., and Fredericksen, Demaris L.

February 26, 2000 — *Archaeological Inventory Survey of the Lower Honoapi'ilani Road Improvements Project Corridor (TMK 4-3-03; 4-3-05; 4-3-10; 4-3-15) Lahaina District, Maui Island.* Prepared for County of Maui Department of Public Works and Waste Management. Prepared by Xamanek Researches, Pukalani, HI.

August 18, 2000 — *Archaeological Inventory Survey for the Waiehu Kou Sewer Line Corridor, Wai'ehu Ahupua'a, Wailuku District, Island of Maui (TMK: 3-2-13).* Prepared for Department of Hawaiian Home Lands, by Xamanek Researches, Pukalani, HI.

Photo 1 – Wave cut bank where Profile 1 was recorded.

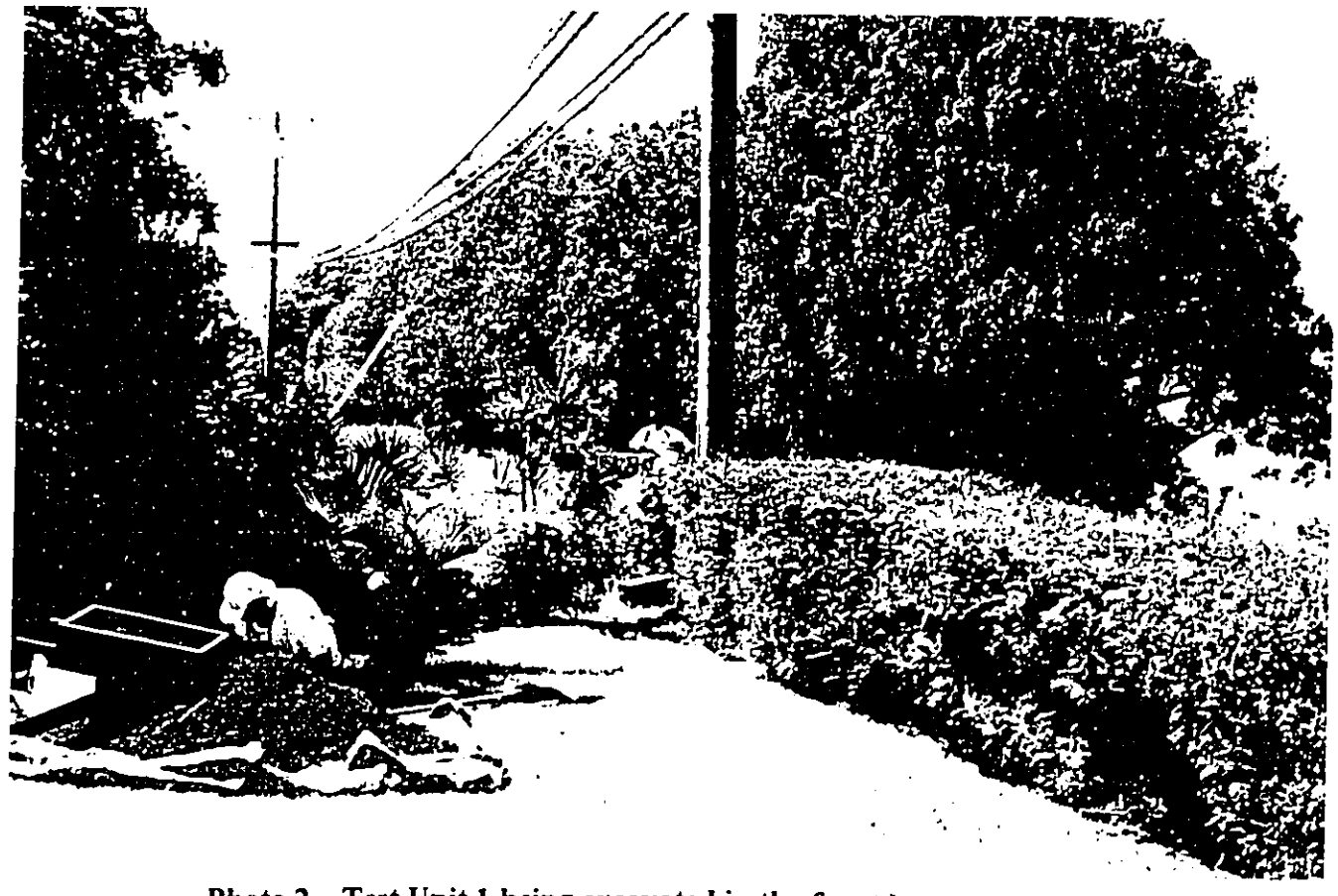

Photo 2 – Test Unit 1 being excavated in the front lawn of property.

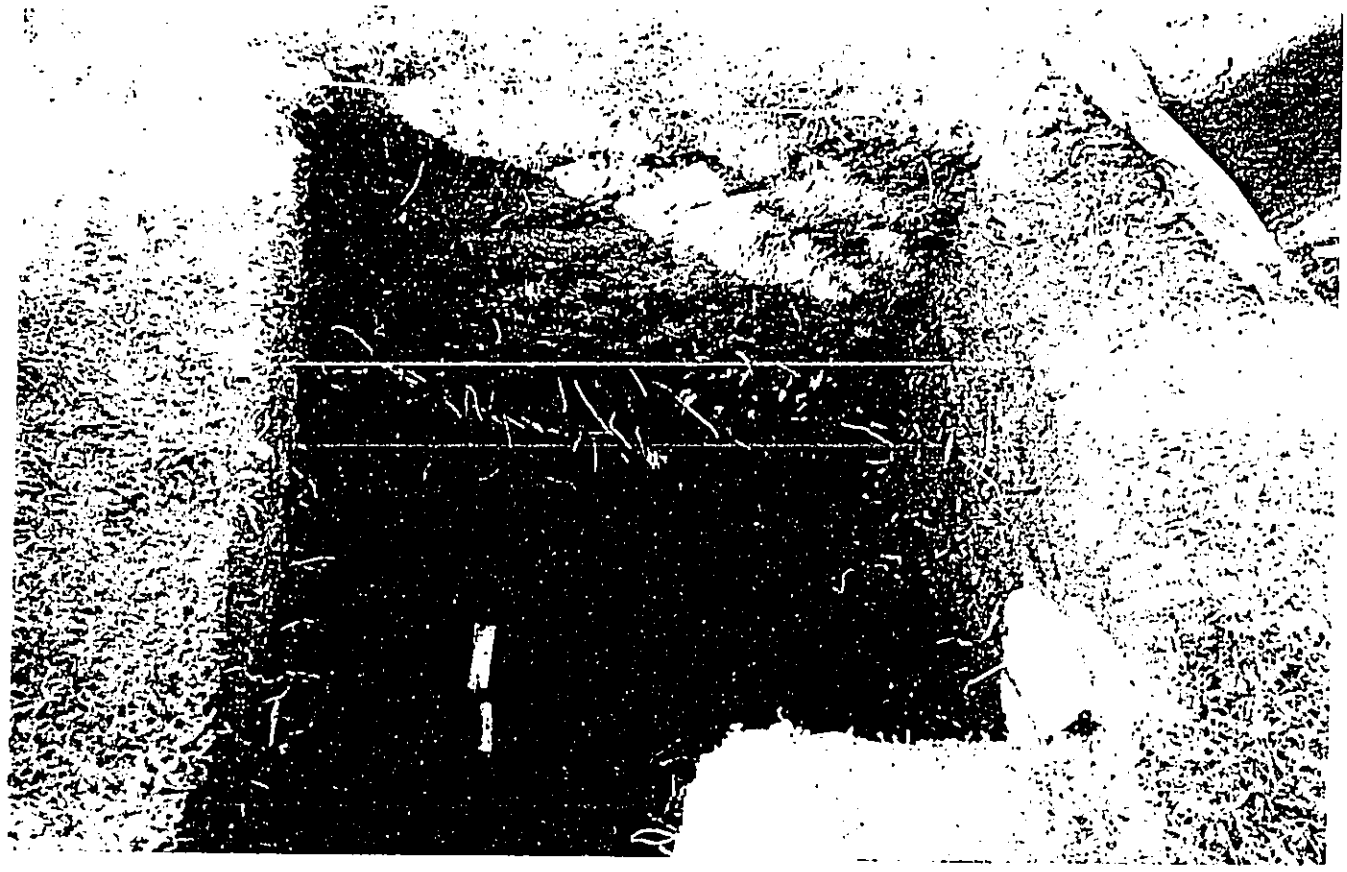

Photo 3 – Test Unit 1—excavation completed.

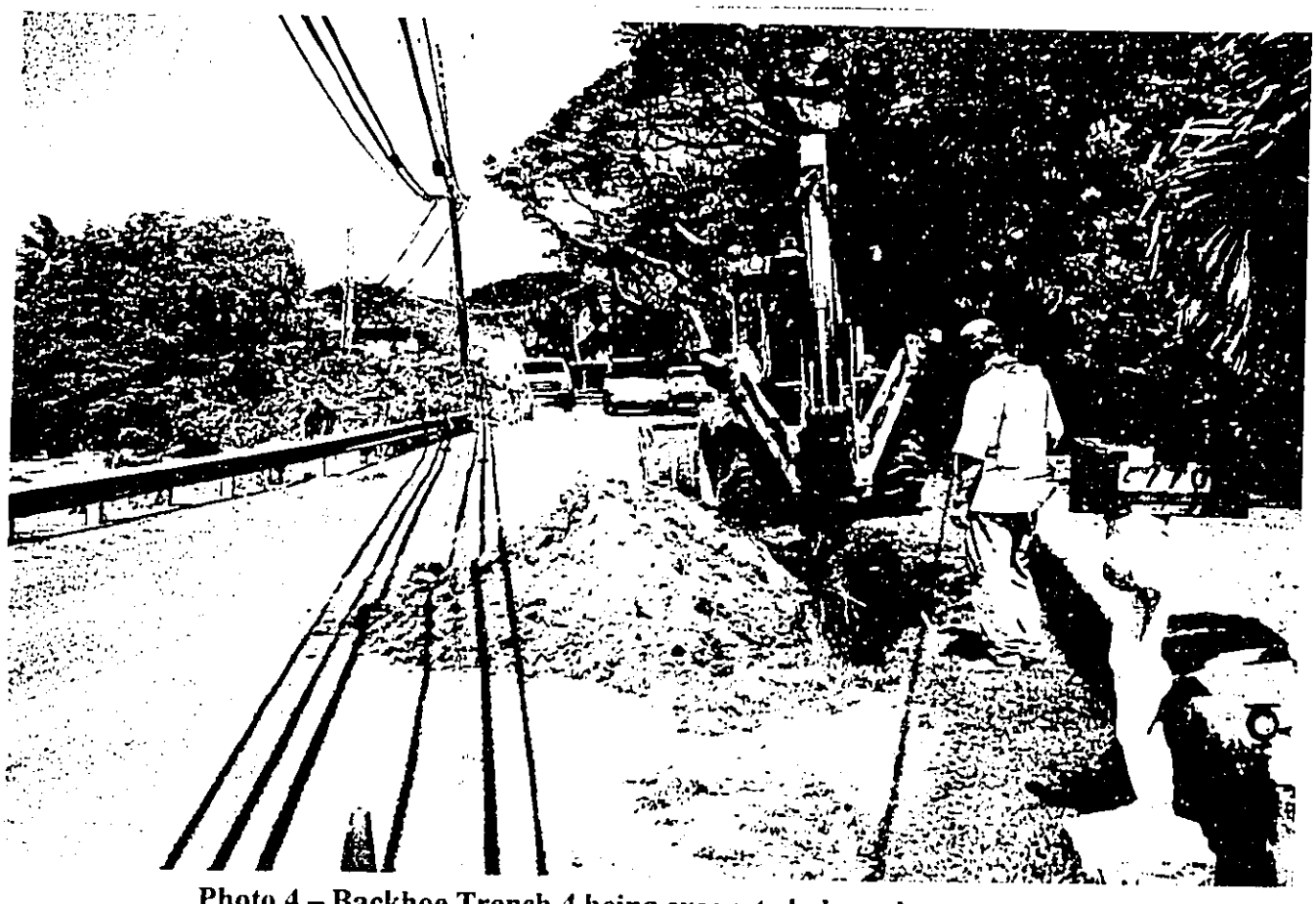

Photo 4 – Backhoe Trench 4 being excavated along the roadway.

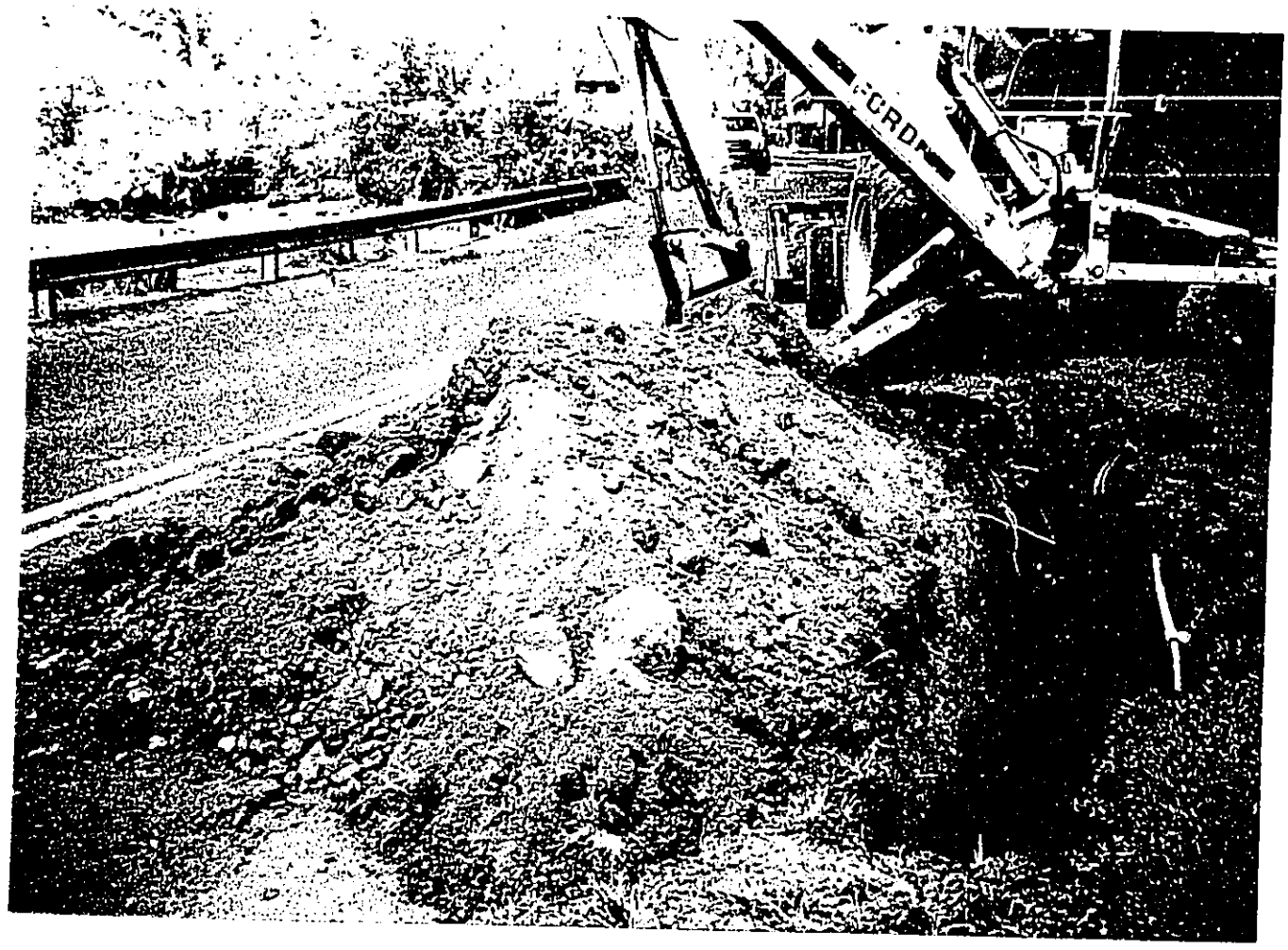

Photo 5 – BT 4—again illustrating the difficult working conditions.

Appendix C

Coastal Evaluation

COASTAL EVALUATION
FOR THE
LOWER HONOAPI`ILANI ROAD
IMPROVEMENTS, PHASE 4
(HO`OHUI RD. TO NAPILIHAU ST.)

Federal Aid Project No. STP-3080(8)
District of Lahaina,
Island of Maui

Prepared for:
County of Maui,
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Hawai`i 96793

Submitted by:
Sea Engineering, Inc.
Makai Research Pier
41-202 Kalaniana`ole Highway, Suite 8
Waimānalo, Hawai`i 96795

September 2000

#20-27

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COASTAL EVALUATION FOR THE LOWER HONOAPI`ILANI ROAD IMPROVEMENTS, PHASE 4 (HO`OHUI RD. TO NAPILIHAU ST.)

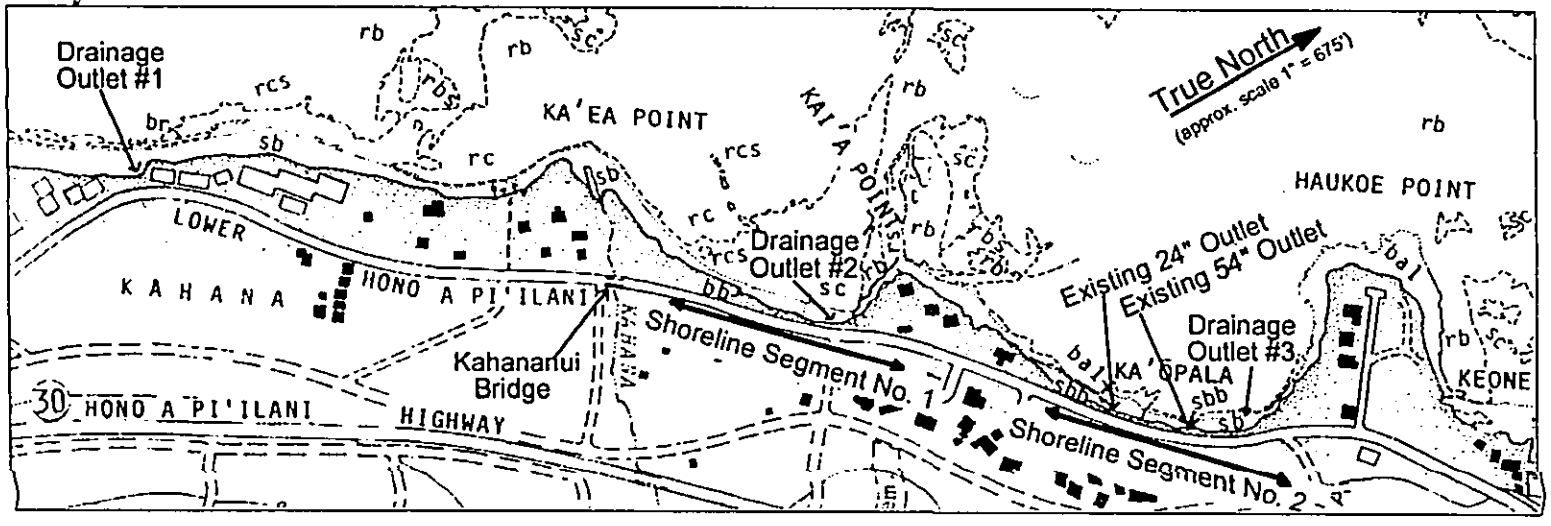
1. INTRODUCTION

The County of Maui Department of Public Works and Waste Management has applied for Special Management Area (SMA) Use Permit and Shoreline Setback Variance (SSV) in order to initiate improvements to Lower Honoapi`ilani Road from Ho`ohui Rd. to Napilihau St., on a 1.4 mile stretch between Kahana and Nāpili on the West-Northwest coast of the island of Maui. The improvements consist primarily of roadway widening and drainage modifications. The project will provide local residents and visitors with better driving conditions, safer pedestrian walkways, and improved drainage conditions. This report is a discussion of the oceanographic conditions, results of a reconnaissance site condition survey, and an assessment of project impacts and mitigative measures in a study area between Kahana and Haukoe Point. Biological and water quality assessments were conducted by Aecos, Inc., and their report is included as an appendix (Aecos, Inc., 2000).

The project location and study area is shown in Figure 1, and an aerial photograph of the study area is shown in Figure 2. The shoreline along this coast is characterized by a series of embayments slung between headlands. Two segments of Lower Honoapi`ilani Road directly border the shorelines: 1) the embayment between Ka`ea Point and Kai`a Point north of Kahana Stream (Shoreline Segment No. 1); and 2) the Ka`ōpala gulch embayment south of Haukoe Point (Shoreline Segment No. 2). The road also briefly touches near the shoreline on the northern end of Kahana Beach by the Pōhailani condominium (Outlet No. 1). In addition, the road improvements will include widening of the Kahananui Bridge and relocating existing utility lines adjacent to the bridge that cross Kahana Stream.

Three existing drainage outlets will be repaired, and two new ones will be constructed. Drainage Outlet No. 1, located at the curve near the Pōhailani condominium, is an existing 18-inch outlet that was severely damaged during the high winter surf conditions of the 1998-1999 season. It will be completely renovated with a new 36-inch culvert, with cement rubble masonry (CRM) headwall and wing walls, and a grouted rubble paving (GRP) apron. Drainage Outlet No. 2 is a new outlet and will consist of a new 30-inch outlet and CRM headwall located along Shoreline Segment No.1 just south of Hui Road D. Drainage Outlet No.3 will also be a new outlet located at the north end of the Ka`ōpala gulch embayment (Shoreline Segment No. 2), just south of Haukoe Point. It will consist of a new 24-inch culvert and CRM headwall. Shoreline Segment No. 2

Study Area



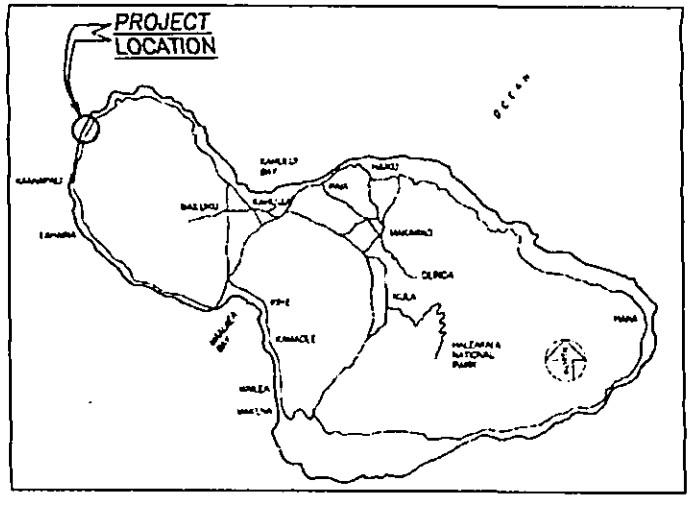


Figure 1. Project site location and study area on the island of Maui.

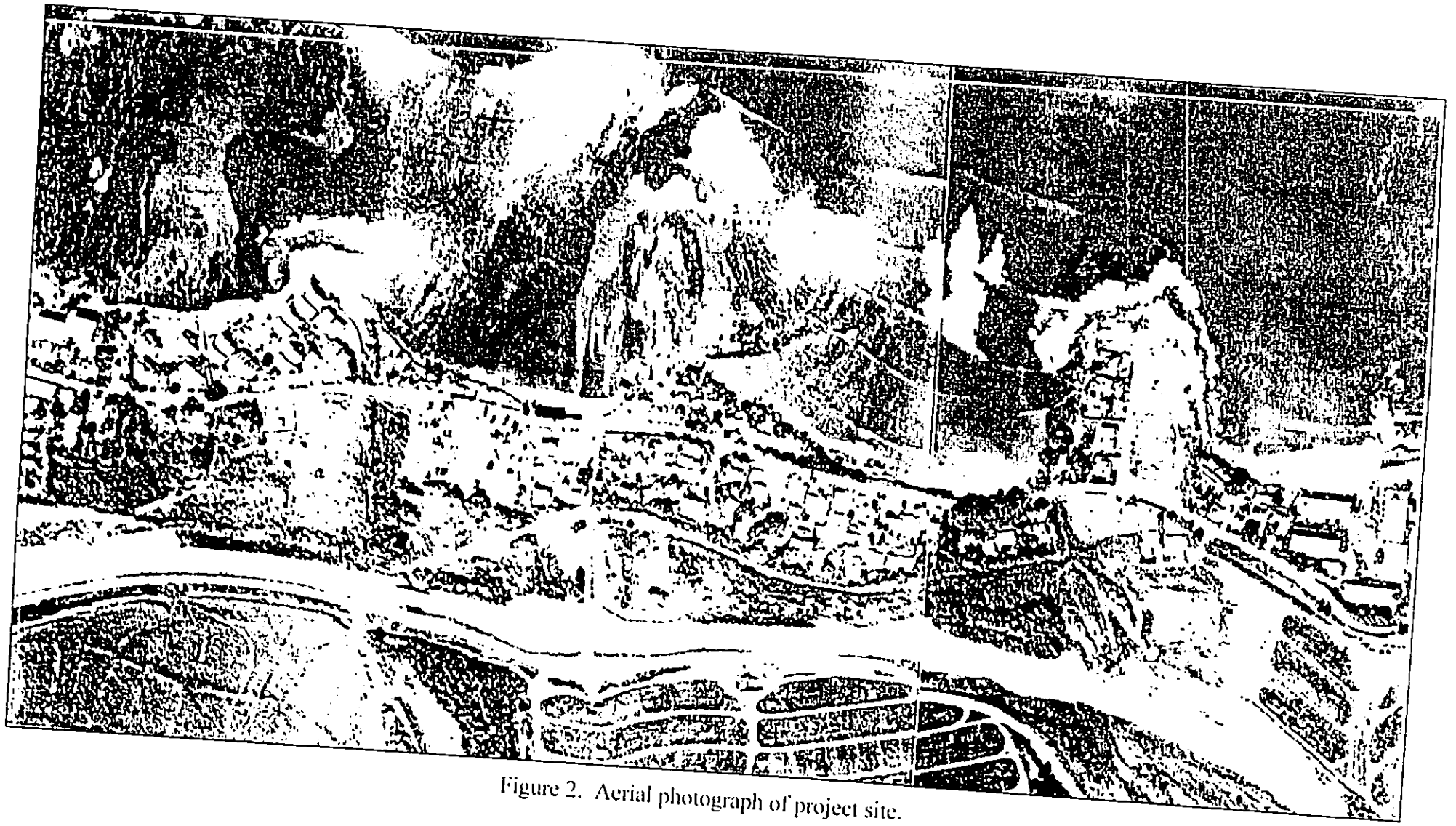


Figure 2. Aerial photograph of project site.

also contains two existing outlets, a 24-inch and a 54-inch. The 54-inch outlet will be renovated with a new 54-inch culvert and CRM inlet structure with a GRP apron. The CRM headwall of the existing 24-inch outlet will be repaired.

2. OCEANOGRAPHIC SETTING

The project site is on the west-northwest coast of the island at the foot of the West Maui Mountains. The site is protected from prevailing tradewinds by the mountains, and is somewhat sheltered from waves by the surrounding islands of Moloka`i, Lāna`i, and Kaho`olawe.

2.1 Winds

The predominant winds in the Hawaiian Islands are the northeast tradewinds. During the summer months of April through October, the tradewinds occur 80-95 percent of the time with average speeds of 10-20 mph. The tradewind frequency decreases to 50-60 percent of the time during the winter months, when southerly or "Kona" winds may occur. Kona winds are generally associated with local low pressure systems. Kona conditions occur about 10 percent of the time during a typical year, with winds ranging from light and variable to gale strength. A severe, relatively long duration Kona storm which occurred in January 1980 produced sustained wind speeds of 30 mph, with gusts in excess of 50 mph, from the southwest. Winds of hurricane strength occur infrequently in Hawai`i, but they are important for design purposes because of their intensity.

The blocking effect of the West Maui mountains decreases the influence of tradewinds in the Kahana-Nāpili area. As a result, a land-sea breeze condition caused by the diurnal heating and cooling of the land often predominates in coastal areas.

2.2 Waves

The general Hawaiian wave climate can be described by five primary wave types: 1) northeast tradewind waves generated by the prevailing northeast winds; 2) north Pacific swell generated by mid-latitude low pressure systems; 3) southern swell generated by mid-latitude storms of the southern hemisphere; 4) Kona storm waves generated by local low pressure storm systems; and 5) hurricane waves generated by nearby tropical storms and hurricanes. Northeast tradewind waves occur throughout the year, but the other wave types have seasonal distributions. North Pacific swell and Kona storm waves typically occur from October through March during the northern hemisphere winter. Conversely, southern swell typically occurs from April through September during the southern hemisphere winter. Hurricanes and tropical storms are also summer and fall phenomena.

The shorelines within the study area are directly exposed to deepwater waves from the sector 170° clockwise to 220° true north and to waves from approximately due west (Figure 3). The study area is well protected from the northeast tradewind waves by the island of Maui itself. North Pacific swell approaches from the sector west through north.

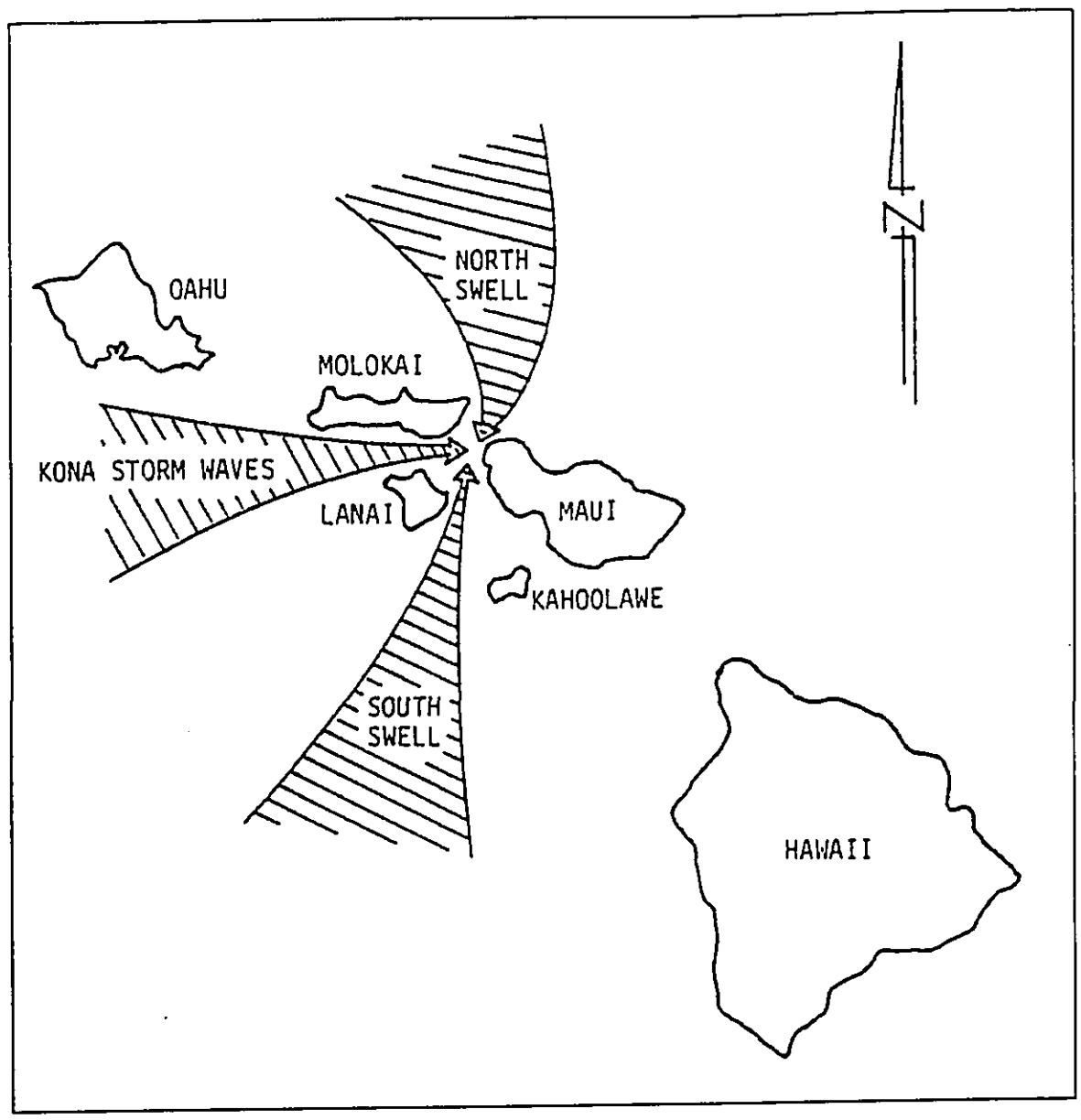


Figure 3. West Maui wave exposure.

Typical deepwater heights are 5 to 15 feet, but higher waves can occur, and 20-foot waves occur on at least an annual basis. Although the project coast is partially sheltered from west and west northwest swells by the island of Moloka`i, some north swell energy refracts and diffracts around the east end of Moloka`i to reach the area. Wave heights are typically one-third to one-half that of waves on fully exposed coasts.

Southern swell is generated from mid-latitude winter storms in the southern hemisphere. These waves must travel long distances in order to reach the Hawaiian Islands, and are characteristically long and low, with deep water wave heights of 1 to 6 feet and wave periods of 12 to 20 seconds. Their approach can vary from southeast through southwest. Kona storm waves are locally generated by southerly winds associated with nearby winter storms. They may have wave heights over 10 feet, with periods of 8 to 10 seconds. Kona storm waves approach from the south to the west, with the largest waves usually coming from the southwest. Deepwater wave heights during the severe Kona storm of January 1980 were about 17 feet with a period of 9 seconds. The islands of Lāna`i and Kaho`olawe partially block both southern swell and Kona storm waves from reaching the study area.

2.3 Storms

There are two distinct types of storms that typically affect the Hawaiian Islands. These are Kona storms and tropical cyclonic storms. Kona storms occur when the winter low pressure systems that travel across the North Pacific Ocean dip south and approach the islands. Southerly winds generated by these storms not only cause Kona storm waves, but bring considerable precipitation to the normally dry leeward coasts. Hurricanes, the worst-case tropical cyclonic storms, are caused by intense low pressure vortices that are usually spawned in the eastern tropical Pacific Ocean and travel westward. While they typically pass south of the Hawaiian Islands, their paths are unpredictable and they will occasionally pass near or over the islands. In recent years Hurricane `Iwa (1982) and Hurricane `Iniki (1992) directly hit the island of Kaua`i. Damage from these hurricanes was extensive, not only on Kaua`i, which was subject to both high wind and waves, but also along coastal areas of other islands exposed to the large hurricane storm waves.

2.4 Tides

The tides in the Hawaiian Islands are semi-diurnal in nature, with pronounced diurnal inequalities (i.e. two tidal cycles per day with the range of water level movement being unequal). The nearest official tide station to the project site is at Lahaina. Based on National Oceanic and Atmospheric Administration (NOAA) tide prediction tables, the tides at Lahaina are:

Highest Tide (estimated)	1.6 feet
Mean Higher High Water	1.2 feet
Mean High Water	0.7 feet
Mean Tide Level	0.0 feet
Mean Low Water	-0.7 feet
Mean Lower Low Water	-1.0 feet

These values are referenced to the Mean Tide Level datum, which is approximately equal to Mean Sea Level. The MSL datum is used for the reference elevation in this report.

2.5 Currents and Circulation

Local currents in the Hawaiian Islands are generally driven by the semi-diurnal tides. Current measurements conducted by SEI off Kā`anapali in 1986 showed ebb tide currents flowing to the north and flood tide currents directionally inconsistent, flowing both north and south. The change in current direction lags the tide change by one to two hours. North flowing currents are stronger than south flowing currents with average speeds of about 0.25 knots (0.29 mph). Flood tide currents flow at about half the speed of ebb tide currents.

Nearshore circulation is greatly affected by the presence of reefs and breaking waves. The bay and headland morphology of the coastline along the study area is also characterized by the presence of fringing reefs lying 400 to 1000 feet offshore. Circulation near the reefs is probably vigorous due to the presence of breaking waves. However, circulation near the shoreline appears to be generally low. In both shoreline segments, the bottom sediment nearshore contains a significant amount of silty sediment that contributes to a prevailing condition of high turbidity. The amount of silt in the bottom sediment decreases with distance from the shoreline.

2.6 Tsunamis

About 85 tsunamis have been observed in Hawaii since 1813, with 15 resulting in serious damage. Four tsunamis have occurred in recent history, occurring in 1946, 1957, 1960, and 1964. The 1946 tsunami was the most destructive to ever hit Hawai`i. Tsunami wave runup heights at Kai`a Point reported by Loomis (1976) for the 1946, 1957, and 1960 tsunamis were 24 feet, 9 feet, and 10 feet, respectively.

2.7 Shoreline History

The coastal processes along the shoreline within the study area are complicated by the bay and headland morphology, the presence of offshore fringing reefs, and a seasonal wave climate with two opposing wave approach directions. The beaches along both

shoreline segments are laterally variable, consisting of discontinuous sand beaches, rocky promontories, and stretches protected with seawalls, revetments, or rip-rap stone. A vertical bluff with exposed red volcanic soil surmounts the beaches along most of shoreline.

The Kā`anapali coastline south of the project area has a well-documented history of dynamic beach movement. Aerial photographic analysis conducted by Sea Engineering and Makai Ocean Engineering (SEI and MOE, 1991) for West Maui using photographs taken in 1949, 1961, 1975, 1987, and 1988 revealed erosion and accretion cycles on the order of 20 to 30 feet at Kā`anapali Beach, north of Keka`a Point. Profile studies conducted in 1986 (SEI, 1986) illustrated the dynamic nature of the beach, with common seasonal fluctuations of +/- 10 to 20 feet relative to the mean shoreline position and localized beach recession up to 60 to 70 feet in a season. Most of the sand lost was simply moved up or down the beach in response to different wave directions, with the net sand volume remaining relatively constant.

Hanaka`ō`ō Beach, south of Keka`a Point is even more dynamic. The Kona storm of January, 1980 was a specific incident that caused shoreline recession along much of Maui's southern and western coastlines. Waves from the storm cut 40 feet into the beach backshore at Hanaka`ō`ō, creating a 2 to 3 foot high erosion scarp. More recently, high winter waves during the winter of 1998-1999 caused dramatic recession of the shoreline. Beach recovery was also dramatic, with complete recovery occurring by the summer season. Erosion and accretion fluctuations for this event were on the order of 100 to 150 feet.

Accretion and erosion cycles, although dramatic, are relatively balanced in the vicinity of Keka`a Point. However erosion begins to dominate to the north towards Honokōwai Point. In response to severe shoreline erosion, a rock revetment was constructed to protect the Mahana Condominium in1986. North of Honokōwai Point much of the shoreline is protected by revetments or seawalls.

Shore protection is also common along Kahana Beach, north of Honokōwai. Aerial photographic analysis of a transect just south of Drain Outlet No. 1 showed a 55-foot recession between 1961 and 1975, with a modest recovery by 1988. At present, the shoreline is in a narrow and degraded condition, with the backshore protected by temporary sand bags.

Kai`a Point is the outlet for the Kahananui Stream. Different sections of the point show up to 50 feet of both erosion and accretion between 1949 and 1988, such that the net

volume of sediment is balanced. Beach changes at the point are probably related to stream flood events and changes in the channel configuration.

Shoreline Segment No. 1 at Drainage Outlet No. 2 appears to be a stable beach and has shown a net accretion of 10 to 20 feet between 1949 and 1988. Aerial photographic analysis of Shoreline Segment No. 2 is inconclusive, but it is apparent that the narrow beaches that exist there now were also present in 1949 and 1961.

3. SITE CONDITIONS

3.1 Introduction

Sea Engineering, Inc. and Aecos, Inc., conducted a site visit on July 13, 2000. Beach conditions were inspected along Shoreline Segments No.'s 1 and 2 and at each outlet site, as well as the shoreline in the vicinity of the Kahananui Bridge. A cross-shore profile was conducted at each outlet site, and offshore geological and biological conditions were noted. The Aecos report, comprising biological and water quality observations, is included in this report as an appendix.

3.2 Drainage Outlet No. 1

Drainage Outlet No. 1 is located on Kahana Beach near the Pōhailani Condominium. There is a sharp bend in Lower Honoapi'ilani Road at the location of the drainage outlet, where the road approaches close to the beach (Figure 1). The location is marked by a sand-filled gully. A previously existing outlet was severely damaged from high surf during the 1998-1999 winter season and, as a result, pieces of CRM wing wall and other debris from the outlet are scattered about the beach (Figure 4). The drainage outlet is bounded on the north by a low bluff on which the Pōhailani Condominium is located. The seaward (western) side of the condominium property is protected by a rock revetment, while the southern side of the property (where the drainage outlet north wing wall will be constructed) is in a seriously eroded condition. Remnants of previously installed shore protection are exposed and under-cut (Figure 5). South of the drainage outlet, shorefront properties show evidence of beach erosion and are protected by a sand bag seawall. The beach here is narrow and without a well-defined berm crest (Figure 6).

A cross-shore profile of the site is shown in Figure 7. The nearshore beach slope is mild at 1 to10, vertical to horizontal, and flattens quickly to 1 to 50, vertical to horizontal, about 30 feet offshore. A fringing reef lies 500 to 1000 ft offshore. The bottom sediment near the shoreline consists of sand with some cobbles. The sand did not appear to have a high silt fraction, but conditions were nevertheless highly turbid, probably in part due to the vigorous shore break. A discussion of water quality conditions by Aecos Inc. is contained in the appendix to this report (Aecos, Inc., 2000). Flood water discharge at the site during an extreme event is projected to increase by about 10% due to the road improvements.

Unlike the embayments that comprise Shoreline Segments No.'s 1 and 2, the shoreline here is relatively long and straight, and not contained within an embayment. Circulation at the site will therefore be enhanced by the formation of alongshore currents due to wave action at the shore.

Figure 4. Location of Drain Outlet No. 1, showing remnants of previous 18-inch outlet.

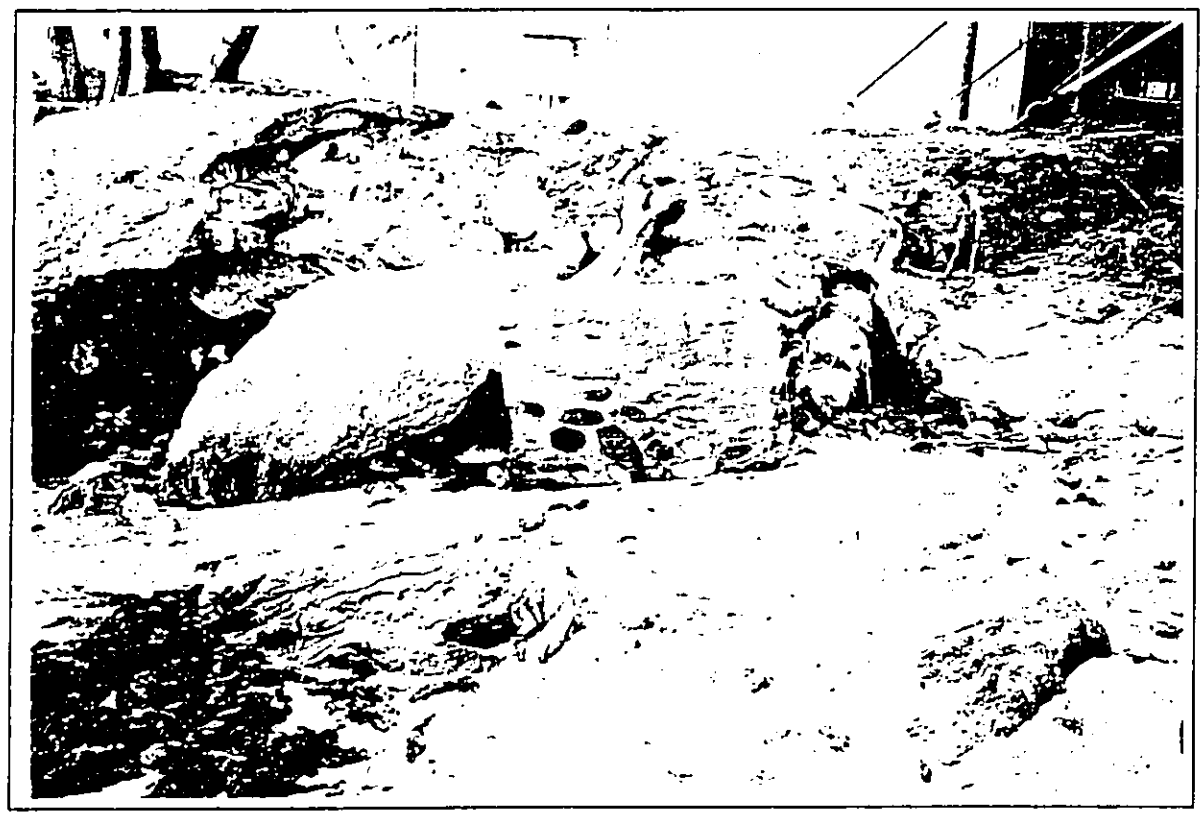


Figure 5. Erosion of the north bank, Drain Outlet No. 1.

Figure 6. View of Drain Outlet No. 1 location, looking north on Kahana Beach.

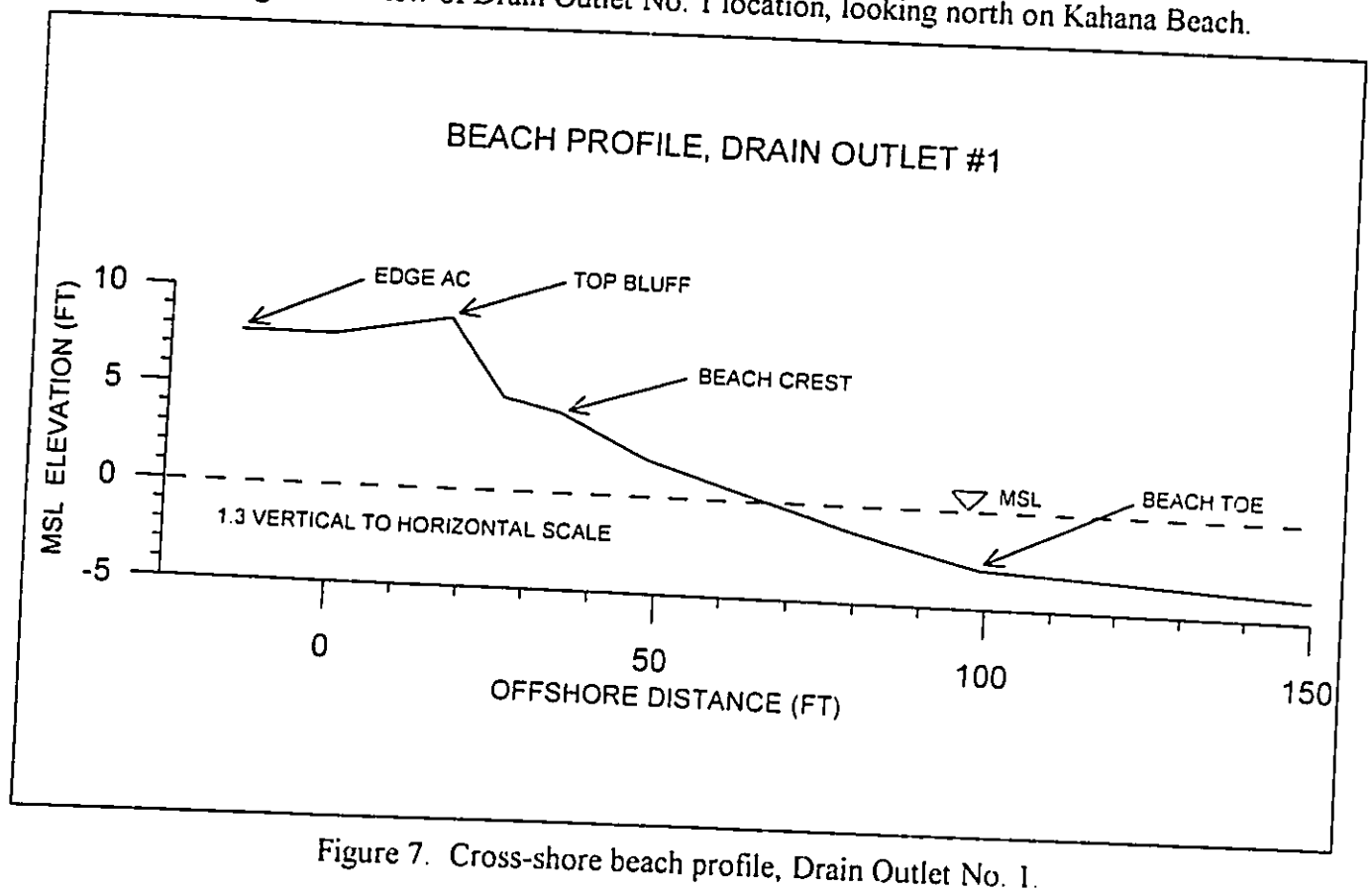


Figure 7. Cross-shore beach profile, Drain Outlet No. 1.

Impacts

The beach in this area has a history of erosion and is in a degraded condition at present. However, the proposed construction is not likely to accelerate any new beach deterioration. The new 36-inch outlet is at the same location as the previous 18-inch outlet, and the present design shows little incursion on to the beach. In addition, the outlet location at the terminus of the sand beach will tend to minimize effects of the proposed structure on beach processes. The water quality at the site is generally poor, but this is likely a regional effect due in part to heavy development and non-point source runoff (see consultant's report in the appendix).

Recommendations

The site shows the effects of wave damage in the recent past. The shore protection on the south side of the Pōhailani bluff (the wing wall location) does not appear to have been adequately designed to withstand the site wave climate, and is in serious disrepair. The CRM wingwalls for the drainage outlet can expect to encounter waves 4 to 6 ft in height during extreme conditions, and should therefore be constructed with care, following standard coastal engineering guidelines. These may include:

1. Use of geotextile filter fabric to prevent piping and erosion behind the CRM wingwalls.
2. A splash apron on top of the wing walls to prevent erosion due to wave over-topping.
3. Sufficient excavation to provide a solid foundation for the wingwalls and headwall and prevent wave undercutting.
4. The seaward face of the wingwalls should be tied-in to existing shore protection.

3.3 Kahananui Bridge

Lower Honoapi`ilani Road crosses the Kahana Stream at the Kahananui Bridge (Figure 8), and this will be widened to match the new road cross-sections. Existing utility lines adjacent to the bridge and crossing the stream will also be relocated. Blocking half the stream section around the work area will minimize the induced turbidity during construction, as per the Best Management Practices plan (BMP). Two existing 24-inch drain outlets in the north and south wingwalls of the bridge drain the immediate area. An approximate 20% increase in drainage due to road improvements at these outlets is insignificant compared to the stream flow.

Ka`ea Point is a delta formed by the Kahana Stream. The stream mouth lies about 300 ft downstream from the bridge (Figure 9). During the site visit the stream mouth was blocked by sand on the beach, shown in Figure 10. This is a prevailing condition during periods of low stream flow. Beyond the sand beach, Ka`ea Point is a broad shallow point

Figure 8. Kahananui Bridge.

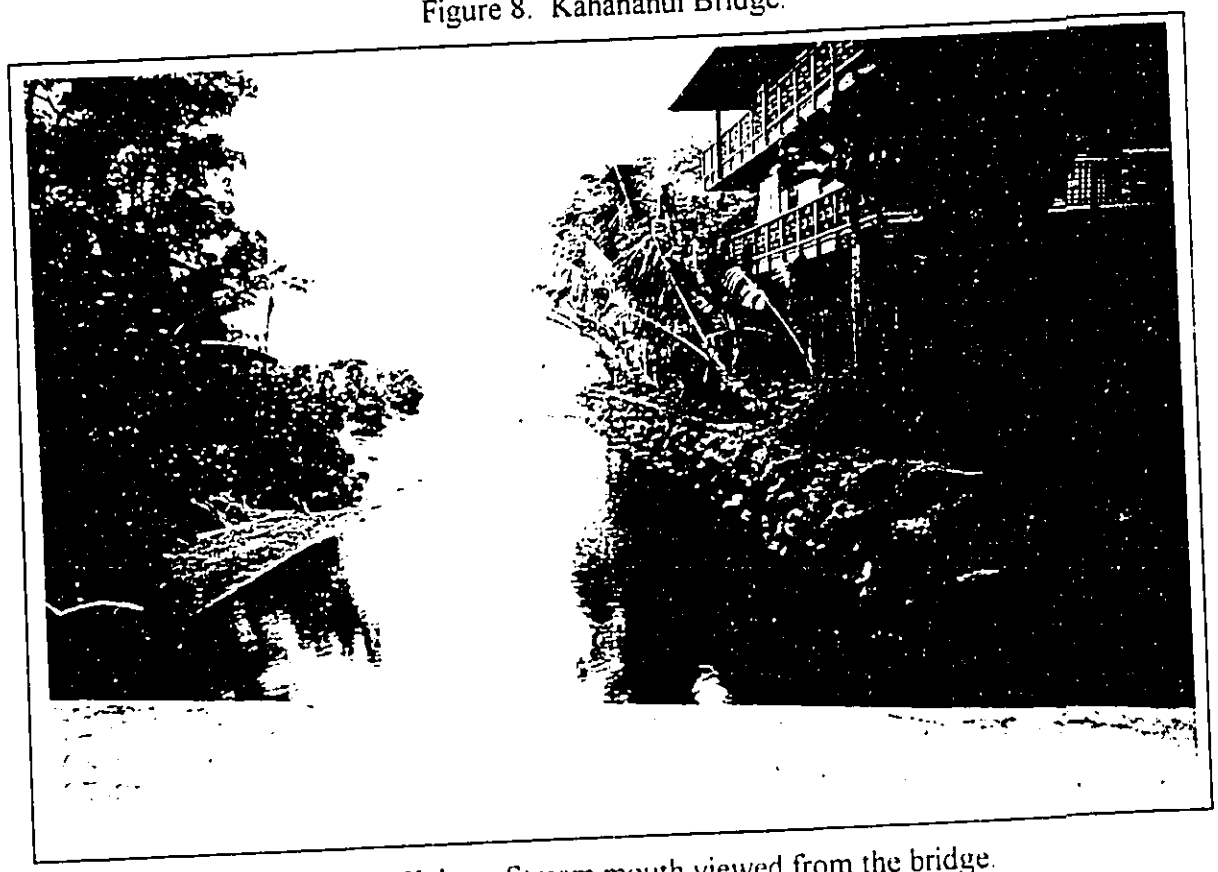


Figure 9. Kahana Stream mouth viewed from the bridge.

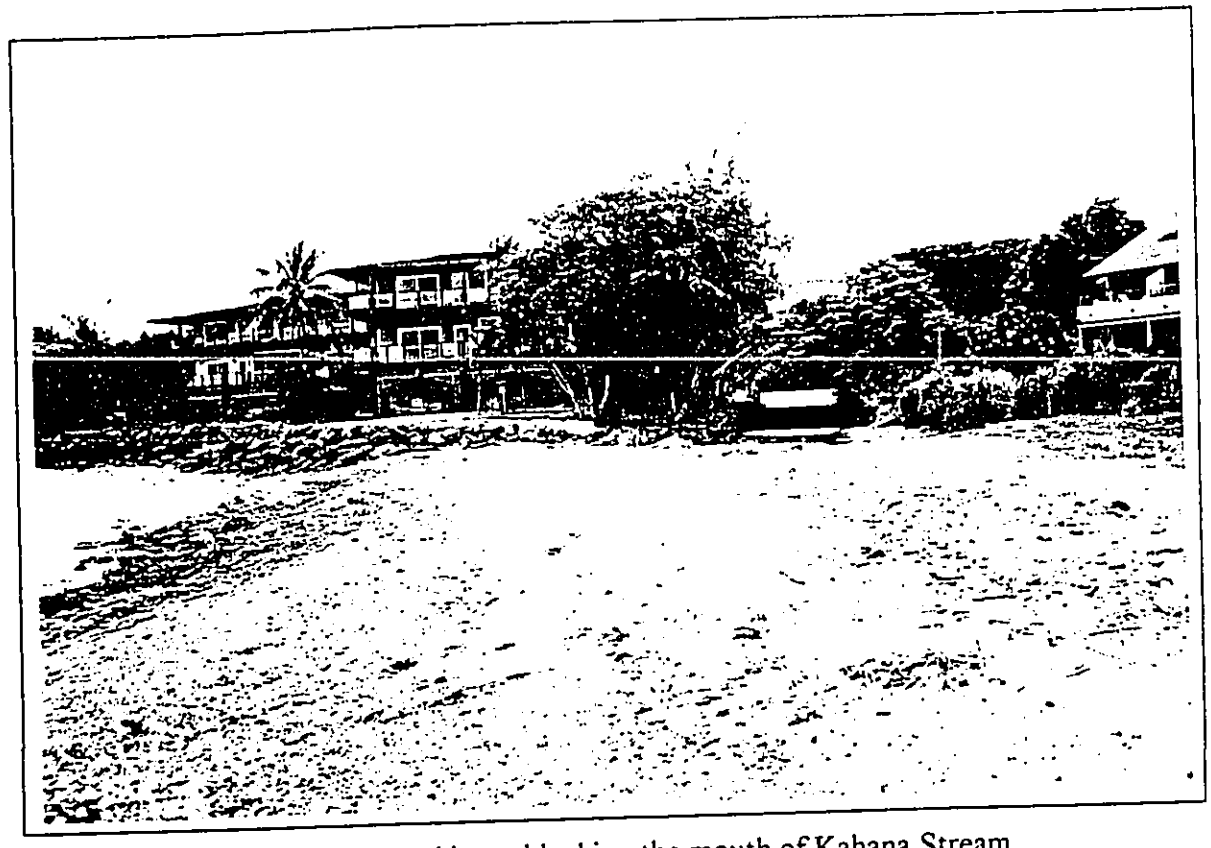


Figure 10. Sand berm blocking the mouth of Kahana Stream.

Figure 11. Boulders and cobbles at Ka'ea Point.

formed from stream cobbles and boulders (Figure 11). The stream mouth discharges on the north side of the point.

Impacts

There will be no shoreline impacts as a result of the bridge improvements. Additional flow volume will be negligible compared to the stream capacity, and will therefore affect neither the existing water quality nor sediment transport at the stream mouth. No structures will be built near the shoreline.

3.4 Drainage Outlet No. 2

Drainage Outlet No. 2 is located within shoreline Segment No. 1, a 900-foot stretch of coast between the headlands of Ka'ea Point and Kai'a Point (Figure 1). The outlet location is on the north side of the embayment, approximately 100 feet south of exposed red soil bluffs that mark the beginning of Kai'a Point. A heavily vegetated culvert about 20 feet north of the new outlet location marks a previous drainage outlet location. This existing drainage outlet will not be used and will be abandoned in place. Road improvements will result in a small increase in drainage flow at the new outlet location.

The road embankment is protected by a 5-ft stone retaining wall at the location of the new outlet (Figure 12). A cross-shore profile taken at the outlet location is shown in Figure 13. The beach slope is about 1 to 8, vertical to horizontal, to the beach toe at about –2 ft. The water depth nearshore remains shallow, dipping slowly offshore at 1 to 50, vertical to horizontal. The fringing reef begins about 400 ft offshore. The bottom sediments consist of silty sand and gravel, with the percentage of silt in the sediment decreasing offshore. Circulation nearshore is therefore probably poor but increases in the offshore direction with proximity to the fringing reef. *Limu* is plentiful offshore, attached to rocks and cobbles.

The shoreline at the north side of the bay near the new outlet location is fronted by a sandy beach approximately 50 feet in width. However, a 400-foot revetment protects properties along the south side of the bay near Ka'ea Point, and the sand beach there has disappeared. A panorama of the beach looking south from Kai'a Point is shown in Figure 14, and a view looking north at the point is shown in Figure 15. Large amounts of *Limu* torn from the bottom by wave action can be seen on the beach. The beach in the vicinity of the new outlet location has a healthy and stable appearance at present. Vegetation on the beach is well established to the point that the vegetation line has moved seaward past the beach crest.

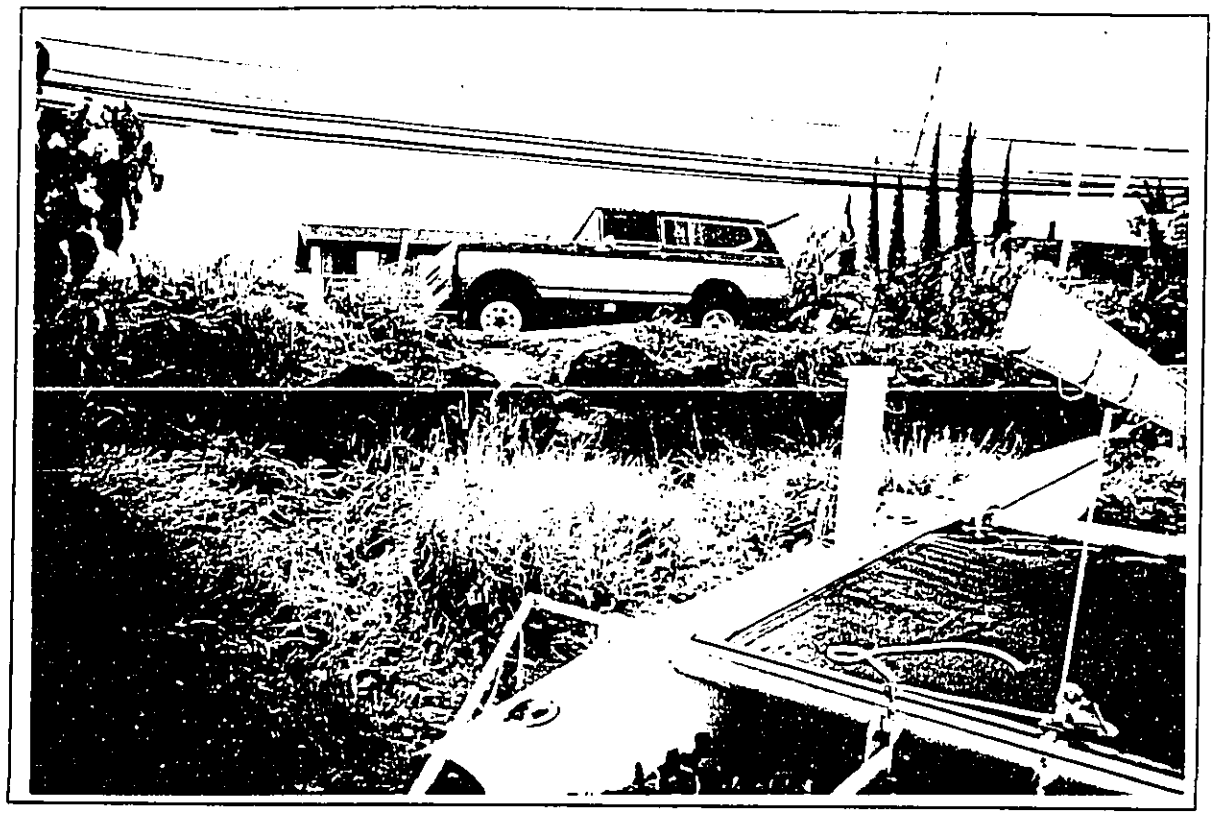


Figure 12. Location of Drain Outlet No. 2.

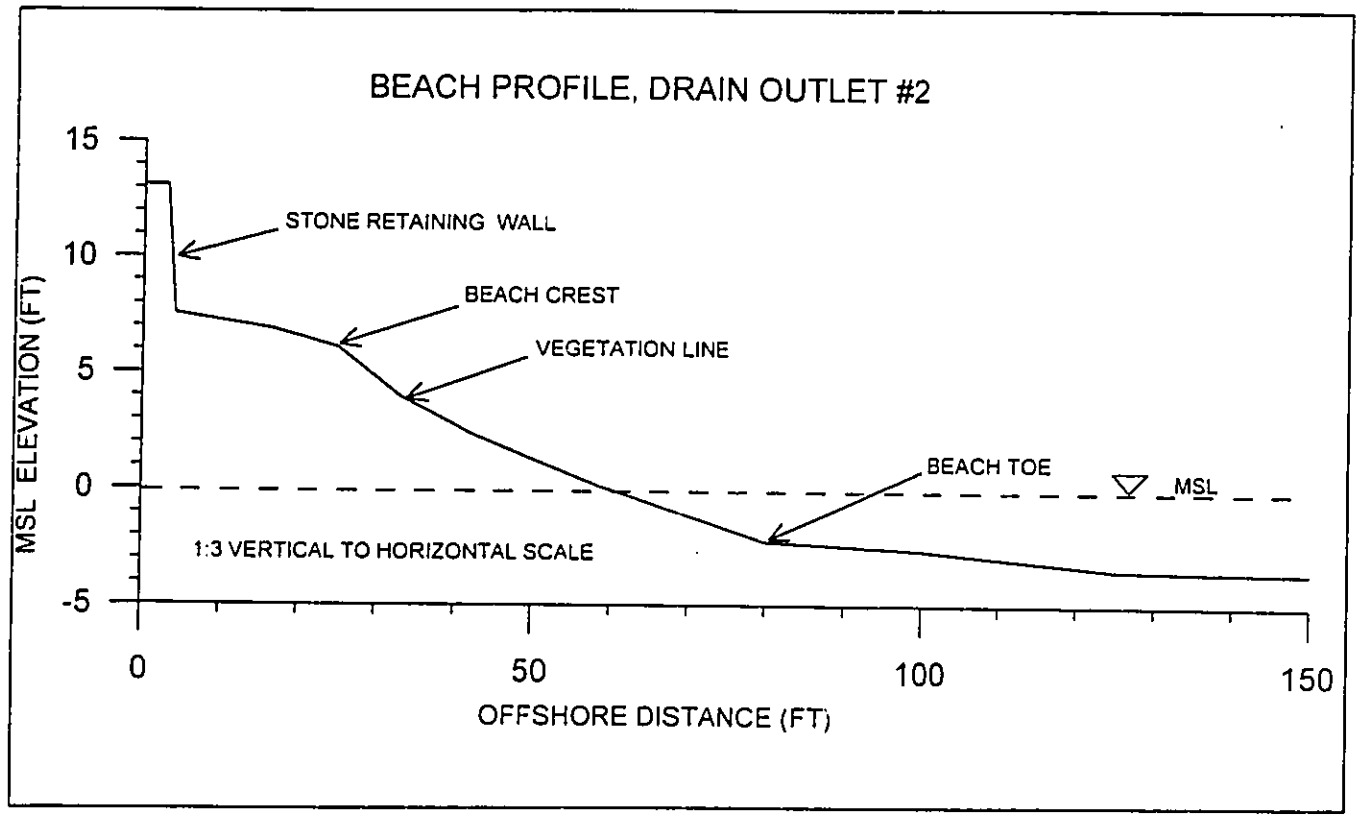


Figure 13. Cross-shore profile at Drain Outlet No. 2.

Figure 14. Beach at Drain Outlet No. 2, view looking south.

Figure 15. Kai`a Point.

Impacts

There are no specific recommendations for this site. The new outlet will replace pre-existing drainage on a stable and healthy beach. No significant impacts are expected.

3.5 Shoreline Segment No. 2

The second shoreline segment of the road improvements is along the Ka`ōpala gulch embayment, between Kai`a point and Haukoe Point. The road improvements will have three drainage outlets over a 600-foot reach, including one new 24-inch line (Drainage Outlet No. 3), one existing 54-inch outlet, and one existing 24-inch outlet. Shoreline conditions along this stretch vary from sand beaches to rocky shorelines to stretches with revetted shore protection. A red soil bluff with an elevation of 15 to 20 feet surmounts the beach along the stretch, often with vertical escarpments.

Figure 16 is a photograph of the reach taken from the location of Drainage Outlet No. 3. The existing 54-inch outlet can be seen in the center of the photo, while the existing 24-inch outlet is located at the right side. The beach along Shoreline Segment No. 2 is steep and narrow. On-site signs of erosion include the presence of shore protection, lack of beach vegetation, and narrow sand beaches with no well-defined beach berm. Much of the segment has been altered with shore protection or highway-related structures, and where present, the sand beach crest lies directly at the foot of these structures. However, aerial photograph analysis (SEI and MOE, 1991) does not indicate a significant history of erosion. The high bluff behind the beach is likely to have always been a near vertical escarpment, giving a reflective surface for wave activity to scour the beach, and a lack of sediment supply may well limit the extent of sand beaches in this bay.

On the day of the site visit water turbidity was visibly higher in a localized area at the northern part of the embayment at Haukoe Point. This was probably due to heavy shorebreak at this location. The offshore fringing reef is extensive, with the nearest reef patch about 400 feet offshore.

3.6 Existing 24-inch Outlet

The existing 24-inch outlet is located toward the southern end of the bay. Headwall improvements are planned at this existing outlet. Drainage flow during extreme conditions will increase by about 17 % due to the road improvements. The shoreline at this location is rocky, consisting of a light gray volcanic tuff. Figure 17 is a photograph looking down at the existing drainage outlet from the red soil bluff. The near proximity of the roadway can be seen to the left in the photograph, as well as the erosional embayment at the outlet location. Figure 18 is a photograph looking at the existing outlet headwall from the shoreline rock outcrops. The deteriorated condition of the existing outlet headwall can be seen in this photograph: some of the stones appear loose, and a

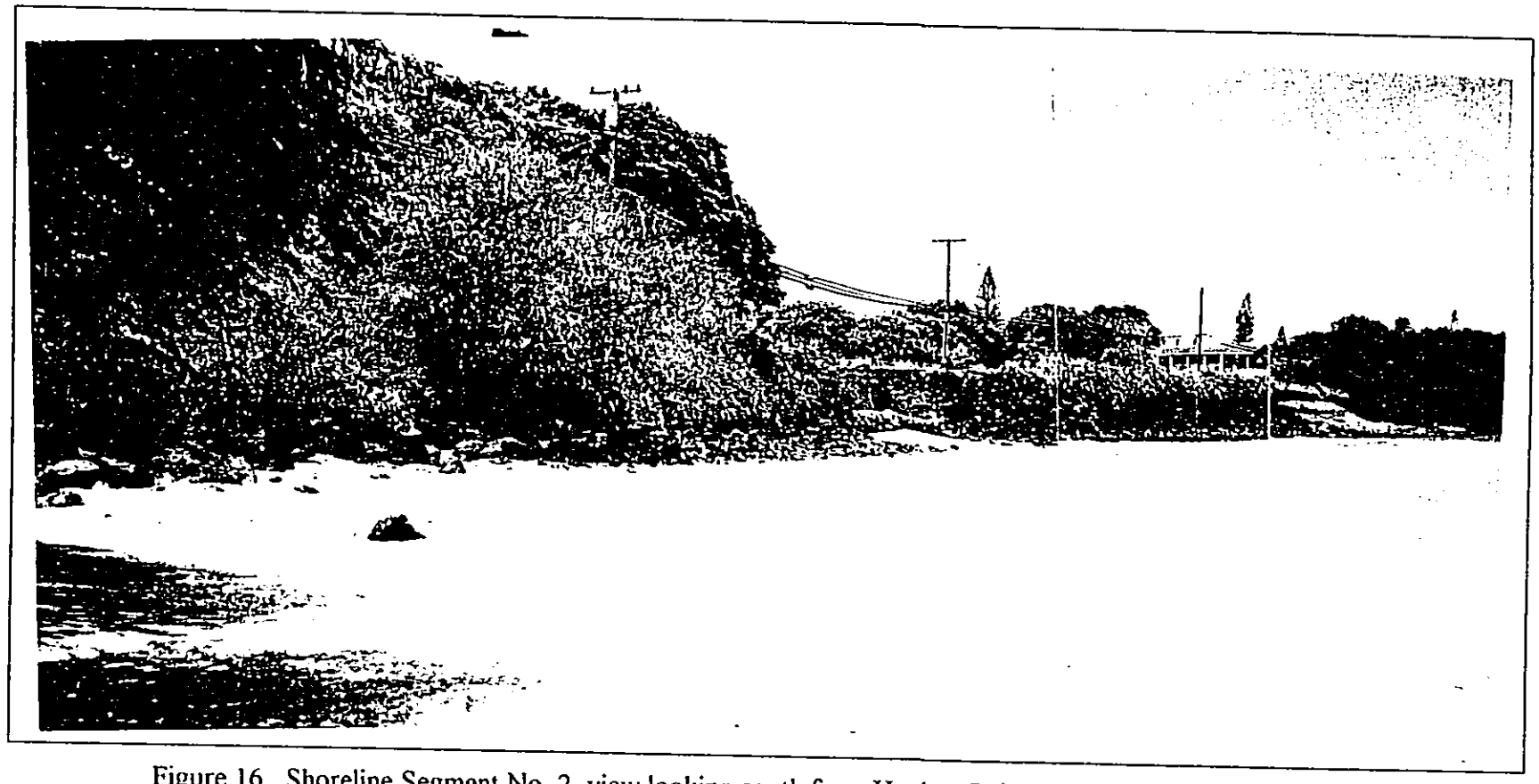


Figure 16. Shoreline Segment No. 2, view looking south from Haukoe Point to the existing 24-inch outlet.

Figure 17. Existing 24-inch drain outlet at Shoreline Segment No. 2.

Figure 18. View of existing 24-inch outlet from the shoreline.

short section north of the pipe appears to have suffered partial collapse. Water coursing from the drainline appears to have caused some erosion of the red soil bluff in front of the headwall, and a localized embayment exists in the immediate vicinity of the existing outlet. Figure 19 shows the rocky shoreline south of the outlet, and Figure 20 shows the rock shoreline and red bluffs north of the existing outlet.

Figure 21 is a cross-shore profile taken at the existing outlet location. The rock shoreline is uneven, with a relief of one to two feet. The profile at the shoreline slopes unevenly at about 1 vertical to 8 horizontal to a depth of 6 feet and then becomes flat. The bottom transitions offshore from rock to cobble to gravel, and includes isolated rock outcrops 3 feet or more in relief. The nominal offshore depth of 6 feet is relatively deep and gives the site increased exposure to depth-limited breaking waves.

Impacts

The bluff is generally eroded and deteriorated in the immediate vicinity of the existing outlet. Although the increase in the volume of flow at this outlet is projected to be small, some turbidity will be associated with the gradual erosion of the red soil in front of the outlet. There is no existing sand beach in the vicinity of the existing outlet. The existing outlet is setback from the shoreline and will therefore have no structural implications on the beach.

Recommendations

If left unprotected, the bluff erosion may continue and eventually threaten the highway with undermining. The outlet location will therefore benefit from improvements to the outlet that prevent further erosion of the bluff. The repair of the headwall will provide insurance against undermining, particularly from direct wave attack during a severe storm event. Other improvements that might be considered are the construction of an apron and wing walls for increased protection against bluff erosion. As the shoreline at this location is rocky and devoid of sand, there will be no beach impacts due to outlet improvements.

3.7 Existing 54-inch Outlet

The existing 54-inch outlet is about 300 feet north of the existing 24-inch outlet (Figure 1). Improvements to the existing outlet will include replacement of the existing culvert with a new 54-inch culvert, a new CRM inlet structure with GRP apron, and associated CRM repair work around the perimeter of the new culvert at the existing outlet. The existing outlet, shown in Figure 22, will drain an existing culvert and drainage ditch. The drainage area for this existing outlet does not include runoff from the road, therefore flow volumes will not be increased by the project.

A cross-shore profile in front of the existing outlet is shown in Figure 23. The existing outlet headwall drops approximately 9 ft from the road to the outlet invert. A GRP apron

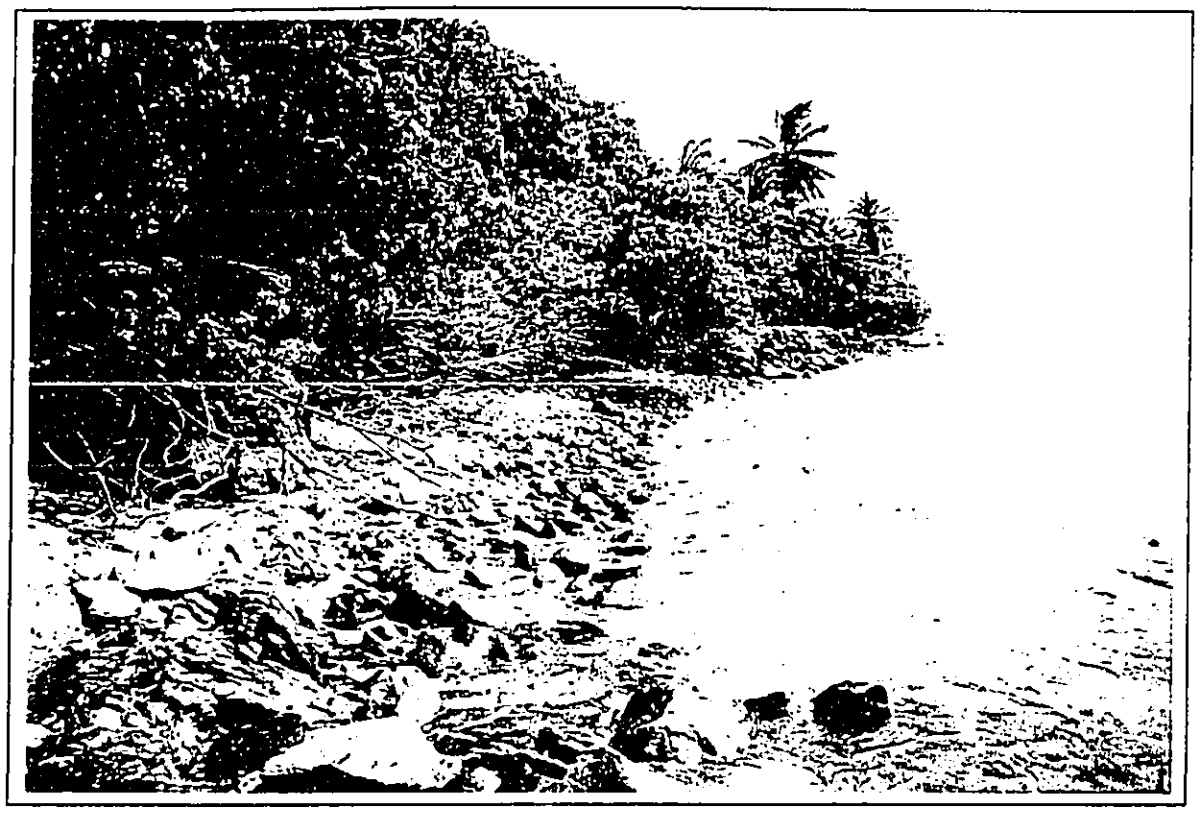


Figure 19. View of the shoreline south of the existing 24-inch outlet.

Figure 20. View of the shoreline north of the existing 24-inch outlet.

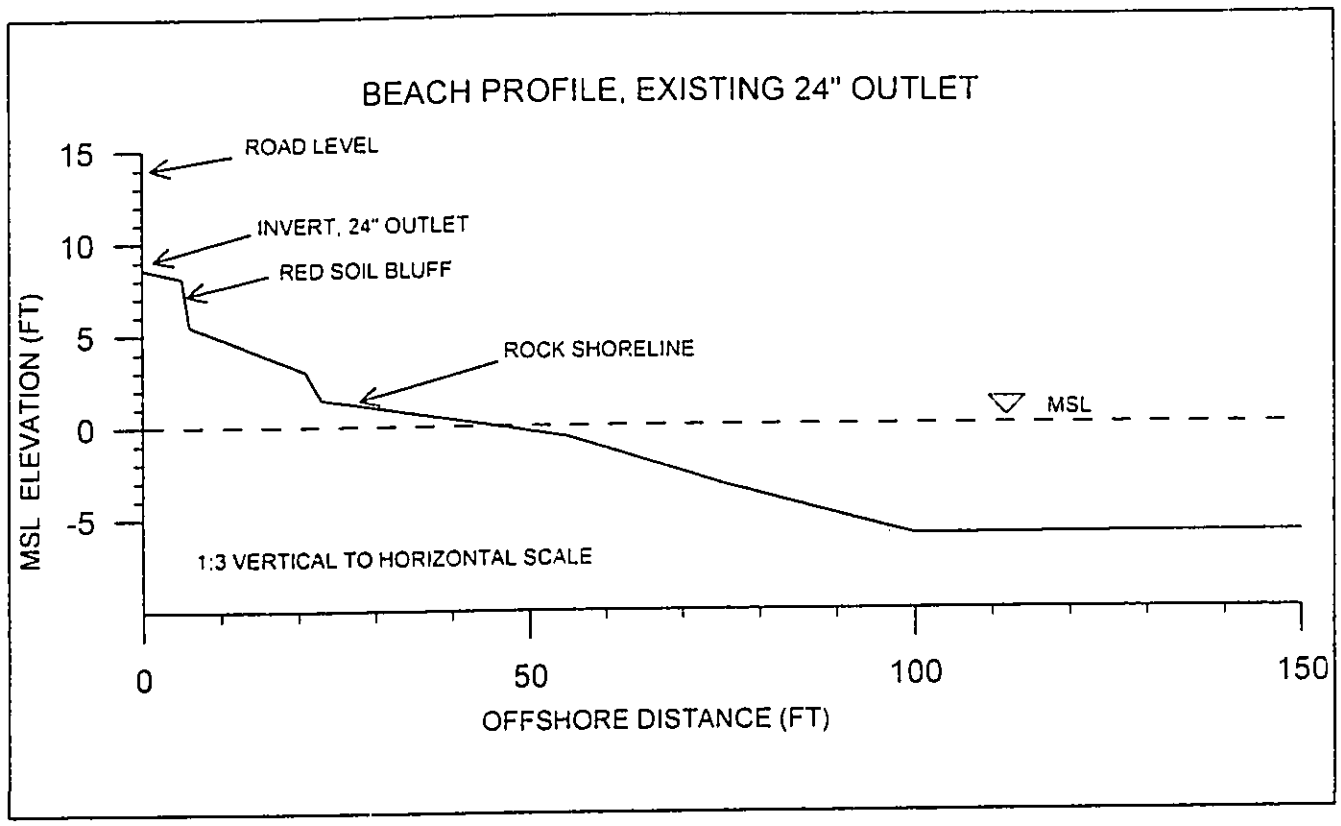


Figure 21. Cross-shore profile at the location of the existing 24-inch outlet.

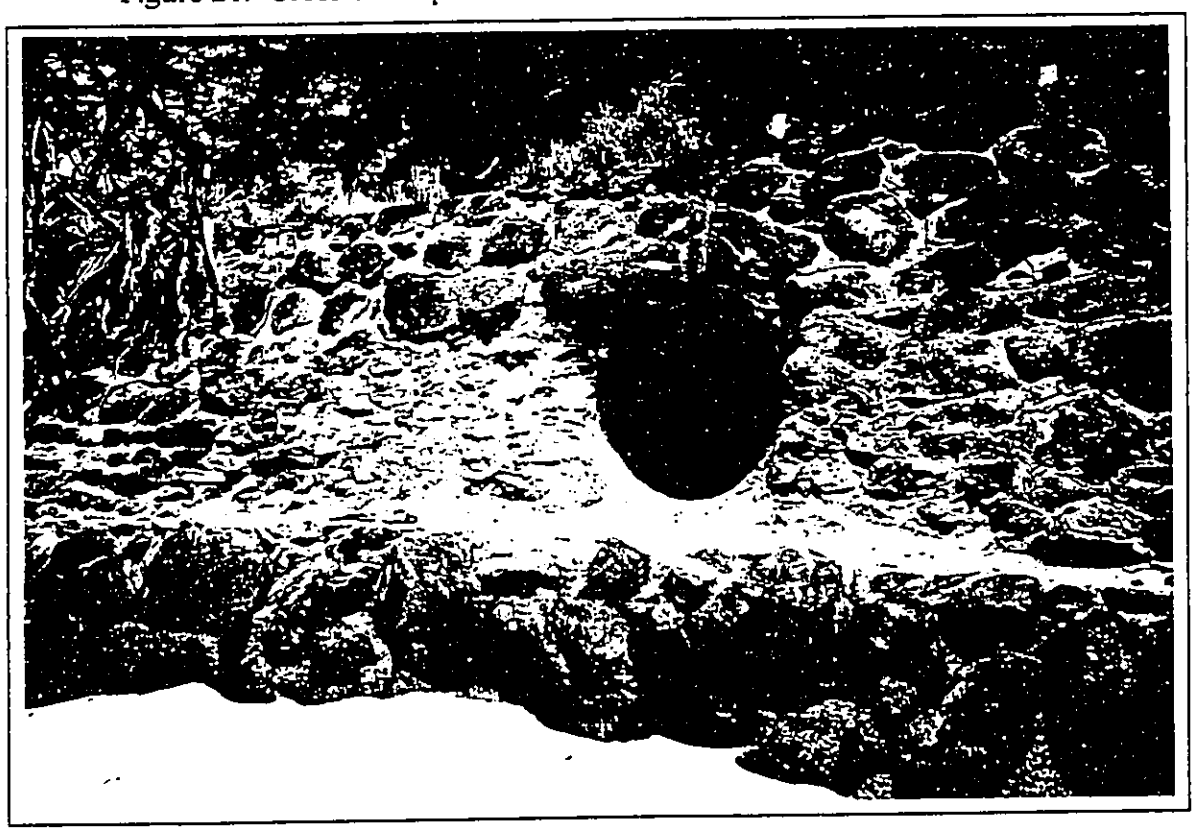


Figure 22. Existing 54-inch outlet.

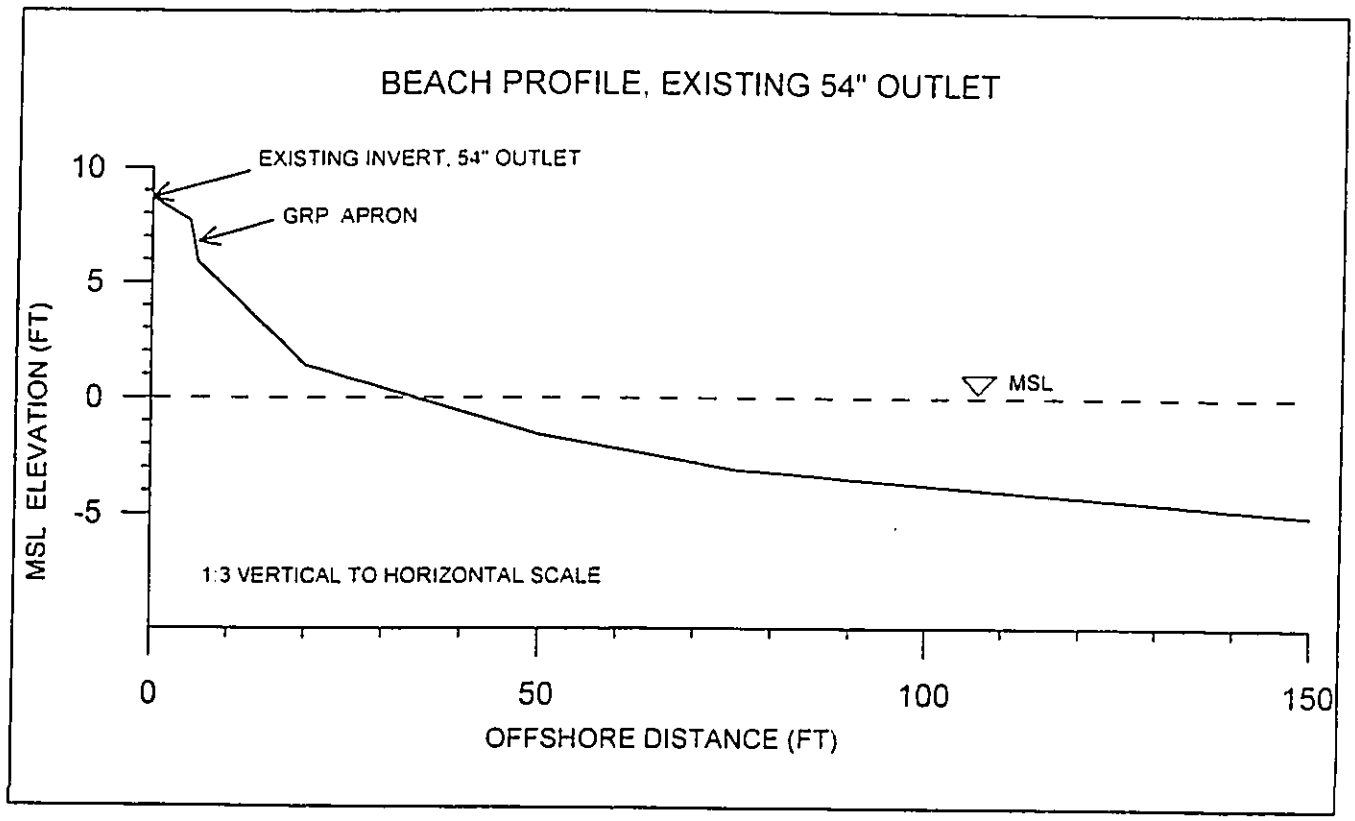


Figure 23. Cross-shore profile at the location of the existing 54-inch outlet.

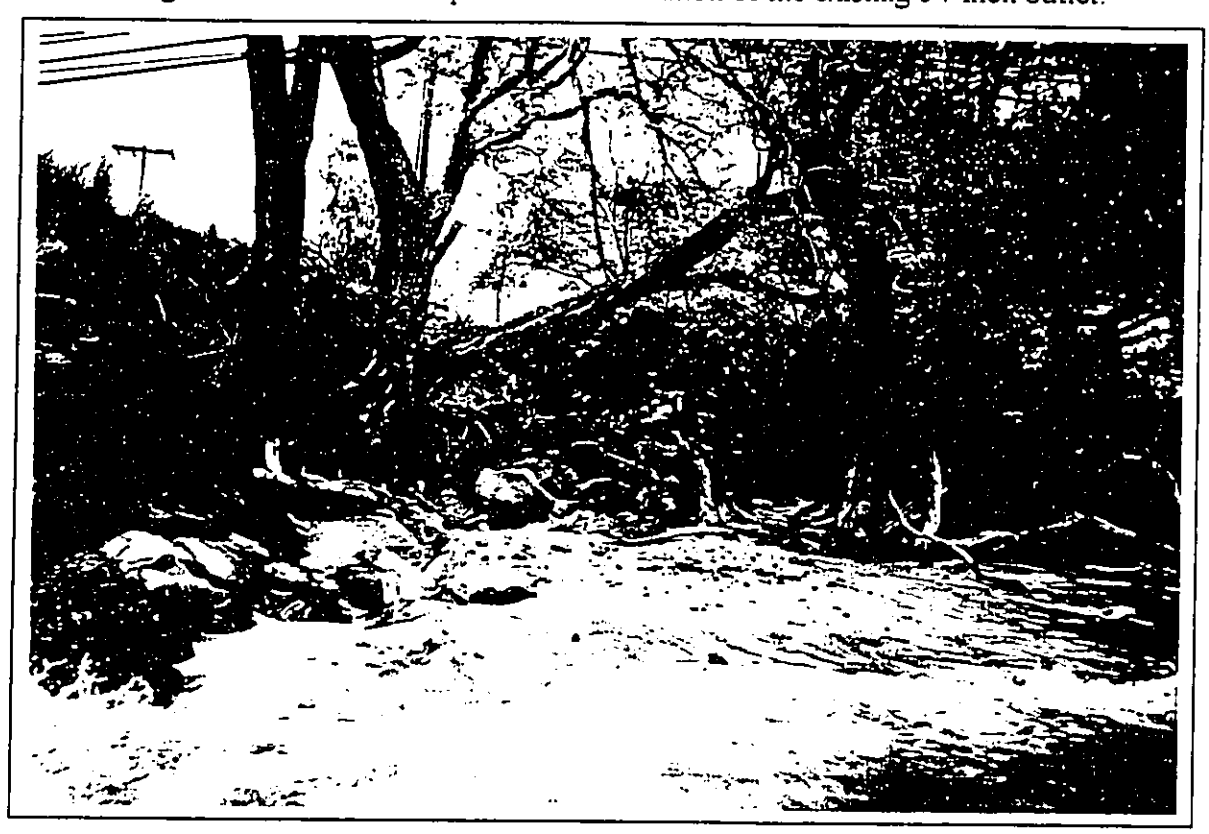


Figure 24. Location of Drain Outlet No. 3.

extends 5 feet in front of the existing outlet before dropping 2 feet to the beach crest. A small pocket sand beach lies in front of the existing outlet. Reaches immediately north and south are fronted by stone rip-rap revetments and had no sand beaches at the time of the site visit. The sand beach fronting the outlet is unusually steep at 1 to 3, vertical to horizontal. The steepness decreases abruptly at the water line to about 1 to 12 and then to 1 to 40 further offshore.

Bottom conditions offshore past the sand beach consisted of gravel-sized coral fragments and rocks.

Impacts

The existing outlet headwall is a vertical structure that could cause wave reflection and potential scour. However, the small pocket beach existing at the site is the widest and highest sand beach along Segment No. 2, and in the absence of the drainline and headwall structure the natural embankment would probably also have a near-vertical slope and cause wave reflection. There will be no new impacts associated with the outlet structure, as the outlet configuration at the beach will remain unchanged.

3.8 Drainage Outlet No. 3

The third drainage outlet along the Ka`ōpala Gulch embayment is about 300 feet north of the existing 54-inch outlet at the corner of the bay near Haukoe Point (Figure 1). The increase in drainage flow during extreme conditions will be about 15%. The highway embankment is protected by rock rip-rap placed at a steep slope of 1 to 1 vertical to horizontal. Figure 24 is a photograph showing the embankment at the new outlet location. A cross-shore profile taken 20 feet south of the outlet location is shown in Figure 25. Figure 26 is a photograph of Haukoe Point and the new outlet and profile locations. A narrow 30-foot beach lies at the base of the embankment and slopes at 1 vertical to 8 horizontal to a depth of about 5 feet. The slope is nearly flat offshore. The beach extends south for about 200 feet to the beginning of a rock revetment, where it narrows further. The sand is medium to coarse in size, which is indicative of vigorous shorebreak wave activity.

The waters offshore had very poor visibility during the site visit - this northern pocket appeared to be the most turbid part of the bay. Bottom conditions offshore past the beach toe consisted of gravel-sized coral fragments and rocks, with plentiful *Limu* growth.

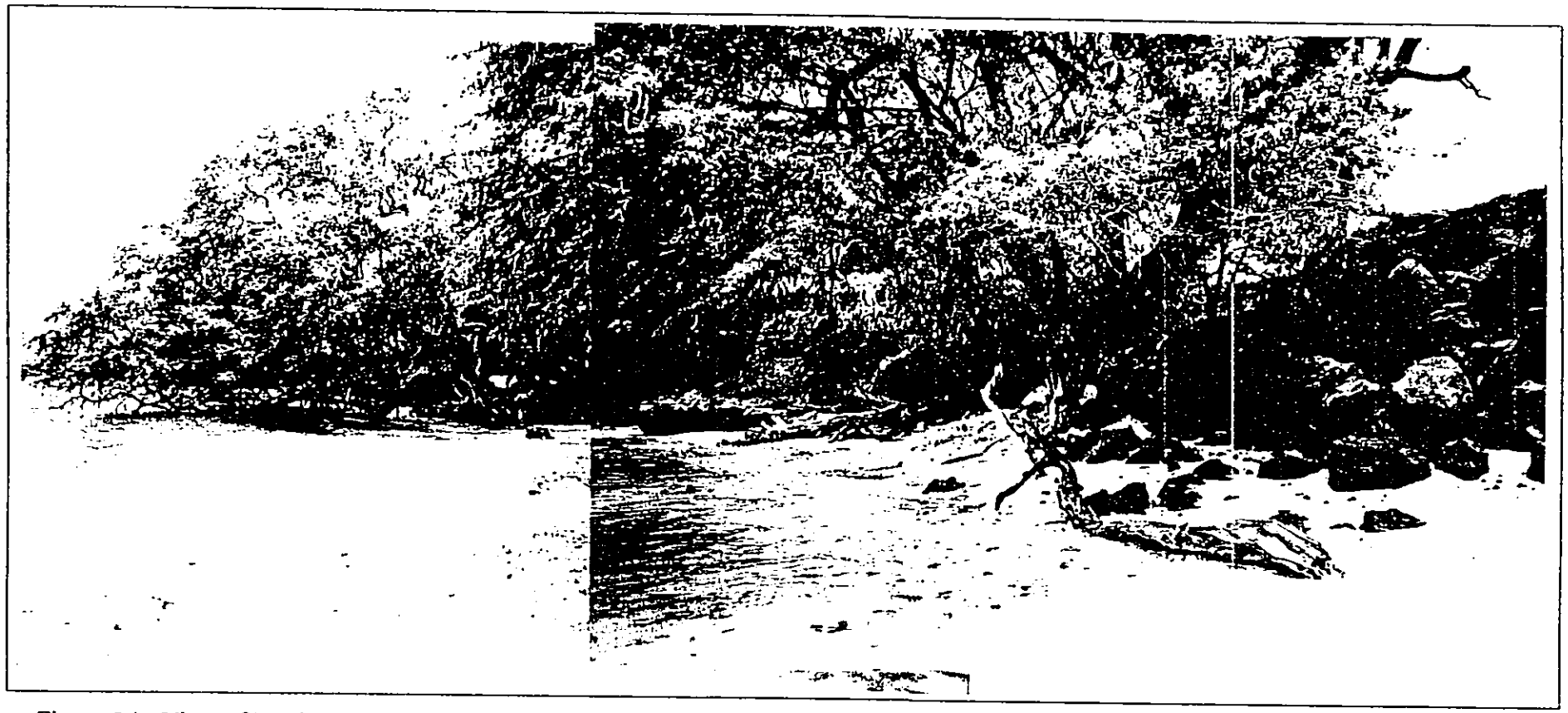


Figure 26. View of Haukoe Point looking north at the site of Drain Outlet No. 3. The highway embankment is to the right in the photo.

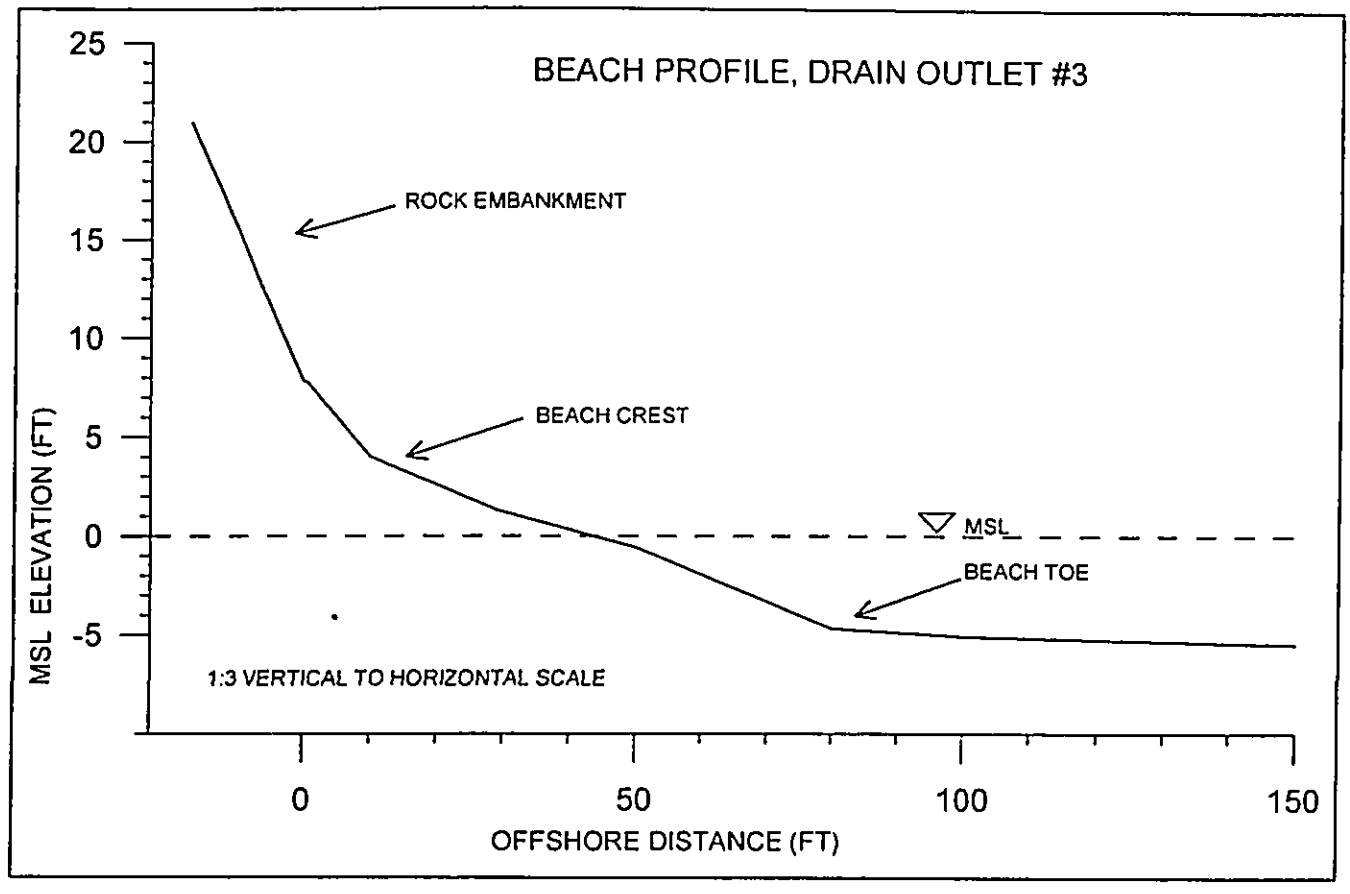


Figure 25. Beach profile Outlet No. 3.

Impacts

The invert of the new outlet will be located about 14 feet above the mean tide level, and will be located within the roadway embankment. It will have no direct impact on the shoreline and will not restrict sediment movement.

4. DISCUSSION

The effects of roadway improvements along Lower Honoapi'ilani Road on the shoreline are likely to be minimal. The proposed drainage structures will either remain appreciably unchanged from present configurations (Existing 54-Inch, Existing 24-Inch outlets, and the Kahananui Bridge outlets), discharge on rock shorelines (Existing 24-Inch), or be constructed in existing retaining walls removed from the beach (Drainage Outlet No. 2 and Drainage Outlet No. 3). The remaining outlet, Drainage Outlet No. 1, will have less physical presence on the beach than the previous existing structure at the site.

Existing water quality conditions near the shoreline were turbid during the site visit, and, as shown in the attached report by Aecos, Inc. (see appendix), this appears to be a prevailing condition. Turbidity and nutrient concentrations were highest at the southern end of the project area and lowered steadily to the north (i.e., water quality conditions improved from south to north along the project reach). Oil and grease testing revealed no significant presence of those parameters despite the roadway.

An approximate 10% increase in runoff will occur along these reaches as a result of the road improvements. As the increase will result from an increase in paved surface area and improved drainage, it is not likely to increase the amount of turbidity or nutrient concentrations.

The two areas of concern from a coastal engineering viewpoint for this project are the proposed construction at Drainage Outlet No. 1 and the existing conditions at the Existing 24-Inch Outlet:

Drainage Outlet No. 1

This site shows the effects of wave damage in the recent past. The shore protection on the south side of the Pōhailani bluff (the outlet north wing wall location) does not appear to have been adequately designed to withstand the site wave climate, and is therefore in serious disrepair. The CRM wingwalls for the drainage outlet can expect to encounter waves 4 to 6 ft in height during extreme conditions and should be constructed with care, following standard coastal engineering guidelines. These may include:

1. Use of geotextile filter fabric to prevent piping and erosion behind the CRM wingwalls.
2. A splash apron on top of the wing walls to prevent erosion due to wave over-topping.
3. Sufficient excavation to provide a solid foundation for the wingwalls and headwall and prevent wave undercutting.

4. The seaward face of the wingwalls should be tied-in to existing shore protection. It is noted that the adjacent existing shore protection is in disrepair, and the outlet wingwalls may therefore be subject to some flank erosion.

Existing 24-Inch Outlet

This outlet appears to be in disrepair and vulnerable to wave attack during high wave conditions. If left unprotected, the bluff erosion may continue and eventually threaten the highway with undermining. The outlet location will therefore benefit from improvements to the outlet that prevent further erosion of the bluff. The planned repair of the headwall will provide insurance against undermining, particularly from direct wave attack during a severe storm event. Other improvements that might be considered are the construction of an apron and wing walls for increased protection against bluff erosion. As the shoreline at this location is rocky and devoid of sand, there will be no beach impacts due to the outlet improvements.

5. REFERENCES

Aecos, Inc., 2000; *Reconnaissance survey of the Nearshore environment for the Lower Hono-a-Piilani Road Improvements Project, West Maui*; Report prepared for Sea Engineering, Inc.

Loomis, G.H. 1976, *Tsunami Wave Runup Heights in Hawaii.* Hawaii Institute of Geophysics, University of Hawaii, HIG-76-5.

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Sea Engineering, Inc., 1986; *Coastal Engineering Evaluation and Marine Biological Assessment for Kaanapali North Beach, Maui, Hawaii.*

6. APPENDIX: CONSULTANTS REPORT BY AECOS, INC.

RECONNAISSANCE SURVEY OF THE NEARSHORE ENVIRONMENT FOR THE LOWER HONO-A-PIILANI ROAD IMPROVEMENTS PROJECT, WEST MAUI

Reconnaissance survey of the nearshore environment for the Lower Hono-a-Piilani Road Improvements Project, West Maui[1]

August 25, 2000 *AECOS* No. 958

AECOS, Inc. 970 N. Kalaheo Ave., Suite C311
Kailua, Hawai'i 96734
Phone: (808) 254-5884 Fax: (808) 254-3029 Email: guinther@aecos.com

Introduction

The County of Maui, Department of Public Works and Waste Management plans to conduct road widening and drainage improvements to a 2.25 km (1.4 mi) segment of Lower Hono-a-Piilani Road from Hoohui Road to Napilihau Street in the Lahaina District, Maui. Portions of this route closely abut the shoreline. Improvements to existing storm drains and the construction of additional storm drains are proposed.

This report presents results from a reconnaissance survey of the marine environment along the West Maui coastline between Kahana and Haukoe Point (Figure 1). This survey was undertaken in conjunction with Sea Engineering, Inc. for the purpose of describing the shoreline and nearshore environments potentially impacted by the road improvements project. This report is primarily concerned with describing existing water quality conditions and project impacts on nearshore marine resources.

Methods

The project area was visited on July 13, 2000. Visual observations in the water were limited to making swims with snorkeling gear off each of five selected culvert sites. Visibility was so poor at all of the sites, especially within the nearshore area, that only a very rough picture of the fishes and benthic community could be obtained by

[1] Report prepared for Sea Engineering, Inc. for inclusion in their report entitled: "Coastal Evaluation for the Lower Honoapi`ilani Road Improvements, Phase 4 (Ho`ohui Rd. to Napilihau St.), Federal Aid Project NO. STP-3080(8) District of Lahaina, Island of Maui." for submittal to Munekiyo, Arakawa & Hiraga, Inc. This report will become part of the public record.

this method. Since poor visibility is probably related to water quality problems associated with runoff from the land, our discussion focuses on water quality.

Certain water quality properties were measured *in situ* with appropriate instruments: water temperature and dissolved oxygen (DO) with a DO meter, salinity with a refractometer (a field salinity reading is needed to calibrate the DO meter). The remaining measurements (turbidity, total suspended solids, ammonia, nitrate + nitrite, total nitrogen, total phosphorus, salinity, and oil & grease) were obtained from water samples collected in the field and shipped to our laboratory on O`ahu. A listing of analytical methods and instruments is presented as Table 1. Appropriate containers were used in the field, including 125 ml, acid-rinsed polypropylene bottles for nutrient samples and pre-cleaned glass bottles with Teflon® cap liners for the oil & grease samples.

Table 1. Analytical methods and instruments used for the July 13, 2000 sampling of West Maui.

Analyses List	Method	Reference	Instrument
Ammonia	alkaline phenol	Koroleff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 57 DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
Oil and Grease	EPA 3050, 3540 EPA 413.2	EPA (1986) EPA (1979)	Perkin Elmer 1430 Infrared Spectrophotometer
Salinity (field)	refractive index	---	handheld, temperature compensating refractometer
Salinity	Bench salinometer	Grasshoff in Grasshoff et al. (1986)	AGE Model 2100
Temperature	thermister calibrated to NBS cert. Thermometer (EPA 170.1)	EPA (1979)	YSI Model 57 DO meter
Total Nitrogen	persulfate digestion /EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion /EPA 365.1	Koroleff in Grasshoff et al. (1986) / EPA (1993)	Technicon AutoAnalyzer II
Total Suspended Solids (TSS)	Method 2540D (EPA 160.2)	Standard Methods 18th Edition (1992); EPA (1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100P Turbidimeter

D'Elia, C.F., P.A. Stendler, & N. Corwin. 1977. *Limnol. Oceanogr.* 22(4): 760-764.

EPA. 1979. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency, EPA 600/4-79-020.

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Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.

Standard Methods. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.

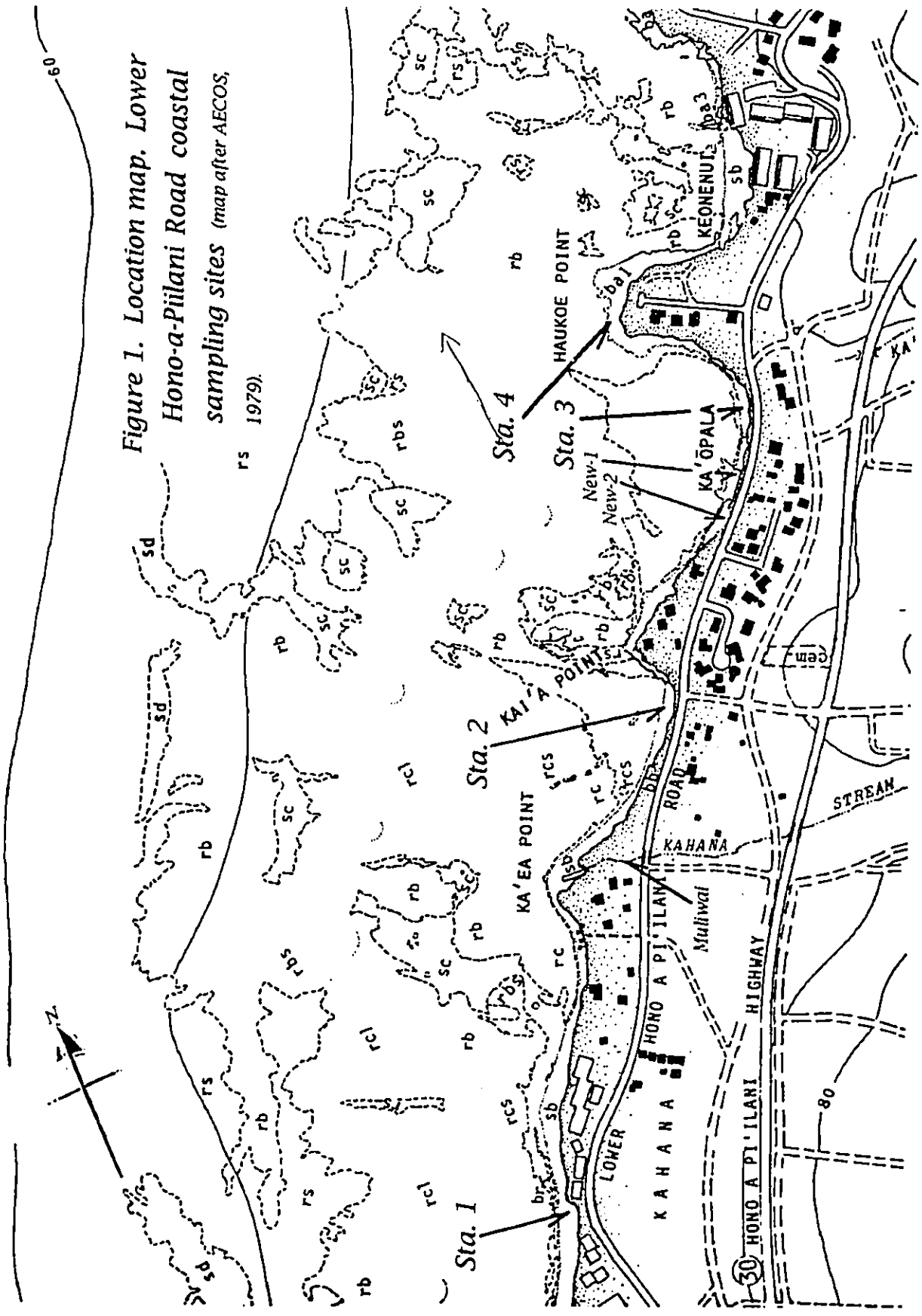

Figure 1. Location map. Lower Hono-a-Piilani Road coastal sampling sites (map after AECOS, 1979).

Samples were collected near the shore, although sample bottles were filled seaward of the zone of breaking waves (in some cases 5+ m or 15-20 ft off the shore) to minimize the influence of sand suspended by wave action on the TSS values. A total of six marine shore locations and a coastal pond (*muliwai* of Kahana Stream) were sampled for some or all of the basic water quality parameters used to define the State of Hawaii water quality standards (DOH, 1992).

Site Descriptions

Sampling sites were located generally opposite existing or proposed culverts. Each site or area is described here as encountered moving from south to north along the roadway (see Figure 1). One location (Station 4) off Haukoe point was sampled for water quality to represent an area where the road is not located close to the shore.

Station 1 is a small public right-of-way located on the broad curve in Lower Hono-a-Piilani Road at Kahana (Figure 1). It is near the location of Drainage Outlet No. 1. At this point, the shoreline and road are separated by a distance of less than 10 m, although a short distance in either direction along the road and shoreline properties support large condominium developments. A very narrow beach of moderately coarse sand is present at the shore and the bottom drops away relatively quickly to depths around 2 m off the beach. The bottom offshore here is mostly sand with scattered boulders and small rock outcrops, becoming a mixed bottom type with sand and mostly rubble (cobble and smaller size limestone fragments). The hard substratum occurrences support dense growths of algae, including *Acanthophora spicifera*, *Ulva* sp., *Hypnea* spp., and some *Sargassum echinocarpum*. Visibility at the time of our survey was less than 1 m. No corals or fishes were seen, clearly a consequence of both low biomass and poor visibility. Underwater visibility was so bad at this location (see Water Quality section) that no reliable estimate of fishes presence could have be made.

Kahana Stream crosses under Lower Hono-a-Piilani Road 500 m (1640 ft) north of Station 1. Extending from beneath the bridge for a distance of approximately m is a pond or *muliwai*: water from the stream (or groundwater at times of no surface flow) that backs up behind a beach barrier. This body of water was isolated from both surface inflows and surface outflows at the time of the site visit. The water was a deep tea brown in color. Depth was difficult to gage, but probably reached 1 meter near the bridge. Salinity at the time was 12 ppt, about 1/3 the salinity of sea water. The short-fin mollie, *Poecilia mexicana*, is abundant in this water feature, while damselflies (*Ischnura ramburi*) and dragonflies (*Pantala flavescens*) are attracted to it. At the seaward end, an extensive beach deposit of (from the ocean waterline to the *muliwai*) cobble, gravel, and sand separating the stream from the ocean. This deposit forms Ka`ea Point. Kahana Stream (State ID No. 6-1-08) is

clearly an interrupted stream (intermittent at lower elevation) and was not flowing at the time of our visit.

Station 2 is in the cove or small bay between Ka`ea Point and Kai`a Point. It is near the location of Drainage Outlet No. 2. This feature is the first of the "Bays of Pi`ilani" (*hono a Pi`ilani*) that extend north along the coast. A sand beach is present at the shore and sand bottom extends offshore for a considerable distance. Towards the south part of the cove, outcrops of limestone are evident off the shore, and the bottom becomes increasingly more loose rock material towards Ka`ea Point. The sandy bottom includes considerable silt mixed with the sand and is rather barren appearing. Further offshore, seaweeds are conspicuous on available hard substratum: species observed include *A. spicifera*, *Ulva* spp., *Hypnea* sp., *Dictyota* sp., *Hydrolithon*, and *Porolithon gardineri*. *S. echinocarpum* becomes abundant closer to Ka`ea Point. The black sea cucumber, *Holothuria atra*, is relatively common. At a substantial distance off the shore (> 30 m) a sparse growth of several corals, including encrusting *Montipora flabellata* and small heads of *Pocillopora damicornis* occur on limestone outcrops.

Station 3 is located at the north end of Ka`opala Bay, opposite the existing 54-inch culvert — Stations "New 1" and "New 2" are also along the shore of this cove, south from Station 3 (Figure 1). An existing 24-inch drainage outlet is also present at New-2. The shoreline is rocky at both of the "new" culvert sites, while there occurs a narrow sand beach off Station 3. This shoreline sand deposit grades into massive boulders protecting the base of the roadway behind the beach. Towards "New 1" the sand beach is replaced by a cobble beach. The intertidal seaweed, *Ahnfeltia concinna*, is present along the southern shore of the cove. Offshore of the lava rock shore, the bottom is mostly cobble and boulders, with some large outcrops 30 or more meters seaward. Off Station 3, the bottom is sand for considerable distance offshore, this giving way to a limestone rubble bottom. The only conspicuous inhabitants noted off Station 3 were the algae, *Ulva* spp. and *Hypnea musciformes*. *A. spicifera* is also common. However, only a sparse covering by hermatypic corals occurs on massive boulders off this shore. *Porites lobata* and *Pocillopora damicornis* were observed, as was the calcareous alga, *P. gardineri*.

Station 4 is located at Haukoe Point, reached by the public right-of-way (Public Beach Access No. 216) at the end of Hui Road "E". The point is a broad volcanic shelf exposed to wave erosion. No attempt was made to get in the water here. This location was used as a water quality control (see below) because the end of the point is well separated from the proposed road improvements project.

Water Quality Results

The results of water quality testing are given in Table 2 that shows all of the data obtained for all seven locations sampled. These data are then summarized in statistics (averages and standard deviations) considering, however, only the values from four of the stations (at three stations only field readings of temperature, DO, and salinity were made). For these averages, means are given for temperature, salinity, and dissolved oxygen (DO). Geometric means are given for turbidity, TSS, and the nutrients (ammonia, nitrate + nitrite, total nitrogen, and total phosphorus) as is generally standard practice for applying the State of Hawaii water quality standards (DOH, 1992). Note that because a standard deviation for a geometric mean is not symmetrical about that mean, it must be presented as a range instead of a value to be added and subtracted from the mean.

Temperature values showed slight variation and perhaps a pattern of increasing as the day progressed through the noon hour. The Station 4 temperature (collected last) was the same as that for Station 1 (collected earliest in the day), presumably reflecting the fact that Station 4 was located outside of the coves that typified the other locations except Station 1. Thus, this location is probably closer to the seawater temperature not influenced by slightly reduced exchange or circulation within a cove.

Salinity values also showed very little variation, except for the *muliwai* sample which was brackish as expected. Otherwise, salinity at all stations was within the normal range for sea water. However, a pattern of slightly increasing salinity is evident from south to north. Dissolved oxygen (DO) values tended to be high. At most of the places where DO was measured, the concentrations represent water at or slightly above saturation for the salinity and temperature. This circumstance is to be expected in well-mixed coastal waters. At two locations (New-1 and New-2) measured oxygen values indicate a saturation closer to 128 percent. This result is probably anomalous considering that the water at these locations was not especially confined and waves were coming in, breaking on the rocky shore. Generally, vigorous water movement will tend to maintain DO concentration right around saturation, since the result is to encourage diffusion. It is probable that calibration of the meter resulted in readings that were not accurate (too high). The true values are probably closer to 100% saturation (around 7 ppm). The values appear to be increasing from the Station 3 measurement taken previous (111% of saturation). Because the instrument was field calibrated between each reading, there may have been a problem with the meter itself, which received some wave splash while at Station 3.

Turbidity and TSS measure particulates suspended in the water column. Turbidity measures specifically cloudiness in the water. Both measures show that there is a

trend of improving water clarity from south to north in the project area, and this trend is quite marked. The "cleanest" water was found off Hakoe Point, outside the coves; the most turbid water was off Kahana. An ongoing monitoring of water quality (turbidity, TSS, and salinity only) off this coast (*AECOS*, 2000) demonstrates the trend is persistent beyond the date of our field survey (see below).

Table 2. Water quality characteristics of nearshore waters abutting the Lower Hono a Piilani Highway improvements project on West Maui, July 13, 2000.

	Time	Temp. (°C)	DO (mg/l)	DO Sat. (%)	Salinity (ppt)	Turbidity (ntu)	TSS (mg/l)
07-13-00							
Sta. 1	1125	25.8	6.88	102	33.25	24.8	44.8
mullwai, Kahana Str.	1100	25.4	7.64	100	12*	--	--
Sta. 2	1140	25.1	7.25	107	33.93	13.9	43.8
"new 2"	1340	26.4	*8.56*	*128*	33*	--	--
"new 1"	~1300	26.1	*8.27*	*123*	33*	--	--
Sta. 3	1235	25.9	*7.45*	*111*	33.37	4.49	8.2
Sta. 4 (Haukoe Pt.)	1445	25.8	6.70	100	34.09	1.26	3.3
MEANS		25.7	7.1	105	33.66	6.65	15.2
STD.DEV.		± 0.4	± 0.3	± 0.05	± 0.41	1.78-24.8	4.2 - 55
N		4	4	4	4	4	4

		Ammonia (µg N/l)	Nitrate nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)		Oil & Grease (mg/l)
07-13-00							
Sta. 1	1125	24	59	480	85	--	< 0.61
Sta. 2	1140	10	54	304	38	--	< 0.61
Sta. 3	1235	7	32	256	21	--	< 0.61
Sta. 4	1445	6	4	171	10	--	< 0.61
MEANS		10	25	283	29	--	ND
STD.DEV.		5 - 19	7 - 89	184-433	12 - 71	--	--
N		4	4	4	4	–	4

* Hand-held refractometer reading made in the field. Readings were corrected by subtracting 2 ppt based upon comparison of field and bench salinometer readings.

Nutrients provide information on biological productivity and contributions from land runoff or groundwater seepage. Nutrient concentrations are generally low in oceanic waters, but can be excessive in confined waters, resulting in eutrophication. The nutrients off the project site show a gradient of decreasing concentrations from south to north; the same as the turbidity and TSS. While there is a trend of slightly increasing salinity along this gradient, the overall conclusion to be made is that nearshore waters at the south end of the project area have the poorest water quality, and water quality improves steadily northward along the coast.

A monitoring at six stations along this coast since November 1998 (*AECOS*, 2000) provides a basis for exploring further the apparent water quality gradient. Although only salinity, TSS, and turbidity are measured in this monitoring program, and the total number of events is presently three. Two of the six stations sampled correspond to Stations 3 and 4 in the Lower Hono-a-Piilani Road improvements project area. Remaining stations include three within `Alaeloa Bay (Sites 1,2, & 3) and one off Oneloa Breach at Kapalua Resort. Table 3 presents summaries of these data with the sampling locations (sites 1 through 6) lumped in various ways: "Alaeloa" is all of the `Alaeloa Bay sites; "Other" is the remaining three sites; and "NW Coast" is five sites (all but the innermost in `Alaeloa Bay).

Table 3. Averaged results from November 1998, June 1999, and March 2000 sampling events (*AECOS*, 2000).

STATION DATA	SAMPLE EVENTS	STATISTIC	SALINITY (ppt)	TURBIDITY (ntu)	TSS (mg/l)
`ALAELOA (Sites 1 - 3)	Nov. 98 – Mar 00 n = 6	mean	34.06	2.31	3.8
		range	32.87 - 34.82	1.02 - 7.56	2.0 - 14.6
		stdev	*±0.68*	*1.27 - 4.20*	*2.0 - 7.3*
OTHER (Sites 4 - 6)	Nov. 98 – Mar 00 n = 6	mean	34.41	2.94	7.1
		range	33.80 - 35.18	0.74 – 22.4	2.7 – 47.4
		stdev	*±0.48*	*0.90 - 9.57*	*2.8 - 18.0*
NW COAST (Sites 2 - 6)	Nov. 98 – Mar 00 n = 10	mean	34.36	2.39	4.8
		range	33.50 - 35.18	0.74 - 22.4	2.0 - 47.4
		stdev	*±0.52*	*0.92 - 6.21*	*2.0 - 11.4*

We can see that average salinity is higher than all but the Haukoe Point sample in the present data set, suggesting nearshore conditions towards Kahana are perhaps more influenced by land runoff or groundwater seepage than sites towards Kapalua. Mean turbidity and mean TSS in the Table 3 data are generally more like values measured on June 17 off Haukoe Point or Station 4 (= Site 4) than the means for all the June 17 stations, because turbidity and TSS were so high at Stations 1 and 2 to the south. Note that upper values (see ranges) in the monitoring study are comparable to our Station 1 and 2 values. In fact, the high extremes in that study have been nearly always measured at Site 5 (= Station 3).

Statistical analyses (ANOVA and Kruskal-Wallace) yield no significant differences when the various data sets are compared (present data set, "Alaeloa", "other", and "NW Coast"). This outcome is not surprising considering how few samples represent each set. Two other statistical tests (Student's t-test and Mann-Whitney) indicate a possible significant difference in the average salinity of the present data set (Table 2) and the "NW Coast" and "Other" data sets (Table 3).

Because the project is one involving a vehicular transportation system (road), we collected samples from four stations and analyzed these for oil & grease to establish if this parameter (it is a single measurement sensitive to a variety of petroleum-based substances). The results for all four samples were that oil & grease was not present in the water at concentrations of 0.61 mg/l or greater — essentially oil & grease was not detected.

Discussion

The proposed roadway improvements involve repaving the roadway, creating wider, paved shoulders, and constructing or reconstructing culverts that drain directly onto the shore. None of the proposed changes would involve adding fill to areas makai of the certified shoreline, so no direct impacts on marine resources are indicated.

Improvements to existing drains will not much alter the pattern of runoff to the shore. Runoff water presently arriving at any drain that is either plugged with debris or undersized simply crosses the roadway above the drain and enters the coastal waters that way. While some minor filtering may be accomplished by this flow pattern (as opposed to flowing via a drain), this is not a preferred way to handle runoff, in as much as it tends to encourage erosion of the backshore and entrainment of road debris. Water quality problems certainly exist along this coast, but these are not exacerbated by the Lower Hono-a-Piilani Road in any way that would be altered by the proposed project. Runoff from construction, from agricultural lands mauka of the road, and from contaminants entering the

groundwater are the most likely causes. These nonpoint sources are not easily pinned down. Obviously, construction on the road could become a temporary contributor and appropriate Best Management Practices (BMPs) will need to be employed as part of the roadway improvement project.

Additional paving of shoulder areas along this roadway will produce some increase in impermeable surface. However, the actual effect will be minor because of the present nature of these shoulder areas. In the project area, Lower Hono-a-Piilani Road is confined to a corridor between developed properties and, in some cases, the shore. Most of this land, including especially the road shoulders, is already resistant to infiltration during rains. Paving the shoulders will reduce soil and road debris entrained in runoff, while increasing runoff only slightly.

Water conditions off this coast were too poor to obtain good qualitative or quantitative data on marine biota. It was evident, however, that marine resources are sparse in the nearshore and communities are very likely stressed by turbid water. Areas of extensive coral growth do not occur near the shore in this area. While this coast is traditionally one of extensive fishing by various means, including spear and throw-net, very little of this appears to occurs anymore. During our site visit one person seeking limu and one shore-casting comprised the only mid-week biological resource users. Several people were observed relaxing or swimming in the area.

The impact of the high nutrients measured in the water quality sampling is evident by the lush growth of benthic algae. Conditions are generally poor for favored species of limu, and mostly what occurs are sea lettuce (*Ulva*) and other "pest" species such as *Hypnea* and *Acanthophora*. The roadway project will have no impact on the nearshore nutrient regime either way.

References Cited

AECOS Inc. 1979. Maui Coastal Zone Atlas representing the Hawai`i Coral Reef Inventory, Island of Maui (MICRI). Part C: AECOS Inc. / U.S. Army Corps of Engineers, Pacific Ocean Division.

_____. 2000. Monitoring of water quality in `Alaeloa Iki Bay, Napili, West Maui for the Napilihau Villages Joint Venture - 3rd Report. AECOS Inc., Kailua. AECOS 812D: 5 pp.

State of Hawaii - Department of Health (DOH). 1992. Hawaii Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards. State of Hawaii, Department of Health.

Appendix D

Drainage Report

DRAINAGE REPORT
FOR
LOWER HONOAPIILANI ROAD IMPROVEMENTS, PHASE 4 (HOOHUI ROAD TO NAPILIHAU STREET)
Second Division TMK: 4-3-01, 03, 05, 15, and 19
West Maui, Hawaii

February 2000
Revised May 2001

Prepared for:

County of Maui
Department of Public Works and Waste Management

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817-5031
Telephone: (808) 533-3646
Facsimile: (808) 526-1267
Honolulu • Wailuku, Hawaii

DRAINAGE REPORT
FOR
LOWER HONOAPIILANI ROAD IMPROVEMENTS, PHASE 4
(HOOHUI ROAD TO NAPILIHAU STREET)
West Maui, Hawaii
Second Division TMK: 4-3-01, 03, 05, 15, and 19

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Civil Engineers • Surveyors
Honolulu • Wailuku, Hawaii

February 2000
Revised May 2001

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EXHIBITS

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(Cont'd)

APPENDICES

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

TED S. KAWAHIGASHI, P.E., FACEC
KENNETH K. KUROKAWA, P.E.
DONOHUE M. FUJII, P.E.
STANLEY T. WATANABE
TERRANCE S. ARASHIRO, P.E.
MERNA S. KIBE

DRAINAGE REPORT
FOR
LOWER HONOAPIILANI ROAD IMPROVEMENTS
(HOOHUI ROAD TO NAPILIHAU STREET)
WEST MAUI, HAWAII
SECOND DIVISION TMK: 4-3-01, 03, 05, 15 AND 19

I. INTRODUCTION

The purpose of this report is to evaluate the existing drainage conditions along Lower Honoapiilani Road from Hoohui Road to Napilihau Street and to propose drainage improvements as part of the Lower Honoapiilani Road Improvements project.

II. PROJECT LOCATION AND DESCRIPTION

The project is located on the northwest side of the island of Maui between Kahana and Napili (See Exhibit 1). The project site is approximately 1.4 miles in length along Lower Honoapiilani Road from Hoohui Road to Napilihau Street (See Exhibit 2). The following Tax Map Keys cover the entire project site: Second Division TMK: 4-3-01, 03, 05, 15, and 19.

The roadway improvements along the mauka side include the following: sidewalks, curbs, and drainage systems. The roadway improvements along the makai side include the following: buffer, paved swale and/or unimproved shoulder, and drainage systems.

III. FLOOD ZONES

Based on the Floodway Map and Flood Insurance Rate Map (FIRM) dated September 17, 1997 and June 1, 1981, respectively, portions of the project site are subject to flooding (See Exhibits 3 and 4).

REPLY TO:
501 SUMNER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE (808) 533-3646 • FAX (808) 526-1267 • EMAIL: atahnl@atohawaii.com

OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII

The section of Lower Honoapiilani Road between the Pohailani Maui condominium and Hui Road "D," including the Kahananui Bridge, are within Flood Zone V24 [i.e., Area of 100-year coastal flooding with velocity (wave action)]. The base flood elevation at Kahananui Bridge is between elevation 16 feet and 17 feet.

Another section of Lower Honoapiilani Road between Puamana Place and Hui Road "E," including the Kaopala Gulch 54-inch diameter culvert crossing, is within Zone A5 (i.e., Area of 100-year flooding). Also, a portion of the makai edge of the roadway along the coastline is on the borderline between Zones A5 and V24 [i.e., Area of 100-year coastal flooding with velocity (wave action)]. The base flood elevation at the Kaopala Gulch culvert crossing is between elevation 17 feet and 21 feet.

IV. EXISTING DRAINAGE CONDITIONS

A. Off-Site Drainage Along Honoapiilani Highway

Honoapiilani Highway has four (4) existing drainage crossings along the highway on the mauka side of the project site. The first existing drainage crossing along Honoapiilani Highway is at Sta. 136+45± to 137+20± (Kahanakai Bridge) which consists of a 68-foot span bridge over Kahana Stream. The runoff at this crossing is Q_{50} = 5,700 cfs (cubic feet per second) and Q_{100} = 7,400 cfs as referenced on the State Department of Transportation (DOT) plans, Honoapiilani Highway, Kahana to Alaeloa, FAP F-030-1(13), April 10, 1978. The runoff at this crossing eventually crosses Lower Honoapiilani Road at Kahananui Bridge via Kahana Stream. Based on the existing bridge opening, being 5 feet by 26 feet, the capacity is approximately 1,100 cfs. The capacity of the proposed bridge, based on an opening of 5 feet by 36 feet, is approximately 1,300 cfs. Besides the new grouted rubble paving (GRP) apron, the steam channel both upstream and downstream of the bridge, will remain natural and unimproved. See appendices for bridge capacity and GRP apron design calculations.

It should be noted that Kahananui Bridge is within Flood Zone V24 [i.e., Area of 100-year coastal flooding with velocity (wave action)] as mentioned in the previous section.

The second existing drainage crossing along Honoapiilani Highway is at Sta. 148+60±, which consists of two (2) 48-inch diameter pipes. The capacity of this crossing with entrance control is approximately 160 cfs (i.e., H/D = 1.0). The

runoff at this crossing is believed to be intercepted by the existing cane haul road and retained between Honoapiilani Highway and Lower Honoapiilani Road.

The third existing drainage crossing along Honoapiilani Highway is at Sta. 159+35±, which consists of two (2) 8-foot by 7-foot culverts (S = 1.05%). The runoff from Kaopala Gulch at this crossing is Q_{50} = 953 cfs and Q_{100} = 1,293 cfs as referenced on the State DOT plans, Honoapiilani Highway, Kahana to Alaeloa, FAP F-030-1(13), April 10, 1978. The runoff from this crossing flows toward a natural drainage ditch between TMK: 4-3-015:15 and 4-3-015:14, and eventually crosses under Lower Honoapiilani Road via a 54-inch diameter culvert. It should be noted that the culvert crossing is within Flood Zone A5 (i.e., Area of 100-year coastal flooding) as mentioned in the previous section.

The fourth existing drainage crossing along Honoapiilani Highway is at Sta. 170+13±, which consists of a 66-inch diameter corrugated metal pipe (CMP). The runoff at this crossing is Q_{50} = 224 cfs (S=3.6%, A=68.6 Acres) as noted on the State DOT plans, Honoapiilani Highway, Kahana to Alaeloa, FAP F-030-1(13), April 10, 1978. The runoff from this crossing flows into a retention basin on the mauka side of Lower Honoapiilani Road and crosses under Lower Honoapiilani Road via a 24-inch diameter outlet pipe. The 24-inch diameter outlet pipe discharges into an open drainage structure inside Kahana Sunset condominium with a 36-inch diameter outlet pipe. The retention basin discharges a maximum of 70 cfs through the 24-inch diameter outlet pipe.

B. Off-Site Drainage Along Lower Honoapiilani Road

Two off-site drainage areas exist along Lower Honoapiilani Road at Pohailani Maui Mauka and at Kepola Place. The first off-site drainage area at Pohailani Maui Mauka is located between Sta. 88+20 and Sta. 100+35. The runoff is collected within the private property and connects to the drainage system along Lower Honoapiilani Road. The area is approximately 6.3 acres, which produces 12.4 cfs of runoff.

The second off-site drainage areas are at Hale Kahana and Kahana Mauka Subdivisions adjacent to Kepola Place, between Sta. 100+35 and Sta. 107+50. The runoff is collected through a series of grated inlets within the private properties and catch basins along Kepola Place and is connected to the County's

drainage system at an existing catch basin, Sta. 107+13. The combined areas of the two subdivisions are 2.3 acres, which produces 6.2 cfs of runoff.

C. On-Site Drainage Along Lower Honoapiilani Road

The slope along Lower Honoapiilani Road from Hoohui Road to Hui Road "E" is relatively flat (0% - 5%), while the section of roadway from Hui Road "E" to Napilihau Street is steeper (5% - 8%).

The existing on-site drainage systems along the unimproved portions of Lower Honoapiilani Road consists of drainage inlets, underground pipes, and several drainage outlets with CRM outlet structures.

The existing on-site drainage systems along the improved portions of Lower Honoapiilani Road consists of curb and gutters, catch basins, manholes and several drainage outlets with CRM outlet structures.

Per the Department of Public Works and Waste Management, an existing drainage outlet adjacent to Pohailani Maui condominium requires repair, and drainage problems in this area along Lower Honoapiilani Road require mitigative measures. In addition, two new outlets are being proposed and an existing 24-inch outlet and 54-inch CMP culvert also requires repair. The new outlets are located across Hui road "D" and between the existing 54-inch culvert and Hui Road "I." The existing outlet that requires repair is located between Puamana Place and the existing 54-inch culvert.

The existing Kahananui Bridge along Lower Honoapiilani Road spans Kahana Stream and is approximately 28 feet, 6 inches wide by 29 feet, 0 inch span. A concrete slab under the bridge extends the full width and span of the bridge and approximately an additional 10 feet on the mauka side and an additional 2 feet on the makai side. There is approximately 5 feet of vertical clearance under the bridge between the concrete slab and girders.

Kahana Stream is unimproved and natural at the upstream end of Kahananui Bridge. The existing stream is flat and shallow and is approximately 30 feet wide and 5 feet deep. The stream capacity at the upstream end of the existing bridge is approximately 1,300 cfs. The capacity of the inlet end of Kahananui Bridge with entrance control is approximately 900 cfs (i.e., H/D = 1.0).

The existing 54-inch diameter CMP culvert crossing Lower Honoapiilani Road is connected to an existing drainage ditch on the mauka side of Lower Honoapiilani Road. The existing drainage ditch is natural and unimproved and is located between TMK: 4-3-15:15 and TMK: 4-3-15:14.

The drainage ditch is approximately 8 feet wide and 4 feet deep along the edge and 6 feet deep along the low point. Scouring was observed along the low point. The slope of the drainage ditch is approximately 3%. The capacity of the drainage ditch is approximately 600 cfs. The capacity of the inlet end of the 54-inch diameter CMP culvert with entrance control is approximately 200 cfs (i.e., H/D = 1.7).

V. HYDROLOGY

The storm water runoff quantity was computed using the Rational Formula,

Q = CIA where:

Q = Flow rate in cubic feet per second (cfs);

C = runoff coefficient;

I = Rainfall intensity in inches per hour for a duration equal to the time of concentration (Tc);

A = Drainage Area in acres (AC).

Based on the State of Hawaii, Department of Transportation, Highway Division, "Hydraulic Design Standards & Guidelines," a 10-year, 1-hour storm recurrence interval was used to determine the runoff quantities along the roadway.

See Appendix A for Hydrologic Calculations and Runoff Map for Existing Drainage Conditions (On-Site).

VI. PROPOSED DRAINAGE IMPROVEMENTS

Due to the relatively flat slopes and existing residences along Lower Honoapiilani Road, the new roadway improvements will basically be an extension of the existing road. The relatively flat slopes will also dictate the location of the drainage improvements along Lower Honoapiilani Road.

The proposed drainage improvements were designed around the existing roadway conditions since the new roadway was to match the existing roadside elevations.

The flat slopes ranging from 0.14% to 2.0% for the majority of the project in combination with the project being near to sea level posed special design considerations. The calculations for flooded width were performed on both the existing and proposed conditions and are presented in the Appendices.

The existing drainage outlet adjacent to Pohailani Maui condominium will be upgraded and additional drainage structures will be constructed along Lower Honoapiilani Road to mitigate the drainage problem in this area. Also, existing drainage outlets adjacent to Hui Road "D" and between Puamana Place and Hui Road "E" will be upgraded.

The Kahananui Stream Bridge will be improved to match the new road cross-sections on both sides (i.e., North and South) of the bridge.

The existing 54-inch diameter CMP culvert will also be upgraded. A new GRP apron is proposed on both the mauka and makai sides of the bridge.

VII. CONCLUSIONS

The runoff generated by this roadway improvement project along Lower Honoapiilani Road from Hoohui Road to Napilihau Street will not create adverse effects to downstream and adjacent properties. Hydrologic analysis of existing and proposed conditions affecting the project area reveal insignificant increases in existing flows resulting from the improvement project. The additional runoff of approximately 2.3 cfs will be collected by catch basins on the mauka side and drain inlets on the makai side and disposed at drainage outlets.

VIII. REFERENCES

Drainage and Erosion Control Report for Kahananui Village, C. Takami Engineering, Inc., Rev. November 1995.

Drainage of Highway Pavements, U.S. Dept. of Transportation, Federal Highway Administration, Hydraulic Engineering Circular No. 12, March 1984.

Drainage Report for Alaeloa Subdivision, Norman Saito Engineering Consultants, Inc., Rev. May 1992.

Drainage Report for Hale Kahana - Mauka Subdivision, Austin, Tsutsumi & Associates, Inc., Rev. November 1994.

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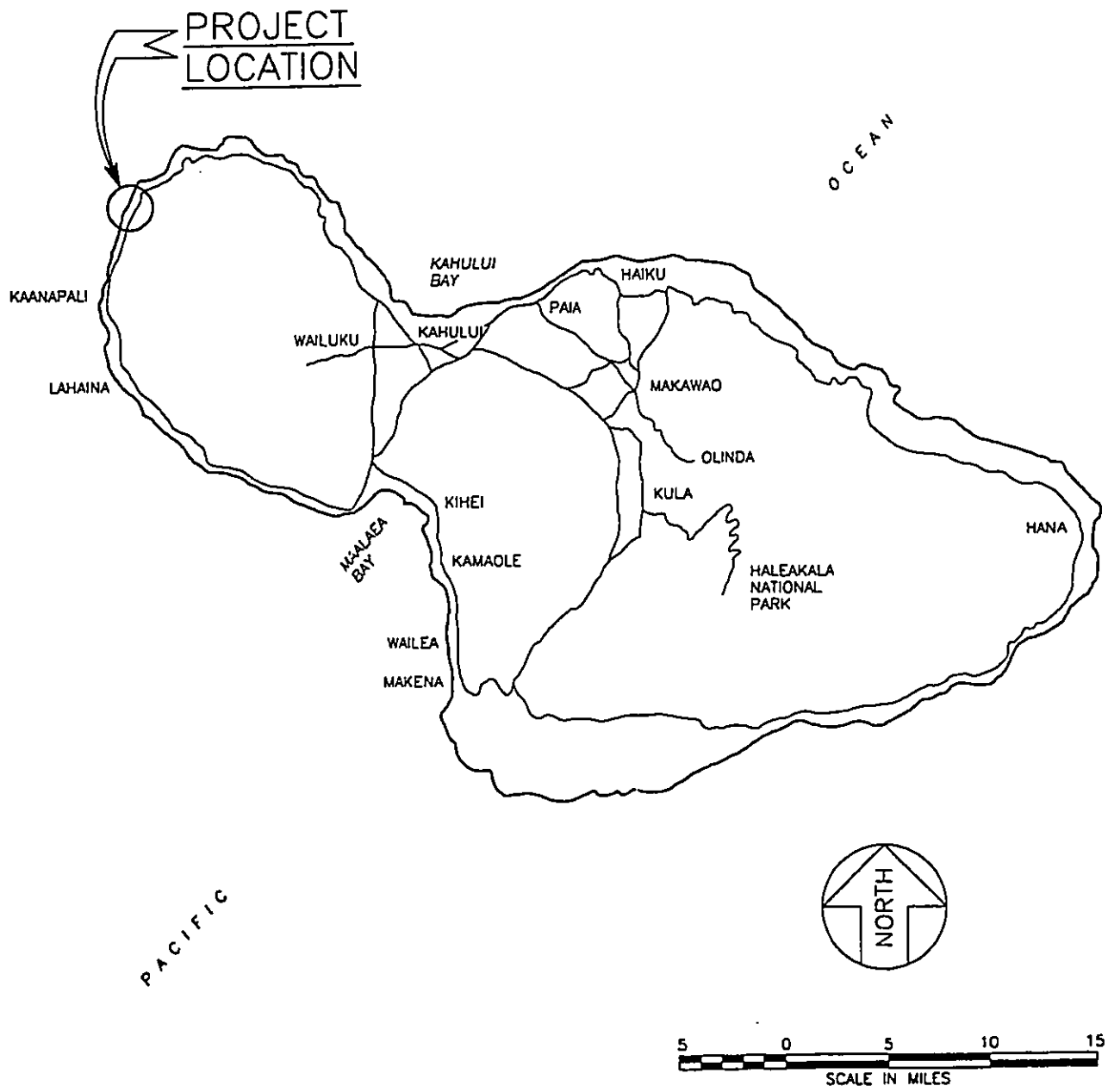
Rules for the Design of Storm Drainage Facilities in the County of Maui, Effective November 12, 1995.

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

EXHIBITS

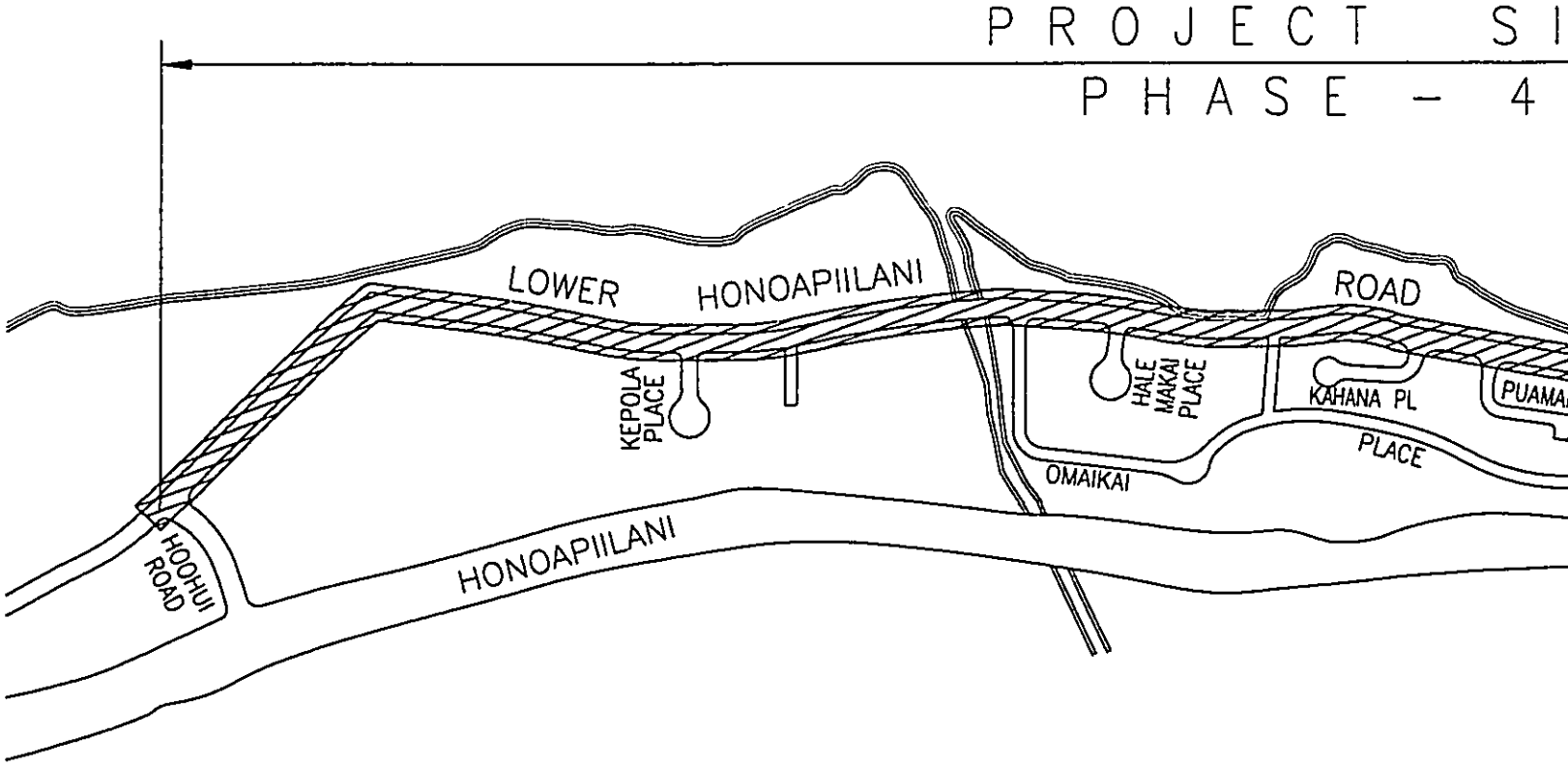


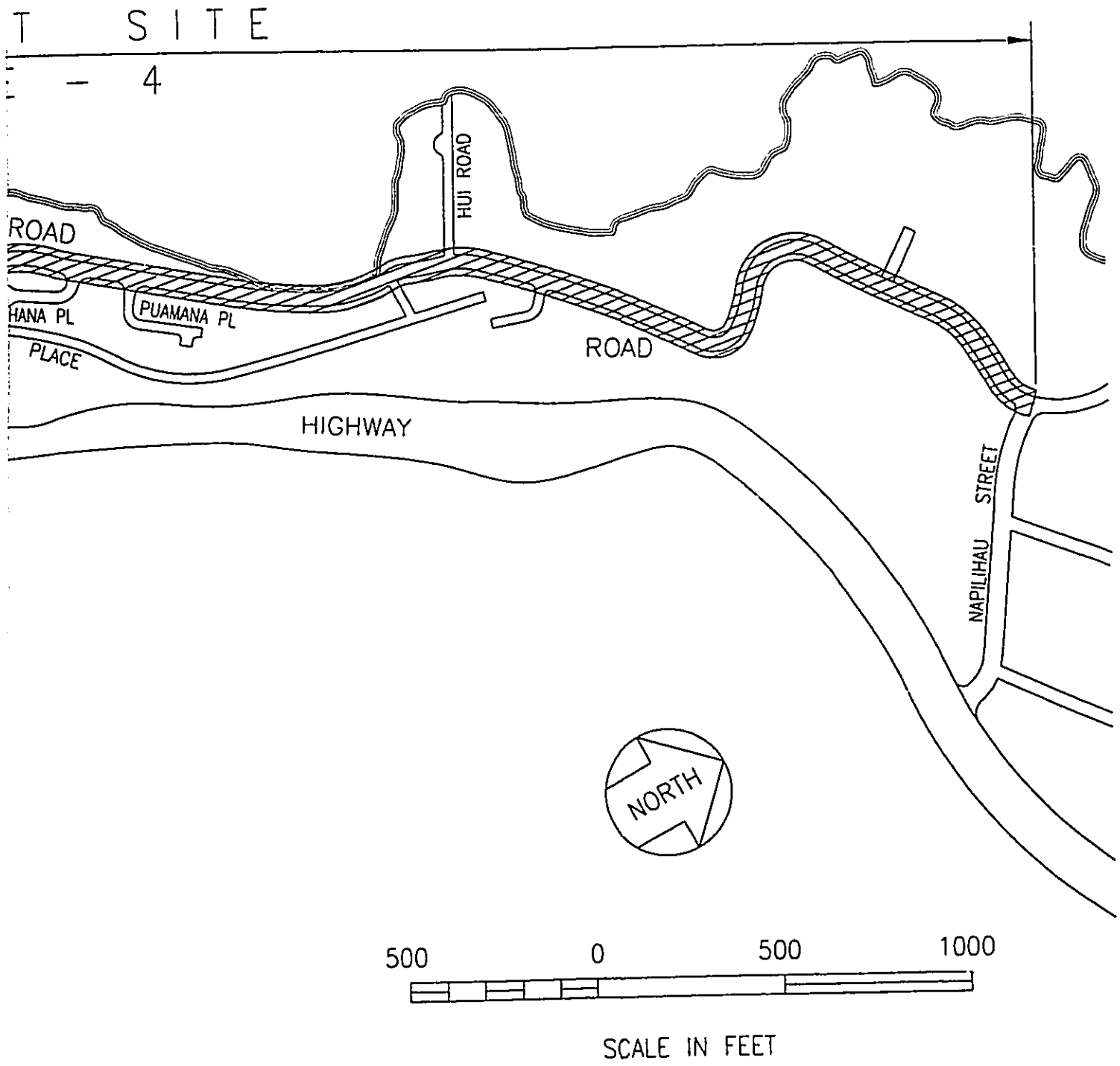
ISLAND OF MAUI

DRAINAGE REPORT FOR LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE - 4 LAHAINA, MAUI, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII LOCATION MAP	EXHIBIT 1

PROJECT SI

PHASE – 4





DRAINAGE REPORT FOR LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE – 4 LAHAINA, MAUI, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII VICINITY MAP	EXHIBIT 2

KEY TO MAP

500-Year Flood Boundary

100-Year Flood Boundary

FLOODWAY FRINGE — FLOODWAY

100-Year Flood Boundary

500-Year Flood Boundary

Approximate 100-Year Flood Boundary

Cross Section Line — A — A

Elevation Reference Mark — RM7

River Mile — M1.5

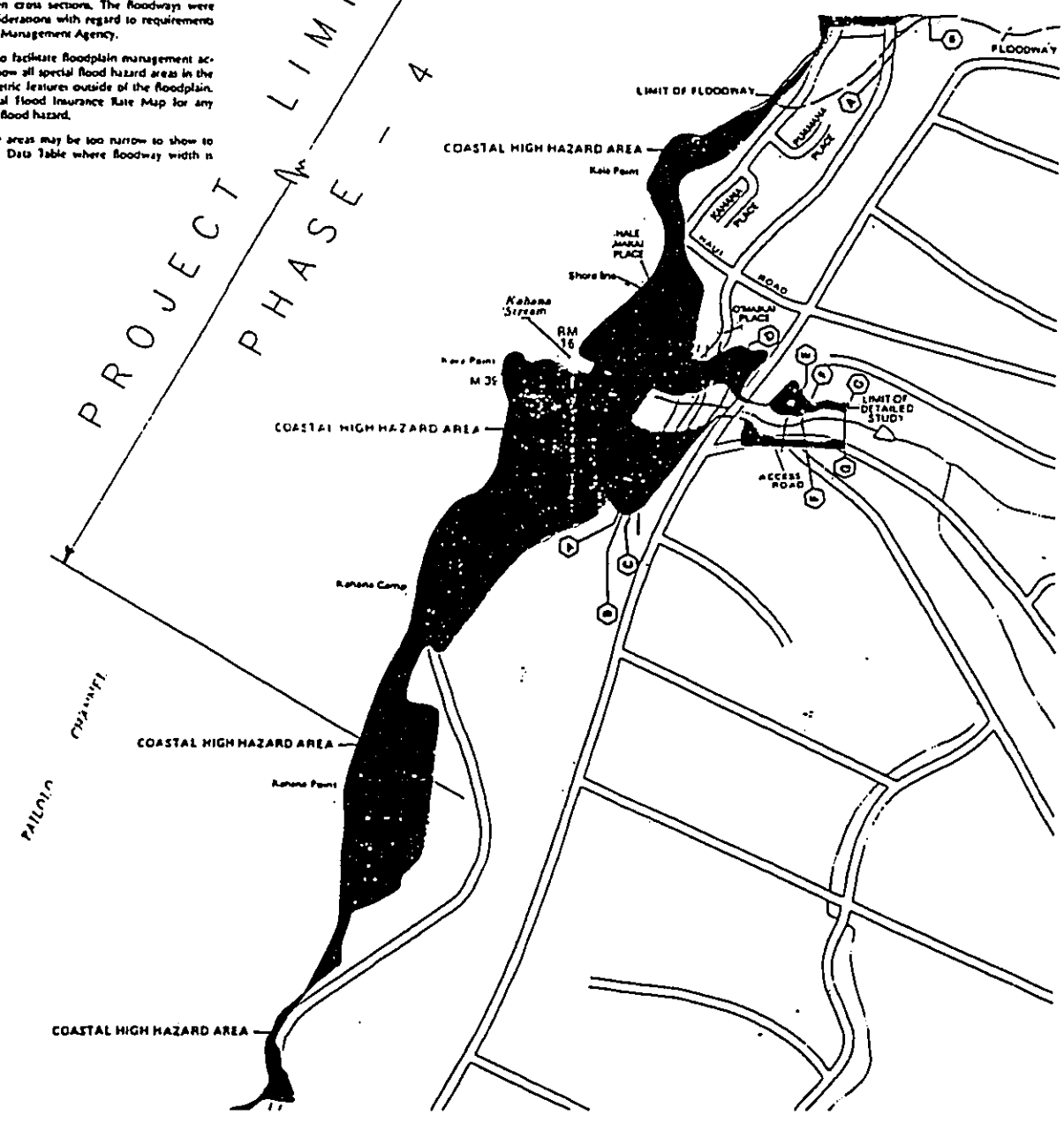
NOTES TO USER

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 Federal Emergency Management Agency.

This map was prepared to facilitate floodplain management activities only; it may not show all special flood hazard areas in the community or all planimetric features outside of the floodplain. Refer to the latest official Flood Insurance Rate Map for any additional areas of special flood hazard.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 1/20 inch.

PROJECT LIMITS
PHASE - 4



DRAINAGE REPORT FOR
LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE – 4
LAHAINA, MAUI, HAWAII

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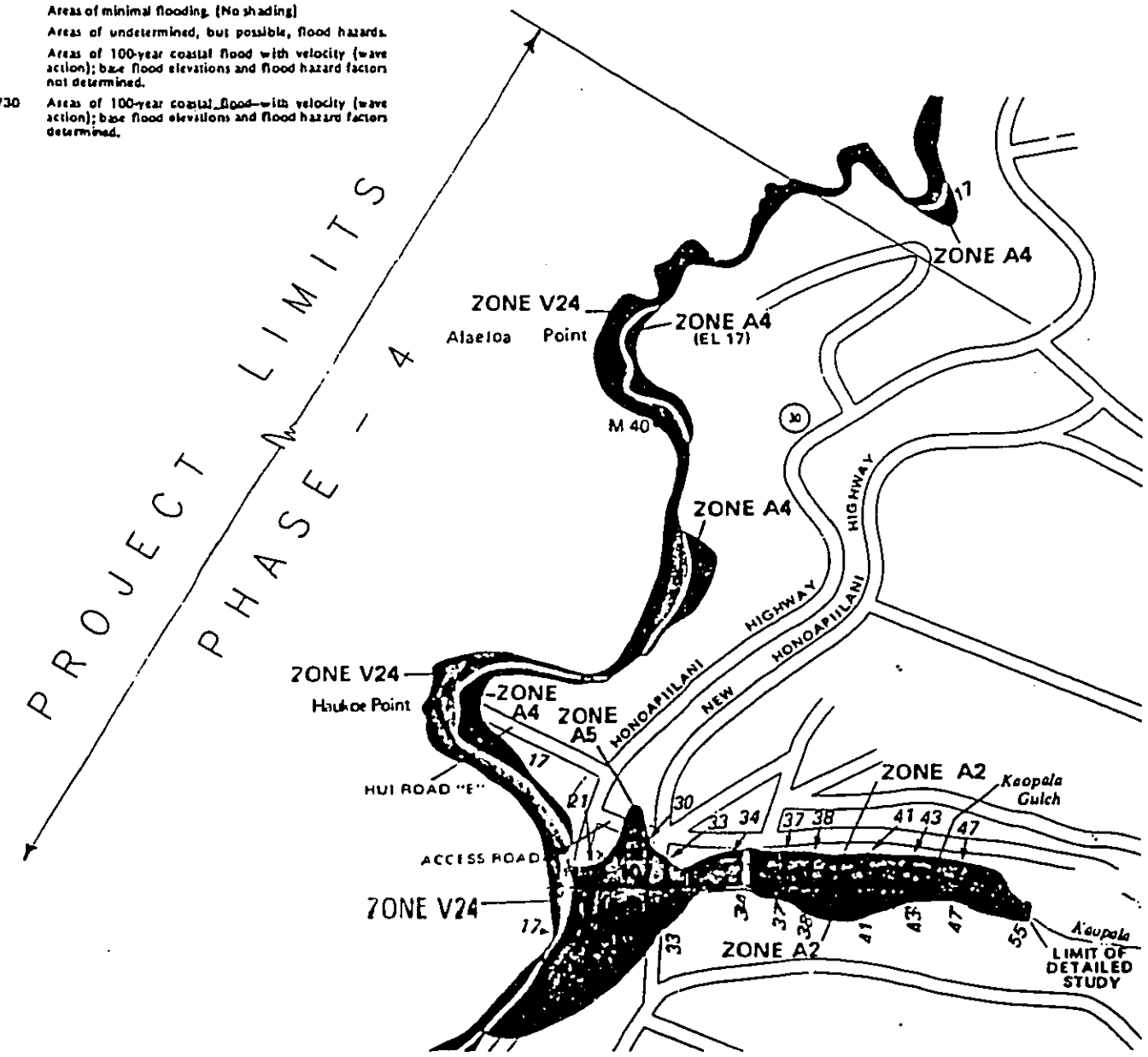
FLOODWAY MAP

FLOODWAY MAP PANEL 150003 0151, SEPTEMBER 17, 1997

EXHIBIT
3

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.



DRAINAGE REPORT FOR LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE – 4 LAHAINA, MAUI, HAWAII	ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS.SURVEYORS • HONOLULU,HAWAII FIRM MAP F.I.R.M. MAP PANEL 150003 0138B, JUNE 1, 1981 F.I.R.M. MAP PANEL 150003 0151B, JUNE 1, 1981	EXHIBIT 4

APPENDICES

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX A
EXISTING AND PROPOSED HYDROLOGIC CALCULATIONS AND RUNOFF MAPS FOR EXISTING AND PROPOSED DRAINAGE CONDITIONS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

LOWER HONOAPIILANI ROAD IMPROVEMENTS
SUMMARY OF EXISTING HYDROLOGY COMPUTATIONS

Recurrence Interval (Tm) = 10 years

Rational Method - Q = cia

Q = flow rate in cubic feet per second;
c = runoff coefficient;
i = rainfall intensity in inches per hour for a duration equal to the time of concentration; and
a = drainage area in acres.

AREA NO	EXISTING AREA, A (ACRES)	RUNOFF COEFFICIENT, c	RAINFALL INTENSITY, i	FLOW RATE, Q (CFS)
E1	0.52	0.78	4.80	1.95
E2	0.55	0.76	4.85	2.03
E3	0.13	0.68	5.30	0.47
E4	1.34	0.86	4.15	4.78
E5	1.68	0.58	4.30	4.19
E6	0.70	0.67	5.30	2.49
E7	3.56	0.55	4.60	9.01
E8	0.095	0.95	5.10	0.46
E9	0.49	0.64	4.85	1.52
E10	1.93	0.61	4.65	5.47
E11	0.58	0.54	5.35	1.68
E12	1.88	0.53	4.80	4.78
E13	0.64	0.57	4.80	1.75
E14	2.18	0.60	4.85	6.34
E15	4.00	0.56	4.00	8.96
E16	0.31	0.52	4.90	0.79
E17	1.10	0.51	4.50	2.52
E18	1.52	0.57	4.40	3.81
E19	0.70	0.64	5.00	2.24
E20	0.45	0.68	6.00	1.84
E21	0.84	0.72	4.70	2.84

AREA NO	EXISTING AREA, A (ACRES)	RUNOFF COEFFICIENT, c	RAINFALL INTENSITY, i	FLOW RATE, Q (CFS)
E22	1.59	0.58	4.20	3.87
E23	1.76	0.57	4.65	4.66
E24	0.99	0.65	4.70	3.02
			TOTAL =	81.48

AUSTIN, TSUTSUMI & ASSOCIATES, INC
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LOWER HONOAPIILANI ROAD IMPROVEMENTS
SUMMARY OF PROPOSED HYDROLOGY COMPUTATIONS (MAUKA)

Recurrence Interval (Tm) = 10 years

Rational Method - Q = cia

AREA NO.	STATION	INLET	DRAINAGE AREA a (ACRES)	RUNOFF COEFFICIENT c	RAINFALL INTENSITY i	FLOW RATE Q (CFS)
P1	91+64	CB A-2	0.270	0.74	5.10	1.02
P2	92+90	CB A-3	0.081	0.72	5.10	0.30
P3	94+60	CB BB-1	0.15	0.7	5.10	0.54
P4	95+18	CB C-3 DOWN STA.	0.03	0.84	5.10	0.13
	95+18	CB C-3 UP STA.	0.04	0.84	5.10	0.17
P5	97+23	CB F-1	0.16	0.64	5.00	0.51
P6	98+00	CB F-2 DOWN STA.	0.14	0.95	5.10	0.68
	98+00	CB F-2 UP STA.	0.2	0.95	5.10	0.97
P7	99+00	CB F-3	0.221	0.95	5.10	1.07
	100+15	CB G-1	0	0	0	0
P8	101+45	CB G-2 DOWN STA.	0.8	0.64	5.10	2.61
	101+45	CB G-2 UP STA.	0.53	0.64	5.10	1.73
P9	103+00	CB G-4 DOWN STA.	0.28	0.63	4.90	0.86
	103+00	CB G-4 UP STA.	0.23	0.63	4.90	0.71
P10	105+67	EXIST CB 1 DOWN STA.	0.42	0.61	4.25	1.09
	105+67	EXIST CB 1 UP STA.	0.33	0.62	5.00	1.02

AREA NO.	STATION	INLET	DRAINAGE AREA a (ACRES)	RUNOFF COEFFICIENT c	RAINFALL INTENSITY i	FLOW RATE Q (CFS)
P11	107+13	EXIST CB 2	2.43	0.4	3.70	3.60
P12	112+29	CB L-4 DOWN STA.	0.11	0.95	5.10	0.53
	112+29	CB L-4 UP STA.	0.182	0.61	4.30	0.48
P13	113+00	CB L-5	0.202	0.61	4.75	0.59
P14	113+79	EXIST CB N-1	1.2	0.57	5.10	3.49
P15	114+83	CB N-2	0.625	0.58	4.20	1.52
P16	118+72	CB R-1	0.38	0.66	4.70	1.18
P17	122+05	CB S-1	0.46	0.64	4.75	1.40
P18	123+61	CB T-1 DOWN STA.	1.39	0.63	4.55	3.98
	123+61	CB T-1 UP STA.	0.32	0.56	4.85	0.87
P19	124+41	CB T-2	1.8	0.68	4.55	5.57
P20	125+35	CB P-9	0.86	0.61	4.60	2.41
P21	127+56	CB U-1	0.59	0.6	4.30	1.52
P22	128+39	CB U-2	0.59	0.6	4.35	1.54
P23	129+30	CB U-3	0.5	0.6	4.40	1.32
P24	130+20	CB U-4	0.76	0.61	4.55	2.11
P25	131+88	CB V-6	0.94	0.55	4.30	2.22
P26	134+54	CB WW-1	1.54	0.56	4.40	3.79
P27	139+05	CB W-11	0.16	0.68	5.10	0.55
P28	139+66	CB W-12	0.31	0.75	5.10	1.19
P29	145+28	CB Y-1	0.18	0.73	5.10	0.67

AREA NO.	STATION	INLET	DRAINAGE AREA a (ACRES)	RUNOFF COEFFICIENT c	RAINFALL INTENSITY i	FLOW RATE Q (CFS)
P30	146+70	CB X-6 DOWN STA.	0.1	0.8	5.10	0.41
	146+70	CB X-6 UP STA.	0.35	0.71	4.80	1.19
P31	148+09	CB Z-2	0.346	0.56	4.60	0.89
P32	149+09	CB Z-3	0.513	0.6	4.60	1.42
P33	151+90	CB Z-7	1.13	0.55	4.50	2.80
P34	154+15	CB Z-8	0.892	0.5	4.70	2.10
P35	159+14	CB AA-2	0.53	0.57	4.80	1.45
P36	161+04	CB AA-4	0.208	0.69	4.95	0.71
				$Total_{mauka}$ =		64.91

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

LOWER HONOAPIILANI ROAD IMPROVEMENTS

SUMMARY OF PROPOSED HYDROLOGY COMPUTATIONS (MAKAI)

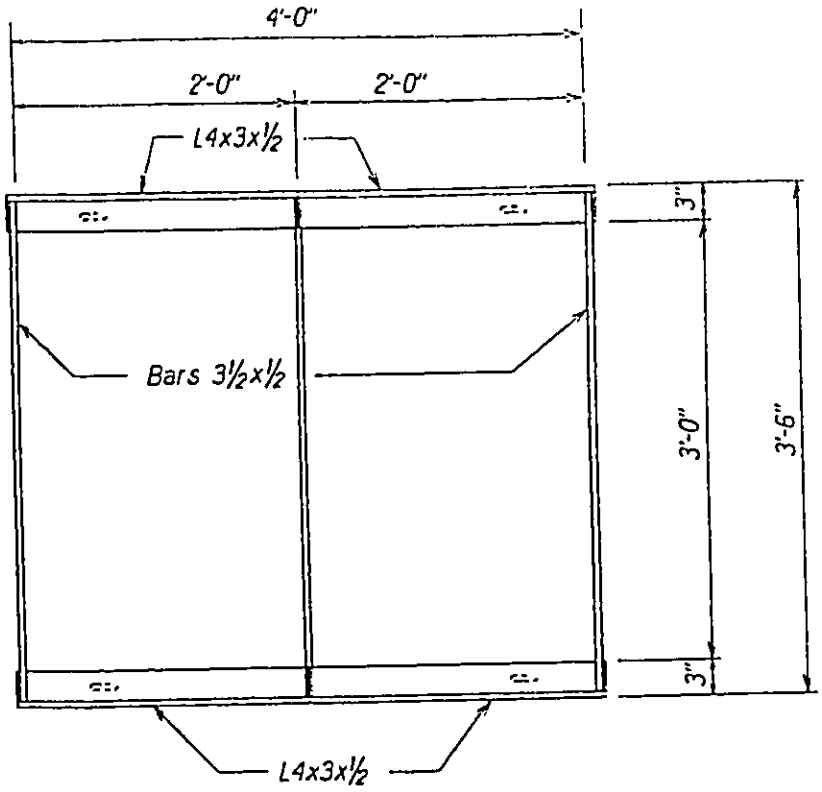
Recurrence Interval (Tm) = 10 years

Rational Method - Q = cia

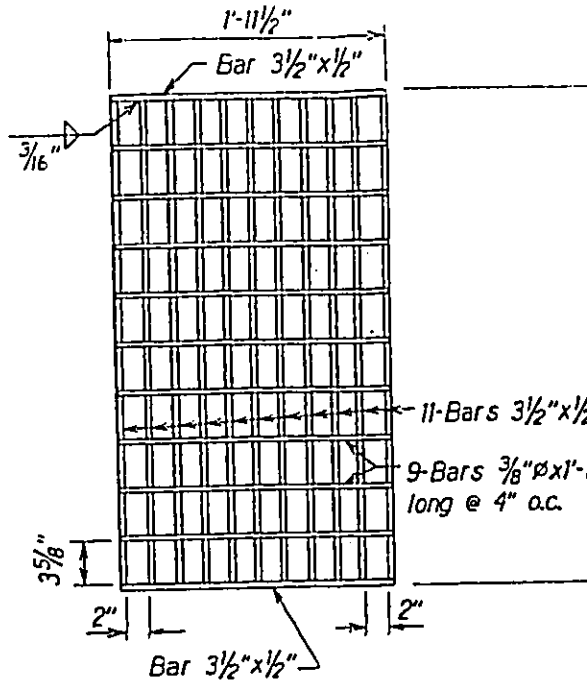
AREA NO.	STATION	INLET	DRAINAGE AREA a (ACRES)	RUNOFF COEFFICIENT c	RAINFALL INTENSITY i	FLOW RATE Q (CFS)
P37	91+64	GDI A-1	0.270	0.95	5.10	1.31
P38	95+18	GDI C-2 DOWN STA.	0.141	0.95	5.10	0.68
	95+18	GDI C-2 UP STA.	0.019	0.95	5.10	0.09
P39	95+55	GDI D-1	0.023	0.95	5.10	0.11
P40	96+60	GDI D-2	0.023	0.95	5.10	0.11
P41	97+23	GDI D-3	0.027	0.95	5.10	0.13
P42	98+00	GDI D-4 DOWN STA.	0.027	0.95	5.10	0.13
	98+00	GDI D-4 UP STA.	0.193	0.95	5.10	0.94
P43	99+00	GDI D-5	0.150	0.95	5.10	0.73
	100+15	GDI D-6	0.000	0	5.10	0.00
P44	101+45	GDI D-7 DOWN STA.	0.110	0.95	5.10	0.53
	101+45	GDI D-7 UP STA.	0.040	0.95	5.10	0.19
P45	103+00	GDI G-5 DOWN STA.	0.021	0.95	5.10	0.10
	103+00	GDI G-5 UP STA.	0.028	0.95	5.10	0.14
P46	105+64	GDI H-1 DOWN STA.	0.104	0.95	5.10	0.50
	105+64	GDI H-1 UP STA.	0.076	0.95	5.10	0.37
P47	106+70	GDI H-2	0.140	0.95	5.10	0.68

AREA NO.	STATION	INLET	DRAINAGE AREA a (ACRES)	RUNOFF COEFFICIENT c	RAINFALL INTENSITY i	FLOW RATE Q (CFS)
P48	112+29	GDI K-3 DOWN STA.	0.045	0.95	5.10	0.22
	112+29	GDI K-3 UP STA.	0.074	0.95	5.10	0.36
P49	113+79	GDI M-1	0.120	0.95	5.10	0.58
P50	118+68	GDI P-3	0.090	0.95	5.10	0.44
P51	120+82	GDI P-4	0.030	0.95	5.10	0.15
P52	122+05	GDI P-5	0.070	0.95	5.10	0.34
P53	123+38	GDI P-6 DOWN STA.	0.083	0.95	5.10	0.40
	123+38	GDI P-7 UP STA.	0.117	0.95	5.10	0.57
P54	125+35	GDI P-8	0.080	0.95	5.10	0.39
P55	118+49	GDI R-3	1.410	0.4	4.30	2.43
P56	134+53	GDI W-4	0.019	0.95	5.10	0.09
P57	134+88	GDI W-5	0.032	0.95	5.10	0.16
P58	135+50	GDI W-6	0.048	0.95	5.10	0.23
P59	136+46	GDI W-7	0.029	0.95	5.10	0.14
P60	137+01	GDI W-8	0.070	0.95	5.10	0.34
P61	138+31	GDI W-10a	0.250	0.95	5.10	1.21
P62	144+83	GDI X-1	0.064	0.95	5.10	0.31
P63	146+79	GDI X-5 DOWN STA.	0.121	0.95	5.10	0.59
	146+79	GDI X-5 UP STA.	0.061	0.95	5.10	0.30
P64	147+99	GDI Z-1	0.183	0.95	5.10	0.89
P65	151+20	GDI ZZ-1	0.306	0.95	5.10	1.48
P66	159+11	GDI AA-1	0.120	0.88	5.10	0.54
				$Total_{makai}$ =		18.87

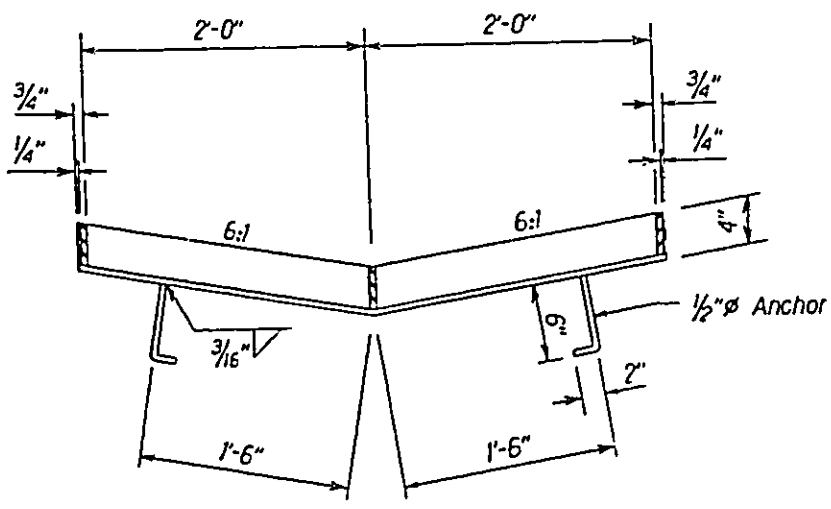
$Total_{mauka}$ + $Total_{makai}$ = 64.91 cfs +18.87 cfs = 83.8 cfs



PLAN



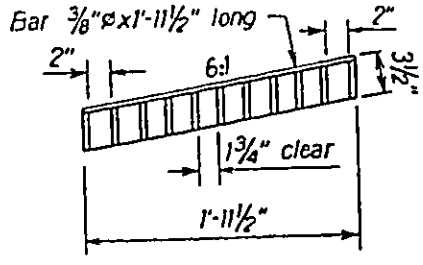
PLAN



SECTION

FRAME

Scale: 1½"=1'-0"



SECTION

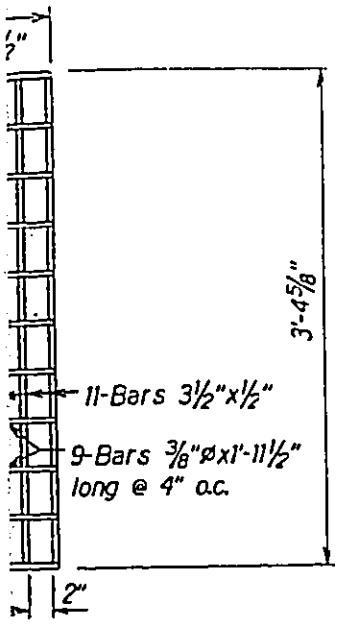
GRATE

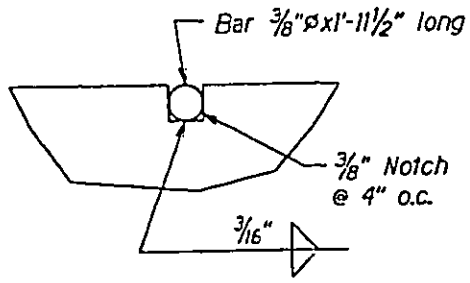
Scale: 1½"=1'-0"

NOTE:
All welds ⅜" unless otherwise noted.

TYPICAL DETAILS OF TYPE 61614P STEEL FRAME AND GRAT

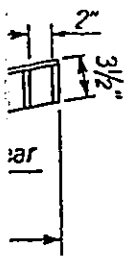
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.				





NOTCH DETAIL

Full Size



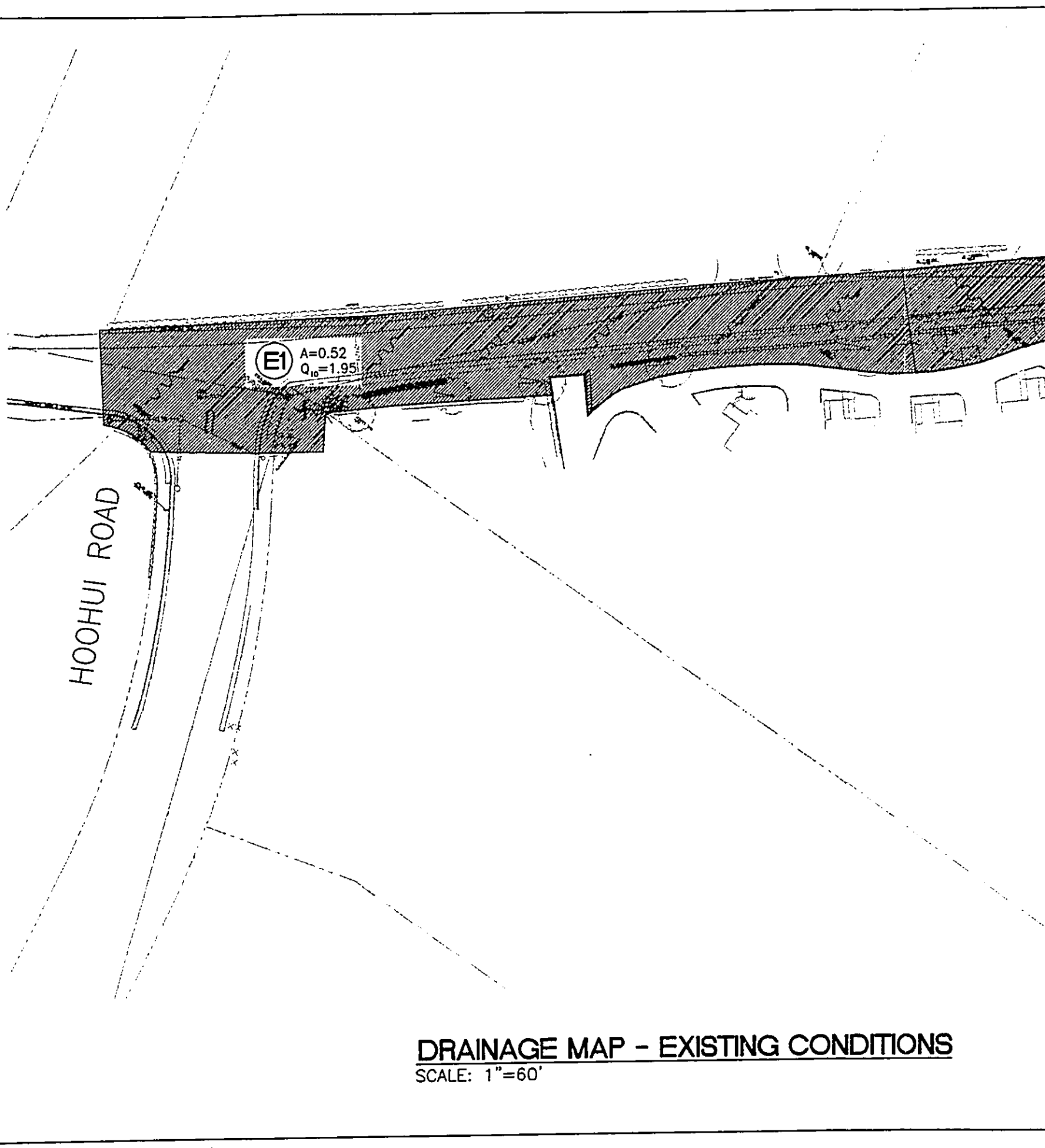
AND GRATES

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

Scale: As Shown Date: Sept. 1999

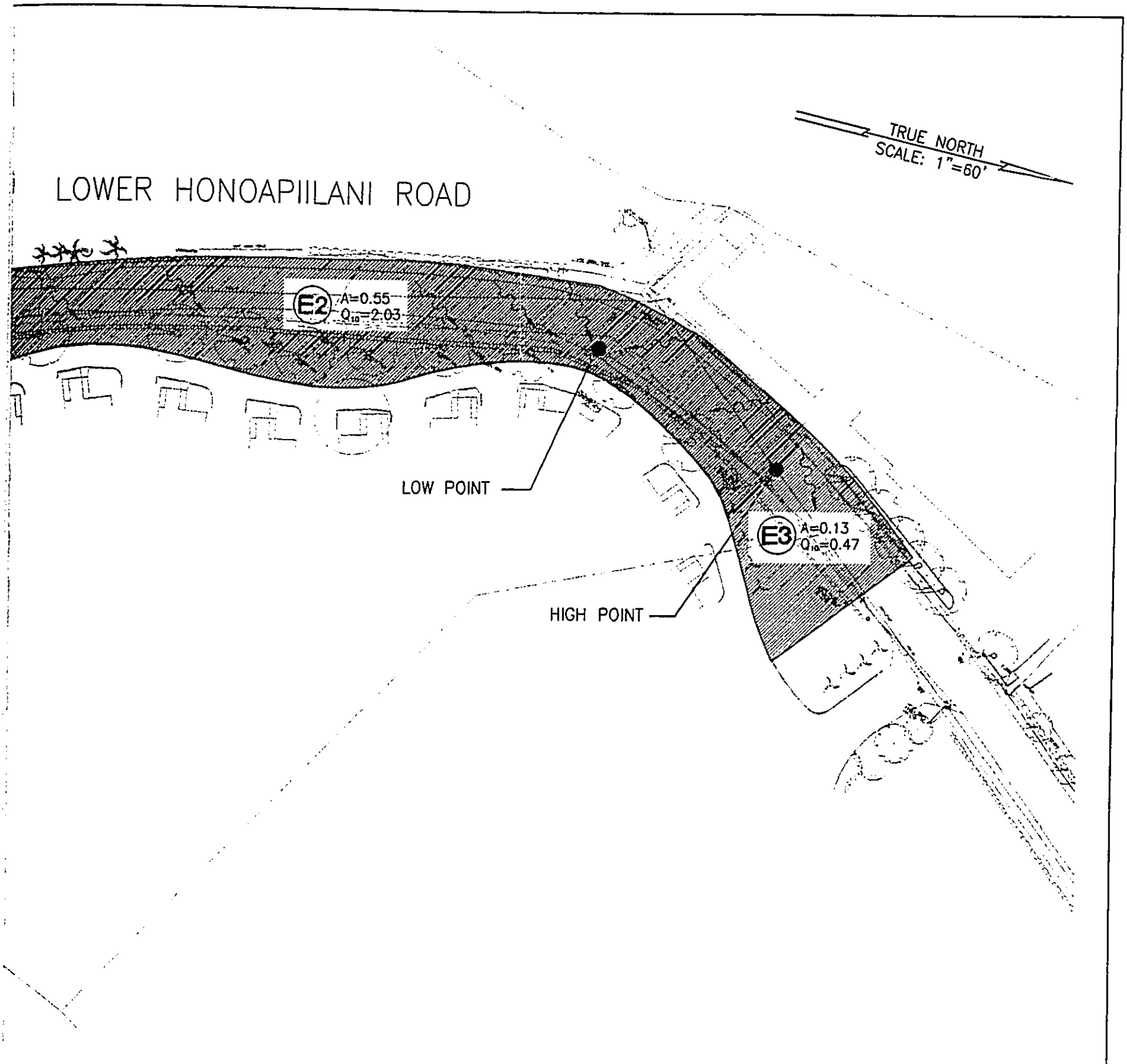
SHEET No. H8 OF 8 SHEETS



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRN-REPORT\DRN-EX1.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

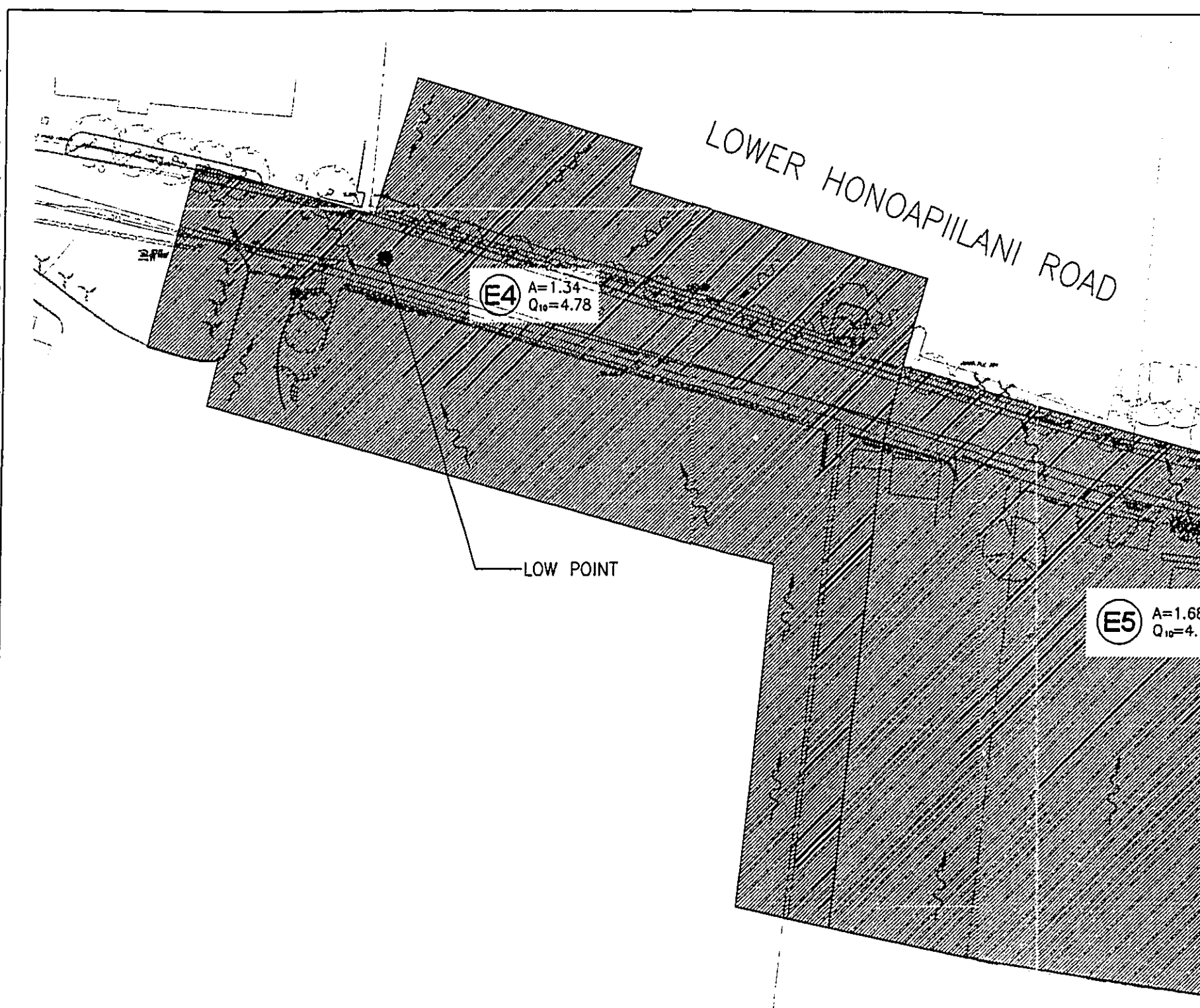
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

A1

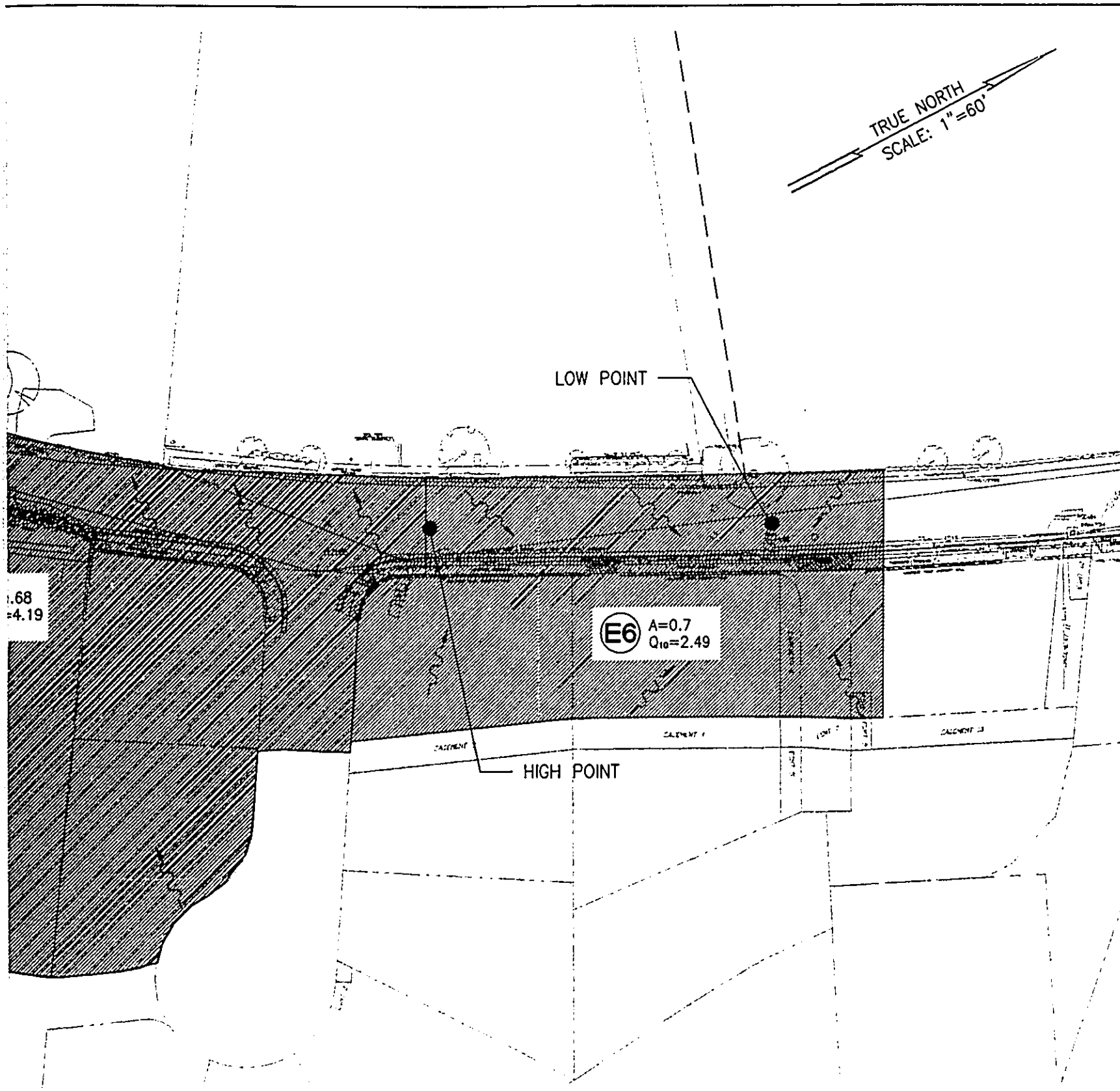
5/15/01



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRN-REPORT\DRN-EX2.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

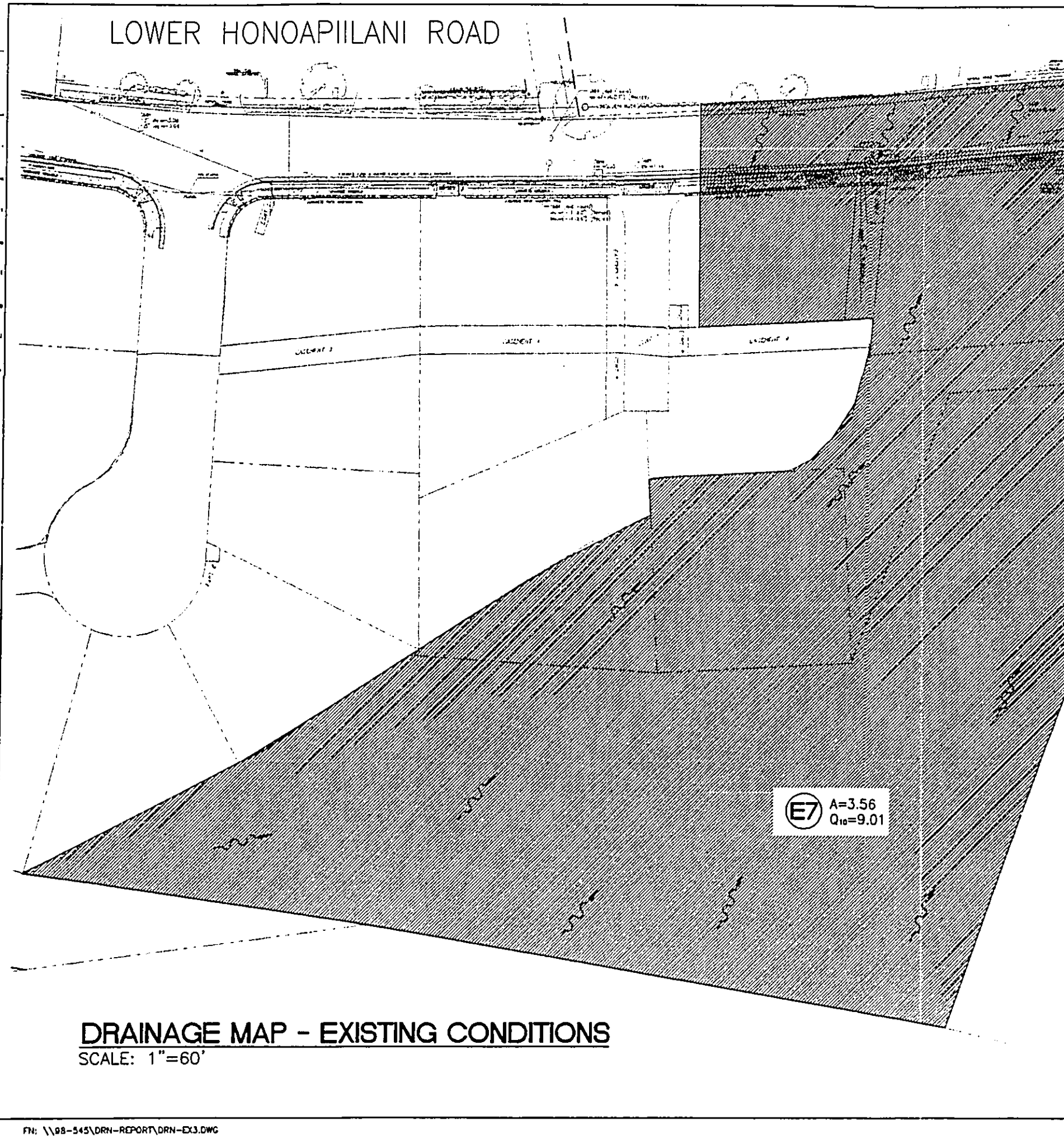
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

A2

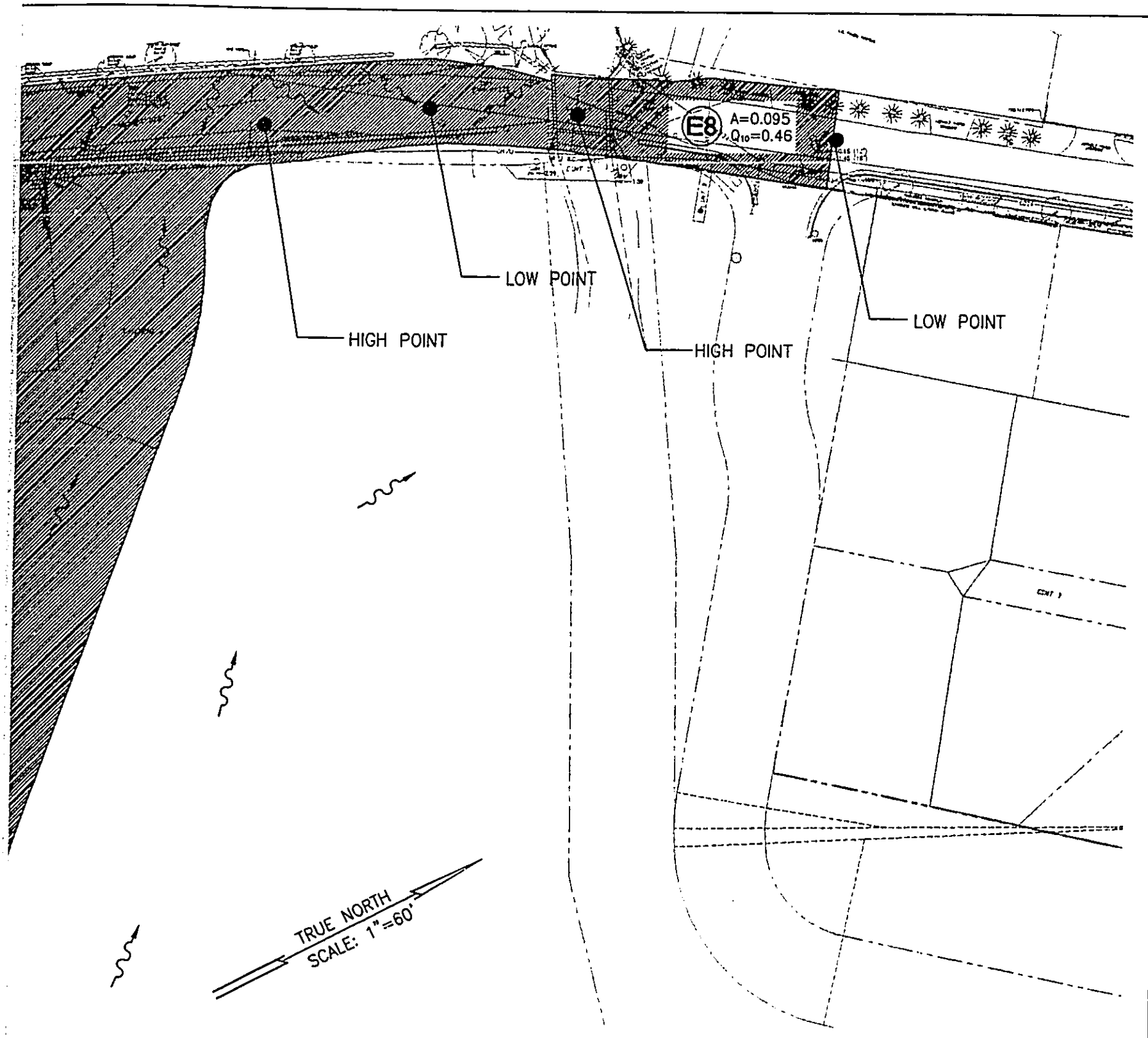
5/15/01



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRN-REPORT\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

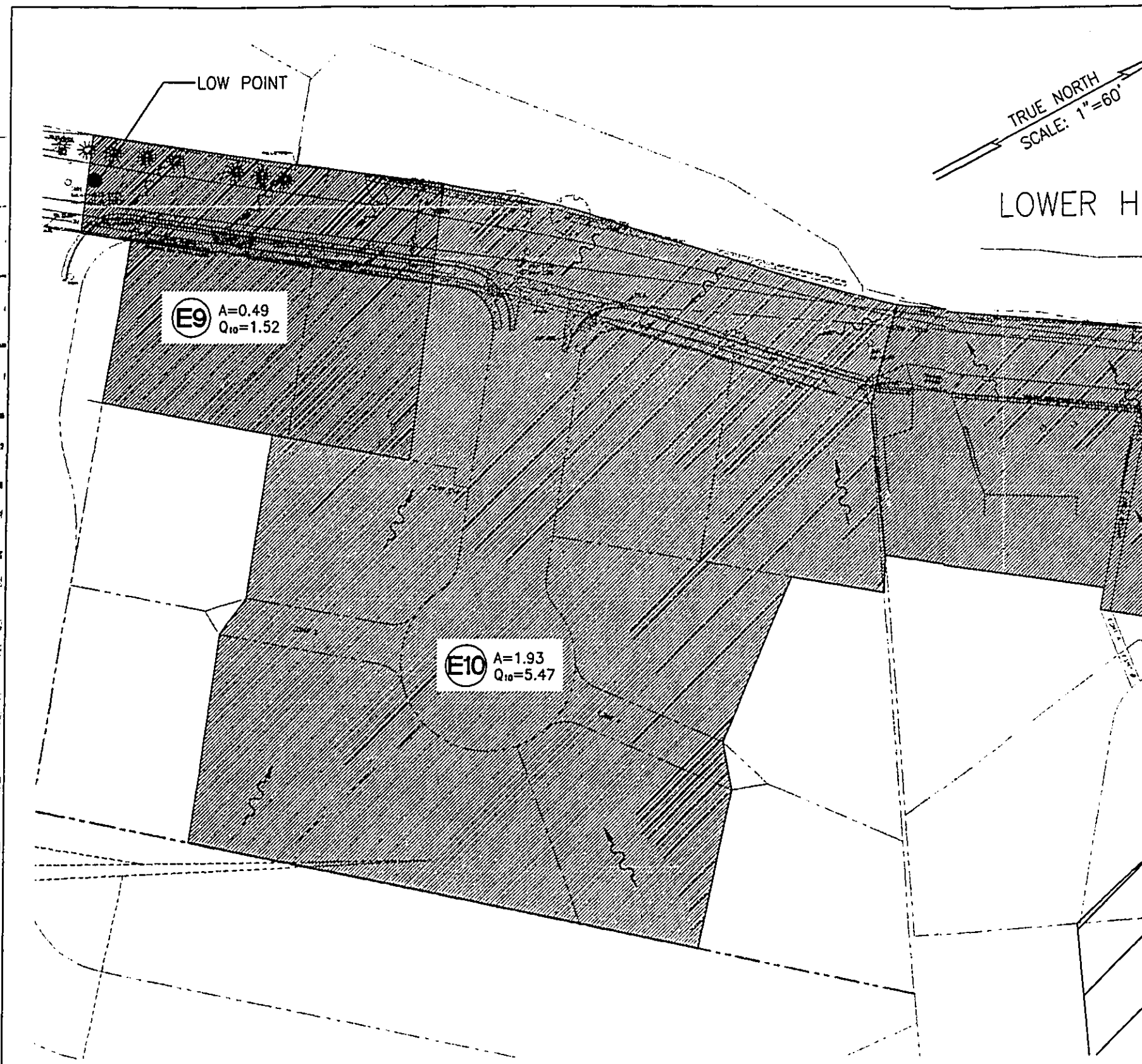
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

A3

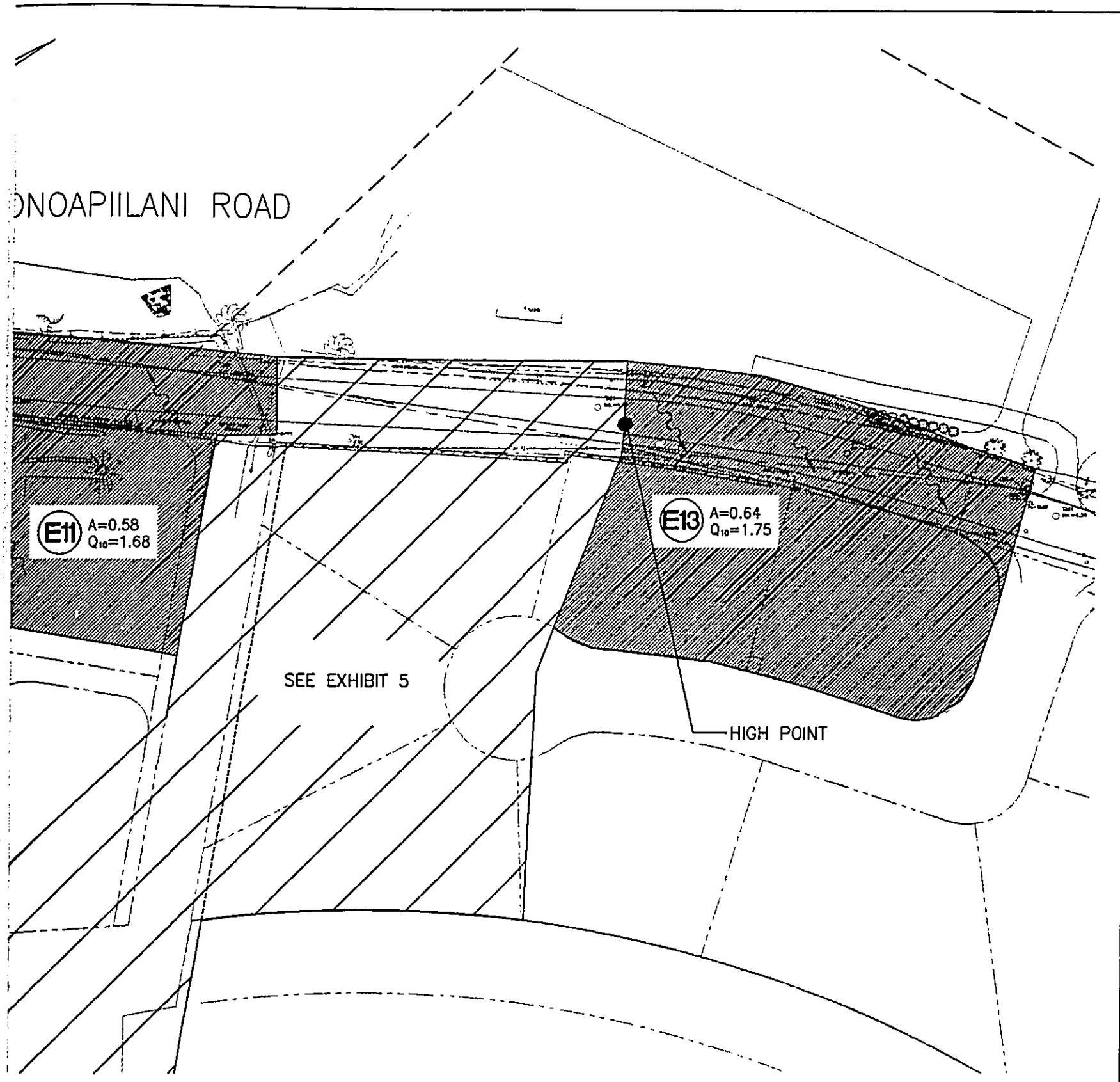
5/15/01



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

FN: \\QB-545\DRN-REPORT\DRN-EX4.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

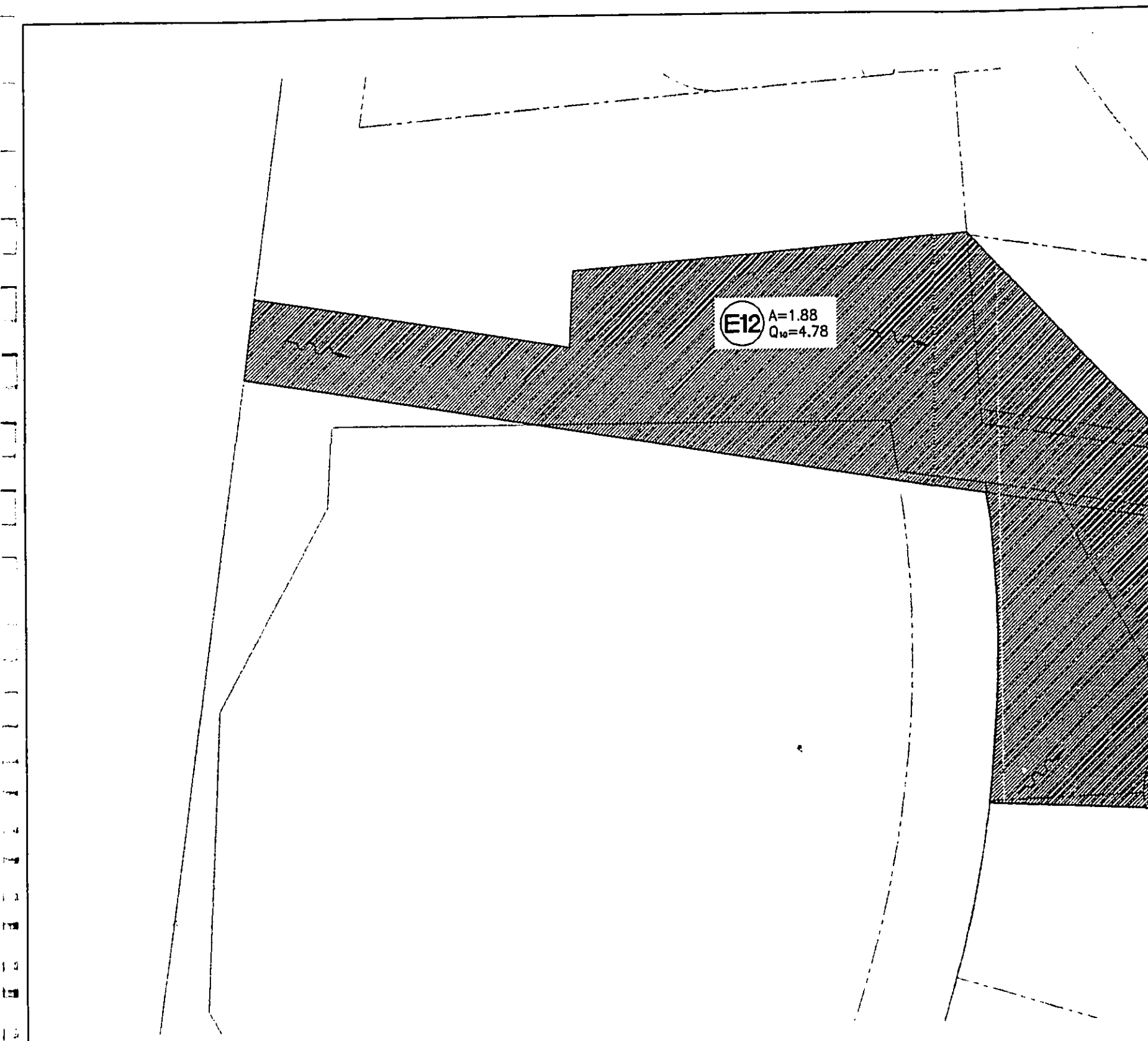
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

A4

5/09/01



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

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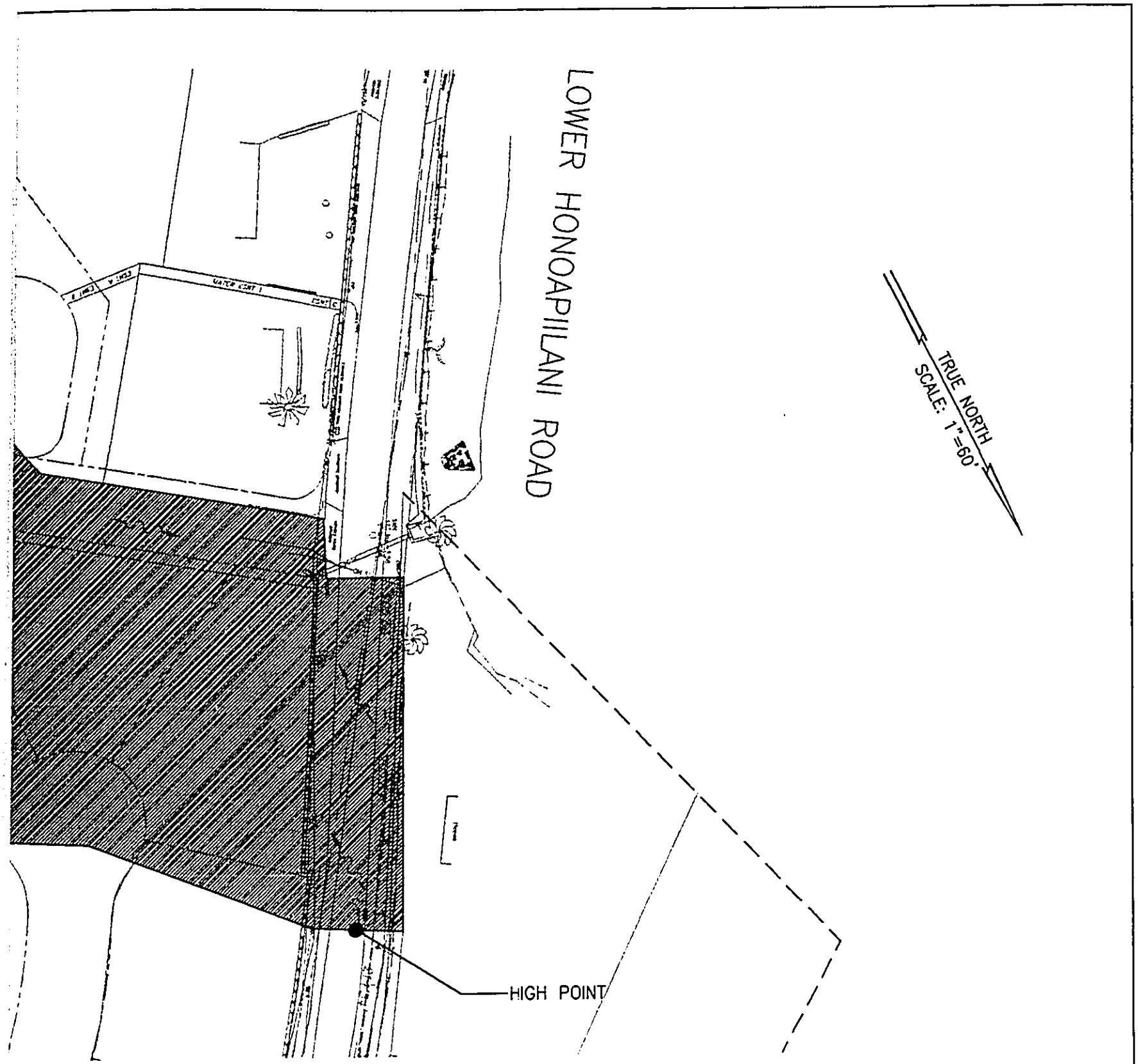


DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

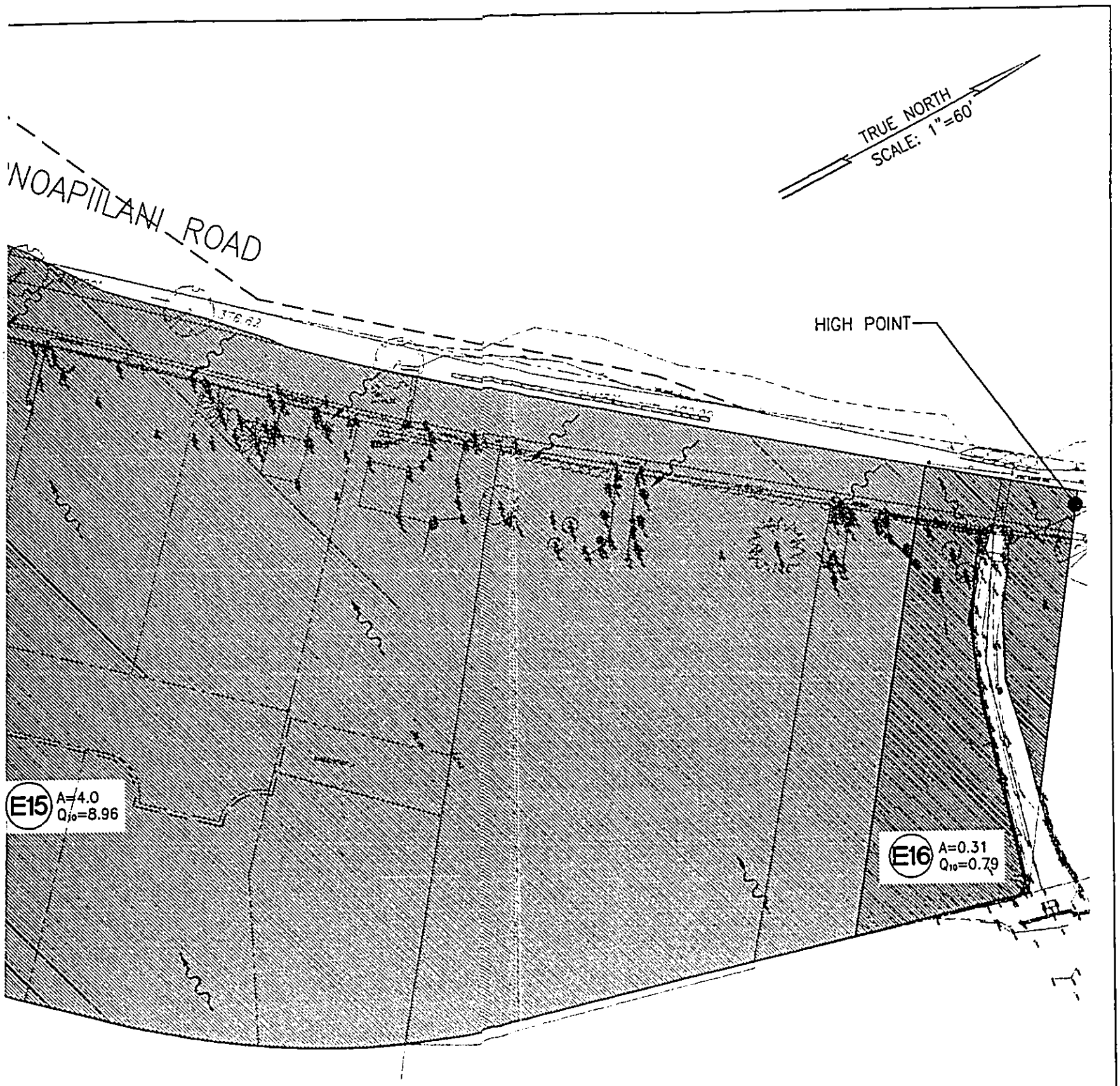
A5

5/09/01

DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRN-REPORT\DRN-EX6.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

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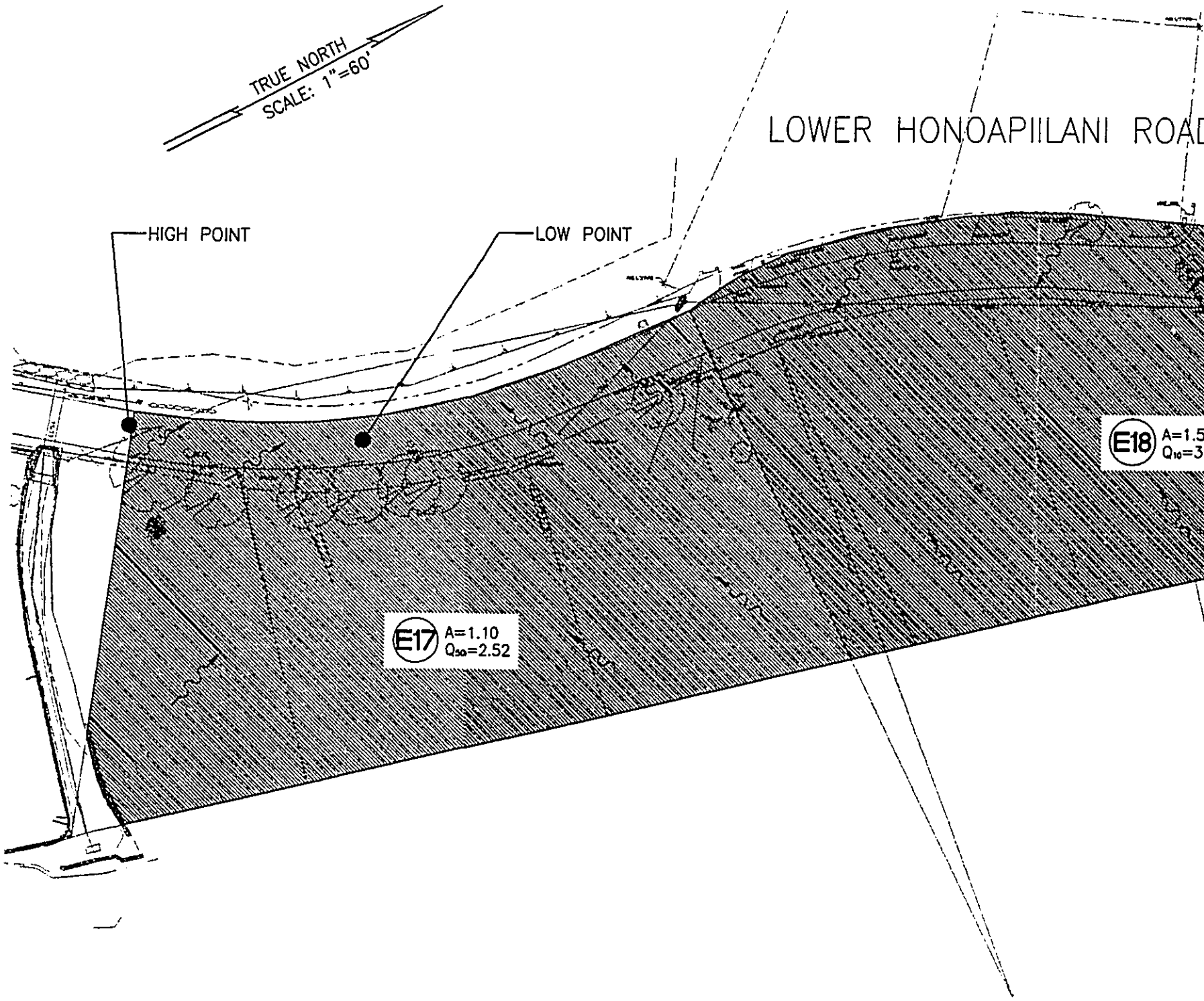
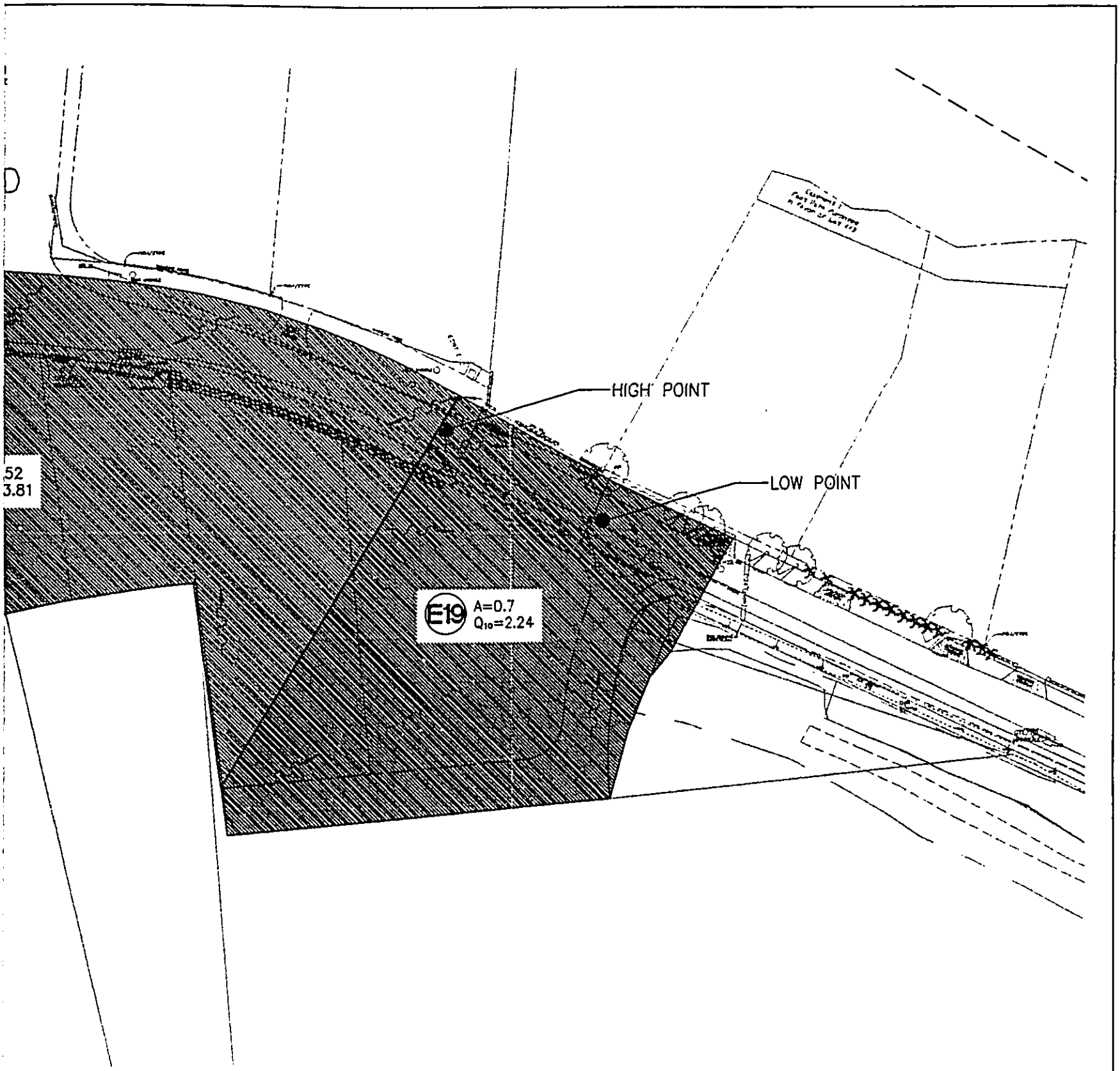
5/09/01



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'



52
3.81

DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

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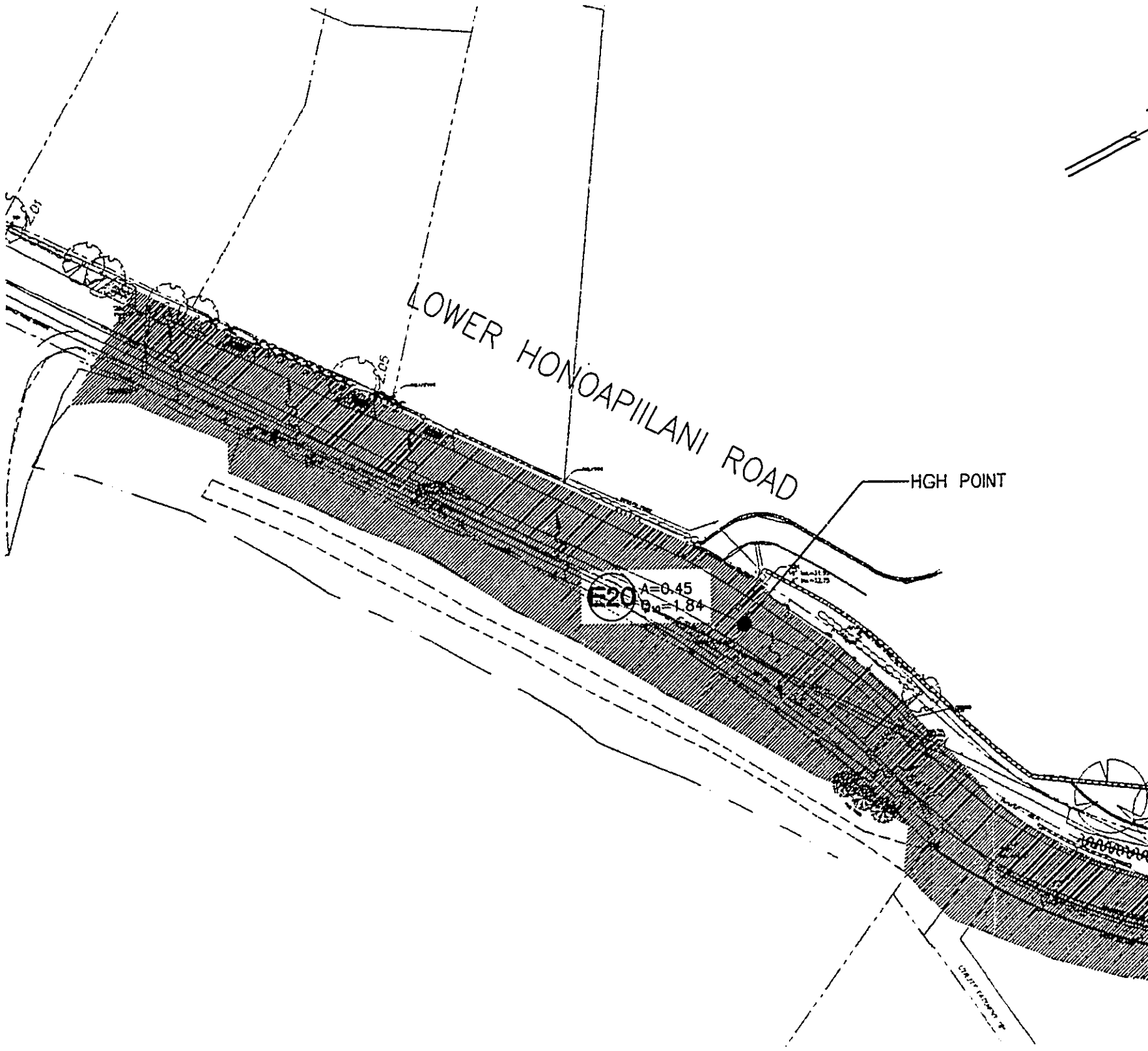
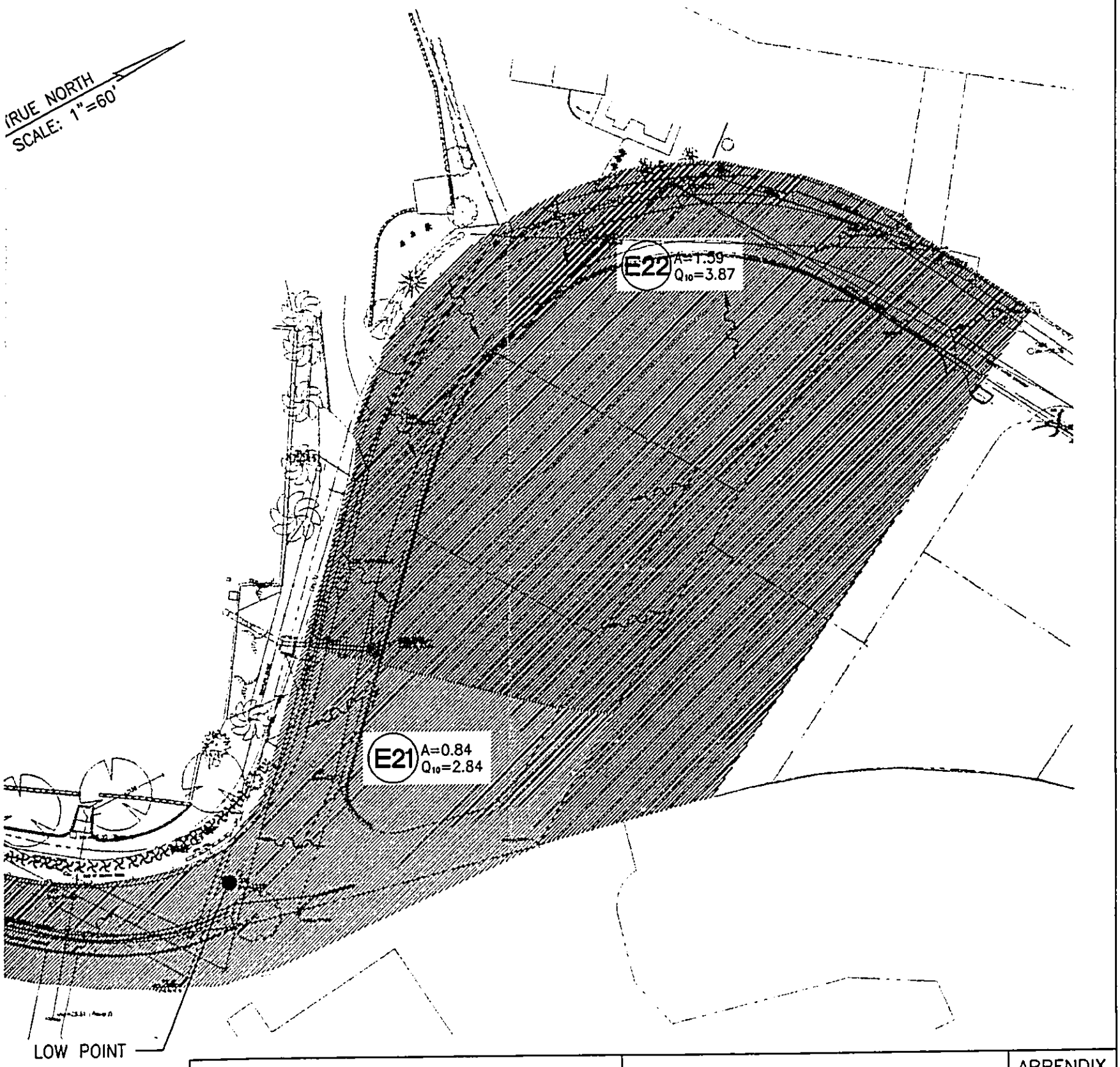
5/09/01



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRN-REPORT\DRN-EX8.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

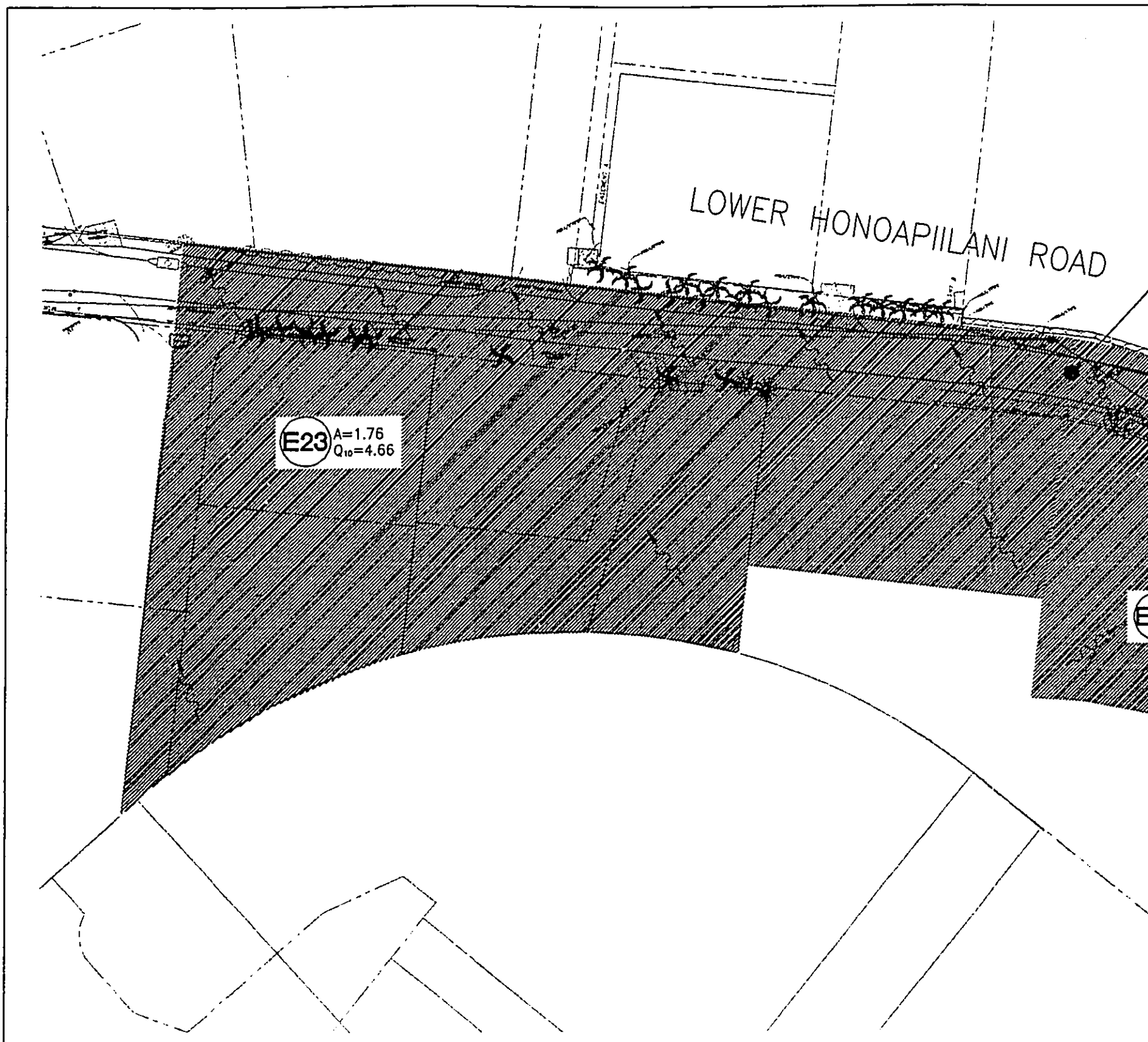
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

A8

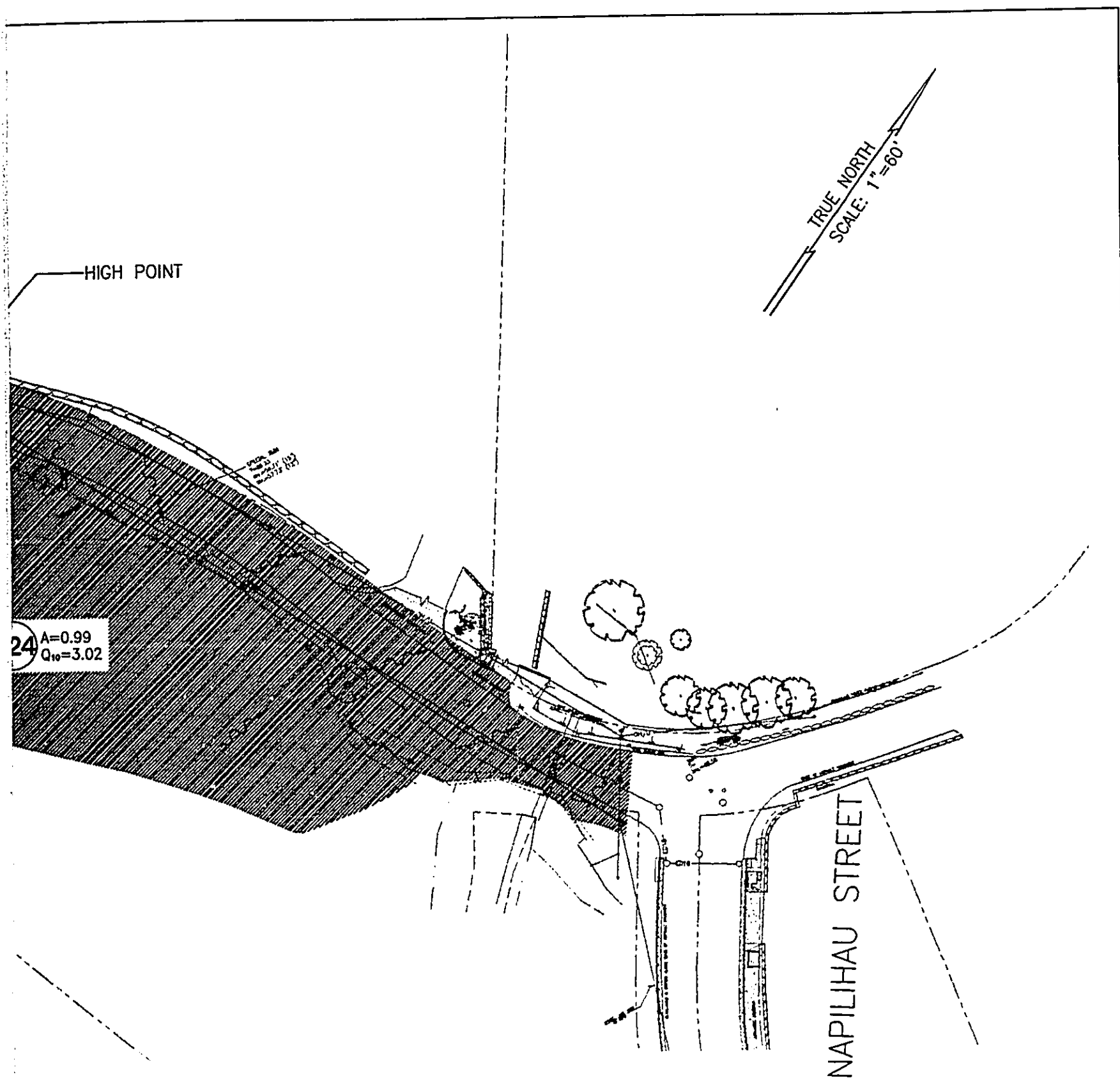
5/09/01



DRAINAGE MAP - EXISTING CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRN-REPORT\DRN-EXG.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

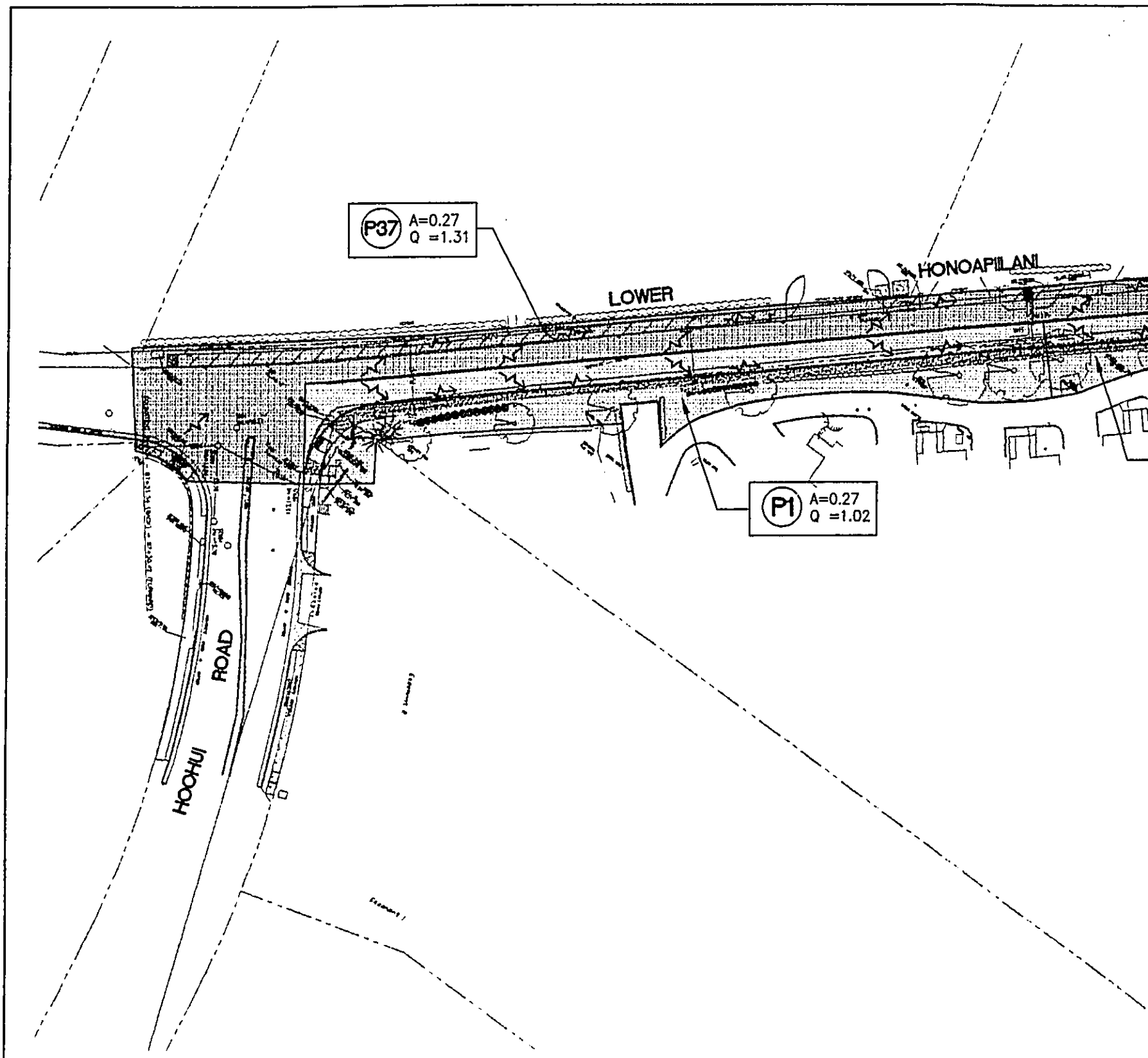
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
EXISTING CONDITIONS

APPENDIX

A9

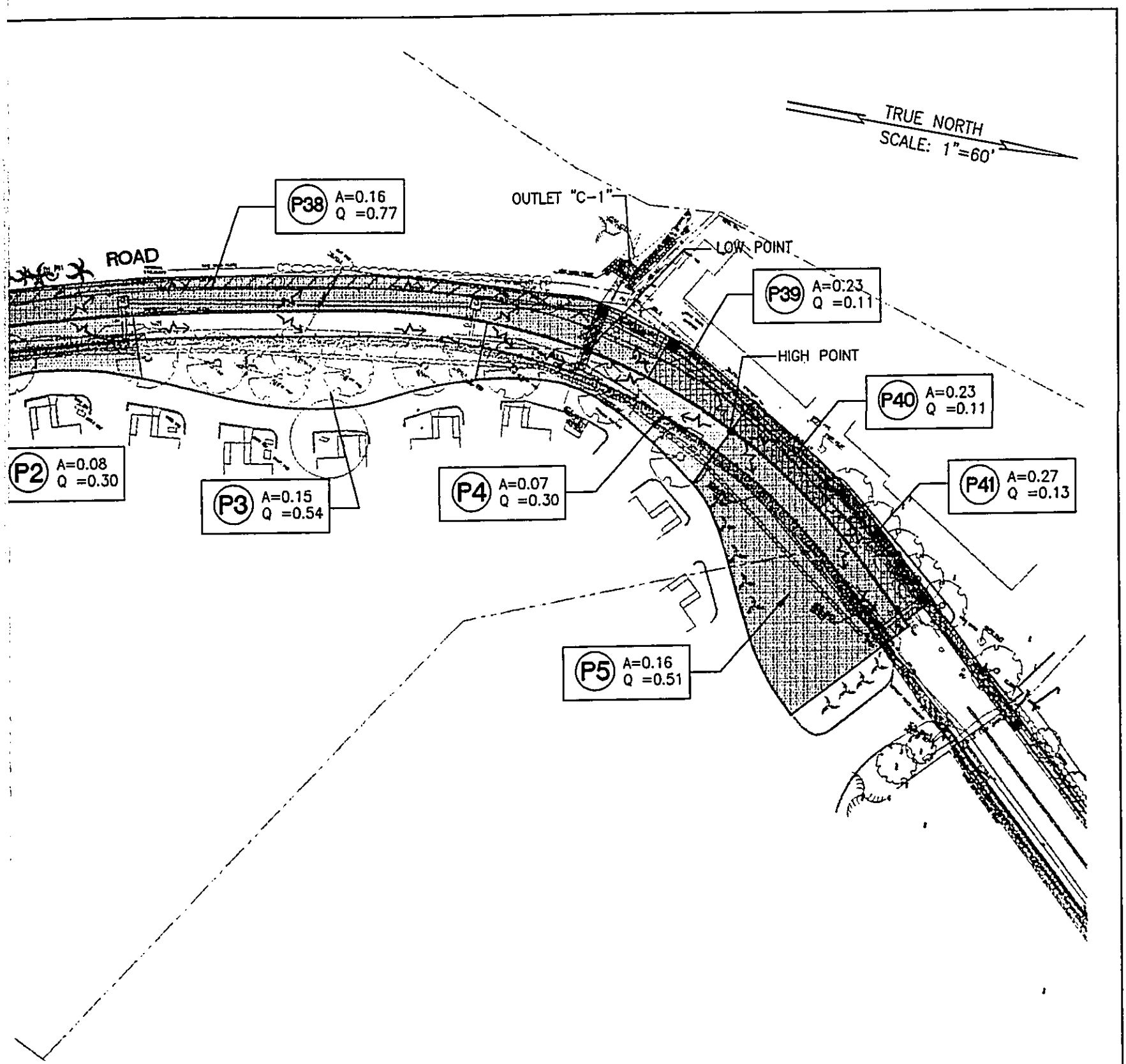
5/09/01



DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

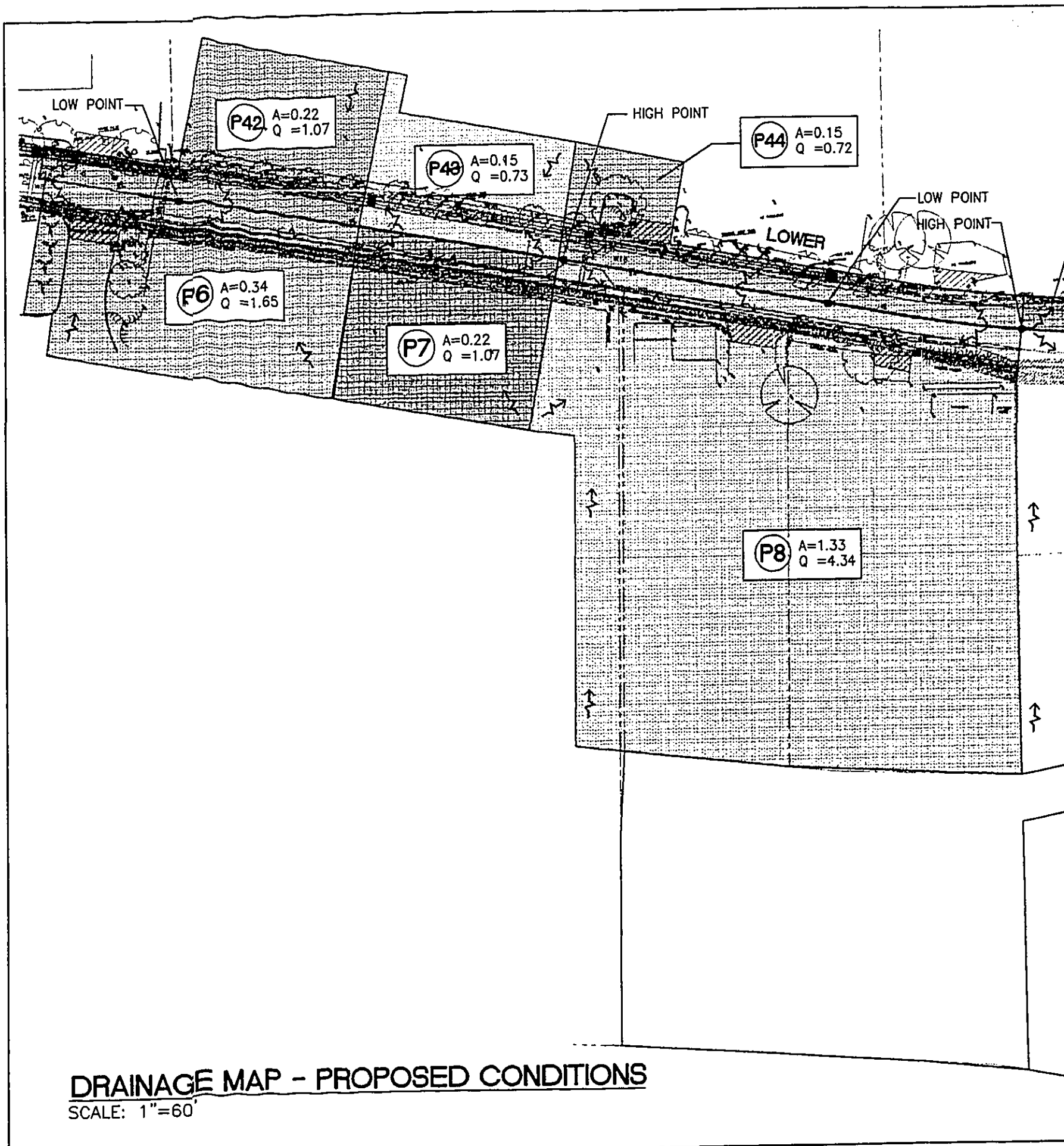
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
PROPOSED CONDITIONS

APPENDIX

A10

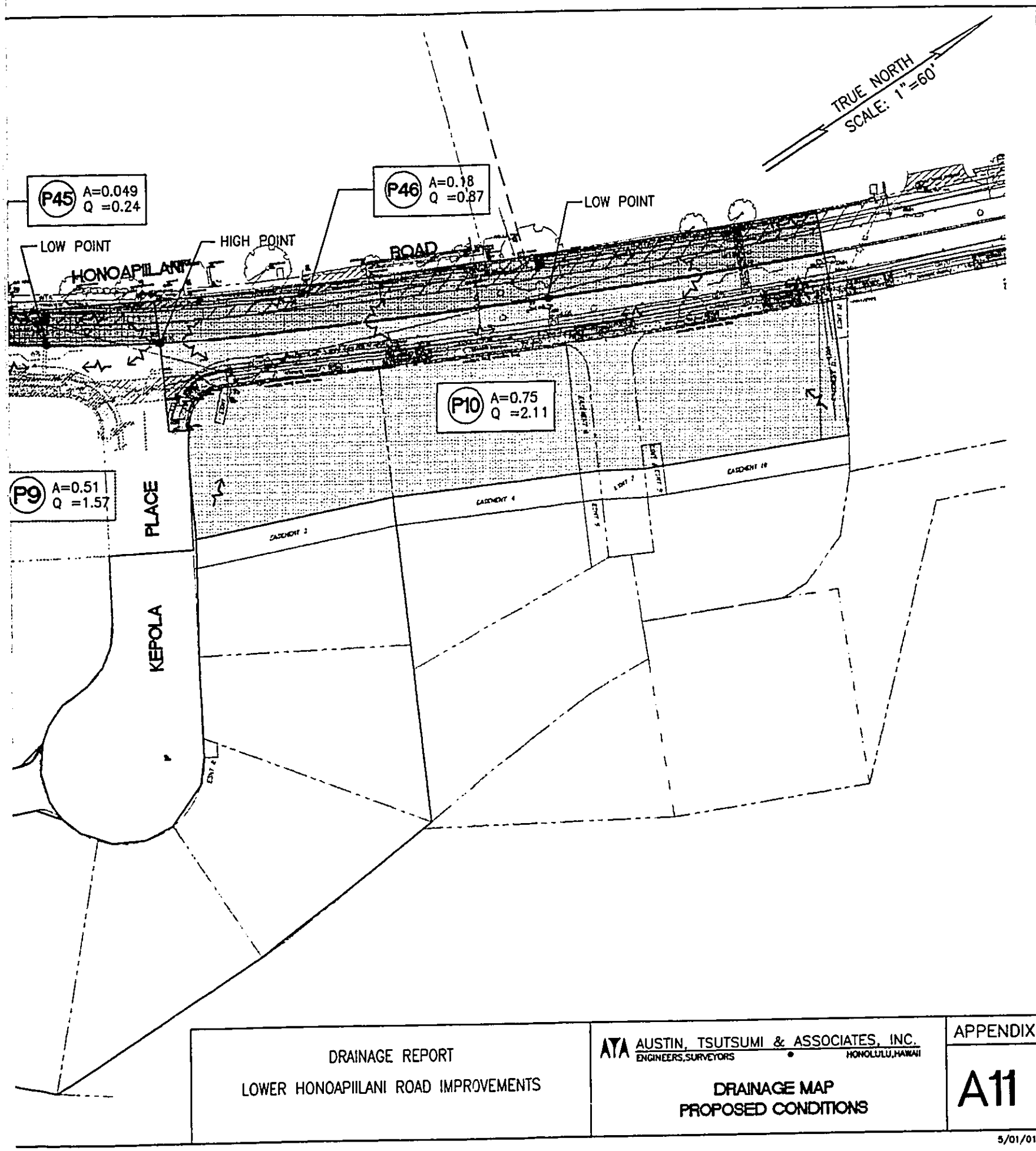
5/01/01



DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

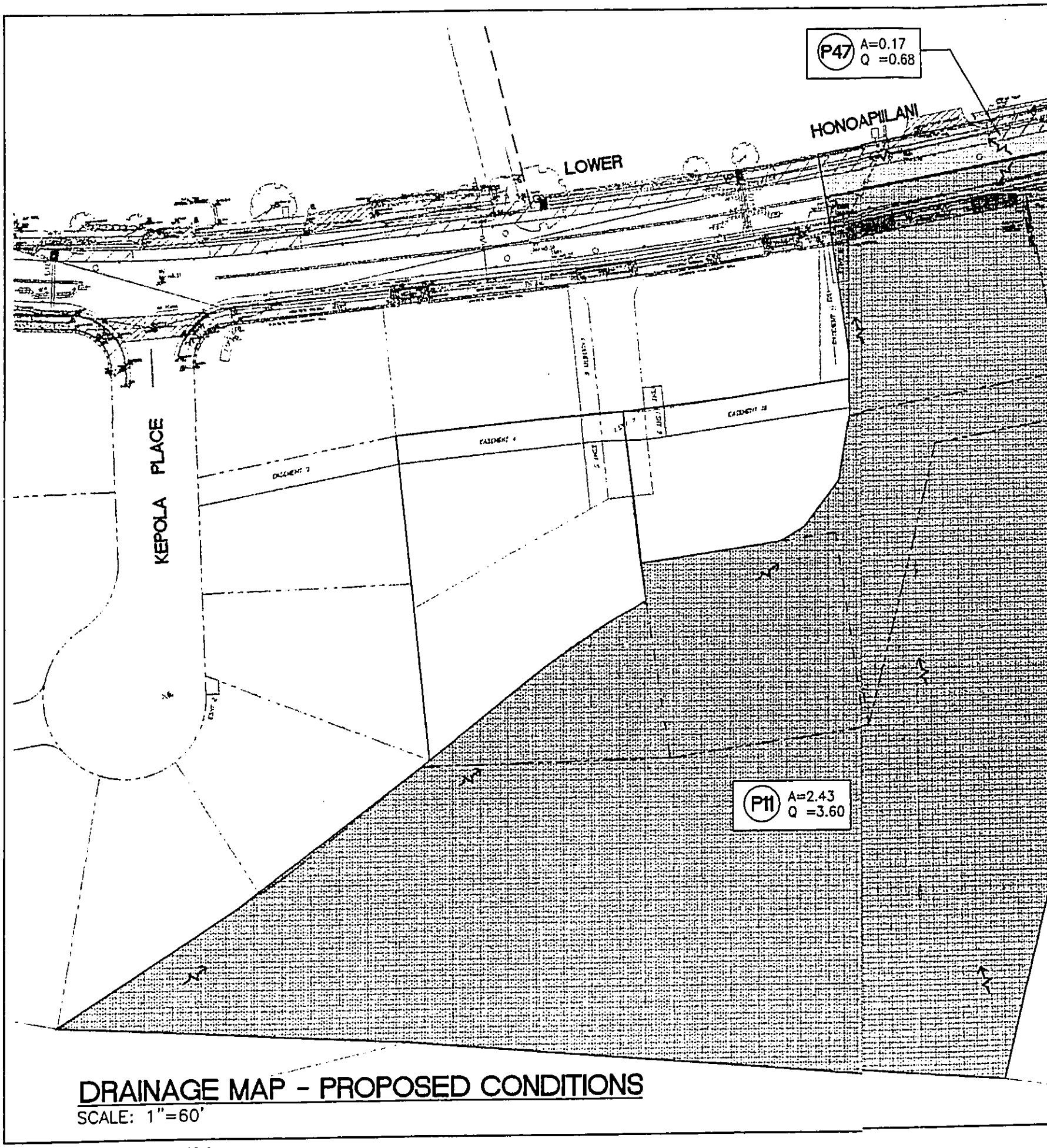
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
PROPOSED CONDITIONS

APPENDIX

A11

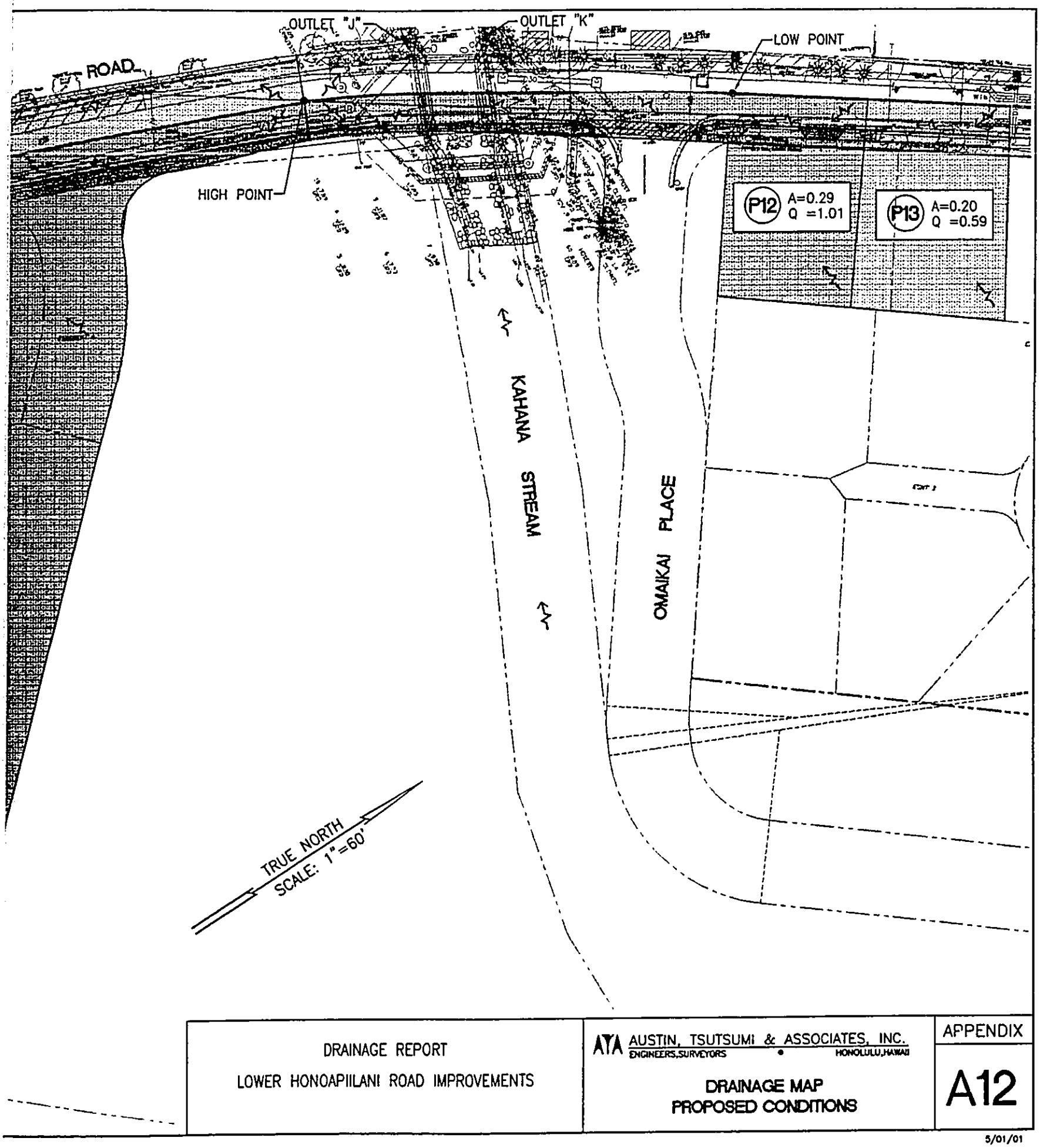
5/01/01



DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

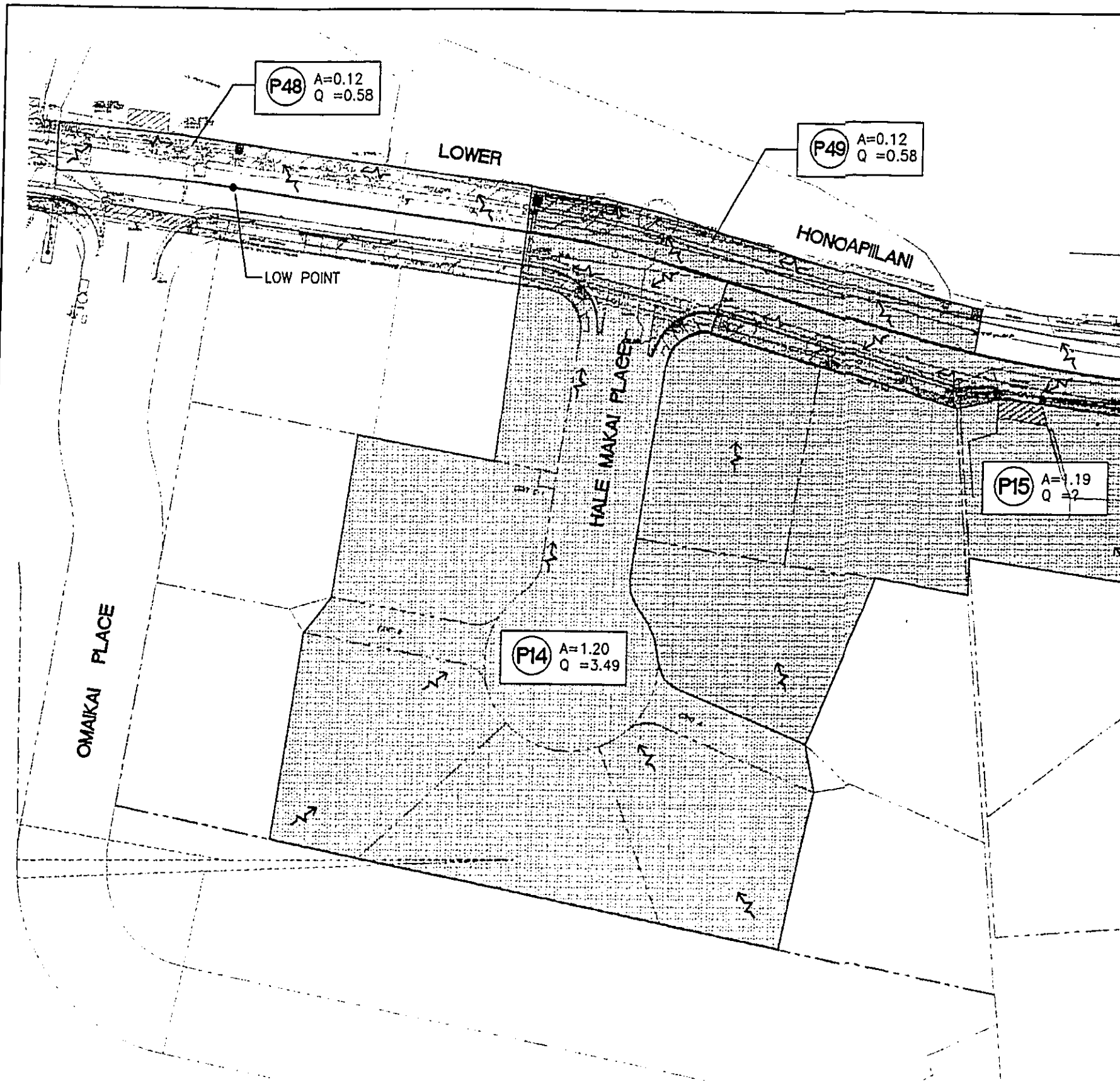
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
PROPOSED CONDITIONS

APPENDIX

A12

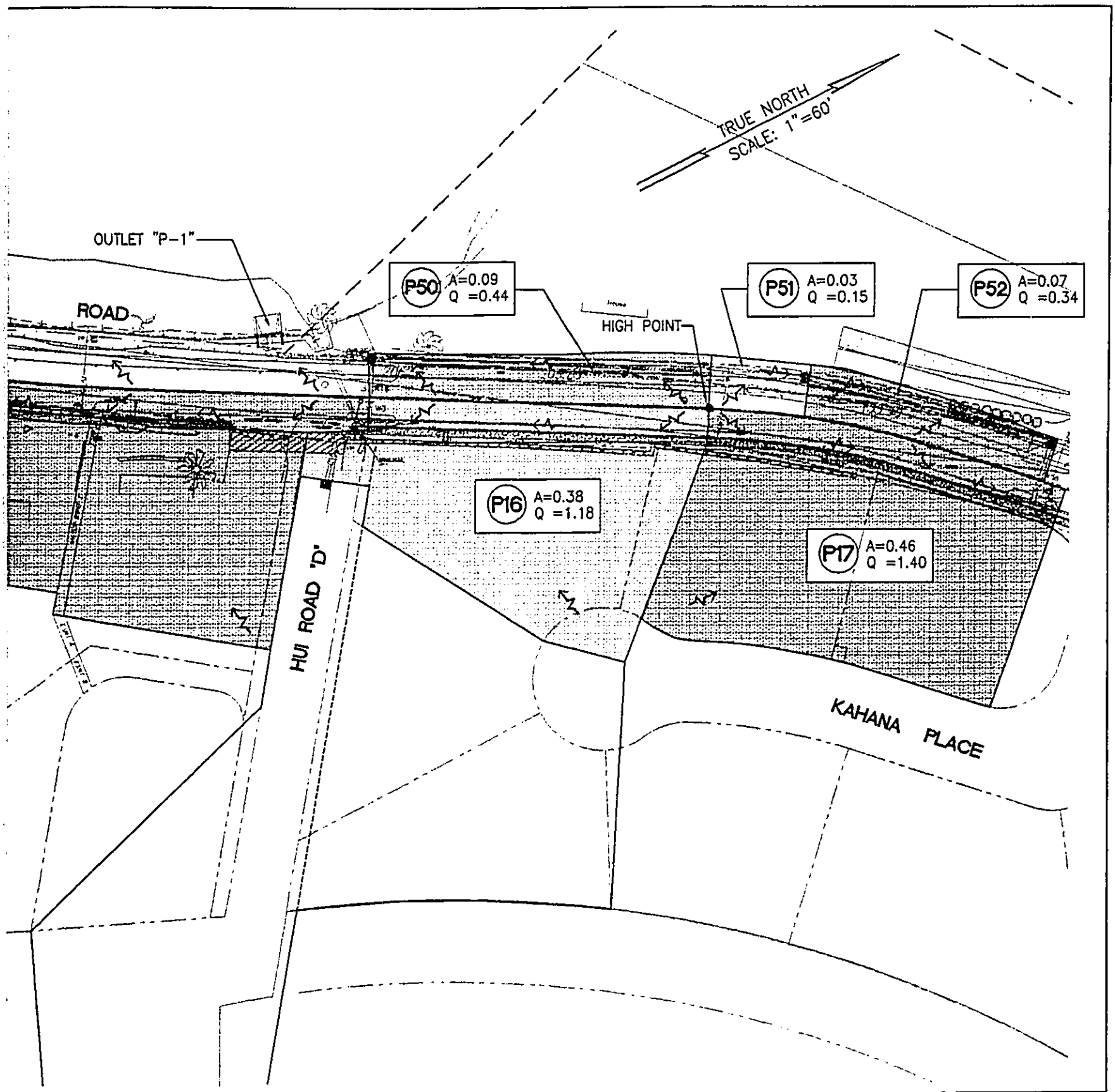
5/01/01



DRAINAGE MAP - PURPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
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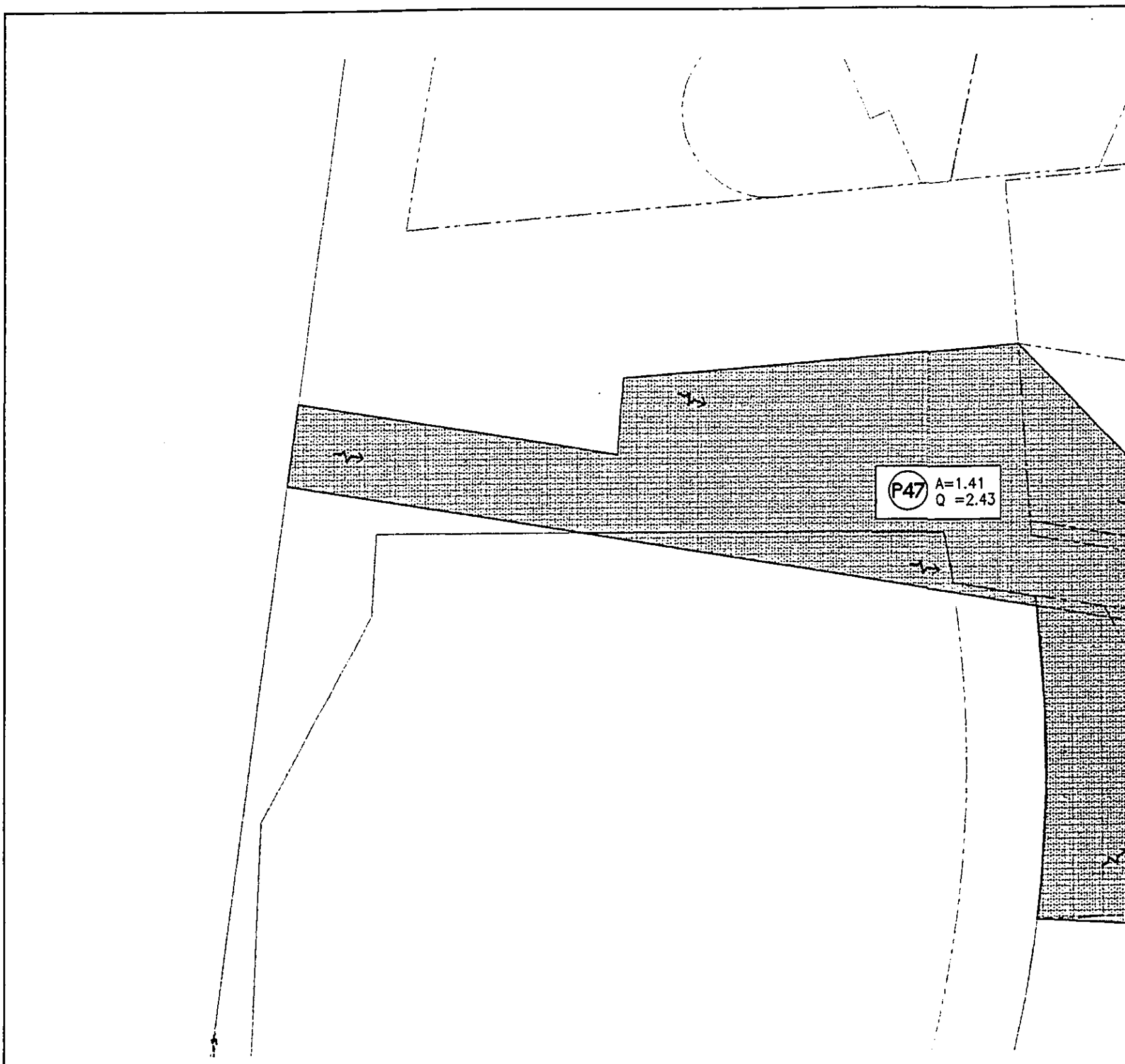
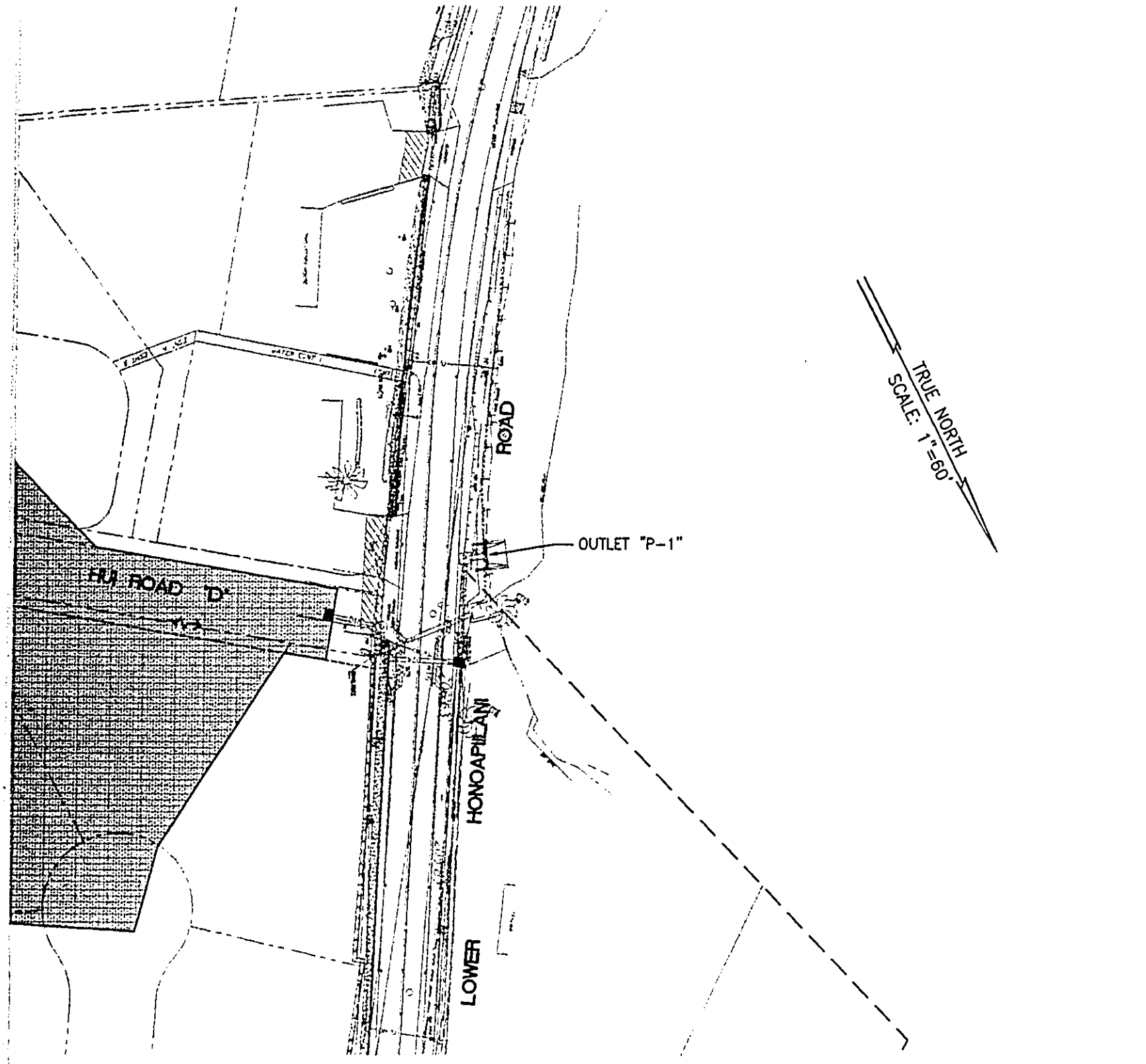
5/01/01



DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
PROPOSED CONDITIONS

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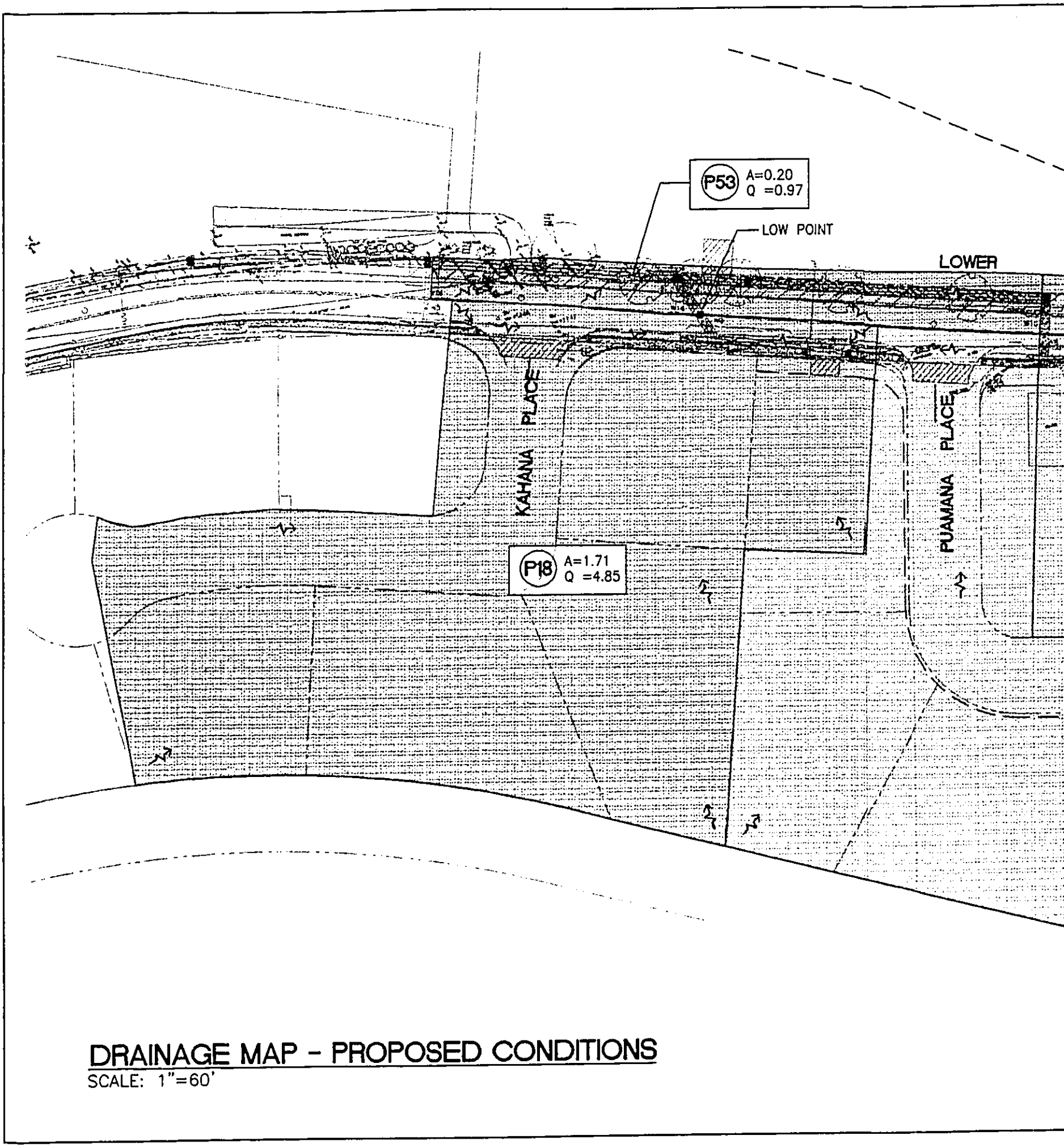
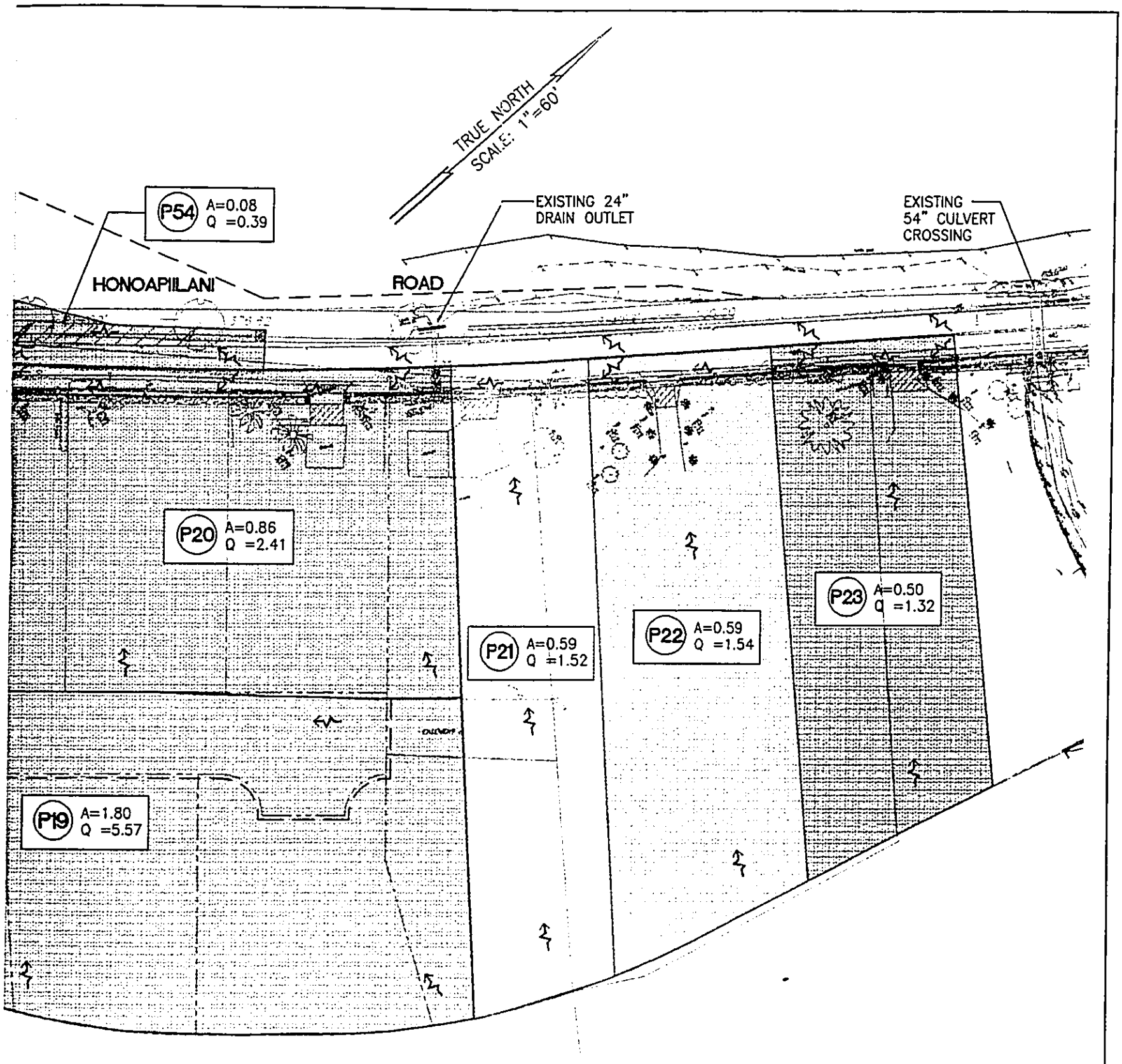
5/01/01



DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
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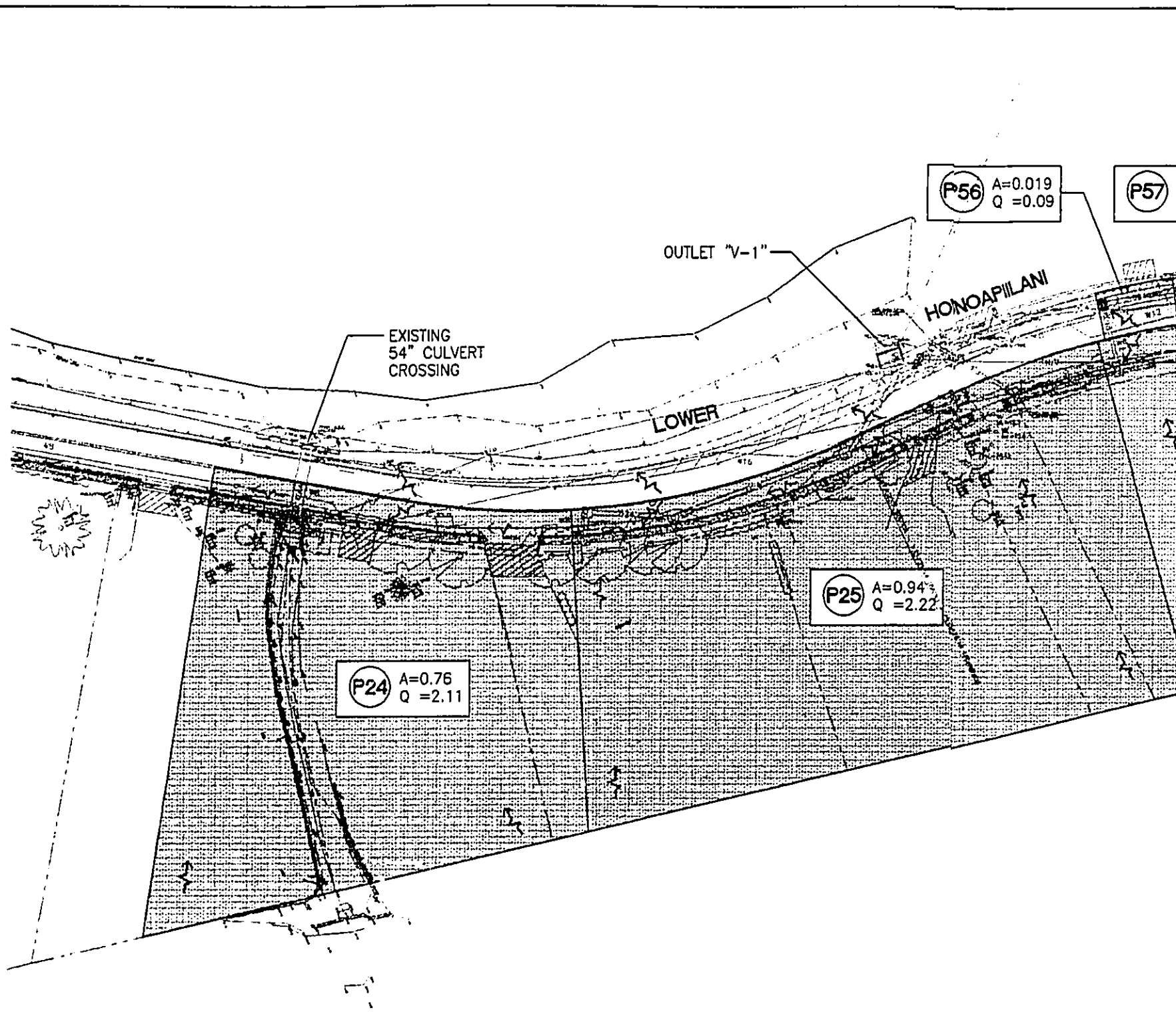
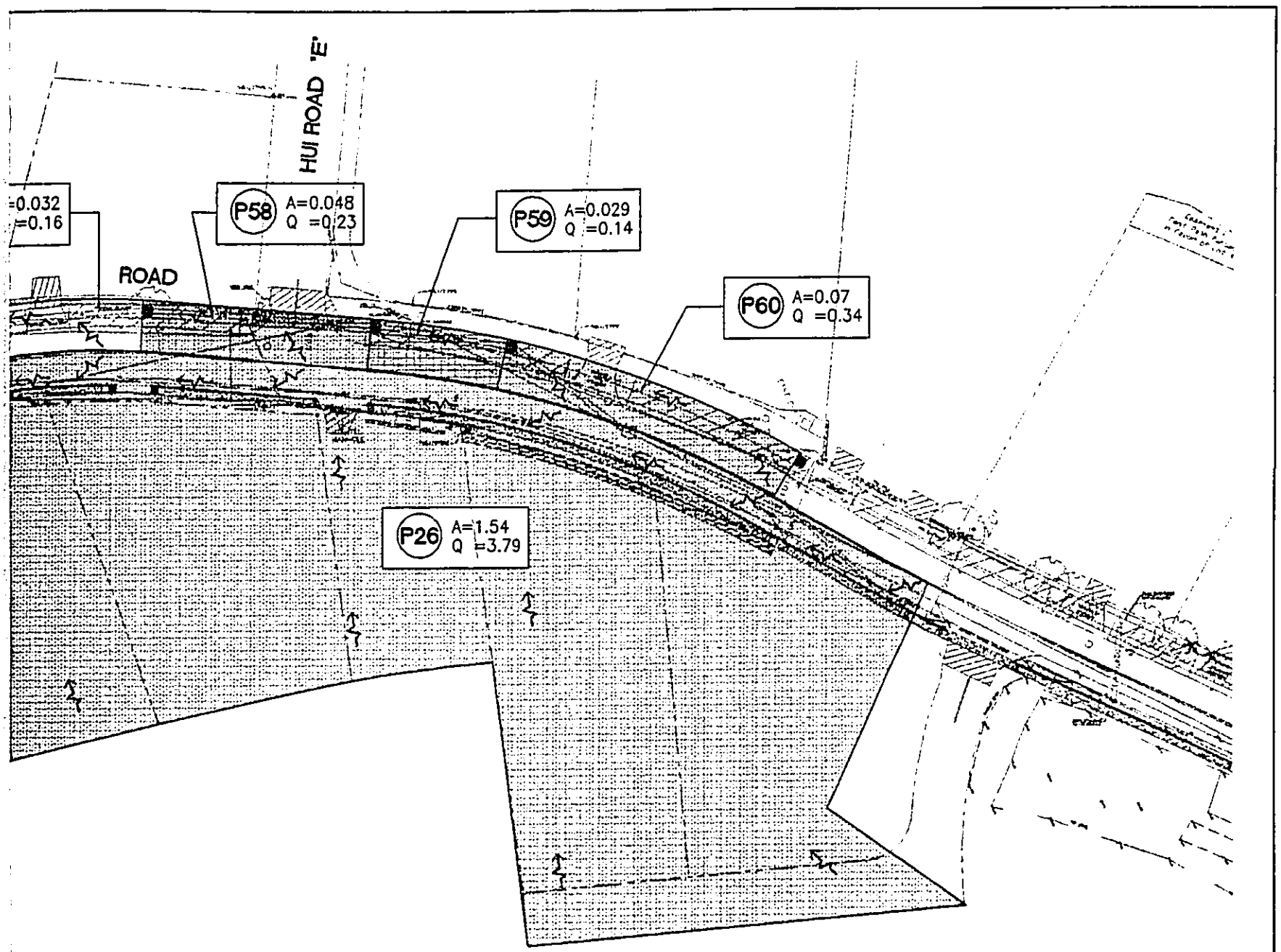
5/01/01



DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
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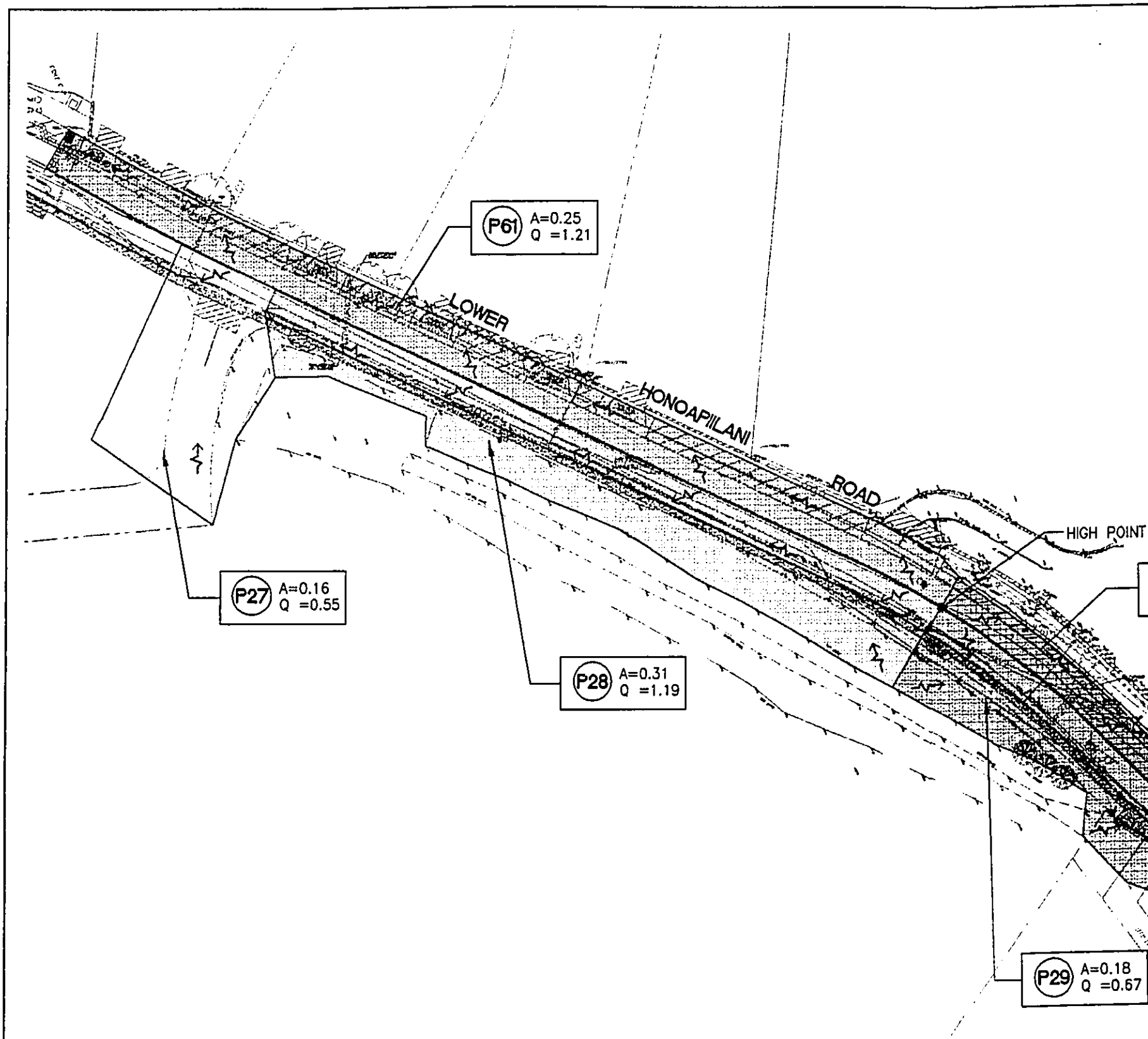
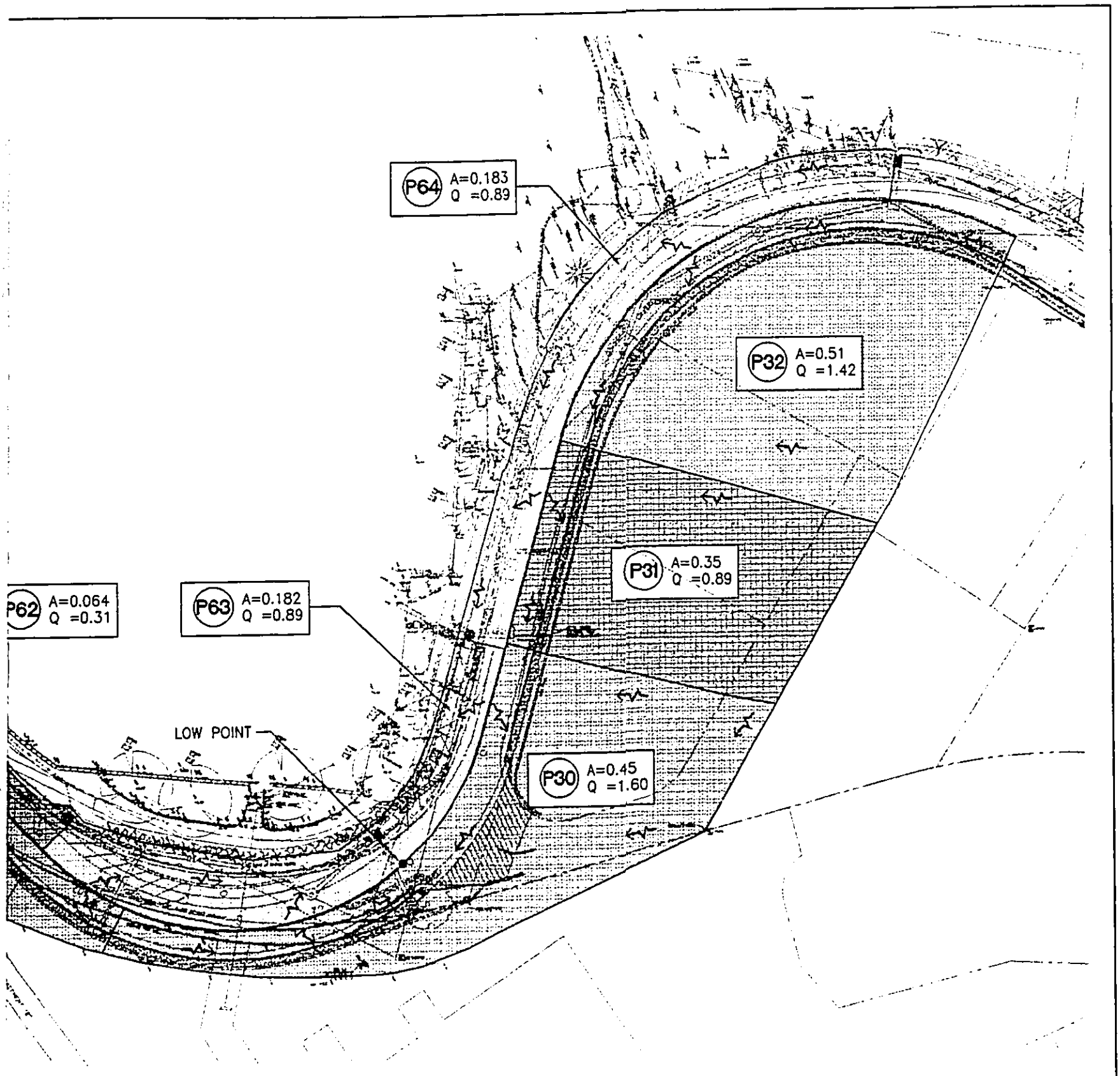
5/01/01



DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
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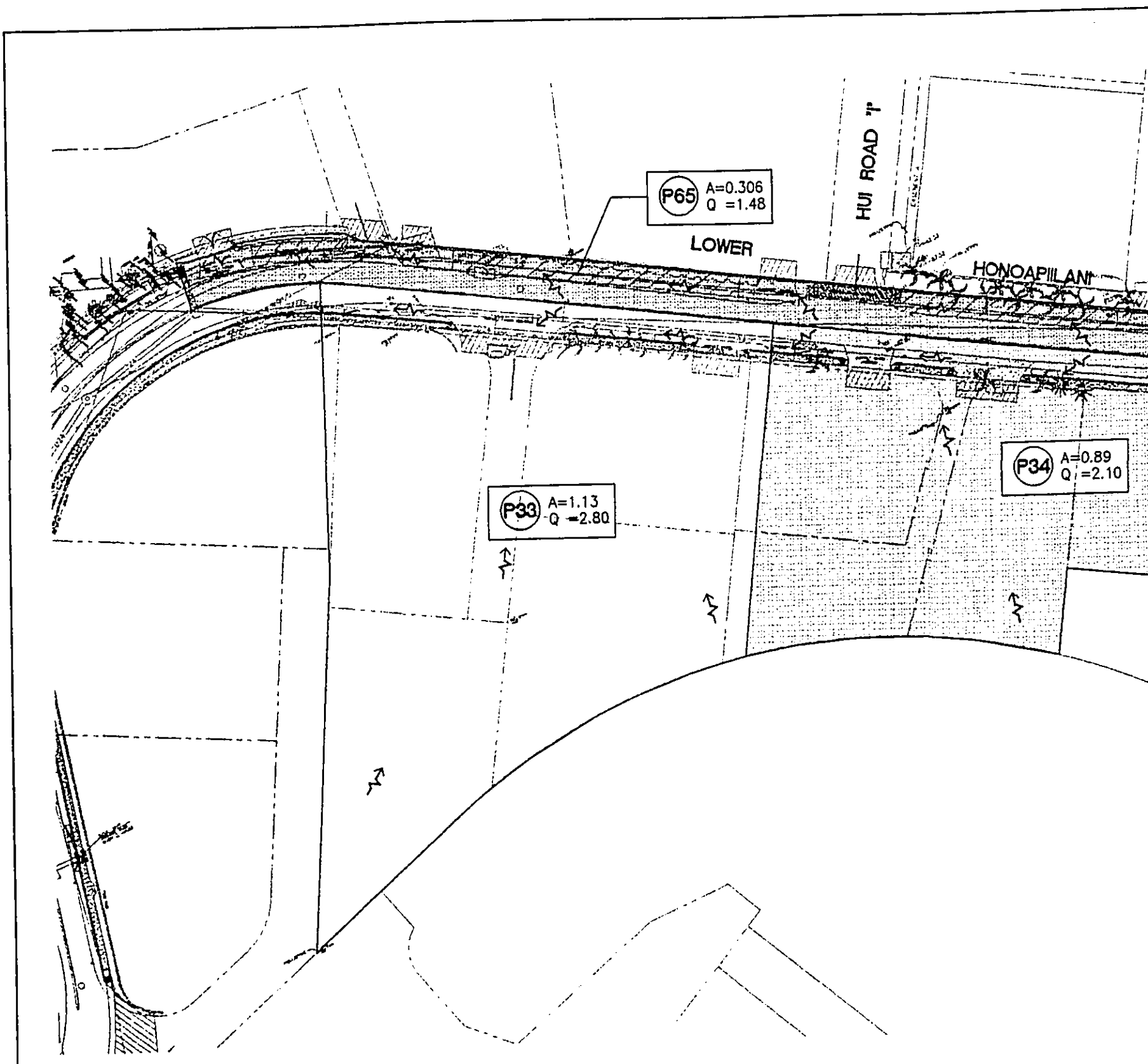
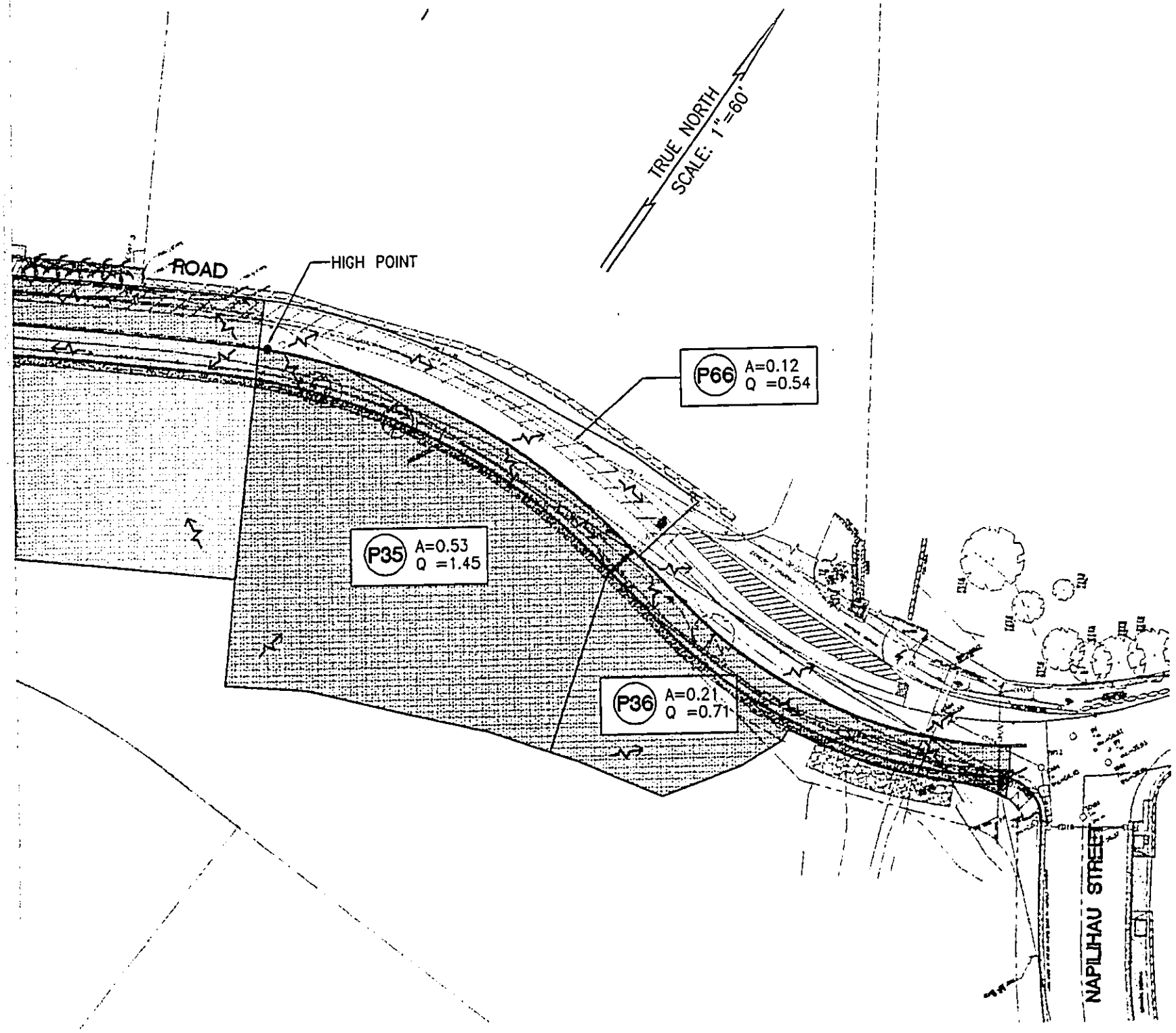


DRAINAGE MAP - PROPOSED CONDITIONS

SCALE: 1"=60'

FN: \\98-545\DRAINAGE\DRN-EX3.DWG



DRAINAGE REPORT

LOWER HONOAPIILANI ROAD IMPROVEMENTS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

DRAINAGE MAP
PROPOSED CONDITIONS

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AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX B

SUMMARY OF EXISTING AND PROPOSED FLOODED WIDTH CALCULATIONS

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

LOWER HONOAPIILANI ROAD IMPROVEMENTS
SUMMARY OF EXISTING FLOODED WIDTH COMPUTATIONS

AREA NO.	EXISTING AREA A (ACRES)	FLOW RATE Q (CFS)	FLOODED WIDTH T (FT)	ENCROACHMENT INTO TRAVELED WAY (FT)
E1	0.52	1.95	10.12	1.61
E2	0.55	2.03	6.70	5.46
E3	0.13	0.47	6.02	4.90
E4	1.34	4.78	20.59	18.83
E5	1.68	4.19	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	
E6	0.70	2.49	15.90	13.90
E7	3.56	9.01	46.70	44.70
E8	0.095	0.46	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	
E9	0.49	1.52	7.31	5.31
E10	1.93	5.47	21.75	19.75
E11	0.58	1.68	SHEET FLOW ACROSS ROAD TO SHORELINE	
E12	1.88	4.78	24.56	21.06
E13	0.64	1.75	16.28	13.03
E14	2.18	6.34	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	
E15	4.00	8.96	30.54	26.77
E16	0.31	0.79	SHEET FLOW ACROSS ROAD TO SHORELINE	
E17	1.10	2.52	SHEET FLOW ACROSS ROAD TO SHORELINE	
E18	1.52	3.81	9.14	5.07
E19	0.70	2.24	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	
E20	0.45	1.84	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	
E21	0.84	2.84	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	
E22	1.59	3.87	12.04	6.25
E23	1.76	4.66	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	
E24	0.99	3.02	SHEET FLOW ACROSS ROAD INTO MAKAI PROPERTY	

EXISTING FLOODED WIDTH CALCULATIONS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

E1

$Q_{11} = 1.95$

$$Q_{11} = \frac{0.56}{0.02} S^{1.67} C^{-5} \left(\frac{d}{0.0184}\right)^{2.67}$$

0.0184 — DETWEEN SOIL & AC PAVEMENT

$$Q_{11} = 1521.74\ S^{0.5} d^{2.67}$$

Q_{11}: 1.95 ; S: 0.013

$d = 0.186'$

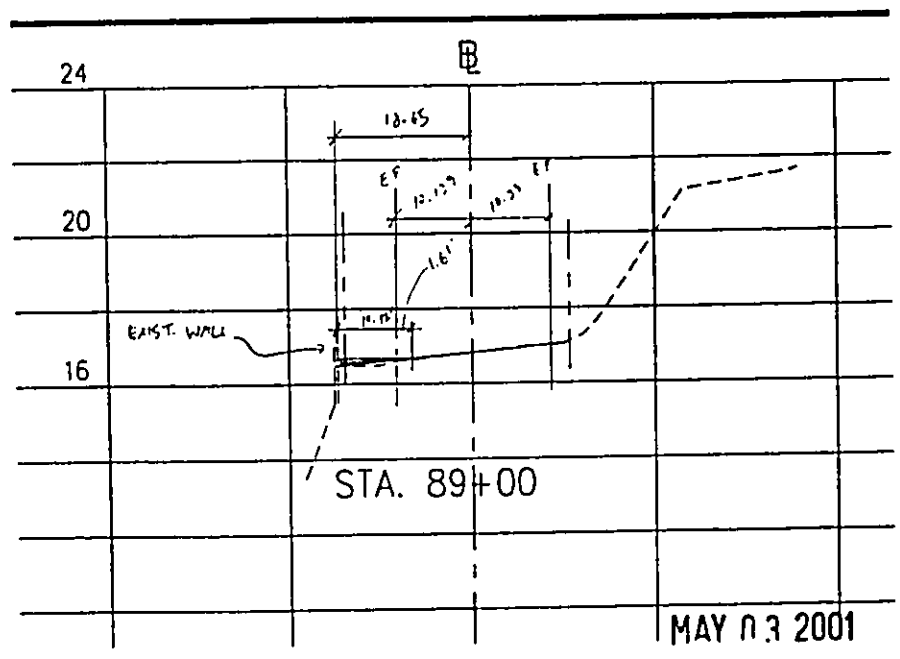
$\frac{d}{S_x} \cdot X \cdot 10.12'$

$y = 0.5t$

$X = 35.62$

$Slope = 1.84\%$

1.61' INTO TRAVELED WAY



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CIVIL ENGINEERS • SURVEYORS

E2

$S_x = 0.0615(0.27) / (0.0615 + 0.27) = 0.05$

$Q_{10} = 2.03$

$Q = \frac{0.5}{0.02} S_x^{1.67} S^{0.5} T^{2.67}$

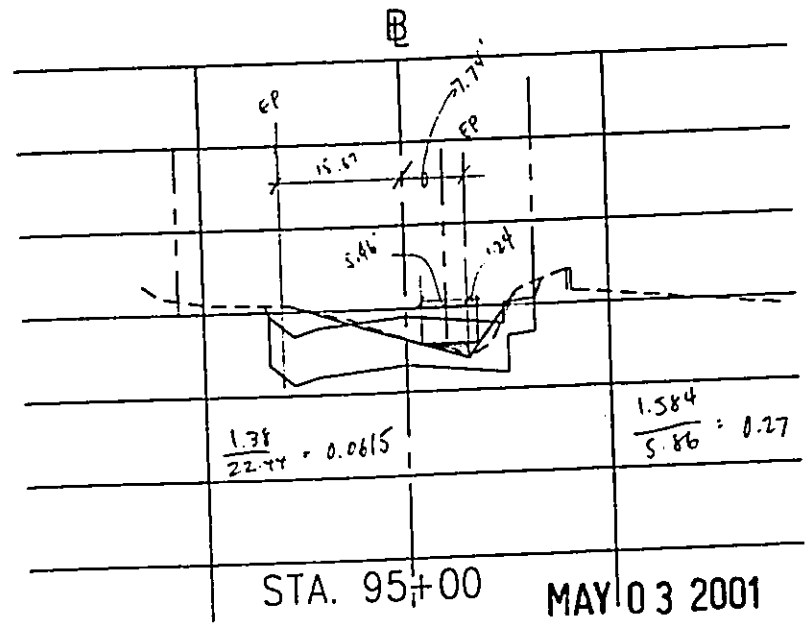
S_x: 0.05 ; S: 0.0045

$Q_{10} = 0.01262\, T^{2.67}$

$T = 6.70' = \frac{d}{0.0615} + \frac{d}{0.27}$

$d = 0.336'$

5.96' INTO TRAVELED WAY



AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E?

$S_y = 0.03(0.12)/(0.03+0.12) = 0.024$

$Q_{1.} = 0.47$

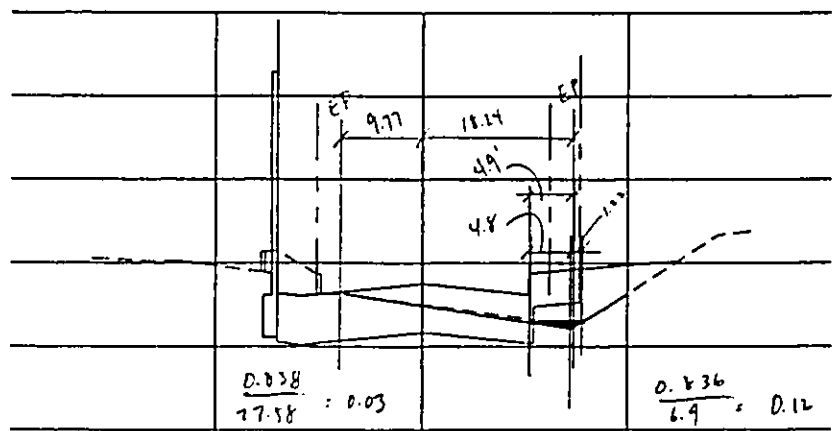
$Q_{10} = \frac{0.54}{0.02} S_y^{1.67} S^{0.5} T^{2.67}$

S_y: 0.024 ↑ ; S: 0.005 ↑

$T = 6.015' = \frac{d}{0.03} + \frac{d}{0.12}$

$d = 0.144'$

4.9' INTO TRAVELED WAY



AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

E4

$$S_x = \frac{(0.0194)0.207}{(0.0194 + 0.207)} = 0.0177$$

$Q_{10} = 4.78$ cfs

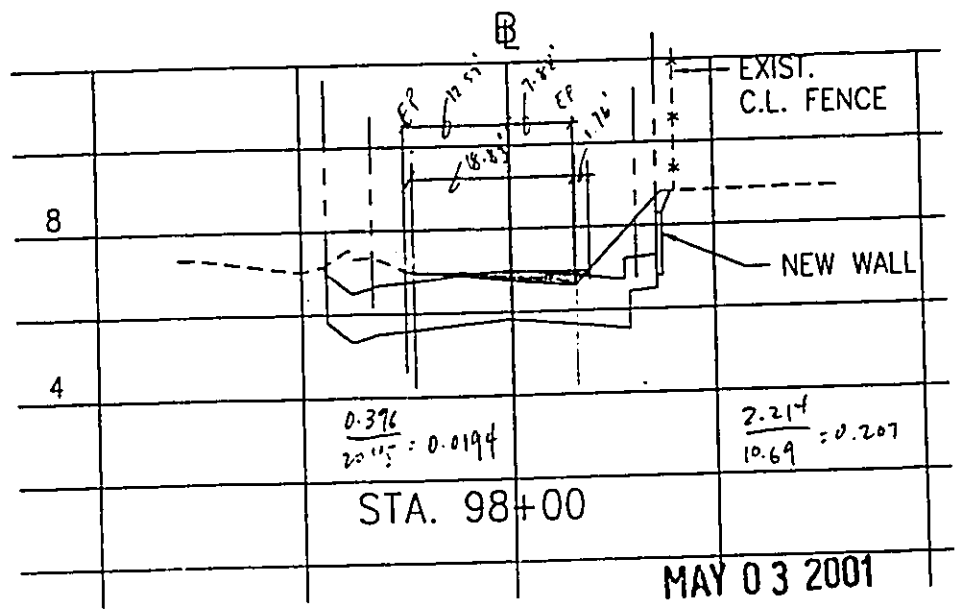
$$Q_{10} = \frac{0.54}{0.02} S_x^{1.27} S^{0.5} T^{2.67}$$

S_x: 0.0177 S: 0.002

$$T = 20.59 = \frac{d}{0.0194} + \frac{d}{0.207}$$

$$d = 0.365$$

18.83' INTO TRAVELED WAY



AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E6

$Q_1 = 2.49$

$S = 0.002$

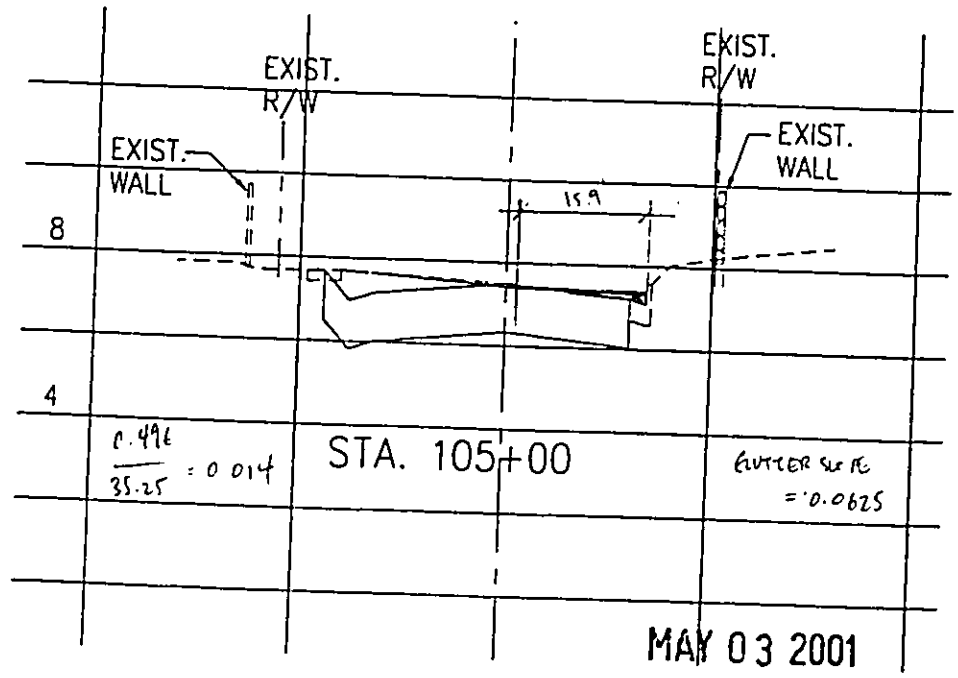
$$Q_s = \frac{0.5t}{0.015} S_x^{1.67} S^{0.5} T^{2.67}$$

$$Q_s = \frac{0.5t}{0.015} 0.014^{1.67} S^{0.5} \left(\frac{d}{0.014}\right)^{2.67}$$

$$Q_s = 2666.67 S^{0.5} d^{2.67}$$

$15.9 - 2' = 13.9'$

$13.9'$ INT. TRAVELED WAY



AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

Q= 2.49 CFS (TOTAL IN CONC)

Sta. 105+00	FLOW EXCEEDS 2' CONC GUTTER	1.4%, 6.25%, CURB				
S =	0.002					
d1	d2	Qs (cfs)	W/T	Sw/Sx	Eo	Qcalc
0.320	0.195	1.5166	0.126	4.464	0.400	2.528
			T (ft) =	15.92857		

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E7

$Q_{10} = 9.0$ cfs

$S = 0.004$

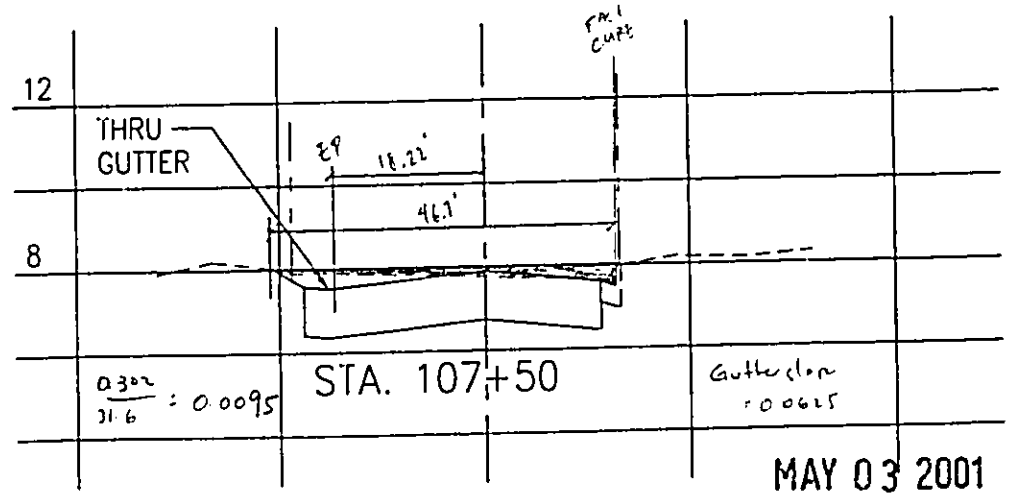
$$Q_s = \frac{0.56}{0.015} S_x^{1.67} S^{0.5} T^{2.67}$$

$$Q_s = \frac{0.56}{0.015} 0.0095^{1.67} S^{0.5} \left(\frac{d}{0.014}\right)^{2.67}$$

$$Q_s = 1395.51\, S^{0.5} d^{2.67}$$

GUTTER
$46.7' - 2' = 44.7'$

44.7' INTO TRAVELED WAY



AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

Q= 9 CFS (TOTAL IN CONC)

Sta. 107+50	FLOW EXCEEDS 2' CONC GUTTER	0.95%, 6.25%, CURB				
S =	0.004					
d1	d2	Qs (cfs)	W/T	Sw/Sx	Eo	Qcalc
0.550	0.425	8.9859	0.043	6.579	0.000	8.986
			T (ft) =	46.73684		

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E9:

$Q_{10} = 1.52$ cfs

$S = 0.012$

$$Q_s = \frac{0.56}{0.015} S_x^{1.67} S^{0.5} T^{2.67}$$

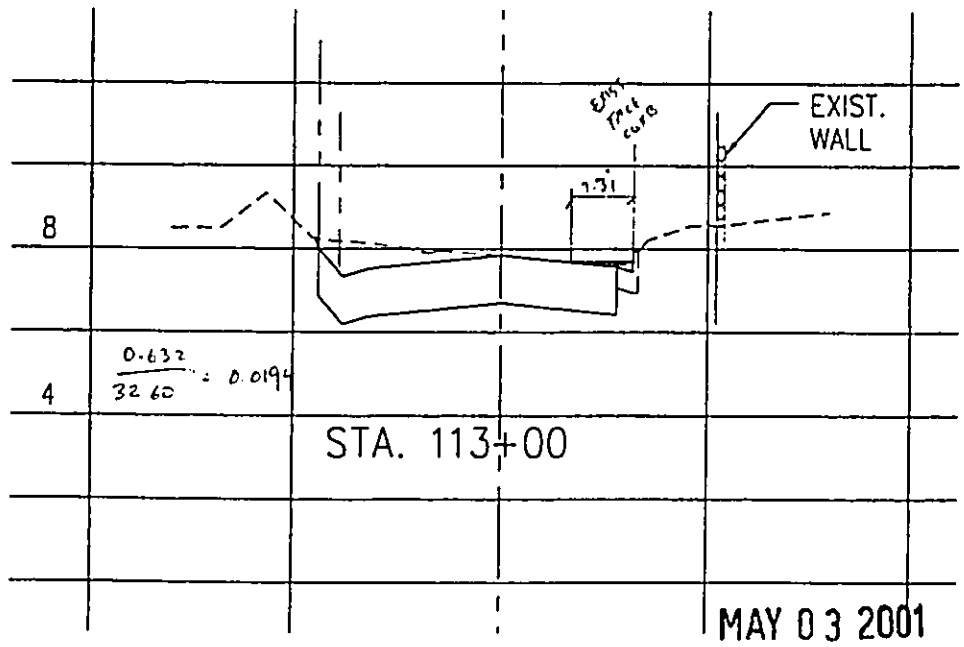
$$Q_s = \frac{0.56}{0.015} 0.0194^{1.67} S^{0.5} \left(\frac{d}{0.0194}\right)^{2.67}$$

$$Q_s = 1924.4 S^{.5} d^{2.67}$$

GUTTER.

$7.31 - 2' = 5.31'$

5.31' INTO TRAVELED WAY



AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

Q= 1.52 CFS (TOTAL IN CONC)

Sta. 113+00	FLOW EXCEEDS 2' CONC GUTTER	1.94%, 6.25%, CURB				
S =	0.012					
d1	d2	Qs (cfs)	W/T	Sw/Sx	Eo	Qcalc
0.228	0.103	0.4877	0.274	3.222	0.680	1.524
			T (ft) =	7.309278		

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E.10

$Q_{10} = 5.47$ cfs.

$S = 0.0012$

$$Q_S = \frac{0.5\epsilon}{0.015} S_x^{1.67} S^{0.5} T^{2.67}$$

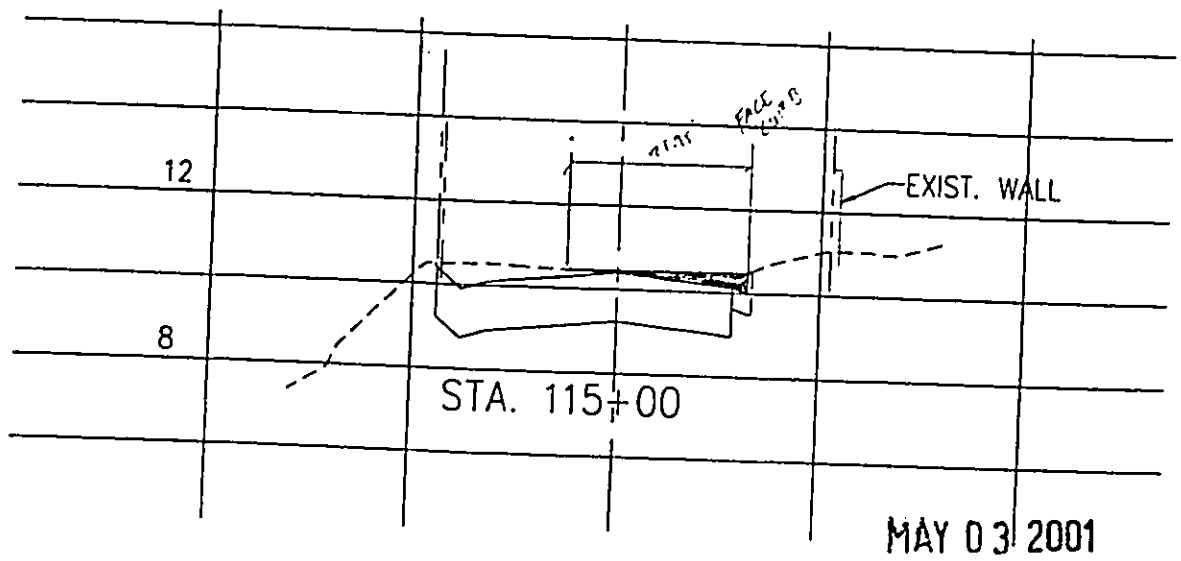
$$Q_S = \frac{0.5}{0.015} 0.02^{1.67} S^{0.5} \left(\frac{d}{0.02}\right)^{2.67}$$

$$Q_S = 1866.67 S^{0.5} d^{2.67}$$

GUTTER

$21.75 - 2' = 19.75$

19.75' INTO TRAVELED WAY



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CIVIL ENGINEERS • SURVEYORS

Q= 5.47 CFS (TOTAL IN CONC)

Sta. 115+00	FLOW EXCEEDS 2' CONC GUTTER	2.0%, 6.25%, CURB				
S =	0.0012					
d1	d2	Qs (cfs)	W/T	Sw/Sx	Eo	Qcalc
0.520	0.395	5.4147	0.092	3.125	0.000	5.415
			T (ft) =	21.75		

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E12

Q_{10} = 4.78 cfs.

S = 0.008

$$S_x = (0.0103)(0.0614)/(0.0103 + 0.0614) = 0.00882$$

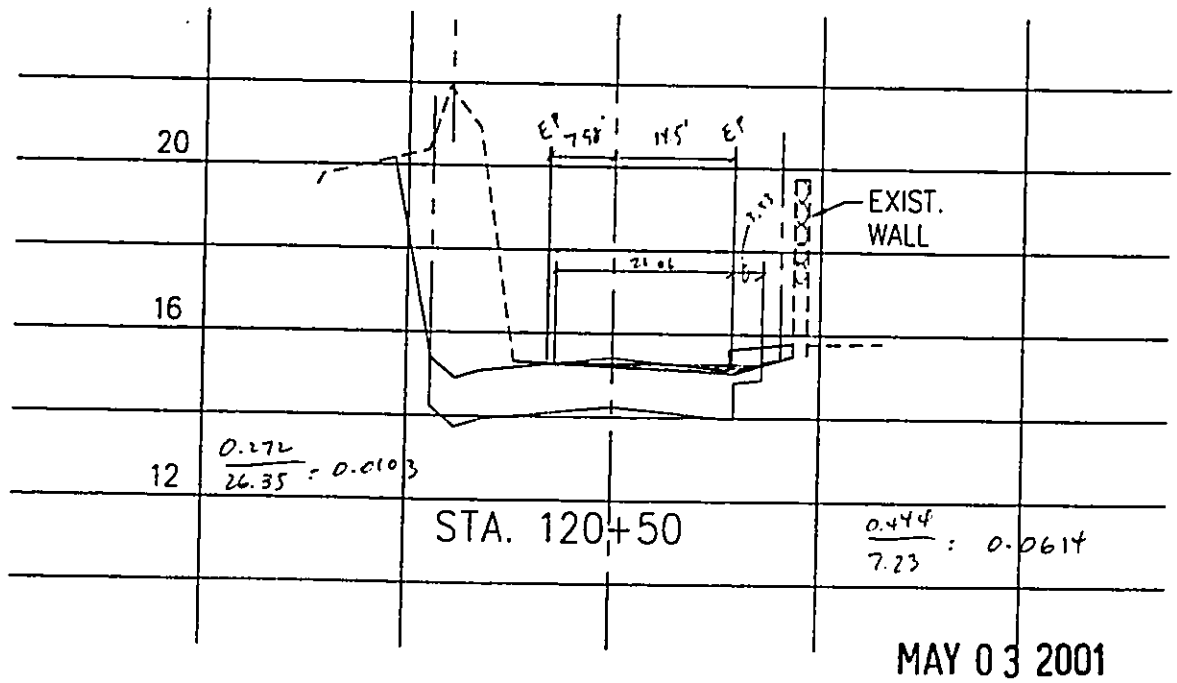
$$D_{10} = \frac{0.56}{0.02} S_x^{1.67} S^{0.5} T^{2.67}$$

(D_{10}: 4.78; S_x: 0.00882; S: 0.008)

$$T = 24.56' = \frac{d}{0.0103} + \frac{d}{0.0614}$$

$d = 0.217$

21.06' INT. TRAVELED WAY



MAY 03 2001

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E13

$Q_{10} = 1.75$

$S = 0.0139$

$S_x = 0.0099(0.0397)/(0.0099 - 0.0397) = 0.0079$

$$Q_{10} = \frac{0.56}{0.02} S_x^{1.61} S^{0.5} T^{2.67}$$

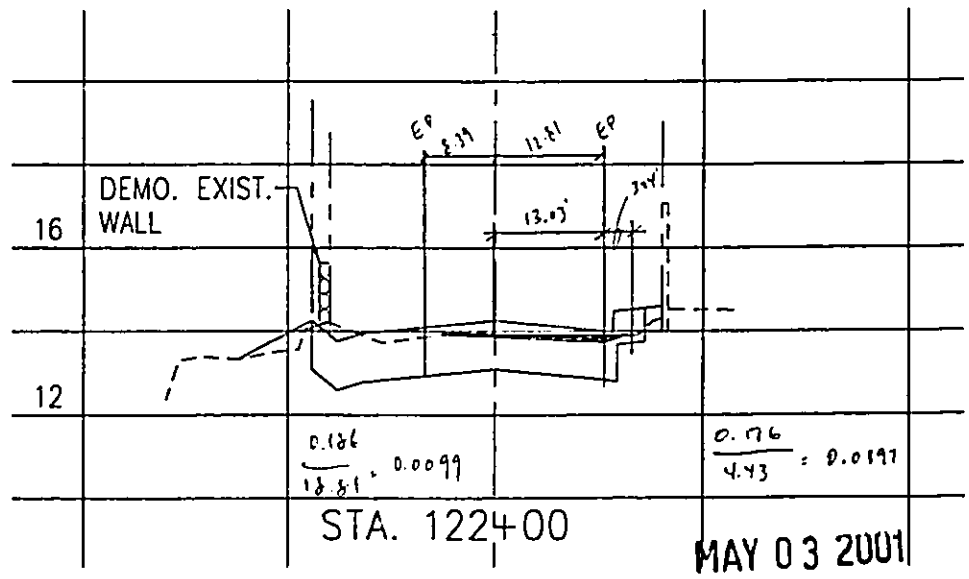
S_x: 0.0079, S: 0.0139

$T = 16.28' = \frac{d}{0.0099}, \frac{d}{0.0397}$

$d = 0.129$

$T = 13.03$ $T = 3.24$

13.03' INTO TRAVELED WAY



MAY 03 2001

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

E15

Q_{15} = 8.96 cfs

S = 0.0046

$S_x = 0.0115(0.164)/(0.0115+0.164) = 0.0107$

$Q_{15} = \frac{0.82}{0.02} S_x^{1.67} S^{0.5} T^{2.67}$

S_x → 0.0107 ; S → 0.0046

$T = 30.54 = \frac{d}{0.0115} - \frac{d}{0.164}$

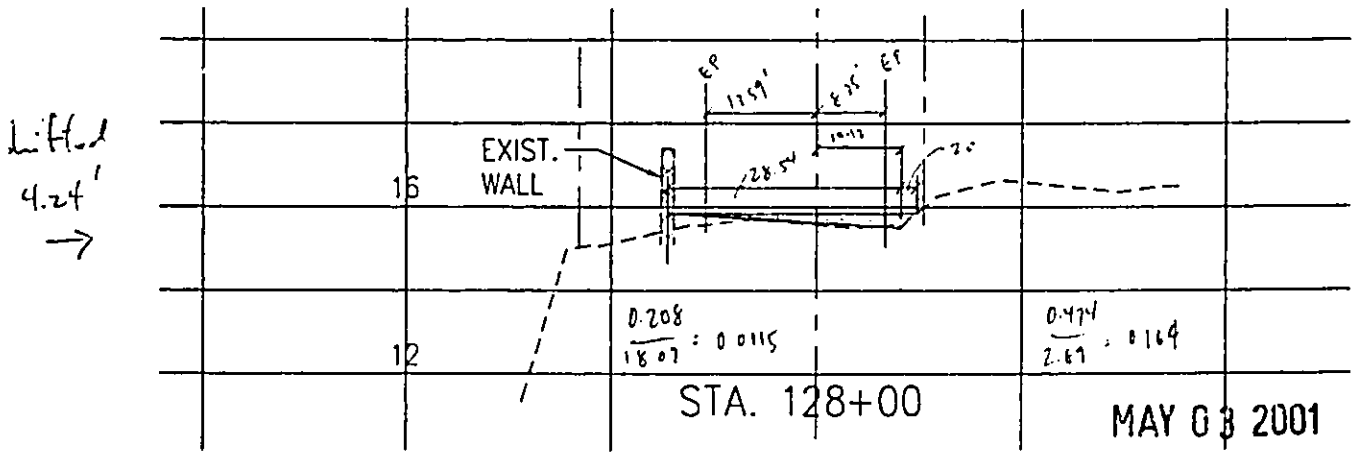
$d = 0.33$

T = 28.54 T = 2.0

ENTIRE TRAVELED WAY FLOODED

$30.54 - 2 - (10.12 - 5.35) = 26.77'$

26.77' INTO TRAVELED WAY



Lifted 4.24' →

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

E18

$Q_{10} = 3.81$ cfs.

$S = 0.0356$

$$S_x = 0.0347(0.0767)/(0.0347 + 0.0767) = 0.0239$$

$$Q_{10} = \frac{0.56}{0.02} S_x^{1.67} S^{0.5} T^{2.67}$$

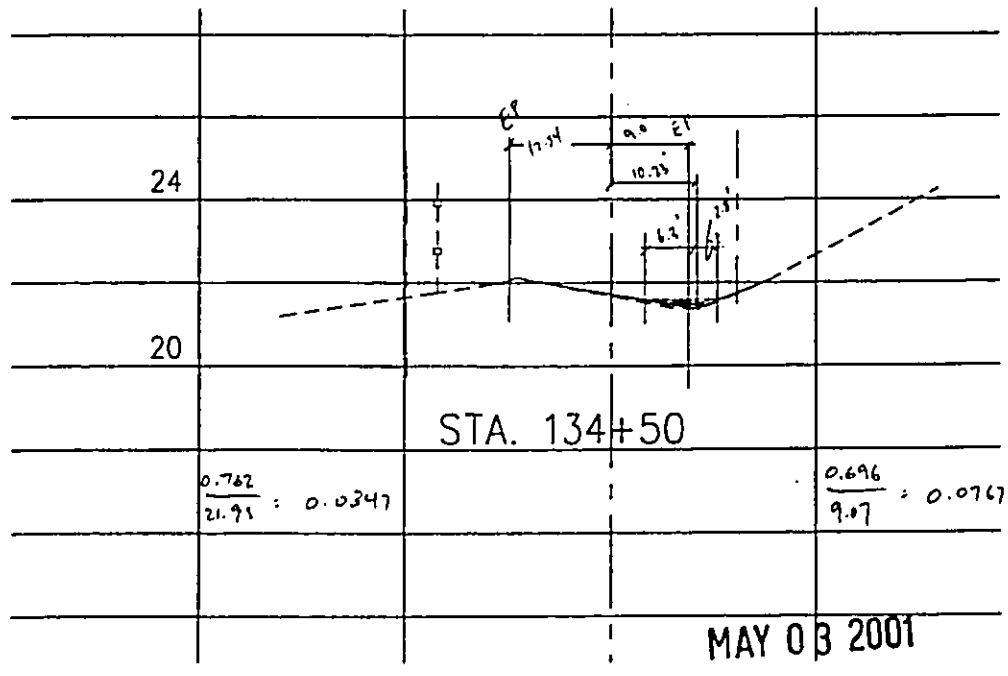
S_x: 0.0239 S: 0.0356

$T = 9.14 = \frac{d}{0.0347} + \frac{d}{0.0767}$

$d = 0.218$

6.293 2.847

5.07' INTO TRAVELED WAY



Shift 0.34
L

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

E.22

Q_{10}: 3.87

S: 0.0324

$$S_x = 0.0246(0.0456)/(0.0246 + 0.0456) = 0.01598$$

$$Q_{10} = \frac{0.56}{0.02} S_x^{1.67} S^{0.5} T^{2.67}$$

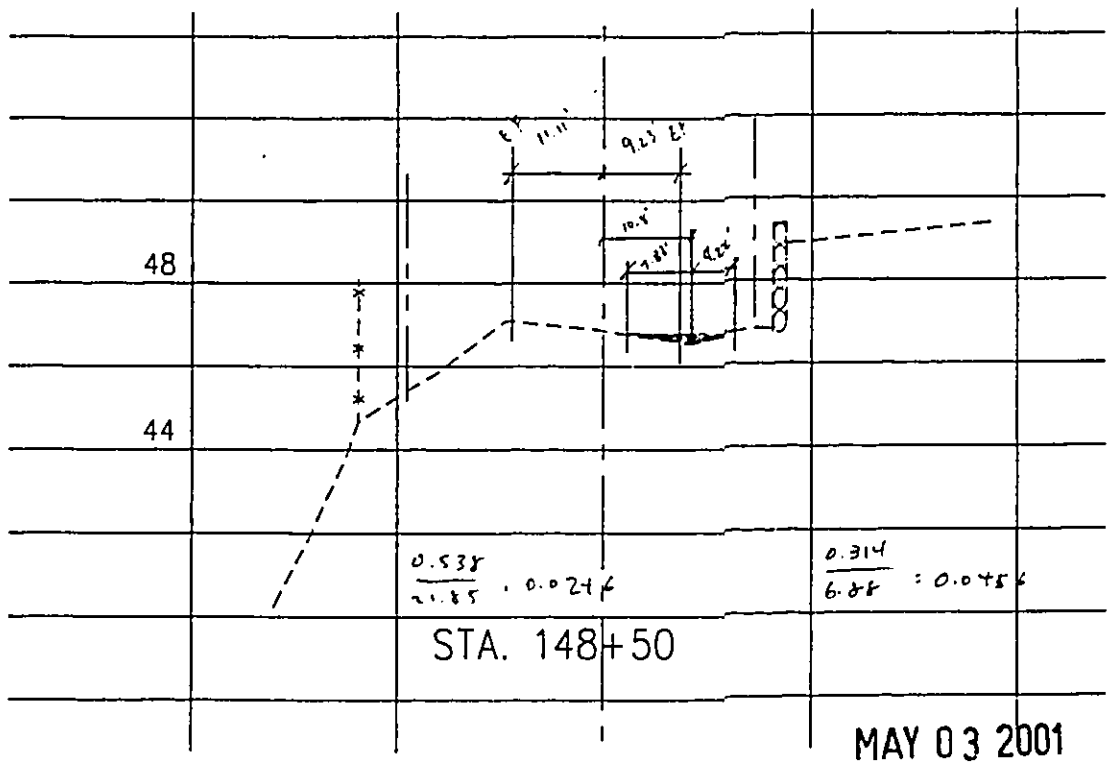
S_x: 0.01598 S: 0.0324

T: 12.04 = $\frac{d}{0.0246} + \frac{d}{0.0732}$

d = 0.19

7.82' 4.22'

6.25' INTO TRAVELED WAY



AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

LOWER HONOAPIILANI ROAD IMPROVEMENTS

SUMMARY OF PROPOSED FLOODED WIDTH COMPUTATIONS (MAUKA)

AREA NO.	STATION	INLET	SLOPE (FT/FT)	FLOW RATE Q (CFS)	FLOODED WIDTH (FT)	TRAVEL LANE WIDTH (FT)	BUFFER (FT)	GUTTER (FT)	ENCROACHMENT INTO TRAVEL LANE (FT)
P1	91+64	CB A-2	0.0130	1.02	6.76	12	-	-	6.76
P2	92+90	CB A-3	0.0100	0.30	4.48	12	-	-	4.48
P3	94+60	CB BB-1	0.0217	0.54	4.83	12	-	-	4.83
P4	95+18	CB C-3 DOWN STA.	0.0130	0.13	3.11	12	-	-	3.11
	95+18	CB C-3 UP STA.	0.0030	0.17	4.56	12	-	-	4.56
P5	97+23	CB F-1	0.0050	0.51	6.25	12	-	-	6.25
P6	98+00	CB F-2 DOWN STA.	0.0050	0.68	6.94	11	3	-	3.94
	98+00	CB F-2 UP STA.	0.0020	0.97	9.42	11	3	-	6.42
P7	99+00	CB F-3	0.0020	1.07	9.78	11	3	-	6.78
	100+15	CB G-1	-	0	-	-	-	-	-
P8	101+45	CB G-2 DOWN STA.	0.0014	2.61	14*	11	3	-	11.00*
	101+45	CB G-2 UP STA.	0.0020	1.73	11.71	11	3	-	8.71
P9	103+00	CB G-4 DOWN STA.	0.0020	0.86	9.03	11	4	2	3.03
	103+00	CB G-4 UP STA.	0.0120	0.71	6.00	11	4	2	0
P10	105+67	EXIST CB 1 DOWN STA.	0.0040	1.09	8.64	11	3.5	2	3.14
	105+67	EXIST CB 1 UP STA.	0.0039	1.02	8.49	11	3.5	2	2.99
P11	107+13	EXIST CB 2	0.0040	3.60	13.52	11	3	2	8.52

AREA NO.	STATION	INLET	SLOPE (FT/FT)	FLOW RATE Q (CFS)	FLOODED WIDTH (FT)	TRAVEL LANE WIDTH (FT)	BUFFER (FT)	GUTTER (FT)	ENCROACHMENT INTO TRAVEL LANE (FT)
P12	112+29	CB L-4 DOWN STA.	0.0136	0.53	5.26	11	3	2	0.26
	112+29	CB L-4 UP STA.	0.0120	0.48	5.17	11	3	2	0.17
P13	113+00	CB L-5	0.0167	0.59	5.24	11	3	2	0.24
P14	113+79	EXIST CB N-1	0.0167	3.49	10.23	11	3	2	5.23
P15	114+83	CB N-2	0.0105	1.52	8.18	11	3	2	3.18
P16	118+72	CB R-1	0.0082	1.18	7.79	11	3	-	4.79
P17	122+05	CB S-1	0.0070	1.40	8.55	11	3	-	5.55
P18	123+61	CB T-1 DOWN STA.	0.0048	3.98	13.58	11	3	-	10.58
	123+61	CB T-1 UP STA.	0.0100	0.87	6.69	11	3	-	3.69
P19	124+41	CB T-2	0.0046	5.57	14*	11	3	-	11.00*
P20	125+35	CB P-9	0.0100	2.41	9.81	11	2.5	-	7.31
P21	127+56	CB U-1	0.0085	1.52	8.51	12	-	-	8.51
P22	128+39	CB U-2	0.0085	1.54	8.55	12	-	-	8.55
P23	129+30	CB U-3	0.0085	1.32	8.07	12	-	-	8.07
P24	130+20	CB U-4	0.0068	2.11	10.03	12	-	-	10.03
P25	131+88	CB V-6	0.0061	2.22	10.44	12	-	-	10.44
P26	134+54	CB WW-1	0.0400	3.79	8.97	11	1	-	7.97
P27	139+05	CB W-11	0.0007	0.55	9.31	11	3	-	6.31
P28	139+66	CB W-12	0.0258	0.50	4.55	11	3	-	1.55
P29	145+28	CB Y-1	0.0064	0.67	6.60	11	3	-	3.60
P30	146+70	CB X-6 DOWN STA.	0.0120	0.41	4.87	11	3	-	1.87
	146+70	CB X-6 UP STA.	0.0150	1.19	6.98	11	3	-	3.98

AREA NO.	STATION	INLET	SLOPE (FT/FT)	FLOW RATE Q (CFS)	FLOODED WIDTH (FT)	TRAVEL LANE WIDTH (FT)	BUFFER (FT)	GUTTER (FT)	ENCROACHMENT INTO TRAVEL LANE (FT)
P31	148+09	CB Z-2	0.0320	0.89	5.43	11	3	-	2.43
P32	149+09	CB Z-3	0.0400	1.42	6.20	11	3	-	3.20
P33	151+90	CB Z-7	0.0100	2.80	10.37	11	3	-	7.37
P34	154+15	CB Z-8	0.0300	2.10	7.58	11	3	-	4.58
P35	159+14	CB AA-2	0.0339	1.45	6.45	11	3	-	3.45
P36	161+04	CB AA-4	0.0220	0.71	5.35	11	3	-	2.35

* Flow overtops crown of road, flows to makai swale.

LOWER HONOAPIILANI ROAD IMPROVEMENTS

SUMMARY OF PROPOSED FLOODED WIDTH COMPUTATIONS (MAKAI)

AREA NO.	STATION	INLET	SLOPE (FT/FT)	FLOW RATE Q (CFS)	SWALE FLOODED WIDTH (FT)	ENCROACHMENT INTO BUFFER (FT)
P37	91+64	GDI A-1	0.013	1.310	5.777	1.475**
P38	95+18	GDI C-2 DOWN STA.	0.013	0.681	3.479	-
	95+18	GDI C-2 UP STA.	0.003	0.091	2.151	-
P39	95+55	GDI D-1	0.003	0.110	2.314	-
P40	96+60	GDI D-2	0.005	0.110	2.103	-
P41	97+23	GDI D-3	0.005	0.130	2.239	-
P42	98+00	GDI D-4 DOWN STA.	0.005	0.130	2.240	-
	98+00	GDI D-4 UP STA.	0.002	0.940	8.241	3.675**
P43	99+00	GDI D-5	0.002	0.731	7.009	2.575**
	100+15	GDI D-6	0	0.000	0.000	-
P44	101+45	GDI D-7 DOWN STA.	0.0014	0.531	6.449	2.075**
	101+45	GDI D-7 UP STA.	0.002	0.190	3.063	-
P45	103+00	GDI G-5 DOWN STA.	0.002	0.100	2.411	-
	103+00	GDI G-5 UP STA.	0.012	0.140	1.955	-
P46	105+64	GDI H-1 DOWN STA.	0.004	0.500	3.865	-
	105+64	GDI H-1 UP STA.	0.0039	0.370	3.471	-
P47	106+70	GDI H-2	0.004	0.680	5.721	1.425

AREA NO.	STATION	INLET	SLOPE (FT/FT)	FLOW RATE Q (CFS)	SWALE FLOODED WIDTH (FT)	ENCROACHMENT INTO BUFFER (FT)
P48	112+29	GDI K-3 DOWN STA.	0.0136	0.221	2.262	-
	112+29	GDI K-3 UP STA.	0.012	0.361	2.784	-
P49	113+79	GDI M-1	0.011	0.700	3.627	-
P50	118+68	GDI P-3	0.0082	0.440	3.222	-
P51	120+82	GDI P-4	0.0035	0.150	2.525	-
P52	122+05	GDI P-5	0.0085	0.340	2.906	-
P53	123+38	GDI P-6 DOWN STA.	0.001	0.400	5.889	1.575
	123+38	GDI P-7 UP STA.	0.0048	0.570	3.923	-
P54	125+35	GDI P-8	0.0046	0.390	3.431	-
P55	118+49	GDI R-3	-	-	-	-
P56	134+53	GDI W-4	0.045	0.090	1.293	-
P57	134+88	GDI W-5	0.06	0.160	1.519	-
P58	135+50	GDI W-6	0.07	0.230	1.691	-
P59	136+46	GDI W-7	0.04	0.140	1.560	-
P60	137+01	GDI W-8	0.02	0.340	2.475	-
P61	138+31	GDI W-10a	0.02	1.211	3.982	-
P62	144+83	GDI X-1	0.0064	0.310	2.959	-
P63	146+79	GDI X-5 DOWN STA.	0.0229	0.590	2.966	-
	146+79	GDI X-5 UP STA.	0.0324	0.301	2.159	-
P64	147+99	GDI Z-1	0.04	0.891	3.117	-
P65	151+20	GDI ZZ-1	0.028	1.670	5.519	1.245
P66	159+11	GDI AA-1	0.03	0.540	2.728	-

** Encroachment into travel lane (no buffer).

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX C

SUMMARY OF INTERCEPTED AND BYPASS FLOW CALCULATIONS

AUSTIN, TSUTSUMI & ASSOCIATES, INC
CIVIL ENGINEERS • SURVEYORS

LOWER HONOAPIILANI ROAD IMPROVEMENTS

SUMMARY OF INTERCEPTED FLOW COMPUTATIONS (MAUKA)

AREA NO.	STATION	INLET, TYPE	TOTAL FLOW RATE Q (CFS)	EFFICIENCY E (%)	INTERCEPTED FLOW RATE Q (CFS)	BYPASS FLOW RATE Q (CFS)
P1	91+64	CB A-2, TYPE C	1.02	100%	1.02	0
P2	92+90	CB A-3, TYPE C	0.30	100%	0.30	0
P3	94+60	CB BB-1, TYPE C	0.54	100%	0.54	0
P4	95+18	CB C-3 DOWN STA., TYPE F	0.13	100%	0.13	0
	95+18	CB C-3 UP STA., TYPE F	0.17	100%	0.17	0
P5	97+23	CB F-1, TYPE C	0.51	100%	0.51	0
P6	98+00	CB F-2 DOWN STA., TYPE C	0.68	100%	0.68	0
	98+00	CB F-2 UP STA., TYPE C	0.97	100%	0.97	0
P7	99+00	CB F-3, TYPE C	1.07	100%	1.07	0
	100+15	CB G-1, TYPE C	0	100%	0.00	0
P8	101+45	CB G-2 DOWN STA., TYPE C	2.61	100%	2.61	0
	101+45	CB G-2 UP STA., TYPE C	1.73	100%	1.73	0
P9	103+00	CB G-4 DOWN STA., TYPE C	0.86	100%	0.86	0
	103+00	CB G-4 UP STA., TYPE C	0.71	100%	0.71	0
P10	105+67	EXIST CB 1 DOWN STA. TYPE A	1.09	100%	1.09	0
	105+67	EXIST CB 1 UP STA., TYPE A	1.02	100%	1.02	0
P11	107+13	EXIST CB 2, TYPE A	3.60	100%	3.60	0

AREA NO.	STATION	INLET, TYPE	TOTAL FLOW RATE Q (CFS)	EFFICIENCY E (%)	INTERCEPTED FLOW RATE Q (CFS)	BYPASS FLOW RATE Q (CFS)
P12	112+29	CB L-4 DOWN STA., TYPE C	0.53	100%	0.53	0
	112+29	CB L-4 UP STA., TYPE C	0.48	100%	0.48	0
P13	113+00	CB L-5, TYPE C	0.59	100%	0.59	0
P14	113+79	EXIST CB N-1, TYPE C	3.49	96%	3.35	0.14
P15	114+83	CB N-2, TYPE A, TYPE C	1.52	100%	1.52	0
P16	118+72	CB R-1, TYPE C	1.18	100%	1.18	0
P17	122+05	CB S-1, TYPE C	1.40	100%	1.40	0
P18	123+61	CB T-1 DOWN STA., TYPE F	3.98	100%	3.98	0
	123+61	CB T-1 UP STA., TYPE F	0.87	100%	0.87	0
P19	124+41	CB T-2, TYPE C	5.57	97%	5.40	0.17
P20	125+35	CB P-9, TYPE C	2.41	100%	2.41	0
P21	127+56	CB U-1, TYPE C	1.52	100%	1.52	0
P22	128+39	CB U-2, TYPE C	1.54	100%	1.54	0
P23	129+30	CB U-3, TYPE C	1.32	100%	1.32	0
P24	130+20	CB U-4, TYPE C	2.11	100%	2.11	0
P25	131+88	CB V-6, TYPE A	2.22	100%	2.22	0
P26	134+54	CB WW-1, TYPE A	3.79	85.5%	3.24	0.55
P27	139+05	CB W-11, TYPE C	0.55	100%	0.55	0
P28	139+66	CB W-12, TYPE C	1.19	100%	0.50	0
P29	145+28	CB Y-1, TYPE C	0.67	100%	0.67	0
P30	146+70	CB X-6 DOWN STA., TYPE A	0.41	100%	0.41	0
	146+70	CB X-6 UP STA., TYPE A	1.19	100%	1.19	0

AREA NO.	STATION	INLET, TYPE	TOTAL FLOW RATE Q (CFS)	EFFICIENCY E (%)	INTERCEPTED FLOW RATE Q (CFS)	BYPASS FLOW RATE Q (CFS)
P31	148+09	CB Z-2, TYPE C	0.89	100%	0.89	0
P32	149+09	CB Z-3, TYPE C	1.42	100%	1.42	0
P33	151+90	CB Z-7, TYPE C	2.80	100%	2.80	0
P34	154+15	CB Z-8, TYPE C	2.10	99%	2.08	0.02
P35	159+14	CB AA-2, TYPE C	1.45	100%	1.45	0
P36	161+04	CB AA-4, TYPE C	0.71	100%	0.71	0

Types A, C, and F refer to the Standard Details for Public Works Construction, Standard Details, D-1, D-7, D-9, see appendices.

LOWER HONOAPIILANI ROAD IMPROVEMENTS

SUMMARY OF INTERCEPTED FLOW COMPUTATIONS (MAKAI)

AREA NO.	STATION	INLET	TOTAL FLOW RATE Q (CFS)	EFFICIENCY E	INTERCEPTED FLOW RATE Q (CFS)	BYPASS FLOW RATE Q (CFS)
P37	91+64	GDI A-1	1.31	100%	1.31	0
P38	95+18	GDI C-2 DOWN STA.	0.68	100%	0.68	0
	95+18	GDI C-2 UP STA.	0.09	100%	0.09	0
P39	95+55	GDI D-1	0.11	100%	0.11	0
P40	96+60	GDI D-2	0.11	100%	0.11	0
P41	97+23	GDI D-3	0.13	100%	0.13	0
P42	98+00	GDI D-4 DOWN STA.	0.13	100%	0.13	0
	98+00	GDI D-4 UP STA.	0.94	100%	0.94	0
P43	99+00	GDI D-5	0.73	100%	0.73	0
	100+15	GDI D-6	0.00	100%	0.00	0
P44	101+45	GDI D-7 DOWN STA.	0.53	100%	0.53	0
	101+45	GDI D-7 UP STA.	0.19	100%	0.19	0
P45	103+00	GDI G-5 DOWN STA.	0.10	100%	0.10	0
	103+00	GDI G-5 UP STA.	0.14	100%	0.14	0
P46	105+64	GDI H-1 DOWN STA.	0.50	100%	0.50	0
	105+64	GDI H-1 UP STA.	0.37	100%	0.37	0
P47	106+70	GDI H-2	0.68	100%	0.68	0

AREA NO.	STATION	INLET	TOTAL FLOW RATE Q (CFS)	EFFICIENCY E	INTERCEPTED FLOW RATE Q (CFS)	BYPASS FLOW RATE Q (CFS)
P48	112+29	GDI K-3 DOWN STA.	0.22	100%	0.22	0
	112+29	GDI K-3 UP STA.	0.36	100%	0.36	0
P49	113+79	GDI M-1	0.58	100%	0.70	0
P50	118+68	GDI P-3	0.44	100%	0.44	0
P51	120+82	GDI P-4	0.15	100%	0.15	0
P52	122+05	GDI P-5	0.34	100%	0.34	0
P53	123+38	GDI P-6 DOWN STA.	0.40	100%	0.40	0
	123+38	GDI P-7 UP STA.	0.57	100%	0.57	0
P54	125+35	GDI P-8	0.39	100%	0.39	0
P55	118+49	GDI R-3	2.43	100%		
P56	134+53	GDI W-4	0.09	100%	0.09	0
P57	134+88	GDI W-5	0.16	100%	0.16	0
P58	135+50	GDI W-6	0.23	100%	0.23	0
P59	136+46	GDI W-7	0.14	100%	0.14	0
P60	137+01	GDI W-8	0.34	100%	0.34	0
P61	138+31	GDI W-10a	1.21	100%	1.21	0
P62	144+83	GDI X-1	0.31	100%	0.31	0
P63	146+79	GDI X-5 DOWN STA.	0.59	100%	0.59	0
	146+79	GDI X-5 UP STA.	0.30	100%	0.30	0
P64	147+99	GDI Z-1	0.89	100%	0.89	0
P65	151+20	GDI ZZ-1	1.48	100%	1.67	0
P66	159+11	GDI AA-1	0.54	100%	0.54	0

All Grated Drop Inlet (GDI) refer to the State of Hawaii, Department of Transportation, 61614 Grated Drop Inlet, Standard Plan H-11.

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX D
HYDRAULIC CALCULATIONS FOR PROPOSED DRAINAGE SYSTEM
ROADWAY SECTIONS

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG		V	n
PROJECT:			LOWER HONOAPIILANI ROAD IMPROVEMENTS																		

DRAINAGE DESIGN DATA

DRAIN LINE "D" **HOOHUI ROAD TO KEPOLA PLACE** **STA. 87+30 TO STA. 103+50**

COMPUTED BY: RM
CHECKED BY:

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
Outlet "C-1"	95+21									2.40	2.40								4.16	9.00	Inv. + dn		
		16.64	28.89	1.78	4.09	36	23	0.19%	0.44%	COVER<1FT	COVER<1FT	0.04						4.26				6.70	0.013
GDI "C-2"	95+18									2.50	2.50		0.02	0.16	0.05	0.14	2.43		5.12	7.20	Open; 2.08'FB		
		0.11	12.25	1.39	2.50	30	40	0.09%	0.25%			0.04						5.16				4.36	0.013
GDI "D-1"	95+55									2.60	2.60		0.03	0.00	0.00	0.00	1.58		5.19	7.40	Full; 2.21'FB		
		0.11	12.14	1.53	2.47	30	110	0.09%	0.18%			0.10						5.29				3.85	0.013
GDI "D-2"	96+60									2.80	2.80		0.03	0.00	0.00	0.00	1.58		5.32	7.30	Ent. Cont.; 1.98'FB		
		3.36	12.03	1.59	2.45	30	63	0.09%	0.16%	COVER<1FT	COVER<1FT	0.05						5.38				3.64	0.013
GDI "D-3"	97+23									2.90	2.90		0.04	0.00	0.00	0.02	1.58		5.44	7.00	Ent. Cont.; 1.56'FB		
		1.07	8.67	1.58	2.76	24	77	0.15%	0.13%	COVER<1FT	COVER<1FT	0.11						5.55				2.39	0.013
GDI "D-4"	98+00									3.00	3.00		0.04	0.03	0.00	0.00	1.48		5.62	6.80	Full; 1.18'FB		
		0.73	7.60	1.58	2.42	24	100	0.11%	0.10%	COVER<1FT	COVER<1FT	0.11						5.74				2.10	0.013
GDI "D-5"	99+00									3.10	3.10		0.03	0.02	0.00	0.00	1.34		5.78	6.90	Full; 1.12'FB		
		6.15	6.87	1.64	2.19	24	115	0.09%	0.09%	COVER<1FT	COVER<1FT	0.11						5.89				1.95	0.013
GDI "D-6"	100+15									3.20	3.20		0.02	0.07	0.00	0.00	1.20		5.99	6.90	Full; 0.91'FB		
		0.72	0.72	0.41	0.41	18	110	0.00%	0.18%	COVER<1FT	COVER<1FT	0.01						5.99				1.86	0.013
GDI "D-7"	101+45									3.40	3.40		0.00	0.00	0.00	0.00	0.00		6.00	6.70	Full; 0.70'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "A" — HOOHUI ROAD TO KEPOLA PLACE — STA. 87+30 TO STA. 103+50

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
GDI "C-2"	95+18									3.00	3.00								5.12	7.20	Main HGL		
		0.54	3.17	0.53	1.01	24	62	0.02%	0.81%			0.01						5.13				4.70	0.013
DMH "A-5"	94+60									3.50	3.50		0.00	0.01	0.00	0.00	0.00		5.14	7.90	Open; 2.76'FB		
		0.00	2.63	0.38	0.84	24	173	0.01%	2.14%			0.02						7.58				6.30	0.013
DMH "A-4"	92+90									7.20	7.20		0.00	0.00	0.00	0.00	0.00		7.78	11.50	Open; 3.72'FB		
		0.30	2.63	0.58	0.84	24	25	0.01%	0.40%	COVER=3 FT	COVER=3 FT	0.00						7.88				3.47	0.013
CB "A-3"	92+90									7.30	7.30		0.00	0.00	0.00	0.00	0.00		7.88	11.05	Open; 3.17'FB		
		1.02	2.33	0.44	0.74	24	143	0.01%	0.98%	COVER=3 FT	COVER=3 FT	0.02						9.14				4.61	0.013
CB "A-2"	91+64									8.70	8.70		0.00	0.01	0.00	0.00	0.00		9.14	12.15	Open; 3.01'FB		
		1.31	1.31	0.42	0.42	24	28	0.00%	0.36%	COVER=3 FT	COVER=3 FT	0.00						9.22				2.73	0.013
GDI "A-1"	91+64									8.80	8.80		0.00	0.00	0.00	0.00	0.00		9.22	12.50	Open; 3.28'FB		

DRAIN LINE "C" — HOOHUI ROAD TO KEPOLA PLACE — STA. 87+30 TO STA. 103+50

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
GDI "C-2"	95+18									2.50	3.00								5.12	7.20	Main HGL		
		12.70	12.70	0.88	4.04	24	30	0.32%	2.00%	COVER=3 FT	COVER=3 FT	0.09						5.21				9.60	0.013
CB "C-3"	95+18									3.60	3.60								5.21	7.25	Open; 2.04'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "BB" HOOHUI ROAD TO KEPOLA PLACE STA. 87+30 TO STA. 103+50

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "A-5"	94+60									4.50	4.50								5.14	7.90	Drain Line "A" HGL		
		0.54	0.54	0.20	0.31	18	20	0.00%	2.00%	COVER+1FT	COVER+1FT	0.00						5.14				3.98	0.013
CB "BB-1"	94+60									4.90	4.90								5.14	7.65	Open; 2.51'FB		

DRAIN LINE "F" HOOHUI ROAD TO KEPOLA PLACE STA. 87+30 TO STA. 103+50

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
GDI "D-3"	97+23									2.90	2.90								5.44	7.00	Main HGL		
		0.51	3.23	0.57	1.03	24	30	0.02%	0.67%	COVER+1FT	COVER+1FT	0.01						5.45				4.42	0.013
CB "F-1"	97+23									3.10	3.10		0.00	0.01	0.00	0.00	0.00		5.45	6.85	Full; 1.40'FB		
		1.65	2.72	0.64	0.87	24	70	0.01%	0.29%	COVER+1FT	COVER+1FT	0.01						5.46				3.11	0.013
CB "F-2"	98+00									3.30	3.30		0.00	0.01	0.00	0.00	0.00		5.47	6.35	Full; 0.68'FB		
		1.07	1.07	0.44	0.34	24	100	0.00%	0.20%	COVER+1FT	COVER+1FT	0.00						5.47				2.09	0.013
CB "F-3"	99+00									3.50	3.50		0.00	0.00	0.00	0.00	0.00		5.48	6.55	Open; 1.07'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "G" HOOHUI ROAD TO KEPOLA PLACE STA. 87+30 TO STA. 103+50

Drainage Structure		Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
GDI "D-6"	100+15									3.20	3.20								5.99	6.90	Main HGL		
		0.00	6.15	0.78	1.96	24	26	0.07%	0.77%	COVER=1FT	COVER=0FT	0.02						6.01				5.57	0.013
CB "G-1"	100+15									3.40	3.40		0.02	0.00	0.00	0.00	0.00		6.03	6.75	Full; 0.72'FB		
		4.34	6.15	1.60	1.96	24	130	0.07%	0.08%	COVER=1FT	COVER=0FT	0.10						6.12				2.28	0.013
CB "G-2"	101+45									3.50	3.50		0.02	0.06	0.00	0.00	0.00		6.20	6.55	Full; 0.35'FB		
		0.00	1.81	0.54	0.58	24	120	0.01%	0.25%			0.01						6.21				2.64	0.013
DMH "G-3"	102+67									3.80	3.80		0.00	0.00	0.00	0.00	0.00		6.21	7.80	Full; 1.59'FB		
		1.57	1.81	0.29	0.58	24	34	0.01%	3.00%	COVER=1FT	COVER=0FT	0.00						6.21				6.35	0.013
CB "G-4"	103+00									3.90	3.90		0.00	0.01	0.00	0.00	0.00		6.21	6.95	Full; 0.74'FB		
		0.24	0.24	0.12	0.14	18	34	0.00%	3.00%	COVER=1FT	COVER=0FT	0.00						6.22				3.60	0.013
GDI "G-5"	103+00									4.00	4.00		0.00	0.00	0.00	0.00	0.00		6.22	6.88	Full; 0.66'FB		

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG	V	n
PROJECT:			LOWER HONOAPIILANI ROAD IMPROVEMENTS																	

DRAINAGE DESIGN DATA

COMPUTED BY: RM
CHECKED BY:

DRAIN LINE "J" **KEPOLA PL. TO KAHANA STREAM** **STA. 103+50 TO STA. 110+00**

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
Outlet "J"	110+55									1.90	1.90								3.90	8.50	Inv. + dn		
		0.00	13.46	1.27	4.28	24	46	0.35%	0.22%			0.16						4.06				3.22	0.013
DMH "J-2"	110+23									2.00	2.00		0.10	0.00	0.03	0.00	1.91		4.19	9.30	Full; 5.11'FB		
		0.00	13.46	1.15	4.28	24	100	0.35%	0.90%			0.35						4.54				7.21	0.013
EXIST DMH "J-1"	109+21									2.90	2.90		0.10	0.26	0.02	0.00	1.91		4.92	8.70	Ent. Cont.; 3.78'FB		
		9.80	13.46	1.41	4.28	24	208	0.35%	0.50%	COVER+1FT	COVER+1FT	0.74						5.66				5.71	0.013
EXIST CB 2	107+13									3.94	3.94		0.10	0.26	0.02	0.00	1.56		6.04	7.04	Ent. Cont.; 1.00'FB		
		1.55	3.66	0.41	1.17	24	44	0.03%	3.18%	COVER+1FT	COVER+1FT	0.01						6.05				7.98	0.013
DMH "H-3"	106+70									4.30	4.30		0.00	0.00	0.00	0.00	0.00		6.05	7.40	Open; 1.35'FB		
		2.11	2.11	0.45	1.19	18	103	0.04%	1.08%	COVER+1FT	COVER+1FT	0.04						6.09				4.77	0.013
EXIST CB 1	105+67									5.05	5.05		0.00	0.03	0.00	0.00	0.00		6.12	6.72	Open; 0.60'FB		

HYDRAULIC CALCULATIONS

EXIST. DRAIN LINE "B" (OFFSITE) KEPOLA PL. TO KAHANA STREAM STA. 103+50 TO STA. 110+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
EXIST CB 2	107+13									3.90	3.90								6.04	7.04	MAIN HGL		
		0.50	6.20	0.92	1.97	24	95	0.08%	0.40%			0.07						6.11				4.39	0.013
EXIST DI "B-1"	OFFSITE									4.28	4.28		0.06	0.00	0.02	0.00	1.18		6.19	8.50	Open; 2.31'FB		
		0.90	5.70	1.00	3.23	18	115	0.29%	0.48%			0.34						6.53				4.55	0.013
EXIST DI "B-2"	OFFSITE									4.83	4.83		0.06	0.10	0.01	0.00	1.31		6.69	11.40	Full; 4.71'FB		
		1.20	4.80	0.89	2.72	18	130	0.21%	0.48%			0.27						6.96				4.39	0.013
EXIST DI "B-3"	OFFSITE									5.45	5.45		0.04	0.08	0.00	0.00	1.16		7.08	11.00	Full; 3.92'FB		
		1.00	3.60	0.61	2.04	18	120	0.12%	1.00%			0.14						6.83				5.39	0.013
EXIST CB "B-4"	OFFSITE									6.03	6.03		0.02	0.03	0.00	0.00	1.01		7.04	10.20	Open; 3.16'FB		
		2.60	2.60	0.42	1.47	18	60	0.06%	2.08%			0.04						7.12				6.41	0.013
EXIST CB "B-5"	OFFSITE									6.70	6.70		0.01	0.04	0.00	0.00	0.00		7.16	11.20	Open; 4.04'FB		

DRAIN LINE "H" KEPOLA PL. TO KAHANA STREAM STA. 103+50 TO STA. 110+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "H-3"	106+70									4.30	4.30								6.05	7.40	MAIN HGL		
		0.68	1.55	0.52	0.88	18	30	0.02%	0.33%	COVER=3.5FT	COVER=3.5FT	0.01						6.06				2.87	0.013
GDI "H-2"	106+70									4.40	4.40		0.00	0.01	0.00	0.00	0.00		6.07	7.10	Full; 1.03'FB		
		0.87	0.87	0.53	0.49	18	105	0.01%	0.10%	COVER=3.5FT	COVER=3.5FT	0.01						6.07				1.56	0.013
GDI "H-1"	105+64									4.50	4.50		0.00	0.01	0.00	0.00	0.00		6.08	6.90	Full; 0.82'FB		

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

5/23/01

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG	V	n

PROJECT: LOWER HONOAPIILANI ROAD IMPROVEMENTS

DRAINAGE DESIGN DATA

COMPUTED BY: RM
CHECKED BY:

DRAIN LINE "L" **KAHANA STREAM TO HUI ROAD "D"** **STA. 110+00 TO STA. 115+00**

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
Outlet K	110+95									2.10	2.10								4.60	7.90	Inv. + pipe diameter		
		0.58	19.15	1.09	3.90	30	7	0.22%	1.43%			0.02						4.62				9.37	0.013
DHM "K-1"	111+02									2.20	2.20		0.08	0.01	0.04	0.00	2.08		4.75	7.90	Ent. Cont.; 3.15'FB		
		0.00	18.57	1.41	3.78	30	18	0.20%	0.56%			0.04						4.79				6.53	0.013
DMH "L-1"	111+05									2.30	2.30		0.08	0.00	0.04	0.00	2.08		4.91	8.40	Ent. Cont.; 3.49'FB		
		0.00	18.57	2.09	3.78	30	50	0.20%	0.20%			0.10						5.01				3.42	0.013
DMH "L-2"	111+55									2.40	2.40		0.08	0.00	0.02	0.00	2.08		5.10	7.80	Full; 2.70'FB		
		11.38	18.57	1.89	3.78	30	25	0.20%	0.80%			0.05						5.15				8.48	0.013
DMH "L-3"	111+68									2.60	2.60		0.08	0.14	0.04	0.00	1.50		5.41	7.90	Full; 2.49'FB		
		1.01	7.19	0.77	2.29	24	60	0.10%	1.00%	cover+2ft	cover+2ft	0.08						5.47				6.39	0.013
CB "L-4"	112+29									3.20	3.20		0.03	0.02	0.00	0.00	1.26		5.52	6.65	Full; 1.13'FB		
		0.59	6.18	0.69	1.97	24	70	0.07%	1.14%	cover+2ft	cover+2ft	0.05						5.57				6.44	0.013
CB "L-5"	113+00									4.00	4.00		0.02	0.01	0.00	0.00	1.20		5.60	7.19	Open; 1.58'FB		
		4.07	5.59	0.67	1.78	24	85	0.06%	1.06%	cover+2ft	cover+2ft	0.05						5.65				6.09	0.013
EXIST CB "N-1"	113+79									4.90	4.90		0.03	0.08	0.00	0.00	0.00		5.76	8.44	Open; 2.68'FB		
		1.52	1.52	0.39	0.48	24	95	0.00%	0.63%			0.00						5.89				3.48	0.013
CB "N-2"	114+63									5.50	5.50		0.00	0.01	0.00	0.00	0.00		5.90	9.75	Open; 3.85'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "K" KAHANA STREAM TO HUI ROAD "D" STA. 110+00 TO STA. 115+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "K-1"	111+02									2.20	2.80								4.75	7.90	Main HGL		
		0.00	0.79	0.34	0.25	24	34	0.00%	0.29%			0.00						4.75				2.19	0.013
DMH "K-2"	111+35									2.90	2.90		0.00	0.00	0.00	0.00	0.00		4.75	7.60	Open; 3.05'FB		
		0.79	0.79	0.44	0.25	24	95	0.00%	0.11%	COVER+2FT	COVER+2FT	0.00						4.75				1.53	0.013
GDI "K-3"	112+29									3.00	3.00		0.00	0.00	0.00	0.00	0.00		4.75	6.80	Open; 2.05'FB		

DRAIN LINE "M" KAHANA STREAM TO HUI ROAD "D" STA. 110+00 TO STA. 115+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
EXIST CB "N-1"	113+79									4.90	4.90								5.76	9.40	Main HGL		
		0.70	0.70	0.37	0.40	18	38	0.00%	0.26%			0.00						5.76				2.10	0.013
GDI "M-1"	115+79									5.00	5.00								5.76	8.70	Open; 2.94'FB		

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG	V	n
PROJECT:			LOWER HONOAPIILANI ROAD IMPROVEMENTS																	

DRAINAGE DESIGN DATA

COMPUTED BY: RM
CHECKED BY:

DRAIN LINE "P" **HUI ROAD "D" TO PUAMANA PL.** **STA. 118+50 TO STA. 125+50**

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
Outlet "P-1"	118+18									5.90	5.90								7.66	12.00	Inv. + dn		
		0.00	20.13	1.27	4.10	30	11	0.24%	0.91%			0.03						7.69				8.02	0.013
DMH "P-2"	118+20									6.00	6.00		0.09	0.00	0.05	0.02	2.18		8.24	12.70	Open; 4.46'FB		
		4.05	20.13	1.31	4.10	30	49	0.24%	0.82%			0.12						8.38				7.71	0.013
GDI "P-3"	118+68									6.40	6.40		0.09	0.09	0.02	0.00	2.18		8.59	13.80	Open; 5.21'FB		
		0.15	16.08	1.15	3.28	30	217	0.15%	0.83%			0.33						9.35				7.33	0.013
GDI "P-4"	120+82									8.20	8.20		0.06	0.00	0.01	0.00	1.88		10.20	14.80	Open; 4.60'FB		
		1.74	15.93	2.00	3.25	30	127	0.15%	0.16%			0.19						10.40				3.78	0.013
GDI "P-5"	122+05									8.40	8.40		0.11	0.00	0.02	0.00	1.88		10.54	13.70	Open; 3.16'FB		
		10.82	14.19	0.86	4.52	24	133	0.39%	0.15%	cover+2ft	cover+0ft	0.52						11.06				2.84	0.013
GDI "P-6"	123+38									8.60	8.60		0.11	0.30	0.02	0.00	1.98		11.49	12.20	Full; 0.71'FB		
		0.57	3.37	0.62	1.07	24	40	0.02%	0.50%	cover+2ft	cover+0ft	0.01						11.50				4.03	0.013
GDI "P-7"	123+75									8.80	8.80		0.00	0.01	0.00	0.00	0.00		11.50	12.30	Full; 0.80'FB		
		0.39	2.80	0.57	0.89	24	160	0.02%	0.50%	cover+2ft	cover+0ft	0.02						11.53				3.83	0.013
GDI "P-8"	125+35									9.40	9.40		0.00	0.00	0.00	0.00	0.00		11.53	12.90	Full; 1.37'FB		
		2.41	2.41	0.51	0.77	24	35	0.01%	0.57%	cover+2ft	cover+0ft	0.00						11.53				3.85	0.013
CB "P-9"	125+35									9.60	9.60		0.00	0.01	0.00	0.00	0.00		11.55	12.75	Open; 1.20'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "T" HUI ROAD "D" TO PUAMANA PL. STA. 118+50 TO STA. 125+50

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
GDI "P-6"	123+38									8.60	8.60								11.49	12.20	MAIN HGL		
		4.85	10.42	1.18	3.32	24	40	0.21%	0.50%	COVER=2FT	COVER=2FT	0.08						11.57				5.42	0.013
CB "T-1"	123+61									8.80	8.80		0.06	0.12	0.02	0.00	0.00		11.78	11.95	Full; 0.17'FB		
		5.57	5.57	0.88	1.77	24	80	0.06%	0.37%	COVER=1FT	COVER=1FT	0.05						11.83				4.17	0.013
CB "T-2	124+41									9.10	9.10		0.01	0.05	0.00	0.00	0.00		11.89	12.35	Full; 0.46'FB		

DRAIN LINE "S" HUI ROAD "D" TO PUAMANA PL. STA. 118+50 TO STA. 125+50

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
GDI "P-5"	122+05									8.40	8.40								10.54	13.70	MAIN HGL		
		1.40	1.40	0.39	0.45	24	35	0.00%	0.57%			0.00						10.54				3.28	0.013
CB "S-1"	122+05									8.60	8.60								10.54	13.55	Open; 3.01'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "R" — HUI ROAD "D" TO PUAMANA PL. — STA. 118+50 TO STA. 125+50

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
										7.90	7.90								8.59	13.80	MAIN HGL	4.32	0.013
GDI "P-3"	118+68											0.01						8.72					
		1.18	3.61	0.62	1.15	24	35	0.03%	0.57%										8.74	13.65	Open; 4.91'FB		
										8.10	8.10		0.00	0.01	0.00	0.00	0.00					4.07	0.013
CB "R-1"	118+72											0.00						8.74					
		0.00	2.43	0.49	0.77	24	15	0.01%	0.67%										8.74	14.00	Open; 5.26'FB		
										8.20	8.20		0.00	0.00	0.00	0.00	0.00					4.34	0.013
DMH "R-2"	118+54											0.00						8.87					
		2.43	2.43	0.47	0.77	24	25	0.01%	0.80%										8.88	14.40	Open; 5.52'FB		
										8.40	8.40		0.00	0.01	0.00	0.00	0.00						
GDI "R-3"	118+49																						

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

5/23/01

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG		V	n

PROJECT: LOWER HONOAPIILANI ROAD IMPROVEMENTS

DRAINAGE DESIGN DATA

COMPUTED BY: RM
CHECKED BY:

DRAIN LINE "U" **OUTLET "U" TO THE 54" CULVERT** **STA. 127+50 TO STA. 130+50**

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
Outlet "U"	127+57									9.85	9.85								10.33	14.50	Inv. + dn		
		1.52	6.49	0.48	2.07	24	40	0.08%	5.13%			0.03						12.38				11.17	0.013
CB "U-1"	127+56									11.90	11.90		0.02	0.03	0.01	0.00	0.00		13.06	15.90	Open; 2.84'FB		
		1.54	4.97	1.16	1.58	24	84	0.05%	0.12%			0.04						13.16				2.63	0.013
CB "U-2"	128+39									12.00	12.00		0.01	0.02	0.00	0.00	0.00		13.19	16.70	Open; 3.51'FB		
		1.32	3.43	0.61	1.09	24	90	0.02%	0.56%			0.02						13.21				4.21	0.013
CB "U-3"	129+30									12.50	12.50		0.00	0.01	0.00	0.00	0.00		13.22	17.00	Open; 3.78'FB		
		2.11	2.11	0.48	0.67	24	90	0.01%	0.56%			0.01						13.48				3.66	0.013
CB "U-4"	130+20									13.00	13.00		0.00	0.01	0.00	0.00	0.00		13.49	17.80	Open; 4.31'FB		

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG		V	n
PROJECT:			LOWER HONOAPIILANI ROAD IMPROVEMENTS																		

DRAINAGE DESIGN DATA

COMPUTED BY: RM
CHECKED BY:

DRAIN LINE "W" **54" CULVERT TO KAHANA SUNSET** **STA. 130+50 TO STA. 143+20**

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
Outlet "V-1"	133+51									13.90	13.90								14.90	20.00	Inv. + dn		
		2.22	9.93	1.00	3.16	24	13	0.19%	0.77%			0.03						15.00				6.32	0.013
DMH "V-2"	133+50									14.00	14.00		0.05	0.06	0.02	0.01	1.56		15.59	19.74	Open; 4.15'FB		
		0.00	7.71	0.96	2.45	24	19	0.12%	0.53%			0.02						15.61				5.14	0.013
DMH "W-1"	133+73									14.10	14.10		0.03	0.00	0.00	0.00	1.34		15.65	20.20	Open; 4.55'FB		
		0.00	7.71	0.78	2.45	24	9	0.12%	1.11%			0.01						15.66				6.77	0.013
DMH "W-2"	133+79									14.20	14.20		0.03	0.00	0.01	0.00	1.34		15.70	19.70	Open; 4.00'FB		
		0.00	7.71	0.65	2.45	24	37	0.12%	2.16%			0.04						15.74				8.62	0.013
DMH "W-3"	134+15									15.00	15.00		0.03	0.00	0.00	0.00	1.34		16.34	20.28	Open; 3.94'FB		
		3.68	7.71	0.52	2.45	24	40	0.12%	5.25%			0.05						17.62				11.84	0.013
GDI "W-4"	134+53									17.10	17.10		0.03	0.07	0.00	0.00	1.34		18.44	21.30	Open; 2.86'FB		
		0.16	3.83	0.38	1.22	24	32	0.03%	5.62%	COVER+1FT	COVER+1FT	0.01						19.26				9.89	0.013
GDI "W-5"	134+88									18.90	18.90		0.00	0.00	0.00	0.00	0.00		19.27	22.80	Open; 3.53'FB		
		0.23	3.67	0.37	1.17	24	65	0.03%	4.77%			0.02						22.37				9.22	0.013
GDI "W-6"	135+50									22.00	22.00		0.00	0.00	0.00	0.00	0.00		22.36	26.40	Open; 4.04'FB		
		0.14	3.44	0.36	1.09	24	97	0.02%	4.64%			0.02						26.86				8.95	0.013
GDI "W-7"	136+46									26.50	26.50		0.00	0.00	0.00	0.00	0.00		26.86	33.40	Open; 6.54'FB		
		0.34	3.30	0.31	1.05	24	60	0.02%	7.83%			0.01						31.51				10.63	0.013
GDI "W-8"	137+01									31.20	31.20		0.00	0.01	0.00	0.00	0.00		31.59	36.10	Open; 4.51'FB		
		0.00	2.98	0.39	0.94	24	63	0.02%	2.54%			0.01						33.19				6.93	0.013
DMH "W-9"	137+60									32.80	32.80		0.00	0.00	0.00	0.00	0.00		33.47	38.30	Open; 4.83'FB		
		1.21	2.98	0.67	0.94	24	70	0.02%	0.29%		COVER+1FT	0.01						33.67				3.18	0.013

HYDRAULIC CALCULATIONS

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "W-10"	138+31									33.00	35.40		0.00	0.00	0.00	0.00	0.00		35.99	38.40	Ent. Cont.; 2.41'FB		
		0.55	1.75	0.59	0.99	18	75	0.03%	0.27%	COVER=1FT	COVER=2FT	0.02						36.19				2.74	0.013
CB "W-11"	139+05									35.60	35.80		0.00	0.01	0.00	0.00	0.00		36.19	38.60	Open; 2.41'FB		
		1.20	1.20	0.55	0.68	18	63	0.01%	0.16%	COVER=1FT	COVER=2FT	0.01						36.25				2.04	0.013
CB "W-12"	139+68									35.70	35.70		0.00	0.01	0.00	0.00	0.00		36.26	38.70	Open; 2.44'FB		

DRAIN LINE "V" 54" CULVERT TO KAHANA SUNSET STA. 130+50 TO STA. 143+20

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "V-2"	133+50									14.00	14.00								15.59	19.70	MAIN HGL		
		0.00	2.22	0.54	0.71	24	52	0.01%	0.38%			0.01						15.60				3.26	0.013
DMH "V-3"	133+13									14.20	14.20		0.00	0.00	0.00	0.00	0.00		15.60	19.70	Open; 4.10'FB		
		0.00	2.22	0.61	0.71	24	85	0.01%	0.24%			0.01						15.60				2.74	0.013
DMH "V-4"	132+29									14.40	14.40		0.00	0.00	0.00	0.04	0.00		15.64	19.20	Open; 3.56'FB		
		0.00	2.22	0.61	0.71	24	42	0.01%	0.24%			0.00						15.64				2.75	0.013
DMH "V-5"	131+88									14.50	14.50		0.00	0.00	0.00	0.00	0.00		15.64	19.10	Open; 3.46'FB		
		2.22	2.22	0.49	0.71	24	18	0.01%	0.56%			0.00						15.64				3.72	0.013
CB "V-6"	131+88									14.60	14.60		0.00	0.01	0.00	0.00	0.00		15.65	19.30	Open; 3.65'FB		

DRAIN LINE "WW-1" 54" CULVERT TO KAHANA SUNSET STA. 130+50 TO STA. 143+20

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
GDI "W-4"	134+53									17.10	17.60								18.44	21.30	MAIN HGL		
		3.79	3.79	0.71	2.14	18	32	0.13%	0.62%			0.04						18.51				4.59	0.013
CB "WW-1"	134+54									17.80	17.80								18.51	22.30	Open; 3.79'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "W-10a" 54" CULVERT TO KAHANA SUNSET STA. 130+50 TO STA. 143+20

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "W-10"	138+31									33.00	33.40								35.99	38.40	MAIN HGL		
		1.21	1.21	0.40	0.68	18	18	0.01%	0.58%			0.00						35.99				3.21	0.013
GDI "W-10a"	138+31									33.50	33.50								35.99	37.60	Full; 1.61'FB		

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG		V	n

PROJECT: LOWER HONOAPIILANI ROAD IMPROVEMENTS

DRAINAGE DESIGN DATA

COMPUTED BY: RM
CHECKED BY:

DRAIN LINE "X" NORTH — KAHANA SUNSET — STA. 143+20 TO STA. 148+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
EXIST STRUCTURE										25.00	25.00		0.00	0.00	0.00	0.00	0.00		27.00	31.00	Inv. + dn		
		0.98	3.47	0.38	1.10	24	27	0.02%	4.81%			0.01						27.01				9.09	0.013
DMH "X-3"	145+98									26.30	37.40		0.00	0.00	0.00	0.00	0.00		37.91	45.00	Full; 7.09'FB		
		0.00	2.49	0.51	0.79	24	34	0.01%	0.59%			0.00						38.11				3.92	0.013
DMH "X-4"	146+31									37.60	37.60		0.00	0.00	0.00	0.00	0.00		38.11	43.70	Open; 5.59'FB		
		0.89	2.49	0.36	0.79	24	43	0.01%	2.33%			0.01						38.96				6.38	0.013
GDI "X-5"	146+79									38.60	38.60		0.00	0.01	0.00	0.00	0.00		39.02	42.60	Open; 3.78'FB		
		1.60	1.60	0.42	0.51	24	36	0.01%	0.56%			0.00						39.22				3.38	0.013
CB "X-6"	146+70									38.80	38.80		0.00	0.01	0.00	0.00	0.00		39.22	43.80	Open; 4.58'FB		

DRAIN LINE "X" SOUTH — KAHANA SUNSET — STA. 143+20 TO STA. 148+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "X-3"	145+98									28.30	40.00								40.26	45.00	MAIN HGL		
		0.67	0.98	0.26	0.31	24	53	0.00%	1.51%			0.00						41.06				4.15	0.013
DMH "X-2"	145+28									40.80	40.80		0.00	0.00	0.00	0.00	0.00		41.06	46.20	Open; 5.14'FB		
		0.31	0.31	0.19	0.10	24	38	0.00%	0.53%			0.00						41.19				2.03	0.013
GDI "X-1"	144+83									41.00	41.00		0.00	0.00	0.00	0.00	0.00		41.19	45.50	Open; 4.31'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "Y" — KAHANA SUNSET — STA. 143+20 TO STA. 148+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "X-2"	145+28									40.80	40.80								41.06	46.20	Drain Line "X" South HGL		
		0.67	0.67	0.29	0.21	24	45	0.00%	0.44%			0.00						41.29				2.42	0.013
CB "Y-1"	145+28									41.00	41.00								41.29	45.90	Open; 4.61'FB		

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv		Hf	A	B	CL	D	Ent	Down	Up	FG		V	n
PROJECT:			LOWER HONOAPIILANI ROAD IMPROVEMENTS																			

DRAINAGE DESIGN DATA

DRAIN LINE "Z" **KAHANA SUNSET TO HUI RD. "I"** **STA. 148+00 TO STA. 154+00**

COMPUTED BY: RM
CHECKED BY:

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
EXIST 30"	147+97									34.50	34.50								34.93	40.00	Inv. + pipe diameter		
		0.89	9.58	0.42	3.05	24	12	0.18%	19.17%			0.02						37.22				19.96	0.013
GDI "Z-1"	147+99									36.80	37.20		0.05	0.03	0.01	0.01	1.52		38.34	44.50	Open; 6.16'FB		
		0.69	8.69	0.45	2.77	24	35	0.15%	12.00%			0.05						41.85				16.44	0.013
CB "Z-2"	148+09									41.40	41.40		0.04	0.02	0.01	0.00	1.42		42.83	45.70	Open; 2.87'FB		
		1.42	7.80	0.59	2.48	24	102	0.12%	3.24%			0.12						45.29				9.99	0.013
CB "Z-3"	149+09									44.70	44.70		0.03	0.03	0.00	0.00	1.35		46.05	49.20	Open; 3.15'FB		
		0.00	6.38	0.61	2.03	24	72	0.08%	1.94%			0.06						46.71				7.86	0.013
DMH "Z-4"	149+83									46.10	46.10		0.02	0.00	0.00	0.00	1.20		47.30	52.40	Open; 5.10'FB		
		0.00	6.38	0.53	2.03	24	65	0.08%	3.38%			0.05						48.83				9.59	0.013
DMH "Z-5"	150+50									48.30	48.30		0.02	0.00	0.00	0.00	1.20		49.50	55.20	Open; 5.70'FB		
		1.48	6.38	0.60	2.03	24	68	0.08%	2.06%			0.05						50.30				8.03	0.013
DMH "Z-6"	151+20									49.70	53.00		0.02	0.03	0.00	0.00	1.20		53.42	57.90	Ent. Cont.; 4.48'FB		
		2.80	4.90	0.42	1.56	24	68	0.05%	5.15%			0.03						56.92				10.31	0.013
CB "Z-7"	151+90									56.50	56.50		0.01	0.03	0.00	0.00	0.00		56.96	60.60	Open; 3.64'FB		
		2.10	2.10	0.43	0.67	24	223	0.01%	0.85%			0.02						56.83				4.26	0.013
CB "Z-8"	154+15									58.40	58.40		0.00	0.01	0.00	0.00	0.00		58.84	63.30	Open; 4.46'FB		

HYDRAULIC CALCULATIONS

DRAIN LINE "Z-1a" KAHANA SUNSET TO HUI RD. "I" STA. 148+00 TO STA. 154+00

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "Z-6"	151+20									49.70	49.70								53.42	57.90	MAIN HGL		
		1.48	1.48	0.31	0.47	24	20	0.00%	1.50%			0.00						53.42				4.69	0.013
GDI "ZZ-1"	151+20									50.00	50.00								53.42	57.20	Full; 3.78'FB		

NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

HYDRAULIC CALCULATIONS

DRAIN

	Qr	Q	dn	Vf	dp	L	Sf	S	Inv	Hf	A	B	CL	D	Ent	Down	Up	FG		V	n

PROJECT: LOWER HONOAPIILANI ROAD IMPROVEMENTS

DRAINAGE DESIGN DATA

COMPUTED BY: RM
CHECKED BY:

DRAIN LINE "AA" **NAPILIHAU ST.** **STA. 159+00 TO STA. 161+31**

Drainage Structure	Station	Q Runoff	Q Accum.	d_n	V_f	Pipe Size	Seg. Length	S_f	S	Lower Invert	Upper Invert	H_f	Manhole Losses A	B	C	D	Ent. Cont.	Hyd. Grade Elev. Down	Up	Opening Elevation	Remarks	V	n
DMH "AA-5"	161+29									54.80	54.80								56.30	60.00	Inv. + pipe diameter		
		0.71	2.70	0.65	1.53	18	23	0.07%	0.43%			0.02						56.32				3.68	0.013
CB "AA-4"	161+40									54.90	54.90		0.01	0.02	0.00	0.00	0.90		56.34	58.65	Open; 2.31'FB		
		0.00	1.99	0.33	1.13	18	113	0.04%	3.27%	[illegible]	[illegible]	0.04						56.93				6.97	0.013
DMH "AA-3"	160+00									58.60	58.60		0.00	0.00	0.00	0.00	0.90		59.50	62.00	Open; 2.50'FB		
		1.45	1.99	0.33	1.13	18	90	0.04%	3.22%	[illegible]	[illegible]	0.03						61.83				6.93	0.013
CB "AA-2"	159+14									61.50	61.50		0.00	0.02	0.00	0.00	0.00		61.85	64.95	Open; 3.10'FB		
		0.54	0.54	0.31	0.31	18	33	0.00%	0.30%	[illegible]	[illegible]	0.00						61.91				2.05	0.013
GDI "AA-1"	159+11									61.60	61.60		0.00	0.00	0.00	0.00	0.00		61.91	64.80	Open; 2.89'FB		

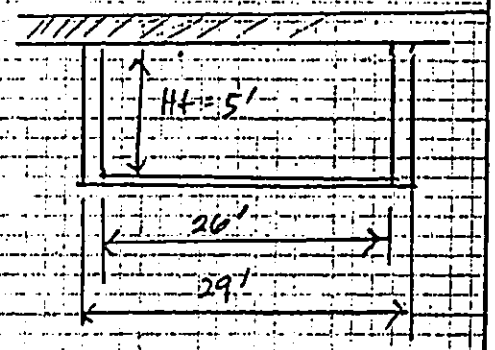
NOTE:

1. Manning's coeff. (n) = 0.013 for Reinf. Conc. Pipe (RCP)
2. Hydrologic Criteria - Runoff computations are based on a recurrence interval of 10 years.

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX E
BRIDGE CAPACITY AND GRP APRON DESIGN CALCULATIONS

Determine Existing capacity of existing box culvert



Assume $\frac{H}{D} = 1.0$, inlet control

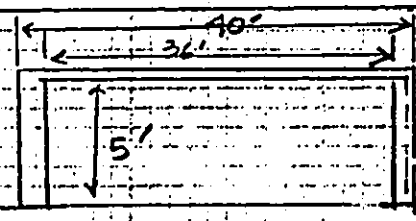
Using Nomograph for Box culverts w/entrance control
Plate 20

$H = 5'$ & $\frac{H}{D} = 1.0 \rightarrow \frac{Q}{b} = 35$ $(b = 26')$

$\boxed{Q_{cap} = 910 \text{ cfs}}$ capacity of ~~box~~ culvert

if $\frac{H}{D}_{max} = 1.2$, $b = 20'$ (exist. width)

$H = 5'_{(exist.)} \Rightarrow \frac{Q}{b} = 41.5 \Rightarrow$ then $Q_{capacity\ exist} = 1079$ cfs



Assume: ① inlet control,
② width of abutment walls = 2'

Given: $H/D = 1.0$ ($H/D_{max} = 1.2 \Rightarrow$ is @ overtop level)
$b = 36'$, $H = 5'$

$\frac{Q}{b} = 34 \Rightarrow$ $\boxed{Q_{cap\ (prop)} = 1224 \text{ cfs}}$

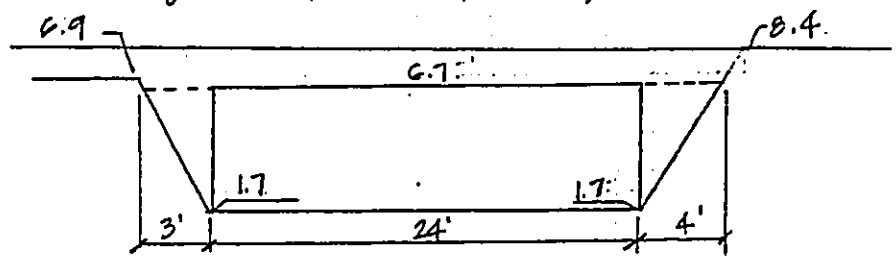
AUSTIN, TSUTSUMI & ASSOCIATES, INC. – CIVIL ENGINEERS • SURVEYORS	PROJECT: KAHANANUT STREAM LOWER HONOAPIILANI ROAD	JOB NO. 98-545	BY em DATE 2/9/88
HONOLULU, HAWAII • HILO, HAWAII WAILUKU, MAUI, HAWAII			CHKD DATE
			SHT. NO. OF

GRP APRON DESIGN

Reference :

1. HEC - 20 , Stream Stability at Highway Structures , Second Edition.
2. HEC - 18 , Evaluating Scour at Bridges , Third Edition

- Determine length of apron : (Upstream)



$Q = 1300 \text{ cfs} = 36.82 \text{ m}^3/\text{s}$

$Q_f = \frac{1300}{137.5} \times 10 = 95 \text{ cfs} = 2.68 \text{ m}^3/\text{s}$

$Q_{30m} = 36.82 - 2.68 = 34.14 \text{ m}^3/\text{s}$

$b = 24' = 7.32 \text{ m}$

$A_{n2} = 120 \text{ ft}^2 = 11.15 \text{ m}^2$

$\frac{Q_F}{Q_{30m}} = \frac{2.68}{34.14} = 0.08$

$V_{n2} = \frac{36.82}{11.15} = 3.30 \text{ m/s}$

$\therefore L_s = 15 \text{ m} = \underline{49'}$ (Figure 44)

- Determine riprap stone size:

$$D_{50} = y \left[\frac{K}{(S_s - 1)}\right]\left[\frac{V^2}{gy}\right]^{0.14}, \quad y = 5' = 1.52 \text{ m}$$

$$= 1.52\text{m} \left[\frac{0.69}{(2.65 - 1)}\right]\left[\frac{(3.30)^2}{(9.81)(1.52)}\right]^{0.14}$$

$$= 0.61 \text{ m} = 20'\phi$$

- Use cut-off wall depth of 3'.

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS	PROJECT: L. Honoapiilani Rd. GRP Apron Design - Upstream Kahanaui Bridge	JOB NO. 16-545	BY TA DATE 5/7/01 CHKD. KM DATE 5/8/01 SHT. NO. 1 OF 1
HONOLULU, HAWAII WAILUKU, MAUI, HAWAII			

APPENDIX F

DRAINAGE STRUCTURES

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

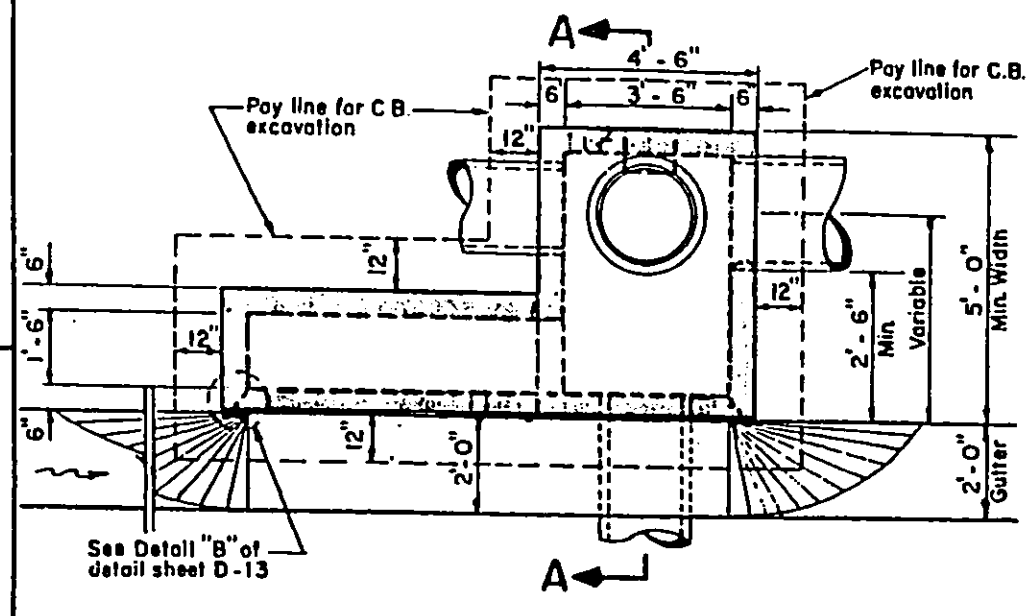
TYPE "A" CATCH BASIN

SCALE: 1/4" = 1'-0"

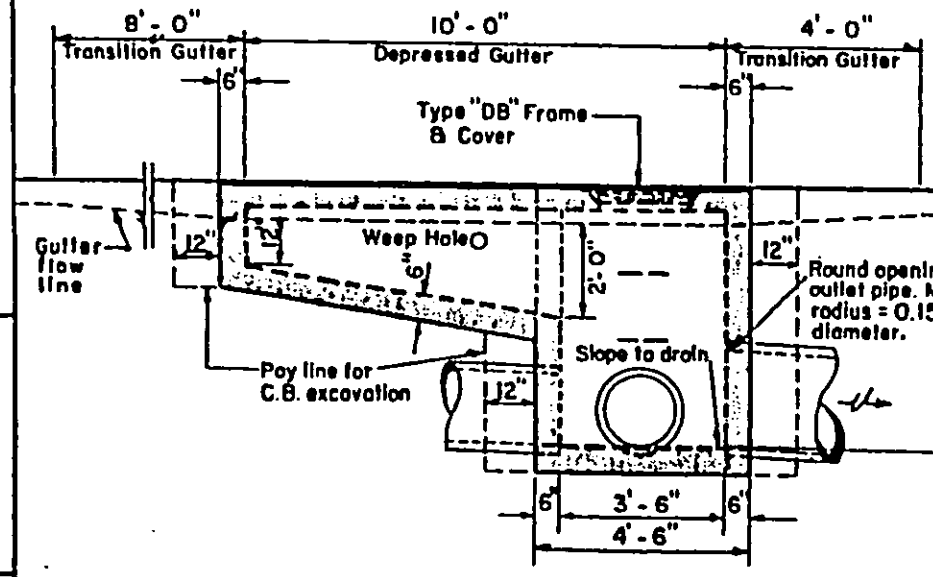
SEPTEMBER 1984

STANDARD DETAILS

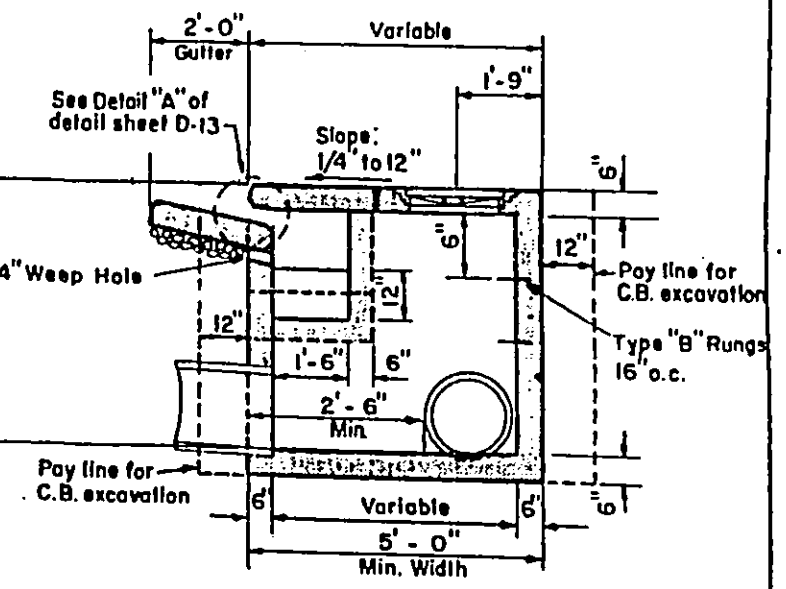
D-1



PLAN



ELEVATION



SECTION A-A

TYPE "A" CATCH BASIN

SCALE: 1/4" = 1'-0"

NOTES:

1. Provide 2 cu. ft. of crushed rock, ASTM size #9 Rock Sand, at weep hole.
2. C.B. wing shall be installed to favor upstream of gutter flow
3. See sheet D-2 for reinforcement details.
4. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2' - 0" above the invert.

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "C" CATCH BASIN

SCALE: 3/8" = 1'-0"

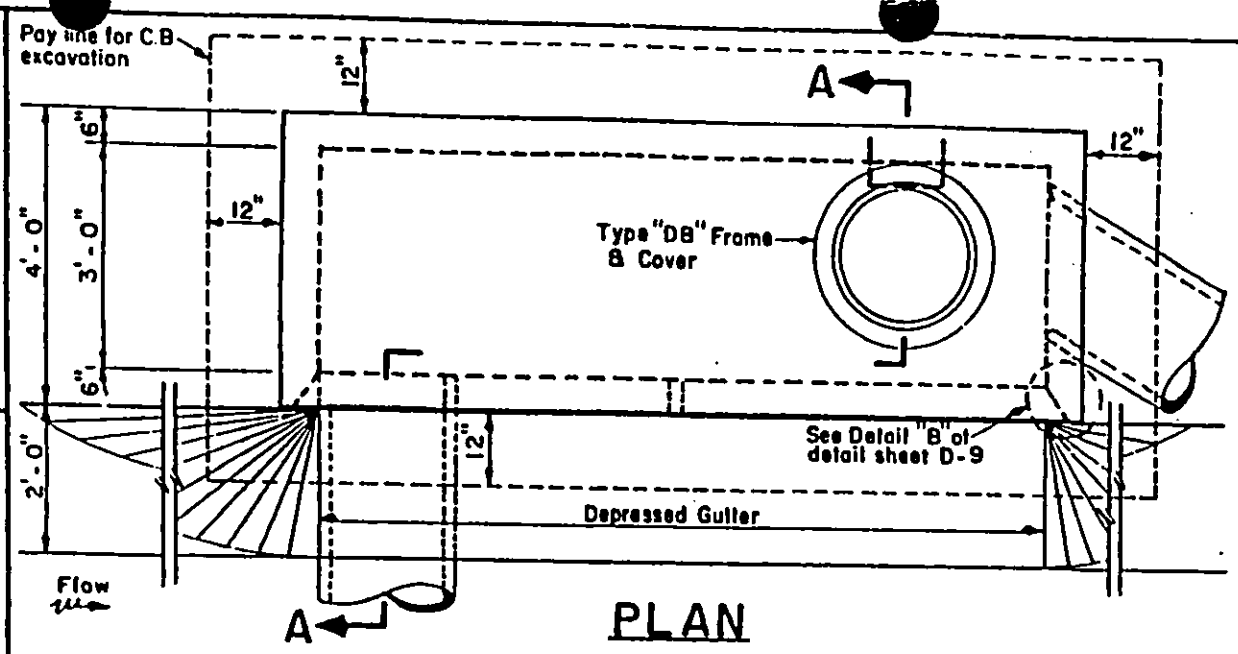
SEPTEMBER 1984

STANDARD DETAILS

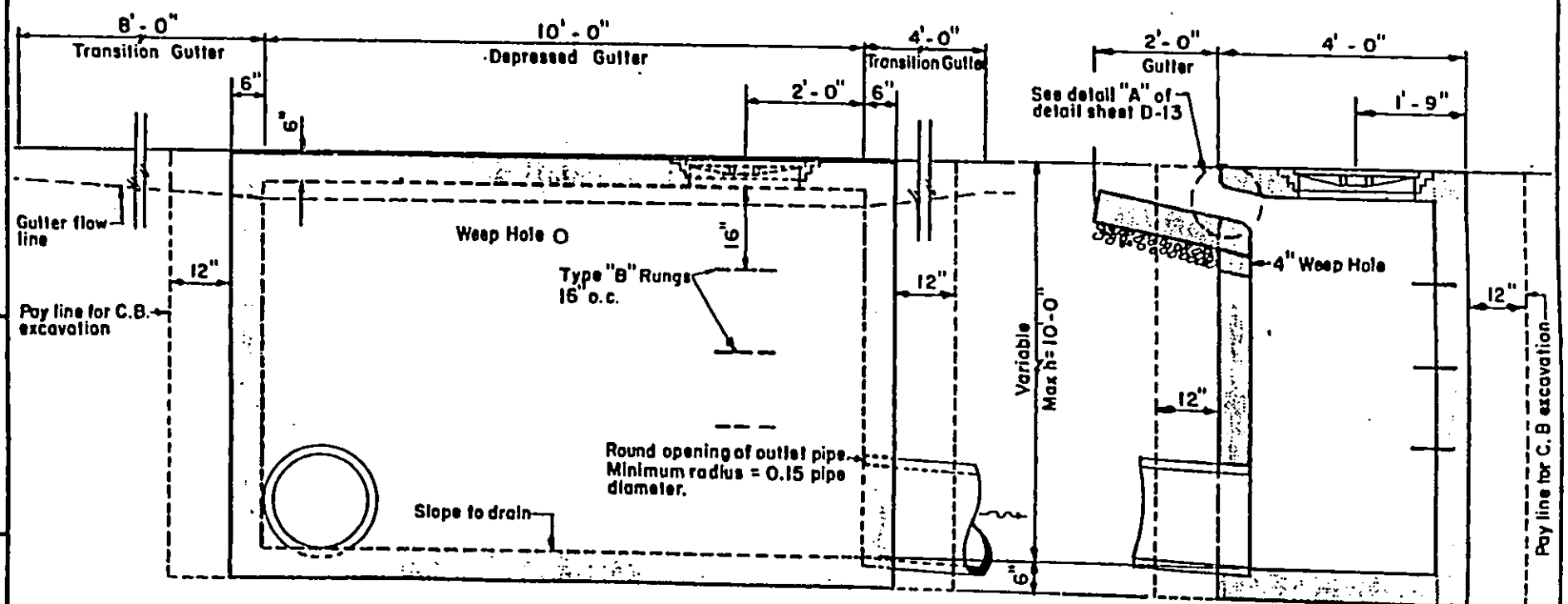
D-9

TYPE "C" CATCH BASIN

SCALE: 3/8" = 1'-0"



PLAN



ELEVATION

SECTION A-A

NOTES:

1. Provide 2 cu. ft. of crushed rock, ASTM size #9 Rock Sand, at weep hole.
2. See sheet D-10 for reinforcement details.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "F" CATCH BASIN

SCALE: 1/4" = 1'-0"

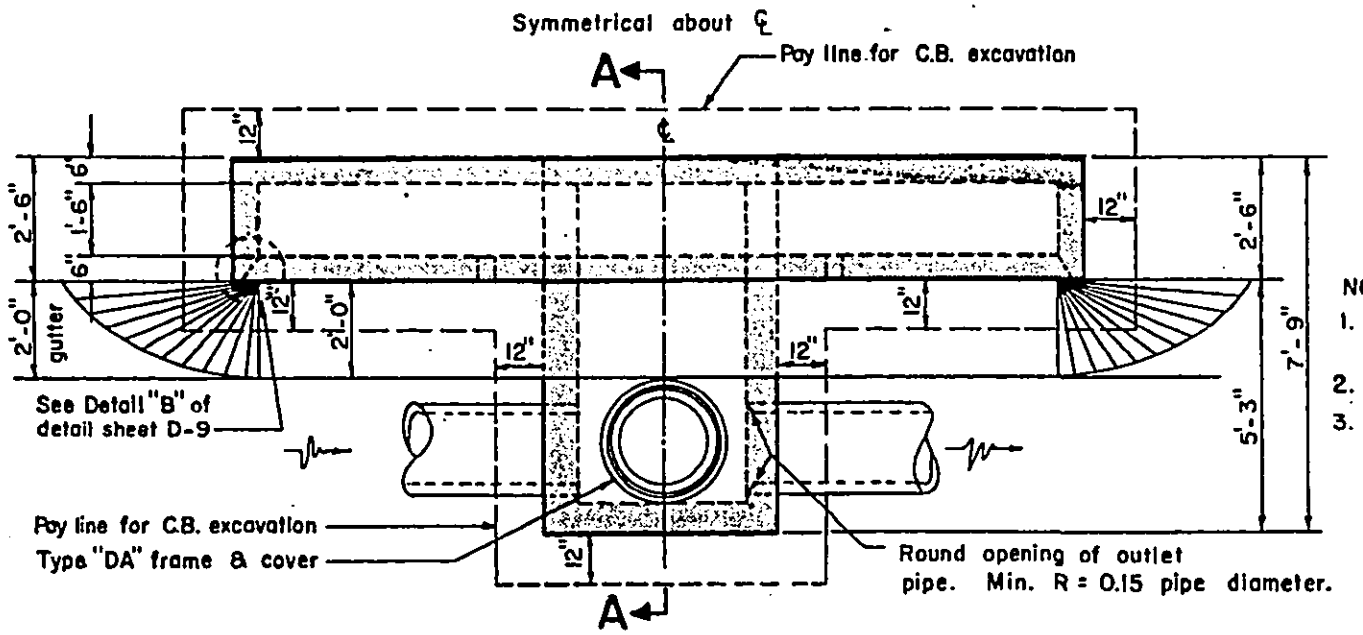
SEPTEMBER 1984

STANDARD DETAILS

D-7

TYPE "F" CATCH BASIN

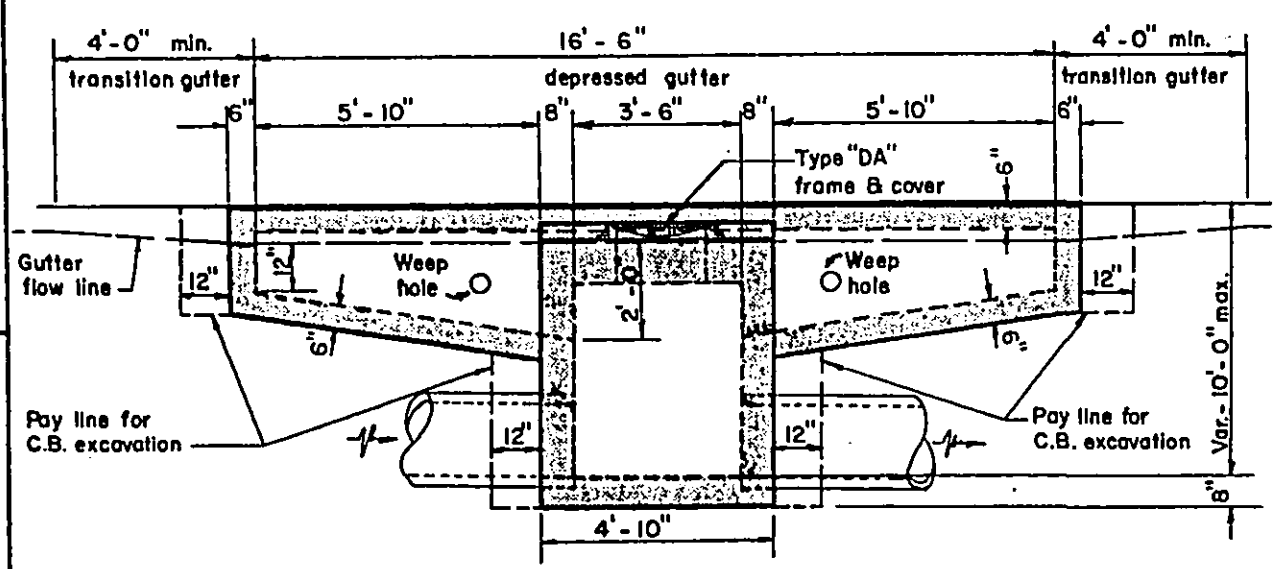
SCALE: 1/4" = 1'-0"



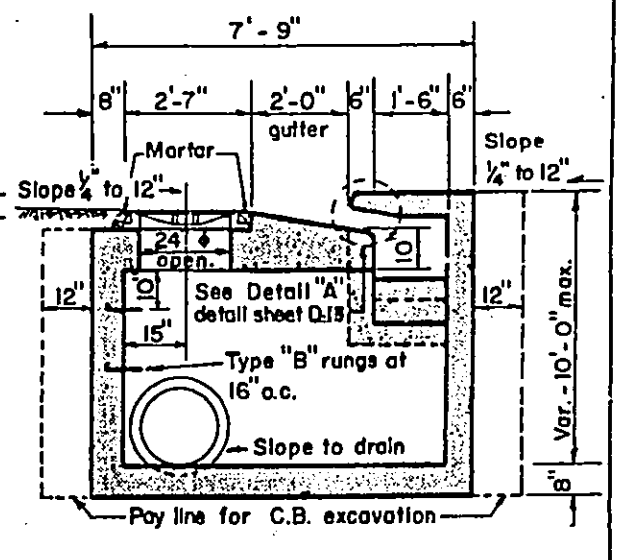
PLAN

NOTES:

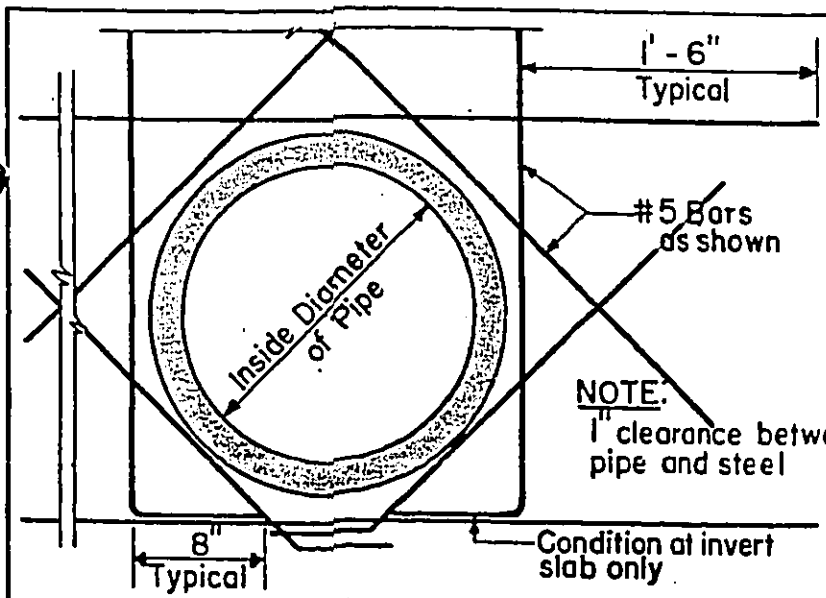
1. Provide 2 cu. ft. of crushed rock (Rock Sand) ASTM size #9, at weep holes.
2. See sheet D-8 for reinforcement details.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.



ELEVATION

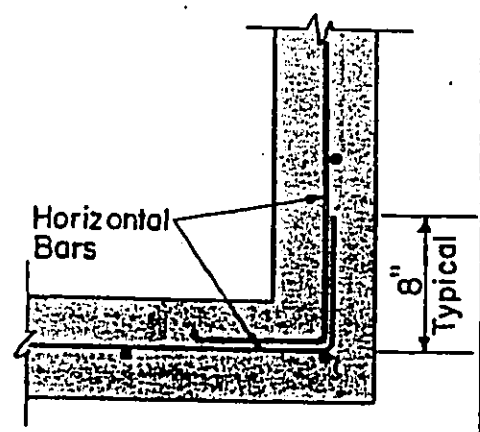


SECTION A-A



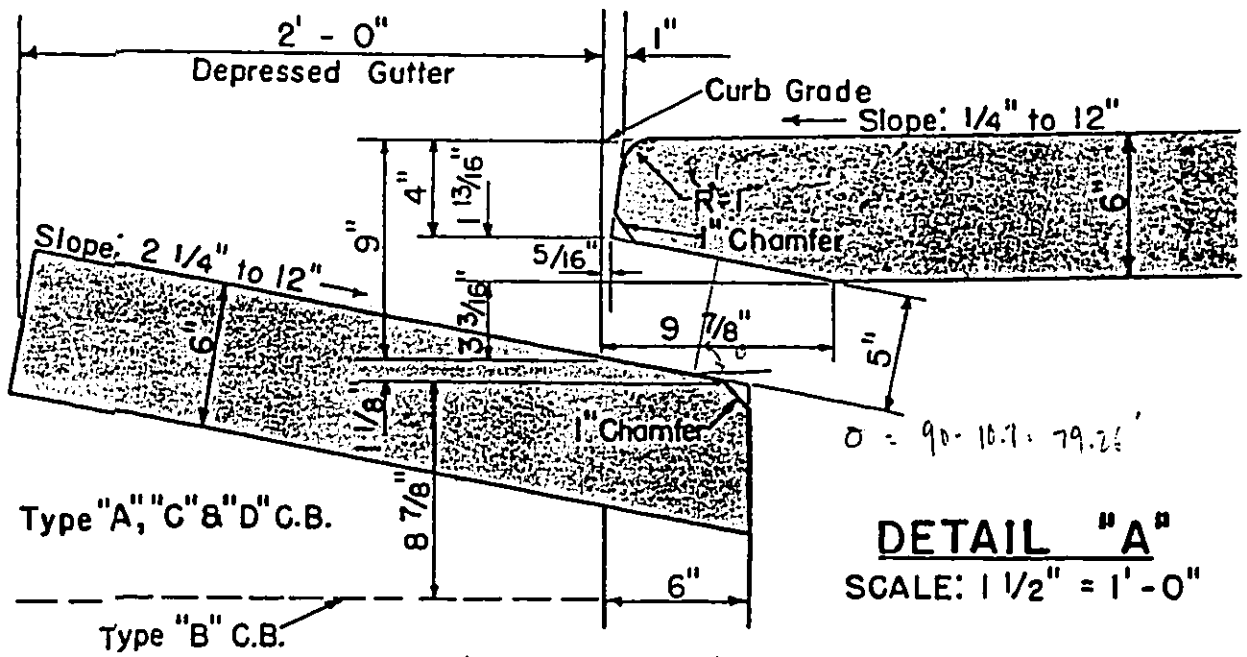
TYPICAL REINFORCEMENT AT PIPES

SCALE: 1" = 1' - 0"



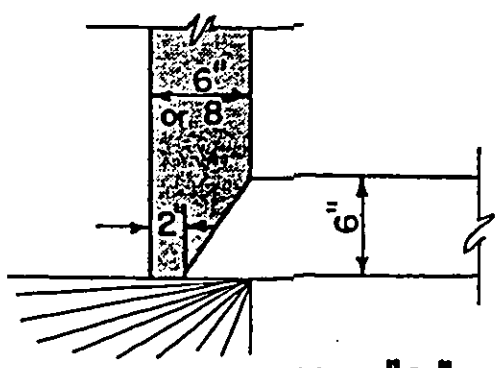
TYPICAL CORNER REINFORCEMENT LAPPING

SCALE: 1" = 1' - 0"



DETAIL "A"

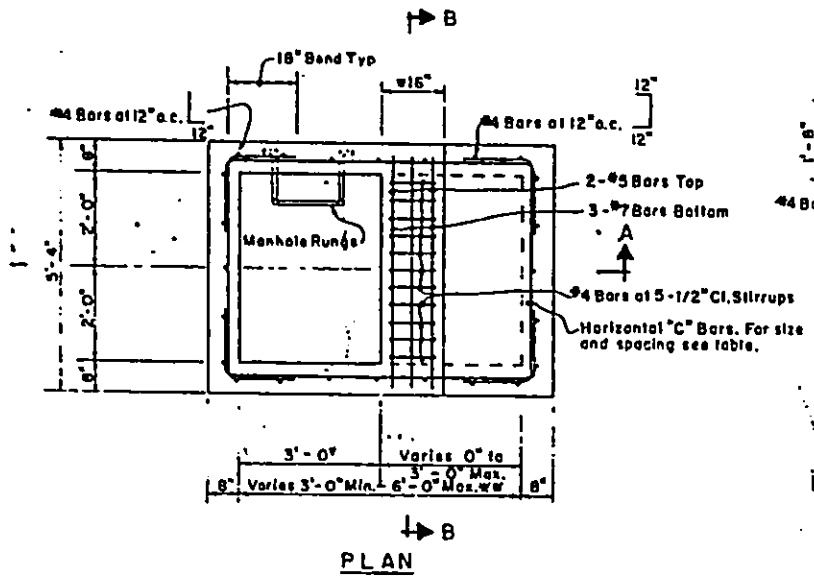
SCALE: 1 1/2" = 1' - 0"



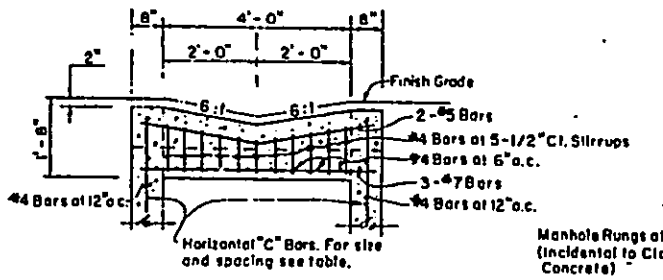
DETAIL "B" SCALE: 1" = 1' - 0"

CATCH BASIN DETAILS

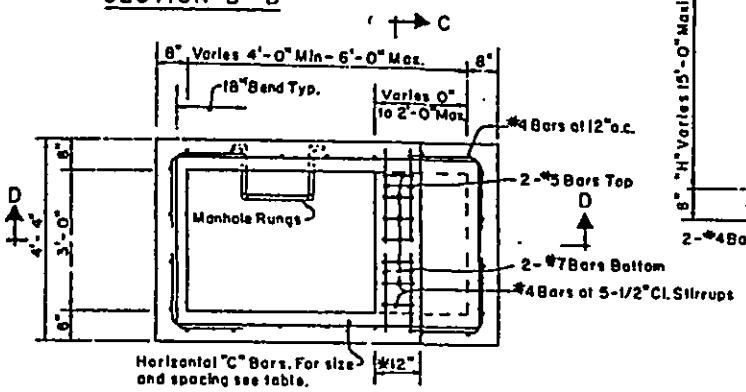
COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	CATCH BASIN DETAILS SCALE: AS NOTED SEPTEMBER 1984	STANDARD DETAILS	D-13



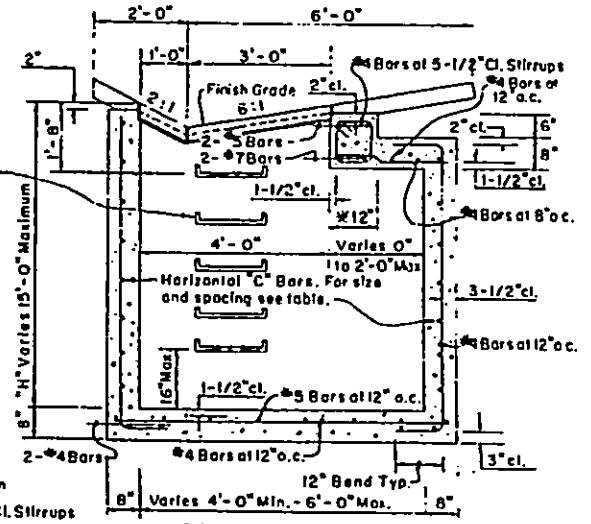
PLAN



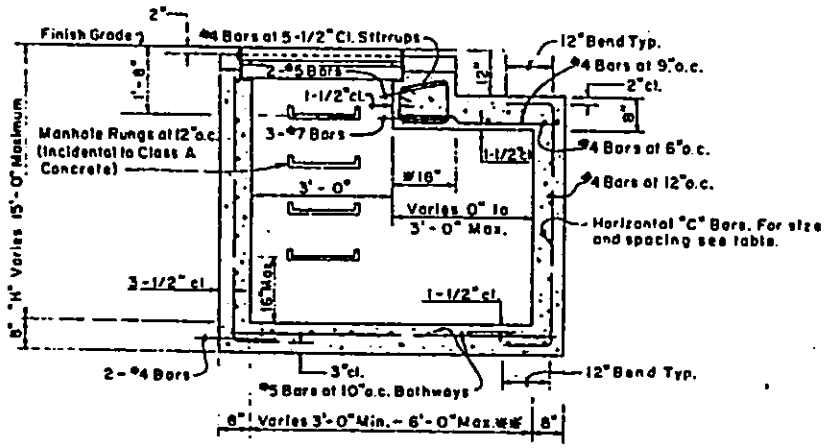
SECTION B - B



PLAN



SECTION D - D



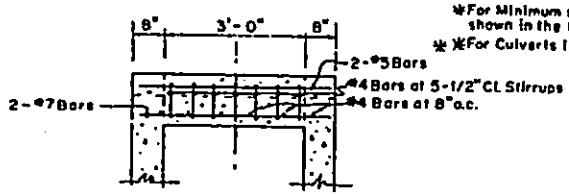
SECTION A - A

TYPE 61614 GRATED DROP INLET

TABLE: GRATED DROP INLET	
"H"	"C" BARS
5'-0" Max.	#4 at 10"o.c.
10'-0" Max.	#5 at 9"o.c.
15'-0" Max.	#5 at 6"o.c.

*For Minimum size box, eliminate beam and use typical wall and wall reinforcing shown in the top portion.

* *For Culverts larger than 30", the minimum dimension shall be 0'.



SECTION C - C

TYPE 61214 GRATED DROP INLET

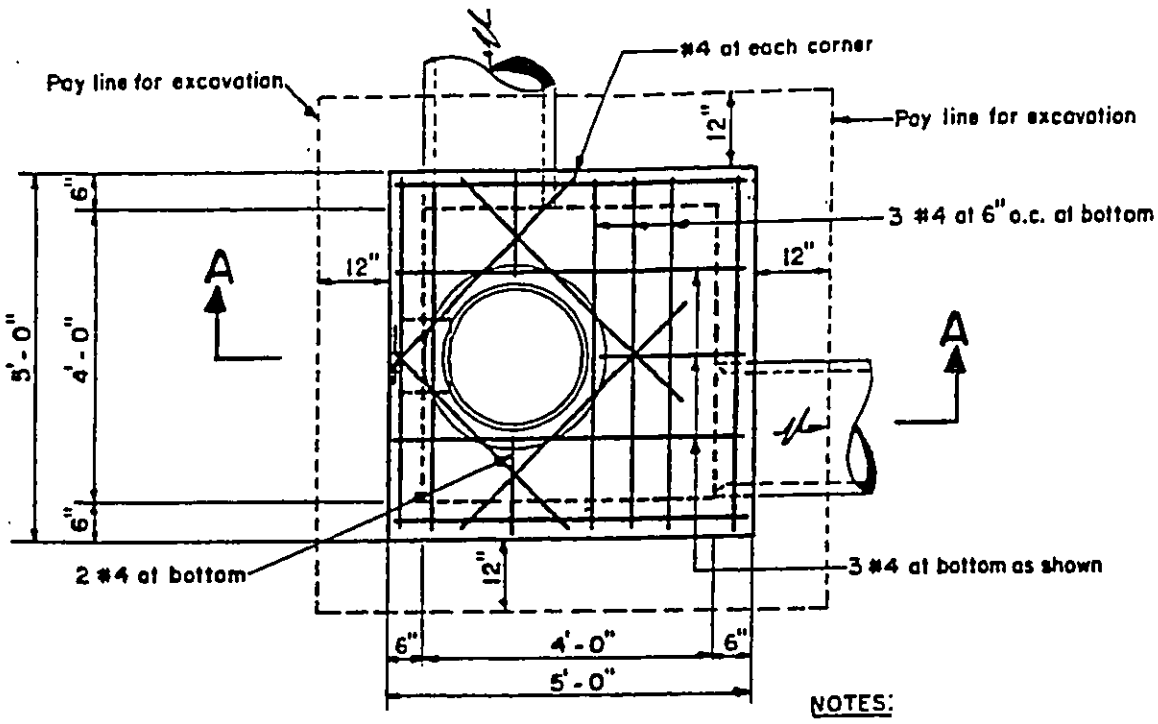
DATE	REVISION	APP'D.

DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD PLAN H-11

TYPE 61614 & 61214 GRATED DROP INLET

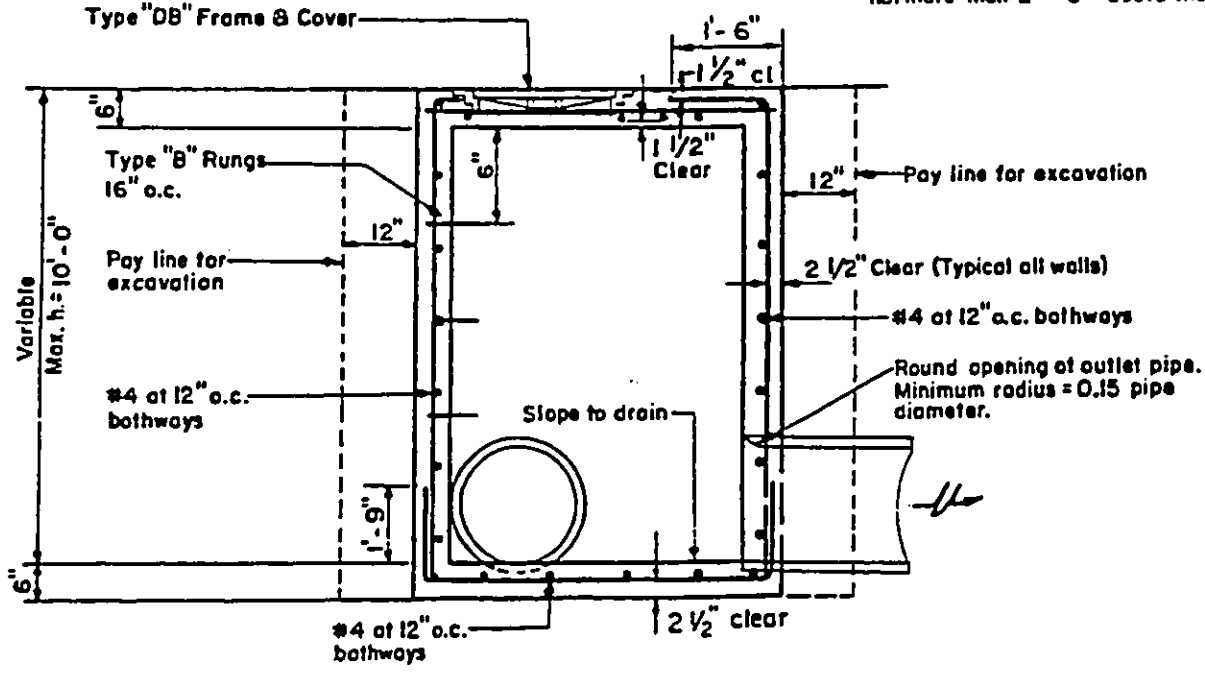
APPROVED — DATE 12-31-85



PLAN

NOTES:

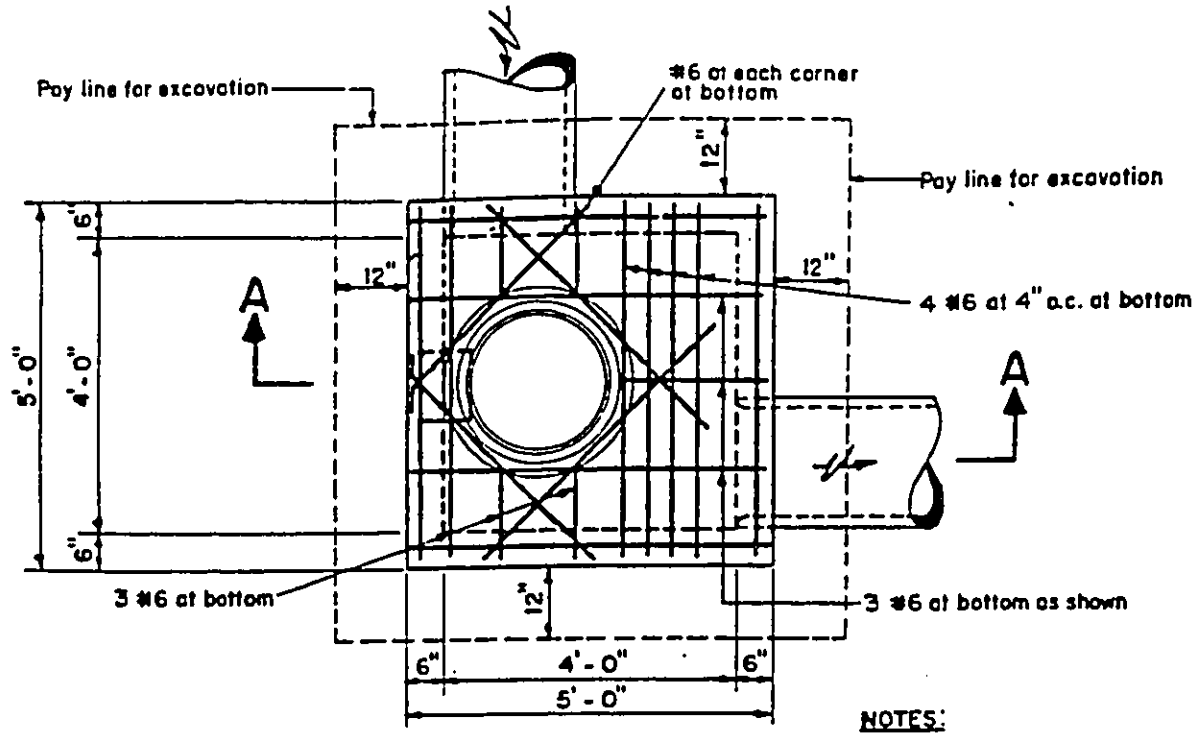
1. See sheet D-26 for channelizing detail.
2. See sheet D-13 for reinforcement at pipes and at corners.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2' - 0" above the invert.



SECTION A-A

SHALLOW DRAIN MANHOLE FOR SIDEWALK AREA

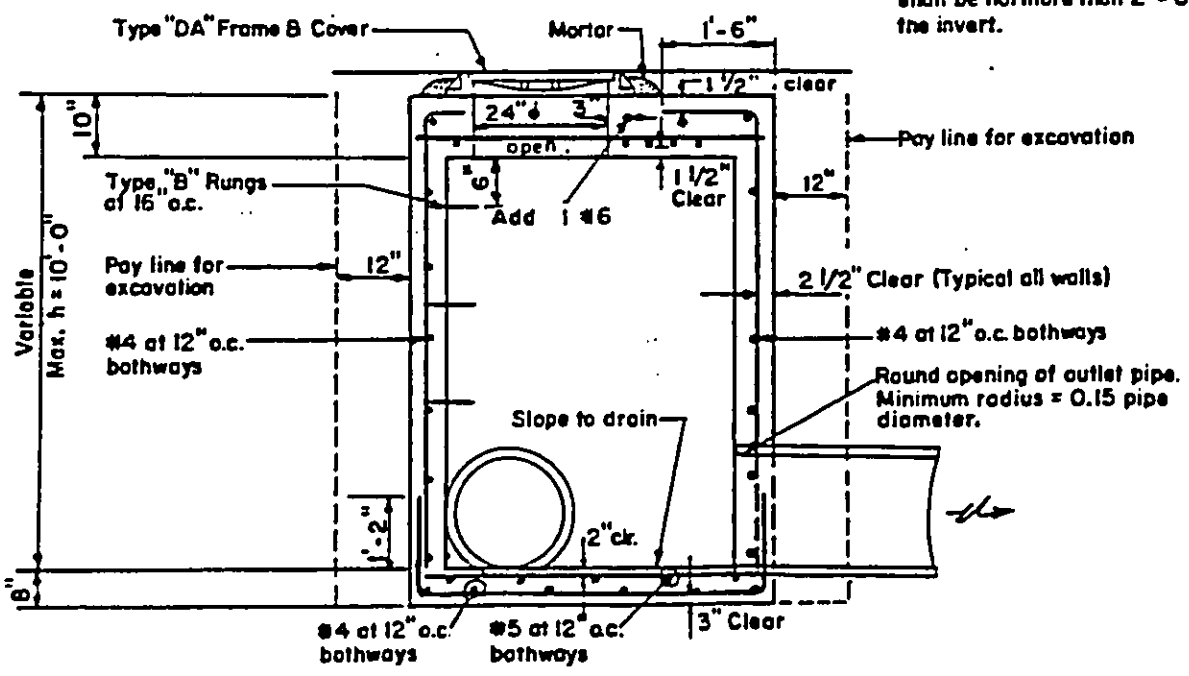
COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	SHALLOW DRAIN MANHOLE FOR SIDEWALK AREA SCALE: 3/8" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-17



PLAN

NOTES:

1. *See sheet D-26 for channelizing detail.*
2. See sheet D-13 for reinforcement at pipes and corners.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2' - 0" above the invert.

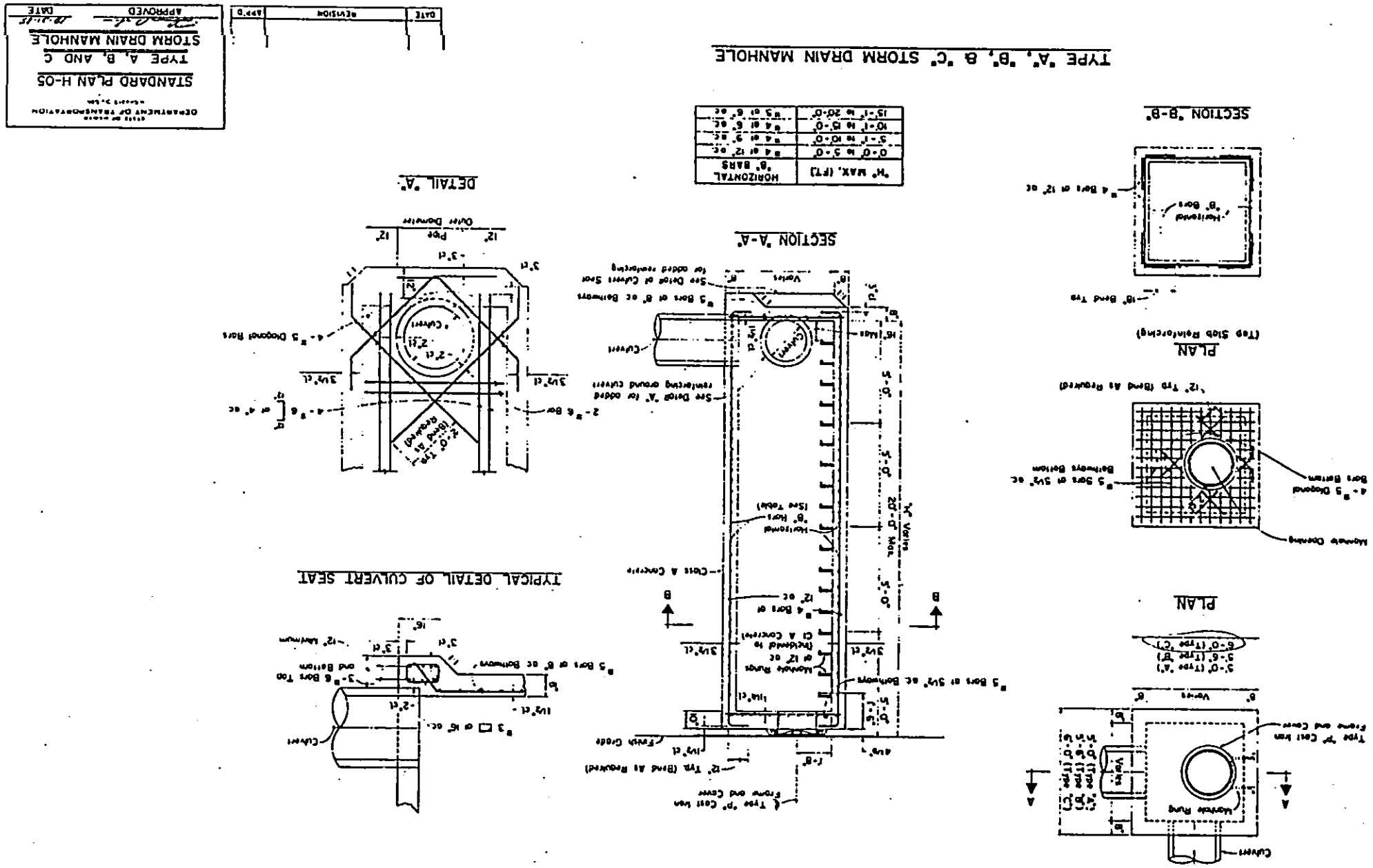


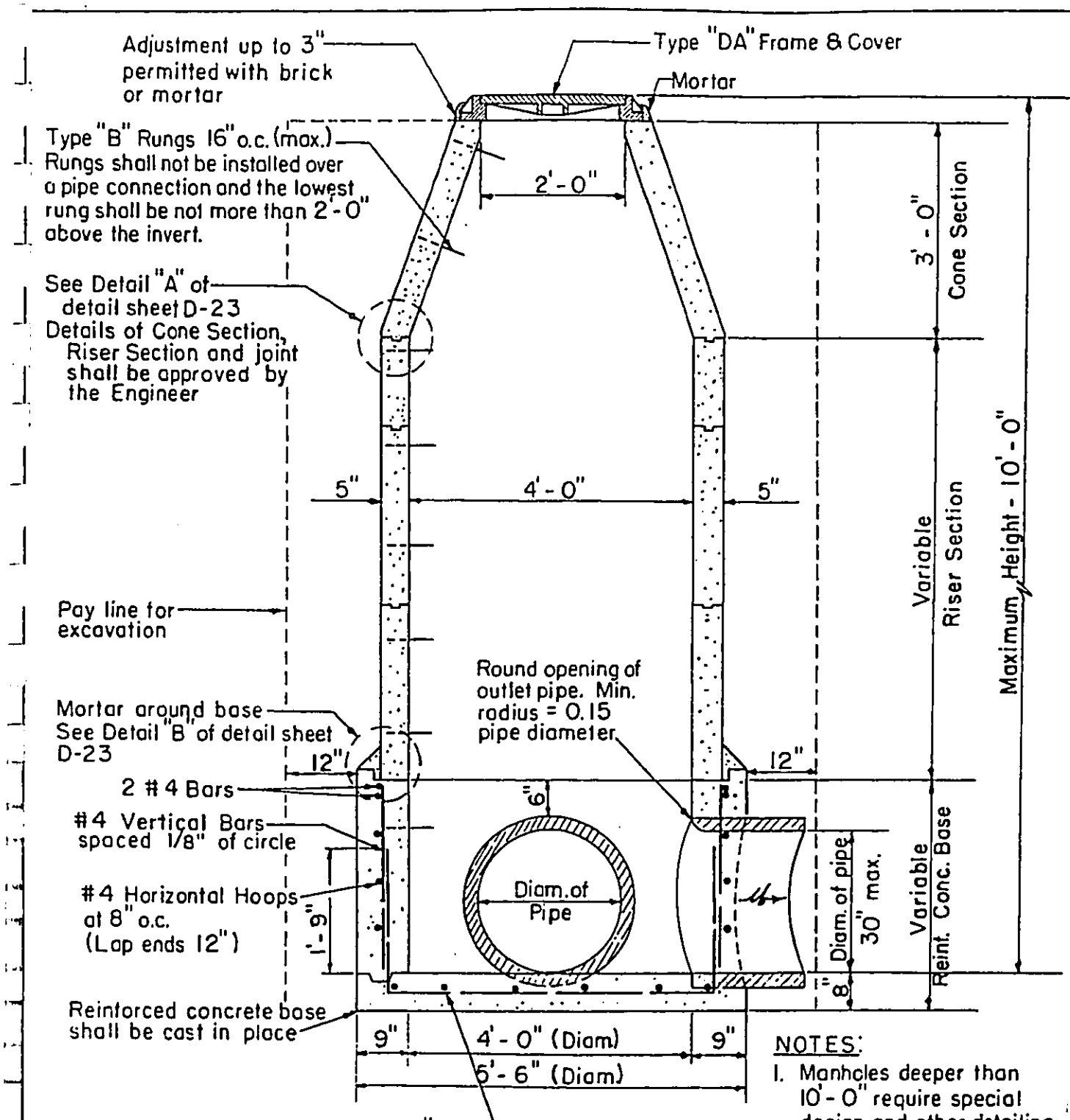
SECTION A-A

SHALLOW DRAIN MANHOLE FOR PAVEMENT AREA

D-18	STANDARD DETAILS	SHALLOW DRAIN MANHOLE FOR PAVEMENT AREA SEPTEMBER 1984 SCALE: 3/8" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII

STANDARD PLAN H-05 07/01/96





NOTES:

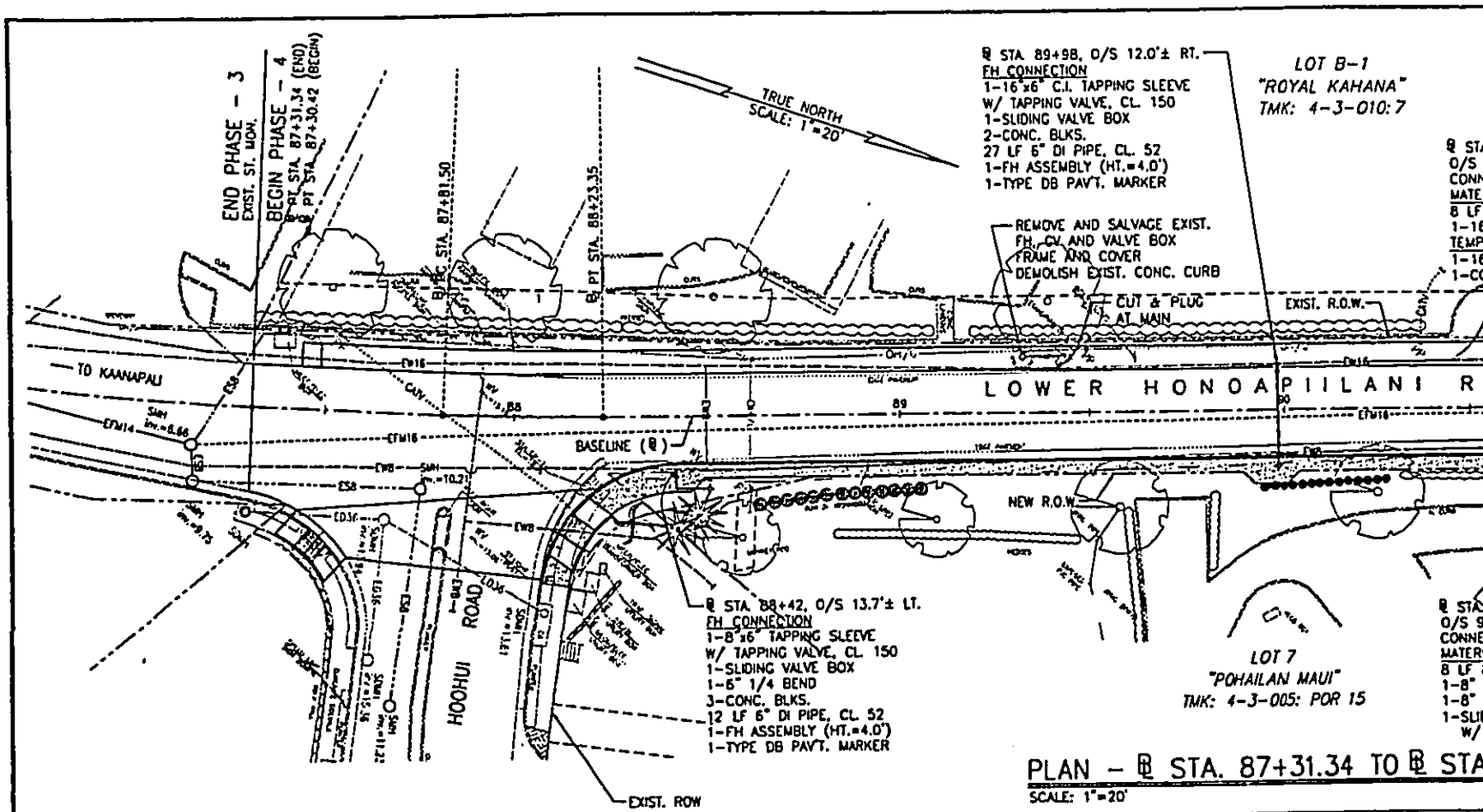
1. Manholes deeper than 10'-0" require special design and other detailing.
2. See sheet D-26 for "Channelizing Details for Drain Manhole"

PRE-CAST CONCRETE DRAIN MANHOLE

SCALE: 1/2" = 1'-0"

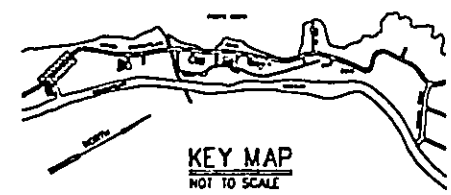
D-22	STANDARD DETAILS	PRE-CAST CONCRETE DRAIN MANHOLE SEPTEMBER 1984 SCALE: 1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII

APPENDIX G
DRAINAGE PLANS AND PROFILES



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	38	113



LOT B-1
"YAL KAHANA"
K: 4-3-010:7

℄ STA. 91+64
O/S 14.0' LT.
TYPE "61614P"
CDI "A-1" (3'x4')
TOP=12.3
INV.=8.8

26 LF 18" RCP,
CL. IV @ 0.38%

℄ STA. 91+74
O/S 6.8' LT.
1-16" 1/8 BEND, H
1-16" 1/8 BEND, TV, MJxPE

℄ STA. 91+41.6
O/S 12.2'± LT.
CONNECT TO EXIST. W16
MATERIALS FOR CONNECTION
8 LF 16" DI PIPE, CL. 52
1-16" SLEEVE
TEMPORARY FOR TESTING
1-16" CAP WITH 4" C.O.
1-CONC. BLOCK

℄ STA. 91+54
O/S 6.9' LT.
1-16" 1/8 BEND, H
1-16" 1/8 BEND, TV, MJxPE

℄ STA. 91+48.6
O/S 12.2' LT.
1-16" 1/8 BEND

45 LF REINF. CONC. JACKET

℄ STA. 91+79.4
O/S 12.2' LT.
1-16" 1/8 BEND

℄ STA. 91+86.4
O/S 12.2'± LT.
CONNECT TO EXIST. W16
MATERIALS FOR CONNECTION
8 LF 16" DI PIPE, CL. 52
1-16" SLEEVE
TEMPORARY FOR TESTING
1-16" CAP WITH 4" C.O.
1-CONC. BLOCK

EXIST. R.O.W.

PIILANI ROAD

EDGE EXIST. A.C.

DRAIN LINE "A"

EDGE EXIST. A.C.

EXIST. R.O.W.

MATCH LINE - ℄ STA. 92+00
FOR CONTINUATION SEE SHT. 39

℄ STA. 91+92
O/S 12.2'± LT.
1-2" COMBINATION AIR VALVE
1-AIR VALVE MH, TYPE "F"
WITH CONC. COLLAR

℄ STA. 91+90
O/S 9.4'± RT.
1-1" COMBINATION AIR VALVE
1-AIR VALVE MH, TYPE "F"
WITH CONC. COLLAR

40 LF REINF. CONC. JACKET

℄ STA. 91+38
O/S 9.8'± RT.
CONNECT TO EXIST. W8
MATERIALS FOR CONNECTION
8 LF 8" DI PIPE, CL. 52
1-8" SLEEVE
1-8" G.V.
1-SLIDING G.V. BOX
W/ COVER

℄ STA. 91+50.5
O/S 9.7' RT.
1-8" 1/8 BEND

℄ STA. 91+64
O/S 12.0' RT.
TYPE "C" C.B. "A-2"
TOP=12.9
INV.=8.7

℄ STA. 91+84.6
O/S 9.4'± RT.
CONNECT TO EXIST. W8
MATERIALS FOR CONNECTION
8 LF 8" DI PIPE, CL. 52
1-8" SLEEVE
TEMPORARY FOR TESTING
1-8" CAP WITH 2 1/2" C.O.
1-CONC. BLOCK

℄ STA. 91+53.9
O/S 6.2' RT.
1-8" 1/8 BEND, H
1-8" 1/8 BEND, TV, MJxPE

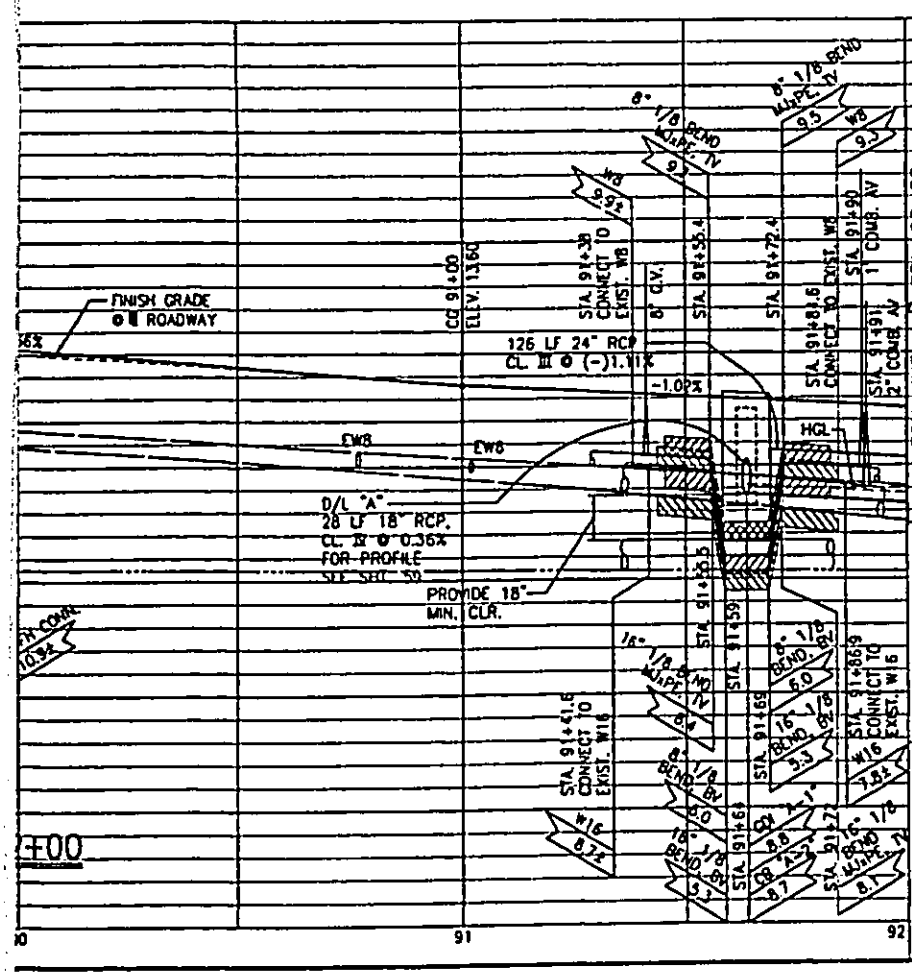
℄ STA. 91+74.0
O/S 6.0' RT.
1-8" 1/8 BEND, H
1-8" 1/8 BEND, TV, MJxPE

℄ STA. 91+77.6
O/S 9.5' RT.
1-8" 1/8 BEND

31.34 TO ℄ STA. 92+00

NOTES:

1. CONTRACTOR SHALL ADJUST ALL FRAMES & COVERS OF NEW & EXIST. UTILITY BOXES, VALVE BOXES, MANHOLES, CATCH BASINS, DRAIN INLETS AND MONUMENTS, WHETHER SHOWN OR NOT SHOWN ON THE PLANS, TO MATCH THE NEW FINISHED GRADES. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
2. FOR ROADWAY GEOMETRICS, SEE IMPROVEMENT PLANS.
3. FOR REMOVAL OF EXIST. PAVEMENT, CURB, GUTTER, SIDEWALK, TREES, HEDGES, WALLS, ETC. SEE DEMOLITION PLANS.



KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 8974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 87+30.42 TO STA. 92+00

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE – 4

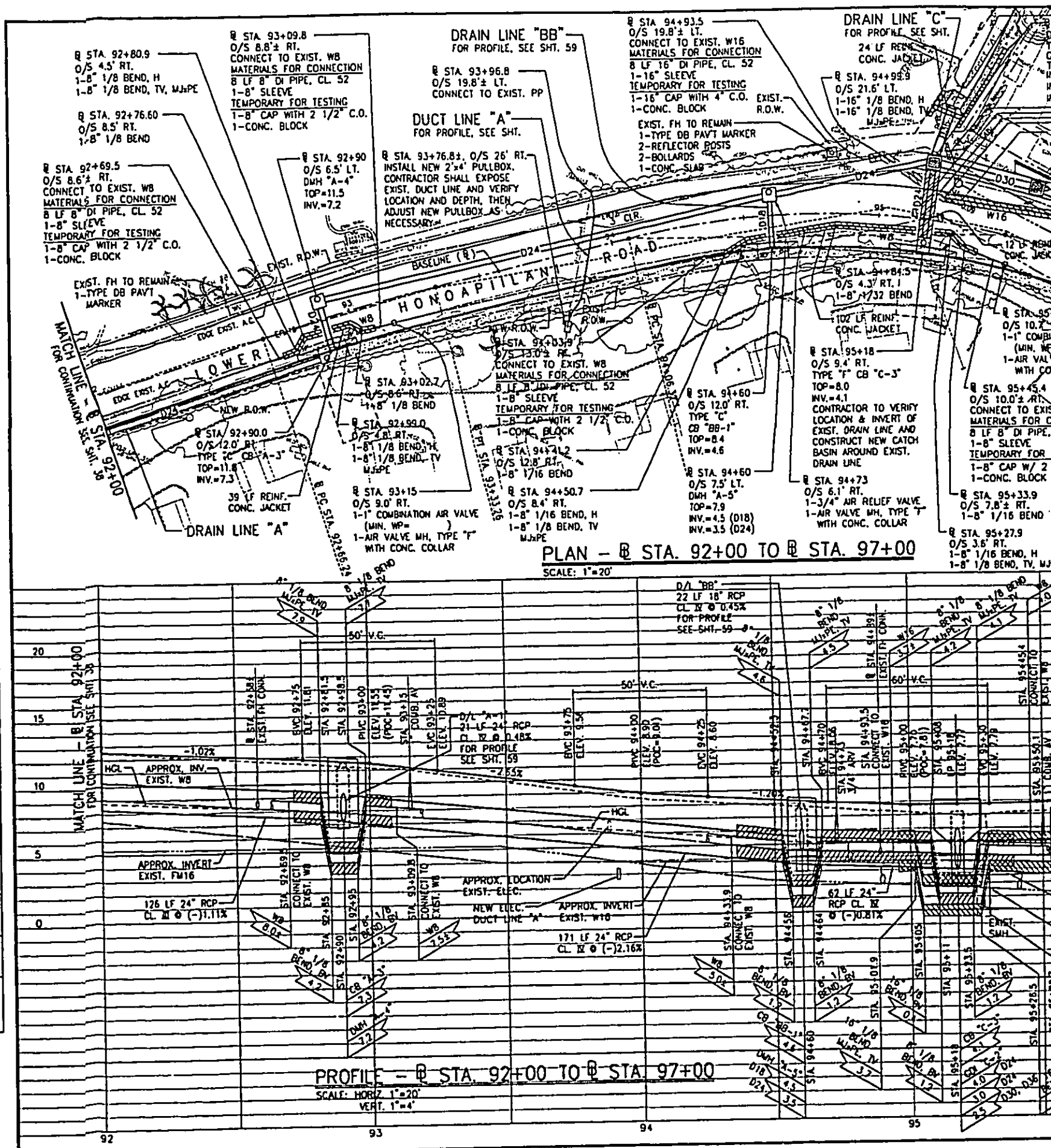
FED. AID PROJECT No. STP-3080(8)

DESIGNED BY
DRAWN BY
CHECKED BY KM

APPROVED
SUBMITTED BY

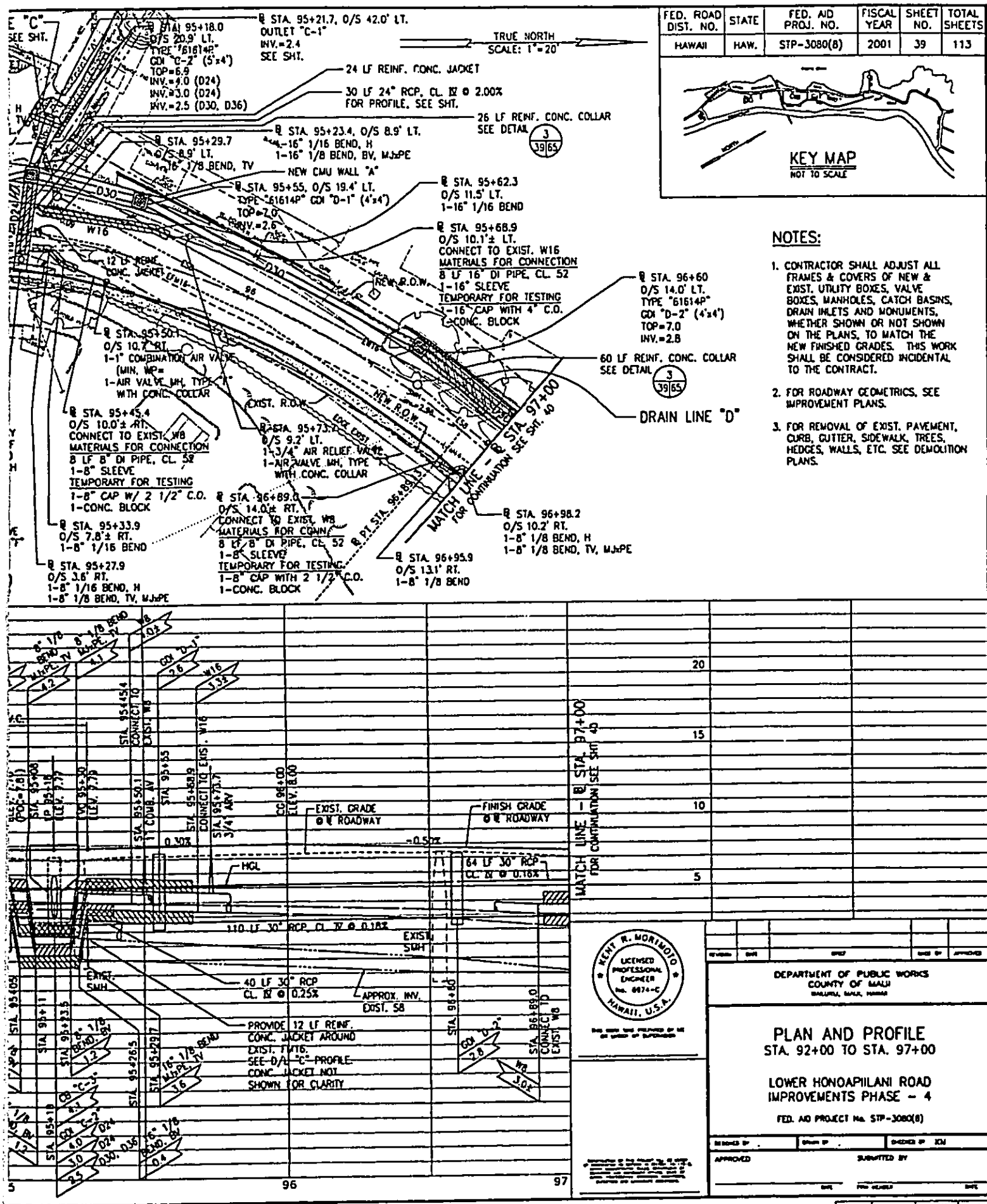
DATE
PROJECT MANAGER
DATE

C-37



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	39	113



NOTES:

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KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 92+00 TO STA. 97+00

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY
DRAWN BY
CHECKED BY KM

APPROVED
SUBMITTED BY

℄ STA. 97+09.5
O/S 9.2' LT.
1-16" 1/8 BEND

℄ STA. 97+02.5
O/S 9.3'± LT.
CONNECT TO EXIST. W16
MATERIALS FOR CONNECTION
8 LF 16" DI PIPE, CL. 52
1-16" SLEEVE
TEMPORARY FOR TESTING
1-16" CAP WITH 4" C.O.
1-CONC. BLOCK

60 LF REINF. CONC. COLLAR SEE DETAIL 3/40/65

℄ STA. 97+13
O/S 5.7' LT.
1-16" 1/8 BEND, H
1-16" 1/8 BEND, TV, MJxPE

℄ STA. 97+23
O/S 14.0' LT.
TYPE "61614P"
GDI "D-3"
TOP=6.7
INV.=2.9

40 LF REINF. CONC. JACKET

℄ STA. 97+33
O/S 5.6' LT.
1-16" 1/8 BEND, H
1-16" 1/8 BEND, TV, MJxPE

℄ STA. 97+36.5
O/S 9.1' RT.
1-16" 1/8 BEND

℄ STA. 97+43.5
O/S 9.0'± LT.
CONNECT TO EXIST. W16
MATERIALS FOR CONNECTION
8 LF 16" DI PIPE, CL. 52
1-16" SLEEVE
TEMPORARY FOR TESTING
1-16" CAP WITH 4" C.O.
1-CONC. BLOCK

"KAHANA REEF"
TMK: 4-3-005:9

℄ STA. 97+48.5
O/S 9.0' LT.
1-2" COMBINATION AIR VALVE (MIN. WP=
1-AIR VALVE MH, TYPE "F" W/ CONC. COLLAR

℄ STA. 97+90.8±
O/S 20.7'± LT.
CONNECT TO NEW PP
VERIFY LOCATION OF NEW PP IN THE FIELD

RELOCATE & RECONNECT EXIST. 1" WATER METER

℄ STA. 98+00
O/S 14.0' LT.
TYPE "61614P"
GDI "D-4" (3'x4')
TOP=6.3
INV.=3.0

℄ STA. 99+00
O/S 14.0' LT.
TYPE "61614P"
GDI "D-5" (3'x4')
TOP=6.5
INV.=3.1

℄ STA. 99+89.9
O/S 8.8' LT.
1-3/4" AIR RELIEF VALVE
1-AIR VALVE MH, TYPE "F" WITH CONC. COLLAR

℄ STA. 99+85, O/S 8.7' RT.
FH CONNECTION
1-16"x6" C.I. TAPPING SLEEVE W/6" TAPPING VALVE, CL. 150
1-SLIDING V.B.
1-6" 1/4 BEND
3-CONC. BLOCKS
33 LF 6" D.I. PIPE, CL. 52
1-FH ASSEMBLY (HT.=5.0')
1-TYPE DB PAV'T MARKER

℄ STA. 99+94.9
O/S 8.8'± LT.
CONNECT TO EXIST. W16
MATERIALS FOR CONNECTI
8 LF 16" DI PIPE, CL. 52
1-16" SLEEVE
TEMPORARY FOR TESTING
1-16" CAP WITH 4" C.O.
1-CONC. BLOCK

℄ STA. 100+01.9
O/S 8.9' LT.
1-16" 1/8 BEND

42 LF REINF. CONC. JACKET

MATCH LINE - ℄ STA. 97+00 FOR CONTINUATION SEE SHT. 39

DRAIN LINE "D"

DRAIN LINE "FF"

DRAIN LINE "F"

72 LF REINF. CONC. COLLAR

98 - SEE DETAIL 3/40/65

EDGE EXIST. A.C.

LOWER HONOAPIILANI

220°42'45" CUT & PLUG

496.48 (PT TO PC)

BASELINE (℄)

EXIST. R.O.W.

NEW R.O.W.

REMOVE & SALVAGE EXIST. FH, GV & VALVE BOX FRAME & COVER

EXISTING TENNIS COURT

55 LF REINF. CONC. JACKET

℄ STA. 97+13, O/S 8.9' RT.
FH CONNECTION
1-8"x6" TAPPING SLEEVE W/6" TAPPING VALVE, CL. 150
1-SLIDING V.B.
1-6" 1/4 BEND
3-CONC. BLOCKS
14 LF 6" D.I. PIPE, CL. 52
1-FH ASSEMBLY (HT.=4.5')
1-TYPE DB PAV'T MARKER

℄ STA. 97+37.7
O/S 11.9' LT.
1-8" 1/8 BEND

℄ STA. 97+32.6
O/S 7.1' LT.
1-8" 1/8 BEND, H
1-8" 1/8 BEND, TV, MJxPE

℄ STA. 97+23
O/S 12.7' RT.
TYPE "C" CB "F-1"
TOP=7.6
INV.=3.1

℄ STA. 97+49.6
O/S 11.6' RT.
1-1" COMBINATION AIR VALVE (MIN. WP=
1-AIR VALVE MH, TYPE "F" WITH CONC. COLLAR

35 LF REINF. CONC. COLLAR. SEE DETAIL 3/40/65

℄ STA. 97+44.7
O/S 11.7'± RT.
CONNECT TO EXIST. W8
MATERIALS FOR CONNECTION
8 LF 8" DI PIPE, CL. 52
1-8" SLEEVE
TEMPORARY FOR TESTING
1-8" CAP WITH 2 1/2" C.O.
1-CONC. BLOCK

℄ STA. 98+00
O/S 14.0' RT.
TYPE "C" CB "F-2"
TOP=7.1
INV.=3.3

℄ STA. 99+00
O/S 14.0' RT.
TYPE "C" CB "F-3"
TOP=7.3
INV.=3.5

℄ STA. 97+86.8±
O/S 31.1'± RT.
INSTALL NEW 2'x4' PULLBOX
CONTRACTOR SHALL EXPOSE EXIST. DUCTILINE & VERIFY LOCATION AND DEPTH, THEN ADJUST NEW PULLBOX AS NECESSARY.

℄ STA. 99+79
O/S 10.7'± RT.
CONNECT TO EXIST. W8
MATERIALS FOR CONNECTION
8 LF 8" DI PIPE, CL. 52
1-8" SLEEVE
TEMPORARY FOR TESTING
1-8" CAP WITH 2 1/2" C.O.
1-CONC. BLOCK

℄ STA. 99+74
O/S 10.6' RT.
1-3/4" AIR RELIEF VALVE
1-AIR VALVE MH, TYPE "F" WITH CONC. COLLAR

53 LF REINF. CONC. JACKI

℄ STA. 100
O/S 14.0'
TYPE "C" C
TOP=7.5
INV.=3.4

℄ STA. 100
O/S 1.8' R
1-8" 1/8
1-8" 1/8

℄ STA. 99
O/S 10.9'
1-8" 1/8

PLAN - ℄ STA. 97+00 TO ℄ STA. 102+00

SCALE: 1"=20'

D/L "F"
35 LF 18" RCP, CL IV @ (-)0.29%
FOR PROFILE SEE SHT. 59

64 LF 30" RCP CL. IV @ 0.16%

77 LF 24" RCP CL. IV @ 0.26%

77 LF 24" RCP CL. IV @ 0.13%

100 LF 24" RCP CL. IV @ 0.2% D/L "F"

100 LF 24" RCP CL. IV @ 0.13% D/L "D"

115 LF 24" RCP CL. IV @ 0.09%

HGL (D/L "D")

HGL (D/L "F")

EXIST. GRADE @ ℄ ROADWAY

FINISH GRADE @ ℄ ROADWAY

0.20%

0.50%

NEW DUCTLINE

APPROX. INVERT EXIST. W8

APPROX. INVERT EXIST. EXIST. W16

APPROX. INVERT EXIST. S10

APPROX. INVERT EXIST. FM16

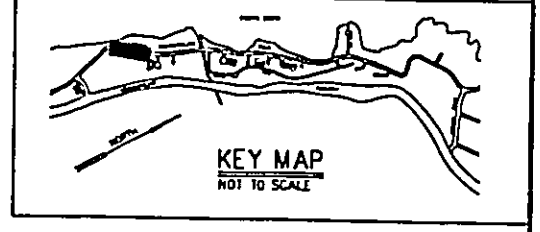
MATCH LINE - ℄ STA. 97+00 FOR CONTINUATION SEE SHT. 59

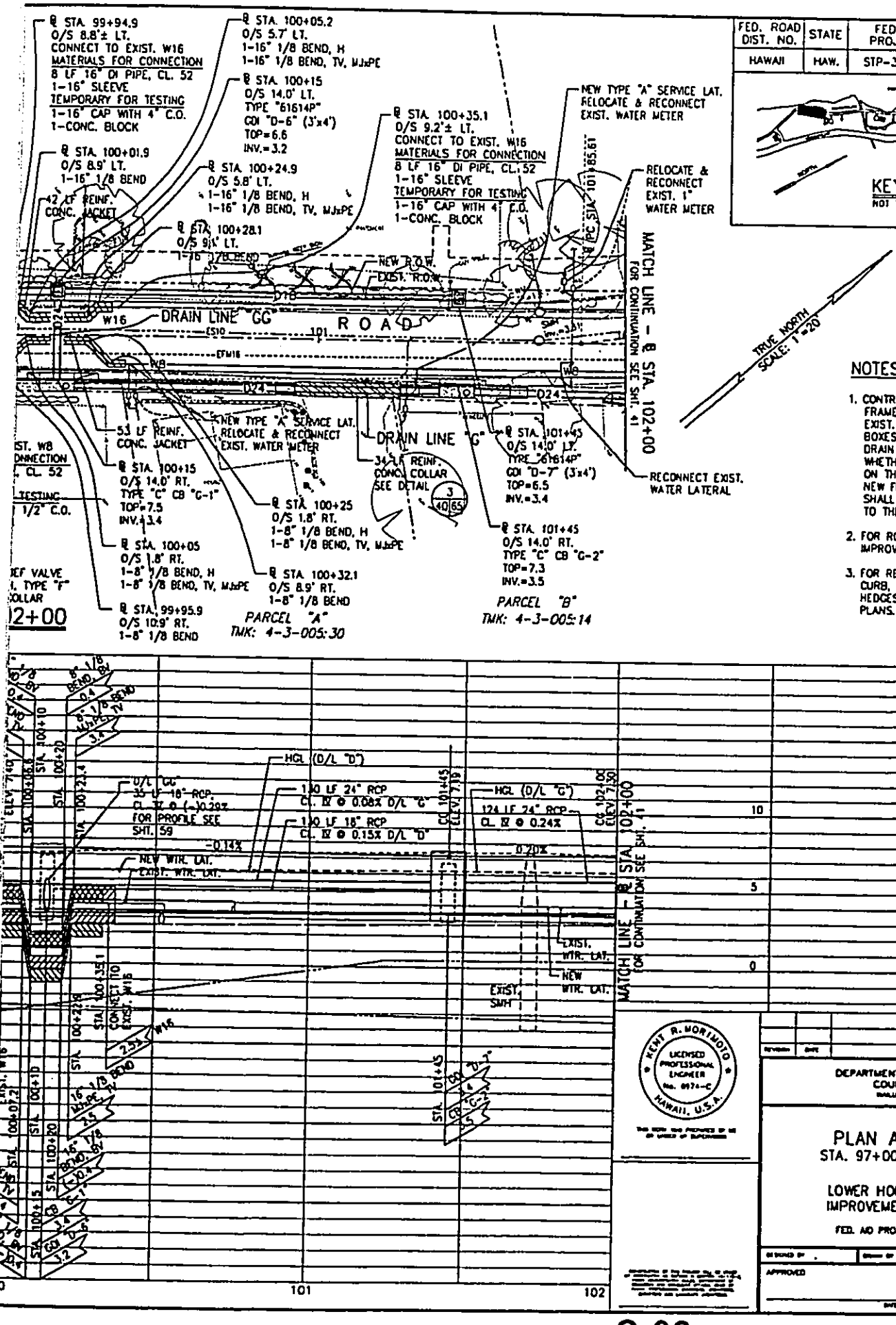
PROFILE - ℄ STA. 97+00 TO ℄ STA. 102+00

SCALE: HORIZ. 1"=20'
VERT. 1"=4'

JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	40	113





KEMT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 97+00 TO STA. 102+00

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

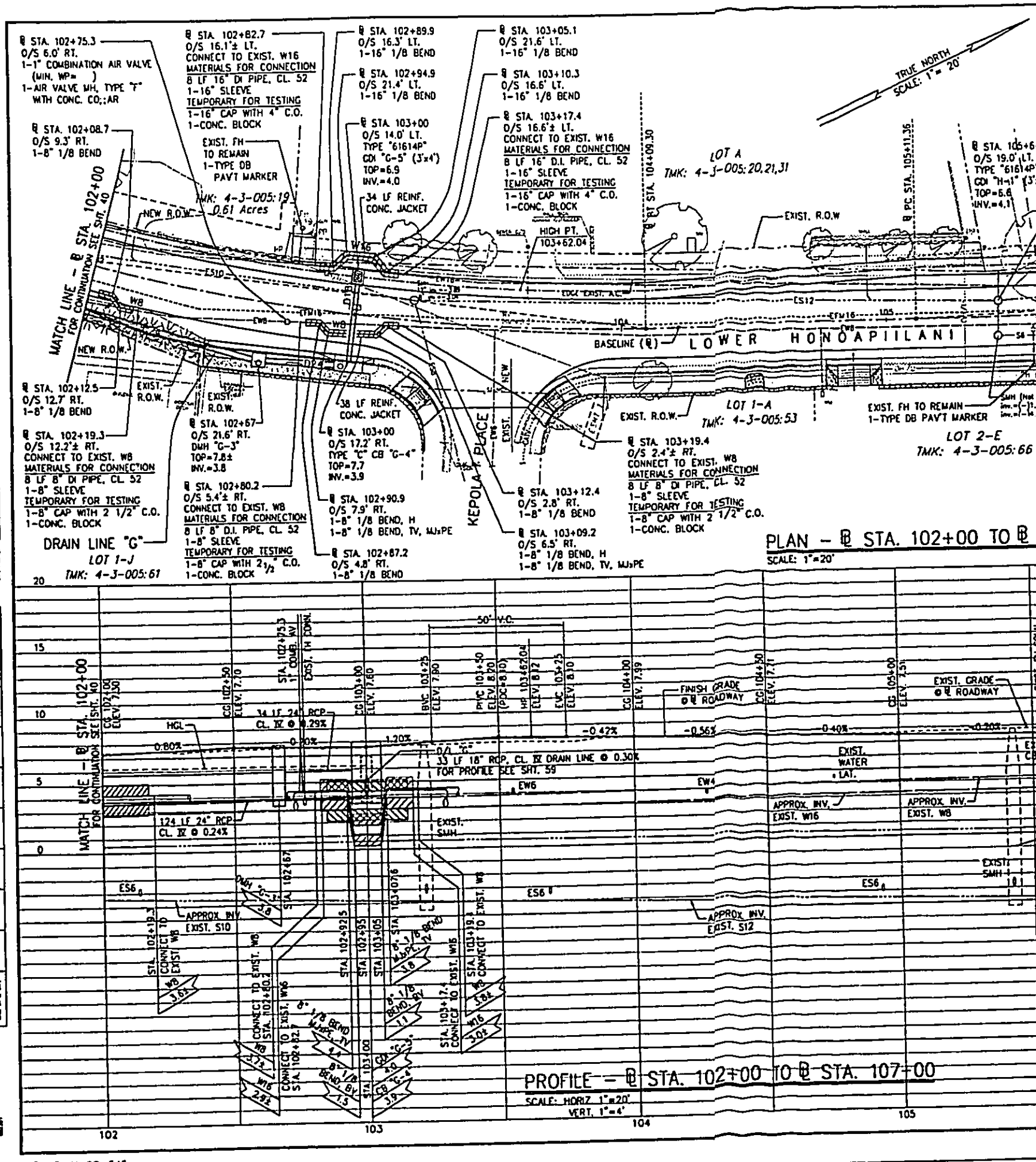
DESIGNED BY | DRAWN BY | CHECKED BY KM

APPROVED | SUBMITTED BY

DATE | FOR HIGHWAY ADMINISTRATOR | DATE

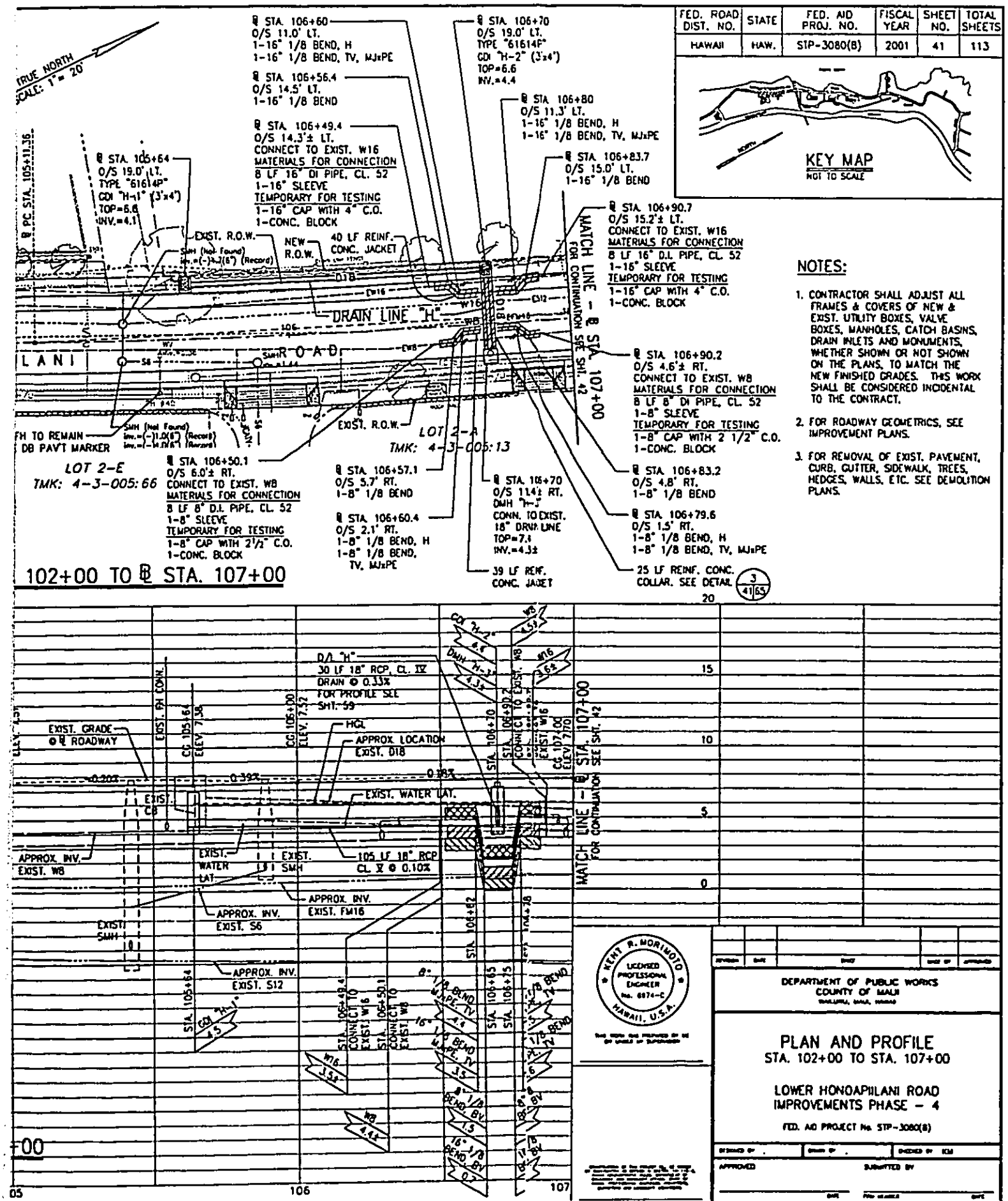
C-39

SHEET 40 OF 113



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	41	113



102+00 TO ℄ STA. 107+00

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KENT R. MORIMOTO
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No. 6974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 102+00 TO STA. 107+00

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

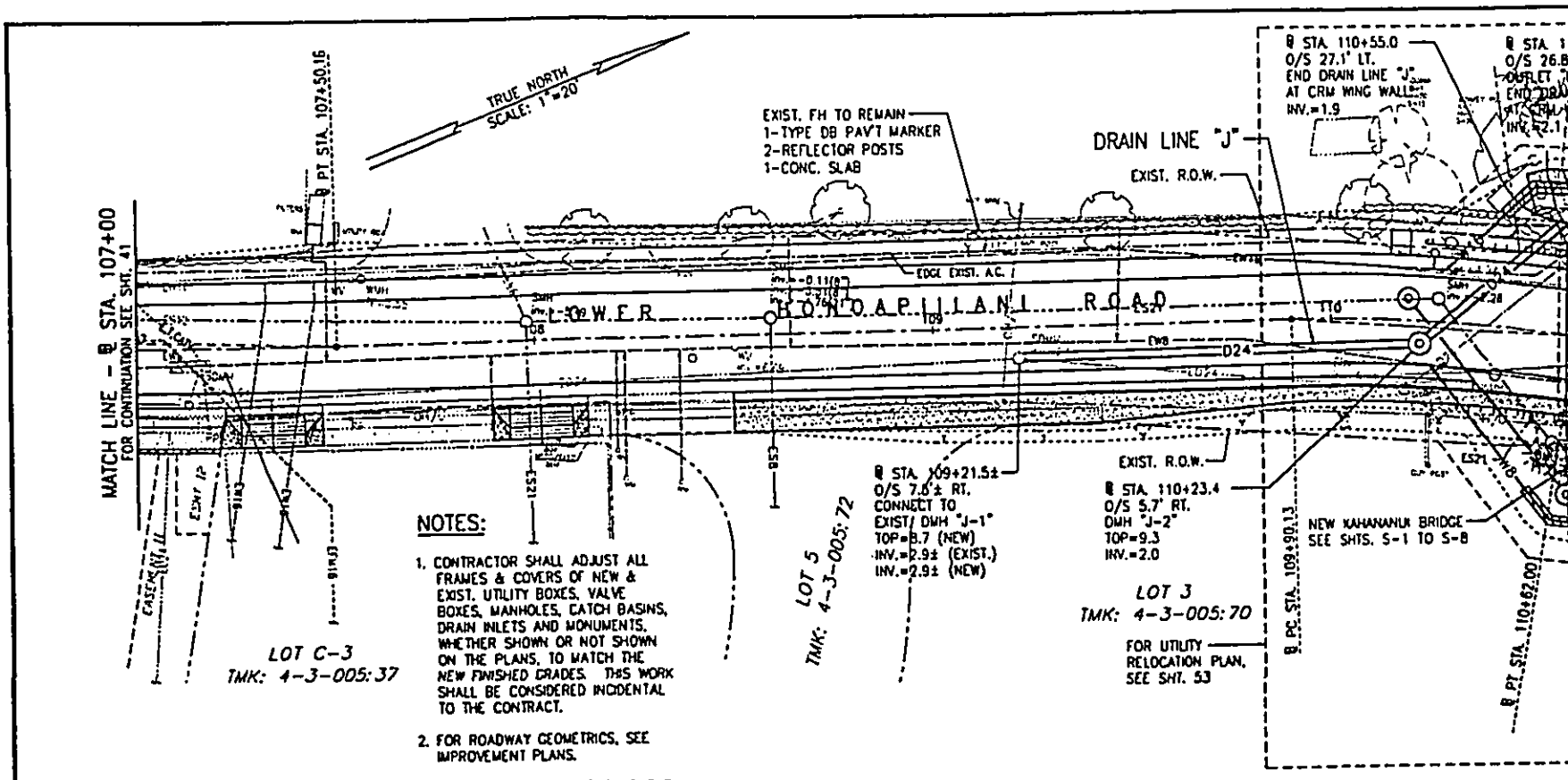
DESIGNED BY . DRAWN BY . CHECKED BY KM

APPROVED DATE

SUBMITTED BY DATE

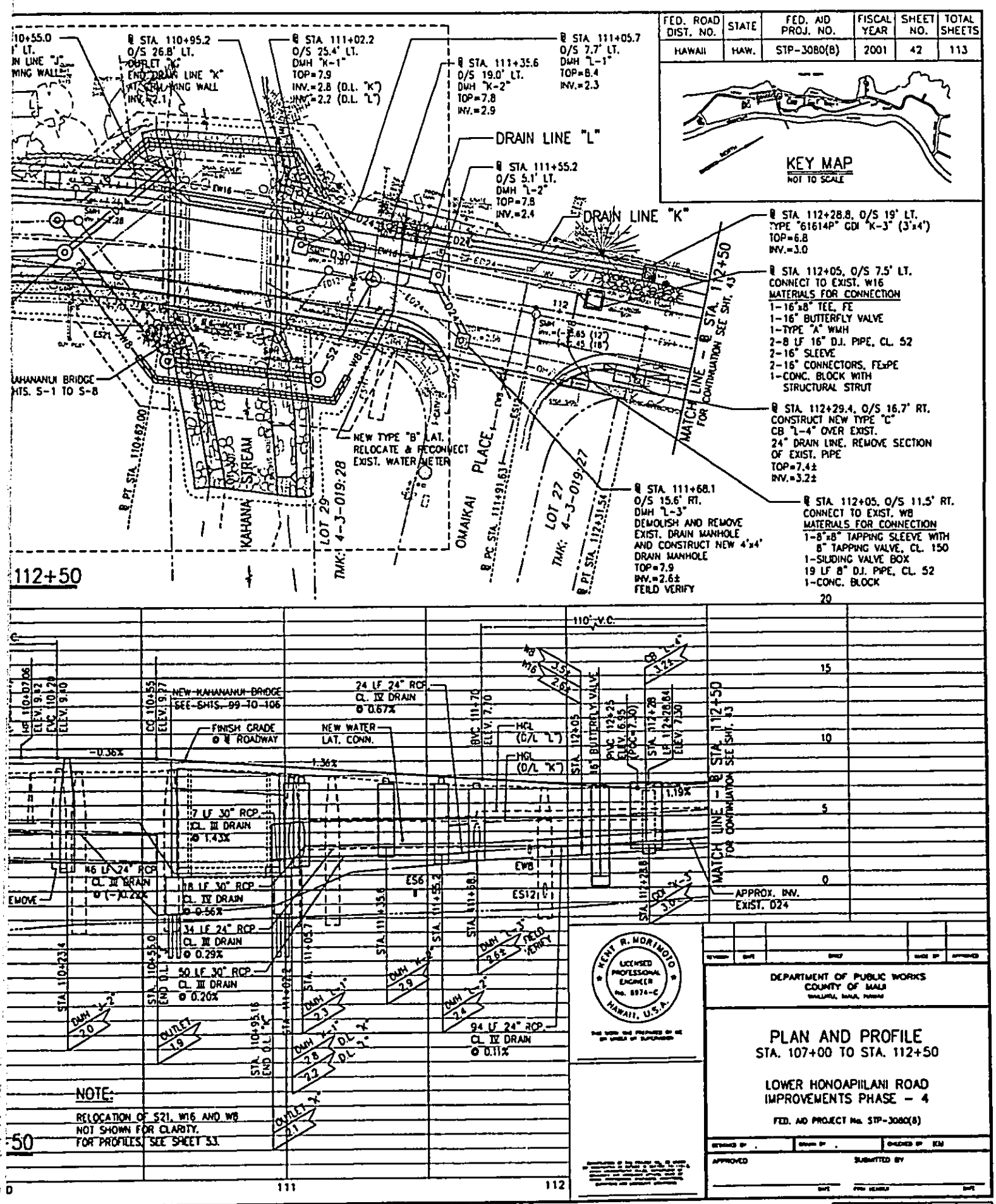
C-40

SHEET 41 OF 113



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(B)	2001	42	113



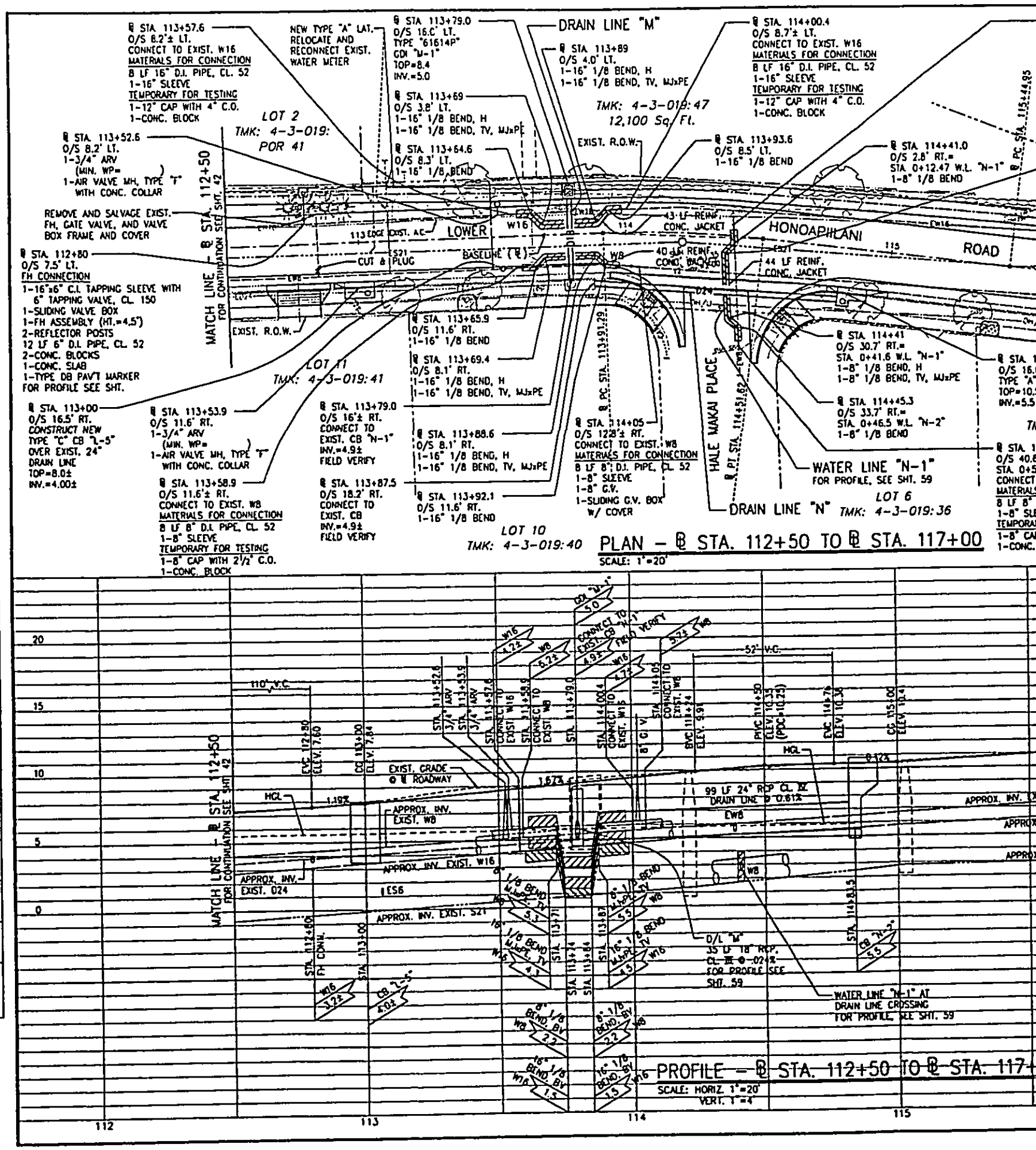
DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

PLAN AND PROFILE
STA. 107+00 TO STA. 112+50

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE – 4

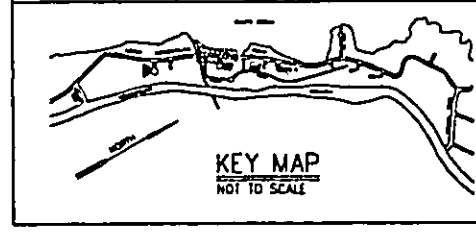
FED. AID PROJECT No. STP-3080(8)

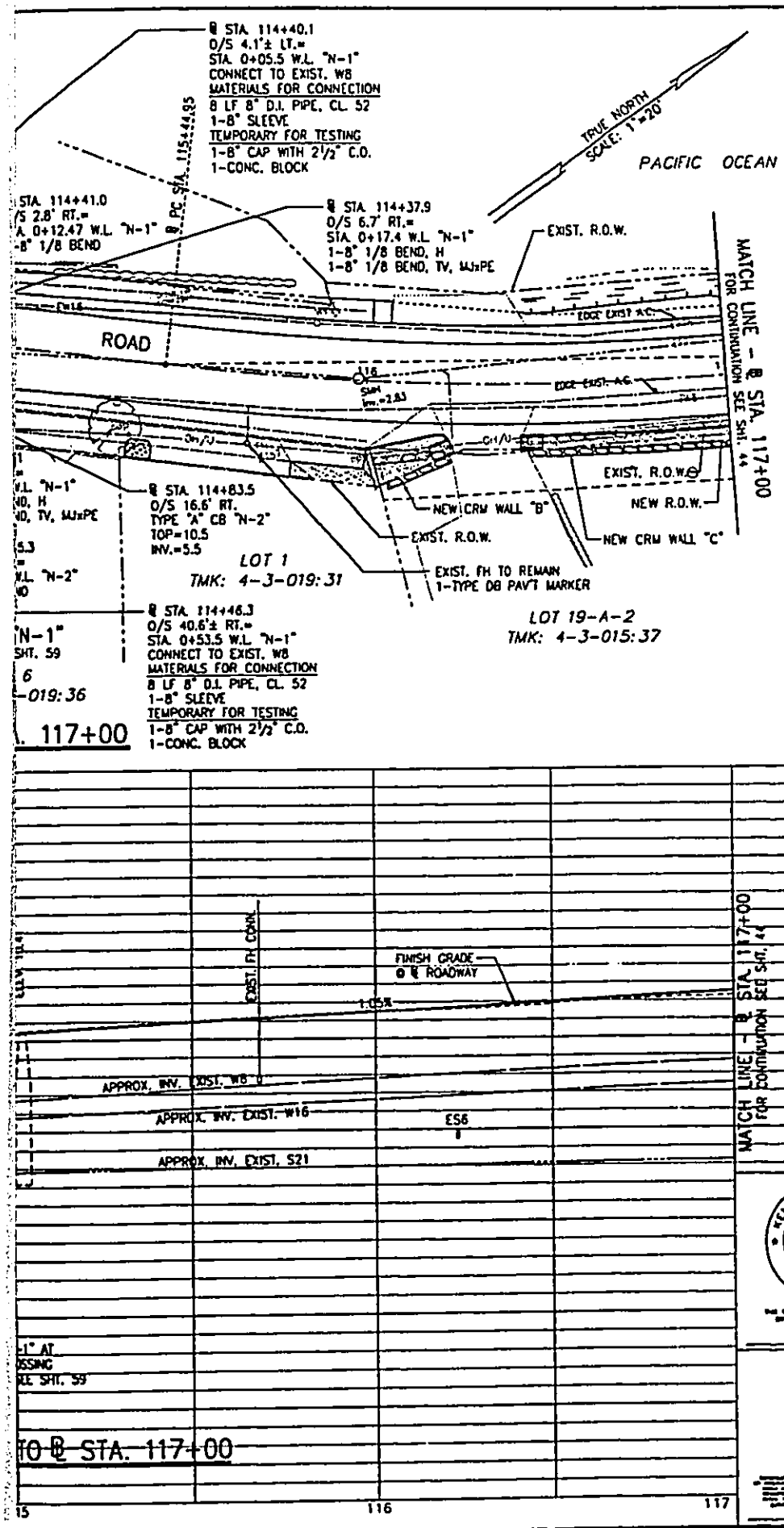
C-41



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	43	113





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KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 8874-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

PLAN AND PROFILE
STA. 112+50 TO STA. 117+00

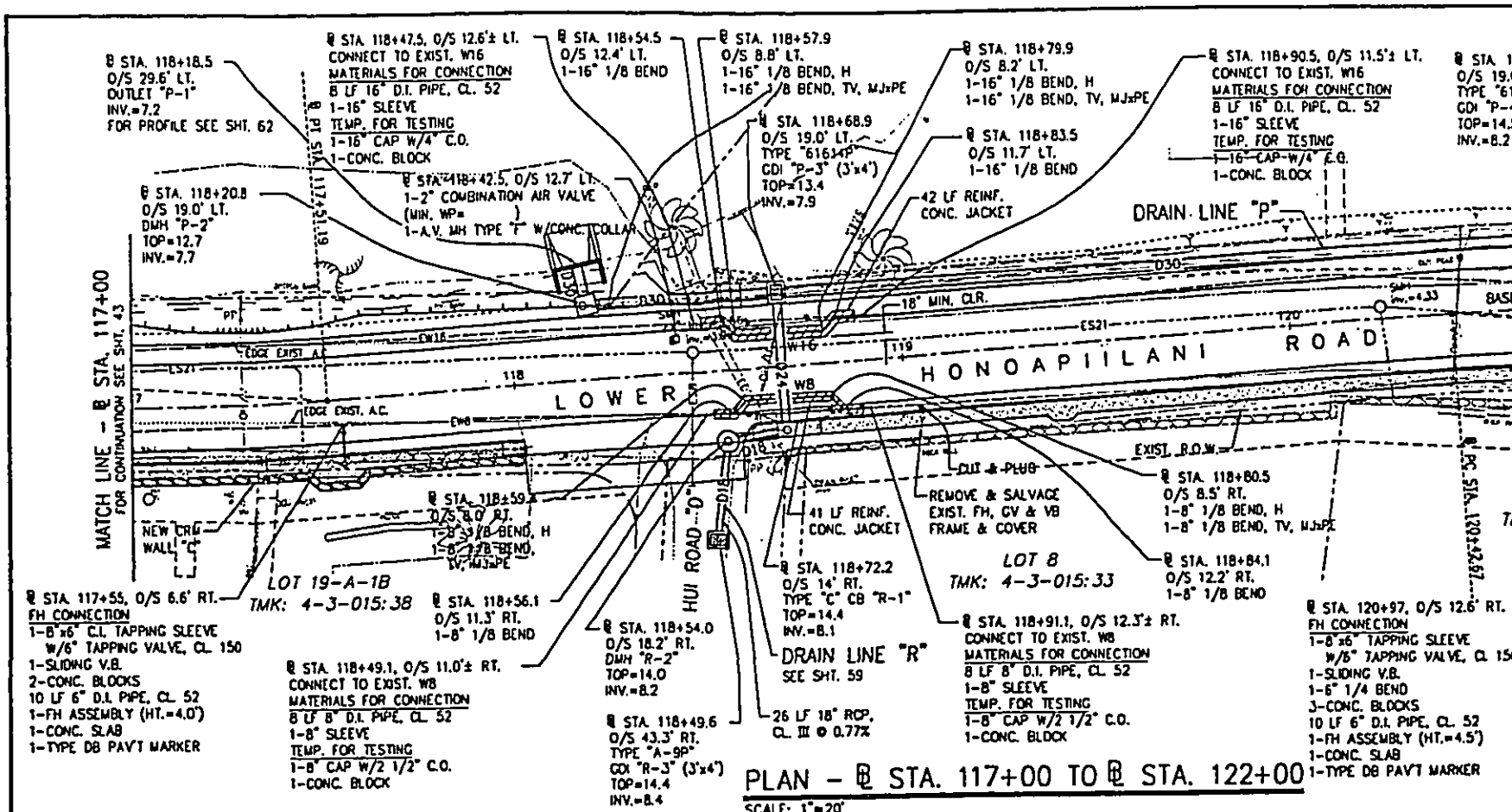
LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE – 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY . DRAWN BY . CHECKED BY KM

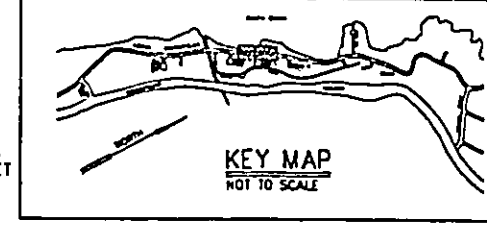
APPROVED SUBMITTED BY

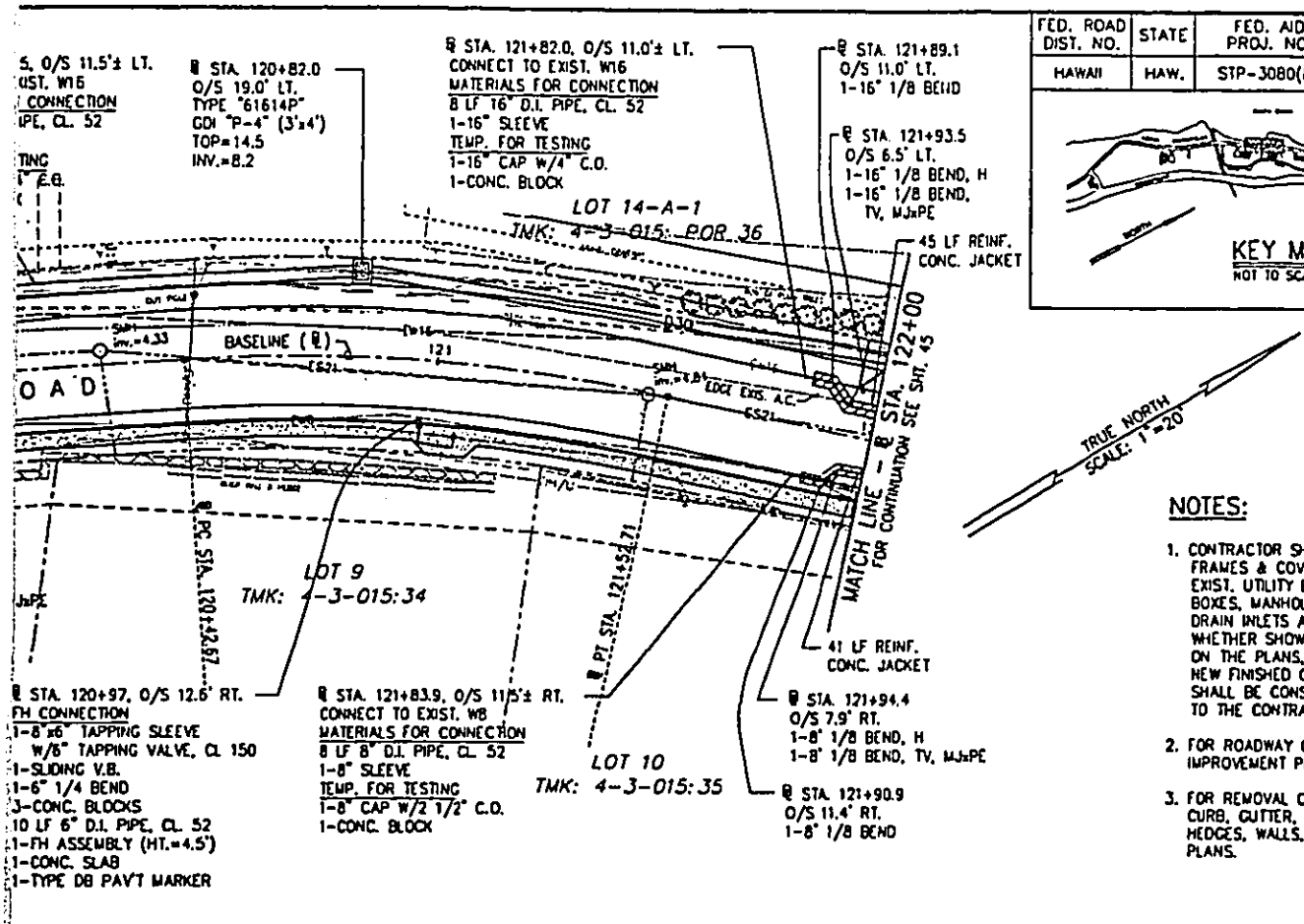
DATE DATE

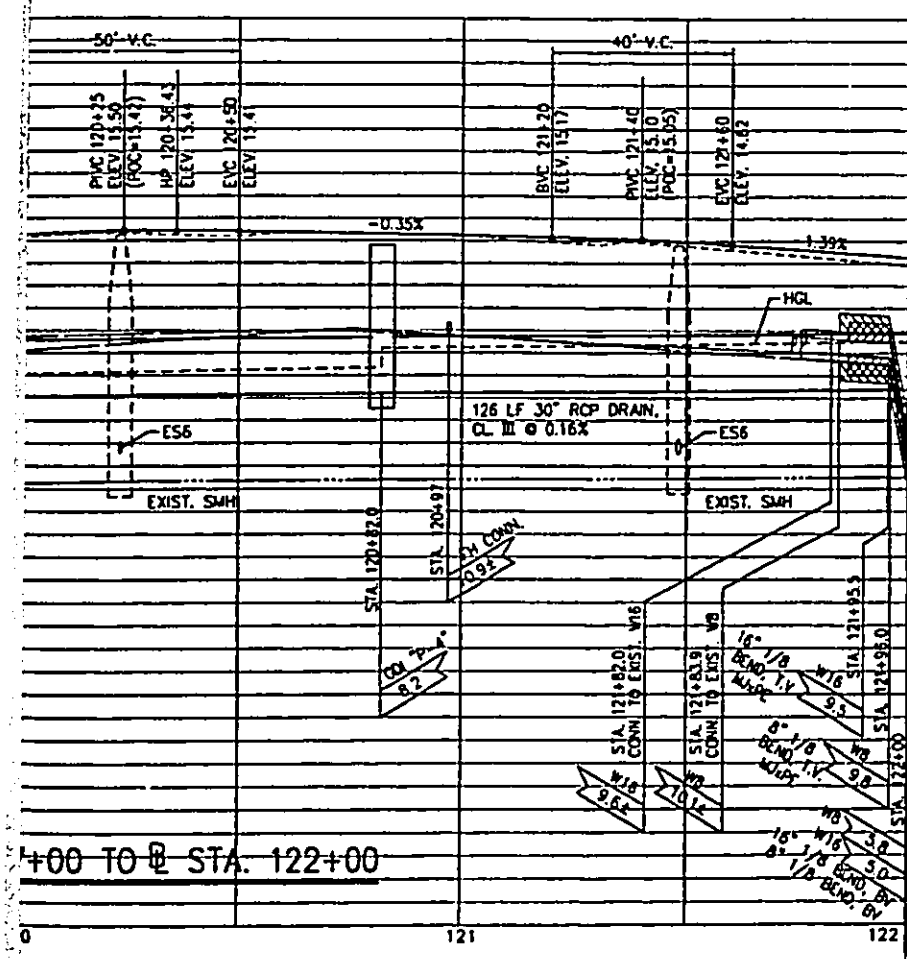


JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	44	113







+00 TO ℄ STA. 122+00

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 9974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 117+00 TO STA. 122+00

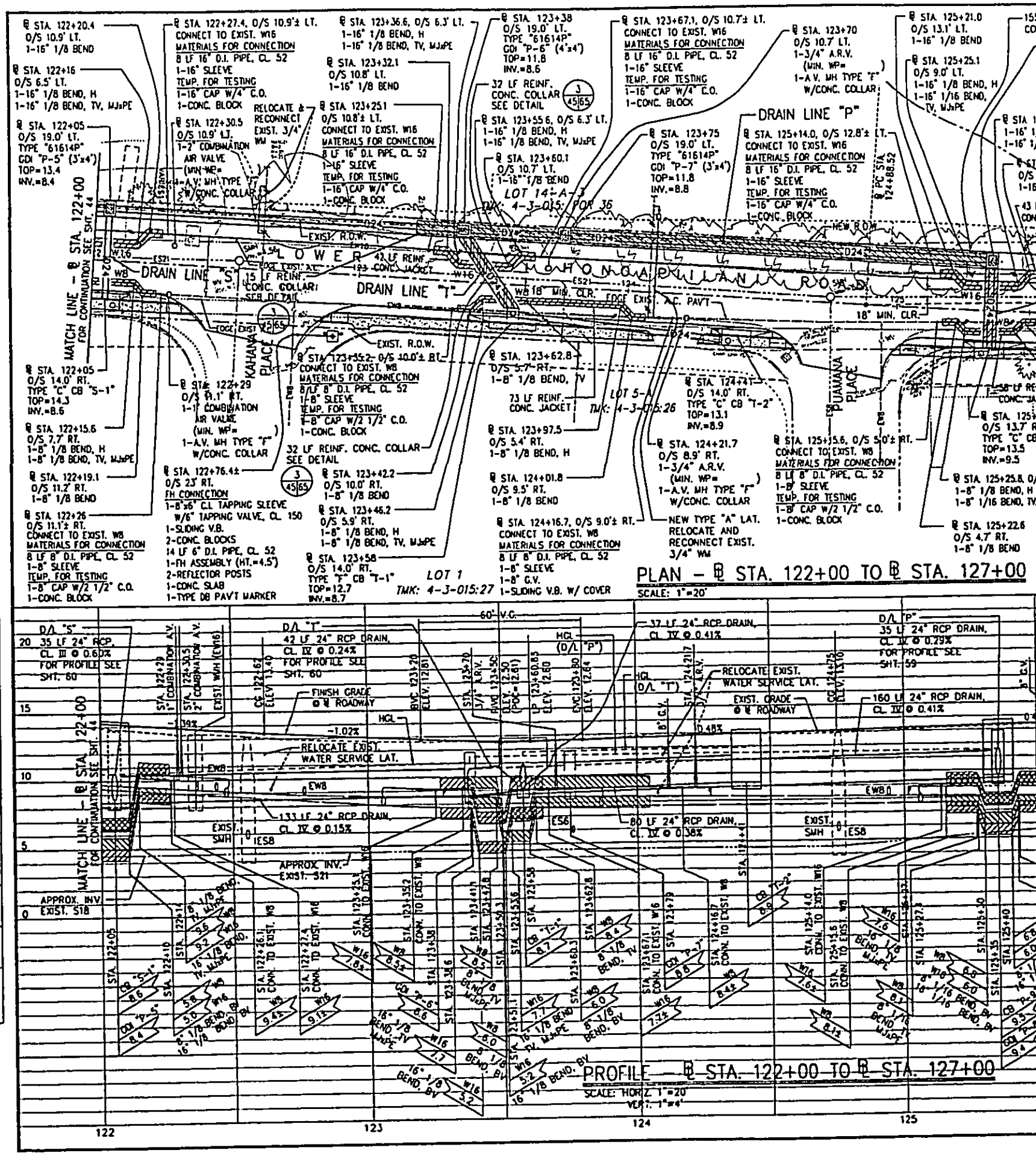
LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY
DRAWN BY
CHECKED BY KM
APPROVED
SUBMITTED BY
DATE
DATE

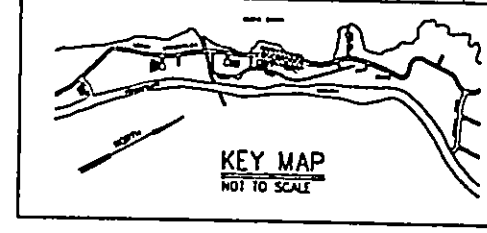
C-43

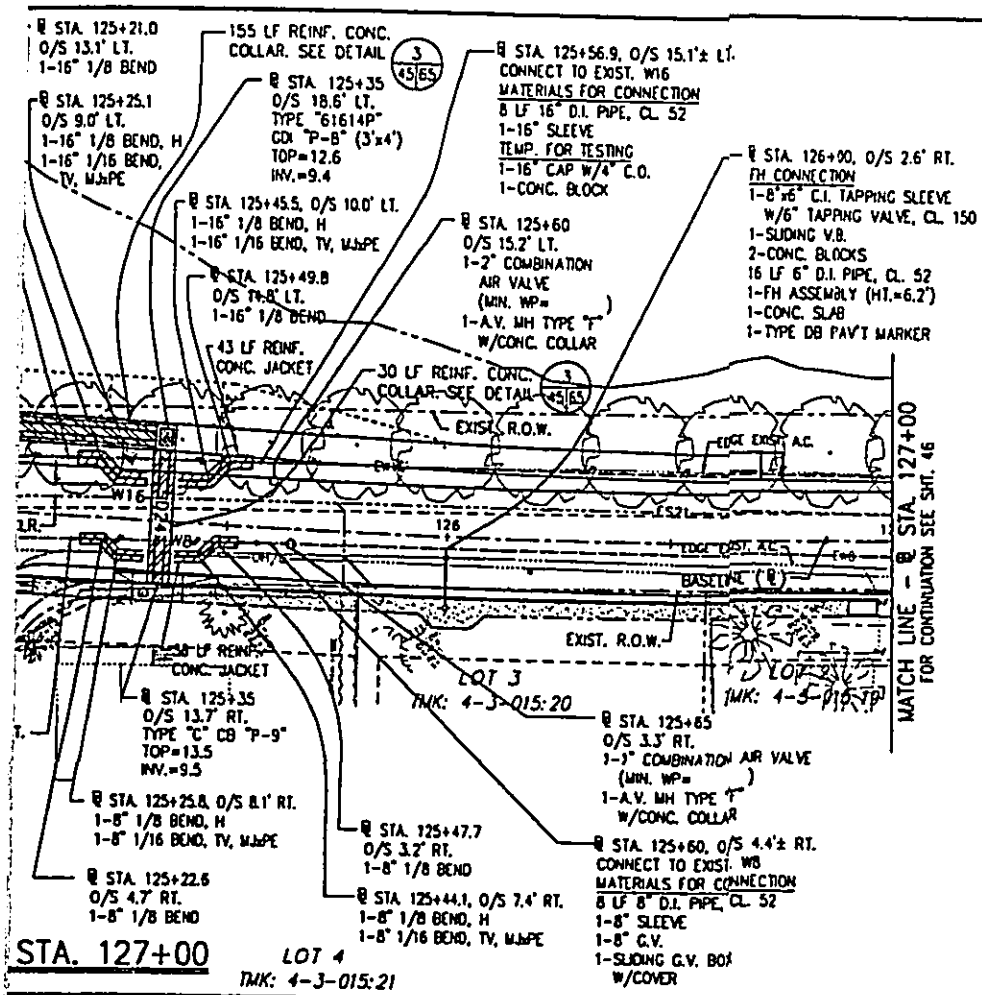
SHEET 44 OF 113

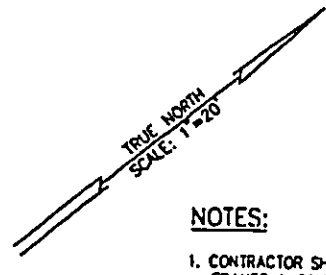


JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	45	113







NOTES:

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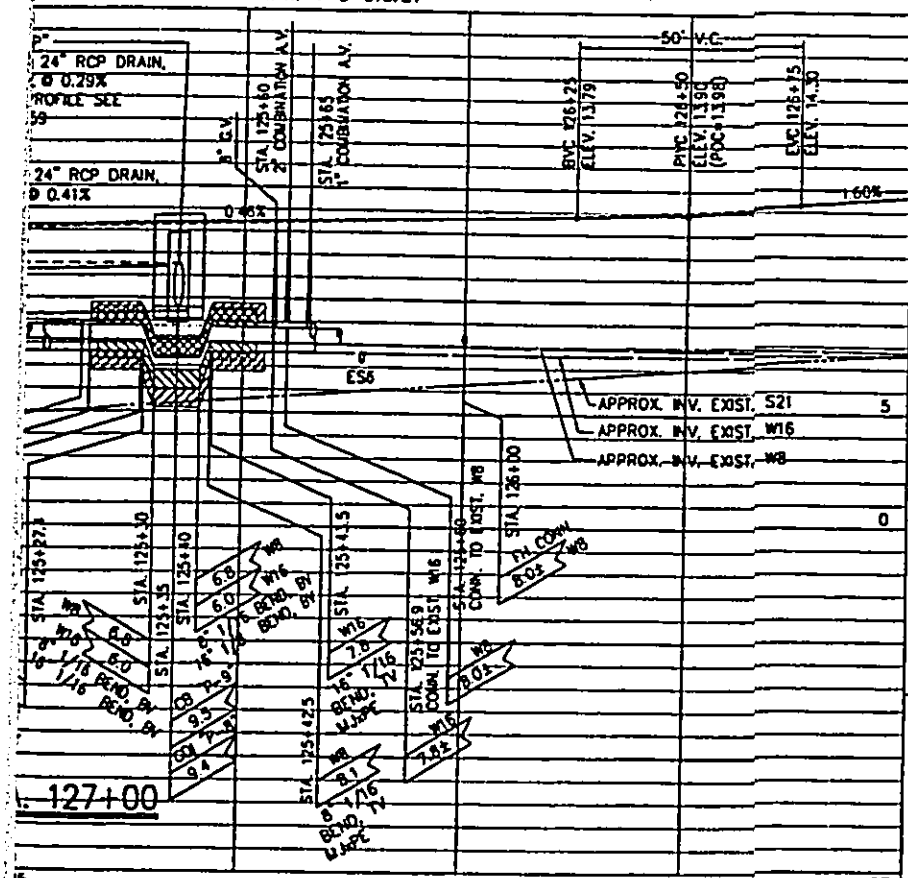


KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6174-C
HAWAII, U.S.A.

REVISION	DATE	SHEET	SHEET BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 122+00 TO STA. 127+00

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY	DRAWN BY	CHECKED BY
.	.	KM

APPROVED

SUBMITTED BY

DATE

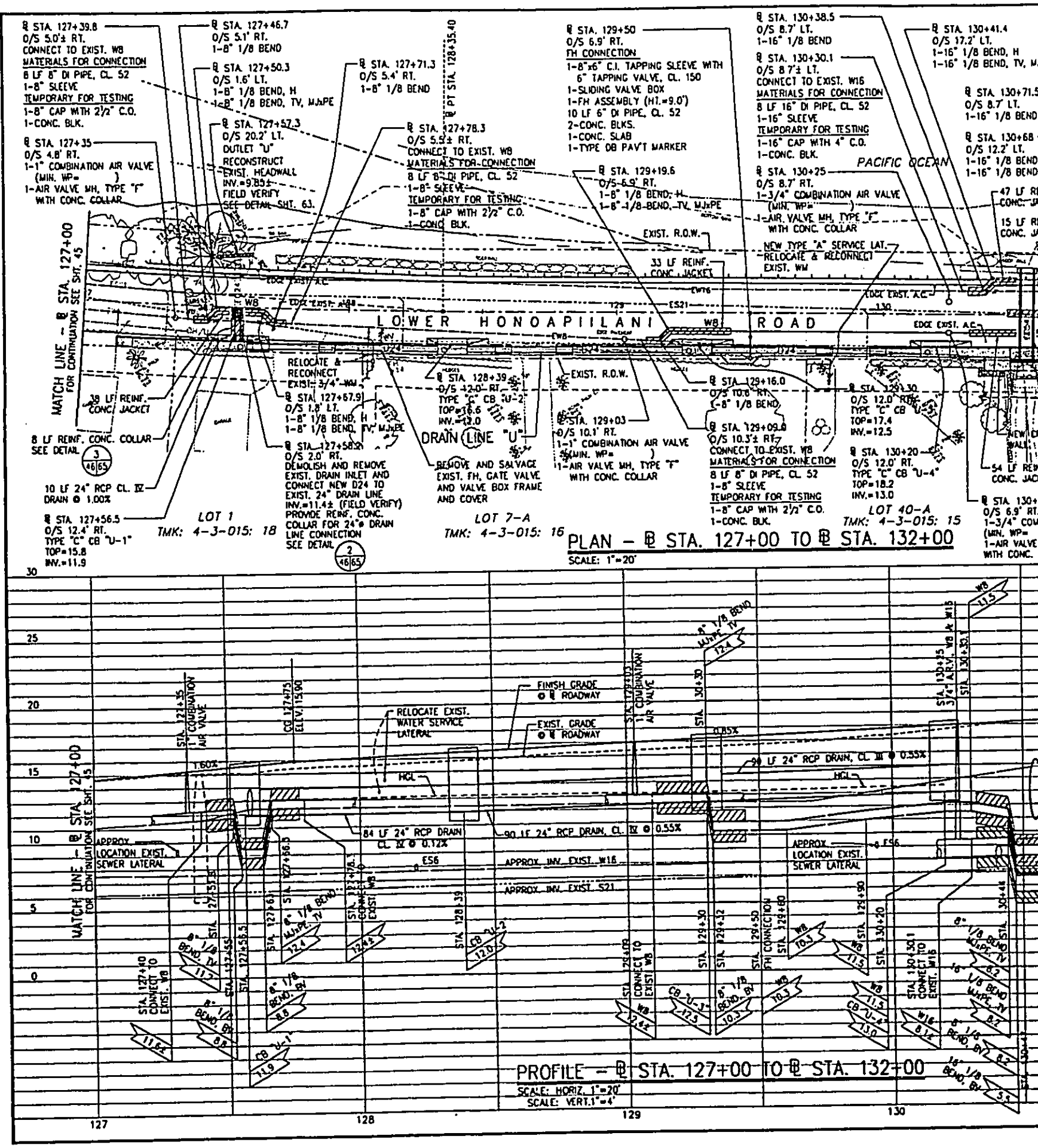
FOR DIRECTOR

DATE

FILE	PROJECT	PROJECT	NO.

C-44

SHEET 45 OF 113



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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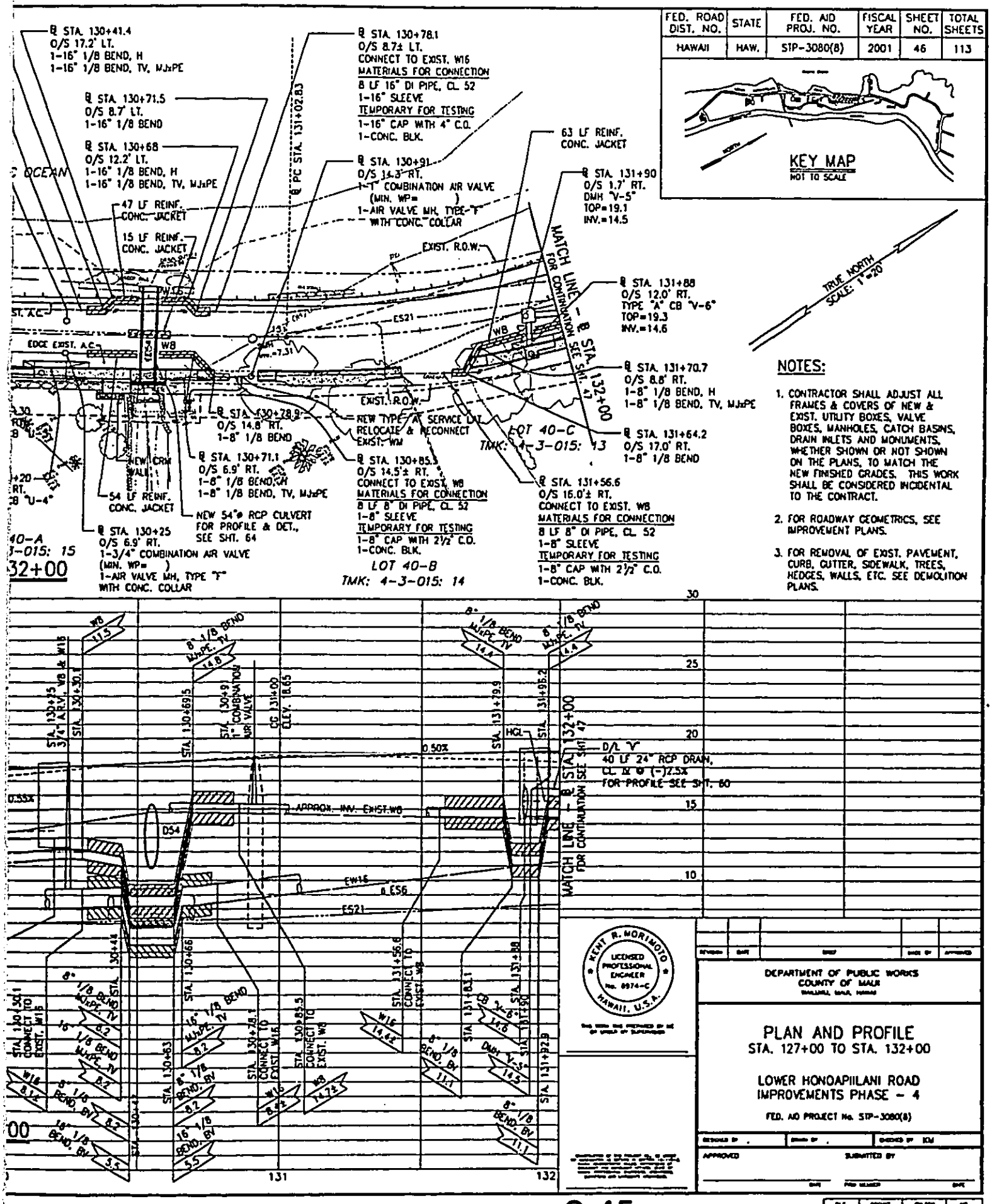


KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 8974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

PLAN AND PROFILE
STA. 127+00 TO STA. 132+00

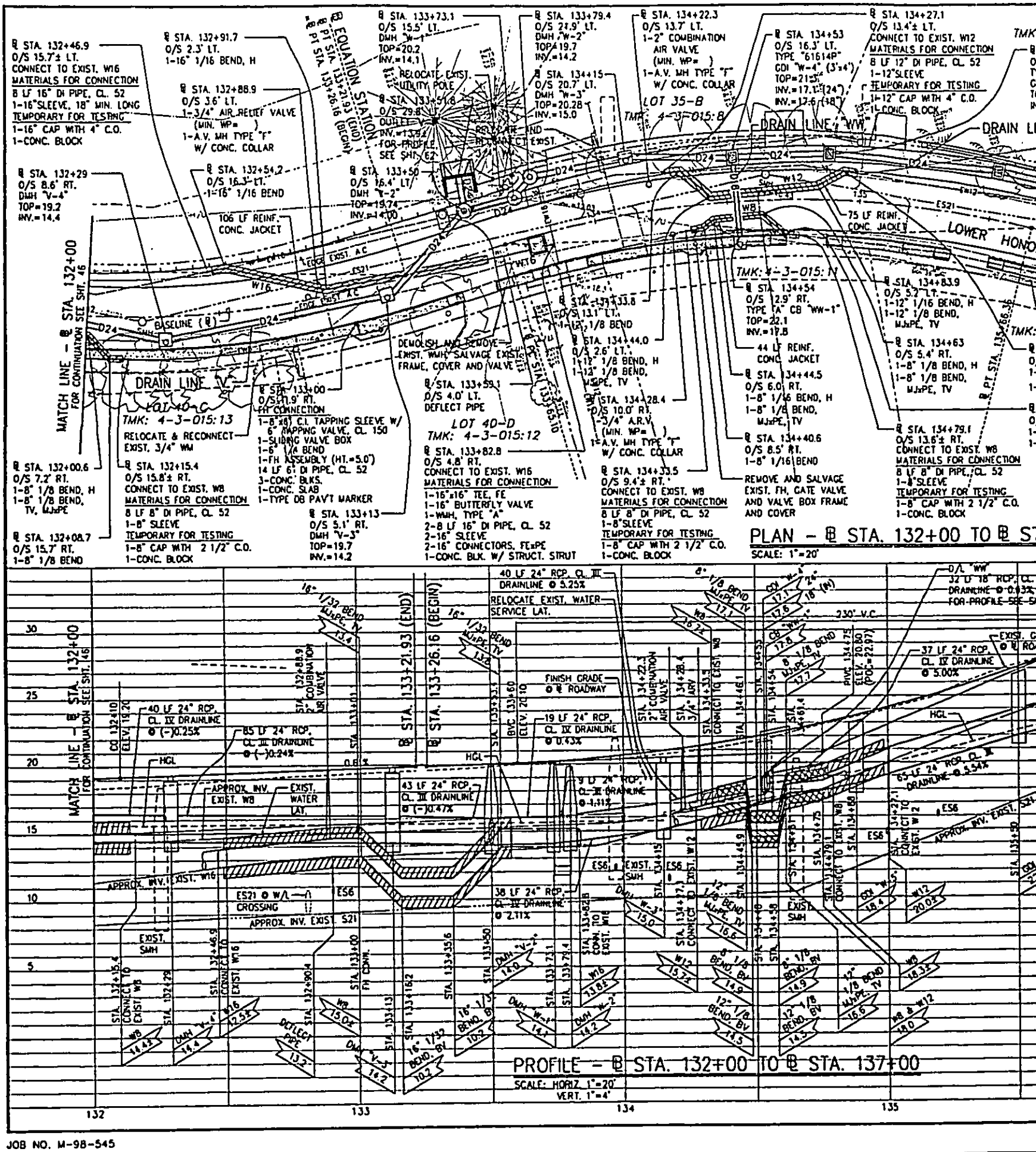
LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

APPROVED

SUBMITTED BY

C-45



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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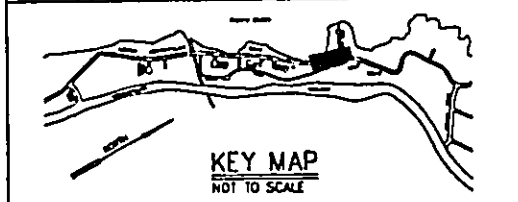

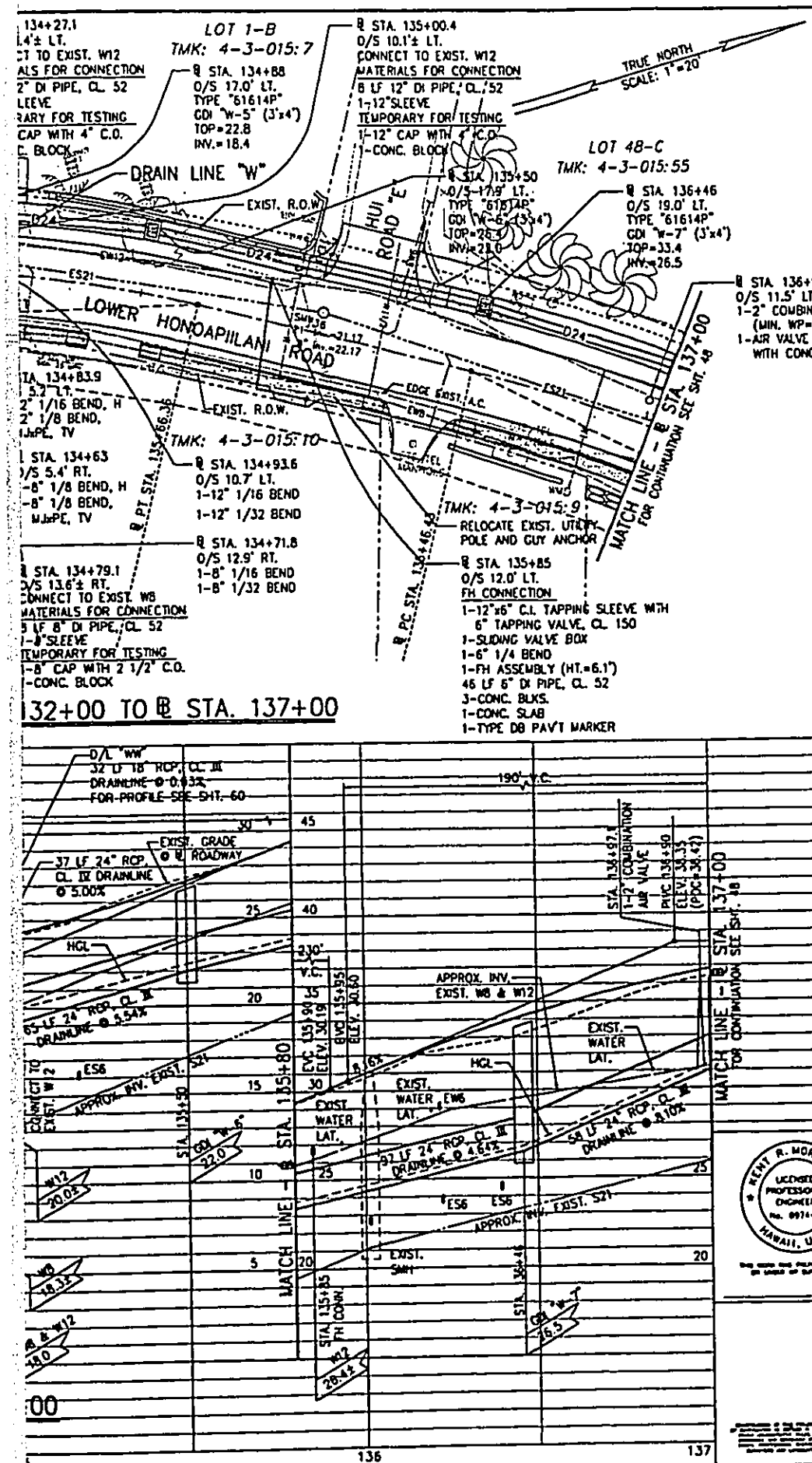

KEMT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 9974-C
HAWAII, U.S.A.

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COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 132+00 TO STA. 137+00

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

DESIGNED BY . DRAWN BY . CHECKED BY KM

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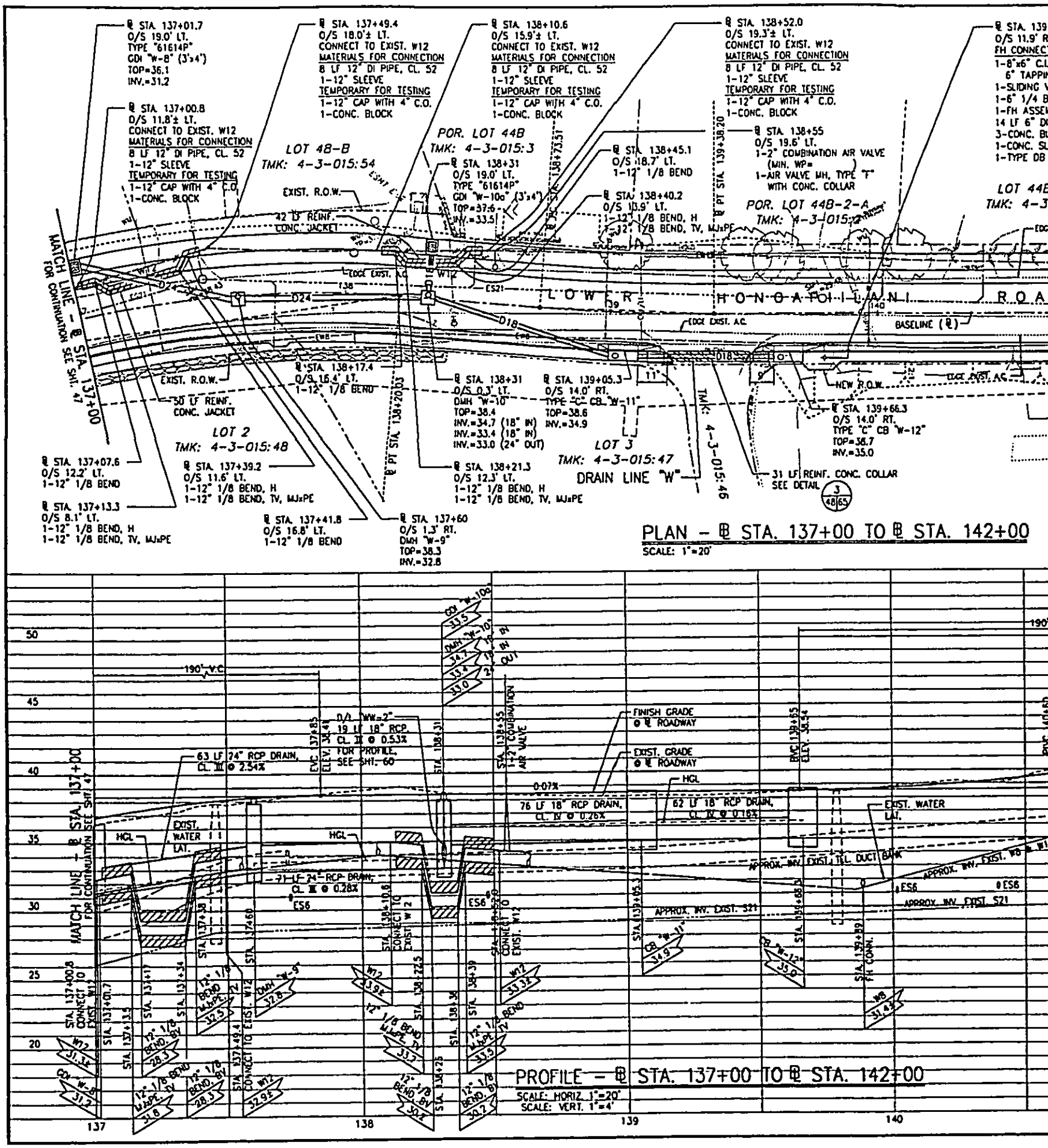
SUBMITTED BY

DATE DATE



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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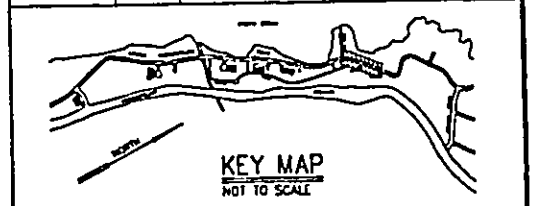

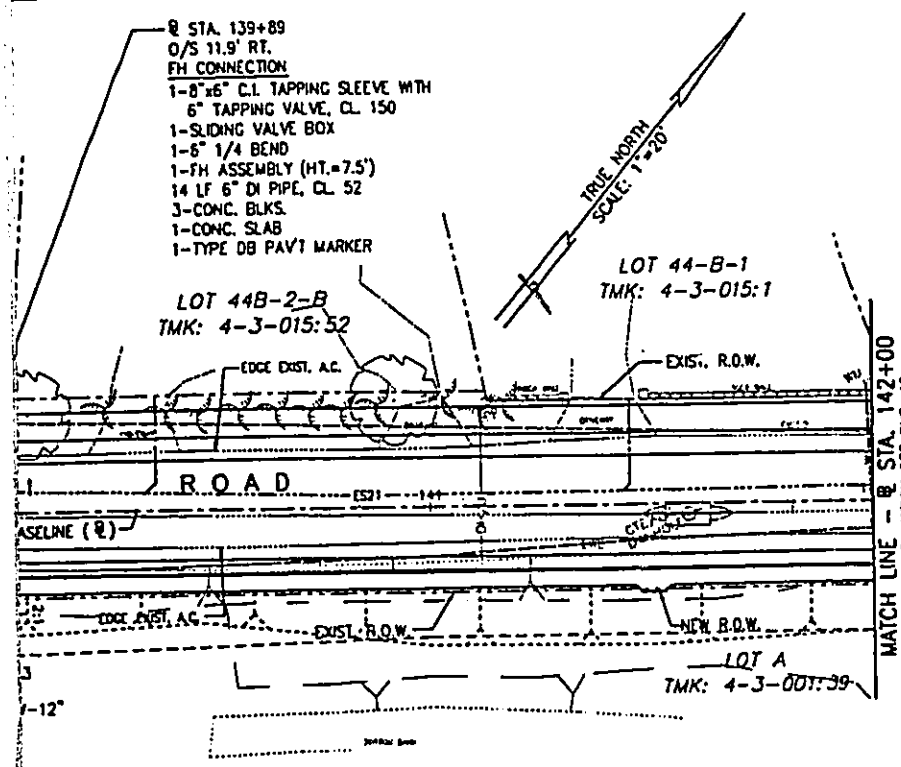

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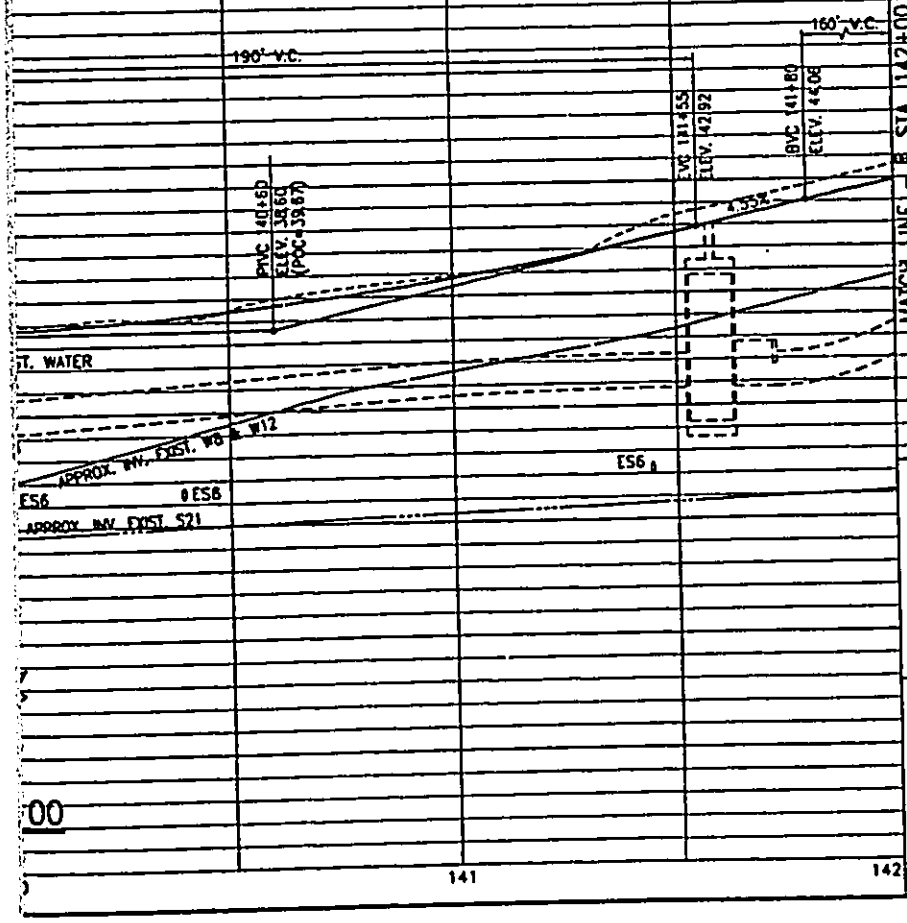
STA. 142+00



KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 8974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

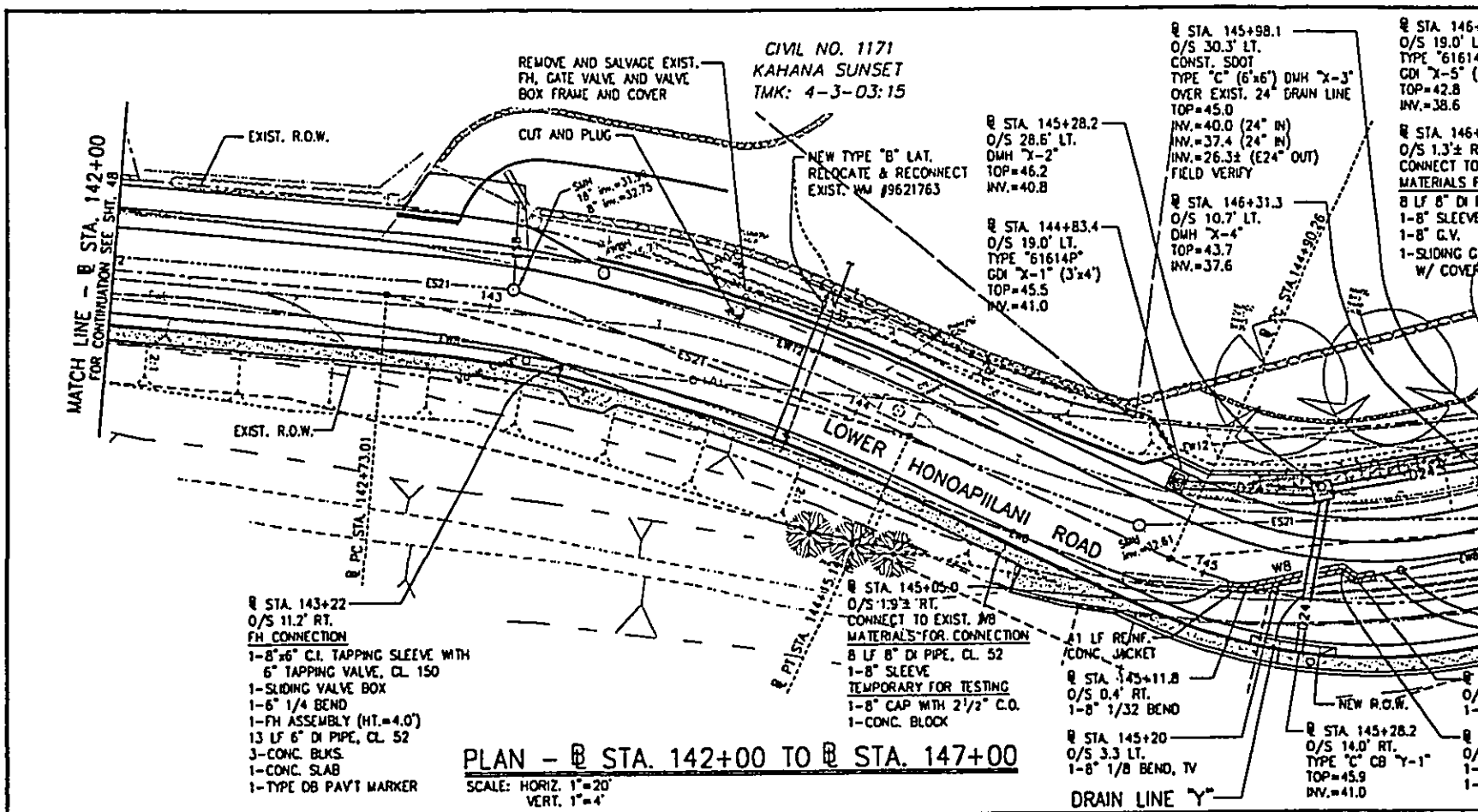
PLAN AND PROFILE
STA. 137+00 TO STA. 142+00

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

APPROVED

SUBMITTED BY



JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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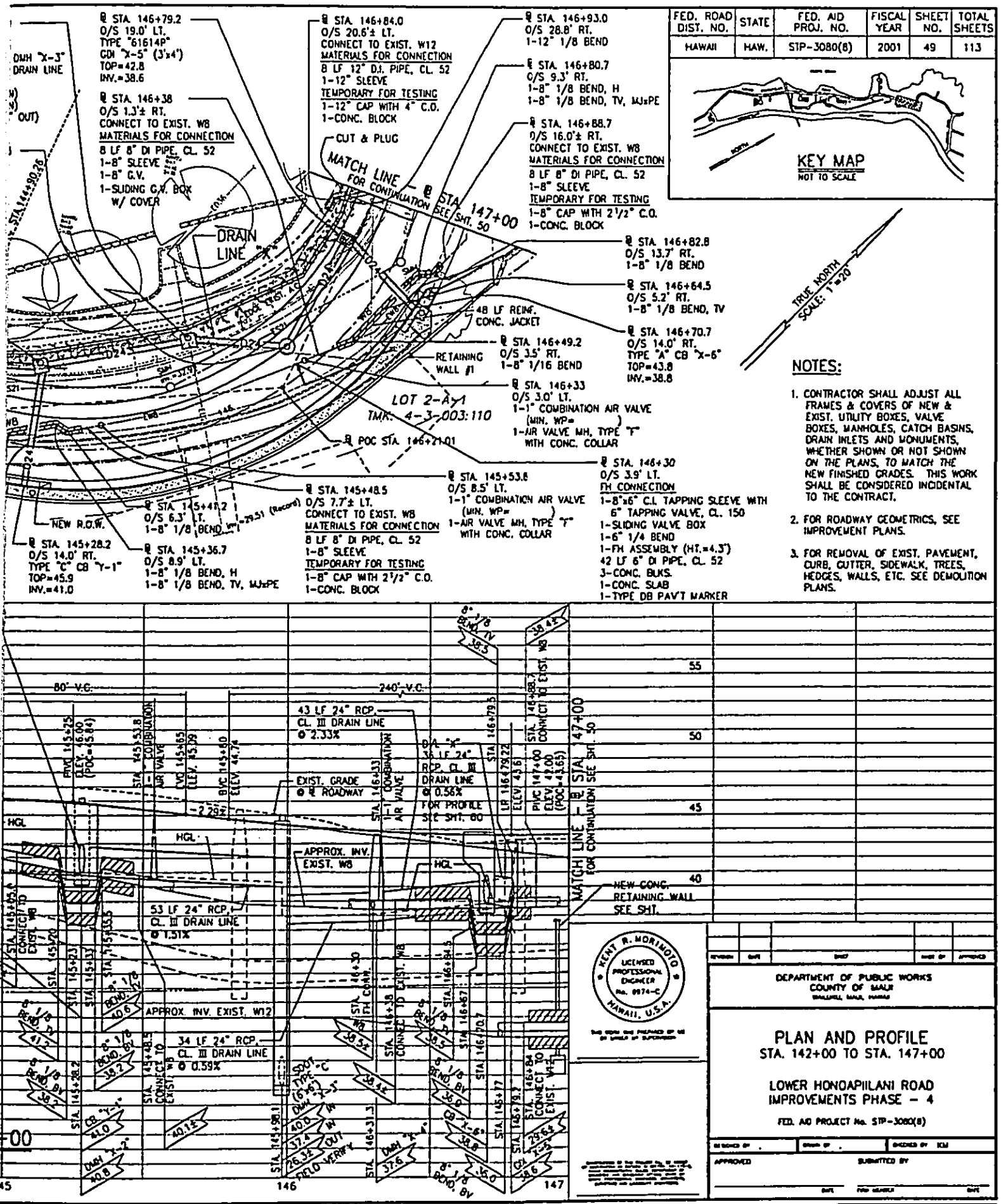


KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 9974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 142+00 TO STA. 147+00

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE - 4

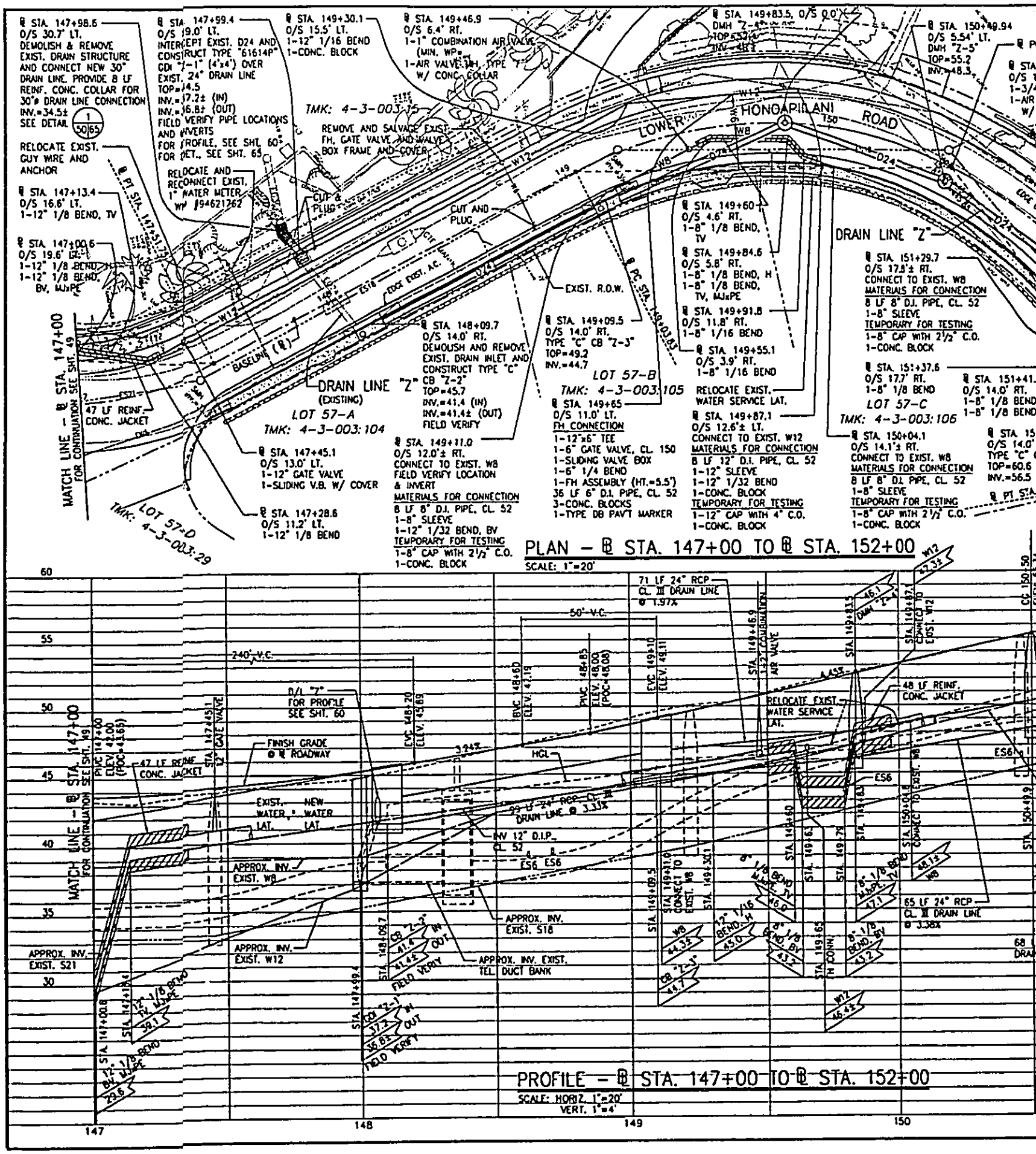
FED. AID PROJECT No. STP-3080(8)

DESIGNED BY . DRAWN BY . CHECKED BY KM

APPROVED SUBMITTED BY

DATE DATE

C-48



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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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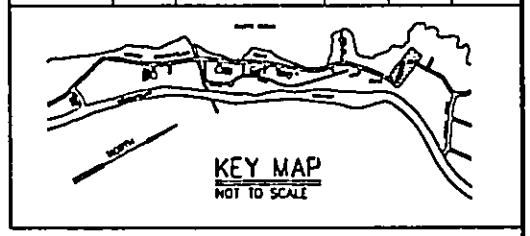

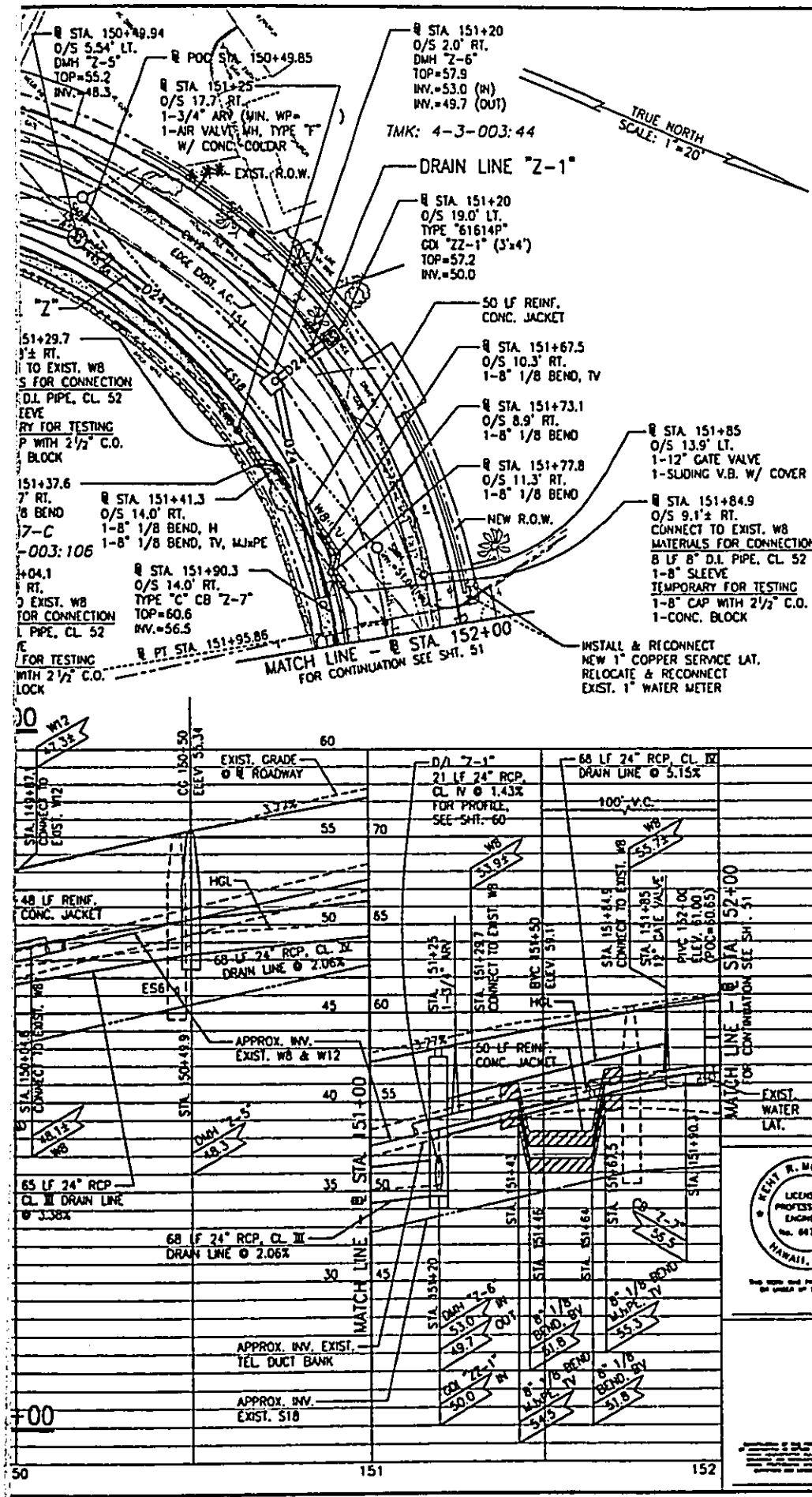

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KEHT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6674-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
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PLAN AND PROFILE
STA. 147+00 TO STA. 152+00

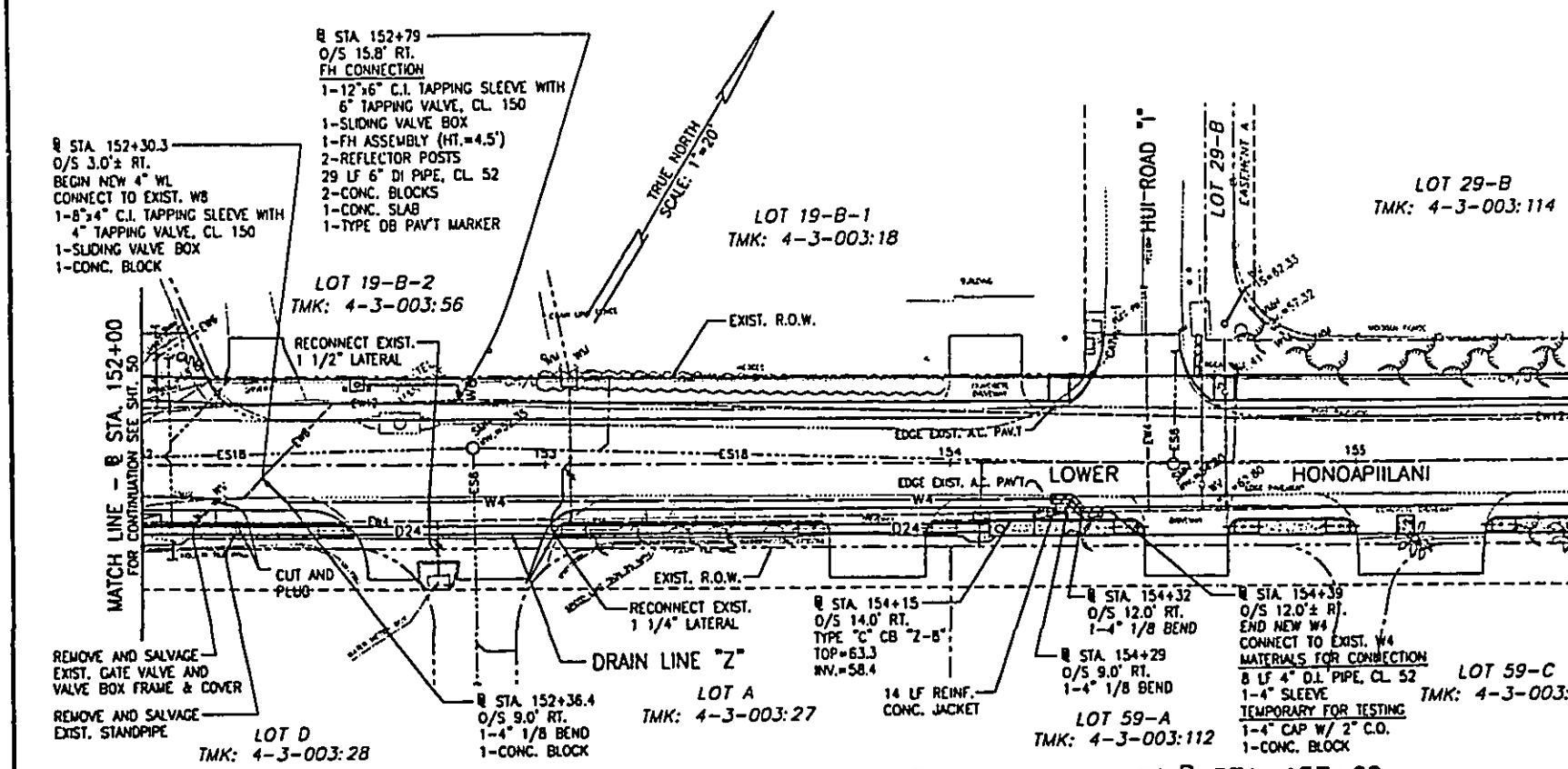
LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE – 4

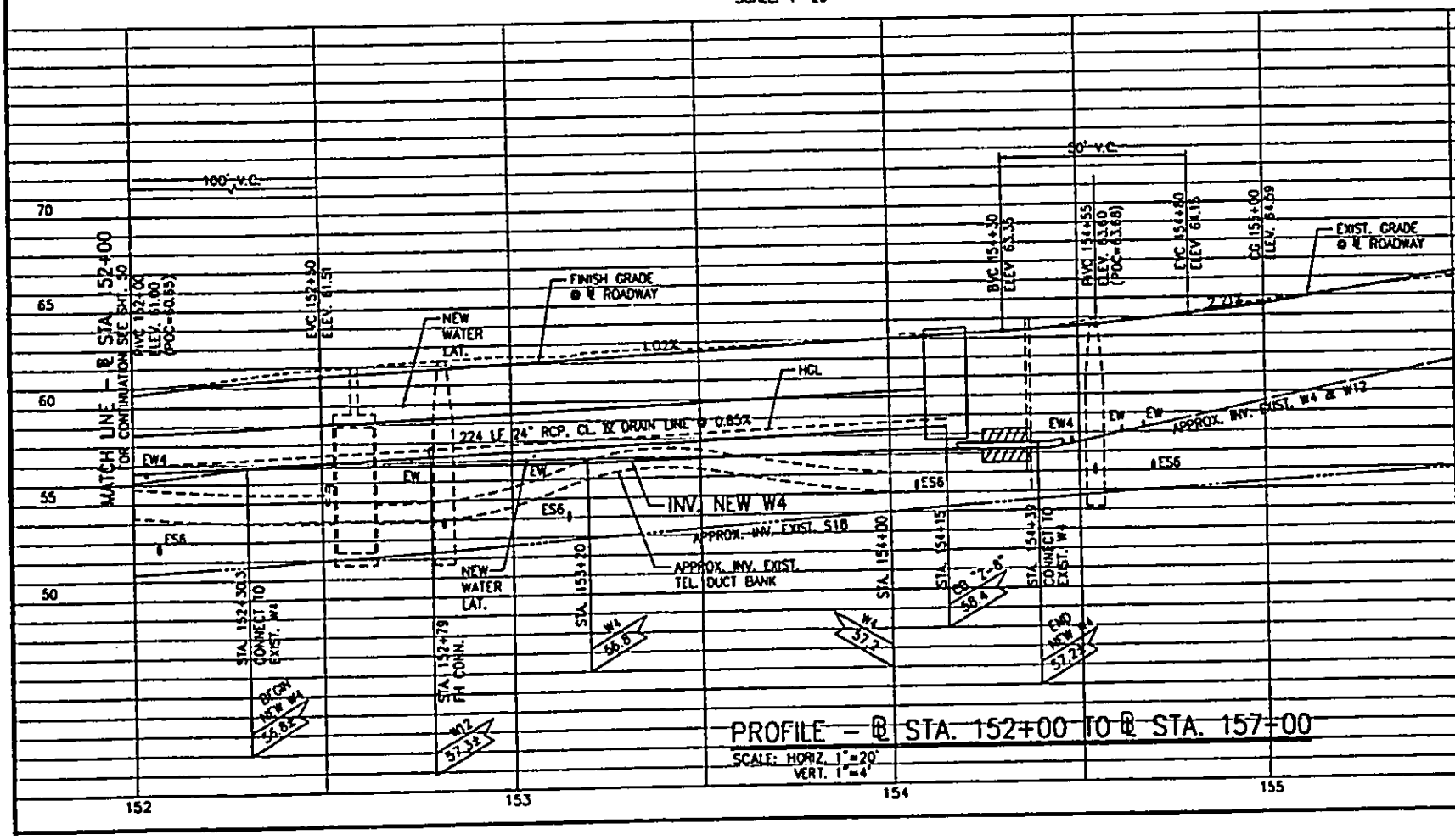
FED. AID PROJECT No. STP-3080(8)

DESIGNED BY . DRAWN BY . CHECKED BY EM

APPROVED SUBMITTED BY

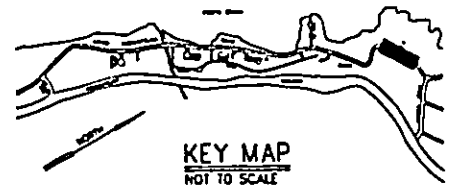
DATE FOR MAYOR DATE

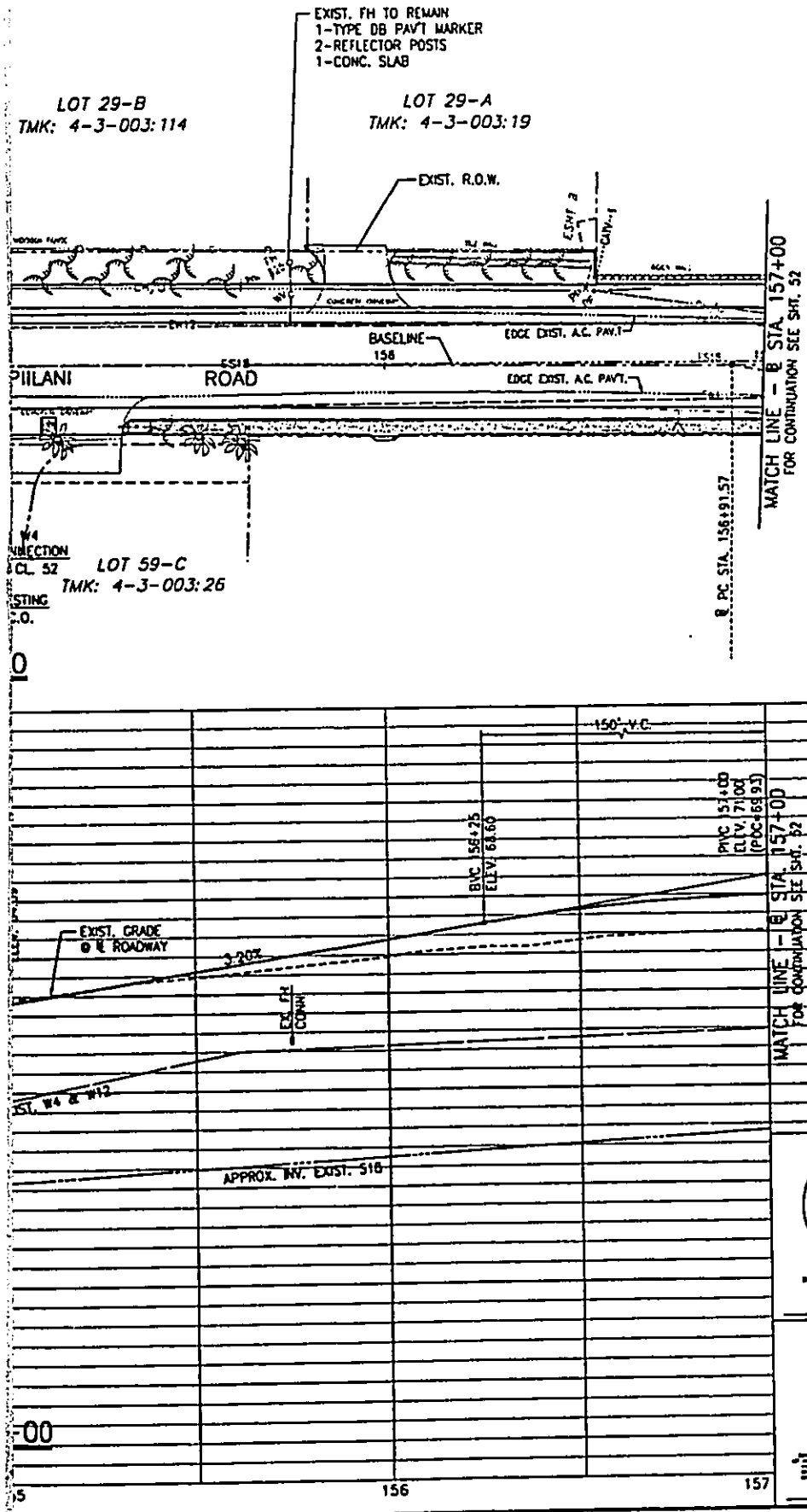




JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-3080(8)	2001	51	113





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KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 9974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 152+00 TO STA. 157+00

LOWER HONOAPIILANI ROAD
IMPROVEMENTS PHASE - 4

FED. AID PROJECT No. STP-3080(8)

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APPROVED

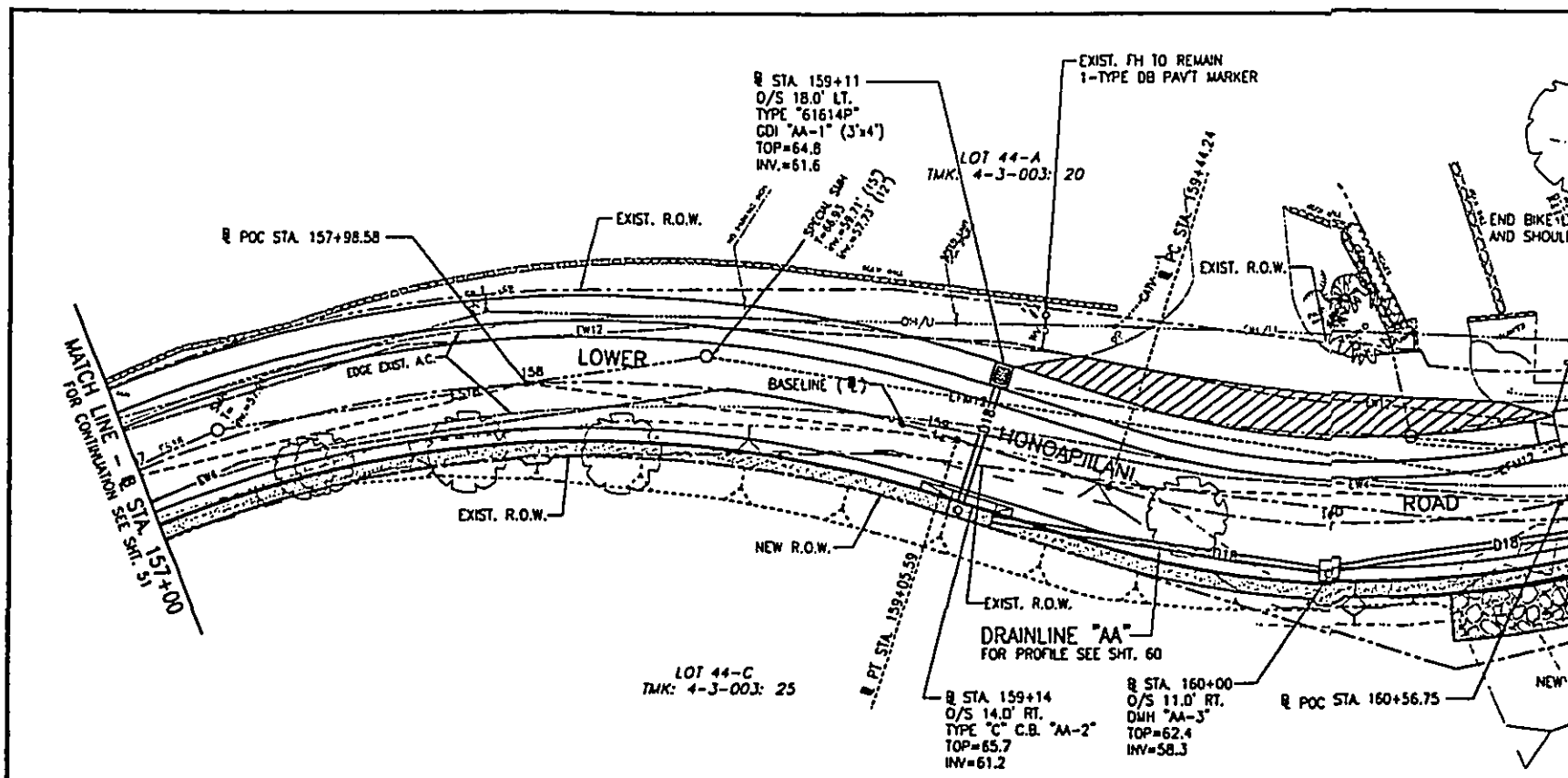
SUBMITTED BY

DATE

PROJ. MANAGER DATE

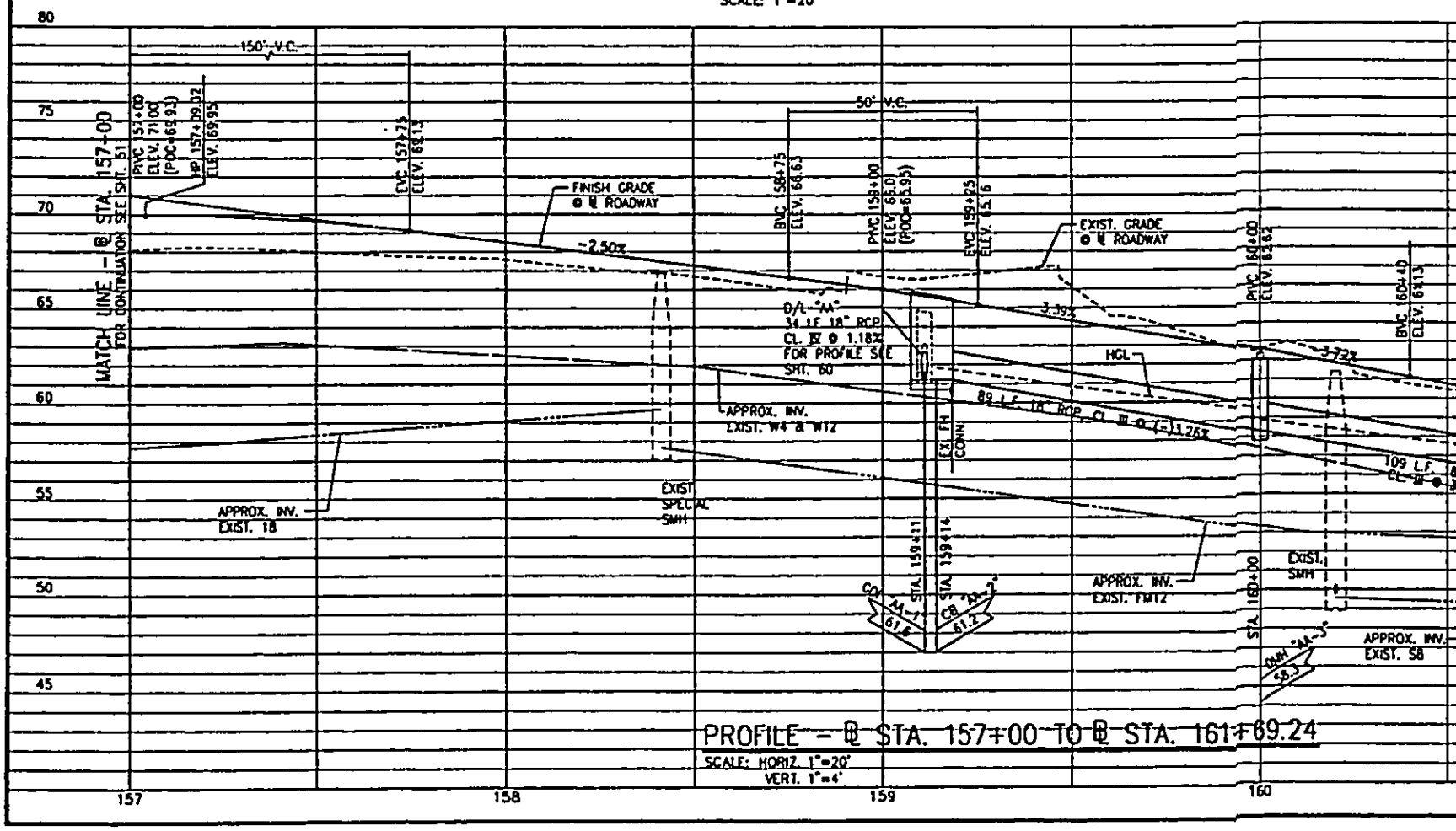
C-50

SHEET 51 OF 113



PLAN - ℄ STA. 157+00 TO ℄ STA. 161+69.24

SCALE: 1"=20'



PROFILE - ℄ STA. 157+00 TO ℄ STA. 161+69.24

SCALE: HORIZ. 1"=20'
VERT. 1"=4'

JOB NO. M-98-545

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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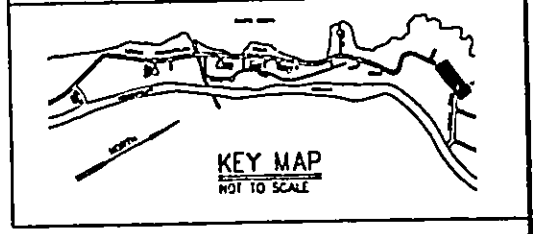

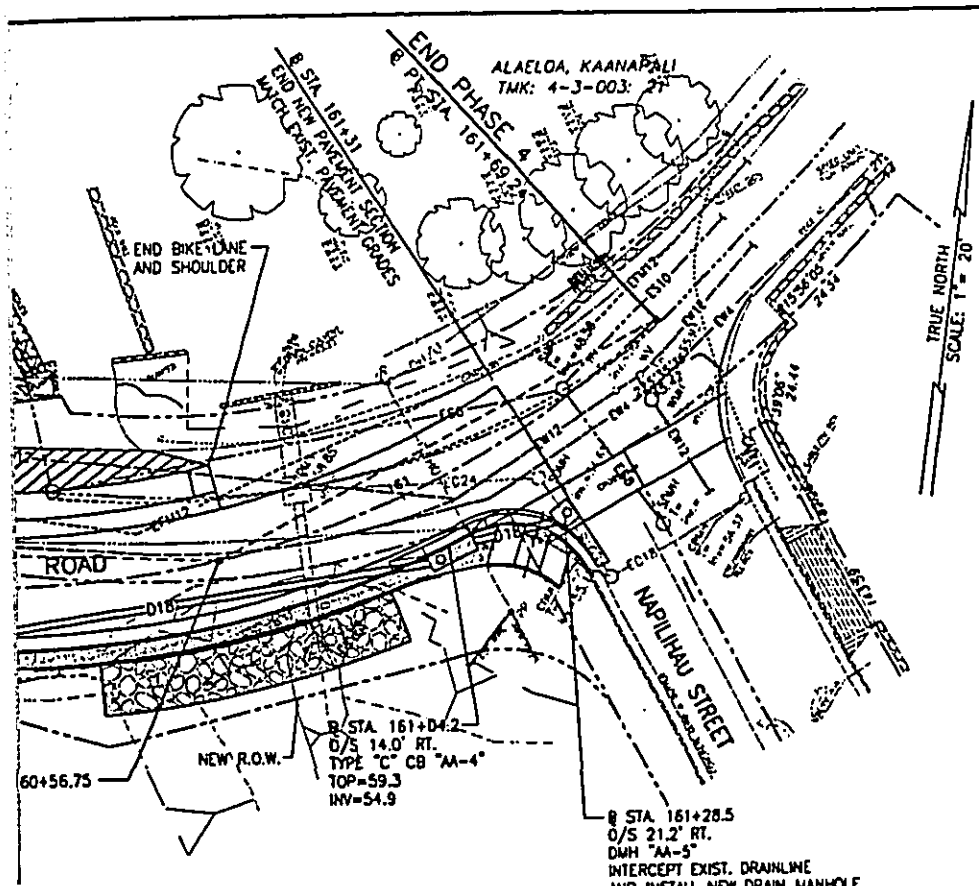

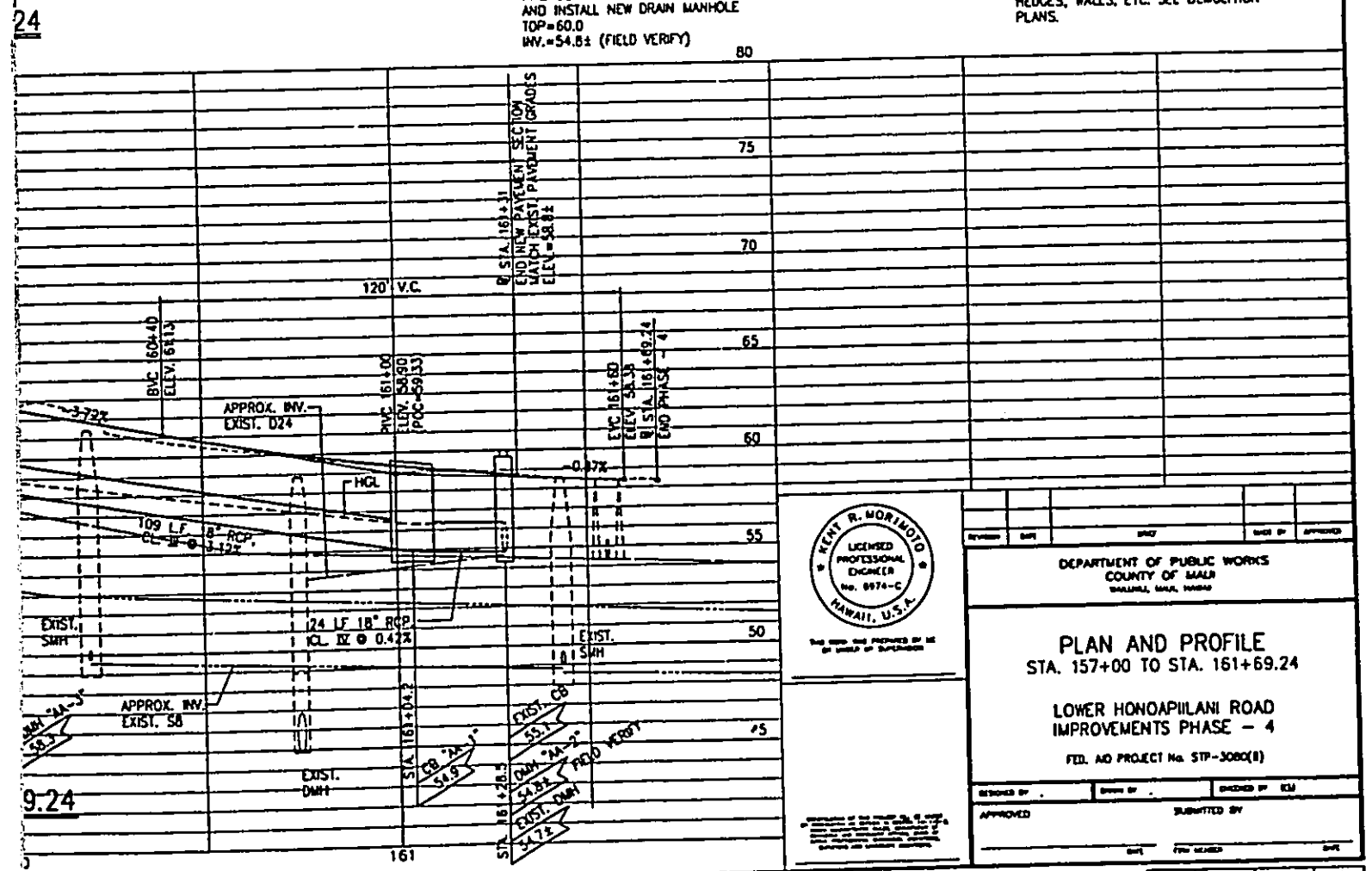

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KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN AND PROFILE
STA. 157+00 TO STA. 161+69.24

LOWER HONOAPIILANI ROAD IMPROVEMENTS PHASE – 4

FED. AID PROJECT No. STP-3080(8)

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APPROVED SUBMITTED BY

DATE FOR MAYOR DATE

FILE | PROJECT | PUBLIC | NO.

C-51 SHEET 52 OF 113

Appendix E

Acoustic Study

ACOUSTIC STUDY FOR THE LOWER HONOAPIILANI ROAD IMPROVEMENTS (HOOHUI ROAD TO NAPILILAU ROAD) KAHANA, MAUI

Prepared for:

AUSTIN, TSUTSUMI & ASSOCIATES INC.

Prepared by:

Y. EBISU & ASSOCIATES
1126 12th Avenue, Room 305
Honolulu, Hawaii 96816

FEBRUARY 2000

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CHAPTER I. SUMMARY

The existing and future traffic noise levels in the environs of the proposed Lower Honoapiilani Road Improvements, Phase 4 (Hoohui Road to Napilihau Road) Project in Kahana on the island of Maui were studied to evaluate potential noise impacts associated with the Build Alternative. Noise measurements were obtained, traffic noise predictions developed, and noise abatement alternatives evaluated.

Existing traffic noise levels in the project area do not exceed the U.S. Federal Highway Administration (FHWA) and Hawaii State Department of Transportation, Highways Division (HDOT) noise abatement criteria. Future (CY 2020) traffic noise levels are not expected to exceed the "66 Leq" HDOT noise abatement criteria at existing single and multifamily dwelling units. The noise abatement criteria will not be exceeded at 3 existing buildings of the Kahana Door of Faith Church. Based on these results, traffic noise mitigation measures should not be required for this project.

The following general conclusions can be made in respect to potential traffic noise impacts which can be expected by CY 2020 under the Build Alternative. These conclusions are valid as long as the future vehicle mixes and average speeds do not differ from the assumed values.

- The HDOT's ">15 dB increase" criteria for substantial change in traffic noise levels will not be exceeded at any noise sensitive structure. Maximum increases in traffic noise levels in the project area should not exceed 4.1 dB as a result of growth in traffic volumes and realignment of the two traffic lanes.

- Under the Build Alternative, future traffic noise levels are not expected to exceed the HDOT "66 Leq" criteria at any noise sensitive buildings located within the limits of project construction.

- No parks or public use structures within the limits of project construction should be affected by the proposed project or require noise mitigation measures.

- No commercial structures should be affected by the proposed project or require noise mitigation measures.

Potential short term construction noise impacts are possible during the project construction period. However, minimizing these types of noise impacts is possible using standard curfew periods, properly muffled equipment, administrative controls, and construction barriers as required.

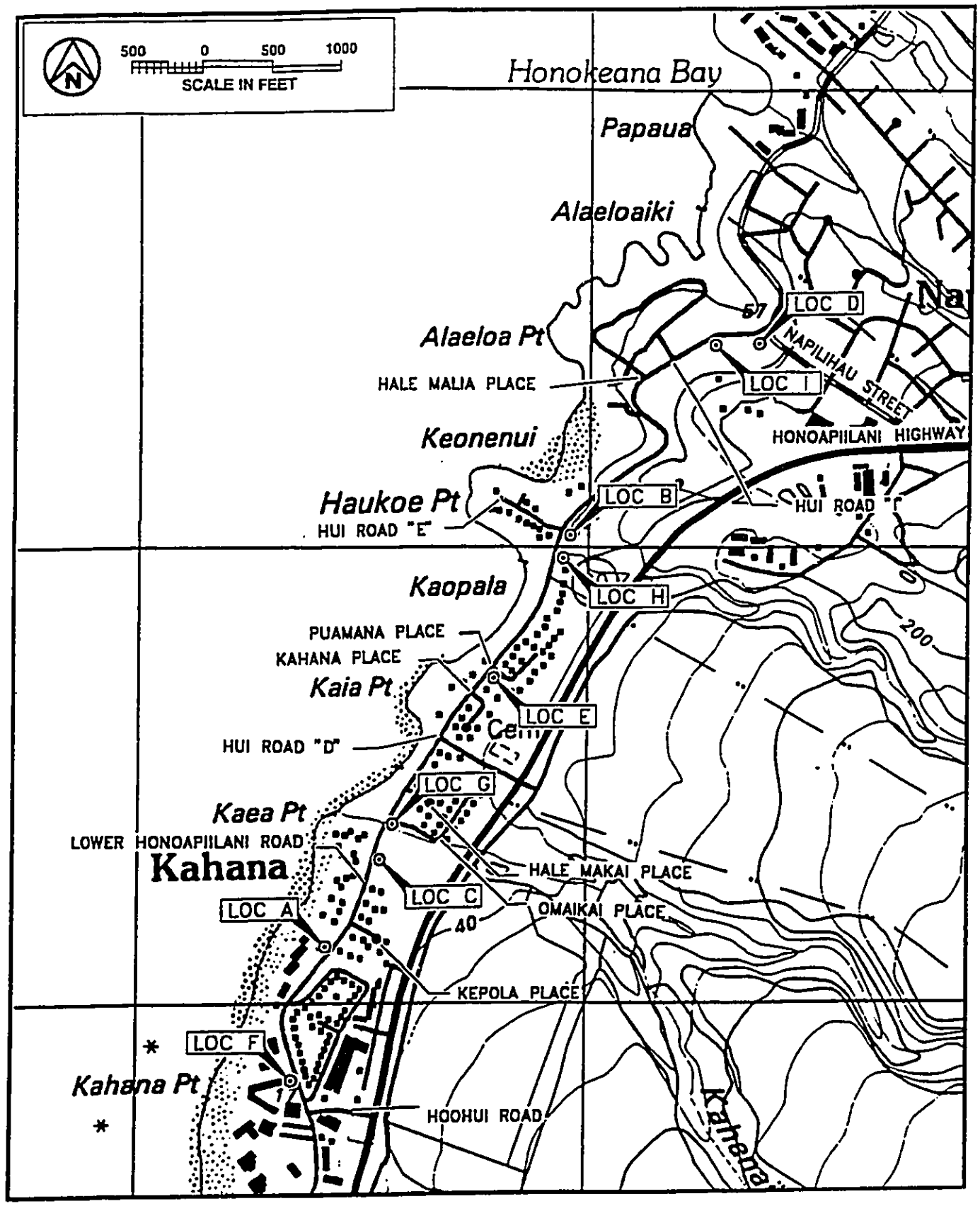
CHAPTER II. GENERAL STUDY METHODOLOGY

Noise Measurements. Existing traffic and background ambient noise levels at nine locations in the project area were measured in November 1999. The traffic noise measurements were used to calibrate the traffic noise model which was used to calculate the Base Year (CY 1999) and future (CY 2020) traffic noise levels under the No Build and Build Alternatives. The background ambient noise measurements were used to define existing noise levels at noise sensitive receptors which may be affected by the project. Also, the measurements were used in conjunction with forecast traffic noise levels to determine if future traffic noise levels are predicted to "substantially exceed" existing background ambient noise levels at these noise sensitive receptors, and therefore exceed FHWA and HDOT noise standards and criteria.

The noise measurement locations ("A" through "I") are shown in Figure 1. The results of the traffic noise measurements are summarized in Table 1. In the table, Leq represents the average (or equivalent), A-Weighted, Sound Level. A list and description of the acoustical terminology used are contained in APPENDIX B.

Traffic Noise Predictions. The Federal Highway Administration (FHWA) Traffic Noise Model, Version 1.0b (or TNM, see Reference 1) was used as the primary method of calculating Base Year and future traffic noise levels, with model parameters adjusted to reflect terrain, ground cover, and local shielding conditions. At the nine traffic noise measurement locations along the project corridor (Locations "A" through "I"), the measured noise levels were compared with model predictions to insure that measured and calculated noise levels for the existing conditions were consistent and in general agreement. As indicated in Table 1, spot counts of traffic volumes were also obtained during the measurement periods and were used to generate the Equivalent Sound Level (Leq) predictions shown in the table. The average vehicle speeds entered into the TNM were higher than posted speeds so as to achieve agreement between measured noise levels and those calculated by the TNM. With these input speed adjustments, the agreement between measured and predicted traffic noise levels was considered to be good and sufficiently accurate to formulate the Base Year and future year traffic noise levels.

Base Year traffic noise levels were then calculated along the project corridor using Base Year (1999) traffic volume data for the AM and PM peak hours from Reference 2. Traffic mix by vehicle types and average vehicle speeds for the various sections of the existing and future roadway were derived from observations during the noise monitoring periods and from References 3 and 4. Determinations of the periods of highest hourly traffic volumes along the project corridor were made after reviewing the AM and PM peak hour traffic volumes from References 2 through 4, and Figures 2 and 3. Total two-way traffic volumes were highest during the PM peak hour. The Equivalent (or Average) Hourly Sound Level [Leq(h)] noise descriptor was used to calculate the Base Year and CY 2020 traffic noise levels as required by Reference 5.



LOCATIONS OF NOISE MEASUREMENT SITES

FIGURE 1

TABLE 1

TRAFFIC NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	--Hourly Traffic Volume-- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
A. 50 FT from the centerline of Lower Honoapiilani Hwy. (11/17/99)	1200 TO 1305	35	344	9	0	60.8	58.9
B. 50 FT from the centerline of Lower Honoapiilani Hwy. (11/17/99)	1400 TO 1503	35	249	7	0	57.5	57.5
C. 50 FT from the centerline of Lower Honoapiilani Hwy. (11/16/99)	1200 TO 1303	35	330	4	1	60.1	58.3
D. 50 FT from the centerline of Lower Honoapiilani Hwy. (11/16/99)	1400 TO 1503	35	267	1	1	61.9	57.2
E. 50 FT from the centerline of Lower Honoapiilani Hwy. (11/18/99)	1200 TO 1303	35	264	5	0	59.7	57.6

TABLE 1 (CONTINUED)

TRAFFIC NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	--Hourly Traffic Volume-- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
F. 30 FT from the centerline of Lower Honoapiilani Hwy. (11/17/99)	0905 TO 1008	35	381	5	0	60.3 *	63.3
G. 30 FT from the centerline of Lower Honoapiilani Hwy. (11/17/99)	1040 TO 1145	35	284	8	1	63.6	62.6
H. 30 FT from the centerline of Lower Honoapiilani Hwy. (11/18/99)	1310 TO 1413	35	235	3	0	61.8	61.1
I. 30 FT from the centerline of Lower Honoapiilani Hwy. (11/18/99)	1508 TO 1612	35	265	2	0	61.1	61.5

* NOTE: Traffic noise partially shielded by roadway embankment at Location F.

FIGURE 2

HOURLY VARIATIONS OF TRAFFIC NOISE AT 50 FT SETBACK DISTANCE FROM THE CENTERLINE OF LOWER HONOAPIILANI ROAD AT KAHANA BRIDGE (APRIL 26, 1999)

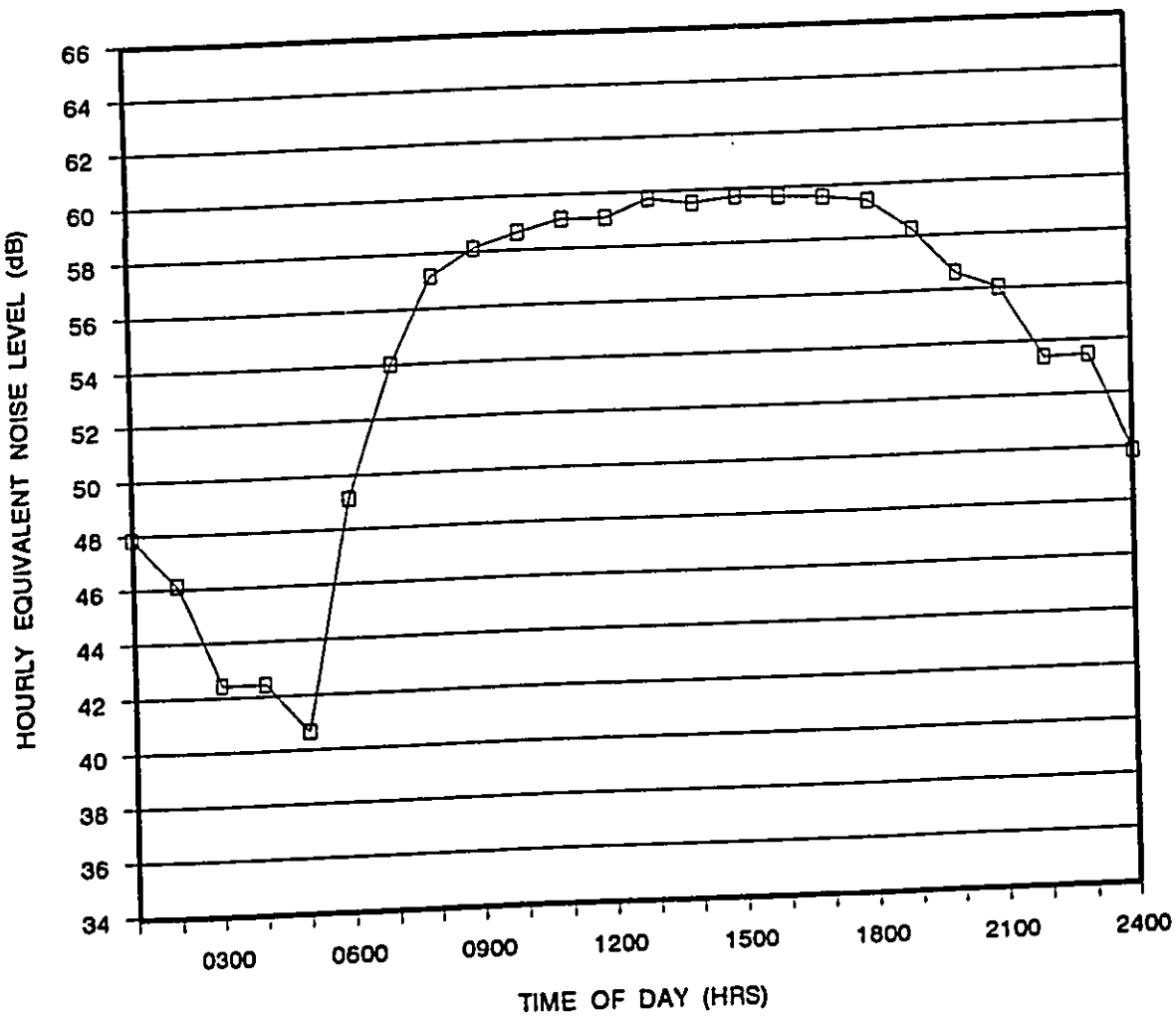
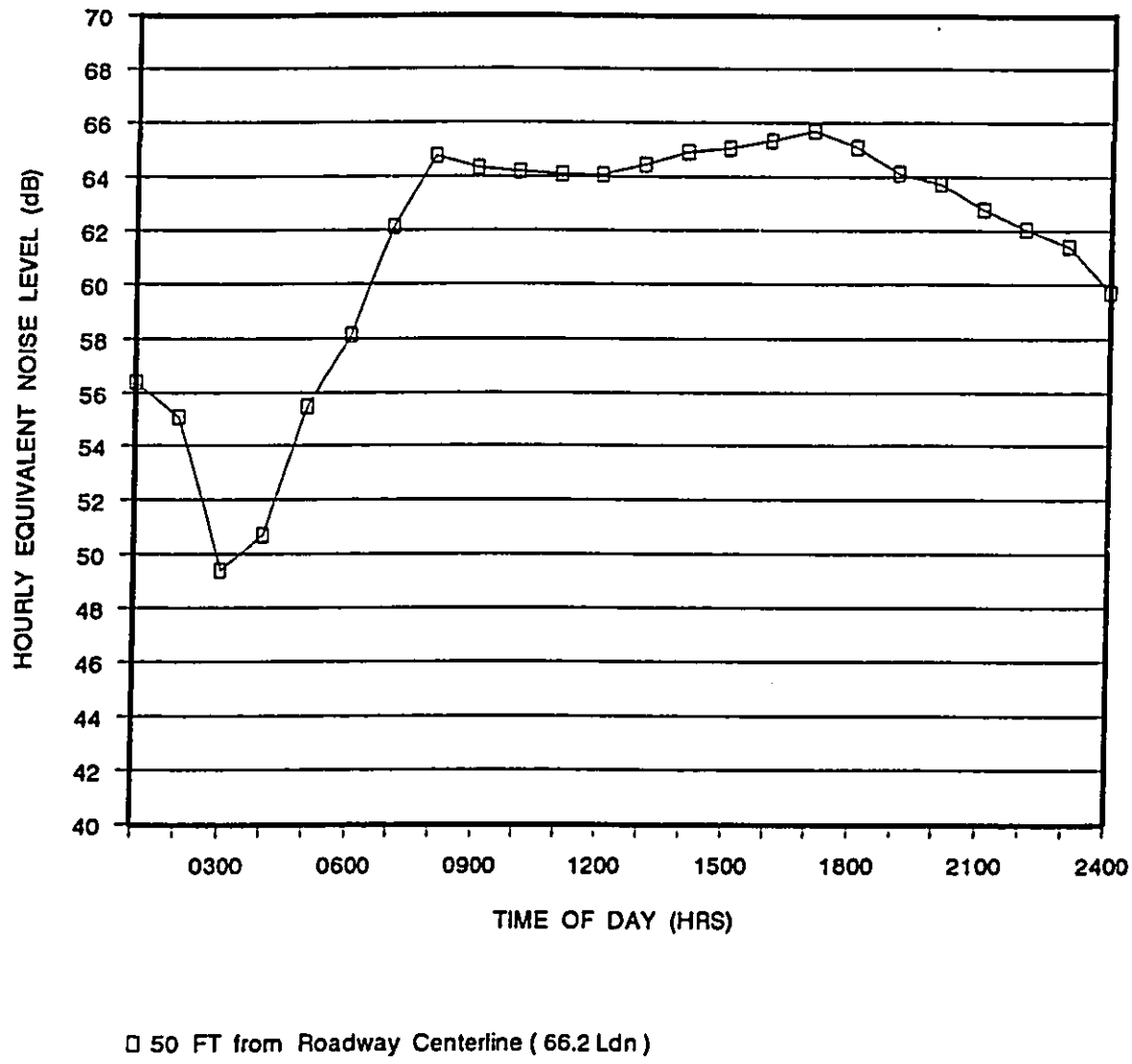


FIGURE 3

HOURLY VARIATIONS OF TRAFFIC NOISE AT 50 FT SETBACK DISTANCE FROM THE CENTERLINE OF NAPILIHAU STREET AT HONOAPIILANI HIGHWAY (APRIL 29, 1999)



Aerial photomaps, topographic maps, and project plans (where available) of the area were used to determine terrain, ground cover, and local shielding effects from building structures, which were entered into the noise prediction model.

Future year (2020) traffic noise levels were then developed for the No Build and Build (roadway improvement) Alternative using the future traffic assignments of Reference 2, the topographic and existing development features described previously, and the roadway alignment of the Build Alternative. Forecast traffic volumes, mixes, and speeds for Year 2020 were assumed to be similar for the No Build and Build Alternatives.

The CY 2020 traffic assignments for the No Build and Build Alternatives were assumed to be identical. Future traffic conditions under the No Build Alternative may worsen, with average vehicle speeds declining as a result of increased congestion. Nevertheless, under both the No Build and Build Alternatives, average vehicle speeds were assumed to remain the same as current values.

Impact Assessments and Mitigation. Following the calculation of the future traffic noise levels, evaluations of the future traffic noise levels and impacts at noise sensitive receptor locations along Lower Honoapiilani Road were made. Comparisons of predicted future traffic noise levels with FHWA and HDOT noise abatement criteria (see Table 2) were made to determine specific locations where the noise abatement criteria are expected to be exceeded.

The FHWA 67 Leq(h) standard shown in Table 2 and the HDOT "greater than 15 dB increase" criteria were applied to all noise sensitive buildings along the project corridor. In addition, the possibility of exceeding the 66 Leq(h) level was also examined for this study, since, by Reference 6, the HDOT has replaced the FHWA 67 Leq(h) criteria with their 66 Leq(h) criteria. At the commercial establishments near the south (Hoohui Road) end of the project corridor, the FHWA 72 Leq(h) and the HDOT 71 Leq(h) noise abatement criteria were applied to identify commercial establishments where noise abatement measures may also be applied. Along the project corridor, the locations of the 66 through 71 Leq(h) traffic noise contours, without the benefit of shielding from natural terrain or man-made sound barriers, were used to identify receptor locations where the HDOT's 66 and 71 Leq would not be exceeded, and which did not require more detailed evaluations. In addition, the HDOT's criteria of "greater than 15 dB increase above existing background noise levels" was also used as a noise abatement threshold for this project (from Reference 6).

TABLE 2

FHWA NOISE ABATEMENT CRITERIA
[Hourly A–Weighted Sound Level––Decibels (dBA)]

ACTIVITY CATEGORY	LEQ (h)*	DESCRIPTION OF ACTIVITY CATEGORY
A	57 (Exterior)	Lands on which serenity and quiet are of extra–ordinary significance and serve an important public need and where the preservation of those qualities is essential if the areas are to continue to serve their intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, activity sports areas, parks, residences, motels, hotels, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	------	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

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* The Hawaii State Department of Transportation, Highways Division, utilizes Leq criteria levels which are 1 Leq unit less than the FHWA values shown.

CHAPTER III. EXISTING ACOUSTICAL ENVIRONMENT

For the purposes of this study, 1999 was used as the Base Year for computing changes in traffic noise levels between the No Build and Build Alternatives. The Base Year noise environment along the project corridor was described by computing the Hourly Equivalent Sound Levels [Leq(h)] along the existing roadway during the PM peak traffic hour for the 1999 time period. The hourly sound levels, expressed in decibels, represent the average levels of traffic noise along the project roadways during the PM peak hour of the study's Base Year.

Table 3 presents the traffic volume, speed, and mix assumptions used to calculate the Base Year noise levels during the AM and PM peak hours along the existing Lower Honoapiilani Road. Shown in Table 3 are the calculated AM and PM peak hour Leq(h)'s at reference distances of 50 and 100 FT from the centerline of the roadway. The calculated distances to the 66, 67, and 71 Leq noise contour lines under unobstructed, line-of-sight conditions to the roadway are shown in Table 4 for the AM and PM peak hours. The actual distances to the contour lines will generally be less than indicated in Table 4 when intervening structures or terrain obstructions exist between the roadway and a receptor. This reduction (or shrinkage) of the traffic noise contour distances from the roadway's centerline is the result of noise shielding (or attenuation) effects caused by the intervening structures or natural terrain features.

By using the traffic noise data shown in Tables 3 and 4, and aerial photos of the existing improvements on the west (makai) and east (mauka) sides of the project corridor, the relationship of the existing free-field traffic noise contours to existing noise sensitive dwellings and public use structure in the project area were obtained. Similar evaluations were provided for those areas where commercial structures are located. An evaluation was performed of the public and private structures or park lands where the FHWA and/or the HDOT noise abatement criteria may be exceeded along the project corridor during the Base Year. From Table 4, it was concluded that existing dwelling units or other noise sensitive properties would need to be located within 25 feet or less of the roadway centerline before the noise abatement criteria could be exceeded. Since no structures or noise sensitive properties are located within 25 feet of the existing centerline of Lower Honoapiilani Road, it was concluded that both the FHWA and the HDOT noise abatement criteria were not exceeded in the project area during the Base Year.

At areas removed from the higher volume roadways, Base Year noise levels are much lower than along the roadways' Rights-of-Way due to distance factors and local shielding effects from buildings. Base Year noise levels in areas removed from the higher volume roadways are typically less than 55 Leq(h), and possibly as low as 45 Leq(h).

TABLE 3

EXISTING (CY 1999) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (AM AND PM PEAK HOURS)

LOCATION	SPEED (MPH)	TOTAL VPH	**** VOLUMES (VPH) ****** AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq
Lower Honoapiilani Road (AM)	35	235	231	4	0	57.0	52.3
Lower Honoapiilani Road (PM)	35	368	362	6	0	58.9	54.3

TABLE 4

EXISTING CONDITIONS ; YEAR 1999; AM AND PM PEAK HR. SETBACK DISTANCES

ROADWAY SEGMENT	SPEED (MPH)	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 50' (dB)	DIST. (FT) FROM CENTERLINE 66 Leq	67 Leq	71 Leq
Lower Honoapiilani Road (AM)	35	(98.2 / 1.7 / 0.1)	235	57.0	<25	<25	<25
Lower Honoapiilani Road (PM)	35	(98.2 / 1.7 / 0.1)	368	58.9	<25	<25	<25

CHAPTER IV. DESCRIPTION OF FUTURE TRAFFIC NOISE LEVELS

The future traffic noise levels in the immediate vicinity of the project during CY 2020 were evaluated for the No Build and Build Alternatives. The same methodology that was used to calculate the Base Year noise levels was also used to calculate the Year 2020 noise levels. It should be noted that forecast traffic volumes for both the No Build and Build Alternatives were identical along Lower Honoapiilani Road for the Year 2020. Under both the No Build and Build Alternatives, average vehicle speeds and traffic mix were assumed to be identical to the Base Year values.

Tables 5 and 6 summarize the traffic conditions, noise levels, and setback distances for the No Build or Build Alternatives during the AM and PM peak hours in CY 2020. Traffic noise levels in the immediate vicinity of the project are predicted to increase by approximately 2.7 dB between CY 1999 and CY 2020 solely as a result of projected traffic volume increases under both alternatives. Under the No Build Alternative, the HDOT 66 noise abatement criteria would not be exceeded at any existing dwelling units along Lower Honoapiilani Road. The FHWA and HDOT noise abatement criteria would not be exceeded at any public use structures or park lands under the No Build Alternative in CY 2020.

Figures 4A through 4L depict the 27 noise sensitive receptor locations where future traffic noise levels were calculated for the Build Alternative using the FHWA Traffic Noise Model. The predicted CY 2020 traffic noise levels at these 27 receptor locations are shown in Table 7. The predicted increases in future traffic noise at the 27 locations range from 1.7 to 4.1 Leq.

The following general conclusions can be made in respect to potential traffic noise impacts which can be expected by CY 2020 under the Build Alternative. These conclusions are valid as long as the future vehicle mixes and average speeds do not differ from the assumed values.

- The HDOT's ">15 dB increase" criteria for substantial change in traffic noise levels will not be exceeded at any noise sensitive structure. Maximum increases in traffic noise levels in the project area should not exceed 4.1 dB as a result of growth in traffic volumes and realignment of the roadway.

- Under the Build Alternative, future traffic noise levels are not expected to exceed the HDOT "66 Leq" criteria at any noise sensitive buildings located within the limits of project construction.

- No parks or public use structures should be affected by the proposed project or require noise mitigation measures. Traffic noise levels at the Kahana Door of Faith Church complex of three buildings located at Receptor #21 will not exceed the HDOT "66 Leq" criteria with or without the project.

TABLE 5

FUTURE (CY 2020) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (AM AND PM PEAK HOURS)

LOCATION	SPEED (MPH)	TOTAL VPH	**** VOLUMES (VPH) ****** AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq
Lower Honoapiilani Road (AM)	35	419	412	7	0	59.6	54.9
Lower Honoapiilani Road (PM)	35	659	647	11	1	61.6	56.9

TABLE 6

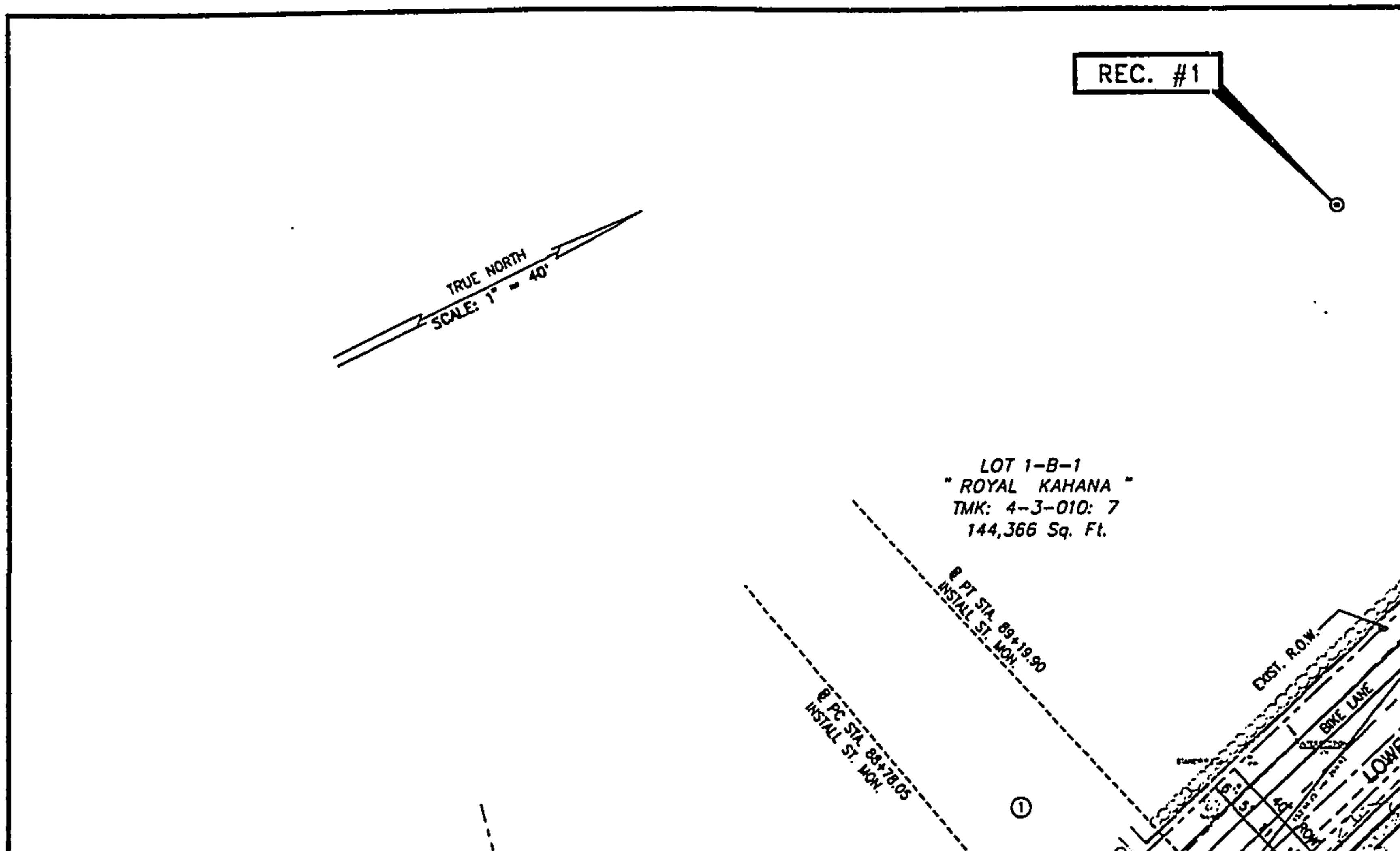
FUTURE CONDITIONS ; YEAR 2020; AM AND PM PEAK HR. SETBACK DISTANCES

ROADWAY SEGMENT	SPEED (MPH)	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 50' (dB)	DIST. (FT) FROM CENTERLINE 66 Leq	67 Leq	71 Leq
Lower Honoapiilani Road (AM)	35	(98.2 / 1.7 / 0.1)	419	59.6	<25	<25	<25
Lower Honoapiilani Road (PM)	35	(98.2 / 1.7 / 0.1)	659	61.6	30/27 *	26/25 **	<25

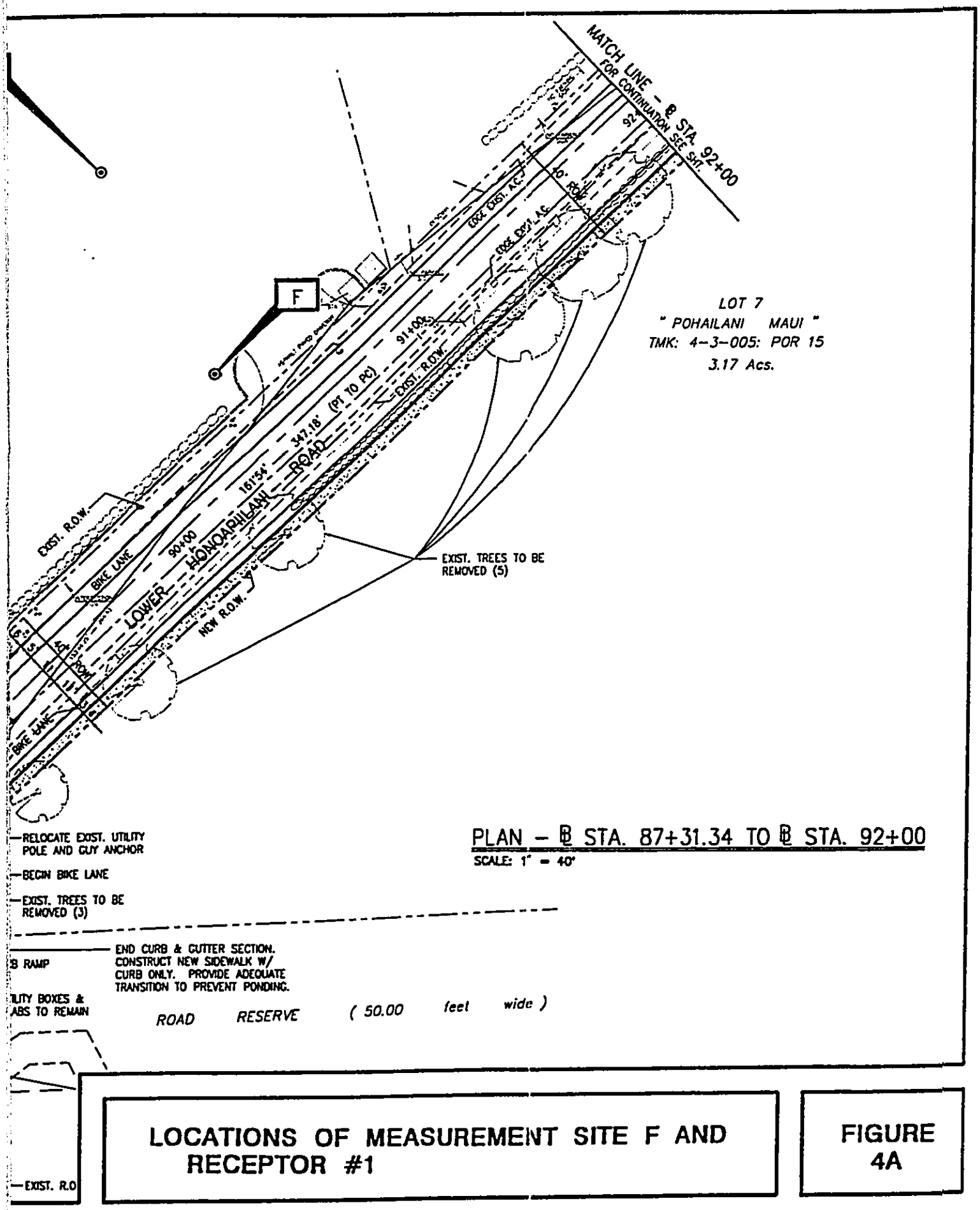
NOTES:

* 30 foot setback distance to the 66 Leq contour on the west side of the Lower Honoapiilani Road, and 27 foot setback distance to the 66 Leq contour on the east side of the Lower Honoapiilani Road.

** 26 foot setback distance to the 67 Leq contour on the west side of the Lower Honoapiilani Road, and 25 foot setback distance to the 67 Leq contour on the east side of the Lower Honoapiilani Road.



REC. #1
TRUE NORTH
SCALE: 1" = 40'
LOT 1-B-1
" ROYAL KAHANA "
TMK: 4-3-010: 7
144,366 Sq. Ft.
℄ PT STA. 89+19.90
INSTALL ST. MON.
℄ PC STA. 88+78.05
INSTALL ST. MON.
EXIST. R.O.W.
BIKE LANE
BEGIN PHASE - 4
℄ PT STA. 87+31.34
END PHASE - 3
EXIST. ST. MON.
BASELINE (℄)
(PT TO PC)
NEW R.O.W.
RELOCATE EXIST. UTILITY POLE AND GUY ANCHOR
BEGIN BIKE LANE
EXIST. TREES TO BE REMOVED (3)
NEW CURB RAMP TYPE "B"
EXIST. UTILITY BOXES & CONC. SLABS TO REMAIN
EXIST. ST. LIGHT TO REMAIN
HOOHUI ROAD
EXIST. R.O

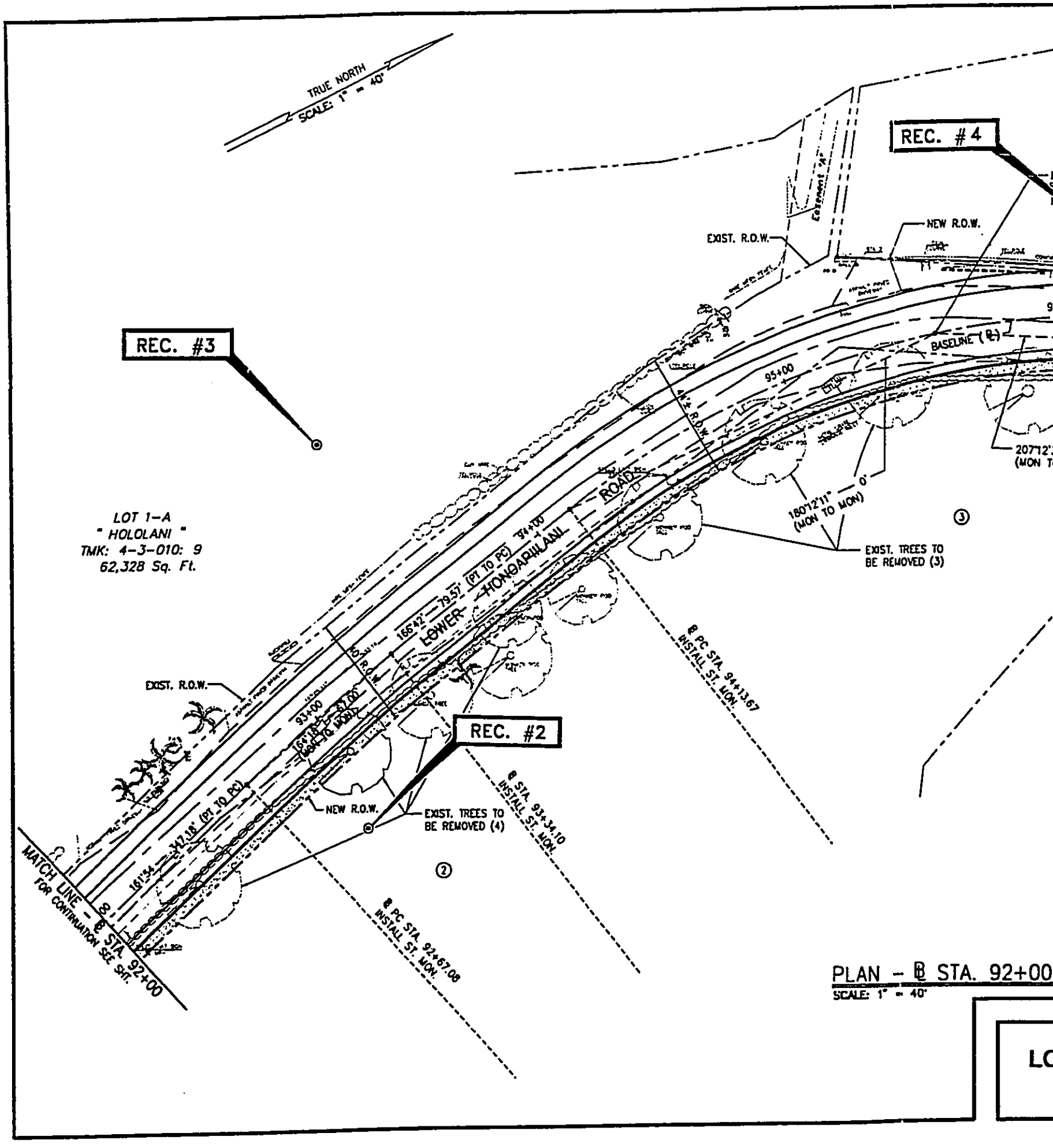


PLAN – ℄ STA. 87+31.34 TO ℄ STA. 92+00

SCALE: 1" = 40'

LOCATIONS OF MEASUREMENT SITE F AND RECEPTOR #1

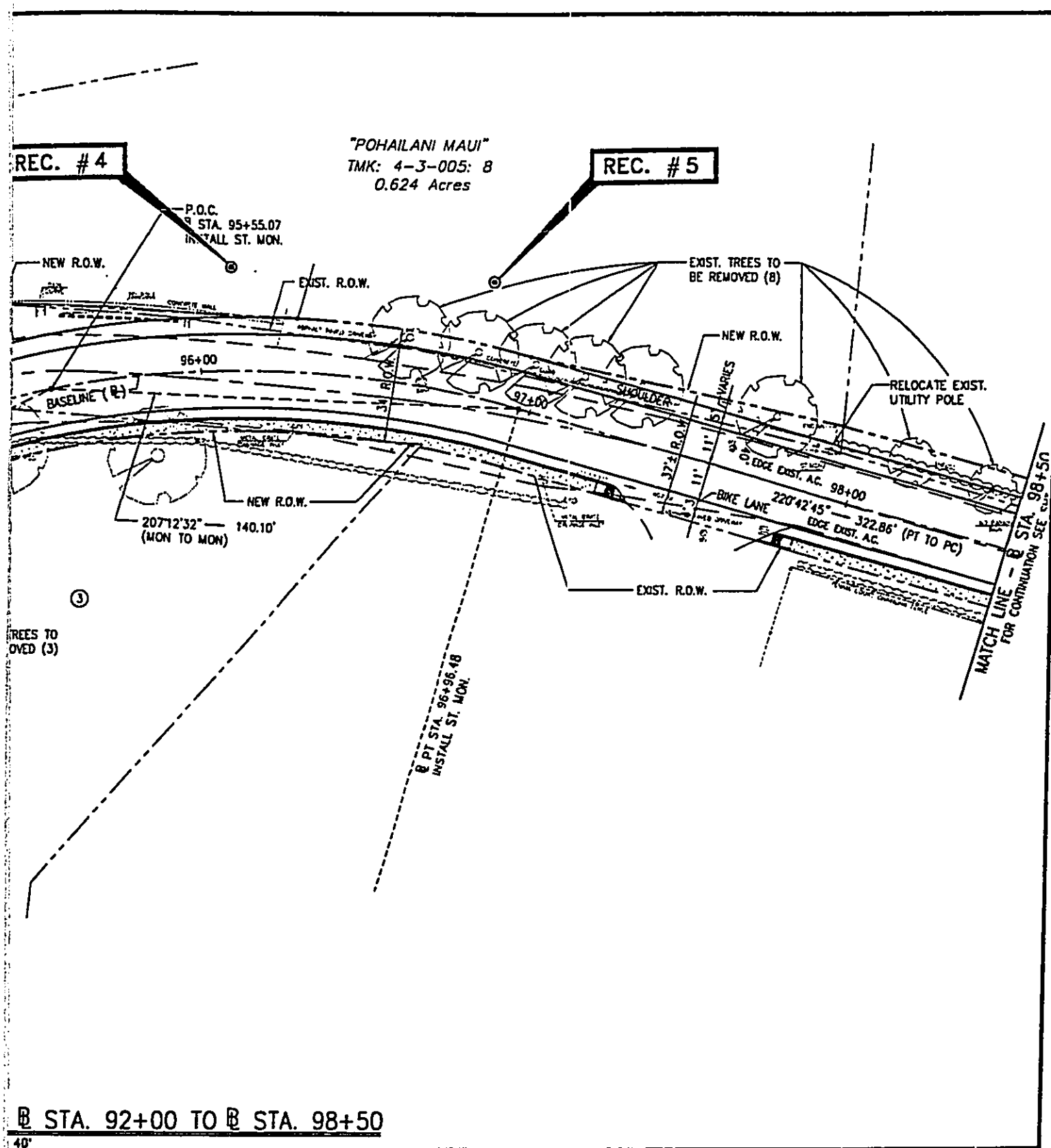
FIGURE 4A



PLAN - ℄ STA. 92+00

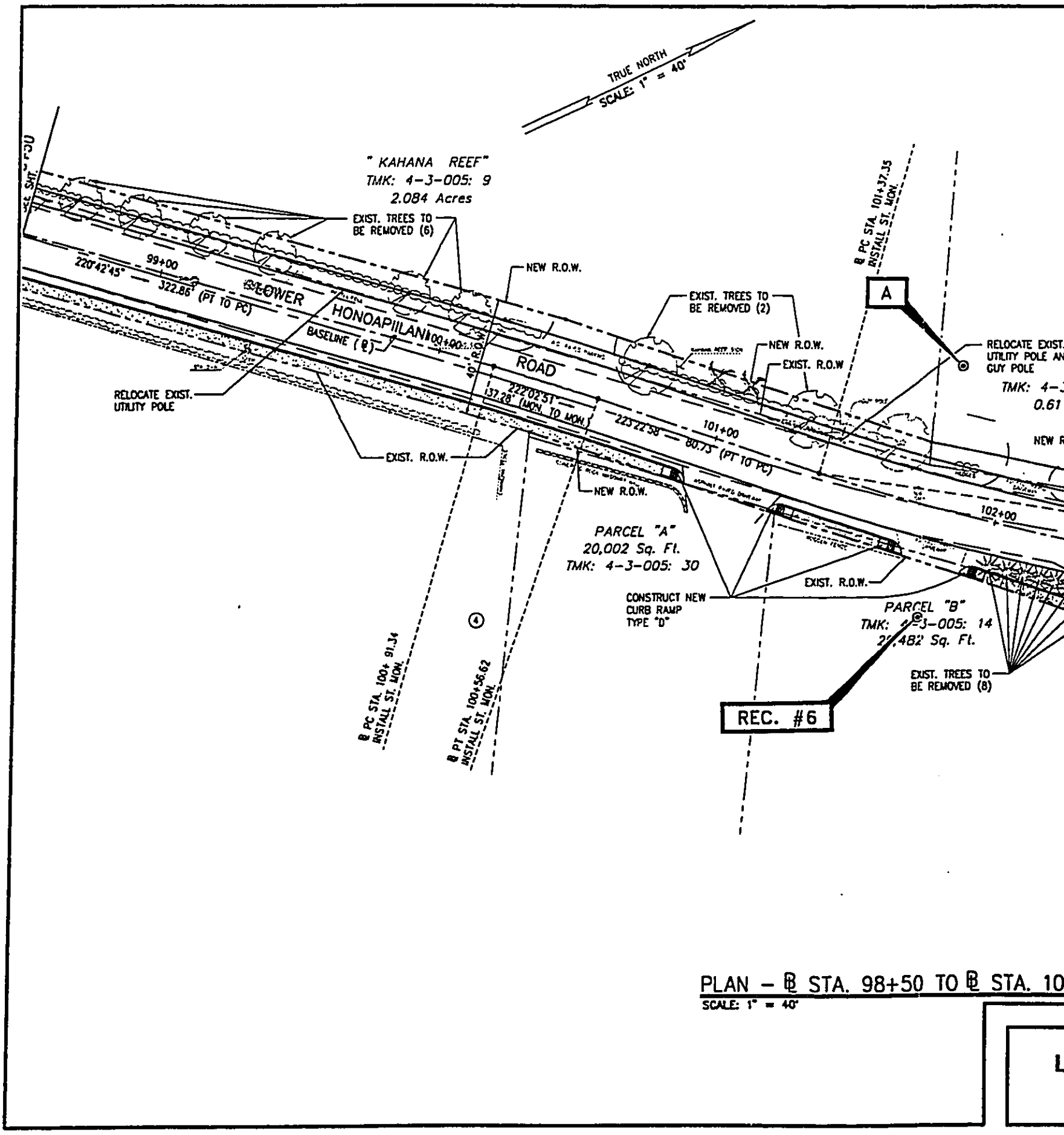
SCALE: 1" = 40'

LO



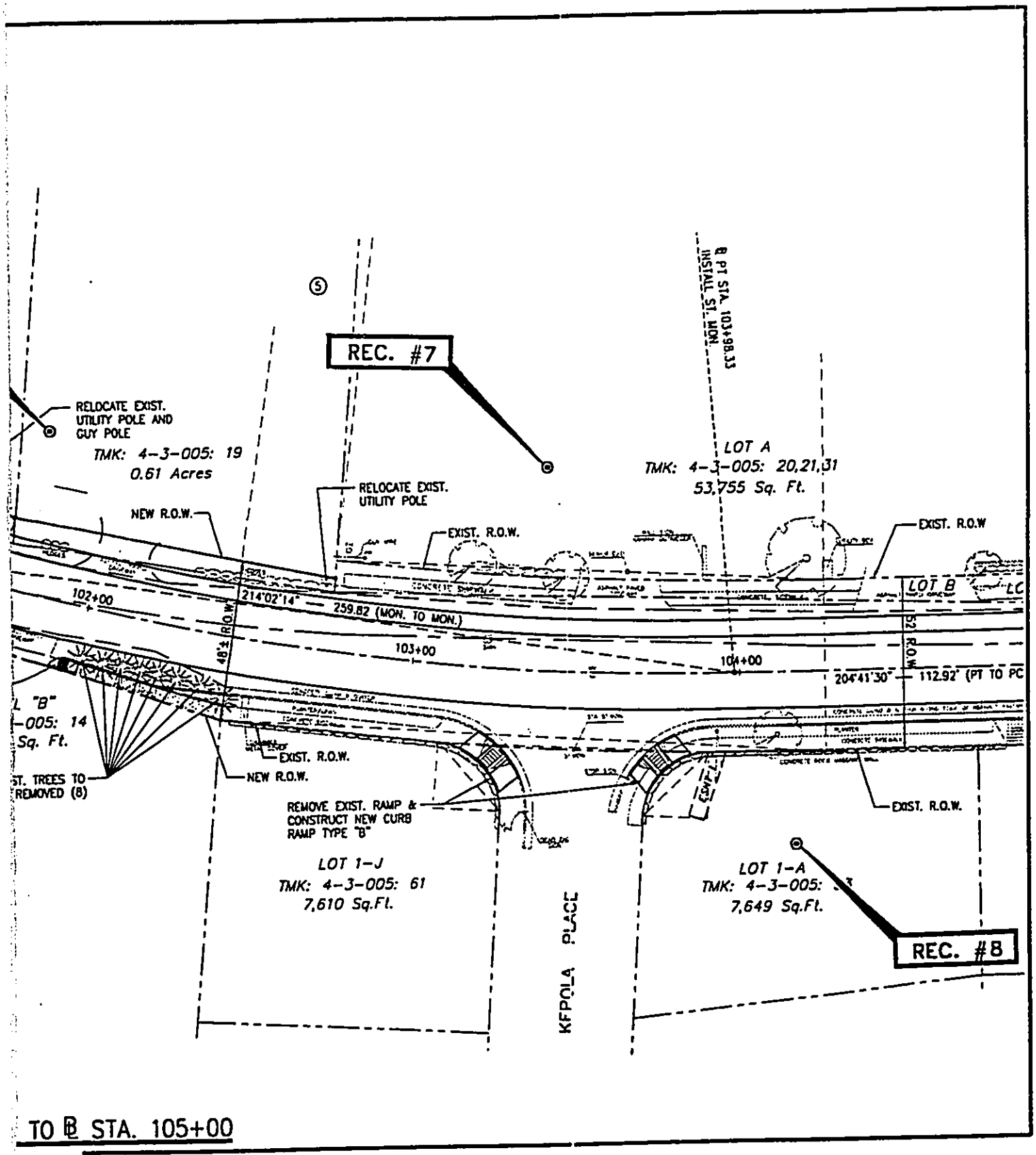
LOCATIONS OF RECEPTORS #2 THROUGH #5

FIGURE 4B



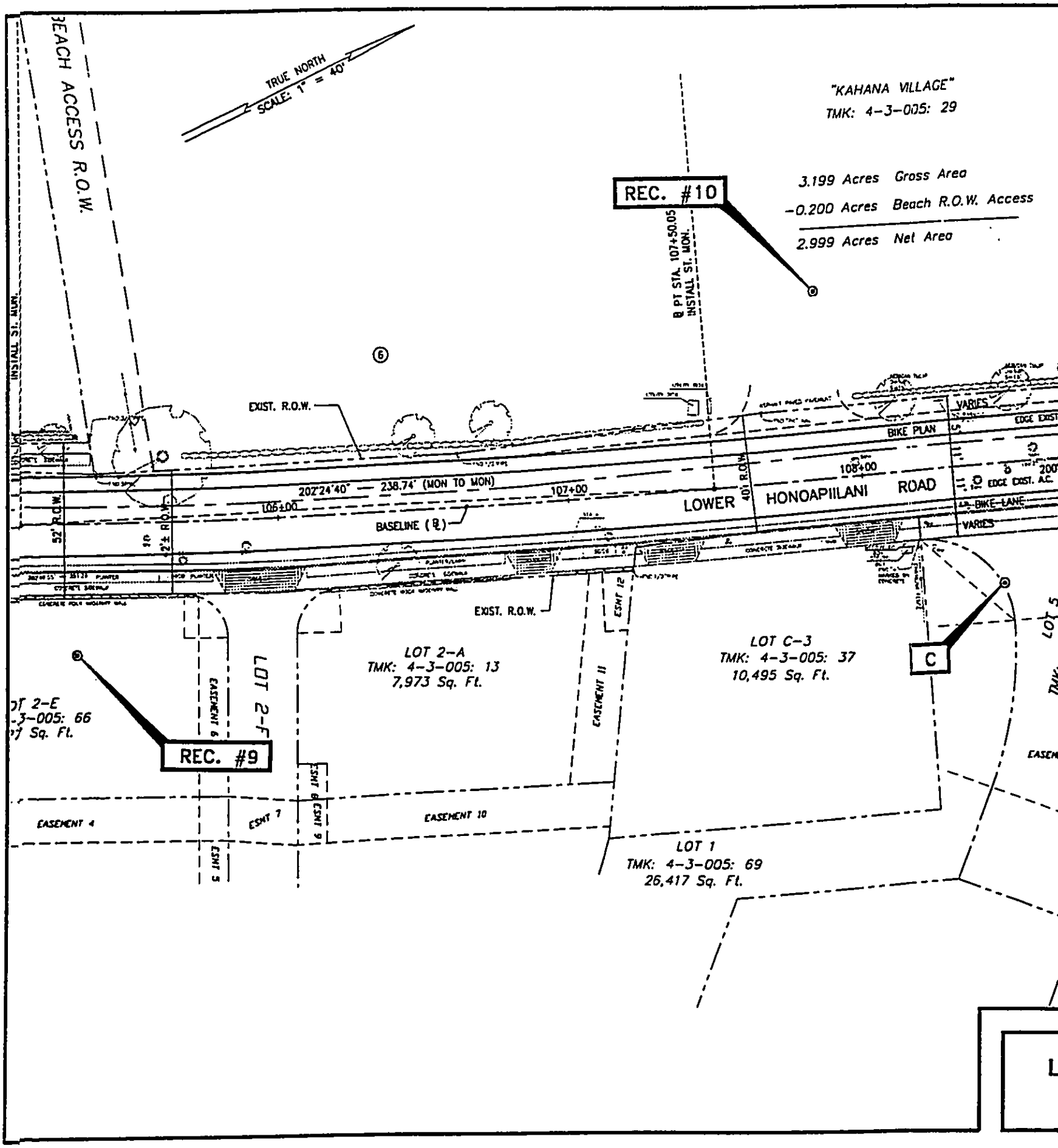
PLAN – ℄ STA. 98+50 TO ℄ STA. 10

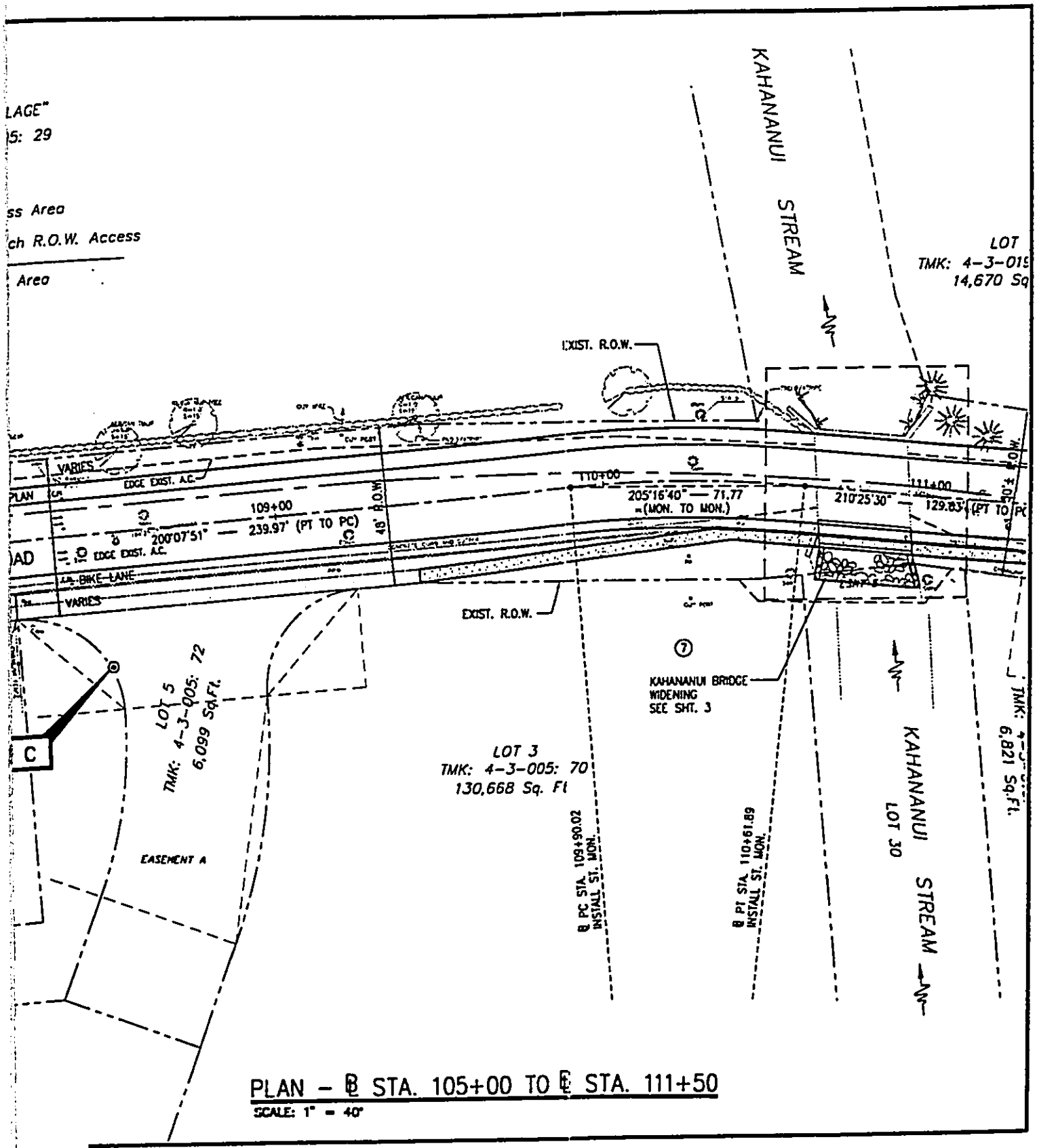
SCALE: 1" = 40'



LOCATIONS OF MEASUREMENT SITE A AND RECEPTORS #6 THROUGH #8

FIGURE 4C


TRUE NORTH
SCALE: 1" = 40'
"KAHANA VILLAGE"
TMK: 4-3-005: 29
3.199 Acres Gross Area
-0.200 Acres Beach R.O.W. Access
2.999 Acres Net Area
REC. #10
REC. #9
C
BEACH ACCESS R.O.W.
INSTALL ST. MON.
℄ PT STA. 107+50.05
INSTALL ST. MON.
EXIST. R.O.W.
202°24'40" 238.74' (MON TO MON)
106±00
107+00
108+00
BASELINE (℄)
LOWER HONOAPIILANI ROAD
401 R.O.W.
52' R.O.W.
12'± R.O.W.
BIKE PLAN
BIKE LANE
VARIES
EDGE EXIST. AC.
LOT 2-A
TMK: 4-3-005: 13
7,973 Sq. Ft.
LOT C-3
TMK: 4-3-005: 37
10,495 Sq. Ft.
LOT 1
TMK: 4-3-005: 69
26,417 Sq. Ft.
LOT 2-F
LOT 2-E
-3-005: 66
7 Sq. Ft.
EASEMENT 4
EASEMENT 5
EASEMENT 6
EASEMENT 7
EASEMENT 8
EASEMENT 9
EASEMENT 10
EASEMENT 11
EASEMENT 12



LOCATIONS OF MEASUREMENT SITE C AND RECEPTORS #9 AND #10

FIGURE 4D

TRUE NORTH
SCALE: 1" = 40'

REC. #11

CONSTRUCT NEW CURB RAMP TYPE "D"

LOT 2
TMK: 4-3-019: POR 46
11,210 Sq. Ft.

EXIST. TREES TO BE REMOVED (8)

E.O.T. R.O.W.

EXIST TREES TO BE REMOVED (1)

TMK: 4-3-019: 47
12,100 Sq. Ft.

112+00

210°25'30" — 129.63 (PT TO PC)

211°51'15" — 39.90 (MON. TO MON.)

LOWER HONOAPAPIILANI ROAD

48' R.O.W.

215°17" — 139.75' (PT TO PC)

BASELINE (℄)

114+00

217°36'15" — 60.27 (MON. TO MON.)

221°55'30" — 103.6

115+00

EXIST. R.O.W.

G

LOT 11
TMK: 4-3-019: 41
7,630 Sq.Ft.

LOT 10
TMK: 4-3-019: 40
7,965 Sq.Ft.

OMAIKAI PLACE

℄ PC STA. 111+91.52
INSTALL ST. MON.

LOT 27
TMK: 4-3-019: 27
2,229 Sq. Ft.

℄ PT STA. 112+31.43
INSTALL ST. MON.

℄ PC STA. 113+91.18
INSTALL ST. MON.

9

HALE MAKAI PLACE

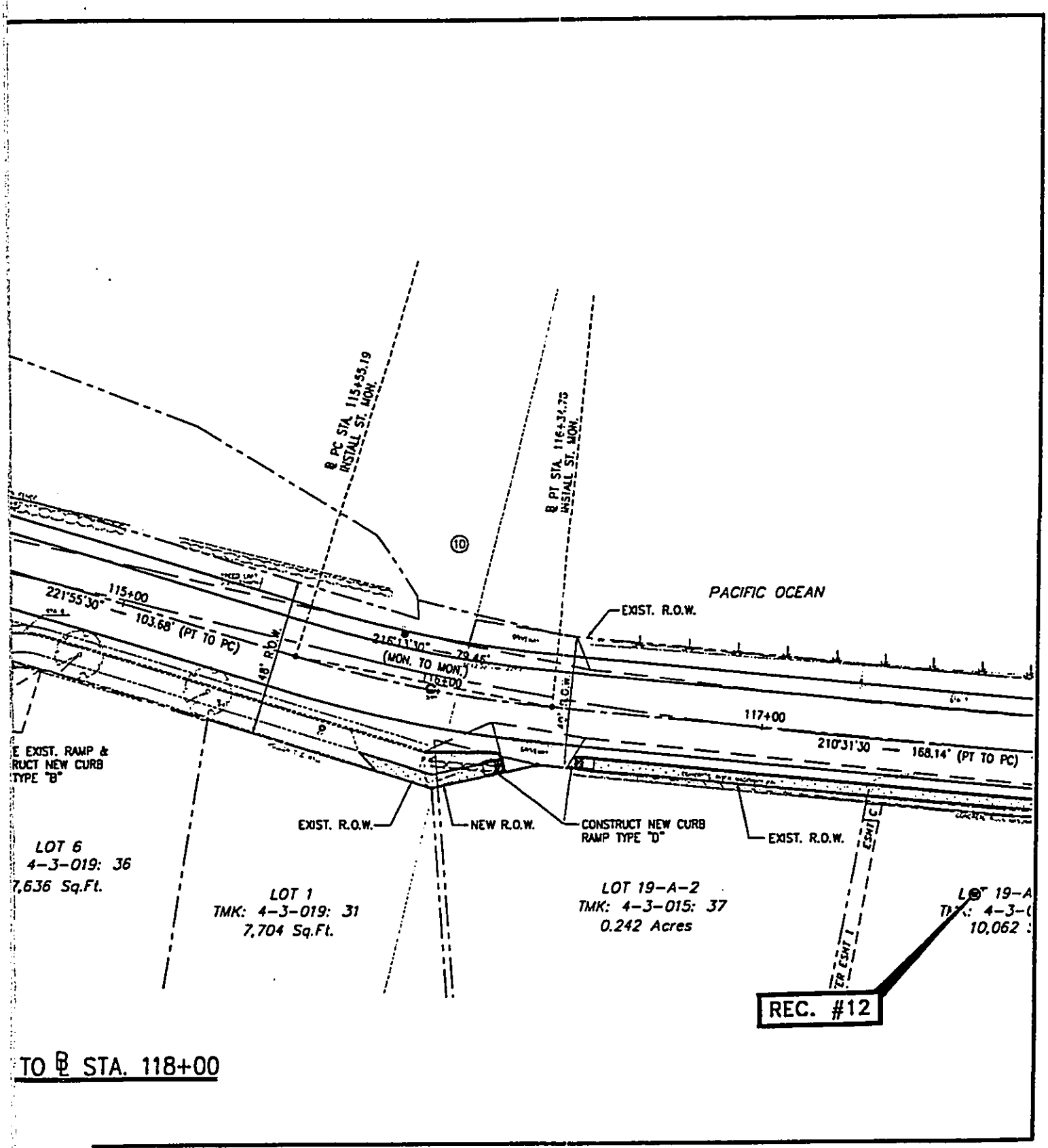
℄ PT STA. 114+51.51
INSTALL ST. MON.

REMOVE EXIST. RAMP & CONSTRUCT NEW CURB RAMP TYPE "B"

LOT 6
TMK: 4-3-019: 36
7,636 Sq.Ft.

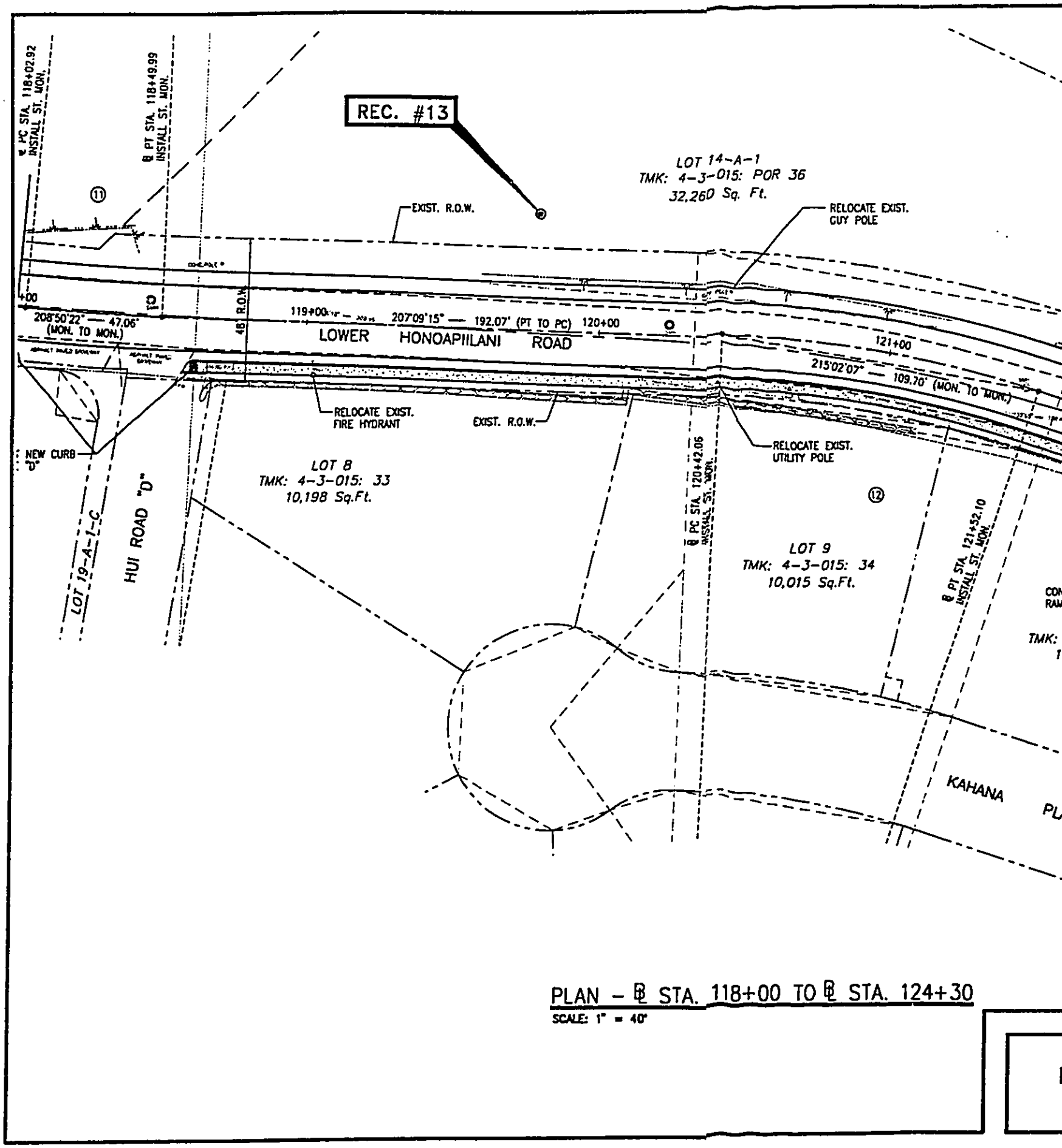
PLAN — ℄ STA. 111+50 TO ℄ STA. 11

SCALE: 1" = 40'



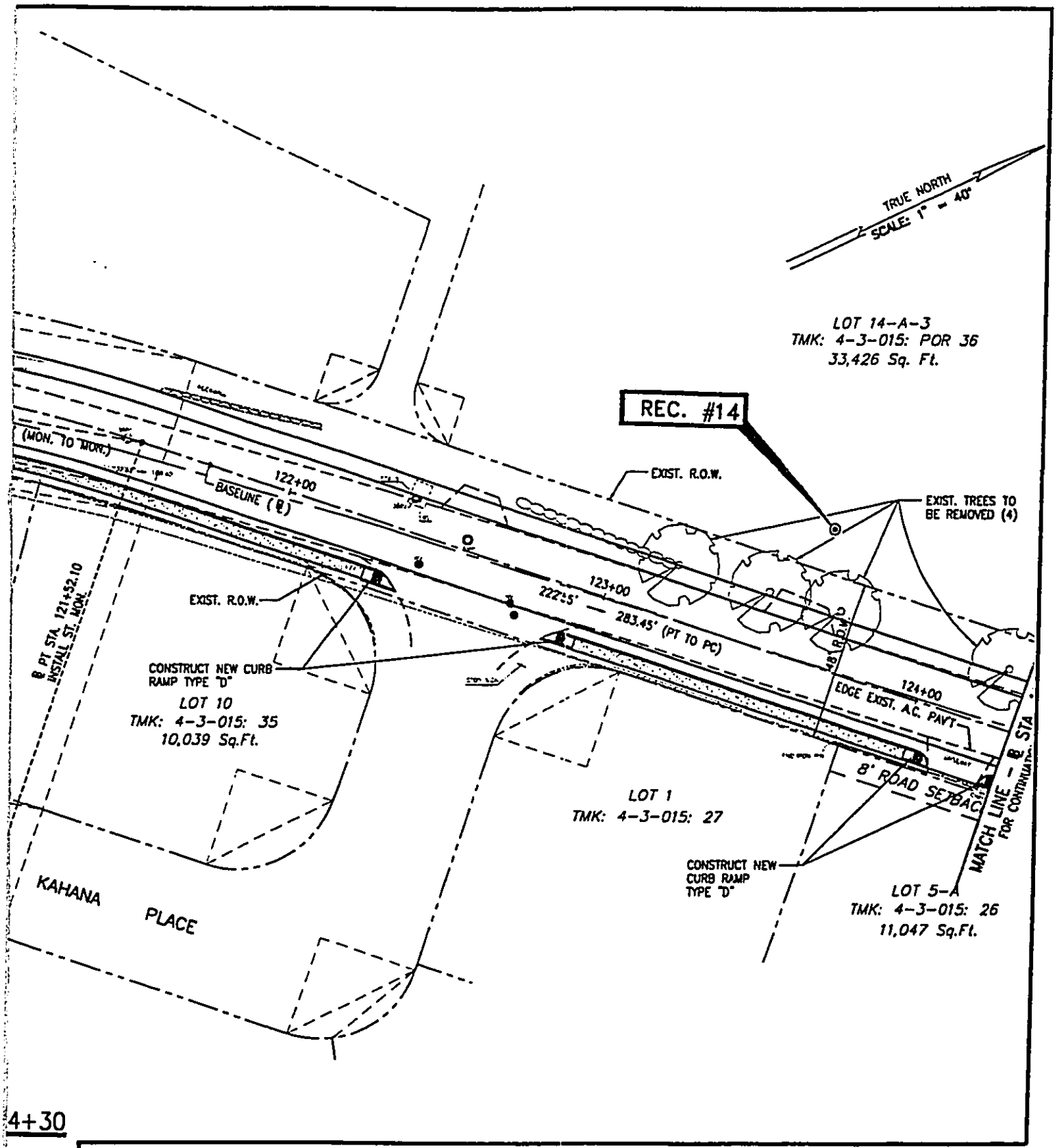
LOCATIONS OF MEASUREMENT SITE G AND RECEPTORS #11 AND #12

FIGURE 4E



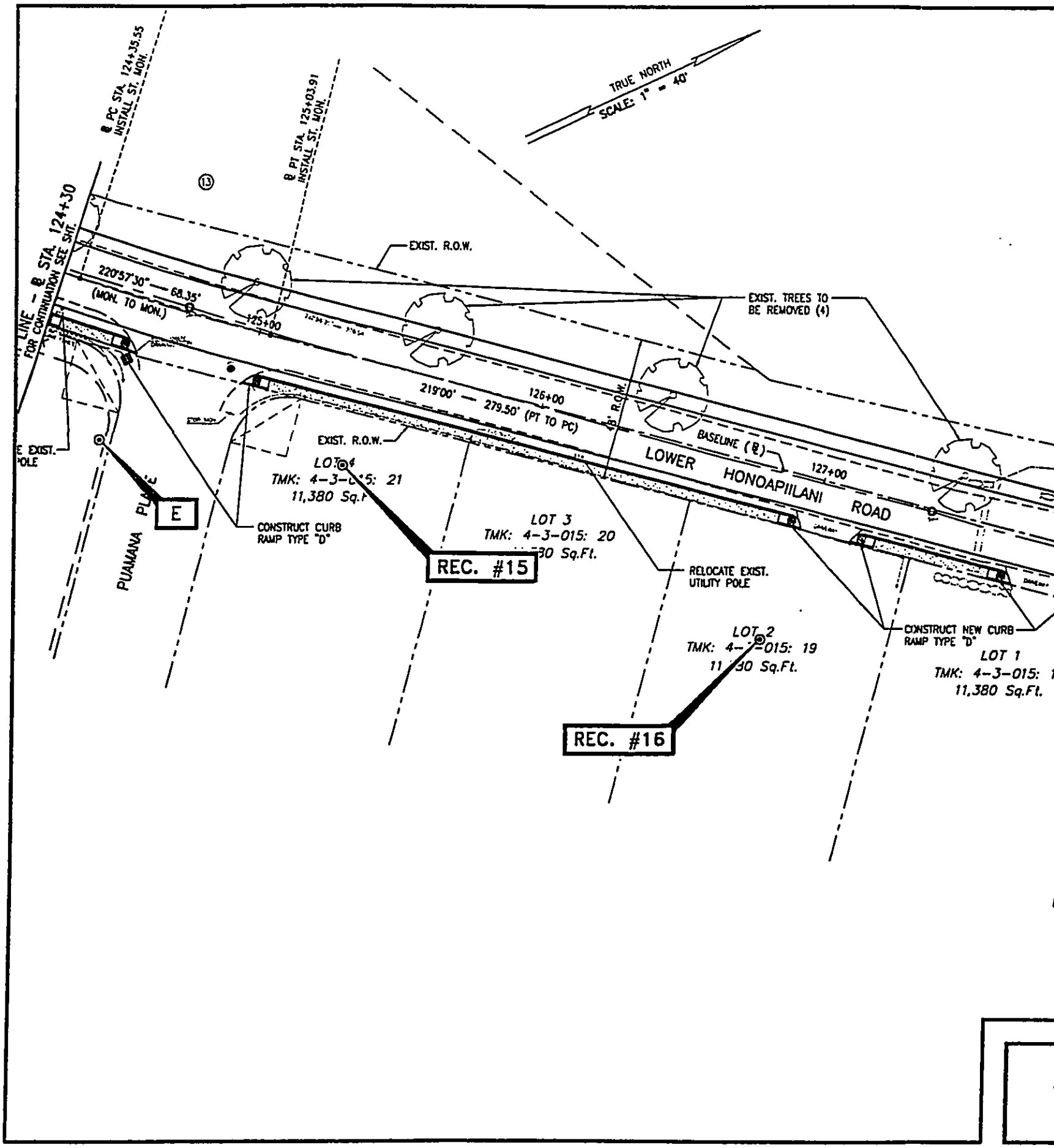
PLAN – ℄ STA. 118+00 TO ℄ STA. 124+30

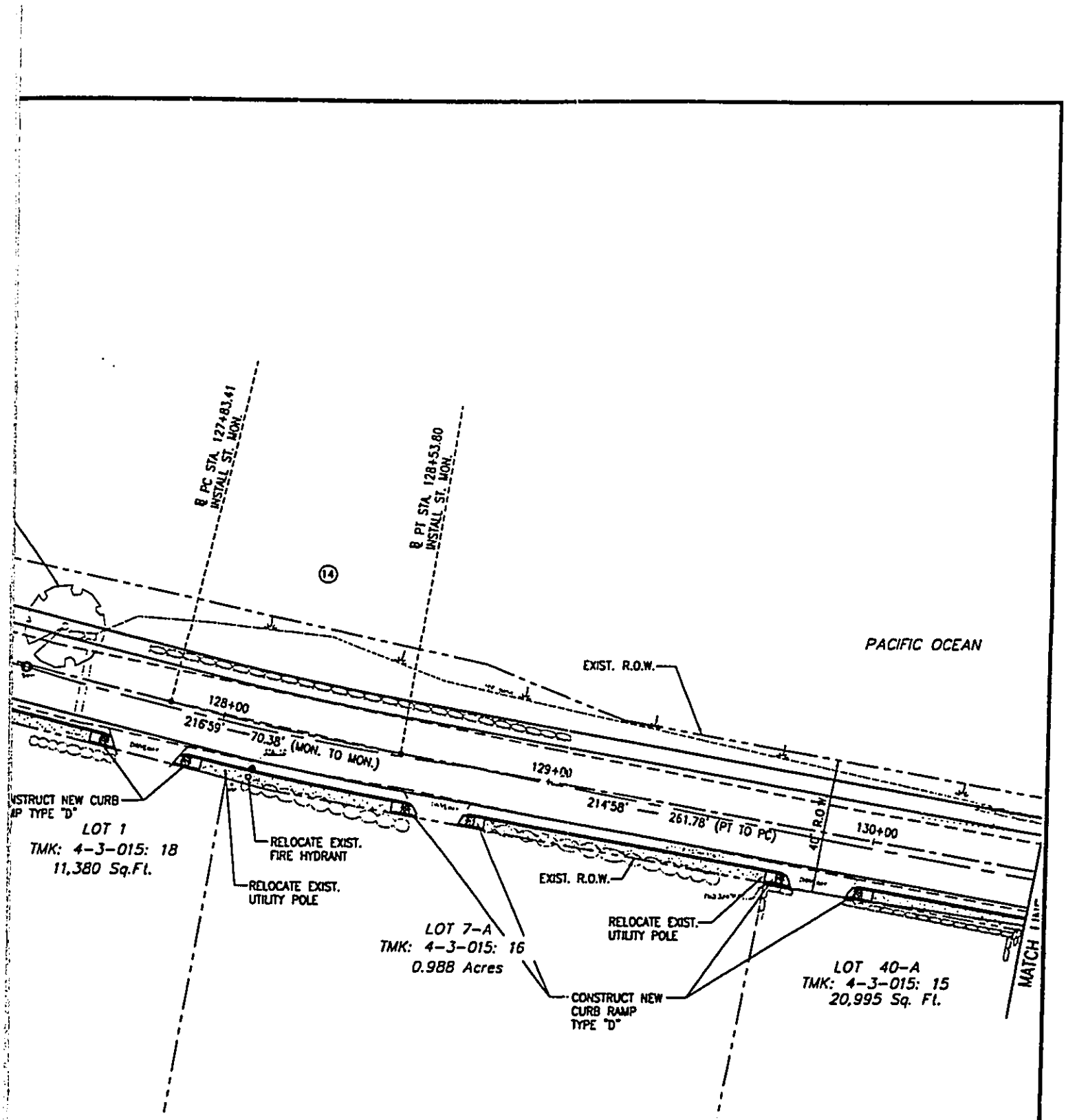
SCALE: 1" = 40'



LOCATIONS OF RECEPTORS #13 AND #14

FIGURE 4F


℄ PC STA. 124+35.55
INSTALL ST. MON.
℄ PT STA. 125+03.91
INSTALL ST. MON.
TRUE NORTH
SCALE: 1" = 40'
⑬
℄ STA. 124+30
FOR CONTINUATION SEE SHT.
EXIST. R.O.W.
220°57'30" — 68.35'
(MON. TO MON.)
125+00
EXIST. TREES TO
BE REMOVED (4)
219°00' — 279.50' (PT TO PC)
126+00
R.O.W.
BASELINE (℄)
127+00
LOWER HONOAPIILANI ROAD
EXIST. R.O.W.
LOT 4
TMK: 4-3-015: 21
11,380 Sq.Ft.
E
CONSTRUCT CURB
RAMP TYPE "D"
REC. #15
LOT 3
TMK: 4-3-015: 20
11,380 Sq.Ft.
RELOCATE EXIST.
UTILITY POLE
PUAMANA PLACE
LOT 2
TMK: 4-3-015: 19
11,380 Sq.Ft.
CONSTRUCT NEW CURB
RAMP TYPE "D"
LOT 1
TMK: 4-3-015:
11,380 Sq.Ft.
REC. #16

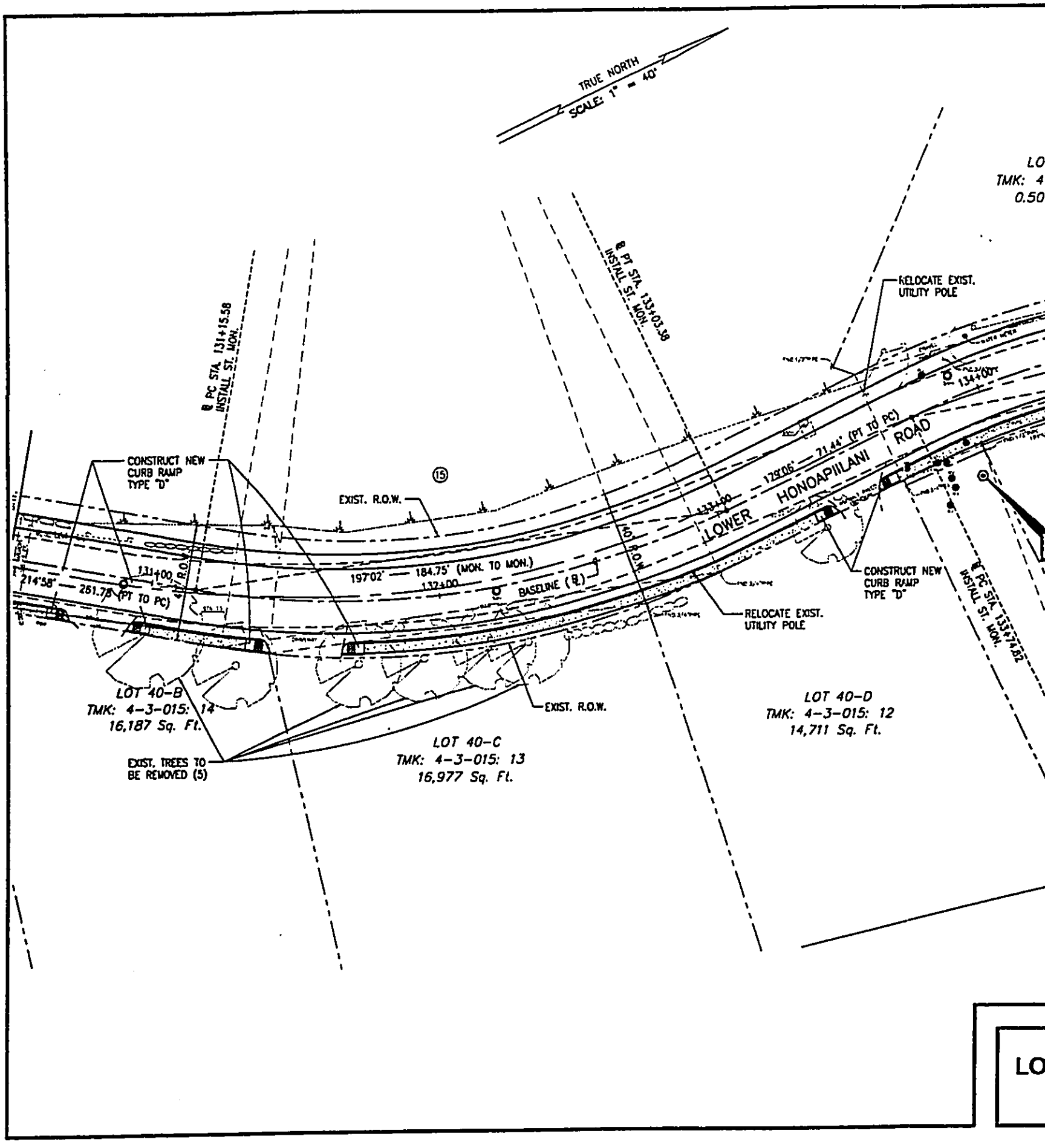


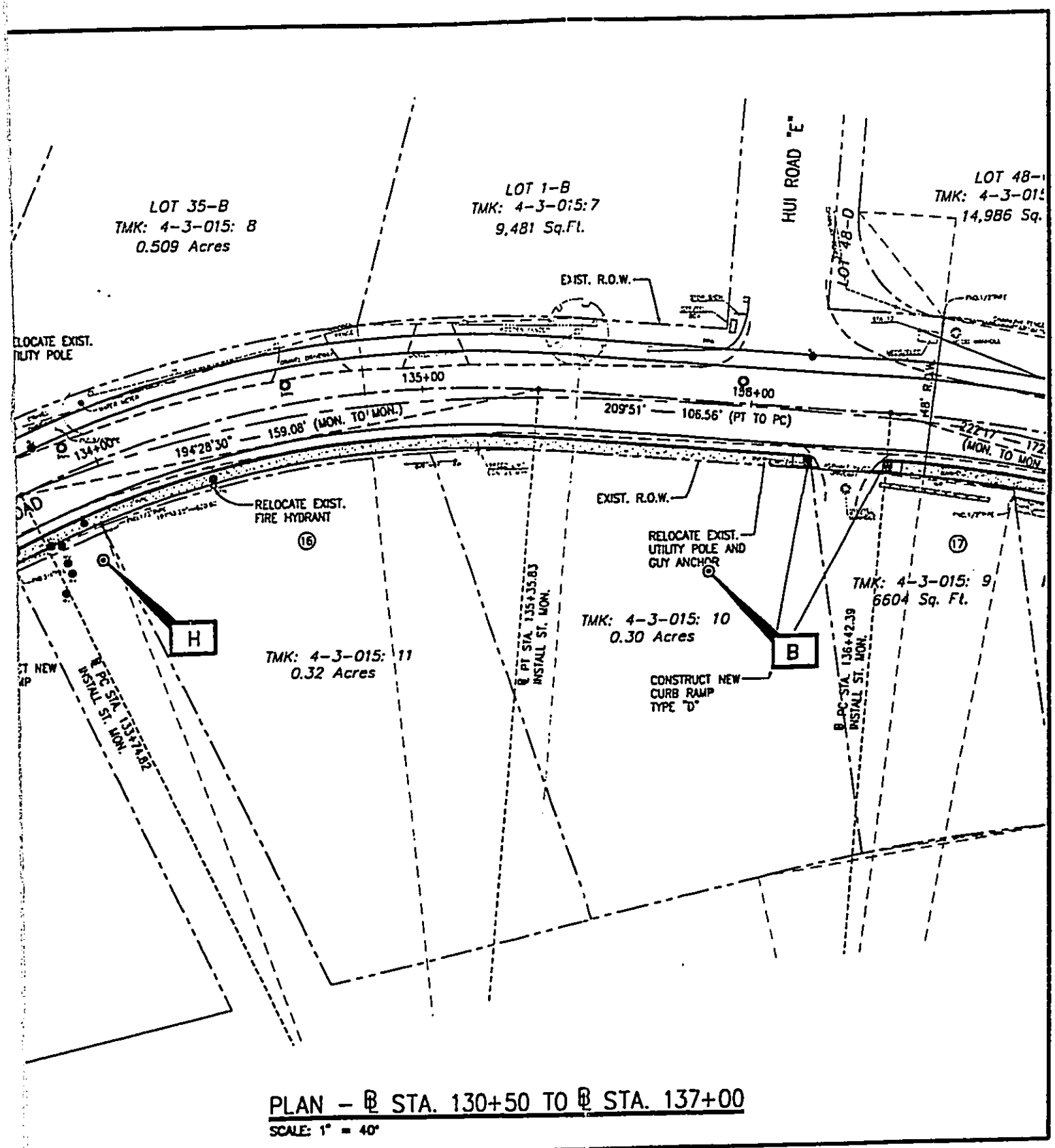
PLAN – ℄ STA. 124+30 TO ℄ STA. 130+50

SCALE: 1" = 40'

LOCATIONS OF MEASUREMENT SITE E AND RECEPTORS #15 AND #16

FIGURE 4G


TRUE NORTH
SCALE: 1" = 40'
PC STA 131+15.58
INSTALL ST. MON.
PT STA 133+03.58
INSTALL ST. MON.
RELOCATE EXIST.
UTILITY POLE
CONSTRUCT NEW
CURB RAMP
TYPE "D"
EXIST. R.O.W.
214°58'
261.78' (PT TO PC)
131+00
R.O.
19°02'
184.75' (MON. TO MON.)
132+00
BASELINE (℄)
133+00
HONOAPIILANI
ROAD
LOWER
40' R.O.W.
129°06'
71.44' (PT TO PC)
134+00
CONSTRUCT NEW
CURB RAMP
TYPE "D"
RELOCATE EXIST.
UTILITY POLE
PC STA 133+74.82
INSTALL ST. MON.
EXIST. R.O.W.
LOT 40-B
TMK: 4-3-015: 14
16,187 Sq. Ft.
EXIST. TREES TO
BE REMOVED (5)
LOT 40-C
TMK: 4-3-015: 13
16,977 Sq. Ft.
LOT 40-D
TMK: 4-3-015: 12
14,711 Sq. Ft.
LO
TMK: 4
0.50

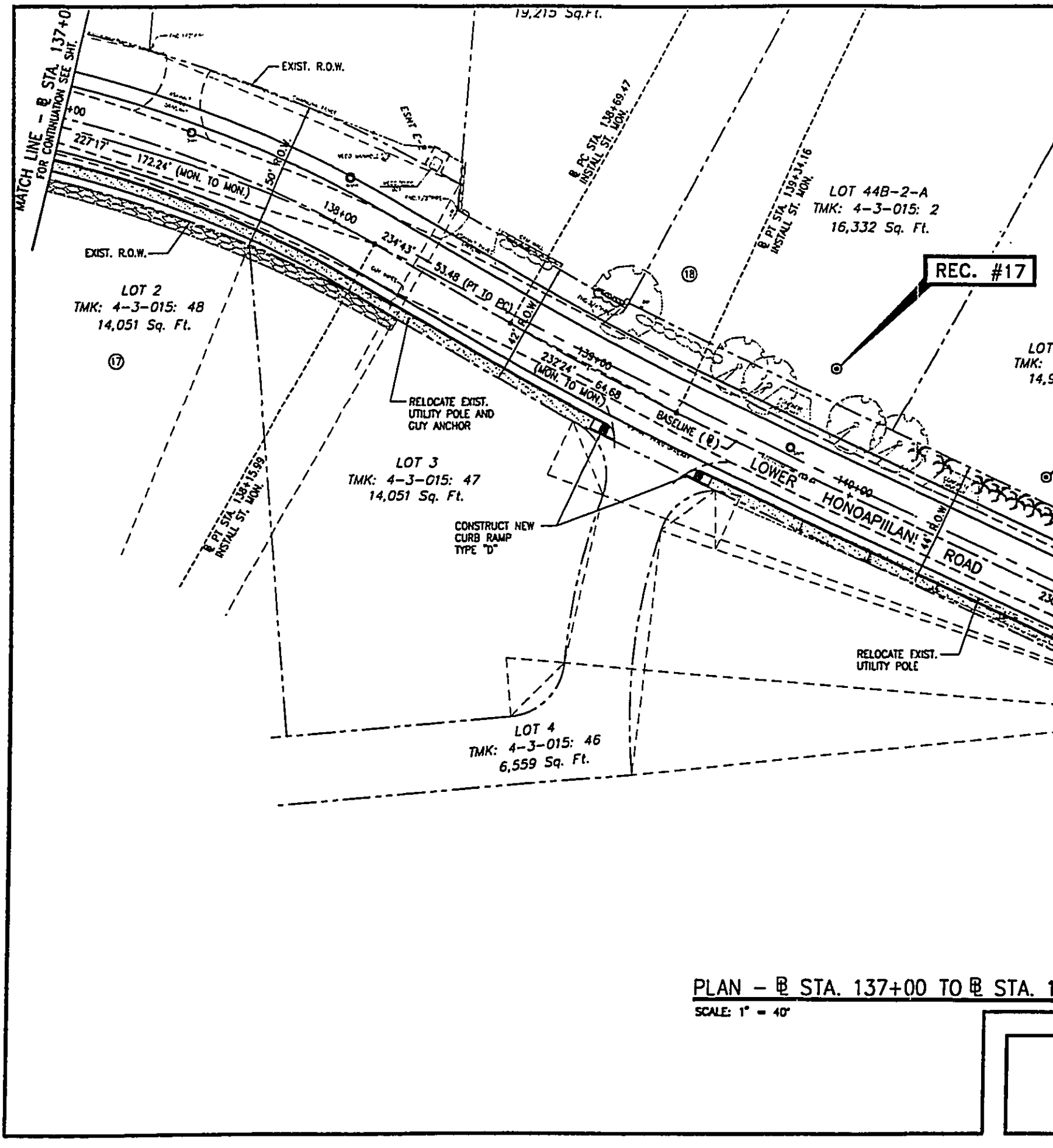


PLAN – ℄ STA. 130+50 TO ℄ STA. 137+00

SCALE: 1" = 40'

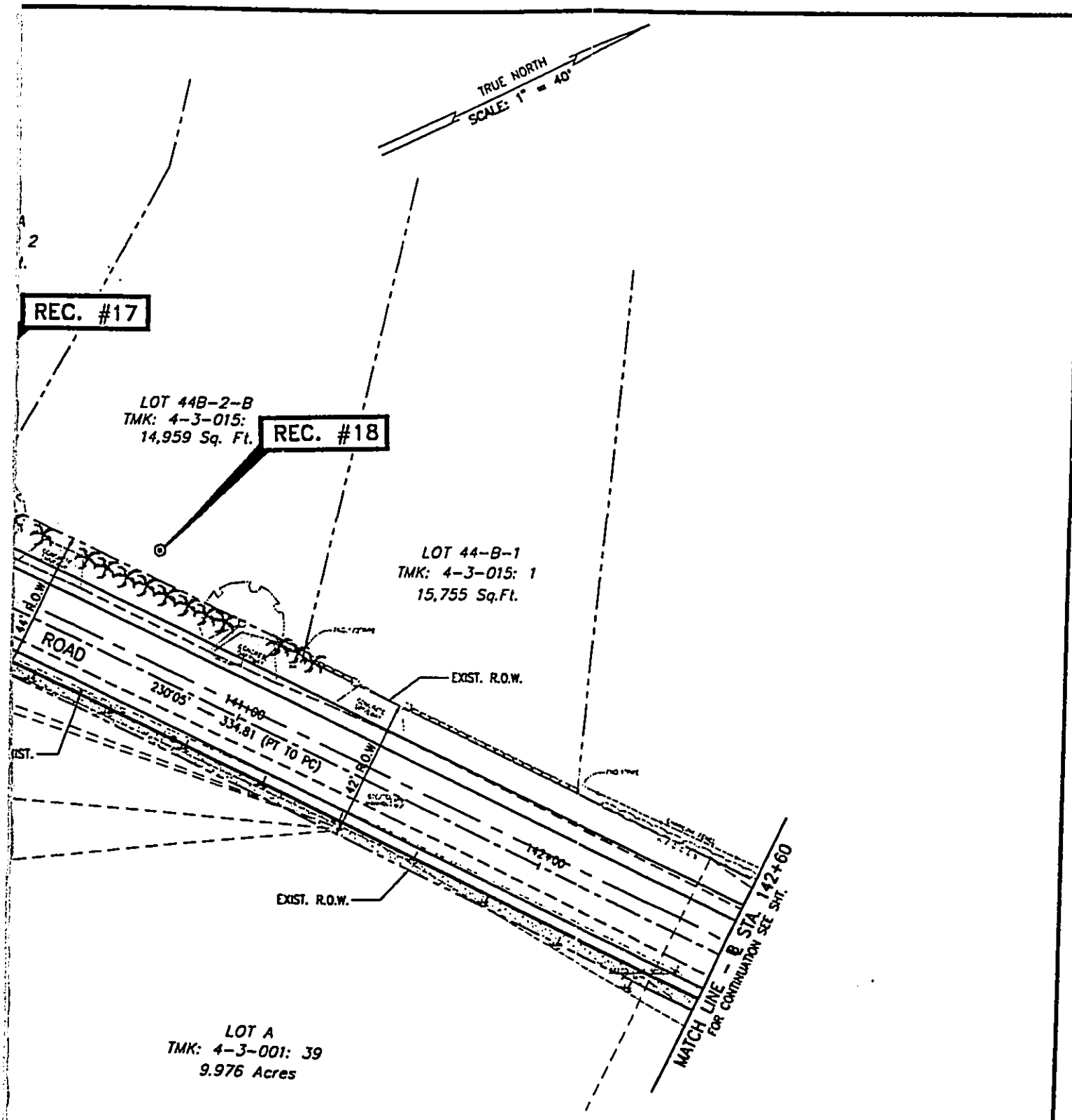
LOCATIONS OF MEASUREMENT SITES B AND H

FIGURE 4H



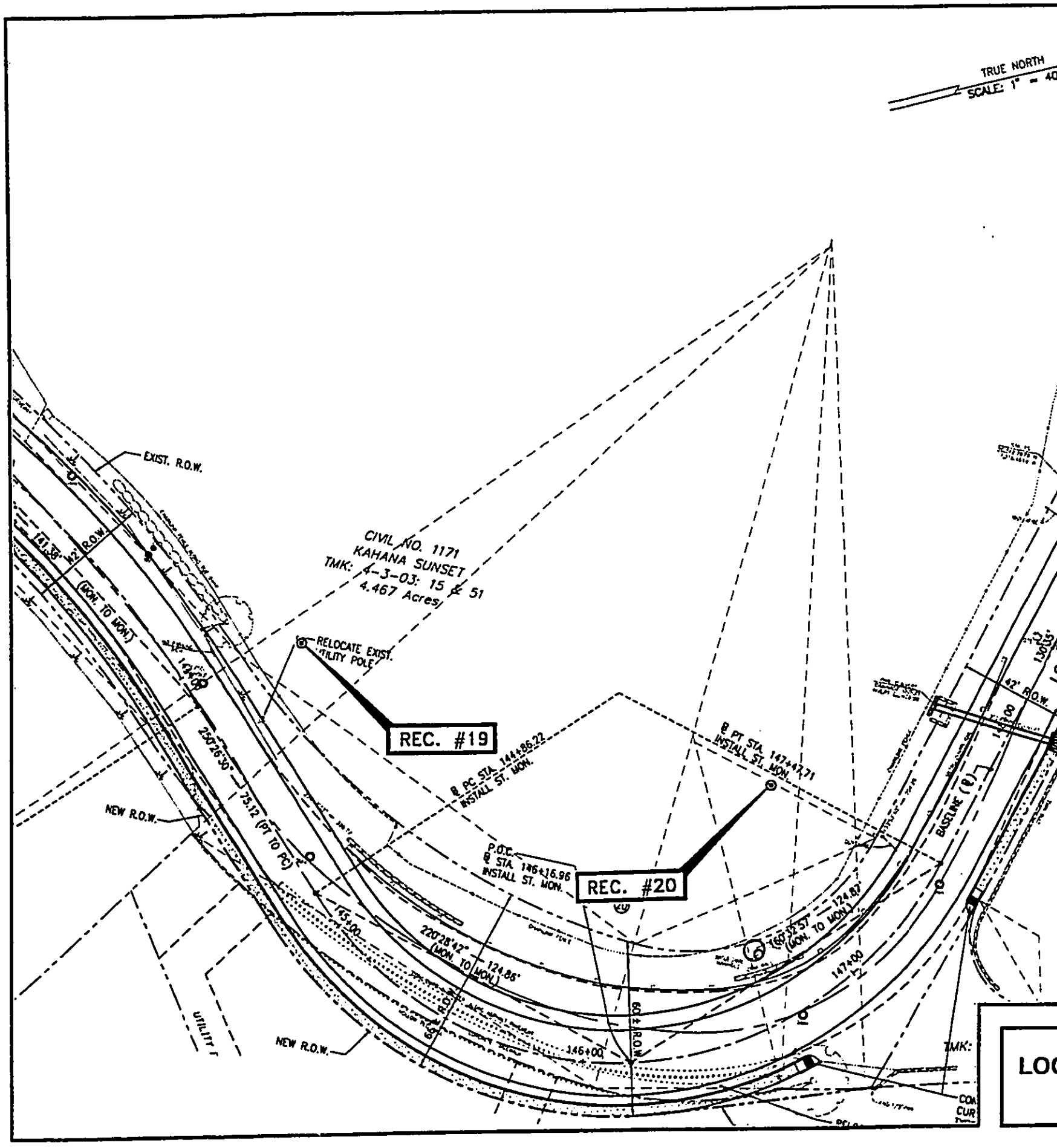
PLAN - ℄ STA. 137+00 TO ℄ STA. 1

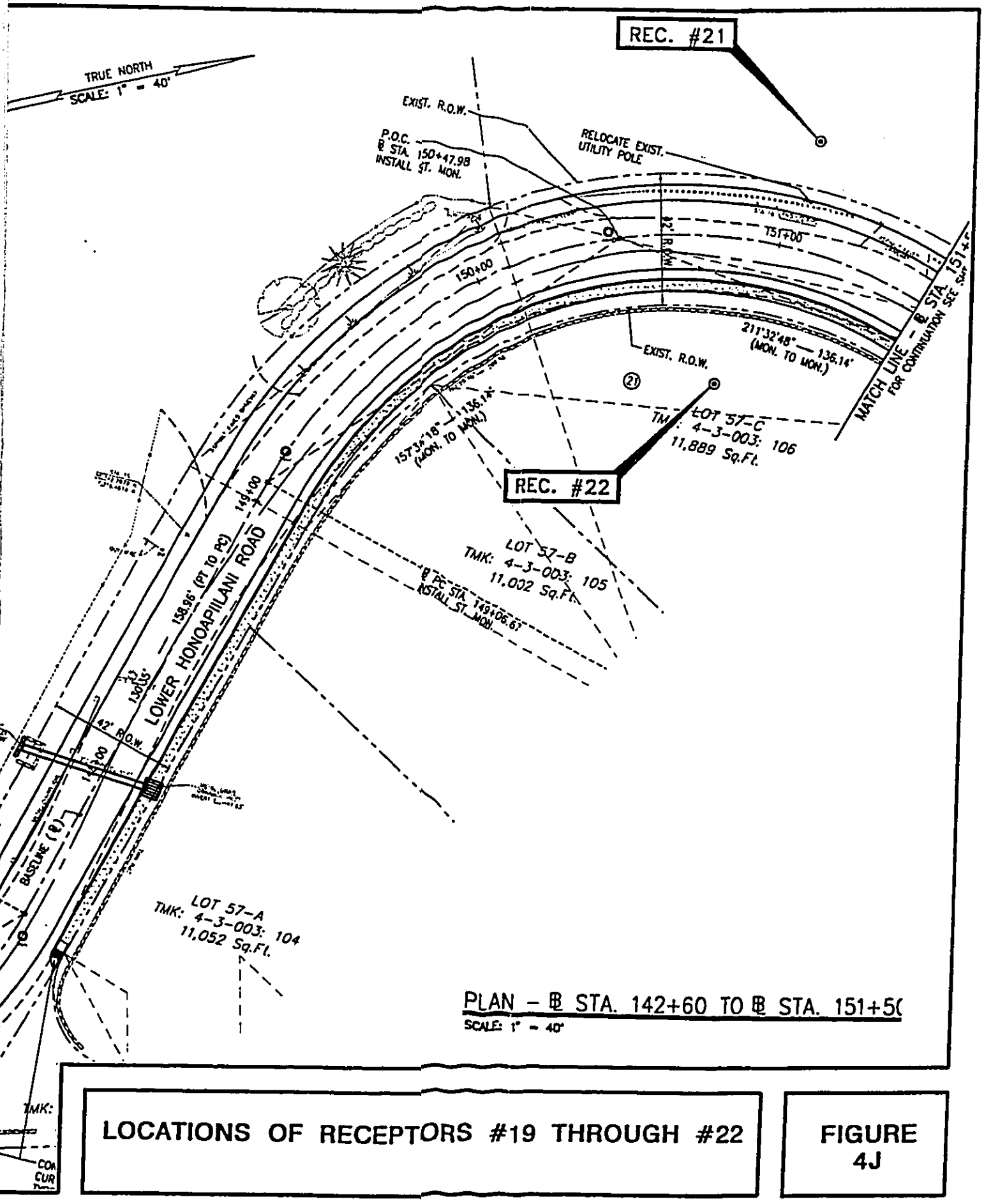
SCALE: 1" = 40'



LOCATIONS OF RECEPTORS #17 AND #18

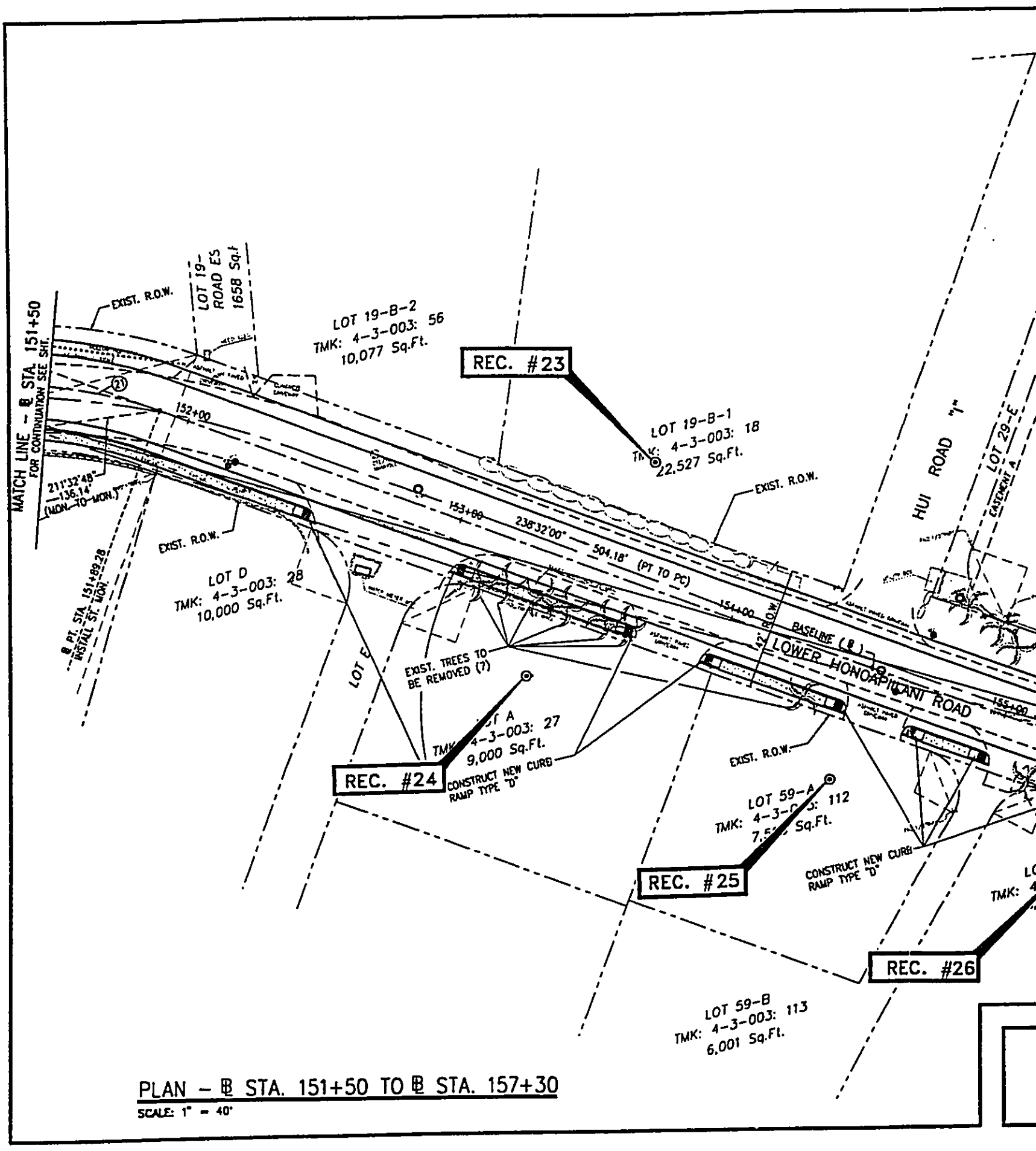
FIGURE 4I


TRUE NORTH
SCALE: 1" = 40
EXIST. R.O.W.
CIVIL NO. 1171
KAHANA SUNSET
TMK: 4-3-03: 15 & 51
4.467 Acres/
RELOCATE EXIST. UTILITY POLE
REC. #19
REC. #20
@ PC STA. 144+86.22 INSTALL ST. MON.
@ PT STA. 147+47.71 INSTALL ST. MON.
P.O.C. @ STA. 146+16.96 INSTALL ST. MON.
NEW R.O.W.
UTILITY
BASELINE (℄)
TMK:
LOC



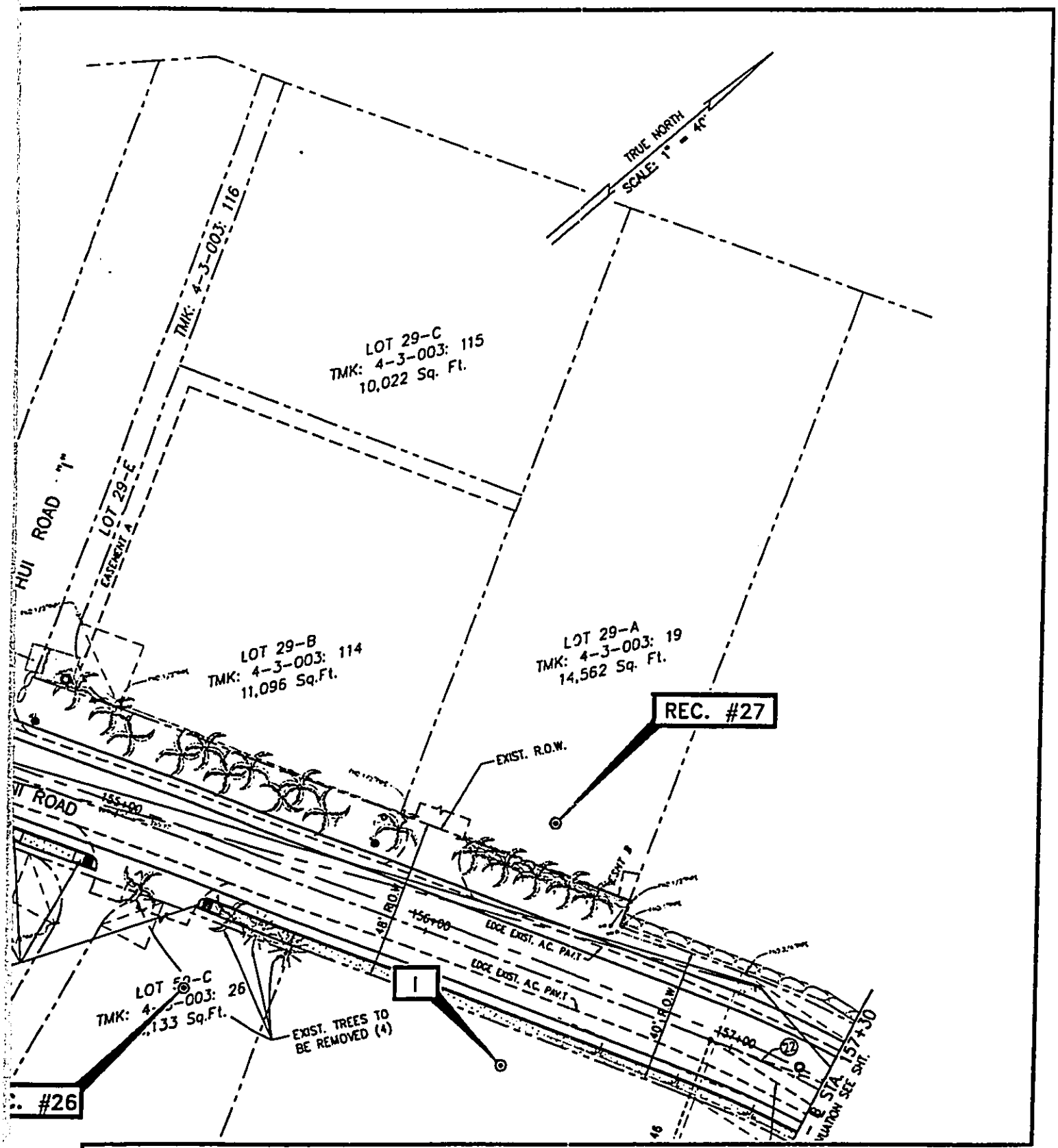
LOCATIONS OF RECEPTORS #19 THROUGH #22

FIGURE 4J



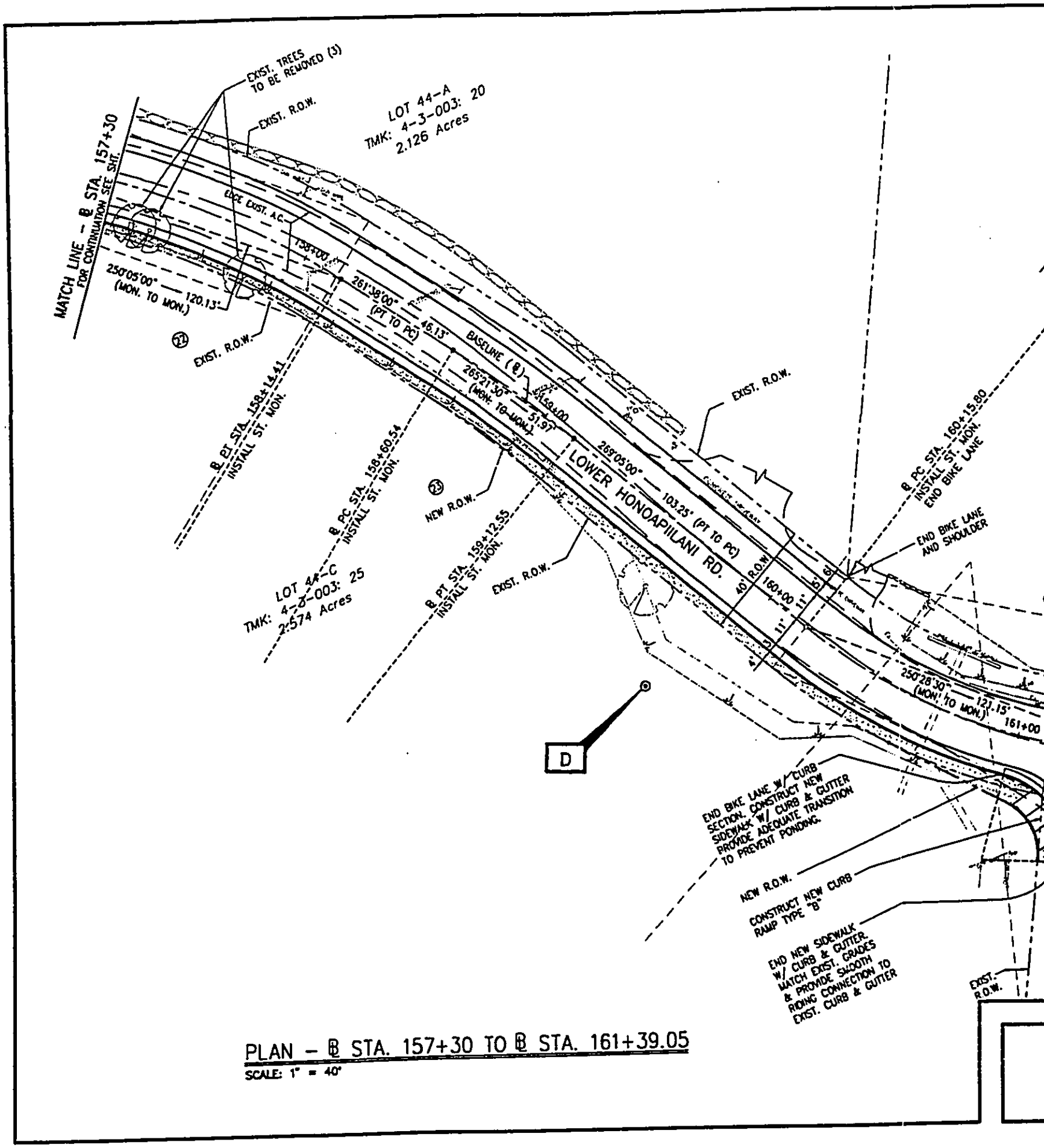
PLAN - ℄ STA. 151+50 TO ℄ STA. 157+30

SCALE: 1" = 40'



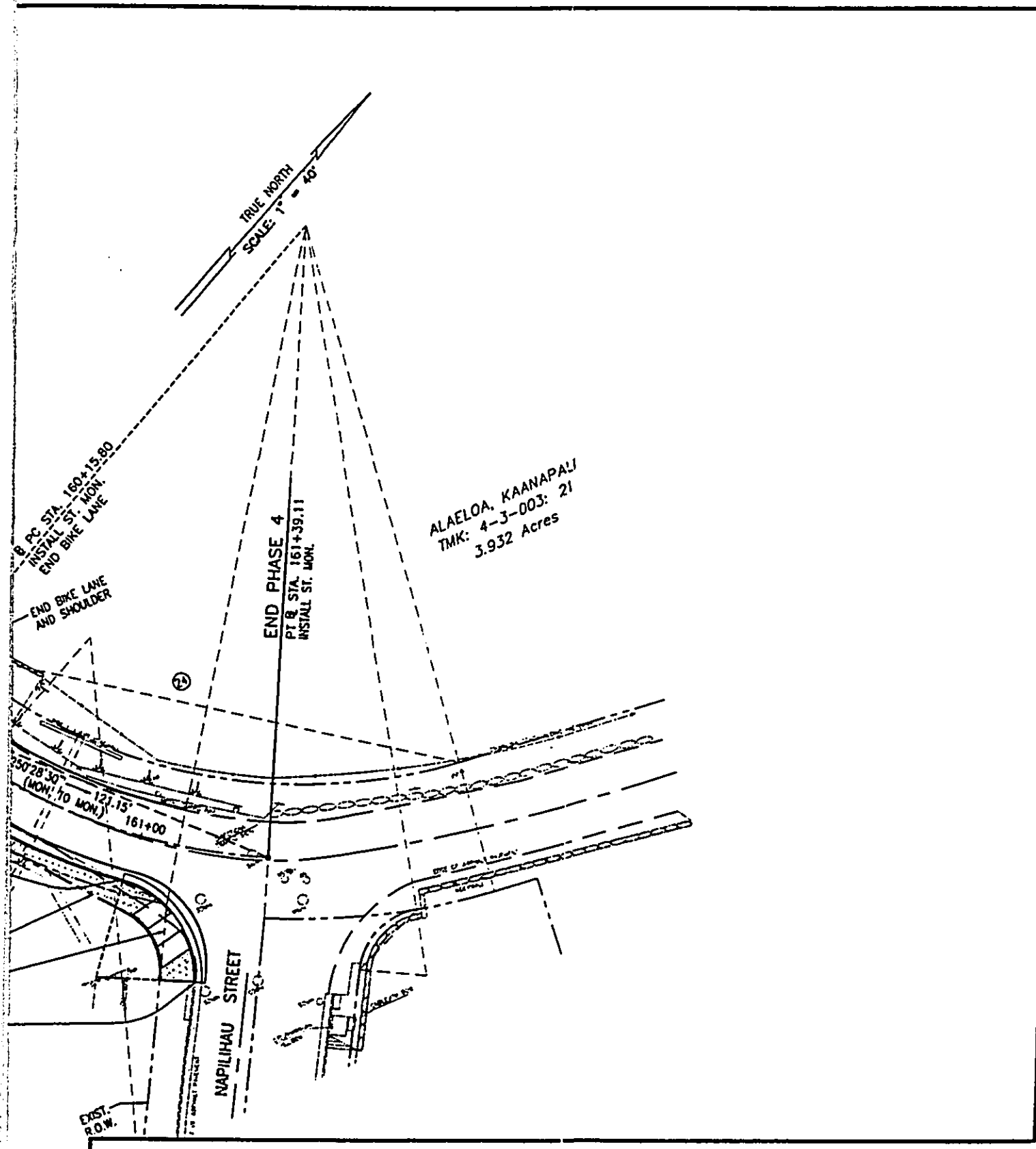
LOCATIONS OF MEASUREMENT SITE I AND RECEPTORS #23 THROUGH #27

FIGURE 4K



PLAN – ℄ STA. 157+30 TO ℄ STA. 161+39.05

SCALE: 1" = 40'



LOCATION OF MEASUREMENT SITE D

FIGURE 4L

TABLE 7

EXISTING AND PREDICTED TRAFFIC NOISE LEVELS WITH THE PROJECT
(4.92 FT HIGH RECEPTOR, PM PEAK HOUR)

RECEPTOR LOCATION	SETBACK DIST. FROM EXIST. C/L	EXISTING (CY 1999) Leq	-- FUTURE (CY 2020) Leq -- W/O BAR./ (CHANGE)	RECOM. WALL (CHANGE)
BUILD ALTERNATIVE 1 - PM PEAK HOUR:				
Receiver #1 (4-3-10:7)	102 FT	53.8	55.9/(2.1)	N/A
Receiver #2 (4-3-05:POR15)	51 FT	58.7	62.5/(3.8)	N/A
Receiver #3 (4-3-10:9)	66 FT	57.0	59.1/(2.1)	N/A
Receiver #4 (4-3-05:8)	33 FT	62.3	65.3/(3.0)	N/A
Receiver #5 (4-3-05:8)	39 FT	60.8	63.6/(2.8)	N/A
Receiver #6 (4-3-05:14)	36 FT	61.6	63.7/(2.1)	N/A
Receiver #7 (4-3-05:20,21,31)	57 FT	57.9	59.8/(1.9)	N/A
Receiver #8 (4-3-05:53)	60 FT	57.6	61.0/(2.4)	N/A
Receiver #9 (4-3-05:66)	51 FT	58.7	62.0/(3.3)	N/A
Receiver #10(4-3-05:29)	54 FT	58.3	60.0/(1.7)	N/A
Receiver #11 (4-3-19:47)	39 FT	60.8	64.6/(3.8)	N/A
Receiver #12(4-3-15:38)	45 FT	59.7	62.1/(2.4)	N/A
Receiver #13(4-3-15:POR36)	42 FT	60.3	63.4/(3.1)	N/A
Receiver #14(4-3-15:POR36)	42 FT	60.3	63.0/(3.3)	N/A
Receiver #15 (4-3-15:21)	36 FT	61.6	63.9/(2.3)	N/A
Receiver #16 (4-3-15:19)	57 FT	57.9	60.4/(2.5)	N/A
Receiver #17 (4-3-15:2)	33 FT	62.3	64.1/(1.8)	N/A
Receiver #18 (4-3-15:52)	33 FT	62.3	64.3/(2.0)	N/A
Receiver #19 (4-3-03:15&51)	40 FT	60.7	63.5/(2.8)	N/A
Receiver #20 (4-3-03:15&51)	69 FT	56.7	61.0/(3.7)	N/A
Receiver #21 (Church)	39 FT	60.8	64.9/(4.1)	N/A
Receiver #22 (4-3-03:106)	42 FT	60.3	62.7/(2.4)	N/A
Receiver #23 (4-3-03:18)	39 FT	60.8	63.0/(2.2)	N/A
Receiver #24 (4-3-03:27)	45 FT	59.7	62.6/(2.9)	N/A
Receiver #25 (4-3-03:112)	42 FT	60.3	63.0/(2.7)	N/A
Receiver #26 (4-3-03:26)	45 FT	59.7	62.8/(3.1)	N/A
Receiver #27 (4-3-03:19)	39 FT	60.8	62.8/(2.0)	N/A

- No commercial structures should be affected by the proposed project or require noise mitigation measures.

CHAPTER V. POSSIBLE NOISE MITIGATION MEASURES

Although noise mitigation measures are not required for this project, the following noise mitigation measures were considered:

A. Restricting the Growth In the Number of Noisy Buses, Heavy Trucks, Motorcycles, and Automobiles with Defective Mufflers. The percentage contribution to the total traffic noise by heavy trucks, buses, and noisy vehicles is currently less than 50 percent, and elimination of these noise sources would reduce total traffic noise levels by less than 3 Leq(h) units. Restricting the growth rate of these vehicles (to growth rates below passenger automobile growth rates) could produce noise reductions in the order of 1 or 2 dB, which are not considered significant for the level of regulatory efforts required.

B. Alteration of the Horizontal Or Vertical Alignment of the Roadway. Major alterations of the horizontal or vertical alignment of the existing roadway were not considered appropriate due to the scope of this roadway improvement project and due to the Right-of-Way constraints on all sides of the affected roadways. The possible roadway alignments are controlled by the required improvements to the existing roadway, existing developments on both sides of the roadway, in and some cases, steep slopes beyond the east and west Rights-of-Way. Vertical realignment of the existing roadway upward would result in adverse visual impacts, and vertical realignment of the roadway via a cut would not be possible without obtaining additional Right-of-Way.

C. Acquisition of Property Rights for Construction of Noise Barriers, and/or Construction of Noise Barriers Along the Right-of-Way. For single story, noise sensitive buildings, construction of a sound attenuating wall is normally the preferred noise mitigation measure. The 6 to 7 dB of noise attenuation achievable with a 6 FT high wall is normally sufficient for single story structures. Where buildings are higher than single story structures, construction of a 6 to 8 foot high sound attenuating barrier would provide sufficient noise reduction benefits only at the ground floor units. It should also be noted that a sound barrier will block the views to the roadway which some of the residents may enjoy. For this project, construction of noise barriers is not required.

D. Acquisition of Real Property Interests To Serve As A Noise Buffer Zone. Where multistory structures are expected to be impacted by future traffic noise, the use of sound attenuating barriers (see para. C above) will not be practical due to the excessive heights required to shield the upper levels from traffic noise. In these situations, the only other noise mitigation possibilities are sound insulation of the affected upper level units or acquisition of the property interests. Noise buffer zones extending approximately 27 to 30 feet east and west of the roadway's baseline, respectively are required to meet the HDOT 66 Leq criteria. These minimum setback distance requirements will be met along Lower

Honoapiilani Road. In general, the acquisition of property for the creation of noise buffer zones for noise mitigation has seldom been applied in Hawaii and is not required for this project.

E. Noise Insulation of Public Use or Nonprofit Institutional Structures. Public use or nonprofit institutional structures located within the limits of project construction should not be impacted by this project. A church complex with 3 buildings should not be impacted by future traffic noise with or without the project due to adequate building setback distances plus an existing wall between the roadway and the closest building.

CHAPTER VI. FUTURE TRAFFIC NOISE IMPACTS AND RECOMMENDED NOISE MITIGATION MEASURES

Future traffic noise levels are predicted to not exceed the HDOT 66 Leq(h) and FHWA 67 Leq(h) noise abatement criteria by CY 2020 along Lower Honoapiilani Road. For this reason, noise mitigation measures such as those discussed in Chapter V are not required for this project.

It is anticipated that potential noise impacts at any new noise sensitive or commercial establishments located in the project area may be mitigated (if required by the individual property owners) through the inclusion of sound walls or other noise mitigation measures within the individual lot development plans. In addition, any new commercial establishments or housing units which may be planned alongside the roadway represent areas of potential adverse noise impacts if adequate noise mitigation measures are not incorporated into the planning of these future projects. It is anticipated that the project's roadway improvements will be completed prior to any redevelopment of the presently open areas or commercial lots adjacent to a roadway, and that noise abatement measures such as adequate setbacks, sound attenuating walls or berms, or closure and air conditioning will be incorporated into these new developments along the roadway as required. In any event, new structures whose building permits were obtained after the date of this noise study will not qualify for noise abatement measures under existing HDOT procedures.

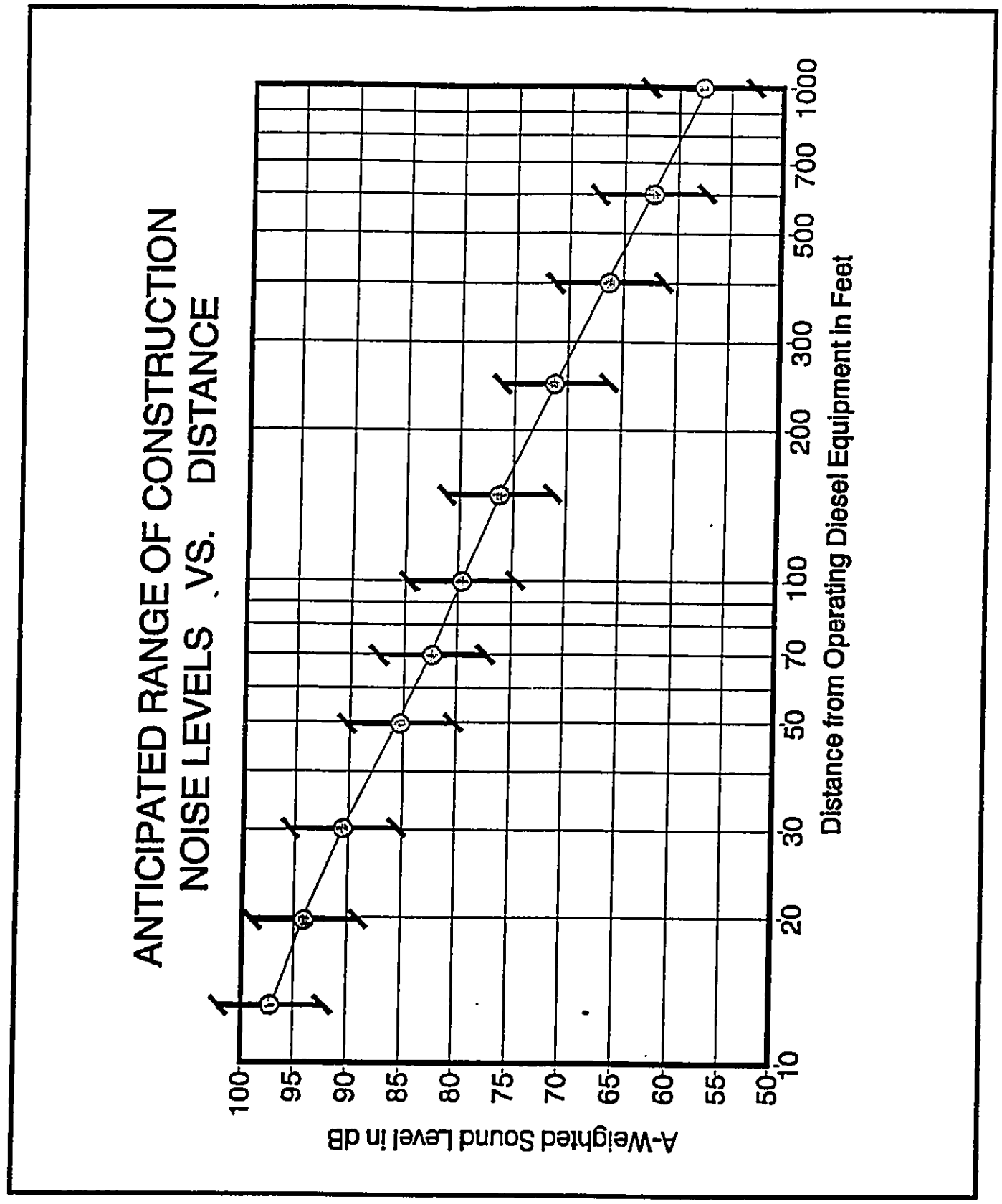
CHAPTER VII. CONSTRUCTION NOISE IMPACTS

Short-term noise impacts associated with construction activities along the existing roadway may occur. These impacts can occur as a result of the short distances (less than 100 FT) between existing dwelling units, resort, and commercial establishments to the anticipated construction corridor. The total duration of the construction period for the proposed project is not known, but noise exposure from construction activities at any one receptor location is not expected to be continuous during the total construction period.

Noise levels of diesel powered construction equipment typically range from 80 to 90 dB at 50 FT distance. Typical levels of noise from construction activity (excluding pile driving activity) are shown in Figure 5. Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work and due to the administrative controls available for its regulation. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the project site.

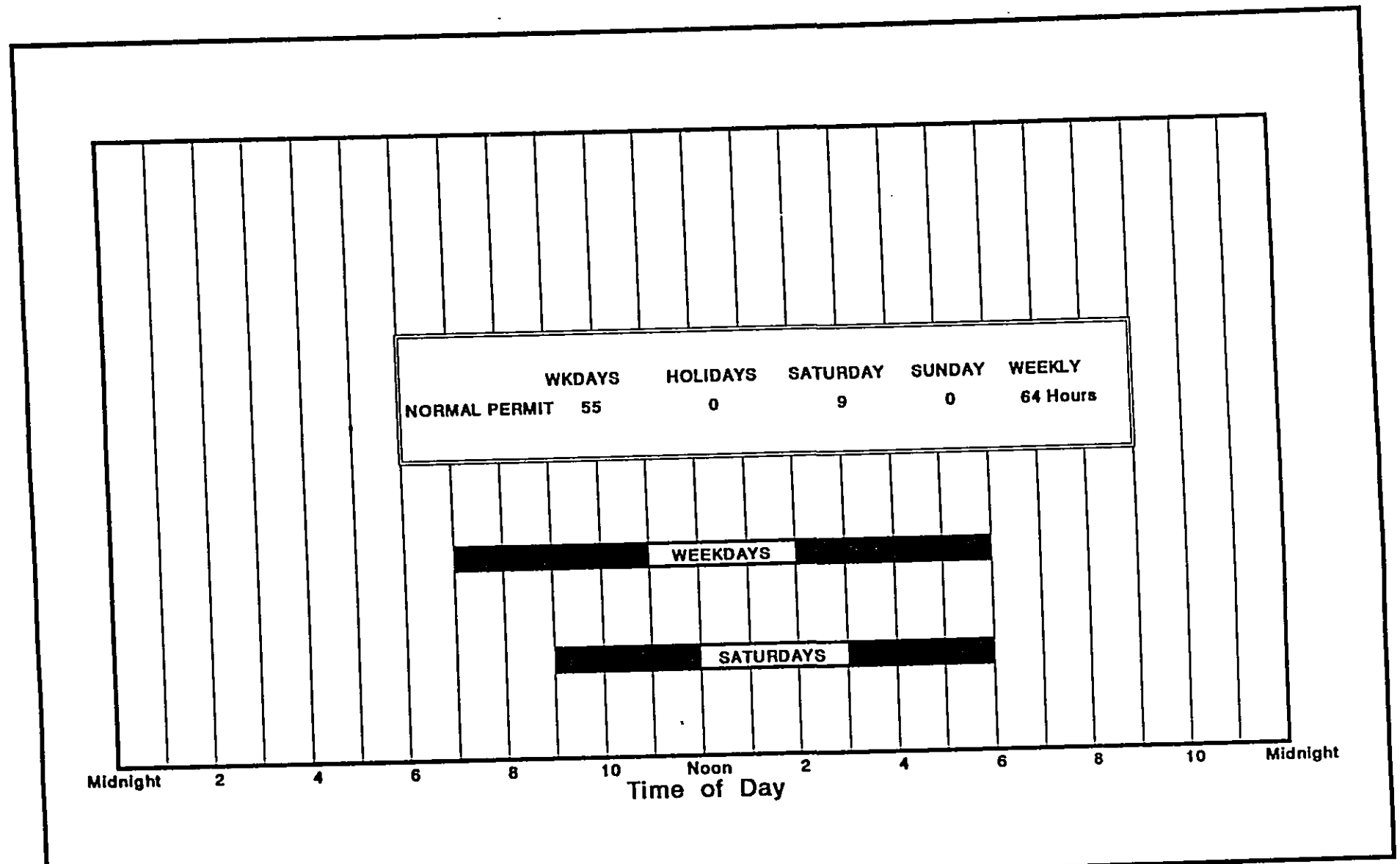
Construction noise levels at existing structures can intermittently exceed 90 dB when work is being performed at close distances in front of these structures. Along the roadway improvement project, distances between the construction sites and receptors are expected to range between 10 and 100 FT, and construction noise levels may intermittently exceed 90 dB. The State Department of Health currently regulates noise from construction activities under a permit system (Reference 7). Under current permit procedures (see Figure 6), noisy construction activities are restricted to hours between 7:00 AM and 6:00 PM, from Monday through Friday, and the hours of 9:00 AM to 6:00 PM on Saturdays. Noisy construction activities are not permitted on Sundays and certain holidays. These restrictions minimize construction noise impacts on noise sensitive receptors along the roadway project corridor, and have generally been successfully applied. In this way, risks of construction noise impacts on noise sensitive receptors can be minimized.

In addition, the use of quieted portable engine generators and diesel equipment should be specified for use within 500 FT of noise sensitive properties. Heavy truck and equipment staging areas should also be located at areas which are at least 500 FT from noise sensitive properties whenever possible. Truck routes which avoid residential communities should be identified wherever possible. The use of 8 to 12 FT high construction noise barriers may also be used where close-in construction work to noise sensitive structures is unavoidable.



CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 5



AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

FIGURE 6

APPENDIX A. REFERENCES

(1) "FHWA Highway Traffic Noise Model User's Guide;" FHWA-PD-96-009, Federal Highway Administration; Washington, D.C.; January 1998.

(2) Traffic Data and Forecasts for the Proposed Lower Honoapiilani Road Improvements, Phase 4 Project; Transmittal from Austin, Tsutsumi & Associates, Inc.; December 1, 1999.

(3) 24-Hour Traffic Counts, Station C-12-B, Lower Honoapiilani Road at Kahana Bridge; April 26-27, 1999; Hawaii State Department of Transportation.

(4) 24-Hour Traffic Counts and Vehicle-Type Classification, Station C-12-E, Honoapiilani Highway at Kahana Kai Bridge; April 27-28, 1996; Hawaii State Department of Transportation.

(5) Federal Highway Administration; "Procedures for Abatement of Highway Traffic Noise and Construction Noise;" 23 CFR *Chapter I, Subchapter H, Part 772; April* 1, 1995.

(6) "Noise Analysis and Abatement Policy;" Hawaii State Department of Transportation, Highways Division, Materials Testing and Research Branch; June 1997.

(7) "Title 11, Administrative Rules, Chapter 46, Community Noise Control;" Hawaii State Department of Health; September 23, 1996.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the LCdn with the LAdn.

Although not included in the tables, it is also recommended that "Lpn" and "LepN" be used as symbols for perceived noise levels and effective perceived noise levels, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, Leq, is designated the "equivalent sound level". For Ld, Ln, and Ldn, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristics of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, DBA, PNdB, and EPNdB are not to be used. Examples of this preferred usage are: the Perceived Noise Level (Lpn was found to be 75 dB. Lpn = 75 dB). This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighed Loss of Hearing" (PHL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

APPENDIX B (CONTINUED)

TABLE I

A-WEIGHTED RECOMMENDED DESCRIPTOR LIST

TERM	SYMBOL
1. A-Weighted Sound Level	L_A
2. A-Weighted Sound Power Level	L_{WA}
3. Maximum A-Weighted Sound Level	L_{max}
4. Peak A-Weighted Sound Level	L_{Apk}
5. Level Exceeded x% of the Time	L_x
6. Equivalent Sound Level	L_{eq}
7. Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8. Day Sound Level	L_d
9. Night Sound Level	L_n
10. Day-Night Sound Level	L_{dn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$
12. Sound Exposure Level	L_{SE}

(1) Unless otherwise specified, time is in hours (e.g. the hourly equivalent level is $L_{eq(1)}$). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine).

SOURCE: EPA ACOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78,

APPENDIX B (CONTINUED)

TABLE II

RECOMMENDED DESCRIPTOR LIST

TERM	A-WEIGHTING	ALTERNATIVE[1] A-WEIGHTING	OTHER[2] WEIGHTING	UNWEIGHTED
1. Sound (Pressure)[3] Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2. Sound Power Level	L_{WA}		L_{WB}	L_W
3. Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4. Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5. Level Exceeded x% of the Time	L_x	L_{Ax}	L_{Bx}	L_{px}
6. Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7. Equivalent Sound Level[4] Over Time(T)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8. Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9. Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10. Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12. Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13. Energy Average Value Over (Non-Time Domain) Set of Observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14. Level Exceeded x% of the Total Set of (Non-Time Domain) Observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15. Average L_x Value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.

(2) Only B-weighting shown. Applies also to C,D,E,.....weighting.

(3) The term "pressure" is used only for the unweighted level.

(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is Leq(1). Time may be specified in non-quantitative terms (e.g., could be specified as Leq(WASH) to mean the washing cycle noise for a washing machine.

Appendix F

Traffic Assessment

TRAFFIC ASSESSMENT REPORT
FOR
LOWER HONOAPIILANI ROAD IMPROVEMENTS
(HOOHUI ROAD TO NAPILIHAU STREET)
West Maui, Hawaii

February 2000

Prepared for:

County of Maui
Department of Public Works and Waste Management

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817-5031
Telephone: (808) 533-3646
Facsimile: (808) 526-1267
Honolulu • Wailuku, Hawaii

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

TED S. KAWAHIGASHI, P.E., FACEC
KENNETH K. KUROKAWA, P.E
DONOHUE M. FUJII, P.E.
STANLEY T. WATANABE
TERRANCE S. ARASHIRO, P.E
MERNA S. KIBE

TRAFFIC ASSESSMENT REPORT
FOR
LOWER HONOAPIILANI ROAD IMPROVEMENTS
(HOOHUI ROAD TO NAPILIHAU STREET)

I. INTRODUCTION

A. Purpose and Scope

The purpose of this study to establish the existing traffic operating conditions on Lower Honoapiilani Road, between Hoohui Road and Napilihau Street in West Maui, and evaluate the impact of the proposed roadway improvements on this segment of Lower Honoapiilani Road.

B. Project Description

The County of Maui, Department of Public Works and Waste Management (DPWWM) proposes to improve approximately 1.41 miles of the existing 2-lane section of Lower Honoapiilani Road between Hoohui Road in Kahana and Napilihau Street in Napili. The improvements will include improving the horizontal alignment of the road; widening the travel lanes to 11 feet each; construction of curbs and sidewalks on the mauka side; construction of a 5-foot wide bike lane and 6-foot wide drainage swale along the makai side of the road; widening Kahananui Bridge; and other improvements to enhance the safety of the roadway.

REPLY TO:
501 SUMNER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE (808) 533-3646 • FAX (808) 526-1267 • EMAIL: ats@lava.net

OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII

II. EXISTING CONDITIONS

A. Project Site

The project is located on the island of Maui, in Kahana and Napili. The roadway serves primarily residential areas and is located near the ocean on the west side of the island. This road was formerly the principle and only roadway between Honokowai and Kapalua prior to the construction of the new Honoapiilani Highway mauka of the roadway.

B. Roadway

Lower Honoapiilani Road is a 2-lane local road serving primarily residential areas between Honoapiilani Highway and the ocean. The existing road width varies from about 20 feet wide to 24 feet wide. The adjacent shoulders are mainly unimproved although some segments have curbs, gutters and sidewalks. The existing shoulders are unimproved along most of this section. Bicyclists, as well as pedestrians, often have to utilize the travelway because of the narrow street and the unimproved shoulders.

C. Traffic

Traffic consists primarily of passenger vehicles, pickup trucks and utility vehicles. Traffic counts taken in 1997 by the State Highways Division on Lower Honoapiilani Road at Kahana Bridge, Station C-12-B, showed approximately 4,235 vehicles per day on the roadway. The AM peak hour traffic was 233 vehicles between 7:00 and 8:00 AM; the PM peak hour traffic was 344 vehicles between 4:15 and 5:15 PM.

III. STUDY METHODOLOGY

This study compares the capacity of the existing road and the improved road in accordance with procedures contained in the Highway Capacity Manual[1]. The improvements, however, are primarily directed to improving traffic safety, especially for pedestrians and bicyclists along the roadway.

[1] Highway Capacity Manual, Special Report 209, Third Edition Transportation Research Board, National Research Council, 1994.

Future traffic was projected for the Year 2020 (20 years from the present year) using State Highways Division traffic counts taken for the years 1991, 1993, 1995 and 1997 on Lower Honoapiilani Road at Kahana Bridge, Station C-12-B.

IV. TRAFFIC ASSESSMENT

A. Existing Traffic

The State Department of Transportation 1997 traffic count at Kahana Bridge on Lower Honoapiilani Road shows the vehicle count over a 24-hour period. The AM peak hour factor is 5.5%, with a distribution of 52% of the traffic heading in the Kapalua direction. The PM peak hour factor is 8.12%, with 57% of the traffic heading in the Kapalua direction also. Truck traffic is assumed to be 1% since the existing road is relatively narrow with several short radius curves.

The level of service (LOS) for the existing road is computed as LOS "C".

B. *Future Traffic*

Future traffic was estimated by using the traffic data from the years 1991, 1993, 1995 and 1997 to determine the traffic trend. The data was extrapolated to the year 2020. The annual growth, on a straight-line basis, is estimated at approximately 5.7%; therefore, the ADT for Year 2020 is estimated at 8,350 vehicles per day. The AM peak hour traffic is estimated at 460 vehicles and the PM peak hour traffic is 680 vehicles.

Using this data and data for the proposed roadway improvements, the LOS for the future road is computed as LOS "C".

C. Traffic Considerations During Construction

The accommodation of traffic during construction is a major concern. This section of Lower Honoapiilani Road connects to Honoapiilani Highway only at Hoohui Road and at Napilihau Street, the ends of the construction segment. Therefore, careful planning to avoid unnecessary traffic delays and congestion will be needed.

The contractor should discourage casual traffic through this section of roadway during construction by installing informational and warning signs at the termini of the construction zone, in both directions of travel, alerting motorists of the construction ahead and encouraging detouring to Honoapiilani Highway.

Detour signs and signs with "LOCAL TRAFFIC ONLY" during construction would deter motorists during the construction period and direct them to Honoapiilani Highway to get around the construction zone. At the construction area, only one lane of road should be worked on at a time; the other lane should be available for two-way traffic, with the appropriate flagger or police controls. The contractor should also provide for access to residences adjacent to the work site.

During non-working hours, all lanes of the road should be available for traffic.

V. CONCLUSIONS

It is concluded that the proposed roadway improvements to Lower Honoapiilani Road from Hoohui Road to Napilihau Street will have no significant impact on the level of service of the roadway. However, these improvements will significantly improve traffic safety and ease of driving by providing a bike lane, sidewalks and realignment of sharp curves.

VI. RECOMMENDATIONS

This project will enhance traffic safety and will upgrade this roadway to better accommodate traffic.

A traffic control plan should be included in the construction plans to show the construction phasing and traffic controls the contractor should follow. Appropriate accommodations for traffic and pedestrians through the construction area should be provided and public information should be utilized to inform motorists of traffic restrictions that may be implemented during construction.

WORKSHEET FOR GENERAL TERRAIN SEGMENTS
TWO-LANE HIGHWAY

HIGHWAY: Lower Honoapiilani Road (Existing)
LOCATION: Napili, Maui
CALC. BY: HM

COUNT DATE: 4/22/97
TIME PERIOD: PM Peak Hr.
CHECKED BY:

I. GEOMETRIC DATA

To Hoohui Rd. ◄——► To Napilihau St.

SHOULDER

SHOULDER

4 FT. (AVE.)

20 FT.

SPEED LIMIT: 25 MPH
% NO PASS: 80%
TERRAIN (L,R,M): R
SEGMENT L: 1.41 MI

II. TRAFFIC DATA

TOTAL VOLUME, BOTH DIR.
147 + 197 = 344 vph

DIRECTIONAL DISTRIBUTION: 57% / 43%
HVY. VEH. 1.0% TRUCK 0.0% BUS 0.0% RV

FLOW RATE, VPH = VOL / PHF
358 = 344 / 0.96

III. LEVEL OF SERVICE ANALYSIS

$f_{HV} = 1/[1+P_T(E_T-1)+P_B(E_B-1)+P_{RV}(E_{RV}-1)]$

LOS	SF =	VOL. x	v/c x	f_g x	f_w x	f_{HV}	P_T	E_T	P_B	E_B	P_{RV}	E_{RV}
			Table 8-1	Table 8-4	Table 8-5			Table 8-6		Table 8-6		Table 8-6
A	105	2800	0.05	1.00	0.77	0.971	0.010	4.0	0.000	3.0	0.00	3.2
B	352	2800	0.17	1.00	0.77	0.962	0.010	5.0	0.000	3.4	0.00	3.9
C	663	2800	0.32	1.00	0.77	0.962	0.010	5.0	0.000	3.4	0.00	3.9
D	995	2800	0.48	1.00	0.77	0.962	0.010	5.0	0.000	2.9	0.00	3.3
E	2,083	2800	0.91	1.00	0.85	0.962	0.010	5.0	0.000	2.9	0.00	3.3

LOS: C

IV. COMMENTS

FLOW RATE 358

Note: v/c entry is manual, from Table 8-1
1997 ADT = 4,236; "k"=8.12%, D=57/43, T=1.0%(est.)

P_T = proportion of trucks, decimal
P_B = proportion of buses, decimal

WORKSHEET FOR GENERAL TERRAIN SEGMENTS
TWO-LANE HIGHWAY

HIGHWAY: Lower Honoapiilani Road (Improved)
LOCATION: Napili, Maui
CALC. BY: HM

COUNT DATE: Future-2020
TIME PERIOD: PM Peak Hr.
CHECKED BY:

I. GEOMETRIC DATA

To Hoohui Rd. ◄——► To Napilihau St.

SHOULDER

SHOULDER

5 FT. (AVE.)

22 FT.

SPEED LIMIT: 25 MPH
% NO PASS: 80%
TERRAIN (L,R,M): R
SEGMENT L: 1.41 MI

II. TRAFFIC DATA

ADT: 8350

TOTAL VOLUME, BOTH DIR.: 386 + 292 = 678 vph

DIRECTIONAL DISTRIBUTION: 57% / 43%

HVY. VEH.: 1.0% TRUCK, 0.0% BUS, 0.0% RV

FLOW RATE, VPH = VOL / PHF
706 = 678.02 / 0.96

III. LEVEL OF SERVICE ANALYSIS

$f_{HV} = 1/[1+P_T(E_T-1)+P_B(E_B-1)+P_{RV}(E_{RV}-1)]$

LOS	SF =	VOL. x	v/c x	f_g x	f_p x	f_{HV}	P_T	E_T	P_B	E_B	P_{RV}	E_{RV}
			Table 8-1	Table 8-4	Table 8-5			Table 8-6		Table 8-6		Table 8-6
A	116	2800	0.05	1.00	0.85	0.971	0.010	4.0	0.000	3.0	0.00	3.2
B	389	2800	0.17	1.00	0.85	0.962	0.010	5.0	0.000	3.4	0.00	3.9
C	732	2800	0.32	1.00	0.85	0.962	0.010	5.0	0.000	3.4	0.00	3.9
D	1,098	2800	0.48	1.00	0.85	0.962	0.010	5.0	0.000	2.9	0.00	3.3
E	2,254	2800	0.91	1.00	0.92	0.962	0.010	5.0	0.000	2.9	0.00	3.3

LOS: C

P_T = proportion of trucks, decimal
P_B = proportion of buses, decimal

IV. COMMENTS

FLOW RATE 706

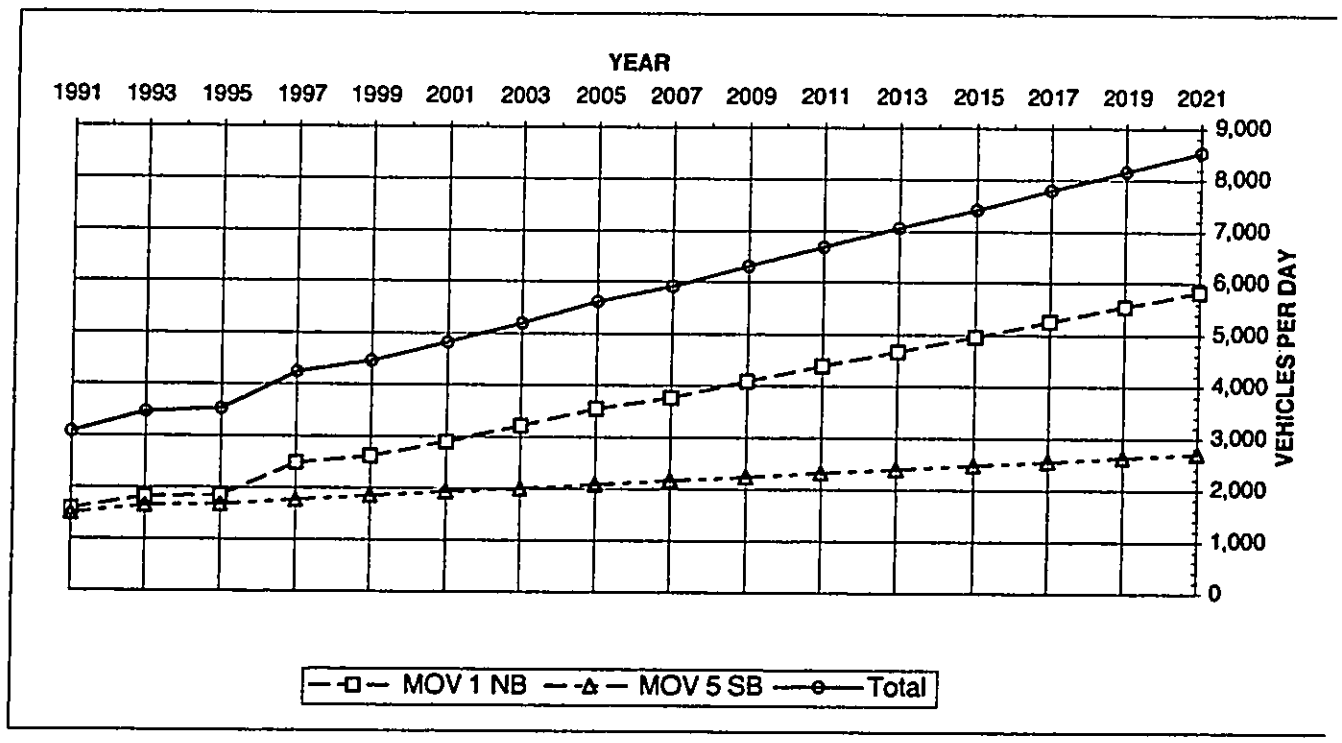
Note: v/c entry is manual, from Table 8-1
Year 2020 assume 8,350 ADT, PM "K"=8.12%, D=57/43, T=1.0%

Traffic Counts
Lower Honoapiilani Rd. @ Kahana Bridge, Maui
Count Station: C-12-B

	MOV 1 NB	MOV 5 SB	Total	
1991	1,575	1,496	3,071	
1993	1,812	1,651	3,463	
1995	1,849	1,672	3,521	
1997	2,478	1,758	4,236	
1999	***2,615***	***1,846***	***4,461***	***Projected***
2001	***2,890***	***1,927***	***4,816***	"
2003	***3,205***	***1,988***	***5,193***	"
2005	***3,544***	***2,079***	***5,623***	"
2007	***3,763***	***2,155***	***5,918***	"
2009	***4,089***	***2,230***	***6,319***	"
2011	***4,385***	***2,307***	***6,693***	"
2013	***4,669***	***2,388***	***7,057***	"
2015	***4,952***	***2,463***	***7,415***	"
2017	***5,259***	***2,541***	***7,800***	"
2019	***5,542***	***2,620***	***8,162***	"
2021	***5,832***	***2,698***	***8,530***	"

Source: State Highways Division's "Traffic Survey Data Island of

Ave. Annual Growth:	1991 – 1997		
	8.19%	2.50%	5.42%
Ave. Annual Growth:	1991 – 2021		
	8.72%	1.95%	5.73%



Appendix G

Transcript of August 29, 2001 Public Hearing

TRANSCRIPT OF PUBLIC HEARING

IN RE: LOWER HONOAPIILANI ROAD IMPROVEMENTS

(HOOHUI ROAD TO NAPILIHAU STREET - STP 3080(8))

ORIGINAL

Taken at Lahaina Intermediate School, 871 Lahainaluna Road, Lahaina, Maui, Hawaii, commencing at 7:00 p.m. on August 29, 2001, pursuant to Notice.

REPORTED BY: RACHELLE PRIMEAUX, RPR/CSR #370

A P P E A R A N C E S

Mike Munekiyo -- Planning Consultant, Munekiyo & Hiraga

Glenn F. Tadaki -- Munekiyo & Hiraga, Planner

Milton Arakawa -- Dept. of Public Works and Waste Management

Joe Krueger -- Dept. of Public Works and Waste Management

Lloyd Lee -- Dept. of Public Works and Waste Management

Kent Morimoto -- Austin, Tsutsumi & Associates

Neal Shinyama -- Maui Electric

Ronald Fukushima -- Maui Electric

Greg Kauhi -- Maui Electric

Erik Fredericksen -- Xamanek Researches

Sheri Ann Tihada -- Verizon Hawaii

TRANSCRIPT OF PROCEEDINGS

MR. MUNEKIYO: Thank you all for joining us this evening. Again, we do have a sign-in sheet, so if you have not had the opportunity, sign in right over here, and we also have a project summary, a handout like this. You can pick that up at the registration table. Can everybody hear me?

VOICES: Yes.

MR. MUNEKIYO: My name is Mike Munekiyo. I'm the planning consultant for the County and we've prepared a Draft Environmental Assessment for the Lower Honoapiilani Road project, Hoohui Road to Napili Street. And that is the subject of this evening's public hearing.

I would like to make a few introductions before we start, and maybe what I'll do is just give these folks a few minutes to sign in before we get started so that we don't get distracted. Before we start, let me just explain the format for this evening's public hearing. We will give a project overview describing the technical aspects of the project. Followed by that presentation, we'll take a few minutes' break so that people can come up and review the plans just as many of you did before the meeting. Take a look at

the plans. If you've got questions, we'll have the engineers stationed at the various tables, and you could ask the questions at that point.

Following that review, during that period, we'll receive public testimony. And public testimony will be received in two forms. You may either provide oral testimony or we've got comment cards at the table, which we will be distributing later on. If you wish to provide comments in writing, we will also receive those, so basically it's a three-part program: a presentation of the project, we'll take a break, we will have everyone go up, take a look at the plans, ask questions of the engineers and so forth, and then we'll conclude by receiving your comments on the project.

Let me begin by making a few introductions this evening. We do have several representatives from the Department of Public Works. First we have Milton Arakawa. He's the Deputy Director of the department; Mr. Lloyd Lee, who is the head of the engineering division; Joe Krueger, project engineer. These gentlemen are from the Department of Public Works and Waste Management.

We have Mr. Kent Morimoto. Kent is the design engineer, the project engineer from Austin, Tsutsumi &

Associates. So they are the engineers that prepared the plans, which you will be reviewing this evening. We also have Erik Fredericksen. Erik is back in the corner there. He's project archeologist if there's questions regarding archeology. We do have also representatives from Maui Electric and Verizon Hawai`i should there be questions for those regarding utility services.

Again, my name is Michael Munekiyo, I'm with Munekiyo & Hiraga, and we prepared the Environmental Assessment. And the purpose of this public hearing this evening is to receive your comments regarding this project. Some of you may know that this is a project which involves both federal funding and County funding, and so whenever there is federal funding, County funding involved, an Environmental Assessment is required.

There are two levels of Environmental Assessment. One is the state level, the state EA and the federal EA. This public hearing is being conducted to conduct the federal Environmental Assessment requirements, and so we are going to be filing both a consolidated state and federal EA for the project.

Just to give you some additional background,

once the comments are received on this particular document, and we have indicated September 12th as the deadline which we would like to receive comments on the project, we will prepare a final EA addressing all of the comments received. The final EA will then be filed with the State Office of Environmental Quality Control following review by federal highway officials. And that should then conclude the EA process.

Following the EA process, this project is also located within the County special management area, and so then we would need to go before the Maui Planning Commission to get a special management area permit. We expect that hearing to occur probably early next year following the closing of the federal EA/state EA process. So those of you that live in and around the project vicinity, you will be getting notices of that public hearing again probably early next year, and that will again be for the special area management permit for the project.

And that again will be before the Maui Planning Commission. This project, as noted in the project handout, is being proposed as one of -- actually, the final phase of the Lower Honoapiilani Road improvements where three previous phases, phases I and

II are completed. Phase III is nearing completion, so this would be the final phase from Hoohui Street to Napilihau Street.

And again, as for the other phases, the purpose of this project is to improve, of course, traffic flow, pedestrian safety, drainage improvements and so forth, basically to upgrade the whole Lower Honoapiilani stretch from Honokowai Stream to Napili Stream.

At this point, I would like to ask Kent Morimoto, who is the project design consultant, to talk a little bit about the project itself. Feel free to ask questions during the -- actually, what will be best is when we take the break, come up and I think a lot of you will have questions specific to perhaps areas where you might reside. And, of course, we would be more than happy to answer questions at this point. I would also like to recognize Councilmember from West Maui, Jo Anne Johnson. Thank you for joining us.

Again, we will let Kent give the presentation, and we'll take that break, have everyone come up, take a look at the plans, ask questions, and then we'll go ahead and receive comments on the project itself.

MR. MORIMOTO: Thank you, Mike. As Mike said,

my name is Kent Morimoto. I'm with Austin, Tsutsumi. We are the design consultants hired by Maui County to do this roadway improvement project. Basically, I'm going to give you kind of a background of the project, give you a little bit of the design issues that we're up against with the project, and finally, describe the exhibits that we have here tonight.

As far as the background of this project, I'm from Oahu. First when I went through the project corridor, I guess some of the things I noticed was many bikers, many pedestrians, many people walking around on the streets. In this area, without any improved sidewalks, there were some tight areas. Personally, I felt it was a little unsafe, but that's one of the purposes for this project to make a safer roadway for pedestrians.

As far as the design issues that we're up against, obviously, land rights is very important to everyone here. We have met with some of the residents yesterday, and, you know, appreciate everyone who was available to take their time out of their schedule yesterday to meet with us and also everyone here tonight taking time out of your schedule to meet with us.

The design issues, obviously, one is land

rights; secondly, is trying to preserve the trees along the right-of-way. The third issue is trying to put a drainage system within a roadway that has existing utilities such as water lines, sewer lines and trying to fit everything in a limited right-of-way. That's really probably one of the toughest jobs we have is trying to get this drain system in among all these existing utilities.

The third design issue is flatness of the road. Starting from Hoohui Road all the way to probably Hui Road E, the project is so flat. Trying to get the drainage off the roads and discharging into the ocean, which we're right at sea level, that's probably another hard issue that we're trying to contend with, just getting the water off the road into the ocean, and the third issue is, of course, the limited right-of-way. We don't want to impact everybody's property with this project, but obviously, some areas are so tight that we need to request some land from certain homeowners.

As far as the exhibits here tonight, on this table closest to me, we show starting at that end, which is Hoohui Road, ending at this end, which is Napilihau Street, we show the proposed improvements of the widening basically consisting of a sidewalk,

11-foot travel ways, a buffer zone on both mauka/makai sides next to the travel ways and paved swale on the makai side. And that requires a 40-foot minimum area to develop. Some areas we have deviated from that 40-foot right-of-way or 40-foot required width to deal with certain circumstances like existing trees like Pohailani Maui, also existing trees fronting Mr. Aluli's house. We try to accommodate those kind of considerations.

But basically, we're trying to get a 40-foot wide roadway in through this narrow corridor. At the same time, putting in a sidewalk, curbed ramps that comply to ADA standards, putting the drainage system among existing water lines, existing sewer lines and lastly just trying to make everybody -- minimize the impact to everybody with the improvements.

So my exhibits here right now, we show the project with the typical sections at various locations along the project. If you look at it, there's like a number one begin, number one end. If you look at the top of the sheet or at the bottom of the sheet, you may see a typical section with that number in it. That represents the section that we're trying to get into that portion of the project.

The next exhibit we have is the far table, which

is the overview, aerial overview of the entire project starting from Hoohui Road. In this case, the map is backwards starting Hoohui Road to Napilihau on the right. The third exhibit by Milton is the overall subdivision map. That map shows the land taking for the whole project from each individual property. The areas are shaded to show the areas that are being requested by the County to do this roadway improvements. So it's a combination of looking at these front exhibits, looking at the roadway section that we're trying to get in through the project and the subdivision map, which is an overall view of the areas that we're taking property from the individual owners. A combination of the two maps should hopefully give you a good idea of what we're trying to get in with this project. And if you folks have any questions, feel free to see me, Lloyd or Joe. We will be more than happy to answer all your questions tonight. Thank you.

MR. MUNEKIYO: So what we'll do is we'll have the engineers stationed at the various tables, and I know many of you did come in late. We do have a sign-in sheet, but what we would like to do at this point is take a short break, have everyone come up, take a look at the maps. If there are particular

areas that you have questions on, again, we'll have the engineers stationed at the table to respond. If there are general questions regarding the project, we'll also be there to respond. But basically, I think let's give you the opportunity to take a look at the plans and respond to any questions that you may have, and we'll reconvene in about 10 or 15 minutes just depending on how many questions you do have.

(Recess taken.)

MR. MUNEKIYO: So we'll reconvene the public hearing, and thank you for the questions. As I mentioned, after we receive your comments, your testimony this evening, the engineers will be available to answer any additional questions you have. There were during the question-and-answer period, there were some general questions asked. General questions meaning those questions which may be of interest to the group as a whole, not specific to any particular property. So I thought I would give members of the audience, if you do have general questions, it's something we can spend five, ten minutes on just to clarify the scope of the project in general, but again, not specific to any particular property.

If you have any of those, then we'll give you an

opportunity to ask those at this point, and we'll see if we can answer those. Again, this is for purposes of clarifying the overall scope of the project. And if I may ask, for the purpose of the court reporter, when you do ask your question, if you could identify yourself and I'll refer you to the right person who can answer the question.

MS. BEKHEART: My name is Edna Bekheart, and I live at 4760 Honoapiilani Road. I'm curious to know where the light standards are going to go, how far into a private property will these, you know, standards be moved? Your light, your electrical -- excuse me, electrical wires and TV cables, et cetera, how far into the private property will these posts go in?

MR. MORIMOTO: Okay. Right now we have a representative from Maui Electric, Ron Fukushima. But basically, the new poles will be put at the back of the sidewalks on the mauka side. On the makai side, it will be put at the back of the V-swale, if there is a swale. And if you have a property on the back of the swale or on the mauka side of the sidewalk, it will be in your property. And maybe Ron here can give you further details.

MR. FUKUSHIMA: Our cross arms are about 8 foot

wide.

MR. ALULI: What's a cross arm?

MR. FUKUSHIMA: A cross arm is a wooden piece of lumber that we use to attach to the pole, and on that lumber, we install insulators, and the insulators carry the conductors. We need proper spacing. That's why we use the cross arm conductors. And typically, the cross arm will extend about 4 feet on either side of the pole. So if the pole is right on the boundary line, that means the conductor will extend 4 feet into your property. So that's the reason why we would need space.

MS. BEKHEART: What about the swag of all the lines? You know, your cables are --

MR. FUKUSHIMA: Yes, the wires do swing, and we need to get enough easements to take care of that swing. The easements are generally aerial easements. You can build walls and whatnot within that area, but I guess there's a County setback, so you won't be able to build any tall structures within that area.

MS. BEKHEART: Is it just a rumor that there will be fences six feet high placed along the mauka side; is there anything to that rumor?

MR. MORIMOTO: What is your question?

MS. BEKHEART: I said is there anything to this

rumor that six-foot high fences will be erected on the mauka side of the properties?

MR. MORIMOTO: Within your properties? No. I mean --

MS. BEKHEART: Alongside the sidewalk.

MR. MORIMOTO: No, there is no fences being put in, not part of the County. I'm sure you have your own fence on your private property. You have a right to put up a fence.

MS. BEKHEART: I understand that. Well, okay. Right now, you know, we have such a beautiful view, unobstructed view from our homes, and this whole section is a wonderful residential area. It's historic, too. To have the swags of lines, you know, coming across your sky, skyline, I'm just wondering if there's anything -- I wonder if anything can be done about tightening those lines instead of having them hanging and it's such a way to -- it just cuts into your view. At least of where I am, they're really hanging very low, and I'm concerned about that when they move the posts. Is that going to be considered?

MR. FUKUSHIMA: The existing pole line is fairly old in that area. So when we're putting up new poles and conductors, we tighten it up as much as we can, so there's minimum amount of sway.

MR. MUNEKIYO: Any other general questions which would clarify the scope of the project? And please identify yourself.

MR. HAWKINS: My name is Will Hawkins. 9 Puamana Place. I wanted to kind of find out if everything goes as planned, which I know it won't, but if everything goes as planned, what is the initial start of the dig? What end does it start on? I'm assuming it starts on the south end. And what is the time of completion? Is there any way to judge that?

MR. KRUEGER: If all goes according to schedule, we will bid the job out in June and probably start in September, and we estimate 12 months construction period if everything goes according to plan.

MS. LUMLUNG: You said it's going to take about a year to have it done?

MR. KRUEGER: Yes.

MS. LUMLUNG: You're not really sure, right? It's not going to be like Hawaiikai or H-3 freeway?

MR. KRUEGER: It's not going to -- we gave them a 12-month construction period, and there's a liquidated damages charge for each day they go over that period.

MS. LUMLUNG: Okay. Also when this is being done, only residential people will be using the roads,

right?

MR. KRUEGER: Construction people, too.

MS. LUMLUNG: Yeah, residential and construction.

MR. KRUEGER: And there's some delivery trucks.

MS. LUMLUNG: I know. What are they delivering in front of the beautiful homes? There's no stores down there.

MR. KRUEGER: A couple of restaurants.

MS. LUMLUNG: Well, that ends at Kahana Gateway.

MR. KRUEGER: All the way down from Hoohui Road to Napilihau Road.

MS. LUMLUNG: Why can't they go up to the upper highway and swing down that way?

MR. KRUEGER: Traffic will be limited because everyone will know construction is going on.

MS. LUMLUNG: Please inform the hotels. They can let the tourists know, also. Mahalo.

MR. KRUEGER: We'll have construction signs up.

MR. MUNEKIYO: Okay. Any other again questions regarding the project scope?

MR. ALULI: My name is Pia Aluli, 4790 Honoapiilani Highway. A couple of things. I was reading this Draft Environmental Assessment and part

of it says that the socioeconomic environment, and they're talking about the population growth and whatnot in West Maui. I think that just in between Hoohui and Napilihau Road, the population growth is like almost nothing compared to West Maui. So you guys are basing the need to have to make the road so wide and so big and extensive to accommodate the population growth, where I think it should be some place else.

I guess the consensus of a lot of us here is that wider is not necessarily safer and that straighter is not necessarily safer, so we all are really concerned, not so much of just saving our little kuleanas, but actually just trying to maintain the whole scope of this neighborhood. So when you folks do this assessment, and I know there's more to be read within there, too, I'm just wondering how valid that is and who I address that question to.

MR. MUNEKIYO: I can say as the preparer of the EA that what we tried to do was look at regional context because much of the traffic that uses Honoapiilani Highway really is of a regional nature; in other words, maybe not necessarily local residents, and so I think, and like Public Works officials can correct me, but in looking at the project need, they

basically looked at traffic volumes and existing conditions of the road in the context of the region and what they feel would be priorities for upgrading.

So, yes, the socioeconomic discussion in the EA is quite broad, but it was intended to address regional -- regional growth just to address the context that this project is, in fact, something that addresses traffic volumes, which has increased over time and I guess the existing condition of the road, Honoapiilani Road.

MR. ALULI: So when you say Honoapiilani Road, do you mean the highway or do you mean the lower road?

MR. MUNEKIYO: The lower road. But that's a valid concern, and, of course, that's something that what you speak to, Mr. Aluli, will be addressed in the EA as well, in the final EA. Any others?

MR. ALULI: I've got one more question. If I could just ask, why can't the -- why can't the utilities be put underground? You know, we talked about it, and they say no more bucks, right. I mean you might as well put out the bucks now. And, you know, it looks really shitty. You just look at all the lines and stuff. It looks ugly. And I think Maui is going to go down as, yeah, we got so much wires and

so much da kine because we're too cheap.

MR. KRUEGER: This request is statewide. You know, everybody wants overhead utilities underground, but there aren't enough money to do that. So the state has decided they're not going to use federal funds because there's not enough federal funds to go around to put it underground. The cost from overhead to underground is ten times.

MR. ALULI: Okay. Then my final question on this is if we were to get together and maybe try and get this road declared a historic road like they did in Hana, would the federal government maybe kick in something different as opposed to what's available for state funding for highway improvement? Do we possibly qualify if this is something that we can do?

MR. LEE: Lloyd Lee from Public Works. Historic district as far as standards, is there standards? Yes there, is possibility of eligibility. However, it's not at this point in the sense of Hana Highway. It's actually a trail road right now declared by the, I guess the governor, as far as historic roads. And there's no funding available as far as putting utilities even on Hana Highway underground.

MR. ALULI: Well, I'm just using that as a comparison, but maybe there might be. Does it qualify

if it is declared a historic highway?

MR. LEE: Well, as far as available funding for the County side, anything is available as far as putting in as long as you have the revenues. On the federal side, too, eligibility, it might be eligible. However, the amount of funding that we have allotted every year is determined and basically the state would not allow or delegate the authority of the County to use federal funds to go underground because the stress -- the importance of the priority of roadways is basically to get the infrastructure in. Utilities are secondary.

MR. ALULI: Well, you know, you talk about Hana Highway. There's like minimal utilities, and we're talking about people that live long distances like that, so I understand that. But this is right through a residential community where there's going to be posts every so many feet.

MR. LEE: Yes. But again, like I said, we already asked for participation for underground utilities, and they told us funding is not available.

MR. ALULI: But that's based on what is going on?

MR. LEE: It didn't make any difference.

MR. ALULI: Are you telling me it's not going to

make any difference?

MR. LEE: I would say it's not going to make any difference.

MR. ALULI: I just wanted that on record.

MS. VIERRA: What about certain areas, my area? There's only one street light right there. I don't know. I'm just asking because it was there I think in 1972. The property was built in 1960, so really, I mean we don't have enough lights, and I don't know why.

MR. LEE: You're referring that you want --

MS. VIERRA: Just in my area.

MR. LEE: You want additional street lights, or you're saying you want it underground?

MS. VIERRA: If you don't need it --

MR. LEE: There is a process if you need additional street lights. There's a street light committee the County runs or manages, so there's an application. If you want additional street lights, you need to fill out this application, submit it to the County and we will look at it, yes. But as far as undergrounding a portion of what you're saying is "in front of my house," that possibility is very, how do you put it, low priority. I hate to tell you that, but low priority.

MS. VIERRA: This is Addie. You know that, right. Where you going? What about if we take it out?

MR. LEE: Take what out?

MS. VIERRA: The street light. Just the same way I want to apply for a street light.

MR. LEE: Okay. Street lights, there has been a rule by our corporation counsel or legal counsel that we cannot remove street lights because it's a standard, and if we do remove street lights, it becomes a liability and risk on behalf of the County.

MS. VIERRA: Thank you.

MR. MUNEKIYO: Any other general questions?

MR. ALULI: How close to the general plan are you folks trying to keep?

MS. CLIFFT: I just wanted to ask, when you put in the extra pole lines, are they going to be the same type of poles like you get in Kaanapali, or is it the original poles that we have on the lower road when you change the electrical poles?

MR. MUNEKIYO: We'll have Mr. Fukushima respond.

MS. CLIFFT: I just wanted to know if it's going to look like the one in Kaanapali.

MR. FUKUSHIMA: There are 35 wooden poles in

between those two streets, and four of those poles will be steel poles. They will be the same color, but the tallest pole will be a 50-foot pole. It won't be as tall as the ones at Kaanapali. Kaanapali has two circuits going on that pole, so we needed the extra height. And in this, we're keeping it flat cross arm construction.

MS. CLIFFT: So basically, you're using the same poles then?

MR. FUKUSHIMA: The wooden poles.

MS. CLIFFT: Yeah, the wooden poles.

MR. FUKUSHIMA: We have 35 wooden poles. Four are steel poles. The steel poles are required because we cannot get guy wires into the residential property. There is either a high wall or a driveway right next to the pole location, and we need to install a steel pole without any guy wires. And steel poles are basically a design product. So we can make it so that we won't need any guy wires.

MS. CLIFFT: Okay. Thank you.

MR. FUKUSHIMA: We have a drawing and some fact sheets about our pole design.

MS. PAUHALANI: Rena Robinett Pauhalani. My concern with the electrical poles and the wiring has to do with the high wind situations, and I really

still don't understand in the area that we're in, which has got to be a high risk zone for hurricanes, for wind situations, that we cannot get some kind of extra funding for underground electricity and wiring and also on -- I like the wooden poles also, but I'm concerned about how heavy -- I mean I don't know anything about this, but I look up and I see how heavy the wiring is on those old wooden poles, and I think if we get one good 60-mile-an-hour wind, those things are going down.

MR. MUNEKIYO: Maybe I'll have Mr. Fukushima respond, but just so that we don't stay too long, a lot of the comments I think you are expressing I think are valid comments, certainly appropriate for the testimony phase as well, which, you know, we'll continue to receive questions. But if you think that it's something that is of a concern, we certainly would like to receive it as a comment of testimony that we can then respond to, look at if it's appropriate and respond in writing.

MR. FUKUSHIMA: The new pole line design will be based on the 80-mile-an-hour wind loading. So it will be able to handle 60-mile-an-hour winds. Right now the existing line was installed, you know, way back I think before I even started at Maui Electric.

But at that time, we may not have had the standards we have right now. So our standards for designing this line, pole line, wooden pole line is 80 miles an hour. So any type of wind up to that point, we would be able to handle.

MR. MUNEKIYO: Any other general questions which would clarify the scope of the project? And please identify yourself for the record.

MR. ROTHMAN: Ken Rothman. I would say probably about half the people here have an issue with the power lines. I was wondering if there's some way if the community got together to at least find out what the budget would be with the difference on the funding to bury some or all the lines, could we work with the power company to see if there's enough support, whether maybe we can do it without the state money or the County money, but the local residents? I don't know what the money is. I don't know if anybody does. Could we work with the power company to find out what it would cost, whether it's in some sections or all of it to see whether they could be buried?

MR. SHINYAMA: Hi, I'm Neal Shinyama, Maui Electric. Actually, it could be looked at. Anytime somebody wants to underground a line, usually it's between the utility and the customer. So additional

costs of the underground is usually borne by the customer, whoever it might be, a developer or whatever it is.

Hawaiian Electric, our parent company, has adopted a cost sharing program, which is basically one-third utility, one-third customer and one-third state or whatever funding there might be. We haven't adopted it, but we can look at things on a case-by-case basis. There's also an opportunity where the federal funds are available. It's what they call 80/10/10, which would be 80 percent, 10 percent utility, 10 percent some other utility, whether it be County or whatever. But you've got to realize now the County or the state is a big player in this, okay, because they have a big chunk of the portion. Unless like you said, if you go one-third, one-third, one-third, MECO takes a turn on the electrical side, the developer, could be all the residents that live along the property kick in the other third and somebody else like the County kick in the other third. That's a possibility.

But, you know, Lloyd guys are working under some federal guidance and rules, and those would have to be looked at, too. When they get certain funds, there's certain rules they've got to follow. I don't know all

the details on that component of it, but there are opportunities. Like I said, we haven't adopted the same policy as HECO yet. We do look at things on a case-by-case basis.

MR. ROTHMAN: If we could find out how much money would need to be drawn from the community. You know, maybe it's there, and it can just be done. It's just a beautiful area. It would be great to see, you know, the power lines go underground there.

MR. SHINYAMA: As far as MECO is concerned, and you're going to be talking about all the other utilities also, it doesn't make sense for MECO to go underground and Verizon to stay up or cable or whoever it might be. It doesn't make sense for only one person. If everybody is willing to look at that -- I know MECO would be willing to sit down and look.

But then again, like I said, the County is a big player in this. This is their project. This is their lead. We're locating our pole lines only basically because there's a development, a road widening project, a road improvement project that we have to relocate our facilities. If that wasn't being done, that existing pole line would still stay there.

That's the driving issue right there as far as the road improvement project and a component of that,

the undergrounding of utilities, and everybody has got to get together and see if that's a possibility at all. Like I said, I'm looking at Lloyd because he's the head guy on this project. So to me, he's the key guy right there.

MR. LEE: Okay. I guess Neal put it in my lap. But anyway, for your information, this 80/10/10 cost sharing that Neal is referring to is no longer available. The other issue as far as what they've adopted in Honolulu or the poles is one-third, one-third, one-third. It's not going to happen. So basically, what we have now is that under this HRS, the utility company and the County or government agencies when we have projects, they're required to enter into agreements where the first $10,000 is picked up by the utility company and the remaining improvements is shared with the government agency and the utility companies on a 50/50 basis.

Now, the gentleman's question as far as is it possible to underground facilities if a private entity would pay for it; yes, it would not be objectionable as long as the funds are not coming from the County or from the federal government. I shouldn't say the federal government. I'm saying delegated to the state. The state will not allow federal funds for

underground. So I hope that answers your question.

MR. MUNEKIYO: Okay. Mr. Aluli, you had a question?

MR. ALULI: A while ago, we were all given letters to sign in agreement so that the electric company, the telephone company to come inside and do work, right, some kind of a letter to allow that. We had a meeting, and a lot of us decided not to sign the paper because we had no open in, no end in. It was an open end that you guys could come in anytime and do it. Now, in retrospect, we look at back at Dollie's down there. They're still working on it, so we're just wondering if there's anymore of a concise timetable so when the letters come back again if we're going to sign it to allow them access into the property. This has kind of dragged out too long, and just the reading of the wording was just open. They could come anytime and there was no expiration.

MR. LEE: What he's referring to is what we call a Right of Entry document for the County and its agents, which includes the utility companies and the contractor and subcontractor to enter into your property during the process of construction to do whatever we've got to do to move the project forward. Like, for instance, if your driveway connects to our

road, which it does, we would have to have some kind of agreement with the owner to construct some kind of transition driveway into your property, but we need a right of entry document to allow us to do that.

Otherwise, we won't be able to do any transition as far as make a transition back into your driveway. Vice versa, if we're doing sidewalks to the edge of your property, the contractor is required to put foam work to form some kind of edges for that sidewalk. Now, the foam work temporarily might be primarily in your property, but when it's completed, the foam will be removed and your property no longer will have anything under construction.

But why we say construction right of entry is because to ensure you, the owner, that the contractor, when he's completed, would do something better, equal or better than what is existing and to give them right of access to do the work. It's not something we're going to do now. We're looking at hopefully if everything passes, the Federal EA, the SMA process passes, the project goes forward, we finally get approved from the state to advertise the project, we're looking at hopefully at the earliest maybe summer of next year and hopefully completed in the following year.

MR. ALULI: You talk about construction, but you also talked about Verizon and electrical, too.

MR. LEE: Right. If you look at utility drawings, a lot of the utility drawings, they will not per se affect you as far as utility work. The only ones, the major ones is where we have mostly the commercial developments when it's underground and we have to do service connections. The existing conduits would have to be tied back into the new system as far as the new alignment and therefore required to go into private property as far as utilities.

The other one when you say utility, we have where the poles now would conflict with the new construction, and therefore, we need a right of entry or utility easement depending on where the pole is going to be located in the private property. So that's where, you know, it's not going to affect all the residents as far as, you know, that actually.

But on those, the right of entry is just a general document. But we would have to come back. If the poles are going to be placed on your property, we would have to come back to you and negotiate, A, separate utility easement with the owners. So if you haven't received any utility easements as far as an easement document for a permanent easement, you

wouldn't be directly impacted.

MS. BEKHEART: This is my last comment. Well, we're all here to talk about the environment, and we're dealing with the science and technology of environment, which is very important to all of us. We do want a smooth drive through, and we do want good drainage and we do want to maintain the character of this particular corridor. As it is, it's wide open to speeders and accidents. And I live, you know, on the road and so many other families live alongside me, and we have a small community.

I think we should be also talking about the artistic environment. And even if we may not be able to get the wires underground, at least we should be considering about beautification and making this corridor a unique place. I did write a letter to the Maui County Director of this project and I suggested that we do something about the historic value of this particular road because underneath this Honoapiilani Road, the lower road, which is original, underneath this road is the first road or the trail that Piilani built for the people under his reign, you know, built.

Now that we are improving this particular spot, is there a space for some historic points so that

people can come down to our road and respect it so that they do not use our corridor like a speedway but to have an easy drive, you know, through our little corridor and respect our community because right in front of my house we have local fishermen that come in in the weekends and they cast their lines out there and catch fish all the time. Kids go surfing right outside there. And, you know, mothers walk along with their babies, and this is a special place. The view is incredible.

You look at Molokai, Lanai, Kahoolawe, and it's the most beautiful place in all the islands, all the islands. And when you have six incredible bays that are named for, you know, King Piilani, and I said this before, and I know more history about this particular strand of road. And if we really want to be unique, then I think we should be thinking also about the environment and not tearing down too many trees and trying to keep it, you know, a special place. Thank you.

MR. MUNEKIYO: Thank you for your comment. And I think the nature of her comments reflected what we want to receive from you if you wish in terms of public testimony; that is, whatever you feel is important to you that you want to express tonight, we

will receive. We will not discuss it. We will receive it. If it's something that requires further analysis, of course, we will do that. The project team will do that.

At this point, what I would like to do is continue the comments and receive any oral testimony that you might have. If you feel that you would like to think about it more, we do have, Glenn, comment cards that you can pick up and, of course, write your comments down, send it out to us or mail it. We are receiving comments until September 12th. But at this point, let me just ask if there's anybody who would like to express further comments. We will receive the comments, and please identify yourself if you do have verbal comments. Make sure that you have signed in so that we can get your address. We do have a sign-in sheet, which we are looking for addresses so that in the event we do need to follow up with you, we can do that. So let me just ask if there's anybody who would like to give additional oral testimony. If not -- ma'am, and please just tell us who you are and tell us what's on your mind.

MS. CLIFFT: I'm Eileen Clifft. Address is 4652. My comment is we live on the lower road. We like the road the way it is. We just need you guys to

resurface our road. Then we wouldn't have to deal with this electrical poles. These runoffs, bad water runoff that we will have to deal with, too. I'm concerned about where the runoff is coming to and where it's ending. In the ocean, right? We had algae problem this past summer right in front of Kahana Reef right in front of where I live.

If runoff is dumping into the ocean, that's not going to help our algae problem. And I thought we were going to do an environmental study on that as far as the runoff and ending into the ocean because we live right across the ocean. My other comment was I noticed a lot of tourists walk and jog on the lower road. And the only reason they do that is because they don't feel safe walking and jogging on the highway. Now, you build a highway in the back of my house. Why can't you build the sidewalks up there? Why do you have to come on the lower road where it's a residential area where people like seeing koa trees, where they like seeing people walking with their dogs, children riding their bicycles. It's not made for another lower highway. It's a residential area.

We have children that ride their bicycles on the road. We have parents that visit neighbors on the road. We hang out on the road because that's how we

know what's going on in our environment. So I guess my main concern is that if we as a community, we're not against you coming in and doing what needs to be done. But what made you decide to pick us when there's a highway right in the back of my house that all of this could go on. And would save us as being, quote, a quiet neighborhood. All we needed was to resurface our road and have the drainage system worked on basically. We don't want anything else done. We just wanted our road to be resurfaced, and don't expand the road because I saw what you did in the front of the Dollie's and Falls of Kahana. You expanded the road, and now it's parking.

I thought that was supposed to be a bike path, and people speed on the lower road now ever since you guys widened that road. Anyway, this is my comment.

MR. MUNEKIYO: Thank you very much. Anyone else wishing to speak? And introduce yourself.

MR. HAWKINS: My name is Will Hawkins again. It was kind of ironic that the gentleman that drafted part of the plans here, he said that his first indication when he came into the neighborhood was that it was unsafe for people walking on the roads, and I can't disagree with that thought. I mean plenty of times I've had to slow down because a mother is

pushing a baby in the center of the road. It's just absolutely insane, so I definitely understand the need for all of this improvement. But the ironic thing about it is that, you know, whereever you are, mainland or on the islands, if you improve the road, people are going to go faster.

So instead of, you know, the lesser of two evils, not that I'm encouraging it, of course, but you either get bumped by a bumper, which is the condition that it is now, and you have to go slow because the road is all potholes and in terrible shape. Or the other option is to have some guy on a motorcycle going 90 miles an hour because the road is nice and smooth to ride on and he plows through someone's house and kills two people in the house. I mean it's just the irony is that you're trying to make the road safe, but the realism is you're going to have people speeding up and down the highway, and I think that issue really needs to be addressed if this improvement does follow through.

You need to provide some kind of speed enforcement or signage or whatever, you need to provide that. And personally, the lesser of two evils for me, I like the road the way it is because I don't really like the whole modern road thing that we've got

going on in Hawai`i. I don't want Dairy Road in my back yard. And I just would rather see this potholed road with a skinny bridge that people have to slow down to get over and to get through the neighborhood. And I would also like to find a way that we could encourage people to take the highway to go to Kapalua and get people up on the highway and off of the lower road. And maybe I guess that was the whole purpose of the Hui roads is to provide access off the highway down to the lower road. And but now most people take the lower road to Kapalua I think. That's all I have.

MR. MUNEKIYO: Thank you very much. Anyone else wishing to speak? Ma'am.

MS. VIERRA: Hello. Who gets to choose? Does the County get to choose where they want to spend the money as far as this particular area? Lloyd, who gets to choose?

MR. MUNEKIYO: We'll answer that question. The question is who gets to choose where the monies are spent.

MR. LEE: Who chooses?

MS. VIERRA: Yes.

MR. LEE: Basically, the priority of projects as far as the County of Maui goes, it's, how do you put

it, it's something that we look at a massive plan as far as where we are in the community plans, where our master plans are initiated, where our complaints come in. And we try to prioritize projects based on that need per se.

Now, as far as funding, if you're referring to County funding, it goes to the mayor's office, it goes to County Council. And then we put in our projects based on our immediate projects. Now, if you're dealing with the state government who actually delegates the federal funds to the counties for the highway projects, that is a statewide need assessment that's done to justify what island or what County gets what money.

So there's a lot of lobbying for projects. However, it's usually in compliance with what we call a statewide transportation plan that the state initiates. So it's a master plan for all the islands for all roads, all government roads including state and County roadways. So we, I guess my job is to lobby the state and federal government for these monies based on our needs and our priorities jointly with the state DOT over here.

MS. VIERRA: So as the residents, we won't be able to kind of like make a petition?

MR. LEE: Petitions are good.

MS. VIERRA: Like Honokohau -- this project that's going on in our lower road, there seems to be no really problem. Maybe towards after the plantation they need more widening and things like that.

MR. LEE: Well, like anything else, what you're referring to is a non-federal funded area, Napilihau area -- not Napilihau, but Honokohau area. So as far as funding, it's strictly under County revenues.

MS. VIERRA: Like Kahakuloa or something where we do need the monies in case of an accident or in case of fire.

MR. LEE: Even Kahakuloa/Hana Highway is basically non-federal funded areas.

MS. VIERRA: Thank you.

MR. MUNEKIYO: Okay. Anybody else would like to provide verbal testimony? If not, again, we do have the comment cards, and feel free to fill these out, send them in to the -- I believe we have the directors -- Glenn, do we have the director's address on that?

MR. TADAKI: Yes, it's on the handouts.

MR. MUNEKIYO: On your handout, in the inside cover, there is the director's address. So if you would like to submit written comments, pick up a card

and you can either deliver it to the director's office or mail it in. Again, if you do want to have additional questions answered after this phase of the meeting is closed with regard to any specific property, we will be here for a few minutes or however long it takes to answer your questions, so feel free to come back up and ask those questions. So at this point, I will close the public hearing and I would like to thank all of you for joining us this evening. We really appreciate it. The department appreciates it. Thank you.

(The hearing concluded at 8:30 p.m.)

C E R T I F I C A T I O N

I, Rachelle Primeaux, Notary Public for the State of Hawaii, certify:

That on the aforementioned date and time the proceedings contained herein were had;

That the proceedings were taken by me in machine shorthand and were thereafter produced in transcript form under my supervision;

That the foregoing represents, to the best of my ability, a true and accurate transcript of the proceedings had in the foregoing matter.

I further certify that I am neither attorney for any of the parties hereto nor in any way concerned with the cause.

Dated this 6th day of Sept., 2001.

Notary Public, State of Hawaii

My Commission Expires June 14, 2004

2002-11-08-MA-FEA-

Final Environmental Assessment

LOWER HONOAPIILANI ROAD IMPROVEMENTS (Hoohui Road to Napilihau Street) Project No. STP 3080(8)

Prepared for:

October 2002

The Accepting Authority - County of Maui, Department of Public Works and Waste Management

MUNEKIYO & HIRAGA, INC.

Final
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Preface

The County of Maui, Department of Public Works and Waste Management (DPWWM) proposes road widening, drainage, and related improvements to an approximately 1.4 mile segment of Lower Honoapiilani Road from Hoohui Road to Napilihau Street in the Lahaina District on Maui, Hawaii. The proposed project involves the use of County and Federal funds as well as lands within the shoreline area.

Pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and Chapter 200 of Title 11, State Department of Health Administrative Rules pertaining to Environmental Impact Statement Rules, as well as 23 CFR 771, U.S. Department of Transportation, Federal Highway Administration, Environmental Impact and Related Procedures, this Environmental Assessment (EA) documents the project's technical characteristics, environmental impacts and alternatives, and advances findings and conclusions relative to the project.

Summary

Proposing Agency and Landowner

The proposing agency for the Lower Honoapiilani Road Improvements Project (Hoohui Road to Napilihau Street) is the County of Maui, Department of Public Works and Waste Management (DPWWM). The majority of improvements will be conducted within the existing roadway right-of-way (ROW). Should limited ROW acquisition be required, a determination of the physical boundaries of acquisition areas would be made during the detailed engineering design phase of the project.

Property Location and Description

The proposed project will involve road widening, drainage, and related improvements to an approximately 1.4 mile segment of Lower Honoapiilani Road that extends from Hoohui Road in Kahana to Napilihau Street in Napili. With the exception of an 0.8 mile segment within the Kapalua Resort which is privately owned and maintained, Lower Honoapiilani Road is a two-lane coastal roadway under the jurisdiction of the County of Maui that begins at its intersection with Honoapiilani Highway and proceeds in a northerly direction to its terminus within the Resort.

Proposed Action

The proposed typical roadway section will consist of two (2) travel lanes with a makai lane width of 11 feet and a mauka lane width of 12 feet, as well as a paved drainage swale outside the makai travel lane and a concrete curb, gutter, and sidewalk outside the mauka travel lane. The existing Kahananui Bridge at Kahana Stream will be reconstructed to accommodate the widened roadway section and three (3) existing drainage outlets will be repaired and two (2) new outlets will be constructed. Additional improvements include the provision of driveway connections for providing access to properties bordering the roadway and the construction of crosswalks and curb ramps, as needed, to meet Americans with Disabilities Act (ADA) criteria. In connection with the project, utilities will be relocated as needed and new drainlines, catch basins, drain inlets and storm drain manholes will be constructed where necessary.

Determination

On a short-term basis, construction related employment is anticipated to have a positive effect on the local economy. The proposed project will improve vehicular and pedestrian traffic as well as drainage conditions along the project corridor.

No adverse drainage or other infrastructural impacts are anticipated as a result of the implementation of the proposed project. In addition, the proposed project is not expected to have adverse impacts upon sensitive environments as well as public services and facilities.

Chapter I

Project Overview

I. PROJECT OVERVIEW

A. PROJECT LOCATION AND LAND OWNERSHIP

The County of Maui, Department of Public Works and Waste Management (DPWWM) proposes to implement road widening, drainage, and related improvements to Lower Honoapiilani Road on the island of Maui.

Lower Honoapiilani Road is a two-lane coastal roadway under the jurisdiction of the County of Maui and has a variable right-of-way (ROW) ranging from 40 to 60 feet. Extending approximately 5.0 miles, Lower Honoapiilani Road begins at its intersection with Honoapiilani Highway, makai of the County's Lahaina Wastewater Reclamation Facility (LWRF), and proceeds in a northerly direction to its terminus within the Kapalua Resort. The 0.8 mile segment of Lower Honoapiilani Road within the Resort terminates at its intersection with Office Road and is privately owned and maintained by Kapalua Land Company, Ltd.

Previous improvements to Lower Honoapiilani Road involved a segment of the roadway from Honokowai Stream to Honokowai Beach Park, as well as a 0.4 mile segment between Honokowai Beach Park to Mahinahina Stream and a 1.0 mile segment from Mahinahina Stream to Hoohui Road.

Within the project corridor, Lower Honoapiilani Road traverses lands which are primarily occupied by condominiums, apartment complexes, and single-family residences.

The majority of the proposed Lower Honoapiilani Road improvements will be conducted within the roadway's existing ROW, however, limited ROW acquisition will be required.

With the exception of the 0.8 mile segment within the Kapalua Resort, the ownership of Lower Honoapiilani Road rests with the County of Maui.

The proposed project is located within the limits of the Special Management Area (SMA) for the island of Maui. Within the project area, lands makai of the Honoapiilani Highway ROW are encompassed by the SMA.

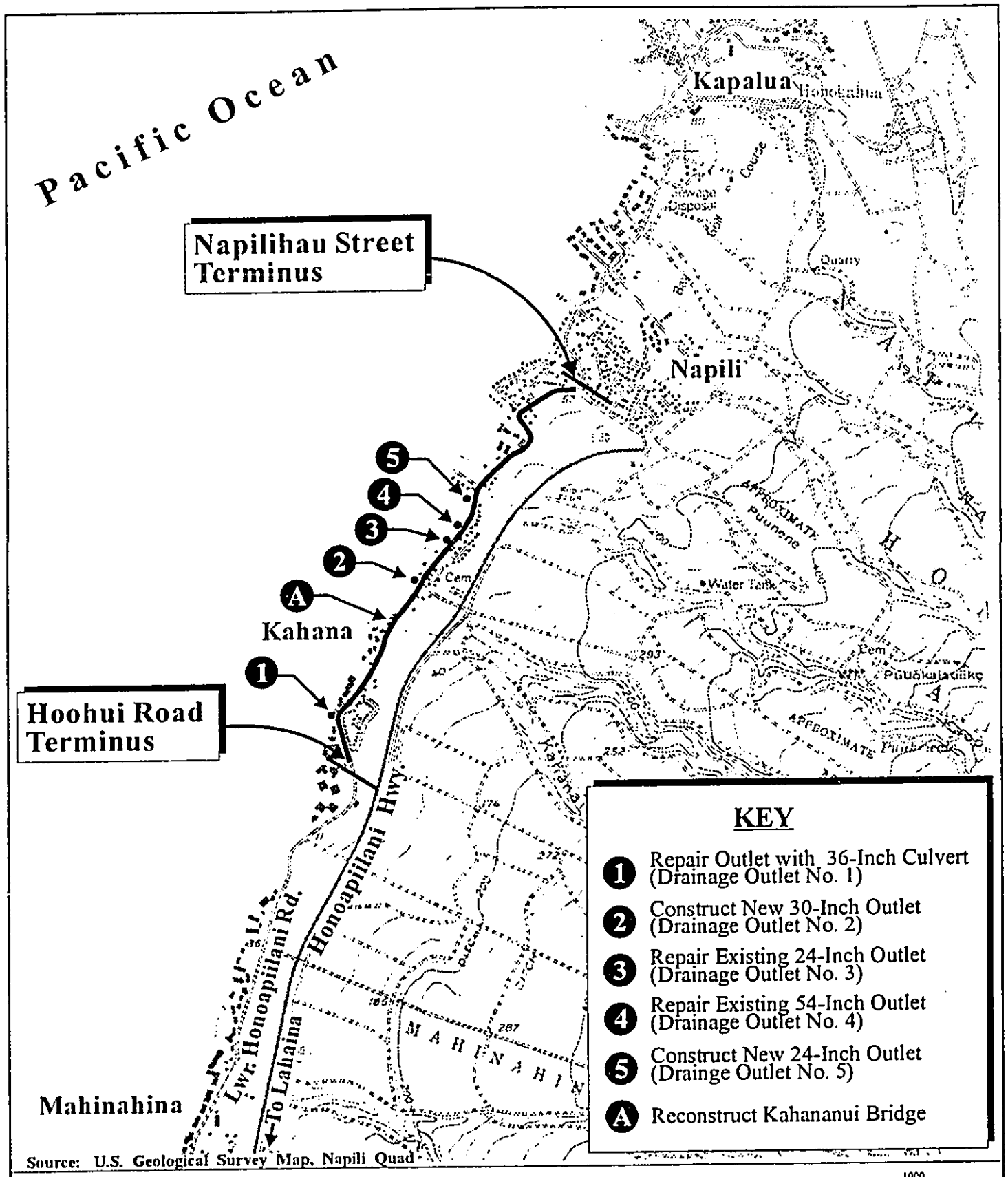
B. PROPOSED ACTION

1. Project Need

The segment of Lower Honoapiilani Road that is proposed to be improved begins at Hcohui Road in Kahana and ends at Napilihau Street in Napili, a distance of approximately 1.4 miles. See Figure 1. This segment of the roadway has a pavement width that ranges from 20 to 24 feet and a ROW which varies from 24 to 52 feet.

Recent growth in the West Maui region has resulted in an increase in vehicular and pedestrian traffic along Lower Honoapiilani Road. To accommodate this growth, roadway conditions need to be improved and sidewalks installed in order to provide for the safe and efficient travel of motorists and pedestrians.

The proposed project will provide residents and visitors with better driving conditions, safer pedestrian walkways, and improved drainage conditions.



Source: U.S. Geological Survey Map, Napili Quad

Figure 1 Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)
Regional Location Map

MUNEKIYO & HIRAGA, INC.

Prepared for: County of Maui, Dept. of Public Works and Waste Management

2. *Proposed Improvements*

The proposed project will involve road widening, drainage, and related improvements to an approximately 1.4 mile segment of Lower Honoapiilani Road that extends from Hoohui Road in Kahana to Napilihau Street in Napili.

The primary elements of the proposed roadway improvements project include the following:

1. Widening the existing paved roadway surface. The typical roadway section will include two (2) travel lanes with a makai lane width of 11 feet and a mauka lane width of 12 feet, a 6-foot wide paved drainage swale outside the makai travel lane, and a concrete curb and sidewalk outside the mauka travel lane. See Figure 2. Based on right-of-way and design parameters, the sidewalk will vary in width. The widened roadway segment at the new Kahananui Bridge will not include the paved swale.

2. Demolishing and reconstructing the existing Kahananui Bridge at Kahana Stream to accommodate the widened roadway section. Refer to Figure 1, map key item "A".

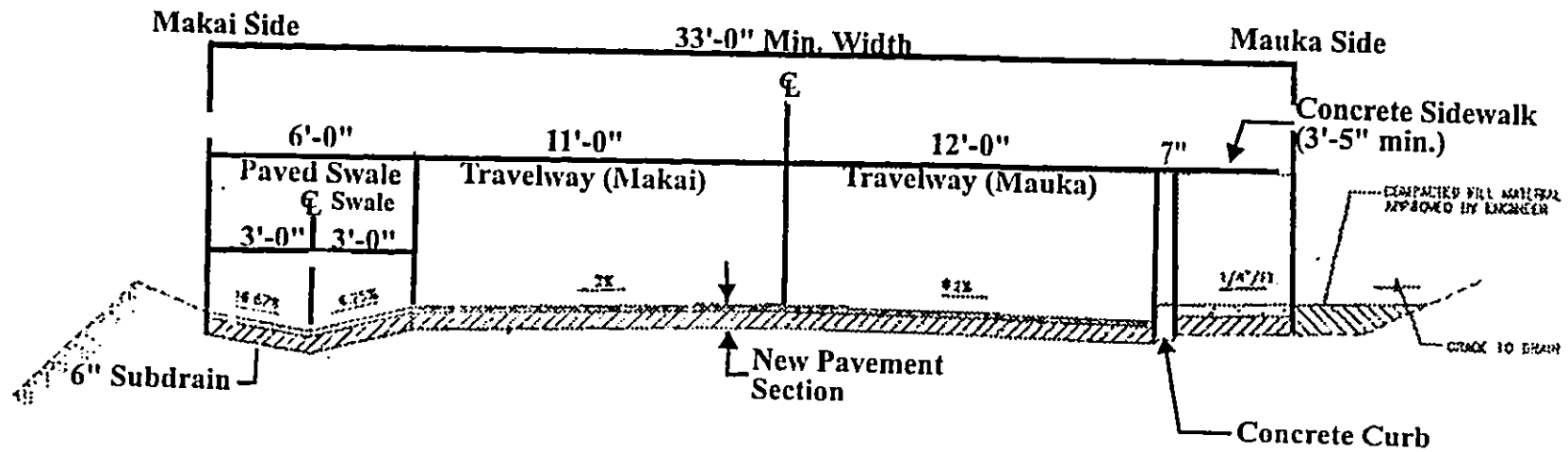
3. Installing new drainlines and constructing two (2) new drainage outlets and repairing three (3) existing outlets.

4. Replacing the roadway's existing asphalt concrete pavement with new pavement.

5. Relocating existing sewerlines, waterlines, fire hydrants, and overhead utility poles and lines, as necessary.

6. Constructing crosswalks and curb ramps, as necessary, and in accordance with the standards of the Americans with Disabilities Act (ADA).

7. Providing driveway connections for properties adjoining the right-of-way.



Source: Austin, Tsutsumi & Associates, Inc.

Figure 2

Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)

Proposed Typical Roadway Sections

NOT TO SCALE

Prepared for: County of Maui, Dept. of Public Works and Waste Management

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C. *WORK PROPOSED WITHIN THE SHORELINE SETBACK AREA*

Specific elements of work to be performed within the shoreline setback area have also been identified and are described in this section.

1. *Roadway Segments Within the Shoreline Setback*

Within the project corridor, two (2) segments of Lower Honoapiilani Road directly border the shoreline. These segments include the portions of the roadway between Ka'ea Point and Kai'a Point, north of Kahana Stream (between TMKs 4-3-15:36 and 4-3-19:47) (Shoreline Segment No. 1) and at the Ka'opala Gulch embayment south of Haukoe Point (between TMKs 4-3-15:08 and 4-3-15:36) (Shoreline Segment No. 2). There are no intervening parcels between the ocean and the roadway ROW along these shoreline bordering areas.

The road widening improvements proposed in connection with this project have been previously described in this chapter. These improvements are needed to provide residents and visitors alike with better driving and drainage conditions along the project corridor and enhance safety and traffic circulation for pedestrians and bicyclists as well.

2. *Existing Drainage Outlets to be Repaired*

The proposed project will involve repairs to three (3) existing drainage outlets.

Drainage Outlet No. 1, (refer to Figure 1, map key item 1) which was described in the project's Draft Environmental Assessment (EA), is located to the south of the Pohailani Condominium's makai complex. Since the filing of the Draft EA, the design for the repair

of this outlet has been modified. The proposed repairs to this existing outlet involve installing a 36-inch diameter culvert and constructing a concrete reinforced masonry (CRM) headwall, rip-rap boulder apron, and rip-rap boulder slope protection improvements. The rip-rap boulder apron and slope protection improvements will replace the grouted rubble paving (GRP) apron and concrete reinforced masonry (CRM) wingwalls that were initially proposed. See Appendix A-1. It is noted that a 24-inch outlet pipe was previously located at this outlet location but was damaged by wave action and removed. The existing 24-inch drainline which leads to the outlet will not be affected by this work. The repair work will remain within TMK 4-3-05:27 and an existing drainage easement on TMK 4-3-10:por. 09.

Since the time the project's Draft EA was published, two (2) additional outlets requiring repair work were identified by the DPWWM. These repairs involve two (2) existing drainage outlets along Shoreline Segment No. 2.

Repairs to the headwall of an existing 24-inch drainage outlet near the southern end of Shoreline Segment No. 2 are proposed. For reference purposes, this drainage outlet is identified as "Drainage Outlet No. 3", as shown on Figure 1. This repair work is necessary due to the deteriorated condition of the existing CRM headwall. See Appendix A-2.

In addition, repairs to an existing 54-inch drainage outlet are proposed. For reference purposes, this outlet is identified as "Drainage Outlet No. 4, as shown on Figure 1. The repair work for this outlet, which is located about 300 feet north of the existing 24-

inch outlet, includes the in-kind replacement of the existing 54-inch diameter culvert and, as necessary, grouting around the new culvert. To accommodate the new concrete sidewalk, additional repairs include the reconstruction of a CRM headwall and a portion of the GRP inlet on the mauka side of the road. See Appendix A-3.

Repair work to existing Drainage Outlet Nos. 1, 3 and 4 will occur at their present locations. The discharge points for the runoff from these outlets will remain unchanged. With the exception of Drainage Outlet No. 1, the proposed repair and construction of the existing and new drainage outlets are expected to occur mauka of the certified shoreline.

3. ***New Drainage Outlets to be Constructed***

The proposed project will also include the construction of two (2) new drainage outlets. See Appendix A-4.

Situated within Shoreline Segment No. 1, Drainage Outlet No. 2 is located in the vicinity of Hui Road D. Since the filing of the Draft EA, the design of this outlet has been modified to provide a 30-inch diameter culvert rather than the 24-inch culvert that was initially proposed (refer to Figure 1). The proposed scope of work for this new outlet involves the installation of the 30-inch culvert, as well as the construction of a CRM headwall, GRP apron, and a 3-ft. high chain-link fence along the headwall. The construction of this new outlet is necessary as it will accommodate the surface flow from the widened roadway section.

Drainage Outlet No. 5 is located within Shoreline Segment No. 2 and is situated in an area to the south of Hui Road E. The proposed work for this new outlet will involve the installation of a 24-inch diameter culvert and the construction of a CRM headwall, GRP apron, and 3-ft. high chain-link fence along the headwall (refer to Figure 1). This new outlet is needed in order to accommodate the surface runoff from the improved roadway section.

D. *OVERALL COSTS AND TIMESCHEDULE*

The proposed project will involve the use of County and Federal funds and is anticipated to cost approximately $10.0 million, while the cost of the drainage improvements proposed within the shoreline setback area is about $160,000.00. Federal funds will be provided through the Transportation Efficiency Act for the 21st Century (TEA 21). The proposed project is included in the currently approved Statewide Transportation Improvement Program.

Construction of the project will commence upon the receipt of applicable regulatory permits and approvals and is estimated to take about twelve (12) months.

Chapter II

Description of the Existing Environment

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL SETTING

1. Surrounding Land Uses

The project corridor is located along the foothills of the West Maui Mountains. West Maui is known for its resort destinations, as well as its sugar cane and pineapple production lands. Lahaina Town, once the capitol of Hawaii and now designated as a National Historic Landmark, is located approximately 2.5 miles south of the project corridor.

The project corridor begins at Hoohui Road in Kahana and terminates at Napilihau Street in Napili, a distance of approximately 1.4 miles. Within the project corridor, Lower Honoapiilani Road traverses lands which are primarily occupied by condominiums, apartment complexes, and single-family residences.

Along the project corridor, proceeding north from Hoohui Road to Napilihau Street, condominiums and apartment complexes include the Royal Kahana, the Hololani, the Pohailani Maui, the Kahana Reef, the Kahana Outrigger, the Kahana Village, the Kahana Sunset, the Alaeloa, and the Maluna Kai Estates.

Land uses in the vicinity of the project corridor include business/commercial uses typified by Kahana Gateway, a complex located at the intersection of Hoohui Road and Honoapiilani Highway which includes a shopping center, an apartment building, and a professional office building, as well as the Napili Plaza, a shopping center situated at the intersection of Napilihau Street and Honoapiilani Highway. In addition to single-family residences and the Napilihau Planned Unit Development, condominiums and

apartment complexes such as the Kahana Villa, Kahana Beach Resort, Kahana Falls, Sands of Kahana, Valley Isle Resort, and Kahana Manor characterize land uses in close proximity to the project corridor.

2. *Climate*

Like most areas of Hawaii, Lahaina's climate is relatively uniform year-round. Lahaina's tropical latitude, its position relative to storm tracts and the Pacific anticyclone, and the surrounding ocean combine to produce this stable climate. Variations in climate among different regions, then, is largely left to local terrain.

Average temperatures in Lahaina range between 60 degrees and 88 degrees Fahrenheit. August is historically the warmest month, while January and February are the coolest.

Rainfall at Lahaina is highly seasonal, with most precipitation occurring between October and April when winter storms hit the area. Situated on the leeward side of the West Maui Mountains, this region receives most of its rainfall in late afternoon and early evening, after seabreezes take moisture upslope during the day. Precipitation data collected at the Wahikuli Station (#364) show that on average, January is the wettest month, with 3.31 inches of precipitation, while June is the driest, with just 0.25 inch. The average annual total is 18.5 inches (Environment Impact Study Corp., 1979).

Wind patterns in the Lahaina area are also seasonal. The northeasterly tradewind occurs 90 percent of the time during the summer, and just 50 percent of the time in the winter. Wind

patterns also vary on a daily basis, with tradewinds generally being stronger in the afternoon. During the day, winds blow onshore toward the warmer land mass. In the evening, the reverse occurs, as breezes blow toward the relatively warm ocean.

3. *Topography and Soils*

The project corridor is situated at the base of the West Maui Mountains, near the shoreline between Hoohui Road and Napilihau Street.

The topography along the project corridor is generally flat along its southern segment and gently sloping toward its northern extent.

Slopes within the project corridor vary from 0 to 10 percent, while elevations range from approximately 5 feet to 40 feet above mean sea level (amsl).

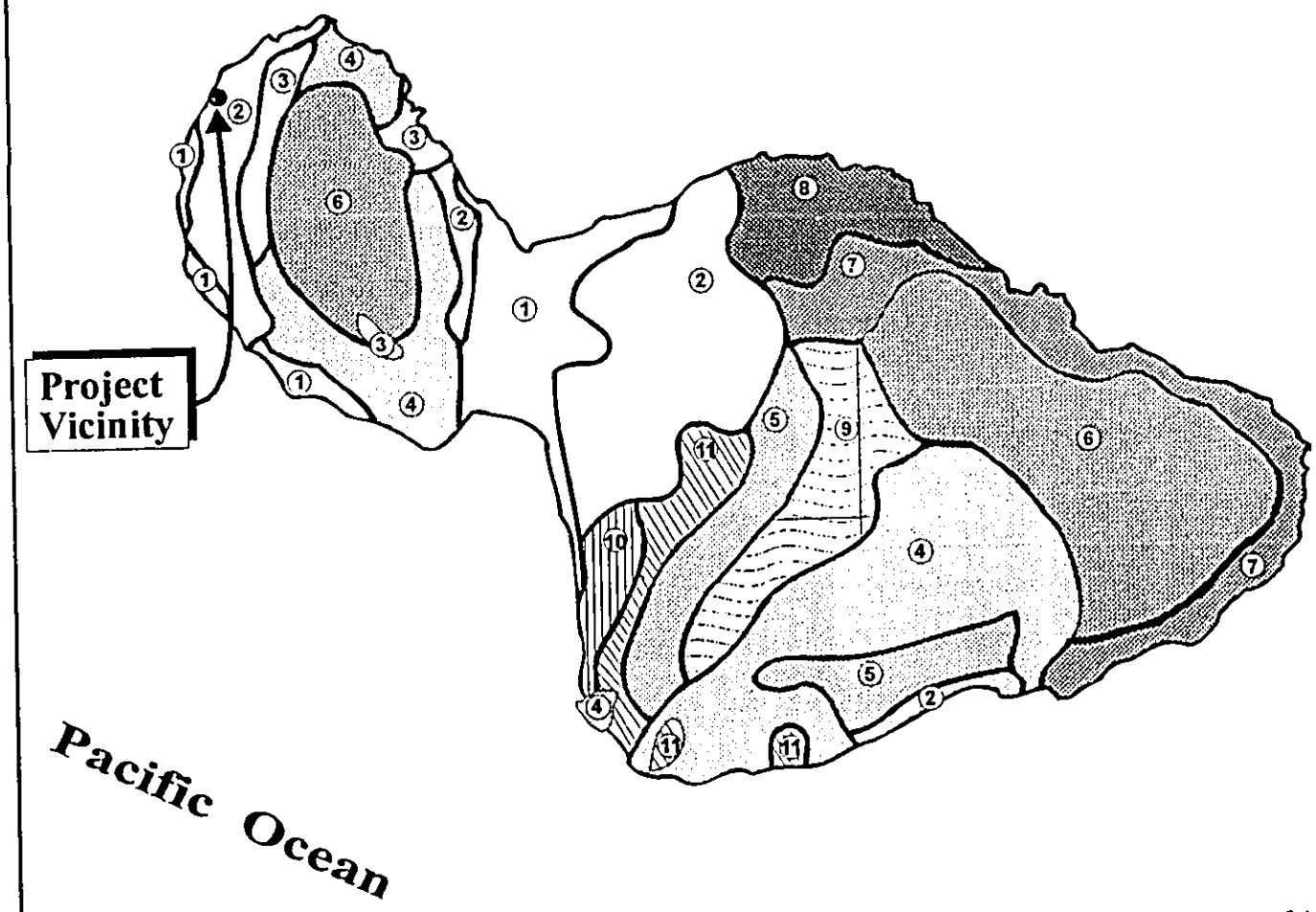
Underlying the project corridor are the soils of the Waiakoa-Keahua-Molokai association. The Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, characterize the soils of this association as well-drained, moderately fine textured soils which are nearly level to moderately steep. See Figure 3.

Soils underlying the project corridor are of the Ewa Series, Kahana Series, Lahaina Series, Pulehu Series, and Rough Broken and Stony Land. See Figure 4.

Ewa Silty Clay Loam (EaA) consists of well-drained soils in basins and on alluvial fans with 0 to 3 percent slopes; runoff is very slow

LEGEND

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



Map Source: U.S. Department of Agriculture, Soil Conservation Service

Figure 3 Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)
Soil Association Map

NOT TO SCALE

Prepared for: County of Maui, Dept. of Public Works and Waste Management

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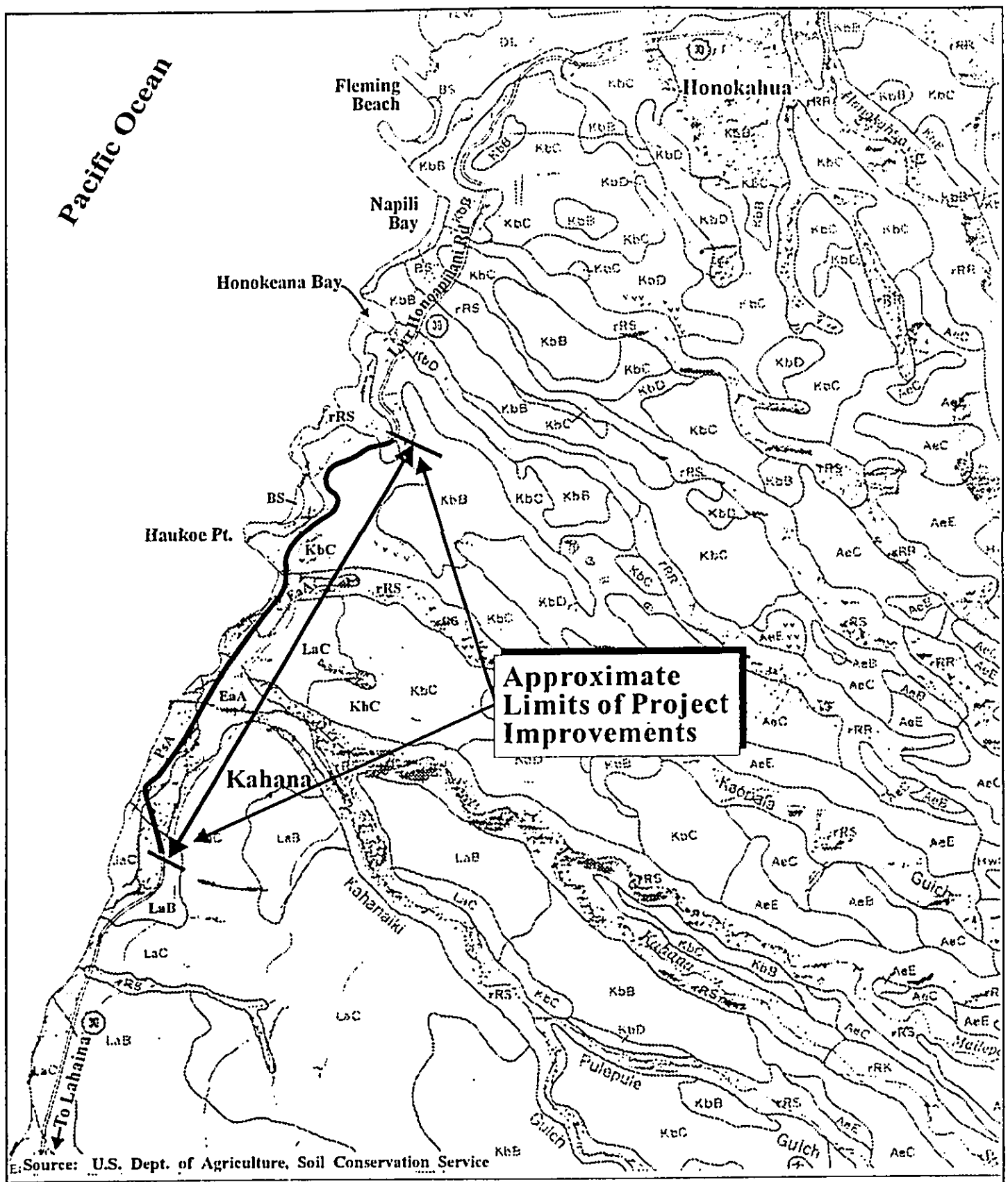

Figure 4 Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)

Soil Classification Map

0 500 1000 2000

Prepared for: County of Maui, Dept. of Public Works and Waste Management

MUNEKIYO & HIRAGA, INC.

and the erosion hazard is no more than slight.

Kahana Silty Clay (KbC) occurs on smooth uplands with 7 to 15 percent slopes; permeability is moderately rapid, runoff is slow to medium, and the erosion hazard is slight to moderate. Lahaina Silty Clay (LaB) occurs on smooth uplands with 3 to 7 percent slopes; permeability is moderate, runoff is slow, and the erosion hazard is slight. Lahaina Silty Clay (LaC) consists of well-drained soils on uplands with 7 to 15 percent slopes; the runoff is medium and the erosion hazard is moderate.

Pulehu Clay Loam (PsA) occurs on basins, alluvial fans, and stream terraces with 0 to 3 percent slopes; permeability is moderate, runoff is slow, and the erosion hazard is no more than slight. Rough Broken and Stony Land (rRs) consists of very steep stony gulches with 40 to 70 percent slopes; runoff is rapid and geologic erosion is active.

The project corridor is located in an area of existing urbanized development as delineated by the State Department of Agriculture's map of Agricultural Lands of Importance to the State of Hawaii (ALISH).

4. ***Flood Hazard Characteristics***

The Flood Insurance Rate Maps (FIRM) for this region indicate that portions of the central, northern, and southern segments of the project corridor are located in areas of minimal flooding (Zone C). South of Haukoe Point and in proximity to Kaopala Gulch, these maps reveal that approximately 600 feet of the project corridor is situated in areas of 100-year flooding (Zone A5). From the vicinity

of Kaia Point to the south of the former Kahana Camp, these maps reflect that the project corridor traverses areas of 100-year flooding (Zone A4) and areas of 100-year coastal flooding with velocity (Zone V24). See Figure 5.

5. ***Flora and Fauna***

Plant life along the project corridor is typical of the developed and undeveloped properties adjoining the roadway.

Undeveloped parcels are typically occupied by haole koa and scrub vegetation, while developed properties are characterized by landscaping typical of single-family residential developments and ornamental landscaping generally associated with condominiums and apartment complexes. Due to urbanization along the project corridor, there are no known rare, threatened or endangered species of plant life in the vicinity of the proposed project.

Animal life along the project corridor is typical of the urbanized regions of West Maui. Fauna typically found in the vicinity include cats, dogs, rats, and mongoose, as well as the House Finch, Zebra Dove, Spotted Dove, Common Mynah, and the Japanese White-Eye. There are no known rare, threatened, or endangered species of animal life or significant habitats found in the vicinity of the proposed project.

In addition, the U.S. Department of the Interior's National Wetlands Inventory Map does not reveal any wetland areas located along or in close proximity of the project corridor.

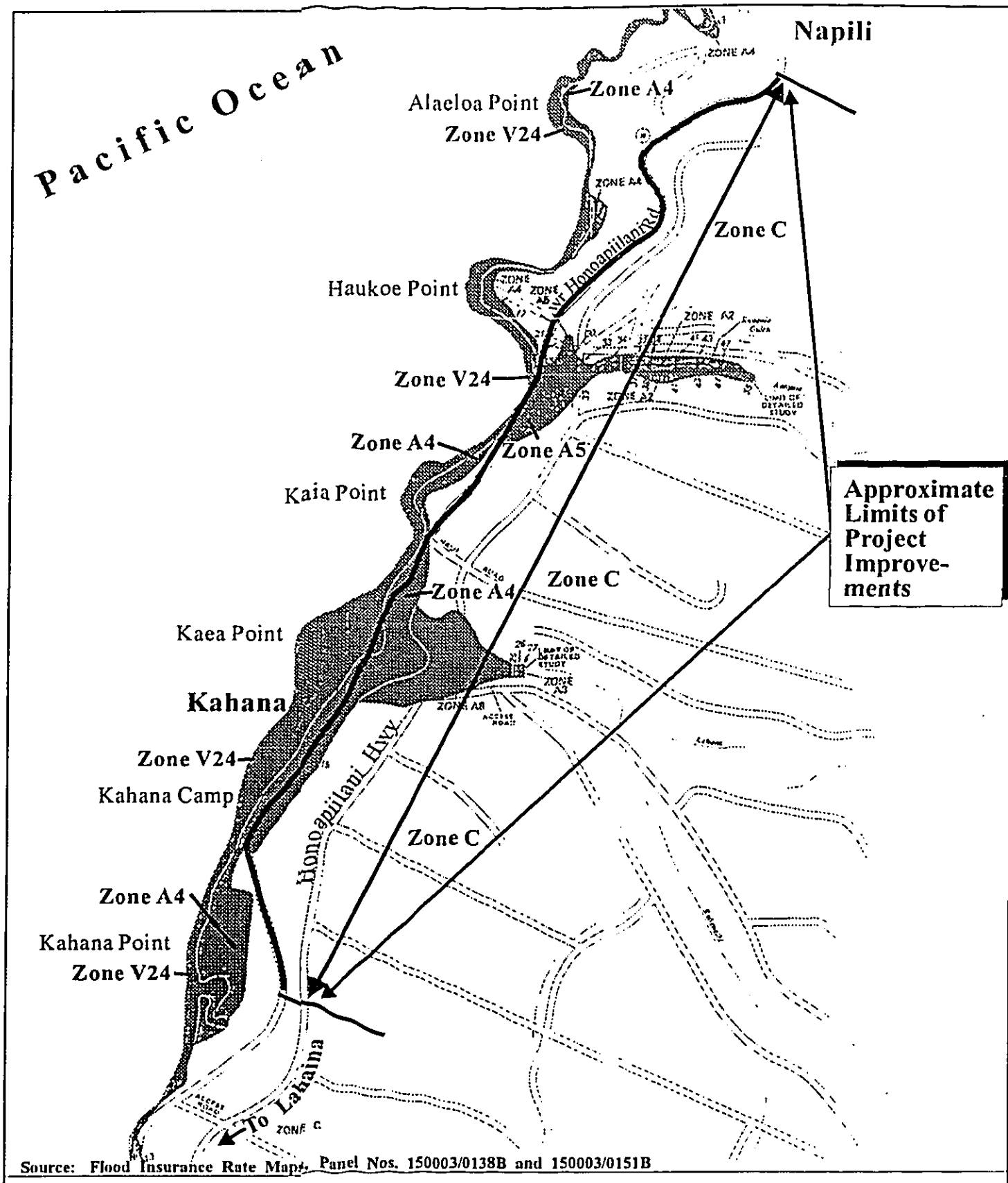

Figure 5 Lower Honoapiilani Road Improvements NOT TO SCALE
(Hoohui Road to Napilihau Street)
Flood Insurance Rate Map

Prepared for: County of Maui, Dept. of Public Works and Waste Management

MUNEKIYO & HIRAGA, INC.

6. ***Archaeology***

An Archaeological Inventory Survey for the proposed project was conducted by Xamanek Researches in early 1999. See Appendix B.

The lands underlying Lower Honoapiilani Road have been extensively modified for the initial construction of the roadway and subsequent road widening and related improvements. In addition, the majority of properties adjoining the roadway ROW have been previously disturbed in connection with the construction of single-family residences, condominiums, and apartment complexes along the project corridor.

The entire project corridor was covered by the inventory level field survey. In addition, all wave-cut portions of the ROW and two (2) drainage outlet locations were inspected. During the survey, three (3) previously unrecorded cultural resources along the coastline were identified, including a pre-contact habitation area between Kaia Point and Haukoe Point (Site 4797), as well as two (2) post-contact features associated with the old Lower Honoapiilani Road, a retaining wall and shoulder barrier wall (Site 4798) to the north of the habitation area, and a retaining wall located between Kaea Point and Kaia Point (Site 4799). Further discussion regarding these sites is contained in Chapter III of this report.

7. ***Surface Waters***

Kahana Stream is a perennial stream that originates in the upper elevations of the West Maui Mountains and outlets into the ocean at Kaea Point near Kahana. Kahana Stream flows year-round in its upper reaches and intermittently at its lower elevations.

8. ***Air Quality***

Airborne pollutants that do exist can largely be attributed to vehicular exhaust from Lower Honoapiilani Road and adjoining roadways. Other sources may include dust from coffee and pineapple cultivating operations. These sources are intermittent, however, and the prevailing tradewinds will disperse particulates generated by these temporary sources.

9. ***Noise***

Existing noise along the project corridor is primarily attributed to vehicular traffic. Wind and ocean surf from adjoining coastline areas also contribute to background noise conditions along the project corridor. At less populated areas, noise contributors other than traffic include birds, dogs, wind, and foliage. The West Maui-Kapalua Airport is also located about 0.7 mile to the south of the project corridor's southern terminus. There are no adverse aircraft-related noise conditions which impinge upon the project corridor.

10. ***Scenic and Open Space Resources***

Extending from Honokowai to Kapalua, Lower Honoapiilani Road is a two-lane coastal roadway that services the West Maui region. The segment of the roadway to be improved extends from Hoohui Road in Kahana to Napilihau Street in Napili, a distance of approximately 1.4 miles. Along the project corridor, the roadway offers views of the ocean and the islands of Lanai and Molokai.

While the majority of the project corridor is bordered by single-family residences, condominiums and apartment complexes adjoin the corridor along its northern and southern limits.

While the roadway segment to be widened is not a part of a scenic corridor, it does offer views of the coastline at Keonenui Bay and at Kaopala Bay.

11. *Oceanographic Setting*

A Coastal Evaluation for the proposed project was prepared by Sea Engineering, Inc. in September 2000. See Appendix C. The report includes an examination of site and oceanographic conditions, as well as an assessment of potential impacts and appropriate mitigative measures. Biological and water quality observations, which were conducted by AECOS, Inc., are also included in the report.

The shoreline along the study area (Kahana to Haukoe Point) is characterized by a series of embayments situated between headlands. Two (2) segments of the existing roadway border the shoreline: (1) the embayment between Ka'ea Point and Kai'a Point (Shoreline Segment No. 1), and (2) the Kaopala Gulch embayment between Kai'a Point and Haukoe Point (Shoreline Segment No. 2). The roadway also veers close to the shoreline at the north end of Kanaha Beach, near the Pohailani Condominium.

A description of the physical conditions at the locations of Drainage Outlet Nos. 1 through 5, as depicted in Figure 1, follows.

Drainage Outlet No. 1 (Repair Outlet with 36-Inch Culvert)

The area around this outlet is marked by a sand-filled gully. Remnants from previous wave damage to the outlet are scattered about the beach. The nearshore beach slope is mild at 1:10 (vertical/horizontal), and flattens quickly to 1:50 (vertical/horizontal),

about 30 feet offshore. A fringing reef lies 500 to 1,000 feet offshore. The bottom sediment near the shoreline consists of sand with some cobbles. While the sand did not appear to have a high silt fraction, conditions were nevertheless highly turbid, probably due in part to the vigorous shore break. Since the shoreline at this outlet location is relatively long and straight, and not contained within an embayment, circulation at this site is enhanced by the formation of alongshore currents due to wave action at the shore.

Drainage Outlet No. 2 (New 30-inch Outlet)

This new outlet will be located along the 900 feet of coastline that comprises Shoreline Segment No. 1. The new outlet location is on the north side of this embayment, about 100 feet south of exposed red soil bluffs that mark the beginning of Kai'a Point. The beach slope is about 1:8 (vertical/horizontal), to the beach toe at about -2 feet. The water depth nearshore remains shallow, dipping slowly offshore at 1:50 (vertical/horizontal). The fringing reef begins about 400 feet offshore. The bottom sediments consist of silty sand and gravel, with the percentage of silt in the sediment decreasing offshore. Circulation nearshore is therefore probably poor but increases in the offshore direction with proximity to the fringing reef. Limu is plentiful offshore, attached to rocks and cobbles. The shoreline near the new outlet location is fronted by a sandy beach approximately 50 feet in width. The beach in the area of this location has a healthy and stable appearance. Vegetation on the beach is well established, with the vegetation line extending seaward past the beach crest.

Drainage Outlet No. 3 (Repair Existing 24-inch Outlet)

The existing 24-inch outlet is located toward the south end of Shoreline Segment No. 2. The shoreline at the existing outlet location is rocky, consisting of a light gray volcanic tuff. The existing headwall is deteriorated; some of the stones appear loose and a short section appears to have suffered partial collapse. Water coursing from the drainline appears to have caused some erosion of the red soil bluff in front of the headwall, and a localized embayment exists in the immediate vicinity of the existing outlet. The rock shoreline is uneven, with a relief of one to two feet. The profile at the shoreline slopes unevenly at about 1:8 (vertical/horizontal) to a depth of 6 feet and then becomes flat. The bottom transitions offshore from rock to cobble to gravel, and includes isolated rock outcrops 3 feet or more in relief. The nominal offshore depth of 6 feet is relatively deep and gives the site increased exposure to depth-limited breaking waves.

Drainage Outlet No. 4 (Repair Existing 54-inch Outlet)

The existing outlet is about 300 feet north of the existing 24-inch outlet. The existing outlet headwall drops approximately 9 feet from the road to the outlet invert. A GRP apron extends 5 feet in front of the outlet before dropping 2 feet to the beach crest. A small pocket sand beach lies in front of the existing outlet. Reaches immediately north and south are fronted by stone rip-rap revetments and had no sand beaches at the time of the site visit. The sand beach fronting the outlet is unusually steep at 1:3 (vertical/horizontal). The steepness decreases abruptly at the water line to about 1:12 (vertical/horizontal) and then to 1:40 (vertical/horizontal) further offshore. Bottom conditions offshore

past the sand beach consisted of gravel-size coral fragments and rocks.

Drainage Outlet No. 5 (New 24-inch Outlet)

This new outlet will be located about 300 feet north of the existing 54-inch outlet, at the corner of the bay near Haukoe Point. The highway embankment is protected by rock rip-rap placed at a steep slope of 1:1 (vertical/horizontal). A narrow 30 foot beach lies at the base of the embankment and slopes at 1:8 (vertical/horizontal) to a depth of about 5 feet. The slope is nearly flat offshore. The beach extends south for about 200 feet to the beginning of a rock revetment, where it narrows further. The sand is medium to coarse in size, which is indicative of vigorous shorebreak wave activity. The waters offshore had very poor visibility during the site visit; this northern pocket appeared to be the most turbid part of the bay. Bottom conditions offshore past the beach toe consisted of gravel-sized coral fragments and rocks, with plentiful limu growth.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population

The resident population of the West Maui region has increased dramatically in the past few decades. Population gains were especially pronounced in the 1970's as the rapidly developing visitor industry attracted many new residents. According to 2000 Census data, the resident population of the Lahaina District was 17,967 (SMS, June 2002). The projected resident population for the year 2010 is estimated to be 21,663 (SMS, June 2002).

Growth patterns at the County level are anticipated to follow a similar pattern. In 2000, the County's resident population was

128,241 (SMS, June 2002). The estimated County population for the year 2010 is projected to be 151,269 (SMS, June 2002).

2. *Economy*

The economy of Maui is heavily dependent upon the visitor industry as reflected by the large number of persons employed in the hotel industry as well as employees engaged in other hotel-related services. In addition to contributing to jobs in the trades and service industries, the hotel industry supports employment in the construction and manufacturing industries as well.

Agriculture is another vital component of the West Maui economy with Maui Land and Pineapple Company's pineapple fields being an important component of the region's agricultural base.

Until recently, Pioneer Mill Company cultivated most of its approximately 6,700 acres in sugar cane. However, with the announced closure of its sugar operations in February 1999, Pioneer Mill is considering other commercial crops as well as expanding its coffee growing operations. Presently, Pioneer Mill utilizes about 500 acres for coffee cultivation, although a 1980 study has identified approximately 2,500 acres that are suitable for growing coffee. For 1999, the coffee crop is projected to yield about 375,000 pounds (Maui News, March 19, 1999).

As of November 1998, the average year-to-date unemployment stood at 6.2 percent. This change is attributable to shifts in the visitor and construction industries that have since led to efforts to diversify and enhance the economy.

C. PUBLIC SERVICES

1. Recreational Facilities

West Maui is served by numerous County parks and shoreline areas that provide diverse recreational opportunities for residents and visitors. Popular ocean and shoreline recreational activities include diving, fishing, surfing, swimming, canoeing, kayaking, picnicking, snorkeling, sunbathing, windsurfing and bodysurfing.

About one-third of the County parks are situated along the coast. Most of these shoreline parks feature sandy beaches as well as parking, restroom, shower, and picnicking facilities. County beach parks located in the general vicinity of the project corridor include Honokowai Beach Park in Honokowai, Pohaku Park ("S" Turns) in Kahana, and D.T. Fleming Beach Park in Kapalua. Other beaches and shoreline recreational areas in the vicinity include Napili Bay, Kapalua Bay, and Oneloa Bay in the Napili/Kapalua area.

Popular surf spots in the area include "S" Turns, Rainbows, Fleming Beach, and Honolua Bay. In addition, the Kaanapali and Kapalua Resorts feature five (5) world-class golf courses which are available for public use.

2. Police and Fire Protection

The project corridor is within the Maui Police Department's (MPD) service area, which includes the entire West Maui region. The MPD's Lahaina Station is located in the Lahaina Civic Center complex at Wahikuli, and was built in the early 1970's. The Lahaina Patrol includes 54 full-time personnel, consisting of one (1) captain, one (1) lieutenant, seven (7) sergeants, and 39 police

officers. The remaining six (6) personnel consist of public safety aides and administrative support staff.

Fire prevention, suppression and protection services for the West Maui region is provided by the Maui Fire Department's (MFD) Lahaina Fire Station, also located in the Lahaina Civic Center, and the Napili Fire Station, located in Napili. The Lahaina Fire Station includes an engine and a ladder company, and is staffed by 30 full-time personnel. The Napili Fire Station consists of an engine company including 15 full-time firefighting personnel.

3. ***Medical Facilities***

The only major medical facility on the island is Maui Memorial Medical Center, located approximately 20 miles from Lahaina, midway between Wailuku and Kahului. Licensed for 196 beds, the medical center provides general, acute, and emergency patient care services for residents and visitors.

In addition, the Maui Medical Group, Lahaina Physicians, West Maui Healthcare Center, and Kaiser Permanente's Lahaina Clinic provide outpatient care and services for residents and visitors during regular business hours.

4. ***Schools***

The State of Hawaii, Department of Education operates four (4) public schools in West Maui: Lahainaluna High School; Lahaina Intermediate School; King Kamehameha Elementary School; and Princess Nahienaena Elementary School. All of the public schools are located within the Lahaina Town area.

D. INFRASTRUCTURE

1. Roadways

Honoapiilani Highway (FAP 30) is the primary arterial serving West Maui. This highway is the only link between West Maui and the rest of the island (except for an unimproved segment that provides limited access around the north coast of the island from Honokohau to Waihee). Honoapiilani Highway is configured for two (2) travel lanes except for an existing four-lane section that extends from Lahainaluna Road in Lahaina Town to the Honokowai Stream Channel Bridge, north of the County's Lahaina Wastewater Reclamation Facility (LWRF).

Lower Honoapiilani Road is a two-lane County roadway with a variable ROW that ranges from 40 to 60 feet. This roadway begins at its intersection with Honoapiilani Highway opposite the County's LWRF and proceeds in a northerly direction to its terminus in the Kapalua Resort (at the entrance driveway for public beach access and parking for Kapalua Bay). The portion of Lower Honoapiilani Road within the Kapalua Resort is privately owned and maintained by Kapalua Land Company and terminates at its intersection with Office Road.

2. Water

Potable water for the West Maui region is provided by the County's Department of Water Supply (DWS) water system. The County water system utilizes three (3) surface sources and eight (8) wells to service the coastal areas from Launiupoko to Kaanapali and from Honokowai to Napili (County of Maui, Department of Water Supply, 1990).

County waterlines along the project corridor consist of a 16-inch transmission line within the makai section of the ROW and an 8-inch distribution line within its mauka portion. The 16-inch transmission line transitions to a 12-inch line near Hui Road E, while the 8-inch distribution line transitions to a 4-inch line by Halemalia Place (telephone conversation with Alan Murata, Department of Water Supply, March 1999).

In addition to the County system, the West Maui region is served by private water systems, including the systems operated by Kaanapali Water Corporation, which services the Kaanapali Resort, and the Kapalua Water Company, which provides service to the Kapalua Resort.

There are no other major public waterlines or related facilities within or in close proximity to the project corridor.

3. *Wastewater Systems*

The County's wastewater collection and transmission system and the LWRF accommodate the region's wastewater needs. The LWRF, located along Honoapiilani Highway just north of Kaanapali Resort, has a design capacity of 9.0 million gallons per day (MGD).

Operating components of the LWRF include a collection and transmission system which serves the West Maui region from Lahaina to Kapalua.

County wastewater system improvements along the project corridor include a force main and a gravity sewerline within the roadway ROW, as well as a sewer pump station just south of Kahana

Stream, on the mauka side of the roadway opposite the Kahana Village condominium. A 16-inch force main traverses most of the project corridor until a point just south of Napilihau Street where it transitions to a 14-inch line.

The gravity sewerline transitions from an 18-inch line to a 21-inch line near the Alaeloa condominium before transitioning to a 12-inch line just south of the sewer pump station. The 12-inch gravity sewerline continues to a point near Kepola Place where it transitions to a 10-inch line and then to an 8-inch line in the vicinity of the Kahana Reef condominium near the project's southern terminus (telephone conversation with Scott Rollins, Department of Public Works and Waste Management, March 1999).

4. Drainage

The Drainage Report for the project was updated by Austin, Tsutsumi & Associates, Inc. to reflect the modifications to the proposed project. See Appendix D.

The slope along Lower Honoapiilani Road from Hoohui Road to Hui Road "E" is relatively flat (0 percent to 5 percent), while the section of roadway from Hui Road "E" to Napilihau Street is steeper (5 percent to 8 percent).

The existing drainage system along the unimproved portions of Lower Honoapiilani Road consists of drainage inlets, underground pipes, and several drainage outlets with CRM outlet structures.

Along those sections of Lower Honoapiilani Road, where mauka segments have been improved (between Kepola Place and Hale

Makai Place), drainage improvements include curb and gutters, catch basins, drain manholes, drainlines, and drainage outlets.

A major drainage feature within the project limits is the Kahananui Bridge which spans the Kahana Stream. This bridge is approximately 28'-6" in width and 29' in length. A concrete slab under the bridge extends the full width and span of the bridge, as well as an additional 10 feet and 2 feet on the mauka and makai sides of the bridge, respectively. There is approximately 5 feet of vertical clearance under the bridge between the concrete slab and girders. The stream channel upstream and downstream of the bridge is natural and unimproved.

5. ***Solid Waste Disposal***

West Maui's solid waste requirements are served by the County of Maui's Central Maui Landfill, located near Puunene. County collection service is provided to single-family residences in West Maui. Both County and private collection services utilize the Central Maui Landfill.

A refuse transfer station is located in Olowalu for West Maui residents. This station accepts household refuse and greenwaste, as well as used oil. The County has contracted Maui Disposal Company to transport these wastes to the Central Maui Landfill in Puunene. No commercial use is allowed at the Olowalu transfer station.

6. ***Electrical and Telephone Service***

Electrical and telephone service to the West Maui region is provided by Maui Electric Company (MECO) and Verizon Hawaii, respectively. Cable service is provided by Hawaiian Cablevision.

MECO has overhead lines on the mauka side of the roadway encompassing the entire length of the project corridor. Also sharing MECO's poles are GTE Hawaiian Tel and Hawaiian Cablevision which utilize these poles for their regional transmission systems.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. IMPACTS TO THE PHYSICAL ENVIRONMENT

1. Topography and Landform

The proposed project will involve grading and roadwork operations to establish the designed pavement section and structure. To facilitate the roadway widening, existing slopes will be cut and retaining walls will be added where slope conditions require structural support.

Due to the proximity of existing development along some segments of the roadway, there may be insufficient area to accommodate fill slopes. Where required, a fill retaining wall will be constructed and existing embankments will be extended with fill to support the wider roadway section. In general, the proposed extent of earthwork for the project is not considered significant and will not alter local topographic and landform conditions.

2. Flora and Fauna

There are no sensitive native plant communities which are located in the project area. Vegetation along the project corridor is dominated by introduced plant species, and there are no known rare, endangered, or threatened species of flora along the corridor.

Similarly, there are no known rare, threatened, or endangered species of fauna or avifauna within the vicinity of the project corridor.

The proposed project is not anticipated to impact wetland areas and wildlife habitats.

3. ***Archaeological Resources***

As previously noted, the Archaeological Inventory Survey report for the project identified Sites 4797, 4798 and 4799 in the vicinity of the project corridor. Refer to Appendix B.

Site 4797 represents a pre-contact coastal occupation area, some of which has been washed away by wave action. The coastal location of this site suggests that this occupation area was associated with marine resource exploitation; the relative proximity of fresh water sources likely made this area additionally suitable for habitation.

As noted in the report, Site 4797 appears to represent a relatively large habitation area. Based on an inspection of about 50 meters of exposed wave-cut bank, the site appears to continue further onto Kaia Point. However, boulders placed along the point effectively prevented further inspection of the area. The inland extent of the site has not been established, nor has it been determined whether the site was permanent or temporary although the extent of the exposed portion of the site suggests it may have been the latter.

Site 4798 is interpreted as an old retaining wall and shoulder barrier wall. The retaining wall is about 75 meters in length and ranges in height from 2 to 4 meters. While this wall is in generally fair condition and constructed from subangular basalt boulders, the construction style of the wall is rough and it does not appear to have been carefully built.

Site 4799 consists of a retaining wall which ranges from about 0.8 to 1.2 meters in height and covers much of the distance along

Kaopala Bay. This retaining wall is relatively well constructed and is in generally fair condition. Sections of the wall appear to have been impacted by high surf in the past.

As indicated by the report, all three (3) sites qualify for significance under Criterion "D" of State and Federal historic preservation guidelines, as they are considered important for the information that they have yielded or are likely to yield. Site 4797 was deemed to be the most significant cultural resource located during the survey, as its represents one of the few surviving pre-contact habitation sites along this portion of the West Maui coastline. While this site also remains important under Criteria "A" and "C", both Sites 4798 and 4799 are no longer considered significant for their information content since both sites are clearly post-contact features associated with the old Lower Honoapiilani Road.

As previously noted, Site 4797 is considered to be significant under Criteria "A", "C", and "D". The report indicates that while the extent of this subsurface cultural deposit is unknown, it appears probable that it continues beneath the existing Lower Honoapiilani Road. In addition to recommending data recovery for a portion of Site 4797, the report notes that archaeological monitoring will probably need to occur after data recovery of the site as the possibility exists that human burials may be associated with this habitation area. The survey also recommends no further archaeological work for Sites 4798 and 4799 as the County of Maui intends to incorporate these features in the proposed project.

In response to comments from the State Historic Preservation Division (SHPD) dated April 25, 2000 (see Chapter XI), a report

describing Additional Archaeological Inventory Level Work for Site 4797 was prepared by Xamanek Researches in April 2001. See Appendix B-1. The wave-cut bank area makai of the road was inspected to re-examine site stratigraphy and assess additional wave-generated erosion of the site. Two (2) additional wave-cut bank profiles were recorded. Subsurface excavation mauka of the road consisted of a hand excavated test unit on a privately owned parcel, and four (4) backhoe trenches in the ROW. A cultural layer was located on the mauka side of the road at about 1.1 to 1.5 meters below the surface. Based on backhoe test results, it appears the site extends approximately 150 meters along the coast. While no subsurface features were noted during the inspection of the four (4) mauka trench profiles, feature density in the exposed portion of Site 4797 makai of the road is relatively low. A total of five (5) recognizable pit features and two (2) possible features were noted in the wave-cut profile that spans a distance of about 78 meters. It appears that backhoe tests may have missed subsurface features associated with this site. Relatively few portable remains were noted in one of the layers along the wave-cut bank and in the backhoe trenches. The few marine shells that were observed were very weathered, a reflection of the very acidic soil conditions of this part of West Maui.

Site 4797 retains its significance under historic preservation guideline Criteria "A", "C" and "D". The report notes that further work is needed on the site; however, existing improvements (e.g., walls, fences, hedges, driveways) that lie in the ROW complicate additional testing at this time. In addition, the report recommends that supplemental inventory survey work be conducted on Site 4797 after the necessary regulatory approvals are granted and

after access to the portions of the residential properties that border the road have been obtained. The report further recommends that the additional work take the form of "pre-digging", and should be conducted prior to actual road construction in the area. As noted in the report, this methodology will effectively recover additional information about Site 4797, as well as identify any burials associated with the site. The report also notes that when actual construction begins, work can proceed at a normal pace, since any finds that might have been impacted will already have been mitigated.

In a letter dated May 10, 2001 (refer to Chapter XI), the SHPD accepted the report and recommended that data recovery of the site take place prior to actual road construction. In accordance with this recommendation, a data recovery plan will be submitted to the SHPD for review and approval prior to the start of construction. In addition, archaeological monitoring will be conducted for all ground-altering activities.

Should any archaeological or historic features be uncovered during construction activities, work will be halted and the SHPD will be contacted to ensure that applicable procedures relating to Chapter 6E of the Hawaii Revised Statutes (HRS), are implemented.

4. ***Cultural Impact Assessment***

The Lahaina District is described as a rich agricultural oasis watered from nearby valleys (Handy and Handy, 1972). This oasis "extended about three leagues in length (about nine miles along the coast) and one (three miles) in breadth. Beyond this, all is dry and barren". Kirch (1973, 1985) and Chapman and Kirch (1979),

describe coastal marine exploitation areas and the inland use of agricultural lands, including the movement from one environment to another on the part of early populations in order to exploit the variety of resources available within the ahupua'a.

The evolution of the ahupua'a land use system essentially provided inhabitants access to resources present in the land unit which stretched from the ocean to the rim of the mountains. Semi-permanent to permanent settlement probably occurred in both coast and upland areas (Chapman and Kirch, 1979, Guerriero, et al., April 1993, pp. 83-84). As noted by Kirch (1985), it is plausible that the ahupua'a in West Maui replicated settlement patterns found elsewhere in the Hawaiian archipelago (i.e., habitation in coastal and inland areas with relatively little activity occurring in the intermediate zone between these areas). In Honokowai and neighboring ahupua'a, the intermediate zone is fairly narrow due to the geographical layout of the mountains and the coastline. As suggested by Handy (1940 and 1972), by late pre-contact times, the fairly sizable population dwelling in the region utilized coastal fishing areas and inland garden plots for subsistence, cultivating sweet potatoes near shore, or taro in terraced lo'i in the wetter valleys inland.

By the time of contact, the Lahaina region had become an important socio-political center, and the residence of several powerful chiefs, most notably Kahekili, one of the highest ranking on Maui. Lahaina was considered by high chiefs to be a favorable place due to the abundance of natural resources and its close proximity to the islands of Lana'i and Moloka'i (Handy and Handy, 1972). In 1820, about 40 years after Captain James Cook's

discovery of the Hawaiian Islands, the islands experienced the loss of King Kamehameha I, the crumbling of the ancient Hawaiian social system, and the sudden arrival on the scene of the first New England whaling ships and missionaries. The population of West Maui continued to decline in the second half of the 19th century followed by the collapse of the Pacific whaling industry in the 1860's which was prompted by the discovery of oil in Pennsylvania a decade or so earlier. In the Lahaina area, sugar production developed in the mid-1800s, while further north, different crops were tried, including coffee and pineapples.

In the 1840s, sugar cane cultivation began in the Lahaina-Kaanapali area. In 1852, the first contract laborers from China arrived in Hawaii to work in the sugar industry. Later, in 1868, the first Japanese laborers arrived, followed by Norwegians, Germans, Koreans, Puerto Ricans, Portuguese, Spaniards, Russians, and Filipinos. In 1865, Pioneer Mill Company was established and during the next decade, added other plantations to its holdings. Later in 1883, Pioneer Mill modernized sugar operations and constructed a railroad across plantation property. Trains were hauling harvested cane between Kaanapali and Lahaina, with more track being laid out to outlying areas. At that time, Pioneer Mill owned 900 acres of land, with 600 acres in cultivation. By the end of the 19th century, Pioneer Mill had grown in size to approximately 12,500 acres. Its fields spread across the West Maui coastline for about 10 miles, from Launiupoko to Kaanapali, and extended approximately a mile inland. In 1918, Pioneer Mill was sold to American Factors. Later, in 1960, Pioneer Mill became a subsidiary of Amfac, Inc.

The pineapple industry in West Maui began as Honolua Ranch. Along with its pineapple crop, Honolua Ranch, which later became Baldwin Packers, grew coffee, cotton, aloe, mangoes, and watermelon. In 1914, the first pineapple cannery was built at Honokahua and five years later, a new cannery was constructed near Mala Wharf. By the 1920s, pineapple was being grown on a large scale. Later, in 1963, Baldwin Packers merged with Maui Pineapple Company, a subsidiary of Maui Land & Pineapple Company.

Up until the mid-1960s, sugar and pineapple cultivation occupied much of the land in the West Maui region. Since the 1960s, commercial, residential, and visitor industry- related land uses have come to dominate the coastal strip along Lower Honoapiilani Road from Kaanapali to Kapalua. While sugar cultivation in the region terminated in 1999, pineapple farming still continues on lands mauka of Honoapiilani Highway.

In order to obtain a range of cultural impact perspectives, interviews were held with West Maui residents. Summaries of conversations with Mr. Wesley Nohara and Mrs. Edna Bekeart follow.

a. ***Wesley Nohara***

Wesley Nohara is the Plantation Manager for Maui Pineapple Company's field operations at Honolua and Haliimaile and is also the Vice-Chair of the West Maui Soil and Water Conservation District.

Mr. Nohara was born and raised in Honolua, a plantation village established for pineapple workers by Honolua Ranch around 1915. When Mr. Nohara was growing up, Honolua Village had a population of approximately 300. At the time, the rent for a village plantation home was about $25.00 a month. In addition to employee housing at the Hawaiian, Japanese, and Filipino camps, the village contained a general store and gas station, dormitories for seasonal workers, an administration building and dispensary, as well as storage, repair, and maintenance facilities.

Around 1975, the three (3) labor camps at Honolua were abandoned and the dwellings demolished. In order to accommodate former village residents in need of home acquisition assistance, Maui Land & Pineapple Company constructed the 174-unit Napilihau Planned Unit Development which is located about 1 mile south of Honolua.

Mr. Nohara mentioned that "Track Road", a pineapple "haul" road that is no longer in use, follows the alignment of an old railway that paralleled Lower Honoapiilani Road. The railway was used to transport pineapple from Honolua to the Baldwin Packers Cannery near Mala Wharf in the town of Lahaina. He also recalled that sugar cane fields, interspersed with scattered single-family development, used to occupy the lands mauka of the lower road.

Insofar as cultural resources within the project corridor are concerned, Mr. Nohara remembered diving and pole fishing

in the waters off the Kahana Sunset condominium. He mentioned that his father used to pick seaweed and spear octopus in the coastal waters around Kahana Stream and that locals would pole fish and pick seaweed in the waters of Kahana Bay and Kaopala Bay, as well as spear octopus around the reefs fringing the bays. In addition, he recalled that fishermen used to catch nehu and salt water opai for use as bait in the waters offshore of the Smith and Robinson properties.

b. ***Edna Bekeart***

Edna Pualani Farden Bekeart, the daughter of Charles and Annie Farden, and the twelfth of thirteen children, was born in 1917 at the Pioneer Mill Company Hospital, the site of the existing Lahaina Center at 900 Front Street. Her mother Annie Kahalepouli Shaw was born in Honolulu and raised on a private estate at Keka'a in Ka'anapali. It was while she was attending Mauna'olu Seminary at Makawao that she met Charles Kekua Farden, who had recently returned from Punahou College (re-named Punahou School). Due to social unrest, Punahou College had closed its doors during the insurrection against Queen Lili'uokalani in 1893. Charles Farden was born in Nahiku and raised in Makawao by his mother. After her graduation in 1897, Annie and Charles were married at the Seminary and again at Makawao Union Church, today, a historic place. A year later, the Fardens moved to West Maui where Charles was hired by Pioneer Mill as a Section Field Overseer. At the time, political and social conditions were unstable; the people of Hawaii were living through trying times as the monarchy sought to retain

control of their homeland. In the agricultural sector, plantations were thriving; wages were low but workers were provided with free housing and medical care. Plantation stores offered clothing, baked goods, fresh meat, and dairy products, as well as tools and household goods and supplies. Fishing, hunting, bartering, and home gardening also supplemented their needs.

As their family increased, the Fardens lived in three different locales, moving to larger plantation homes each time. With the coming of their eleventh child, the Fardens acquired a 0.5 acre oceanfront parcel across from Malu-ulu-o-Lele Park, the site of Moku'ula, the ancient home-place of Hawaiian royalty, and construction of a two-story, six-bedroom home commenced. With the advent of World War I, the increased demand for sugar resulted in longer working hours in the fields and at the mill. More foreign labor was brought in and better wages and salaries ushered in a new prosperity. Keka'a Landing became a busy seaport for freighters transporting raw sugar to refineries in California and importing lumber from the Pacific Northwest. Interisland steamships anchored offshore and carried passengers and freight to shore in whale boats. Forced to move as a result of these changes, the Shaw's of Ka'anapali moved to Kahana and established residence on several acres of land now known as Puamana Place (Farden Subdivision). Edna noted that prior to her birth, her older siblings used to visit the old folks in Kahana when the country side was mostly pasture land and kiawe forest, and where there were taro patches in the valleys and horses and cows roamed in the

wild. A packed dirt road led from the town of Lahaina to Ka'anapali, Honokowai, Kahana, Napili, and around the cliffs of Kahakuloa. There were only a few scattered settlements. It was said that King Pi'ilani of ancient times lived at Moku'ula and engaged the common people in building a wide pathway around the entire island. The roadway was named "Nahonoapi'ilani" (the bays of Pi'ilani) due to the six (6) bays along the western coastline. The Farden children used to swim, fish, and canoe in the bays and gather limu and 'opihi in the shallows. Salt drying in the sun in tidal pools was collected and used in their food; fresh water was drawn from a well on their property. Prior to the end of World War I, the Farden residence in Lahaina was completed and the family moved in, although the majority of the children were grown and were mostly attending boarding schools in Honolulu. Almost immediately, Charles saw to it that each of the children planted a sprouting coconut along the seaside border of the property, as well as care for it. Many of the coconut trees still stand today. "Puamana", a song composed by Charles and daughter Irmgard, describes the beauty and comfort of their home and its grounds. In 1956, long after her parents passed on, the property was sold to American Factors. In a ceremony at the Pioneer Mill manager's estate nearby, the Fardens transferred the name "Puamana" to the plantation manager's grounds and to the park next door. Coconut trees were planted in memory of her parents.

Edna described her childhood and growing up years in Lahaina as "a time of innocence", a period when kids were

kids and adults were in charge. Folks were gentle, kindly, and well-mannered. Dignified behavior and respect for others typified the people of that era. Geared to the daily rhythm of planting, cultivating, harvesting, and milling sugar cane, people were united in their common effort to live together in peace and harmony, despite their different cultures. Children of all ethnic backgrounds went to public schools together but lived in separate neighborhoods (by choice) generally because of the different social lives of labor and management employees. Intermarriage was not encouraged. Fathers worked to support their families, while mothers were home-makers, looking after their children who roamed freely close to home, playing, climbing mango trees, and going to the beach. Toys were scarce. Teenagers attended school dances and home parties, went to picnics at Ka'anapali and on hikes in the hills and valleys, and participated in tennis, swimming, and barefoot football. There was no such thing as dating or going-steady in those days. Smoking and drinking were activities that only adults engaged in. Families regularly attended church and participated in important community events such as the Maui County Fair, the most anticipated and enjoyable event of all. Edna attended kindergarten in a building behind the Baldwin Mission House (the structure still exists). Then, when sister Emma began her teaching career at Honokowai School, Edna went along and learned to read before entering Kamehameha III Elementary School. High school years then followed, first at St. Andrew's Priory in Honolulu, then at Lahainaluna where she graduated and went on to earn a degree in education at the University of Hawaii.

In 1941, Edna Farden and Ensign Robert Bekeart, USN were married in Lahaina at Holy Innocent's Episcopal Church. After five years and several moves among Naval duty stations along the east coast and the Gulf of Mexico, the Bekearts were homesick and returned to Hawaii after World War II to find that housing was scarce and that general conditions were very much changed. Edna taught school at Kamehameha and at Holy Nativity School at Aina Haina. Robert owned a successful used furniture store, and later was the director of Regulatory Agencies for the State of Hawaii and was also employed by the State Real Estate Commission. Robert also served in the Naval Reserve, advancing to the rank of Commander.

The Bekeart's raised three children and lived in a small community at Portlock (before Henry Kaiser's arrival there changed the character of the area). After their children were married, the Bekeart's moved to Maui to live in and care for the 70-year old Farden home in Kahana that was once occupied by her sister Emma and David Sharpe. Now in their retirement years, living out in the country side suited the Bekearts. Insofar as cultural resources are concerned, Edna indicated that the ocean provides a source of food and recreation and that mango and ulu (breadfruit), a staple of the Hawaiian diet, can be found along the project corridor.

The proposed project is not expected to impact gathering rights, nor is it anticipated to adversely affect cultural beliefs, practices, and resources. In accordance with the recommendations of the State Historic Preservation Division (SHPD), data recovery of Site

4797 will take place prior to the start of construction activities. A data recovery plan will be submitted to the SHPD for review and approval prior to the commencement of data recovery for the site. Should any archaeological features or human burials be inadvertently located during construction activities, appropriate stop-work, coordination, and mitigation measures will be incorporated in the project specifications to ensure that proper protocol is followed in the event inadvertent discoveries may occur. In addition, work performed in Kahana Stream and along shoreline areas will incorporate Best Management Practices (BMPs) to ensure that stream and coastal resources are not adversely impacted.

In general, the proposed project will employ appropriate management and coordination practices to ensure that impacts to cultural values and practices are appropriately mitigated.

5. ***Air Quality***

Emissions from construction equipment and other vehicles involved in construction activities may temporarily affect the ambient air quality within the immediate vicinity. However, these effects can be minimized by properly maintaining construction equipment and vehicles.

In addition, dust generated during construction, especially from earth-moving operations such as clearing, excavating, and material importing may also result in a temporary decrease in ambient air quality. Mitigation measures include utilizing dust barriers, waterwagons and/or sprinklers to control dust, and watering graded areas after construction activity has ceased for the day. Watering

is also recommended during weekends and holidays to the extent practicable.

On a long-term basis, once construction activities have been completed, project-related vehicular traffic will generate automotive emissions. However, these emissions are not expected to adversely impact local and regional ambient air quality conditions.

6. ***Noise Characteristics***

An Acoustic Study for the proposed project was prepared by Y. Ebisu & Associates in February 2000. See Appendix E.

The existing and future traffic noise levels along the project corridor were studied to evaluate potential noise impacts associated with the proposed project. Noise measurements were obtained, traffic noise predictions developed, and noise abatement alternatives evaluated.

The study indicates that existing traffic noise levels in the project area do not exceed FHWA and DOT noise abatement criteria. Future (Year 2020) traffic noise levels are not expected to exceed the "66 Leq" DOT noise abatement criteria at existing single and multi-family dwelling units. The noise abatement criteria will not be exceeded at three (3) existing buildings of the Kahana Door of Faith Church. Based on these results, traffic noise mitigation measures should not be required for this project.

The study also notes that the following general conclusions can be made with respect to potential traffic noise impacts which can be expected by Year 2020 with the proposed project.

- The DOT's criteria for substantial change in traffic noise levels will not be exceeded at any noise sensitive structure. Maximum increases in traffic noise levels in the project area should not exceed 4.1 dB as a result of growth in traffic volumes and realignment of the roadway.

- With the proposed action, future traffic noise levels are not expected to exceed the DOT "66 Leq" criteria at any noise sensitive buildings located within the limits of project construction.

- No parks or public use structures within the limits of project construction should be affected by the proposed project or require noise mitigation measures.

- No commercial structures should be affected by the proposed project or require noise mitigation measures.

In the short term, construction-related activities will be the primary source of noise along the project corridor. A Community Noise Permit from the State Department of Health will be required for construction activities occurring during daylight hours. Noise exposure from construction activities at any one (1) receptor location is not expected to be continuous during the total construction period.

In addition to regulatory standards, the use of construction barriers, quieted portable engine generators and diesel equipment, as well as other noise attenuating equipment and measures are anticipated to mitigate construction noise impacts. Proper equipment and vehicle maintenance are also anticipated to minimize noise levels.

In the long term, vehicular traffic will continue to be the primary source of noise along the project corridor. As indicated by the study, future traffic noise levels are predicted not to exceed DOT and FHWA noise abatement criteria by Year 2020.

7. ***Scenic and Open Space Resources***

As previously noted, the proposed improvements will not affect scenic view corridors. In addition, the widening of the roadway is not anticipated to adversely affect the visual character along the Lower Honoapiilani Road. The proposed project will provide for the replacement of landscaping in areas which will be disturbed by construction. Once construction has been completed, the roadway will provide a landscape and visual character similar to existing conditions. Due to right-of-way limitations, no new landscape elements will be introduced in connection with this project.

8. ***Coastal Evaluation***

As previously noted, a Coastal Evaluation was prepared for the proposed project. Refer to Appendix C. The report notes that the effects of the proposed roadway improvements on the shoreline are likely to be minimal. The proposed repairs to Drainage Outlet Nos. 1, 3 and 4 will either remain appreciably unchanged from present configurations or discharge on rock shorelines. New Drainage Outlet Nos. 2 and 5 will be constructed in existing retaining walls removed from the beach.

Existing water quality conditions near the shoreline were turbid during the site visit, and appears to be a prevailing condition. Turbidity and nutrient concentrations were highest at the southern end of the project area and decreased steadily to the north (i.e., water quality conditions improved from south to north along the project corridor). Oil and grease testing revealed no significant presence of those parameters. There will be a slight increase in runoff as a result of the proposed roadway improvements. Since the increase will result from an increase in paved surface area and

improved drainage, it is not likely to increase the amount of turbidity or nutrient concentrations.

From a coastal engineering viewpoint, the report identified conditions at the locations of existing Drainage Outlet Nos. 1 and 3 as areas of concern. Refer to Figure 1.

a. ***Drainage Outlet No. 1 (Repair Outlet with 36-Inch Culvert)***

The beach in this area has a history of erosion and is in a degraded condition at present. The shore protection on the south side of the Pohailani bluff (the outlet's north wingwall location) does not appear to have been adequately designed to withstand the site wave climate, and is therefore in serious disrepair. The CRM wingwalls for this drainage outlet can expect to encounter waves 4 to 6 feet in height during extreme conditions and should be constructed utilizing standard coastal engineering guidelines. These may include:

(1) Use of geotextile filter fabric to prevent piping and erosion behind the CRM wingwalls.

(2) A splash apron on top of the wingwalls to prevent erosion due to wave over-topping.

(3) Sufficient excavation to provide a solid foundation for the wingwalls and headwall and prevent wave undercutting.

(4) The seaward face of the wingwalls should be tied-in to existing shore protection. The adjacent existing shore protection is in disrepair, and the outlet wingwalls may be subject to some flank erosion.

The report also notes that the proposed repair work is not likely to accelerate any new beach deterioration. The repairs to the existing outlet will occur at the same location, and the present design shows little incursion on to the beach. In addition, the outlet's location at the terminus of the sand beach will tend to minimize effects of the renovated outlet on beach processes. The water quality at the site is generally poor, but this is likely a regional effect due in part to heavy development and non-point source runoff.

Since the publication of the Draft EA and the preparation of the Coastal Evaluation, the design for the repair of this outlet has been modified to provide a rip-rap boulder apron and rip-rap boulder slope protection improvements in lieu of the GRP apron and CRM wingwalls that were initially proposed. This design modification is expected to minimize the damaging effects of wave action during high surf conditions.

b. ***Drainage Outlet No. 3 (Repair of 24-inch Outlet)***

The bluff is generally eroded and deteriorated in the immediate vicinity of the existing outlet. Some turbidity will be associated with the gradual erosion of the red soil in front of the outlet. The report indicates that the existing outlet location would benefit from improvements to prevent further erosion of the bluff and recommends that repairing the headwall would provide protection against undermining, particularly from direct wave attack during a severe storm event. The report also notes that since the shoreline at this location is rocky and devoid of sand, there would be no beach impacts due to the outlet improvements.

It should be noted that the recommendations set forth by the report were utilized in the design for the improvements to Drainage Outlet Nos. 1 and 3. It should also be noted that the design for new Drainage Outlet No. 2 includes a GRP apron that provides scour protection for the area around the outlet and also minimizes erosion.

B. *IMPACTS TO THE COMMUNITY SETTING*

1. *Economy and Public Safety*

On a short-term basis, the proposed project will support construction and construction-related employment, as well as have a beneficial impact on the local economy during the construction period. The proposed project will not involve the development or relocation of any residents or businesses.

The proposed improvements are intended to improve traffic safety and operating conditions. Improved pedestrian and bicycle access provisions along the roadway, increased travel lane widths, and improved drainage conditions will enhance overall facility safety and promote the general public welfare.

2. *Fire, Police and Medical Services*

The proposed project will not adversely affect regional public services. By improving traffic conditions, the proposed project is anticipated to benefit emergency service responders (e.g., fire, police and ambulance) by improving accessibility and emergency response times.

The widened roadway will improve the capability to provide for the passage of traffic if there is an accident or other roadway emergency in the area.

3. *Education and Recreational Facilities*

The proposed improvements are not anticipated to affect educational or recreational services in the region or create an additional demand for services or facilities. The road widening improvements will also facilitate access to educational and recreational facilities.

C. *IMPACTS TO THE INFRASTRUCTURE*

1. *Roadways*

A Traffic Assessment for the proposed project was prepared by Austin, Tsutsumi & Associates, Inc. in February 2000. See Appendix F.

The Traffic Assessment compares the capacity of the existing and improved roadway in accordance with procedures contained in the Highway Capacity Manual. The proposed improvements are primarily directed to improving traffic safety, including pedestrians and bicyclists along the roadway.

Within the project corridor, the existing paved roadway varies from about 20 to 24 feet in width. The shoulders adjoining the travelways are mainly unimproved, although some segments have curbs, gutters, and sidewalks.

Existing traffic primarily consists of passenger vehicles, pickup trucks, and utility vehicles. Traffic counts taken by the State

Department of Transportation (DOT) in 1997 along Lower Honoapiilani Road at Kahananui Bridge reflected approximately 4,235 vehicles per day. The AM peak hour traffic (between 7:00 to 8:00 a.m.) was 233 vehicles, while the PM peak hour traffic (between 4:15 to 5:15 p.m.) was 344 vehicles. The existing roadway operates at level of service (LOS) "C".

Future traffic was estimated for the Year 2020 by using and extrapolating data from DOT traffic counts. Using this data, the average daily traffic for the Year 2020 is estimated at 8,350 vehicles per day; the AM peak hour traffic is estimated at 460 vehicles, while the PM peak hour traffic is 680 vehicles. Based on this data and the proposed improvements, the roadway is projected to operate at LOS "C" for the Year 2020.

The Traffic Assessment cites the accommodation of traffic during project construction as an area of concern. Within the project corridor, Hoohui Road and Napilihau Street provide the only connections between Lower Honoapiilani Road to Honoapiilani Highway. To avoid unnecessary delays and congestion during construction, the Traffic Assessment notes that the posting of appropriate signage (e.g., Detour and Local Traffic Only signs) at the project's termini can deter casual traffic and direct and encourage motorists to use Honoapiilani Highway to bypass the construction zone. In addition, working on one lane while leaving the other lane open for two-way traffic (under the control of flagmen or police officers) can facilitate traffic movement through the construction area.

Towards this end, public notification procedures and a traffic control plan that includes construction phasing and traffic controls that the contractor shall need to follow, will be utilized to minimize impacts to traffic during the construction of the project.

The Traffic Assessment concludes that the proposed improvements to Lower Honoapiilani Road will enhance traffic safety and have no significant impact on the level of service of the roadway.

In light of right-of-way and design parameters, bicycle travel along the improved corridor will be provided for on a shared roadway basis (i.e., travel lanes may be legally used by bicyclists). As the proposed action is not expected to generate or result in an increase in traffic volumes, the installation of traffic signals will not be required.

2. ***Water***

The proposed action will not adversely affect County or private domestic water services and facilities. The County's 16-inch transmission line and 8-inch distribution line fall within the Lower Honoapiilani Road ROW. Should construction conditions require a need to adjust vertical or horizontal profiles of the County's waterlines, such adjustments will be coordinated with the Department of Water Supply.

3. ***Wastewater***

The proposed road widening is not expected to affect wastewater lines along the project corridor since these lines are located at a sufficient depth beneath the roadway. Any necessary relocation or adjustment to wastewater system improvements will be coordinated

with the Department of Public Works and Waste Management's Wastewater Reclamation Division.

4. ***Drainage and Erosion Control***

The new drainage system improvements will consist of new drainlines, catch basins, drain inlets, and storm drain manholes within the ROW along areas where the shoulders will be improved. Refer to Appendix D. These improvements are needed to collect and properly dispose of the runoff from the widened roadway sections in accordance with County drainage standards. Existing and new drainage structures will also be repaired and constructed along Lower Honoapiilani Road and the Pohailani condominium (mauka complex) to mitigate existing drainage problems in this area.

Repairs to three (3) existing drainage outlets are proposed. Drainage Outlet No. 1, next to the Pohailani condominium (makai complex), will be repaired. Repair work for this outlet will involve the installation of a 36-inch diameter culvert and the construction of a CRM headwall, rip-rap boulder apron, and rip-rap boulder slope protection improvements, as well as a 4-ft. high chain-link fence along the headwall and the northern slope protection improvements. It should be noted that to minimize the damaging effects of wave action during high surf, the design for the repairs to Drainage Outlet No. 1 was modified to provide for the rip-rap boulder apron and rip-rap boulder slope protection improvements in lieu of the GRP apron and CRM wingwalls that were originally proposed. Refer to Appendix A-1. In addition, at Drainage Outlet No. 3, the headwall of the existing 24-inch drainage outlet near the southern end of Shoreline Segment No. 2 will be repaired due to

the deteriorated condition of the existing CRM headwall. Refer to Appendix A-2. Also proposed are repairs at Drainage Outlet No. 4, the existing 54-inch drainage outlet which is located about 300 feet north of the existing 24-inch outlet. The repair work for this outlet includes the in-kind replacement of the existing 54-inch diameter culvert and, as necessary, grouting around the new culvert. To accommodate the new concrete sidewalk, additional repairs include the reconstruction of a CRM headwall and a portion of the GRP apron at the drainage inlet on the mauka side of the road. Refer to Appendix A-3.

The proposed project will also include the construction of two (2) new drainage outlets. Located in the vicinity of Hui Road D, the scope of work for Drainage Outlet No. 2 will include the installation of the 30-inch culvert, as well as the construction of a CRM headwall, GRP apron, and a 3-ft. high chain-link fence along the headwall. Refer to Appendix A-4. This new outlet is needed to accommodate the surface flow from the widened roadway section. The other new outlet is situated in an area to the south of Hui Road E. The proposed work for Drainage Outlet No. 5 will involve the installation of a 24-inch diameter culvert and the construction of a CRM headwall, GRP apron, and 3-ft. high chain-link fence along the headwall. Refer to Appendix A-4. This new outlet is also necessary as it will accommodate the surface runoff from the improved roadway section.

Due to structural deficiencies, the existing Kahananui Bridge at Kahana Stream must be demolished and reconstructed to accommodate the widened roadway section. Based on the Department of Transportation's (DOT's) structural inventory and

appraisal, the existing Kahananui Bridge has been deemed structurally deficient. This deficiency rating precludes the rehabilitation of the existing bridge. The bridge work will involve the relocation of existing water and sewer lines within the stream, as well as the temporary relocation of overhead utility poles and lines prior to the demolition and removal of the existing bridge deck/superstructure/railings and the existing abutment walls and wingwalls. In addition, new piles will be installed and new concrete pile caps and concrete abutment walls will be constructed. A new concrete bridge deck/superstructure/ railings will also be constructed, as well as new CRM wingwalls, GRP aprons, and GRP slope and top bank protection. The GRP slope protection improvements will provide for a durable and scour-resistant channel lining compared to flexible channel lining materials. The existing concrete slab in the stream underlying the existing bridge will remain and be extended in all directions to match the limits of the reconstructed bridge. The widened roadway section crossing the bridge will not include a paved drainage swale; however, buffer zones will be provided on both sides of the travelways, as well as a concrete curb and sidewalk along the mauka side of the bridge. The bridge has been designed in accordance with the DOT's seismic criteria for Load Resistance Factor Design and ground acceleration maps. The seismicity of the area, measures to address seismic hazards, and seismic design and analysis for the reconstructed bridge were examined in detail during the technical engineering design phase for the bridge.

In light of right-of-way limitations along Shoreline Segment Nos. 1 and 2, the typical roadway section through these areas will incorporate a reverse crown for drainage purposes.

The runoff generated by the proposed roadway improvement project along Lower Honoapiilani Road from Hoohui Road to Napilihau Street will not create adverse effects to downstream and adjacent properties. The additional runoff of approximately 2.3 cubic feet per second (cfs) will be collected by catch basins and drain inlets on the mauka and makai sides, respectively, and properly disposed of at existing or new drainage outlets. All proposed drainage system improvements will be designed in accordance with the Rules for the Design of Storm Drainage Facilities in the County of Maui, (November 12, 1995) and will be coordinated with the applicable regulatory agencies.

An application for a National Pollutant Discharge Elimination Systems (NPDES) Permit for stormwater discharge associated with construction activity will be submitted to the State Department of Health for review and approval, as applicable.

The erosion hazard during construction activities is anticipated to be no more than slight due to soil conditions and grading which will be implemented pursuant to applicable regulatory requirements.

Appropriate mitigative measures will be utilized to minimize soil loss and erosion during construction activities. Examples of some of these erosion control measures include the following:

1. Hydromulch graded areas not actively being graded;
2. Adequate water spraying with a water wagon or sprinkler system;
3. Construct sediment traps and siltation fences where necessary; and

4 Vegetate all exposed slopes and open areas upon completion of grading.

5. ***Solid Waste***

The disposal of construction waste, as well as cleared and grubbed material, will be coordinated with the Department of Public Works and Waste Management's Solid Waste Division. The disposal of this solid waste is not anticipated to adversely impact the capacity or operations of the County landfill.

6. ***Electrical and Telephone Services***

The relocation of poles, utility boxes and transmission lines will be coordinated with Maui Electric Company, Verizon Hawaii, and Hawaiian Cablevision Company as necessary. Overhead lights will be remounted on new utility poles for the existing poles which require relocation.

Chapter IV

Relationship to Governmental Plans, Policies and Controls

IV. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes the four (4) major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural", and "Conservation". The proposed project falls within the "Urban" and "Agricultural" districts. Public roadways are permissible within the "Urban" and "Agricultural" districts. See Figure 6.

B. HAWAII STATE PLAN

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

Sec. 226-14 Objective and policies for facility systems - in general.

Objective (a)	Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.
Policy (b) (1)	Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.

Sec. 226-17 Objectives and policies for facility systems - transportation.

Policy (b) (2)	Coordinate state, county, federal, and private transportation activities and programs toward the

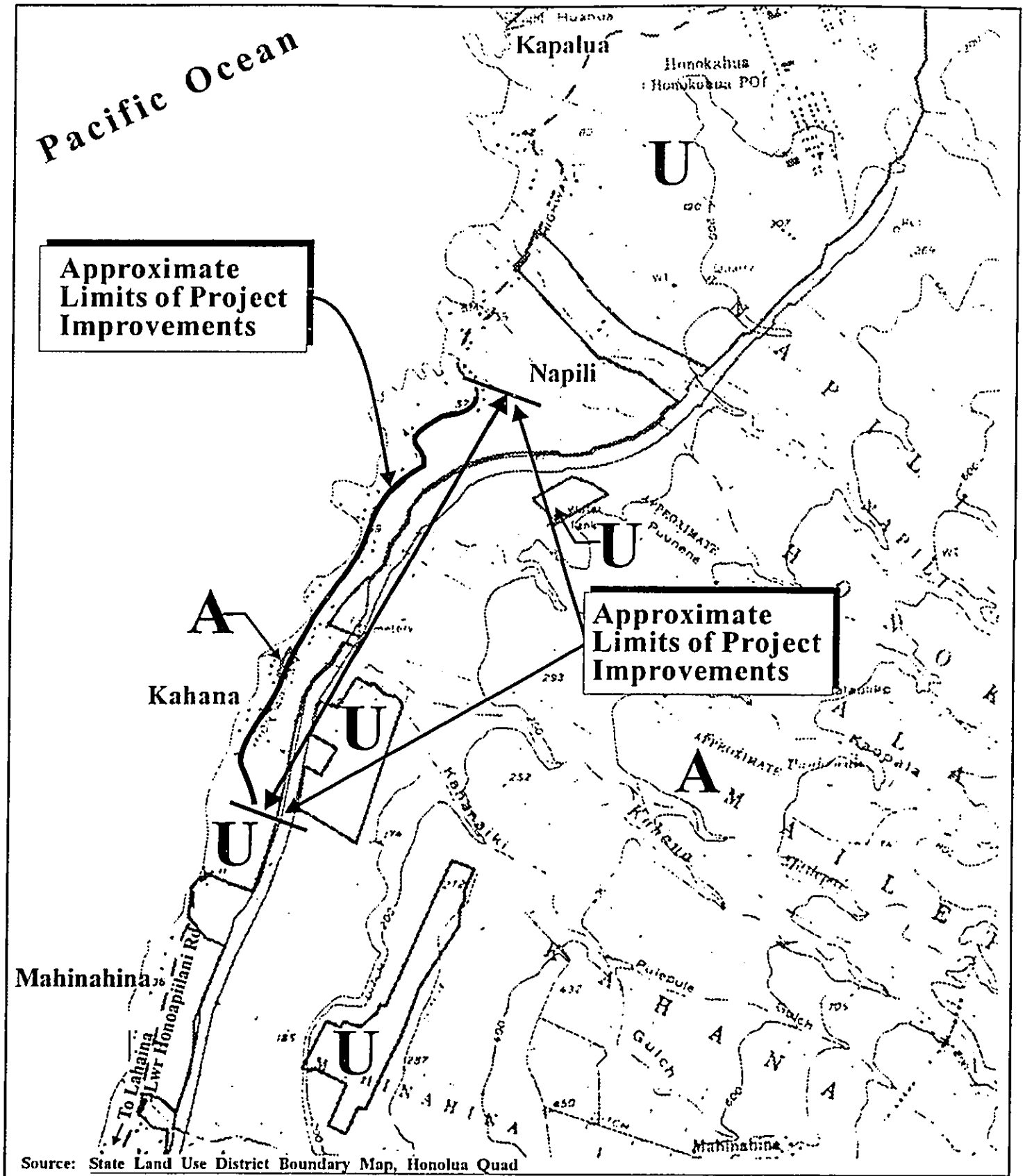

Figure 6 Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

State Land Use Classifications

0 1000 2000 Feet

Prepared for: County of Maui, Dept. of Public Works and Waste Management

MUNEKIYO & HIRAGA, INC.

achievement of statewide objectives.

Policy (b) (6) Encourage transportation systems that serve to accommodate present and future development needs of communities.

Policy (b) (10) Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment.

By improving roadway conditions, the proposed project will promote the public health and safety by providing roadway sections which accommodate vehicles, pedestrians and bicycles, in keeping with current design and safety standards.

C. ***MAUI COUNTY GENERAL PLAN***

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and the development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development".

The proposed action is in keeping with the following General Plan objectives and policies:

Objective: To support an advanced and environmentally sensitive transportation system which will enable people and goods to move safely, efficiently, and economically.

To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.

Policy: Ensure that transportation facilities are anticipated and programmed for construction in order to support planned growth.

D. WEST MAUI COMMUNITY PLAN

The project is located in the West Maui Community Plan region. This region is one (1) of nine (9) Community Plan regions established in the County of Maui. The Community Plans establish regional planning guidelines and implement the objectives and policies of the Maui County General Plan.

The lands adjoining the project corridor are designated for the following uses by the Community Plan: Hotel, Public, Open Space, Multi-Family Residential, and Single-Family Residential. See Figure 7.

The County of Maui recently conducted a comprehensive update of each regional Community Plan. The proposed road widening project is in keeping with the objectives and policies of the West Maui Community Plan. In particular, the project is in consonance with the following Community Plan objective.

> Support improvements for the safe and convenient movement of people and goods, pedestrians and bicyclists in the Lahaina region particularly along Honoapiilani Highway, Front Street and Lower Honoapiilani Road and seek to establish a regional network of bikeways and pedestrian paths.

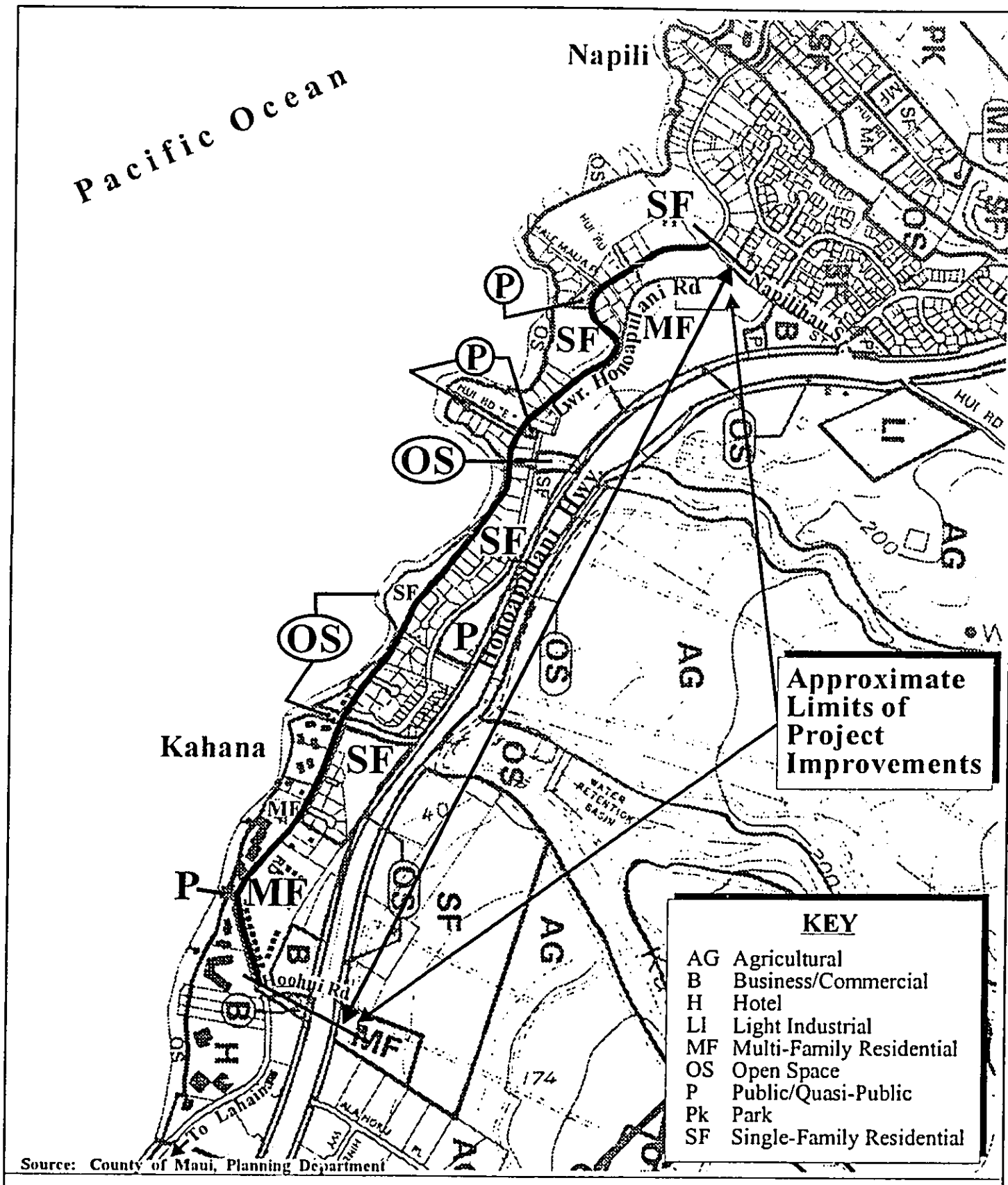

Figure 7 Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

West Maui Community Plan
Land Use Designations

0 250 500 1000 Feet

Prepared for: County of Maui, Dept. of Public Works and Waste Management

MUNEKIYO & HIRAGA, INC.

E. ZONING

The project corridor traverses lands which are designated for the following uses by Maui County zoning: A-1 and A-2, Apartment; D-1, Duplex; H-2, Hotel; and R-1, R-2, and R-3, Residential. The parcels encompassed by the proposed repairs to the existing Drainage Outlet No. 1 on TMK 4-3-05:27 and TMK 4-3-10: por. 09 are zoned H-2, Hotel by County zoning.

F. SPECIAL MANAGEMENT AREA OBJECTIVES AND POLICIES

The Hawaii Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, establishes objectives and policies for the preservation, protection, and restoration of natural resources of Hawaii's coastal zone. Pursuant to Chapter 205A, HRS, and the Rules and Regulations of the Planning Commission of the County of Maui, projects located within the Special Management Area (SMA) are evaluated with respect to SMA objectives, policies and guidelines.

This section addresses the project's relationship to applicable coastal zone management considerations, as set forth in Chapter 205A and the Rules and Regulations of the Planning Commission.

Recreational Resources

Objective: Provide coastal recreational resources accessible to the public.

Policies:

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

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

   i. Protecting coastal resources uniquely suited for recreation activities that cannot be provided in other areas;

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

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

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

v. Ensuring public recreational use of County, State, and *federally owned or controlled shoreline lands and waters* having recreational value consistent with public safety standards and conservation of natural resources;

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

vii. Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county planning commissions, and crediting such dedication against the requirements of Section 46-6 of the Hawaii Revised Statutes.

Response: The proposed project will not impact coastal recreational resources or access to shoreline areas. Lower Honoapiilani Road provides direct access to beaches and shoreline recreational areas in the region. The proposed project will improve vehicular and pedestrian access to these areas, as well as improve drainage conditions.

Historical/Cultural Resources

Objective: Protect, preserve and where desirable, restore those natural and man-made historic and prehistoric resources in the coastal zone

management areas that are significant in Hawaiian and American history and culture.

Policies:

a. Identify and analyze significant archaeological resources;

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

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

Response: The roadway ROW and immediate adjoining areas have been previously disturbed by existing development. The Archaeological Inventory Survey prepared for the project recommends no further archaeological work for Sites 4798 and 4799, as these features will be incorporated in the project. In its letter dated May 10, 2001, the State Historic Preservation Division (SHPD) concurred that Site 4797 retains its significance under historic preservation guideline Criteria "A", "C", and "D". The SHPD also recommended that data recovery of the site take place prior to actual road construction. In accordance with this recommendation, data recovery will be conducted and a data recovery plan will be submitted to the SHPD for review and approval prior to the start of construction. In addition, archaeological monitoring will be conducted for all ground-altering activities. Should human remains be inadvertently discovered during earth moving activities, work shall cease at once in the immediate area of the find, and the find shall be protected from further damage. The SHPD shall be immediately notified and procedures for the treatment of inadvertently discovered human remains shall be implemented pursuant to Chapter 6E, HRS.

Scenic and Open Space Resources

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

Policies:

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

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

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

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

Response: The proposed project will not impact coastal scenic and open space resources and will not affect scenic view corridors.

Coastal Ecosystems

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

Policies:

a. Improve the technical basis for natural resource management;

b. Preserve valuable coastal ecosystems of significant biological or economic importance;

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

d. Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Response: The proposed improvements are not anticipated to affect coastal ecosystems. Appropriate measures will be implemented to

mitigate the impacts of soil erosion and stormwater runoff during the construction of the project.

Economic Uses

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

Policies:

a. Concentrate coastal dependent development in appropriate areas;

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

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

   i. Utilization of presently designated locations is not feasible;

   ii. Adverse environmental effects are minimized; and

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

Response: The proposed project will have a beneficial short-term impact on the local economy during construction by providing construction-related employment. The proposed project will also enhance traffic circulation and safety and access to residential, commercial, resort and recreational destinations within the West Maui region. The proposed project is considered essential to the regional transportation network and is significant in maintaining and enhancing the welfare of the traveling public.

Coastal Hazards

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

Policies:

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

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

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

d. Prevent coastal flooding from inland projects; and

e. Develop a coastal point and nonpoint source and pollution control program.

Response: Portions of the project corridor are situated in Zone C, areas of minimal flooding, while other parts are located in Zones A4 and A5, areas of 100-year flooding, and Zone V24, areas of 100-year coastal flooding with velocity. Coordination with the County of Maui will be undertaken prior to construction to ensure compliance with applicable flood hazard area development standards.

The proposed drainage system improvements will be designed in accordance with the Drainage Standards of the County of Maui and are anticipated to improve existing drainage conditions. No adverse drainage impacts to adjoining and downstream properties are anticipated as a result of the proposed action.

Managing Development

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

Policies:

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

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

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

Response: This Environmental Assessment has been prepared for public review in compliance with Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Administrative Rules, Environmental Impact Statement Rules, and 23 CFR 771, Environmental Impact and Related Procedures.

In addition, applicable State and County requirements will be adhered to in the design and construction of the proposed project.

Public Participation

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

Policies:

a. Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;

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

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

Response: The proposed project is designed to improve traffic operations, as well as drainage conditions along an important transportation corridor. Public awareness and participation for this project is facilitated through the Chapter 343, HRS and local permit review process. The proposed project is not contrary to the objective of public awareness, education and participation.

Beach Protection

Objective: Protect beaches for public use and recreation.

Policies:

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

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

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

Response: The proposed project is not expected to affect natural beach processes or interfere with existing shoreline recreational activities.

Marine Resources

Objective: Implement the State's ocean resources management plan.

Policies:

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

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

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

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

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

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

Response: The proposed improvements will be designed and constructed to minimize impacts to marine resources. Appropriate coordination with affected agencies will be implemented through the SMA and Shoreline Setback Variance (SSV) procedures of the County of Maui.

G. *SHORELINE SETBACK VARIANCE (SSV)*

Since the proposed project involves an action within the County's shoreline setback area, a SSV is being requested. It is noted that the proposed repair and construction of the drainage outlets will occur mauka of the certified shoreline.

1. ***Drainage Outlet Nos. 1, 3, and 4***

The proposed repair of existing Drainage Outlet No. 1, situated on TMK 4-3-05:27 and TMK 4-3-10:por. 09, is necessary to maintain adequate drainage conveyance conditions since these improvements were severely damaged by unusually high wave action during the 1998-1999 winter season. This existing drainage outlet was partially destroyed and a section of the existing culvert was subsequently removed for safety reasons. Erosion of the adjacent side slopes occurred where the outlet structure could no longer support the retained earth on the slopes.

The proposed repair work will include the installation of a 36-inch culvert, as well as a CRM headwall, rip-rap boulder apron and rip-rap boulder slope protection improvements, as well as a 4-ft. high chain-link fence along the headwall and the northern slope protection improvements. The majority of the repair work is expected to occur mauka of the certified shoreline and remain within TMK 4-3-05:27 and an existing drainage easement within an adjoining portion of TMK 4-3-10:09.

The proposed repair work is necessary to maintain the integrity of this drainage outlet. Without action, continued erosion will occur to the embankment which supports the drainage outlet. In particular, as runoff is discharged from the existing outlet, erosion of the earthen fill which surrounds the pipe will continue. In addition to maintaining the discharge capacity and structural integrity of the drainage system, the repair work is needed to mitigate potential safety hazards due to the condition of the existing improvements.

The headwall of Drainage Outlet No. 3, the existing 24-inch drainage outlet near the southern end of Shoreline Segment No. 2 will be repaired due to the deteriorated condition of the existing CRM headwall. Also proposed for repairs is the existing 54-inch drainage outlet which is located about 300 feet north of the existing 24-inch outlet (Drainage Outlet No. 4). The repair work for this outlet includes the in-kind replacement of the existing 54-inch diameter culvert and, as necessary, grouting around the new culvert. To accommodate the new concrete sidewalk, additional repairs include the reconstruction of a CRM headwall and a portion of the GRP apron at the drainage inlet on the mauka side of the road.

2. ***New Drainage Outlet Nos. 2 and 5***

The construction of two (2) new drainage outlets is also proposed. Located in the vicinity of Hui Road D, the scope of work for Drainage Outlet No. 2 will include the installation of the 30-inch culvert, as well as the construction of a CRM headwall, GRP apron, and a 3-ft. high chain-link fence along the headwall. This new outlet is needed to accommodate the surface flow from the widened roadway section. Drainage Outlet No. 5, the other new outlet, is situated in an area to the south of Hui Road E. The proposed work for Drainage Outlet No. 5 will involve the installation of a 24-inch diameter culvert and the construction of a CRM headwall, GRP apron, and 3-ft. high chain-link fence along the headwall. This new outlet is also necessary as it will accommodate the surface runoff from the improved roadway section.

The proposed improvements will be designed in accordance with applicable regulatory standards to produce no adverse effects to downstream or adjacent properties.

3. ***Roadway Work Along the Shoreline***

As previously indicated, two (2) segments along the project corridor adjoin the shoreline. These segments include the portions of the roadway between Ka'ea Point and Kai'a Point (between TMKs 4-3-15:36 and 4-3-19:47-Shoreline Segment No. 1), a distance of about 900 feet, and at the Ka'opala Gulch embayment (between TMKs 4-3-15:08 and 4-3-15:36-Shoreline Segment No. 2), a distance of approximately 600 feet.

The proposed improvements within these roadway segments include widening the existing paved roadway section to provide for a typical roadway section within two (2) travel lanes with a minimum lane width of 11 feet, as well as a paved drainage swale, and concrete curb, gutter and sidewalk. Based on ROW and design parameters, the sidewalk will vary in width. Additional improvements include the provision of driveway connections for providing access to mauka properties abutting the roadway and the construction of crosswalks and curb ramps to meet ADA criteria, as well as the relocation of utilities (as needed), repairs to three (3) existing drainage outlets, and the installation of new drainlines, catch basins, drain inlets, storm drain manholes, and two (2) drainage outlets.

The proposed improvements within Shoreline Segment Nos. 1 and 2 are work elements of the project and a continuation of the roadway improvements within the remainder of the project corridor.

The proposed improvements within these segments are necessary as it will enhance public safety and improve traffic and drainage conditions for residents, motorists, pedestrians, and bicyclists along the roadway.

Chapter V

Summary of Adverse Environmental Effects Which Cannot Be Avoided

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The proposed improvements will result in temporary construction-related impacts as described in Chapter III, Potential Impacts and Mitigation Measures.

Potential effects include noise-generated impacts occurring from site preparation and construction activities. In addition, there may be temporary air quality impacts associated with dust generated from construction activities, and exhaust emissions discharged by construction equipment. These impacts are short term in nature and are not expected to create adverse environmental effects.

The proposed project is intended to improve roadway operating and safety conditions along Lower Honoapiilani Road, from Hoohui Road to Napilihau Street. From a long-term perspective, there are no significant adverse environmental effects anticipated as a result of the proposed roadway improvements.

Chapter VI

Alternatives to the Proposed Action

VI. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The proposed project represents the preferred alternative. The widening of Lower Honoapiilani Road from Hoohui Road to Napilihau Street will improve vehicular and pedestrian as well as drainage conditions along this segment of the roadway. The proposed improvements are not anticipated to generate new traffic; however, it is anticipated to accommodate increasing traffic, provide safer pedestrian and bicycle travel, and improve existing drainage infrastructure along the project corridor.

B. REALIGNMENT ALTERNATIVE

Lower Honoapiilani Road functions as a secondary arterial and provides access to existing developed and undeveloped properties along the West Maui coastline. Within the project corridor, Lower Honoapiilani Road ranges from about 300 to 1,000 feet to the west of Honoapiilani Highway, the major north-south arterial serving the West Maui region. While limited ROW acquisition will be required for the project, the majority of the project's improvements will be within the roadway right-of-way, and to the greatest extent practicable, within the mauka portion of the ROW. Alterations to the roadway's horizontal alignment were not considered appropriate due to ROW limitations through the project corridor. The layout of possible alignments are controlled by several factors, such as the proposed improvements to the existing roadway, existing development on both sides of the roadway, and in some locations, steep slopes beyond the ROW on the east and west. When considering the effectiveness of a partial or complete realignment of the existing roadway, consideration was given to traffic circulation, including access to existing developed properties within the project corridor, as well as the necessary infrastructure improvements to accommodate the realignment. Upon

examining impacts to existing developed properties for new or additional ROW acquisition and the related loss of functional utility of the affected parcels, the expense of relocating the roadway and attendant utilities, as well as its overall effect on traffic circulation, including access to existing developed properties, it was determined that the partial or complete realignment of Lower Honoapiilani Road further mauka would be cost prohibitive. In light of the foregoing, the realignment alternative was deleted from consideration.

C. *NO ACTION ALTERNATIVE*

In light of the established need for the proposed improvements, the "no action alternative" does not represent a responsible option toward improving accessibility and traffic circulation for the community since problems with traffic, drainage, and pedestrian safety will persist.

D. *DEFERRED ACTION ALTERNATIVE*

A "deferred action" alternative will have similar consequences as a "no action" alternative as problems relating to traffic and drainage conditions will continue to persist and potentially increase. Deferring the development of the proposed improvements may also result in higher implementation costs in the future due to inflation.

Chapter VII

Irreversible and Irretrievable Commitments of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The design and implementation of the proposed project will involve the commitment of certain natural and fiscal resources including the possible acquisition of additional land for road widening and drainage improvements, as well as fuel, labor, funding, and material resources.

The commitment of additional land within the existing ROW for the project is consistent with the need to improve the existing transportation system in the area. Impacts relating to the use of these resources should be weighed against the expected positive benefits to be derived from the project versus the consequences of taking no action.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSIONS

Lower Honoapiilani Road is a two-lane coastal roadway under the jurisdiction of the County of Maui that begins at its intersection with Honoapiilani Highway and proceeds in a northerly direction to its terminus within the Kapalua Resort, a distance of approximately 5.0 miles. The proposed project will involve road widening and related improvements to an approximately 1.4 mile segment of Lower Honoapiilani Road that extends from Hoohui Road in Kahana to Napilihau Street in Napili. The proposed project will enhance accessibility and traffic circulation in the area, as well as improve drainage and roadway operating conditions. While the majority of the proposed improvements will be conducted within the roadway's existing ROW, limited ROW acquisition will be required.

Since County funds are proposed to be utilized for the project, an Environmental Assessment (EA) has been prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS), and Chapter 200 of Title 11, Administrative Rules of the State Department of Health.

In addition, since Federal funds available through the TEA 21 program will also be utilized for the proposed project, an EA has been prepared pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. 4332(2)(c), 49 U.S.C. 303, and 23 CFR 771.

Every phase of the proposed action, expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action have been evaluated in accordance with the Significance Criteria of Section 11-200-12 of the Administrative Rules. Based on the analysis, the proposed project is not anticipated to result in any significant impacts. Discussion of project conformance to the criteria is noted as follows:

1. ***No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resource Would Occur as a Result of the Proposed Project***

Flora occupying undeveloped parcels within the project corridor generally consists of haole koa and scrub vegetation, while developed properties are vegetated with landscaping typical of single-family residential developments and ornamental landscaping generally associated with condominiums and apartment complexes. No wetlands exist within the project corridor. Fauna and avifauna are typical of a developed area. There are no known, rare, threatened, or endangered species of flora, fauna, or avifauna within the project limits.

From an archaeological standpoint, the lands underlying and immediately surrounding the project corridor have been previously altered by existing development. The Archaeological Inventory Survey prepared for the project recommends no further archaeological work for Sites 4798 and 4799, as these features will be incorporated in the project. As previously indicated, the SHPD concurred that Site 4797 retains its significance under historic preservation Criteria "A", "C", and "D". The SHPD also recommended that data recovery of the site take place prior to actual road construction. In accordance with this recommendation, data recovery will be conducted and a data recovery plan will be submitted to the SHPD for review and approval prior to the start of construction. In addition, archaeological monitoring will be conducted for all ground-altering activities. However, should archaeological or cultural materials be discovered during construction, work in the vicinity of the find will cease at once, and the SHPD will be immediately notified to ensure compliance with Chapter 6E, HRS.

2. ***The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment***

The roadway segment encompassed by the proposed project traverses lands which are designated for urban uses. In this context, the use of the proposed action is not anticipated to have a significant effect on beneficial uses of the environment.

3. ***The Proposed Action Does Not Conflict With the State's Long-Term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, HRS***

The State Environmental Policy and Guidelines are set forth in Chapter 344, HRS. The proposed action is in consonance with the following policies and guidelines:

Environmental Policy:

Enhance the quality of life by:

* * *

(A) Establishing communities which provide a sense of identity, wise use of land, efficient transportation, and aesthetic and social satisfaction in harmony with the natural environment which is uniquely Hawaiian.

Guidelines:

* * *

Transportation

* * *

(A) Encourage transportation systems in harmony with the lifestyle of the people and environment of the State.

4. ***The Economic or Social Welfare of the Community or State Would Not Be Substantially Affected***

The proposed project will directly benefit the local economy by providing construction and construction-related employment. The proposed project will also have a beneficial effect upon the socio-economic fabric of the community by providing for the safe and convenient movement of traffic in the West Maui region. By improving roadway conditions, the proposed project will promote the public welfare by providing drainage, vehicular, pedestrian, and bicycle facilities which meet current design standards.

5. ***The Proposed Action Does Not Affect Public Health***

No adverse impacts to the public's health and welfare are anticipated.

6. ***No Substantial Secondary Impacts, Such as Population Changes or Effects on Public Facilities, are Anticipated***

No significant population changes are anticipated as a result of the proposed project. The project involves road widening and related improvements to address existing roadway and drainage system deficiencies.

The proposed project will improve traffic and drainage conditions for motorists and pedestrians between Hoohui Road and Napilihau Street.

The County of Maui will coordinate the relocation of improvements (e.g., waterlines, utility poles) with the appropriate agencies and utility companies to ensure that the proposed road widening activities do not impact their facilities.

Stormwater runoff is expected to be accommodated by the proposed drainage system improvements. In addition, the proposed project is not

anticipated to have any adverse impacts upon public services and facilities.

7. ***No Substantial Degradation of Environmental Quality is Anticipated***

Excavation, grading, and fill activities will create temporary short-term nuisances related to noise and dust. Appropriate dust control and noise mitigation measures will be implemented by the contractor to ensure that fugitive dust and noise generated in connection with construction is minimized.

No substantial degradation of environmental quality resulting from the project is anticipated.

8. ***The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Effects On The Environment***

The proposed action is part of the County of Maui's ongoing effort to upgrade deficient roadways to accommodate current drainage, vehicular, pedestrian and bicycle requirements. This action is not expected to result in additional environmental effects as lands along the existing corridor are currently developed.

9. ***No Rare, Threatened or Endangered Species or Their Habitats Would be Adversely Affected By The Proposed Action***

There are no rare, threatened or endangered species of flora, fauna, or avifauna or their habitats within the project limits.

10. ***Air Quality, Water Quality or Ambient Noise Levels Would Not Be Detrimentally Affected By The Proposed Project***

Construction activities will result in short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling, and erection of dust screens will be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from construction equipment. Equipment mufflers or other noise attenuating equipment, as well as proper equipment and vehicle maintenance, are anticipated to mitigate noise from construction activities.

In the long term, the project is not anticipated to have a significant impact on air quality or ambient noise conditions.

Furthermore, to ensure that impacts to water quality are mitigated during construction, erosion control measures will be implemented, as required by the grading ordinance. As required by the State Department of Health, NPDES permit provisions will also be addressed.

11. ***The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such As Flood Plains, Tsunami Zones, Erosion-prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters***

Portions of the project corridor are located in Zone C, areas of minimal flooding, while other parts are located in Zones A4 and A5, areas of 100-year flooding, and Zone V24, areas of 100-year coastal flooding with velocity. The project corridor also traverses Kahana Stream, which is intermittent at its crossing with Lower Honoapiilani Road. The proposed improvements will comply with applicable flood hazard area development standards. In addition, appropriate regulatory permits and approvals will be obtained should any work be required within Kahana Stream or fall within waters regulated by the U.S. Department of the Army.

12. ***The Proposed Project Will Not Substantially Affect Scenic Vistas and Viewplanes Identified in County or State Plans or Studies***

The proposed project will not affect coastal scenic and open space resources and will not affect scenic view corridors.

13. ***The Proposed Project Will Not Require Substantial Energy Consumption***

The proposed project will involve the commitment of fuel for construction equipment, vehicles, and machinery during construction activities. However, this use will be short term and is not anticipated to result in a substantial consumption of energy resources.

Based on the foregoing findings, it is concluded that the proposed action is not anticipated to result in any significant impacts.

Chapter IX

List of Permits and Approvals

IX. LIST OF PERMITS AND APPROVALS

The following State and County permits and approvals will be required prior to the implementation of the project:

State of Hawaii

National Pollutant Discharge Elimination System (NPDES) Permit
Community Noise Permit (daytime construction activities)
Section 401 Water Quality Certification (Kahananui Bridge)
Hawaii Coastal Management Program Consistency Approval
Stream Channel Alteration Permit (Kahananui Bridge)
Conservation District Use Permit (Drainage Outlet No. 1)

County of Maui

Special Management Area (SMA) Use Permit
Shoreline Setback Variance
Construction Permits (e.g., grading, grubbing, driveway).

In addition, a U.S. Department of the Army authorization will be required for the work on Drainage Outlet No. 1 and the Kahananui Bridge.

Chapter X

Agencies and Organizations Contacted During the Preparation of the Draft Environmental Assessment; Letters Received and Responses to Substantive Comments

X. AGENCIES AND ORGANIZATIONS CONTACTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies and organizations were consulted during the preparation of the Draft Environmental Assessment:

Federal Agencies	Date of Letter	Date of Response
Department of Agriculture, Natural Resources Conservation Service	NCR	NRR
Department of the Army, Corps of Engineers	7/7/99	NRR
Department of the Interior, U.S. Fish and Wildlife Service, Pacific Division	7/23/99	8/18/99
State Agencies	**Date of Letter**	**Date of Response**
Department of Business, Economic Development and Tourism, Office of Planning	7/9/99	8/18/99
Department of Health	7/23/99	8/18/99
Department of Land and Natural Resources	8/2/99	8/18/99
Department of Land and Natural Resources, State Historic Preservation Division	10/9/99	NRR
Department of Transportation	8/3/99	NRR
Office of Hawaiian Affairs	7/29/99	8/18/99
County of Maui	**Date of Letter**	**Date of Response**
Department of Fire Control	7/16/99	8/6/99
Department of Housing and Human Concerns	7/1/99	NRR
Department of Parks and Recreation	7/7/99	NRR
Department of Planning	7/19/99	8/18/99
Department of Police	7/19/99	NRR
Department of Public Works and Waste Management	7/28/99	8/18/99
Department of Water Supply	NCR	NRR
Other	**Date of Letter**	**Date of Response**
Maui Electric Co., Ltd.	7/21/99	NRR
West Maui Taxpayers Association	NCR	NRR

NCR - No Comments Received
NRR - No Response Required

Pursuant to the early consultation requirements of the environmental review process, comments received from the above-referenced agencies and organizations, as well as responses to substantive comments, are included in this section.

JUL 0 9 1999

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

REPLY TO
ATTENTION OF

July 7, 1999

Regulatory Branch

Mr. Glen Tadaki
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

This letter responds to your request dated June 29, 1999 for a review of the project summary for the Lower Honoapiilani Highway Improvements from Hoohui Road to Napilihau Street. The information provided was not sufficiently detailed to determine whether a Department of the Army permit will be required, but it is likely that one will be required for reconstruction or replacing the Kahana Stream bridge.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-9258, extension 13, and reference File No. 990000411.

Sincerely,

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

JUL 27 1999

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

JUL 23 1999

In Reply Refer To: MR

Glenn Tadaki
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Re: Preparation Notice of an Environmental Assessment for the Lower Honoapiilani Road *Improvements Project (Hoohui Rd. to Napilihau St.), Lahaina, Maui, Hawaii.*

Dear Mr. Tadaki:

The U.S. Fish and Wildlife Service (Service) has reviewed the proposed project summary provided with your referenced request for technical assistance. The project applicant is the County of Maui, Department of Public Works and Waste Management. The proposed project involves road widening, drainage, and related improvements to an approximately 1.4 mile segment of Lower Honoapiilani Road from Hoohui Road to Napilihau Street in the Lahaina District on Maui. The Service offers the following comments for your consideration.

We have reviewed the information provided with the June 29 letter and contained in our own files, including maps prepared by the Hawaii Heritage Program of The Nature Conservancy and the Service's National Wetlands Inventory program. To the best of our knowledge, no federally endangered, threatened, or candidate species, significant wetlands, or other federal trust resources occur in the immediate area of the proposed project site. However, the endangered dark-rumped petrel (*Pterodroma phaeopygia sandwichensis)* may occur in the general vicinity of the proposed project site. Circumstantial observations and experimental evidence have shown that artificial lighting can disorient petrels and other seabirds when flying between inland nesting areas and offshore feeding grounds. This disorientation is caused by excessively bright outdoor lighting and can result in seabird collisions with man-made structures such as light poles and wires. Injured seabirds that "fall-out" from collisions are highly vulnerable to predation by dogs, cats, and mongooses.

For your information, we have enclosed a copy of a Hawaii Division of Forestry and Wildlife (DOFAW) pamphlet on methods to minimize the effects of lighting on seabirds. At a minimum, we recommend that any light poles erected at the project site be limited to a maximum height of 25 feet

since lights higher than this are more likely to cause seabird fall-out. As is possible, all project lighting should be directed downward and be shaded to prevent light from escaping horizontally, and be of as low wattage as possible. It would also help if the lighting is of muted colors instead of bright white. We suggest you contact the DOFAW office on Maui for other recommendations [phone: (808) 871-2929].

In general, the Service recommends that the draft Environmental Assessment (EA) address potential impacts from the proposed project on the above species as well as other native Hawaiian plants and animals and their habitats and identify the Best Management Practices that will be incorporated into the project to minimize adverse impacts. For example, we recommend that clearing and grading activities be minimized and limited to the immediate project site and that adequate erosion control measures be incorporated to ensure that project-related sediments are not carried into nearby coastal waters by stormwater runoff.

We appreciate the opportunity to provide early technical assistance on the proposed project and look forward to receiving a copy of the draft EA when it is available. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Mike Richardson by telephone at (808) 541341 or by facsimile transmission at (808) 541-3470.

Sincerely,

Karen W Rosa

for/ Robert P. Smith
Pacific Islands Manager

cc: DOFAW, Maui
DOFAW, Honolulu

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 18, 1999

Robert P. Smith, Pacific
Islands Manager
Fish and Wildlife Service
U.S. Department of the Interior
Box 50088
Honolulu, Hawaii 96850

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Smith:

Thank you for your July 23, 1999 letter commenting on the subject project. In response to your comments, we would like to note that no new light poles are planned for installation in connection with this project. In addition, the Draft Environmental Assessment (EA) for the project will examine flora and fauna in the project area as well as include appropriate measures to minimize adverse impacts to their habitats.

Thank you again for providing us with your comments. A copy of the Draft EA will be provided to you.

Very truly yours,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Department of Public Works and Waste Management (via mail)
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc. (via mail)
a:\a/hpllroad/usfwsltr.001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahina@aloha.net

JUL 1 3 1999

BENJAMIN J. CAYETANO
GOVERNOR
SELJI F. NAYA, Ph.D.
DIRECTOR
BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING

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

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

Ref. No. P-8172

July 9, 1999

Mr. Glenn Tadaki
Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

Subject: General Overview and Early Consultation on an Environmental Assessment (EA) for Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)

The Honoapiilani Road improvements project involves road widening, resurfacing, drainage, parking, and bridge improvements along 1.4 miles of Honoapiilani Road and the construction of crosswalks and curb ramps in accordance with the Americans with Disabilities Act. It also involves federal and county funds.

We do not have any objections to the project. Our primary interest is assurance that the project will be designed and implemented in compliance with the Coastal Zone Management (CZM) law, Chapter 205A, Hawaii Revised Statutes. In this respect, an assessment of the project's compliance with the CZM objectives and policies should be included in the environmental assessment which is also required by the Office of Environmental Quality Control's administrative rules.

You should also note that our certification of federal consistency with the CZM Program will be required because of the use of federal funds. The bridge improvement may also require any Army Corps of Engineers' permit.

If there are any questions, please contact Christina Meller of our CZM Program at 587-2845.

Sincerely,

David W. Blane
Director
Office of Planning

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 18, 1999

David W. Blane, Director
Office of Planning
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Blane:

Thank you for your July 9, 1999 letter commenting on the subject project. In response to your comments, we would like to note the following.

An assessment of the project's compliance with the Coastal Zone Management (CZM) objectives and policies will be included in the Draft Environmental Assessment (EA). In addition, an assessment for consistency with the Federal CZM Program will be prepared in connection with the replacement or reconstruction of the Kahana Stream bridge, as required.

Thank you again for providing us with your comments. A copy of the Draft EA will be provided to you.

Sincerely,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Department of Public Works and Waste Management (via mail)
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc. (via mail)
a:\a/hplirsd/osplir.001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahina@aloha.net

JUL 2 0 1999

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to
File:

July 23, 1999

99-136/epo

Mr. Glenn Tadaki, Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

Subject: Early Consultation Comments
Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)
Kahana, Lahaina District, Maui

Thank you for allowing us to review and comment on the subject project. Please address the following in the Draft Environmental Assessment:

1. Polluted Runoff Control (erosion control);

2. Construction noise mitigation;

3. Mitigation of fugitive dust from construction activities; and

4. National Pollutant Discharge Elimination System permit requirements.

Sincerely,

Virginia Pressler

for GARY GILL
Deputy Director for
Environmental Health

c: MDHO

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 18, 1999

Gary Gill, Deputy Director
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Gill:

Thank you for your July 23, 1999 letter providing comments on the subject project. In response to your comments, we would like to note that the Draft Environmental Assessment (EA) for the project will examine measures to address erosion control, noise and dust from construction activities. In addition, National Pollutant Discharge Elimination System (NPDES) permit requirements will be discussed, as applicable.

Thank you again for providing us with your comments. A copy of the Draft EA will be provided to you.

Very truly yours,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Department of Public Works and Waste Management (via mail)
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc. (via mail)
ata/hpwroad/dohltr 001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahina@aloha.net

AUG 0 4 1999

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

P.O. BOX 621
HONOLULU, HAWAII 96809

AUG -2 1999

Ref:PS:EH

Mr. Glenn Tadaki
Munekiyo Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Maui, HI 96793

Dear Mr. Tadaki:

Subject: Draft Environmental Assessment Preparation Notice DEAPN) for Honoapiilani Highway Improvements, from Hoohui Road to Napilihau Street

We have reviewed the subject project description and offer the following comments for your consideration.

Engineering Branch:

Please see attachment.

Maui District Land Office:

Kahana Stream is State owned. Will the project impact the flow of water negatively or positively? Currently, we are experiencing the ponding of water before the river mouth.

Thank you for the opportunity to comment on the proposed project.

Should you have any questions or require further assistance, please contact staff planner Ed Henry at 587-0380.

Very truly yours,

TIMOTHY E. JOHNS
Chairperson

Attachment

c.c. Engineering Branch
MDLO

ENGINEERING BRANCH

COMMENTS

For your information, portions of the project site are located in Zone C, which is an area of minimal flooding, Zones A4 and A5, which are areas located within the 100-year flood; base flood elevations and flood hazard factors are determined, and Zone V24 , which is within the 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined according to FEMA Community Panel Map No. 15003 0151 B.

The project must comply with rules and regulations of the National Flood Insurance Program (NFIP), and all applicable County Flood Ordinances. If there are questions regarding the NFIP, please contact Sterling Yong, State NFIP coordinator, Department of Land and Natural Resources at 587-0428, or if there are questions regarding flood ordinances, please contact the applicable County representative.

In addition to the above requirements the Kahana Stream Bridge reconstruction or replacement shall comply with the following requirements:

1. Remove existing concrete piers and footings from the stream bed to prevent trapping of debris.

2. Install utilities (sewer, gas, water, etc.), suspended along the bridge structure, to minimize flood damage, leakage and snagging of debris.

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 18, 1999

Timothy E. Johns, Chairman
Department of Land and
Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Johns:

Thank you for your August 2, 1999 letter transmitting comments on the subject project from your Engineering Branch and your Maui District Land Office. In response to your comments, we would like to note the following.

The design for the reconstruction or replacement of the existing Kahana Stream bridge will comply with applicable Federal and County flood hazard area development standards. The existing bridge utilizes a box culvert type design and does not involve the use of piers and footings in the stream bed that could trap debris.

To minimize damage from flooding, the protection of utility lines (e.g., protective encasing) will be examined in detail during the final design phase for the reconstruction or replacement of the bridge.

The reconstruction or replacement of the bridge is not expected to alter existing stream flows. The area at the mouth of the stream in which ponding is occurring is situated beyond the limits of the project. The proposed roadway improvements will not aggravate conditions at the mouth of the stream.

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahwa@aloha.net

Thank you for again for providing us with your comments. A copy of the Draft Environmental Assessment (EA) for the project will be provided to you.

Sincerely,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Department of Public Works and Waste Management (via mail)
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc. (via mail)
ata/hpilroad/dlnttr.001

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

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BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

OCT 15 1999

October 9, 1999

Mr. Glen Tadaki
Munekiyo, Arakawa and Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

LOG NO: 24192
DOC NO: 9909CD21

Dear Mr. Tadaki,

SUBJECT: Chapter 6E-106 Historic Preservation Review of the Proposed Honoapi'ilani Highway Improvements (Hoohui Road to Napilihau Street)
Kahana, Mailepai, and Alaeloa Ahupua'a, Lahaina District, Island of Maui
TMK: 4-3-03; 4-3-05; 4-3-10; 4-3-15

Thank you for the opportunity to comment on your letter of June 29, 1999, and thank you for your prompt response in providing the additional information we had requested. Our review is based on reports, maps and aerial photographs maintained at the State Historic Preservation Office; no field inspection was made of the subject property.

We understand from your submitted documents that the proposed undertaking entails road widening and drainage and related improvements to a 1.4 mile segment of Lower Honoapi'ilani Highway. In addition, repairs to the existing drainage culvert and outlet structure located at TMK: 4-3-05:027 and an adjacent drainage easement located at TMK: 4-3-10:029 are proposed. The majority of this work is to be conducted within the roadway's existing right-of-way, but limited right-of-way acquisition may be required.

A search of our records indicates an archaeological inventory survey has not been conducted in the roadway itself. The general area seems likely to have once been the location of pre-contact farming, perhaps with scattered houses. Significant sites are known to be located in some of the adjacent properties including: the ruins of an historic church, a mound, and a concrete walkway (1593), an historic burial (4072), and an historic bridge (4069) suggesting that use of this area continued into the historic period. Thus, the possibility exists that significant historic sites may be located in the subsurface deposits.

However, the proposed project area does not appear to be located in sand deposits and aerial photographs from the mid-1970s indicate the proposed project area has undergone extensive alteration due to modern commercial agriculture and construction. Therefore, we believe it unlikely that significant historic sites remain in these areas.

Given the above information, we believe that this project will have "no effect" on significant historic sites.

In the event that historic remains (i.e. artifacts, human skeletal remains, etc.) are inadvertently encountered during construction, all work needs to cease in the immediate vicinity of the find and the find needs to be protected from further damage. The Contractor needs to immediately contact the State Historic Preservation Office at 692-8023 on O'ahu. The Division will assess the significance of the find and recommend mitigation measures, if necessary.

Please call Cathleen Dagher at 692-8023 if you have any questions.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

CD:jen

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

NOV 17 1999

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

November 9, 1999

Mr. Glen Tadaki
Munekiyo, Arakawa and Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

LOG NO: 24356 ✓
DOC NO: 9911CD03

Dear Mr. Tadaki,

SUBJECT: **Additional Comments Regarding a HRS Chapter 6E-8 and National Historic Preservation Act Section 106 Review of the Proposed Honoapi'ilani Highway *Improvements* (Hoohui Road to Napilihau Street)**
Kahana, Mailepai, and Alaeloa Ahupua'a, Lahaina District, Island of Maui
TMK: 4-3-03; 4-3-05; 4-3-10; 4-3-15

It has just come to our attention that several historic sites have recently been identified in the immediate vicinity of the proposed undertaking.

Our initial comments regarding the proposed undertaking were based on existing information in our files; reports documenting archaeological studies, maps and aerial photographs which are maintained at the State Historic Preservation Office.

We now know that Erik Fredericksen, Xamanek Researches, is conducting an archaeological inventory survey in a portion of the subject properties. In telephone conversations with this office, Fredericksen has stated that he has documented 4 previously unidentified historic sites which are in close proximity to your project corridor along Lower Honoapi'ilani Highway. These sites include a subsurface habitation site (4797) which is located in a drainage and extends beneath the highway somewhere along your corridor. At present, we have no further information or documentation of this site. We do not know the exact location, the depth of the deposit or the extent of the site.

Given this new information, we may need to revise our earlier comments on the proposed undertaking. However, we will not be able to comment until we receive and review the inventory survey report documenting the finds that Mr. Fredericksen has verbally reported.

Please call Cathleen Dagher at 692-8023 if you have any questions.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

CD:jen

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

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

IN REPLY REFER TO:
HWY-PS
2.4818

AUG 3 1999

Mr. Glenn Tadaki, Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

Subject: Lower Honoapiilani Road Improvements,
Hoohui Road to Napilihau Street, Lahaina, Maui

Thank you for the opportunity to review the general overview of the proposed improvements to Lower Honoapiilani Road from Kahana to Napili, a road under County jurisdiction and control.

We support the proposed improvements to Lower Honoapiilani Road.

Since this project will use Federal Highway funds, please continue to coordinate the work with us to ensure compliance with Federal requirements.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

AUG 0 3 1999

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

July 29, 1999

Mr. Glenn Tadaki, Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 204
Wailuku, Hawai'i 96793

PC #50

Re: Lower Honoapi'ilani Road Improvments (Ho'ohui Road to Napilihau Street)

Dear Mr. Tadaki:

Thank you for the opportunity to offer preliminary comments on the preparation of an Environmental Assessment for the proposed road widening, drainage and other improvement to a 1.4 mile segment of Lower Honoapi'ilani Road. The work segment will run from Hoohui Road to Napilihau Street.

We note that the area where the work will be performed was an area of significant habitation by Hawaiians in earlier times. It is likely that archaeological, cultural and burial deposits could be found during road improvements. Therefore, we suggest that an archaeological monitor be onsite whenever there is any ground disturbance. We further suggest that the Maui Burial Council be contacted immediately if any burial are uncovered during construction.

Sincerely,

Colin Kippen
Deputy Administrator

C. Sebastian Aloot
Director, Hawaiian Rights Division

cc: Office of Hawaiian Affairs' Board of Trustees
Maui Community Resources Office

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 18, 1999

Colin Kippen, Deputy Administrator
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Kippen:

Thank you for your July 29, 1999 letter commenting on the subject project. In response to your letter, we would like to note that an archaeological inventory survey is being prepared in connection with this project. Should archaeological monitoring be required, monitoring requirements will be coordinated with the State Historic Preservation Division.

Thank you for again for providing us with your comments. A copy of the Draft Environmental Assessment (EA) for the project will be provided to you.

Sincerely,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Department of Public Works and Waste Management (via mail)
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc. (via mail)
ata/hpiircad/ohaltr.001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph. (808)244-2015 • fax (808)244-8729 • email mahina@aloha.net

JAMES KIMO APANA
MAYOR

CLAYTON T ISHIKAWA
CHIEF

FRANK E FERNANDEZ, JR
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561
FAX (808) 243-7919

July 16, 1999

Mr. Glenn Tadaki, Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street
Wailuku, HI 96793

RE: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Tadaki,

Thank you for the opportunity to comment on the Lower Honoapiilani Road improvements.

The Department of Fire Control offers the following comments.

1. During construction involving widening, drainage and other improvements, the Department shall be notified not less than 48 hours in advance of any road closures or detours. Any and all detours shall be approved by the Department of Fire Control prior to becoming effective.

2. The Department shall also be notified when fire hydrants are being shut down, notification shall include location of hydrant and hydrant number. If the shut down of waterlines affects any property with an automatic fire sprinkler system, the Department and the

property shall be notified 48 hours prior to shutting down the system providing service to the sprinkler system.

If you have any questions, you may direct them in writing to the Fire Prevention Bureau, 21 Kinipopo Street, Wailuku, HI 96793.

Sincerely,

LEONARD F NIEMCZYK
Captain, Fire Prevention Bureau

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 6, 1999

Captain Leonard F. Niemczyk
Fire Prevention Bureau
Department of Fire Control
County of Maui
200 Dairy Road
Kahului, Hawaii 96732

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Captain Niemczyk:

Thank you for your July 16, 1999 letter commenting on the subject project. In response to your comments, we would like to note the following.

The construction plans and specifications for the project will require that the contractor notify the Department of Fire Control (Department) at least 48 hours in advance of any road closures or detours. Should detours be necessary, the contractor shall obtain the Department's approval prior to the implementation of any and all detours.

In addition, the plans and specifications will require that the contractor notify the Department when fire hydrants are being shutdown for relocation. Should properties with automatic fire sprinkler systems be affected, the plans and specifications will require that the contractor notify the Department not less than 48 hours prior to the shut down of waterlines to these properties.

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahraw@aloha.net

Thank you for providing us with your comments. Please feel free to call me should you have any questions or require additional information.

Sincerely,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Engineering Division
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc.
ata/hpilroad/mfdltr 001

JUL 0 7 1999

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

JAMES "KIMO" APANA
Mayor

ALICE L. LEE
Director

PRISCILLA P. MIKELL
Deputy Director

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 243-7805 • FAX (808) 243-7165

July 1, 1999

Mr. Glenn Tadaki, Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

Subject: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

We have reviewed the project summary that was attached to your June 29, 1999 letter and wish to inform you that we support the construction of the subject project.

Thank you for the opportunity to comment.

Very truly yours,

ALICE L. LEE
Director of Housing and
Human Concerns

ETO:hs

c: Housing Administrator

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE WAILUKU, HAWAII 96793

JAMES "KIMO" APANA
Mayor

FLOYD S. MIYAZONO
Director

ELIZABETH D. MENOR
Deputy Director

(808) 270-7230
FAX (808) 270-7934

July 7, 1999

Mr. Glenn Tadaki, Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT: LOWER HONOAPIILANI ROAD IMPROVEMENTS

We have reviewed the summary for the subject project and have no objections to the proposed action.

Thank you for the opportunity to review and comment. Please contact Mr. Patrick Matsui, Chief of Planning and Development, at 270-7387 if there are further questions.

Sincerely,

FLOYD S. MIYAZONO
Director

c: Patrick Matsui, Chief of Planning and Development

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

JUL 2 2 1999

COUNTY OF MAUI
DEPARTMENT OF PLANNING

July 19, 1999

Mr. Glenn Tadaki
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

RE: Environmental Assessment for Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)

The Maui Planning Department has reviewed the summary for the proposed project and offers the following comments:

1. The draft environmental assessment should contain maps and written descriptions of the proposed improvements in relation to the Special Management Area (SMA), Shoreline Setback Area and the existing roadway right-of-way;

2. Project alternatives should include the relocation of the road and infrastructure further mauka (inland), especially those portions of the road that are in close proximity to the shoreline; and

3. Proposed mitigation measures should include a detailed description of Best Management Practice (BMP) measures to be implemented during the project to control non-point source pollution from entering the ocean.

We will reserve further comments until we have had the opportunity to review a completed document.

Should you have any questions, please contact Robyn Loudermilk, Staff Planner, of this office at 270-7735.

Very truly yours,

JOHN E. MIN
Planning Director

JEM:RLL:cmb
c: Clayton Yoshida, AICP, Deputy Director of Planning
Charles Jencks, Director, Department of Public Works and Waste Management
Robyn L. Loudermilk, Staff Planner
General File
S:\ALL\ROBYN\DEA1LOHO.WPD

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 18, 1999

John E. Min, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Min:

Thank you for your July 19, 1999 letter transmitting comments on the subject project. In response to your comments, we would like to note the following.

The Draft Environmental Assessment (EA) for the project will include exhibits and descriptions of the proposed improvements relative to the existing roadway right-of-way and the Special Management Area (SMA) and shoreline setback area.

In addition, the Draft EA will contain an alternatives analysis as well as measures to control and minimize the effects of construction runoff to coastal waters.

Thank you for again for providing us with your comments. A copy of the Draft EA will be provided to you.

Sincerely,

Glenn Tadaki, Planner

GT:to

cc: Joe Krueger, Department of Public Works and Waste Management (via mail)
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc. (via mail)

ata/hpwroad/pdltr.001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

JUL 2 2 1999

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE
YOUR REFERENCE at

POLICE DEPARTMENT
COUNTY OF MAUI

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

CHARLES H.P. HALL
DEPUTY CHIEF OF POLICE

July 19, 1999

Mr. Glenn Tadaki, Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

We have received your letter dated June 29, 1999 and the project summary providing a general overview of the proposed action for the above subject.

Thank you for giving us the opportunity to review the proposed summary, and we have no comments at this time.

Very truly yours,

Assistant Chief Robert Tam Ho
for: THOMAS M. PHILLIPS
Chief of Police

Enclosure

xc: Joe Krueger, Dept. of Public Works
and Waste Management

JAMES "KIMO" APANA
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

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

JUL 30 1999

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

RON R. RISKA, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

ANDREW M. HIROSE
Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

July 28, 1999

Mr. Glenn Tadaki
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT: ENVIRONMENTAL ASSESSMENT
LOWER HONOAPIILANI HIGHWAY ROAD IMPROVEMENTS
HOOHUI ROAD TO NAPILIHAU STREET

We reviewed the subject application and have the following comment.

1. The project plans shall incorporate an erosion control plan that shall show the location and details of structural and non-structural measures to control erosion and sedimentation from the work areas. There shall also be a suitable plan to control dust from the project site during working and non-working hours.

If you have any questions, please call David Goode at 270-7845.

Sincerely,

for CHARLES JENCKS
Director of Public Works
and Waste Management

DG:msc/mt

S:\LUCA\CZM\lwr.honoa.wpd

MUNEKIYO, ARAKAWA & HIRAGA, INC.

August 18, 1999

Charles Jencks, Director
Department of Public Works
and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Jencks: :

Thank you for your July 28, 1999 letter commenting on the subject project. In response to your comments, we would like to note that an erosion control plan, including appropriate dust control measures, will be incorporated in the plans for the project.

Thank you again for providing us with your comments.

Very truly yours,

Glenn Tadaki, Planner

GT:to

cc: Joe Krueger, Department of Public Works and Waste Management (via mail)
Terrance Arashiro, Austin, Tsutsumi & Associates, Inc. (via mail)

ala/hpillani/dpwwmltr.001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahina@aloha.net

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

JUL 2 2 199

July 21, 1999

Mr. Glenn Tadaki
Planner
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Mr. Tadaki:

Subject: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

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

Maui Electric Company's distribution facilities located in the vicinity of the proposed project area may require relocation per statements provided in your project summary. Therefore, we request that we be provided electrical, civil and mechanical final design plans for our review and comment.

In reference to the use of Federal and County funds, our Company request that we be provided all pertinent information as soon as possible to meet all filing deadlines. Another matter of concern is our Company is also required to file for permits. Therefore, this process may affect your project time line and you may need to consider this in your project planning.

If you have any questions or concerns, please call Dan Takahata at 871-2385.

Sincerely,

Edward L. Reinhardt
Manager, Engineering

Chapter XI

Letters Received During the Draft Environmental Assessment Public Comment Period and Responses to Substantive Comments

XI. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT PUBLIC COMMENT PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS

Pursuant to the requirements of the environmental review process, letters received during the Draft Environmental Assessment public comment period, as well as responses to substantive comments, are included in this section.

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

'00 MAR 29 P12:35

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

March 24, 2000

Mr. John E. Min
Planning Director
Maui Planning Department
250 S. High Street
Wailuku, HI 96793

Dear Mr. Min:

Subject: L. Honoapiilani Roadway Improvements
TMK: 4-3-003, 4-3-005, 4-3-010, 4-3-015, 4-3-005:027, 4-3-010:Por. 009
I.D.: SM1 2000/0008, SSV 2000/0001

Thank you for allowing us to comment on the subject project. In reviewing the information transmitted and our records, we have no objection to the subject project. Our comments are noted in the Special Management Area Use Permit and Shoreline Setback Variance application booklet.

If you have any questions or concerns, please call Dan Takahata at 871-2385.

Sincerely,

Edward L. Reinhardt
Manager, Energy Delivery

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

210 Imi Kala St.
Suite 209
Wailuku, HI 96793

USDA

Our People...Our Islands...In Harmony

'00 MAR 31 P2:08

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

DATE: March 30, 2000

Mr. John E. Min, Director
Department of Planning
County of Maui
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Min,

SUBJECT: L. Honoapiilani Roadway Improvements
TMK: 4-3-003, 4-3-005, 4-3-005: 27, 4-3-010, 4-3-010: por. 9, 4-3-015
Subject I.D.: SM1 2000/0008, SSV 2000/0001

We have no comment on the subject application.

Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara
District Conservationist

BENJAMIN J. CAYETANO
GOVERNOR

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

ALFRED M. ARENSDORF, M.D.
DISTRICT HEALTH OFFICER

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

March 31, 2000

Mr. John Min
Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawai'i 96793

Dear Mr. Min:

Subject: **Lower Honoapiilani Roadway Improvements**
TMK: (2) 4-3-003, 4-3-005, 4-3-010, 4-3-015, 4-3-005:027,
4-3-010: Por. 009
SM1 2000/0008, SSV 2000/0001

Thank you for the opportunity to comment on the Special Management Area Permit and Shoreline Setback Variance Applications. Comments from this office were transmitted to our Honolulu Office. A coordinated response is forthcoming.

Should you have any questions, please call me at 984-8230.

Sincerely,

Herbert S. Matsubayashi
District Environmental Health Program Chief

c: Art Bauckham

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

April 5, 2000

Mr. John E. Min, Director
County of Maui
Planning Department
250 South High Street
Wailuku, Maui, Hawaii 96793

Re: I.D.: SM1 2000/0008, SSV 2000/0001
TMK: 4-3-03, 4-3-05, 4-1-10, 4-3-15, 4-3-05:27, 4-3-10:09 portion of
PROJECT NAME: Lower Honoapiilani Roadway Improvements

Dear Mr. Min,

Thank you for the opportunity to comment on this application. The Department of Water Supply has the following comments.

The applicants will need to coordinate construction and any water line closure with DWS. Continuous water service from the 16" transmission line on Lower Honoapiilani Road is required to serve the St. Francis Dialysis Center on Hoohui Road. Continuous service may also be necessary for other medical facilities located in Kahana Gateway. All water valve covers must be lifted to match the finished grade of the roadway. Enclosed is a portion of our water system map pertaining to the project area. The applicants should contact our Engineering Division at 270-7835 as soon as possible to discuss these issues, including alternative water service arrangements for these areas during construction.

In order to protect water resources in the area, DWS recommends that the applicant utilize Best Management Practices (BMPs) designed to minimize infiltration from all construction activities and related vehicle operations. We have attached sample BMPs for principle operations for reference. Additional information is available from the State Department of Health.

To further conserve water resources, the applicants are encouraged to use climate-adapted plants during revegetation. The project site is located in "Maui County Planting Plan" - Plant Zones 3 and 5. Please refer to the "Maui County Planting Plan", and to the attached document, "Saving Water in the Yard: What & How to Plant in Your Area". Climate-adapted and salt-tolerant native plants conserve water and further protect the watershed from degradation due to invasive alien species.

Should you have any questions, please call the Water Resources and Planning Division at 270-7199.

Sincerely,

David Craddick
Director

emb

c: engineering
applicant w/attachments

attachments:
Portion of DWS Fire Protection Map
-Saving Water in the Yard: What & How to Plant in Your Area".
Selected BMPs from "Guidance Specifying Management Measures For Sources of Nonpoint Pollution In Coastal Waters." U.S. EPA.
References for Further Reading from "The Megamanual - Nonpoint Source Management Manual." Commonwealth of Massachusetts

By Water All Things Find Life

MUNEKIYO, ARAKAWA & HIRAGA, INC.

May 10, 2000

David Craddick, Director
Department of Water Supply
County of Maui
200 S. High Street
Wailuku, Hawaii 96793

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Craddick:

Thank you for your letter of April 5, 2000 providing comments on the proposed project. On behalf of the County of Maui, Department of Public Works and Waste Management, we would like to note the following.

Construction work for the project, as well as any water line closure and alternative water service arrangements (if necessary), will be coordinated with the Department of Water Supply's Engineering Division.

In addition, all water valve covers will be lifted to match the finished grade of the roadway and Best Management Practices (BMPs) will be utilized during construction activities to minimize impacts to water resources. It should be noted that space constraints and improvements on parcels adjoining the right-of-way impose landscape limitations; climate-adaptive plants will be considered for revegetation to the extent practicable.

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph (808)244-2015 • fax (808)244-8729 • email: mahina@aloha.net

Thank you for providing us with your comments.

Sincerely,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Dept. of Public Works and Waste Management
Kent Morimoto & Ken Kurokawa, Austin, Tsutsumi & Associates
Colleen Suyama, Dept. of Planning
ata/hpiiroad/dwsltr.001

APR 2 6 2000

POLICE DEPARTMENT
COUNTY OF MAUI

JAMES "KIMO" APANA
MAYOR

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

DEPUTY CHIEF OF POLICE

OUR REFERENCE

YOUR REFERENCE

'00 APR 11 P3:08

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

April 6, 2000

MEMORANDUM

TO : **DIRECTOR, PLANNING DEPARTMENT**

FROM : **THOMAS M. PHILLIPS, CHIEF OF POLICE**

SUBJECT : **I.D.** **SM1 2000/0008, SSV 2000/0001**
TMK: **4-3-003; 4-3-005, 4-3-015, 4-3-05:027, 4-3-010:Por. 009**
Project Name:L. Honoapiilani Roadway Improvements
Applicant: **Charles Jencks**
Dept. of Public Works and Waste Management

____ **No recommendation or special condition is necessary or desired.**

__✓__ **Refer to attachment.**

AC

Assistant Chief Robert Tam Ho
For: THOMAS M. PHILLIPS
Chief of Police

APR 2 0 2000

TO : THOMAS PHILLIPS, CHIEF OF POLICE

VIA : ROBERT TAM HO, AC, UNIFORMED SERVICES BUREAU

FROM : WAYNE RIBAO, CAPTAIN, LAHAINA DISTRICT

SUBJECT : LOWER HONOAPIILANI HIGHWAY ROADWAY IMPROVEMENTS

Sir, this To-From is being submitted in response to a letter dated 03/20/00 from the County of Maui Department of Planning who is seeking comments and recommendations on the roadway construction and improvements planned for Lower Honoapiilani Highway from Hoohui Road to Napilihau Street.

Prior comments and recommendations on this project have been submitted by Lahaina District personnel and a recent meeting (03/21/00) was attended by Sergeant Brian De Mello and Officer Aaron Kamaunu.

According to Officer Anselm Yazaki who looked into the project, he feels that the improvements will be good for the area, however he did have some concerns regarding parking along the roadway which is addressed in his attached To-From.

Sergeant De Mello and Officer Kamaunu did express concern about the timing of the project and how it would impact traffic in the area with roadway improvement construction still going on at the upper highway (Honoapiilani Highway). Their concerns were expressed at the meeting held on 03/21/00.

Refer to attached To-Froms for further information.

CAPTAIN WAYNE RIBAO
04/03/00-1445 HOURS

401 - PL2 F 1F
A-5
3/25/00

APR 2 6 2000 Hawaiian

TO : THOMAS PHILLIPS, CHIEF OF POLICE
MAUI COUNTY POLICE DEPARTMENT

VIA : CHANNELS

FROM : SERGEANT BRIAN DE MELLO
DISTRICT IV, SPECIALIZED UNITS

SUBJECT : PUBLIC WORKS MEETING, RE: LOWER HONOAPIILANI HWY. CONSTRUCTION, APRIL 2000

Sir, at approximately ~0900 hours, this date 3/21/00, the undersigned along with Community Police Officer Aaron KAMAUNU, attended a meeting at the Wailuku Civil Defense Conference room in Wailuku. The subject concerned the commencement of work for Lower Honoapiilani Hwy from the area of Mahinahina Rd. towards Hoohui Rd. The work scheduled will involved roadway improvements and wastewater drainage.

Our input on the project was requested. I expressed concerns over road width safety, pertaining to pedestrians and bicyclists. Further being adamant about two construction sites in the location being conducted during the same time period. The problem already exists in the location fronting Kaanapali Resorts, in which motorists already experience delays to reach from Upper Honoapiilani Hwy. and Lower Honoapiilani Hwy to Kaanapali Parkway of more than fifteen minutes. This is an area of only 1.2 miles. When feeder streets such as Hoohui Rd. and Akahele St. are restricted due to construction, then traffic problems will present itself at Upper Honoapiilani Hwy. and Lower Honoapiilani Hwy., an area which is already a problem.

We expressed concern over beginning the project at this point in time. Ideally such a project would have less complaints if the four lane highway construction was complete. However it was expressed by County Engineers, Pat MURAKAMI, Scott RAWLINS and Steve NEWHOUSE that this project will start as soon as possible to avoid penalties with the Contractor, Goodfellow Brothers. Both Officer KAMAUNU and myself related that with this in mind, we had no further comments that have not been already expressed about traffic and safety issues.

Respectfully submitted,

Sergeant Brian DE MELLO 7000
DISTRICT IV, SPECIALIZED UNITS
3/21/00 1130 HOURS

NOTED.
Capt. Wayne Ontai
03/22/00

Lt. AC
03/23/00

APR 2 6 2000

TO : THOMAS PHILLIPS, CHIEF OF POLICE, MAUI COUNTY

VIA : CHANNELS

FROM : ANSELM YAZAKI JR., POLICE OFFICER III, DISTRICT IV

SUBJECT : LOWER HONOAPIILANI ROAD IMPROVEMENTS FROM HOOHUI TO NAPILIHAU ROAD

Sir this To-From is being submitted as requested from Glenn TADAKI, Planner with Munekyo, Arakawa, and Hiraga Inc., concerning the Lower Honoapiilani Road improvements from Hoohui Road to Napilihau Road.

On 071399 at about 1600 hours, after reviewing the Letter, the project summary, and map of the area involved, there is one question I have.

The question is concerning proposed action number 2, Providing intermittent parallel parking on the makai side of the roadway.

There is a County Code concerning No Parking/Towaway Zone on Lower Honoapiilani Road from Honokowai to Kapalua on the makai side of the roadway. Should the County Code be changed, so person(s) can legally park on the makai side of the roadway would be good.

After further reviewing the project summary, the Lower Honoapiilani Road improvements would be very good for the area as the roadway, drainage and shoulder areas needs a new improvement.

I would recommand this project for Approval.

IT IN PREVIOUS CONSTRUCTION CONDUCTED ON L. HONOAPIILANI HWY - ADEQUATE TRAFFIC CONTROL AND PRIOR NOTIFICATION HAVE ALWAYS ALLEVIATED PROBLEMS ASSOCIATED WITH A CONSTRUCTION PROJECT OF THIS MAGNITUDE

RESPECTFULLY SUBMITTED,

Anselm YAZAKI JR. 0317
071399 @ 1830 hours.

MUNEKIYO, ARAKAWA & HIRAGA, INC.

May 4, 2000

Thomas M. Phillips, Chief
Maui Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Phillips:

Thank you for your letter of April 6, 2000 providing comments on the proposed project. On behalf of the County of Maui, Department of Public Works and Waste Management, we would like to note the following.

Preliminarily, construction of the proposed project is anticipated to commence by the spring of 2001. This is well after the completion of the Honoapiilani Highway Widening Project (Kaanapali Parkway to Honokowai Stream), which is expected to occur by the summer of 2000. As noted in the project's Draft Environmental Assessment, a traffic control plan and public notification procedures will be utilized to minimize impacts to traffic during construction of the proposed project.

The construction work referenced in your letter, which is to be undertaken by the County and its contractor (Goodfellow Brothers), involves improvements along Lower Honoapiilani Road from Mahinahina Stream to Hoohui Road. This improvements project is expected to begin around the time the Honoapiilani Highway Widening Project is completed and is anticipated to be finished prior to the start of construction for the proposed project.

With regard to parking, the provision of intermittent parallel parking along the makai side of the roadway has been deleted from the project since the time the project's early consultation project summary was originally prepared.

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

Thank you again for providing us with your comments.

Very truly yours,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Department of Public Works and Waste Management
Kent Morimoto & Ken Kurokawa, Austin, Tsutsumi & Associates, Inc.
Colleen Suyama, Department of Planning

sta/hpilroad/mpdltr.001

BENJAMIN J. CAYETANO
GOVERNOR

APR 1 0 2000

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

April 7, 2000

Mr. Charles Jencks, Director
Department of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawai'i 96793

Dear Mr. Jencks:

We have reviewed the draft environmental assessment for the Lower Honoapi'ilani Road Improvements (Ho'ohui Road to Napilihau Street) and offer the following comments for your consideration.

1. **Shoreline Concerns**: Since work is occuring in the shoreline setback area, please discuss the nature of the shoreline in the environmental setting section of the environmental assessment. Include photographs of the shoreline, especially near the Kahananui Bridge, and Outlets 1, 2, and 3. A copy of the Environmental Council's Shoreline Hardening policy guidelines is enclosed for your use. Please review and discuss these guidelines and any shoreline impacts and mitigative measures in the environmental assessment. You may wish to consult with Ms. Wendy Wiltse of the U.S. Environmental Protection Agency Pacific Islands Contact Office in Honolulu (telephone 541-2710) concerning water quality issues and the effects, if any, will the drainage culverts and increase in bridge size have on shoreline processes (sand transport, etc.).

Thank you for the opportunity to comment. If you have any questions, please call Leslie Segundo of my staff at 586-4185.

Sincerely,

Genevieve Salmonson

GENEVIEVE SALMONSON
Director

Enclosure

c: Mr. Michael T. Munekiyo, Munekiyo, Arakawa & Hiraga, Inc.
Mr. Joe Krueger, Dept. of Public Works and Waste Management

MUNEKIYO, ARAKAWA & HIRAGA, INC.

April 13, 2000

Genevieve Salmonson, Director
Office of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Ms. Salmonson:

Thank you for your April 7, 2000 letter providing comments on the subject project. On behalf of the County of Maui, Department of Public Works and Waste Management, we would like to note that photographs and a description of the existing shoreline character (where work is proposed), will be included in the subject's Final Environmental Assessment, as well as a discussion of any shoreline impacts and appropriate mitigative measures.

Thank you again for providing us with your comments.

Sincerely,

Glenn Tadaki, Planner

GT:to
cc: Joe Krueger, Dept. of Public Works and Waste Management
Kent Morimoto and Ken Kurokawa, Austin, Tsutsumi & Associates, Inc.
Colleen Suyama, Dept. of Planning
sta/hpilroad/oeqcltr.002

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

BENJAMIN J. CAYETANO
GOVERNOR

RAYMOND H. SATO
~~EUGENE S. HEU~~
COMPTROLLER

FILE NO. _____

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

00 APR 18 P12:49

DEPT
RECEIVED

April 17, 2000

MEMORANDUM

TO: Mr. John E. Min, Planning Director
Maui County Planning Department

ATTN.: Ms. Colleen Suyama, Staff Planner

FROM: Randall M. Hashimoto, State Land Surveyor

SUBJECT: I.D. No. SM1 2000/0008, SSV 2000/0001
TMK: 4-3-003, 4-3-005, 4-3-010, 4-3-015, 5-3-005:027,
4-3-010:por. 009
Project Name: L. Honoapiilani Roadway Improvements
Applicant: Charles Jencks, Department of Public works
and Waste Management

The subject proposal has been reviewed and confirmed that no Government Survey Triangulation Stations and Benchmarks are affected. Survey has no objections to the proposed project.

Randall M. Hashimoto

RANDALL M. HASHIMOTO
State Land Surveyor

APR 2 6 2000

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

REPLY TO
ATTENTION OF

April 21, 2000

Civil Works Technical Branch

'00 APR 24 P1:29

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

Ms. Colleen Suyama, Staff Planner
County of Maui
Department of Planning
250 South High Street
Wailuku, Maui, Hawaii 96793

Dear Ms. Suyama:

Thank you for the opportunity to review and comment on the Special Management Area Application and Draft Environmental Assessment (DEA) for the Lower Honoapiilani Roadway Improvements Project, Maui (TMKs 4-3-3, 4-3-5, 4-3-10, 4-3-15, 4-3-5: 27, and 4-3-10:P por. 9). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Our Regulatory Branch staff is currently reviewing the document for DA permit requirements and will provide their response under separate cover.

b. The flood hazard information provided on pages 15 and 16 of the DEA is correct.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MAY 1 1 2000

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

'00 MAY -4 P12:43

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

April 25, 2000

Mr. John E. Min, Director
Department of Planning - Maui
250 South High Street
Wailuku, Hawaii 96793

LOG NO: 25295
DOC NO: 0004CD19

Dear Mr. Min,

SUBJECT: **National Historic Preservation Act Section 106 Review and Chapter 6E-8 Historic Preservation Review of an Application for Special Management Area Use Permit and Shoreline Setback Variance for the Proposed Lower Honoapi'ilani Road Improvements (Ho'ohui Road to Napilihau Street) (Subject ID: SM1 2000/0008, SSV 2000/0001)**
Alaeloa, Mailepai, and Kahana Ahupua'a, Lahaina District, Island of Maui
TMK: 4-3-03, 4-3-05, 4-3-10, 4-3-15, 4-3-05:027, 4-3-10:009 por

Thank you for the opportunity to comment on your submittal of March 20, 2000.

Xamanek Researches recently completed an archaeological inventory survey of the proposed project area. The report [Fredericksen and Fredericksen 1999] documenting the results of this survey was submitted to our office. We reviewed the report, but have not accepted it as it needs revisions [SHPD DOC NO: 0002RC30/SHPD LOG NO: 24955]. It is our understanding that test excavations are being done for this project, and will be incorporated in the report revisions. Until the revised report is submitted and is acceptable, we are unable to advise your agency whether this project will adversely effect a significant historic site in the project area, and if it will, what appropriate mitigation measures might be.

Therefore, we recommend that no decision be made on this application until an acceptable inventory survey report is available and we are able to advise your agency on sites present and any needed mitigation conditions.

Please call Cathleen Dagher at 692-8023 if you have any questions.

Aloha,

Timothy E. Johns
State Historic Preservation Officer

CD:jen

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

00 MAY 10 P1:56

May 4, 2000

99-136A/epo

Mr. John E. Min, Director
Planning Department
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Special Management Area (SM1 2000/0008) and Shoreline Setback Variance (2000/0001) Applications
Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)
Napili, Maui
TMK: 4-3-03

Thank you for allowing us to review and comment on the subject permit application. We have the following comments to offer:

Control of Fugitive Dust

There is a significant potential for fugitive dust emissions during the construction activities. It is suggested that a dust control management plan be developed which identifies and addresses activities having a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of construction is necessary.

Construction activities must comply with the provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at 586-4200.

Sincerely,

GARY GILL
Deputy Director for
Environmental Health

c: MDHO
CAB

MUNEKIYO, ARAKAWA & HIRAGA, INC.

June 5, 2000

Gary Gill, Deputy Director
for Environmental Health
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Thank you for your letter of May 4, 2000 providing comments on the proposed project. On behalf of the County of Maui, Department of Public Works and Waste Management, we would like to note that construction plans for the project, as well as the grading plan and the erosion control report, will include measures for minimizing fugitive dust emissions during construction activities. The contractor will be required to implement dust control measures in accordance with Department of Health requirements.

Thank you for providing us with your comments.

Sincerely,

Glenn Tadaki, Planner

GT:to

cc: Joe Krueger, Department of Public Works and Waste Management
Kent Morimoto & Ken Kurokawa, Austin, Tsutsumi & Associates, Inc.
Colleen Suyama, Department of Planning

sta/hpllroad/dohltr.002

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

'00 MAY -9 A9:29

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

May 4, 2000

LD-NAV

Ref.: SM12000002.RCM

Honorable John E. Min
Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

SUBJECT: Lower Honoapiilani Roadway Improvements Maui, Hawaii
I.D. SM1 2000/0008, SSV 2000/0002 TMK: 4-3-3 Various

Thank you for the opportunity to review the subject matter.

Copies of the subject informational material were submitted to our appropriate divisions for their review and comment on the proposed project. Attach herewith is a copy of our Commission on Water Resource Management and Land Division Planning and Technical Services and Engineering Branch comments.

The Department has no other comment to offer on the subject matter. Should you have any questions, please feel free to contact Nicholas Vaccaro of the Land Division Support Services Branch at 808-587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

C: Maui District Land Office

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

TIMOTHY E JOHNS
CHAIRPERSON

BRUCE S ANDERSON
ROBERT G GIRALD
BRIAN C NISHIDA
DAVID A NOBRIGA
HERBERT M RICHARDS, JR

LINNEL T NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

April 25, 2000

APR 28 2 23 PM '00

TO: Mr. Dean Uchida, Administrator
Land Division

FROM: Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Lower Honoapiilani Road (Napili) Improvements SMA

FILE NO.: SM120000002.COM

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[ ] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We recommend that no development take place affecting highly erodible slopes which drain into streams within or adjacent to the project.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[X] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[ ] OTHER:

If there are any questions, please contact Charley Ice at 587-0251.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

March 31, 2000

LD/NAV
Ref.: SM120000002.COM

Suspense Date: 04/13/00

MEMORANDUM:

TO:
- Division of Aquatic Resources
- XXX Division of Forestry & Wildlife
- Division of State Parks
- Division of Boating and Ocean Recreation
- OOO Historic Preservation Division (Received Directly)
- XXX Commission on Water Resource Management

Land Division Branches of:
- XXX Planning and Technical Services
- XXX Engineering Branch
- XXX Maui District Office

FROM: Dean Y. Uchida, Administrator
Land Division

SUBJECT: Lower Honoapiilani Roadway Improvements
I.D. SM1 2000/0008, SSV 2000/0002
TMK: 4-3-003 Various - Maui, Hawaii

Please review the following:

Application for Special Area Management Use Permit

and submit your comments (if any) on Division letterhead within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Signed: Andrew M. Monden
ANDREW M. MONDEN, CHIEF ENGINEER

Date: 4/10/00

DLNR-LAND DIVISON
ENGINEERING BRANCH

LD/NAV
Ref.: SM12000000.COM

COMMENTS

Our current projects and programs are not affected by the proposed project.

We confirm that the project site, according to FEMA Community Panel Numbers 150003 0138 C and 15003 0151 C is located in the following Zones:

1. Zone A4 & A5 - areas of 100-year flood; base flood elevations and flood hazards factors are determined;
2. Zone V24 – areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazards factors are determined.
3. Zone C – areas of minimal flooding

The proposed improvements must comply with rules and regulations of the National Flood Insurance Program (NFIP) and all applicable County Flood Ordinances. If there are questions regarding the NFIP, please contact the State Coordinator, Sterling Yong, of the Department of Land and Natural Resources at 587-0248. If there are questions regarding flood ordinances, please contact the applicable County representative.

M:\WLD\MAKAI\SUZIE\MAUI\honopiiM34.DOC

RECEIVED

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

2000 MAR 31 P 1:55

COMMISSION ON WATER
RESOURCE MANAGEMENT

March 31, 2000

LD/NAV
Ref.: SM120000002.COM

Suspense Date: 04/13/00

MEMORANDUM:

TO:
- Division of Aquatic Resources
- XXX Division of Forestry & Wildlife
- Division of State Parks
- Division of Boating and Ocean Recreation
- OOO Historic Preservation Division (Received Directly)
- XXX Commission on Water Resource Management

Land Division Branches of:
- XXX Planning and Technical Services
- XXX Engineering Branch
- XXX Maui District Office

FROM: Dean Y. Uchida, Administrator
Land Division

SUBJECT: Lower Honoapiilani Roadway Improvements
I.D. SM1 2000/0008, SSV 2000/0002
TMK: 4-3-003 Various - Maui, Hawaii

Please review the following:

Application for Special Area Management Use Permit

and submit your comments (if any) on Division letterhead within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

( ) Comments attached.

Signed:

Date:

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Planning and Technical Services Branch
Honolulu, Hawaii

Monday, April 10, 2000

Ref.:PB:EAH SM120000002.COM

MEMORANDUM

TO: Nick Vacarro, Land Agent

THROUGH: Sam Lemmo, Supervising Planner

FROM: Eric Hill, Planner

SUBJECT: Request for Comments – Lower Honoapiilani Roadway Improvements Environmental Assessment

Thank you for the opportunity to comment on the Subject EA. It appears from the Shoreline Setback Variance section beginning on page 53 and the Photographic Analysis that the proposed improvements may impact natural shoreline processes. In order to protect natural process at the shoreline, it might be useful to photograph, locate on a map, describe and propose mitigation measures for any direct or indirect project impacts on shoreline processes mauka or makai of any certified shorelines.

MUNEKIYO, ARAKAWA & HIRAGA, INC.

June 29, 2000

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

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street)

Dear Mr. Uchida:

Thank you for your May 4, 2000 letter providing comments on the proposed project. On behalf of the Department of Public Works and Waste Management, we would like to note the following:

An application for a Stream Channel Alteration Permit for the improvements to the Kahananui Bridge will be prepared and submitted to the department for review and approval. In addition, the Final Environmental Assessment (EA) will include a coastal engineering study and will examine potential impacts to shoreline areas as well as recommend appropriate mitigative measures. The proposed project will also comply with applicable provisions of the National Flood Insurance Program as well as the County flood hazard area ordinance.

Thank you again for providing us with your comments.

Very truly yours,

Glenn Tadaki, Planner

GT:cc

cc: Joe Krueger, Dept. of Public Works and Waste Management (via mail)
Kent Morimoto & Ken Kurokawa, Austin, Tsutsumi & Associates (via mail)
Scott Sullivan, Sea Engineering, Inc. (via mail)
Colleen Suyama, Department of Planning (via mail)

ata\hpuroad\dlrltr.002

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

23

University of Hawaii Sea Grant Extension Service
Maui Community College
310 Kaahumanu Avenue
Kahului, HI 96732

'00 MAY 12 P1:01

May 11, 2000

RECEIVED

County of Maui
Dept. of Planning
250 S. High Street
Wailuku, HI 96793
via facsimile 270-7634
attn: Colleen Suyama, Staff Planner

Dear Ms. Suyama:

RE: SMA Permit Use and SSV for Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)

Thank you for the opportunity to comment on the SMA application and SSV for the road improvements from Hoohui Road to Napilihau Street. Although improving road safety and providing bikeways and sidewalks have obvious benefits to the community, such improvements in the vicinity of the shoreline do have environmental impacts and must be planned to avoid or minimize these impacts.

The subject application mentions that two existing road segments require work in the shoreline setback area, but provides no sketch of how improvements will be modified to minimize potential impacts. It also does not address the coastal erosion hazard along these two segments. Much of the Kahana – Napili shoreline has a history of long-term shoreline retreat, so it may be unsafe to expand the existing roadway in the seaward direction. Aerial photographs of the subject area would have been helpful to provide a better sense of the existing conditions.

Furthermore, several people use the unimproved road shoulders for shoreline access parking. Expansion of the roadway would limit—and in some cases, eliminate—the amount of available parking for shoreline access. This important impact and how it relates to CZM policy was overlooked in the application.

Finally, widening the coastal road will increase the amount of impermeable surface and will lead to increased runoff. This increased runoff is a negative impact that was not discussed. Increased runoff may reduce nearshore water quality and may harm coastal ecosystems as well as degrade recreational use (diving, fishing, surfing, etc.) of this area. The application does list best management practices to reduce nearshore water quality

impacts during construction, but does not describe the remaining impacts of increased impermeable surface area once the project is complete. "Proper disposal" of runoff from the widened roadway may be "proper" from a flood control point of view, but may not be "proper" from a coastal ecosystems point of view.

Per our discussion, I will schedule a site visit with Mr. Joe Krueger, so that we can examine the two aforementioned erosion hotspots and discuss other issues brought up in this letter. I hope this information is helpful. If you wish to discuss the contents with me further, please contact me by phone at 984-3254. Thank you.

Sincerely,

R+A Mullane

Robert A. Mullane
Coastal Processes Extension Agent

cc. John Min, Maui County Planning Dept.
Charles Jencks, Maui County Public Works Dept.
Joe Krueger, Maui County Public Works Dept. fx. 270-7975

MUNEKIYO, ARAKAWA & HIRAGA, INC.

July 14, 2000

Rob Mullane, Coastal Processes
Extension Agent
University of Hawaii, Sea Grant
Extension Service
Maui Community College
310 Kaahumanu Avenue
Kahului, Hawaii 96793

SUBJECT: Lower Honoapiilani Road Improvements
(Hoohui Road to Napilihau Street); STP 3080 (8)

Dear Mr. Mullane:

Thank you for your May 11, 2000 letter providing comments on the proposed project. On behalf of the Department of Public Works and Waste Management, we would like to note the following.

The Final Environmental Assessment (EA) will include a coastal engineering study which will examine potential impacts to coastal processes, marine life, and nearshore water quality, as well as recommend appropriate mitigative measures.

As noted in the Draft EA, Lower Honoapiilani Road traverses the project corridor for a distance of 1.4 miles. Shoreline Segment Nos. 1 and 2 border the coastline for a distance of about 230 ft. and 680 ft., respectively. Within the shoreline segments, the right-of-way for the project is severely constrained due to existing space and topographical conditions such as the limited amount of land area along the mauka right-of-way due to existing single-family residences and the very limited amount of space available along the makai right-of-way due to the existing banks bordering the roadway along the shoreline. The bank along Shoreline Segment No. 1 ranges in height from about 4 to 12 ft., while the bank along Shoreline Segment No. 2 averages approximately 14 ft. in height.

As indicated in your letter, several people use the existing unimproved shoulders along Shoreline Segment Nos. 1 and 2 for shoreline access parking. While parking along these shoreline segments would be affected by the installation of guard rails along the makai side of the roadway, the guard rails are necessary from a public safety standpoint, as they will prevent vehicles from veering off Lower Honoapiilani Road and falling onto

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahina@aloha.net

the sandy and rocky coastline which lies at the base of the banks bordering the roadway.

With regard to your comments concerning surface runoff due to the additional amount of impermeable surface area, please refer to the attached memorandum from the project's civil engineer.

Your interest in and comments on this project are very much appreciated. Should you have any questions, please do not hesitate to call.

Very truly yours,

Glenn Tadaki, Planner

GT:to
Attachments
cc: Joe Krueger, Department of Public Works and Waste Management
Kent Morimoto & Ken Kurokawa, Austin, Tsutsumi & Associates, Inc.
Scott Sullivan, Sea Engineering, Inc.
Colleen Suyama, Planning Department
sta/hpllroad/seagrant.ltr

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1834

TED S. KAWAHIGASHI, P.E., FACEC
KENNETH K. KUROKAWA, P.E.
DONOHUE M. FUJII, P.E.
STANLEY T. WATANABE
TERRANCE S. ARASHIRO, P.E.
MERNA S. KIDE

July 10, 2000

MEMORANDUM

To: Glenn Tadaki
Munekiyo, Arakawa & Hiraga, Inc.

From: Kent Morimoto
Austin, Tsutsumi & Associates, Inc.

Subject: Lower Honoapiilani Road Improvements - STP 3080(8)
(Hoohui Road to Napilihau Street)

With regard to the above-referenced project, the following surface runoff data is provided in response to your request.

The proposed project will increase the amount of impermeable surface area by approximately 2.8 acres. An analysis of existing drainage conditions within the project corridor reveals that the existing pre-development runoff is about 74 cubic feet per second (cfs). With the implementation of the proposed project, the post-development runoff is estimated to be approximately 84 cfs. The incremental increase of 10 cfs due to the additional impermeable surface area is considered minimal and is not anticipated to adversely affect downstream or adjoining properties.

The coastal engineering study that is being prepared for the Final Environmental Assessment will examine the effects of the project's runoff on nearshore waters as well as recommend appropriate mitigative measures.

Please call me should you have any questions regarding this memorandum.

Kent Morimoto

Kent Morimoto, P.E.
Project Manager

KM:sys

Z:\home\everyone\1998\98-545\Ltr Honoa.doc

REPLY TO:
801 BUMMER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE (808) 533-3646 • FAX (808) 526-1267 • EMAIL: atsm@pacific.net

OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII

BENJAMIN J. CAYETANO
GOVERNOR

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

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:

HWY-PS
2.8731

Mr. John E. Min
Director
Planning Department
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Special Management Area, SM1 2000/0008, Shoreline Setback Variance, SSV 2000/0001, Lower Honoapiilani Roadway Improvements, Lahaina District, Maui, TMK: 4-3-3; 4-3-5; 4-3-10; 4-3-15; 4-3-5: 27; 4-3-10: por. 9

Thank you for requesting our review of the Special Management Area and Shoreline Setback Variance applications for improvements to Lower Honoapiilani Road, a road under County jurisdiction and control.

We support the proposed improvements to Lower Honoapiilani Road and request that the County continue to coordinate the improvement work with Sean Hiraoka of our Highway Design Section, Highways Division, at (808) 692-7581, to assure compliance with Federal requirements.

If there are any questions regarding these comments, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at (808) 587-1830.

Very truly yours,

for KAZU HAYASHIDA
Director of Transportation

JUL 2 0 2000

JAMES "KIMO" APANA
MAYOR

CLAYTON T. ISHIKAWA
CHIEF

FRANK E. FERNANDEZ, JR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 270-7561
FAX (808) 270-7919

00 JUL 19 P2:45

July 18, 2000

Miss. Colleen Suyama
Staff Planner
Department of Planning
County of Maui
250 S. High Street
Wailuku, Hi. 96793

Subject: I.D. SM1 2000/0008, SSV 2000/0001
TMK: 4-3-003, 4-3-005, 4-3-010, 4-3-005:027, 4-3-010:009 (por. of)
Project Name: L. Honoapiilani Roadway Improvements

Dear Miss. Suyama:

Thank you for the opportunity to review and comment of the subject application. At this time the Fire Prevention Bureau would request that the contractor to inform Lahaina and Napili Fire Station of any temporary road closing or any water supply for fire protection that maybe shut down.

If you have any questions, please call me at 243-7122.

Sincerely,

Scott English
Fire Plans Examiner

UNIVERSITY OF HAWAI'I

Sea Grant Extension Service
Maui Community College
January 5, ~~2001~~ 2001

County of Maui
Dept. of Planning
250 S. High Street
Wailuku, HI 96793
via facsimile 270-7634
attn: Colleen Suyama, Staff Planner

Dear Ms. Suyama:

RE: SMA and SSV for Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street)

This is a follow-up of my letter of May 11, 2000 regarding the road widening. Most of the issues that I brought up in that letter have been satisfied by the supplementary report prepared by Sea Engineering and a site visit with the applicant's consultants on October 25, 2000.

One concern I still have is the impact of a new drainage outlet on the beach, particularly with respect to scouring during heavy rains. Drainage Outlet #2 will be a new outlet that will empty out onto the backbeach area of a relatively pristine sandy beach. Adequate scour protection of the immediate area of the outlet should be required to minimize erosion to the backbeach area and fronting beach during heavy flow. A condition requiring restoration of damaged dune and beach areas may also better insure that any impacts to the beach attributed to the drainage outlet will be mitigated.

Thank you for the opportunity to comment on this application.

Sincerely,

R + A Mullane

Robert A. Mullane
Coastal Processes Extension Agent

cc. Glenn Tadaki; Munekiyo, Arakawa, and Hiraga

Community Outreach and Technology Transfer for Maui County and the U.S.–Affiliated Pacific Islands
310 Ka'ahumanu Avenue • Kahului, Maui, HI 96732 • Telephone: (808) 242-1254 • Facsimile: (808) 984-3261
E-Mail: rmullane@soest.hawaii.edu

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

May 10, 2001

Mr. Erik Fredericksen
Xamanek Researches
P.O. Box 880131
Pukalani, Maui, Hawai'i 96788

LOG NO: 27459
DOC NO: 0105MK02

Dear Mr. Fredericksen,

SUBJECT: Review of Additional Archaeological Inventory Level Work for Site 50-50-03-4797 Lower Honoapi'ilani Road Improvements Project Corridor
Alaeloa, Mailepai and Kahana Ahupua'a, Lahaina District, Maui
TMK 4-3-15

Thank you for the opportunity to review this report which our staff received on April 16, 2001 (Fredericksen and Fredericksen, *Additional Archaeological Inventory Level Work for Site 50-50-03-4797, Lower Honoapi'ilani Road Improvements Project Corridor, Alaeloa, Mailepai and Kahana Ahupua'a, Lahaina District, Maui, TMK 4-3-15*)...Xamanek ms.

The original archaeological inventory survey report acceptably established the ahupua'a settlement pattern. Three historic properties were documented in the original draft report, Sites 4798 and 4799, both walls associated with Lower Honoapi'ilani Road, and Site 4797, a precontact habitation area. Our office indicated that additional subsurface testing was needed to examine Site 4797. This report summarizes the findings of the additional work. One minor comment; on page 15, Summary and Conclusions, paragraph 1 the site is misnumbered in one instance "4794."

The subsurface survey was limited to areas in which sufficient shoulder was available. Access continued to be difficult, and the majority of the testing was contained within the County of Maui right of way. The subsurface inventory succeeded in documenting the estimated extent of the habitation deposit.

We agree with the significance assessments that Sites 4797 is still significant under multiple criteria of the Hawaii Register of Historic Places (A, C, D).

We agree that there is more data to be gained from additional research at the site, prior to road construction. Rather than mitigate with "additional inventory testing", we recommend archaeological data recovery of the site take place prior to actual road construction. This is

basically an issue of semantics, the mitigation goal is the same, to further document the cultural deposit and associated features. We await the data recovery plan which may be relatively simple in nature.

We find this report to be acceptable.

As always, if you disagree with our comments or have questions, please contact Dr. Melissa Kirkendall (Maui/Lana'i SHPD 243-5169) as soon as possible to resolve these concerns.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

MK:jen

c: John Min, Director, Department of Planning, County of Maui, FAX 270-7634
Bert Ratte, County of Maui, Land Use and Codes, FAX 270-7972
Glen Ueno, County of Maui, Land Use and Codes, FAX 270-7972

MUNEKIYO & HIRAGA, INC.

December 28, 2001

Don Hibbard, Administrator
State Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

SUBJECT: Lower Honoapiilani Road Improvements (Hoohui Road to Napilihau Street); Project No. STP 3080 (8)

Dear Mr. Hibbard:

Thank you for your May 10, 2001 letter providing comments on the Additional Archaeological Inventory Level Work for Site 4797 that was prepared for the project by Xamenek Researches.

On behalf of the County of Maui, Department of Public Works and Waste Management, we would like to note that a data recovery plan for Site 4797 will be submitted to the State Historic Preservation Division for review and approval prior to the commencement of data recovery for the site.

Thank you again for providing us with your comments.

Very truly yours,

Glenn Tadaki, Planner

GT:lfm
cc: Joe Krueger, Dept. of Public Works and Waste Management
Kent Morimoto, Austin, Tsutsumi & Associates, Inc.
Ken Kurokawa, Austin, Tsutsumi & Associates, Inc.
Eric Fredericksen, Xamanek Researches
Colleen Suyama, Department of Planning
ala\hpllroad\shpdltr 002

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

Chapter XII

Letters Received During the Agency Review Period for the Modifications to the Proposed Project and Responses to Substantive Comments

XII. LETTERS RECEIVED DURING THE AGENCY REVIEW PERIOD FOR THE MODIFICATION TO THE PROPOSED PROJECT AND RESPONSES TO SUBSTANTIVE COMMENTS

In connection with the processing of the project's SMA Use Permit application and Shoreline Setback Variance request, the Maui County Planning Department indicated that information regarding the modifications to the proposed project should be sent to the U.S. Army Corps of Engineers, the State Department of Health, the State Historic Preservation Division, and the State Department of Land and Natural Resources for review and comment. Letters received during this review process, as well as responses to substantive comments are included in this section.

MAR 28 2002

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

REPLY TO
ATTENTION OF

March 27, 2002

Regulatory Branch

Mr. Glen Tadaki, Planner
Munikiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

This letter responds to your request for comments concerning the minor changes to elements of the Lower Honoapiilani Road Improvement project, dated March 20, 2002. I concur with your determination that Department of the Army (DA) authorization will be required for the work on Drainage Outlet No.1 and Kahananui Bridge. DA authorization will not be required for the work on the two existing drainage outlets along Shoreline Segment No. 2, Drainage Outlet No. 2 or Drainage Outlet No. 5.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 990000411.

Sincerely,

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

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

APR 10 2002

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P O BOX 621
HONOLULU, HAWAII 96809

APR - 9 2002

Mr. Glenn Tadaki, Planner
Munekiyo Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

Thank you for your letter dated March 20, 2002, requesting additional comments to the Draft Environmental Assessment for the Lower Honoapiilani Road Improvements. Your letter properly acknowledges the need for a stream channel alteration permit for the proposed Kahananui Bridge modifications. We have no additional comments to offer.

If you have any questions regarding this letter, please call David Higa at 587-0249 or toll-free at 984-2400, extension 70249.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

DH:sd

G:\WORK\REGULATE TEMP MunekiyoHoopiilani.docrev.doc

APR 17 2002

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to
File

02-074/cpo

April 12, 2002

Mr. Glenn Tadaki, Planner
Munekiyo & Hiraga, Inc..
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

Subject: Comments on Changes to Applications for Special Management Area (SMA) Use Permit, Shoreline Setback Variance, & Draft Environmental Assessment (DEA) for Lower Honoapiilani Road Improvements.
Tax Map Key: 4-3-03; 4-3-05; 4-3-10; 4-3-15

Thank you for the opportunity to review and comment on the proposed changes. The proposal was routed to the various branches of the Environmental Health Administration. We have the following comments.

Wastewater Branch (WWB)

As the County's wastewater collection and transmission system and the Lahaina Wastewater Reclamation Facility (LWRF) accommodate the region's wastewater needs, we have no objections to the subject project.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We reserve the right to review the detailed wastewater plans for conformance to applicable rules.

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

Clean Air Branch (CAB)

There is significant potential for fugitive dust emissions during the construction activities. It is recommended that a dust control management plan be developed which identifies and addresses activities that have a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of development and construction activities of the project is required.

Control of Fugitive Dust:

Due to the nature of the project, there is a significant potential for fugitive dust to be generated during the removal of debris and during the grading, trenching, and construction activities that would impact thoroughfares and residents. It is recommended that a dust control management plan be developed which identifies and addresses those activities that have a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of the project is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, §11-60.1-33, on Fugitive Dust. The contractor must provide adequate means to control dust from all construction activities including but not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing material transfer points and on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start-up of construction activities.

b. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase.

d. Controlling of dust from shoulders, project entrances, and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to start-up of construction activities; and

f. Controlling of dust from debris being hauled away from the project site.

Noise, Radiation and Indoor Air Quality (NRIAQ) Branch

All project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46, on Community Noise Control.

If you have any questions, please contact the Noise, Radiation and Indoor Air Quality Branch at (808) 586-4701.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: WWB
CAB
NRIAQ

MUNEKIYO HIRAGA, INC.

April 23, 2002

Gary Gill, Deputy Director
Environmental Health Administration
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

SUBJECT: Lower Honoapiilani Road Improvements - STP 3080(8)
(Hoohui Road to Napilihau Street)

Dear Mr. Gill:

Thank you for your letter of April 12, 2002 providing comments on the modifications to the proposed project. On behalf of the County of Maui, Department of Public Works and Waste Management, we would like to note the following.

The department's comments concerning compliance with Chapter 11-62, "Wastewater Systems", Chapter 11-60.1-33 "Fugitive Dust" and Chapter 11-46 "Community Noise Control" are duly noted. In addition, BMPs will be implemented by the contractor to control dust and soil erosion within all the construction work areas. The contractor shall obtain all the required Federal, State, and County permits prior to commencing with any construction activities within the project limits.

Thank you for providing us with your comments.

Very truly yours,

Glenn Tadaki, Planner

GT:yp
cc: Joe Krueger, Department of Public Works and Waste Management
Kent Morimoto & Ken Kurokawa, Austin & Tsutsumi & Associates
Colleen Suyama, Department of Planning
ais Fdwread dohltr 001

APR 2 6 2002

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

April 24, 2002

LD-NAV
L-2046/2043/1967/1941
SM1200000002.RCM2

Munekiyo and Hiraga, Inc.
Glenn Tadaki, Planner
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT: Review: Modification to the Lower Honoapiilani Roadway Improvement Project - Hoohui Road to Napilihau Street, Maui, Hawaii - TMK: 2nd/ 4-3-003 Various
I.D. Nos. SM1 2000/0008, SSV 2000/0002 and STP 3080 (8)

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

A copy of your letter dated March 20, 2002 and exhibits covering the subject matter were distributed to the following Department of Land and Natural Resources' Divisions for their review and comment.

- Division of Forestry and Wildlife
- Commission on Water Resource Management
- Land Division Planning and Technical Services
- Land Division Engineering Branch
- Land Division Maui District Land Office

Attached herewith is a copy of the Land Division Engineering Branch and Maui District Land Office comment.

The Department of Land and Natural Resources has no other comment to offer on the subject matter at this time.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at (808) 587-0438.

Very truly yours,

for DIERDRE S. MAMIYA
Administrator

C: Maui District Land Office

Department of Land & Natural
Resources
Land Division
54 S. High Street, Room 101
Wailuku, HI 96793

facsimile transmittal

To:	Nick Vaccaro	Fax:	587-0455
From:	Jason K. Koga	Date:	4/4/02
Re:	Comments for Modifications to the Lower Honoapiilani Roadway Improvement Project	Pages:	3
CC:			

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

March 28, 2002

LD/NAV
Ref.: SM120000002.COM2

Suspense Date: 4/4/02

MEMORANDUM:

TO:
- Division of Aquatic Resources
- XXX Division of Forestry & Wildlife
- Division of State Parks
- Division of Boating and Ocean Recreation
- Historic Preservation Division
- XXX Commission on Water Resource Management

Land Division Branches of:

- XXX Planning and Technical Services
- XXX Engineering Branch
- XXX Maui District Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT: Modifications to the Lower Honoapiilani Roadway Improvement Project - Hoohui Road to Napilihau Street
I.D. SM1 2000/0008, SSV 2000/0002 and STP 3080(8)
TMK: 4-3-003 Various - Maui, Hawaii

Please review the attached project summary covering changes to the "Lower Honoapiilani Road Improvement Project" and submit your comments (if any) on Division letterhead signed and dated within the time requested above.

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

(✓) Comments attached.

Signed: John K. Kyn

Date: 4/4/02

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
54 South High Street, Room 101
Wailuku, Hawaii 96793-2198

April 4, 2002

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

MEMORANDUM

TO: Dierdre S. Mamiya, Administrator
Land Division

FROM: Jason Koga
District Land Agent

SUBJECT: Modifications to the Lower Honoapiilani Roadway Improvement Project – Hoohui Road to Napilihau Street, I.D. SM1 2000/0008, SSV 2000/0002 and STP 3080(8), TMK: 4-3-003 Various – Maui, Hawaii

The County's project includes the replacement of the Kahananui Bridge together with the relocation of existing water and sewer lines within the stream, necessitating a Stream Channel Alteration Permit from the DLNR- Commission on Water Resources Management. The existing concrete slab in the stream underlying the existing bridge will remain and be extended in all directions to match the limits of the reconstructed bridge.

This office requested the assistance of the DLNR, Engineering Branch to secure proper permits to do channel cleaning, stream mouth opening, or permanent work such as filling the channel with boulders to eliminate standing water which accumulates in a caldron immediately makai of the concrete slab below the bridge. An effort by our Engineering Branch to coordinate a permanent solution to the stagnating water problem with the County may be appropriate.

The Maui District Land Office has no further comments. Thank you for allowing us to review and comment on the subject matter.

c: Central Files
District Files

RECEIVED
LAND DIVISION

2002 APR -9 A 8:28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

March 28, 2002

LD/NAV
Ref.: SM120000002.COM2

Suspense Date: 4/4/02

MEMORANDUM:

TO:
- Division of Aquatic Resources
- XXX Division of Forestry & Wildlife
- Division of State Parks
- Division of Boating and Ocean Recreation
- Historic Preservation Division
- XXX Commission on Water Resource Management

Land Division Branches of:
- XXX Planning and Technical Services
- XXX Engineering Branch
- XXX Maui District Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT: Modifications to the Lower Honoapiilani Roadway Improvement Project - Hoohui Road to Napilihau Street
I.D. SM1 2000/0008, SSV 2000/0002 and STP 3080(8)
TMK: 4-3-003 Various - Maui, Hawaii

Please review the attached project summary covering changes to the "Lower Honoapiilani Road Improvement Project" and submit your comments (if any) on Division letterhead signed and dated within the time requested above.

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Signed:

Date:

APR 01 0855 WATER & LAND

DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Engineering Branch

COMMENTS:

In addition to our previous comments, we offer the following suggestions for the proposed demolition and reconstruction of Kahananui Bridge and its related improvements:

1. The proposed construction work should be done according to all applicable County Flood Ordinances, related to work within a flood zone.

2. If utilities (sewer, gas, water, etc.) are to be suspended along the bridge structure, they should be located and constructed to minimize flood damage, leakage and prevent snagging of debris.

3. A scour analysis should be conducted to ensure that the design of the structure will minimize erosion at the foundation. If the channel opening at the structure is widened, evaluate downstream reaches to provide for adequate capacity and erosion.

4. The proposed bridge should not impede the storm water carrying capacity of the body of water it crosses.

5. When a single span structure replaces a multi-span structure, the pier footings along with the pier columns should be removed (at least to the finished grade) to prevent the trapping of debris.

Signed: Andrew M. Monden
ANDREW M. MONDEN, Chief Engineer

Date: 4/5/02

MUNEKIYO HIRAGA, INC.

July 22, 2002

Dierdre S. Mamiya, Administrator
Land Division
Department of Land and
Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Lower Honoapiilani Road Improvements, STP-3080(8)
(Hoohui Road to Napilihau Street)

Dear Ms. Mamiya:

Thank you for your April 24, 2002 letter providing the Engineering Branch's comments on the modifications to the proposed project. On behalf of the Department of Public Works and Waste Management (DPWWM), we would like to note the following.

1. Construction work for the project will comply with applicable flood hazard area development standards.

2. Utilities will not be suspended from the reconstructed bridge. Utilities will be installed in the stream channel beneath the proposed GRP improvements related to the new bridge structure.

3. To minimize erosion at the foundation, a scour analysis has been conducted in connection with work to determine the limits of the proposed GRP apron and GRP side slope/top bank protection. The proposed bridge structure has been designed to provide adequate capacity, as well as minimize flood and erosion hazards.

4. The proposed bridge structure will not impede the stormwater carrying capacity of Kahana Stream at its point of crossing.

5. The existing Kahananui Bridge is a single-span structure. Accordingly, work for the new single span bridge structure will not require the removal of pier footings and pier columns. To prevent the trapping of debris, the finish grade of the proposed concrete slab extension and GRP improvements within the stream channel will match the surrounding existing grades.

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

Thank you again for providing us with your comments.

Very truly yours,

Glenn Tadaki, Planner

GT:tn
cc: Joe Krueger, Department of Public Works and Waste Management
Kent Morimoto, Austin Tsutsumi & Associates
Colleen Suyama, Department of Planning
ata/hpwroad/dlnrltr 003

MAY 13 2002 C

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTIES
ERIC T. HIRANO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

May 8, 2002

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

LOG NO: 29835 ✓
DOC NO: 0204CD49

Dear Mr. Tadaki,

SUBJECT: **National Historic Preservation Act Section 106 Review Pertaining to an Information Request for the Proposed Lower Honoapi'ilani Highway Improvements – STP 3080(8) (Ho'ohui Road to Napilihau Street) Kahana Ahupua'a, Lahaina District, Island of Maui**
TMK: (2) 4-3

Thank you for the opportunity to provide comments pertaining to the information request for the proposed Lower Honoapi'ilani Highway Improvements (Ho'ohui Road to Napilihau Street), which was received by this office March 28, 2002. Our review is based on reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was conducted of the subject property.

Based on the submitted information request, we understand that there have been some minor changes to elements of the proposed undertaking since the Draft Environmental Assessment (DEA) was published. These changes include:

1) Changes in design to Drainage Outlet No. 1. Located to the south of Poailani Condominium's makai complex (TMK: 4-3-005:027) and a drainage easement within an adjoining portion of TMK: 4-3-010:009. The design of Drainage Outlet No. 1 has been modified to provide a rip-rap boulder apron and rip-rap boulder slope protection improvements in lieu of the GRP apron and CRM wingwalls that were initially proposed. A four-foot high chain link fence along the headwall and the northern protection slopes has been added. The proposed repair work is expected to involve work below the high, high tide elevation and makai of the certified shoreline.
2) Repair of two existing drainage outlets alone Shoreline Segment No. 2. Repairs to the headwall of the existing 24-inch drainage outlet near the Shoreline Segment No. 2. In addition, repairs to an existing 54-inch drainage outlet are proposed. Repairs for this outlet, located approximately 300 feet to the north of Drainage outlet No. 3, includes in-kind replacement of the existing 54-inch culvert crossing Lower Honoapi'ilani Highway. Additional repairs will include re-construction of a CRM headwall and a portion of the GRP apron at the drainage inlet on the mauka side of the road. The repair work for the existing Drainage Outlet Nos. 3 and 4 will occur at their present locations. The discharge points for runoff from these outlets will remain unchanged. The repair of these existing outlets is expected to occur mauka of the certified shoreline.

3) Changes in the design for new Drainage Outlet No. 2. Located within Shoreline Segment No. 1 and located in the vicinity of Hui Road D. The design of this outlet has been modified to provide a 30-inch diameter culvert, instead of the 24-inch culvert initially proposed. Also, the construction of a GRP apron and 3-feet high chainlink fence along the headwall.
4) Changes in the design for new Drainage Outlet No. 5. Drainage Outlet No. 5 is located to the south of Hui Road E. The design for this new outlet will include the construction of a GRP apron and a 3-foot high chainlink fence to be located along the headwall, the construction of the CRM headwall, and the 24-inch diameter culvert that were in the initial proposal.
5) Adjustments to the typical roadway section. The existing paved roadway will be widened to a minimum of 22 feet, and will include a paved buffer zone, a 6-foot wide paved drainage swale outside the makai travel lane and a paved buffer zone and concrete curb with sidewalk outside the mauka travel lane.
6) Kahananui Bridge Improvements. The existing Kahananui Bridge at Kahananui Stream will be demolished and reconstructed to accommodate the widened roadway. The bridge work will include, but is not limited to, the relocation of existing water and sewer lines within the stream, relocation of the overhead utility poles and lines. New piles will be installed, new concrete pile caps, and concrete abutment walls will be constructed to replace the ones demolished and removed.

In early 1999, Xamanek Researches conducted an archaeological inventory survey of the proposed project area. During this survey, three historic sites were identified including, a subsurface pre-Contact habitation site (50-50-03-4797), a road retaining wall (50-50-03-4798), and a second retaining wall (50-50-03-4799). The report documenting the findings was reviewed by this office (SHPD DOC NO.: 0006RC54/LOG NO.: 25710). At that time we requested the submittal of two replacement pages consisting of a map showing the LCA locations and a table providing specific information pertaining to the land use of the LCAs. To date we have not received these replacement pages.

Subsequently, Xamanek Researches conducted additional archaeological inventory level work at site 50-50-03-4797. The report documenting the findings was reviewed and accepted by this office (SHPD DOC NO.: 0105MK02/LOG NO.: 27459). At that time we recommended that archaeological data recovery be conducted of site 50-50-03-4797 prior to the commencement of the actual road construction. To date the data recovery work has not been conducted.

In addition, we note that no subsurface testing was conducted of the project corridor during the archaeological inventory level work due to safety issues. As the proposed project corridor is located in a coastal area, we believe it is likely that additional habitation sites, and possibly associated burials, or remnants of these types of historic sites, may be present in the subsurface deposits.

Given the above information, we recommend the following to mitigate any adverse effects to significant historic sites:

1. A qualified archaeological monitor be present during all ground-altering activities in order to identify and document any unknown historic sites that might be found, and to provide mitigation measures as necessary. An acceptable monitoring plan will need to be submitted to this office for review, prior to the commencement of any ground-altering activities. An acceptable report documenting the findings of the monitoring activities will need to be submitted to this office for review upon 180 days following the completion of the proposed undertaking.

2. The two above-mentioned replacement pages be submitted to this office.

3. Archaeological data recovery be conducted of site 50-50-03-4797 prior to the commencement of the proposed highway improvements. An acceptable data recovery plan will need to be submitted to this office for review. And an acceptable report documenting the findings of the data recovery work will need to be submitted to this office for review.

If you have any questions, please call Cathleen Dagher at 692-8023.

Aloha,

Gilbert Coloma-Agaran
State Historic Preservation Officer

CD:jen

MUNEKIYO & HIRAGA, INC.

July 5, 2002

Don Hibbard, Administrator
State Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

SUBJECT: Lower Honoapiilani Road Improvements, STP-3080(8)
(Hoohui Road to Napilihau Street)

Dear Mr. Hibbard:

Thank you for your May 8, 2002 letter providing comments on the modifications to the proposed project. On behalf of the Department of Public Works and Waste Management (DPWWM), we would like to note the following.

The original, revised replacement pages for the archaeological inventory survey were submitted to the State Historic Preservation Division (SHPD) on February 26, 2000. Copies of the revised pages were recently provided to the SHPD as well.

The SHPD's recommendations regarding archaeological monitoring and data recovery are duly noted. Archaeological monitoring will be conducted for all ground-altering activities. An archaeological monitoring plan will be submitted to the SHPD for review and approval prior to the start of ground-altering activities, and a report documenting the findings of monitoring activities will be submitted following the completion of the project.

In addition, archaeological data recovery of Site 4797 will be conducted prior to the construction of the project. In connection with this work, a data recovery plan and a report documenting the findings of the data recovery work will be submitted to the SHPD for review and approval.

environment

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

Thank you again for providing us with your comments.

Sincerely,

Glenn Tadaki, Planner

GT:tn
cc: Joe Krueger, Department of Public Works and Waste Management
Kent Morimoto & Ken Kurokawa, Austin Tsutsumi & Associates
Erik Fredericksen, Xamanek Researches
Colleen Suyama, Planning Department

ata/hpiiroad/shpdltr 003

Chapter XIII

Comments from August 29, 2001 Public Hearing; Written Comments Received at or Following the August 29, 2001 Public Hearing; and Evaluation of Substantive Comments

XIII. COMMENTS FROM AUGUST 29, 2001 PUBLIC HEARING; WRITTEN COMMENTS RECEIVED AT OR FOLLOWING THE AUGUST 29, 2001 PUBLIC HEARING; AND EVALUATION OF SUBSTANTIVE COMMENTS

This chapter consists of three (3) sections as follows:

A. Pertinent excerpts from the August 29, 2001 public hearing held at the Lahaina Intermediate School (see Appendix G for full transcript);

B. Written comments received at or following the August 29, 2001 public hearing; and

C. Evaluation of substantive comments received during and following the August 29, 2001 public hearing.

The full transcript covers the public hearing in its entirety. During the public hearing, questions were posed and answers provided. Many of the questions were related to technical parameters relating to the project. Responses to those questions were presented at the public hearing. Questions raised at the public hearing for which answers were immediately provided are not addressed by this chapter. Other comments were of a broader nature, requiring a separate written evaluation which is presented in this chapter. Comments requiring evaluation are identified and numbered directly on the transcript document excerpts. Similarly, substantive written comments received during or following the public hearing are identified and numbered directly on the comment card. Evaluation of each numbered substantive comment is made a part of this chapter.

Pertinent Excerpts from Transcript of August 29, 2001 Public Hearing

of it says that the socioeconomic environment, and they're talking about the population growth and whatnot in West Maui. I think that just in between Hoohui and Napilihau Road, the population growth is like almost nothing compared to West Maui. So you guys are basing the need to have to make the road so wide and so big and extensive to accommodate the population growth, where I think it should be some place else.

(1)

I guess the consensus of a lot of us here is that wider is not necessarily safer and that straighter is not necessarily safer, so we all are really concerned, not so much of just saving our little kuleanas, but actually just trying to maintain the whole scope of this neighborhood. So when you folks do this assessment, and I know there's more to be read within there, too, I'm just wondering how valid that is and who I address that question to.

(2)

MR. MUNEKIYO: I can say as the preparer of the EA that what we tried to do was look at regional context because much of the traffic that uses Honoapiilani Highway really is of a regional nature; in other words, maybe not necessarily local residents, and so I think, and like Public Works officials can correct me, but in looking at the project need, they

wouldn't be directly impacted.

MS. BEKHEART: This is my last comment. Well, we're all here to talk about the environment, and we're dealing with the science and technology of environment, which is very important to all of us. We do want a smooth drive through, and we do want good drainage and we do want to maintain the character of this particular corridor. As it is, it's wide open to speeders and accidents. And I live, you know, on the road and so many other families live alongside me, and we have a small community.

I think we should be also talking about the artistic environment. And even if we may not be able to get the wires underground, at least we should be considering about beautification and making this corridor a unique place. I did write a letter to the Maui County Director of this project and I suggested that we do something about the historic value of this particular road because underneath this Honoapiilani Road, the lower road, which is original, underneath this road is the first road or the trail that Piilani built for the people under his reign, you know, built.

③ Now that we are improving this particular spot, is there a space for some historic points so that

people can come down to our road and respect it so that they do not use our corridor like a speedway but to have an easy drive, you know, through our little corridor and respect our community because right in front of my house we have local fishermen that come in in the weekends and they cast their lines out there and catch fish all the time. Kids go surfing right outside there. And, you know, mothers walk along with their babies, and this is a special place. The view is incredible.

③

You look at Molokai, Lanai, Kahoolawe, and it's the most beautiful place in all the islands, all the islands. And when you have six incredible bays that are named for, you know, King Piilani, and I said this before, and I know more history about this particular strand of road. And if we really want to be unique, then I think we should be thinking also about the environment and not tearing down too many trees and trying to keep it, you know, a special place. Thank you.

④

MR. MUNEKIYO: Thank you for your comment. And I think the nature of her comments reflected what we want to receive from you if you wish in terms of public testimony; that is, whatever you feel is important to you that you want to express tonight, we

will receive. We will not discuss it. We will receive it. If it's something that requires further analysis, of course, we will do that. The project team will do that.

At this point, what I would like to do is continue the comments and receive any oral testimony that you might have. If you feel that you would like to think about it more, we do have, Glenn, comment cards that you can pick up and, of course, write your comments down, send it out to us or mail it. We are receiving comments until September 12th. But at this point, let me just ask if there's anybody who would like to express further comments. We will receive the comments, and please identify yourself if you do have verbal comments. Make sure that you have signed in so that we can get your address. We do have a sign-in sheet, which we are looking for addresses so that in the event we do need to follow up with you, we can do that. So let me just ask if there's anybody who would like to give additional oral testimony. If not -- ma'am, and please just tell us who you are and tell us what's on your mind.

MS. CLIFFT: I'm Eileen Clifft. Address is 4652. My comment is we live on the lower road. We like the road the way it is. We just need you guys to

⑤

resurface our road. Then we wouldn't have to deal with this electrical poles. These runoffs, bad water runoff that we will have to deal with, too. I'm concerned about where the runoff is coming to and where it's ending. In the ocean, right? We had algae problem this past summer right in front of Kahana Reef right in front of where I live.

(5)

If runoff is dumping into the ocean, that's not going to help our algae problem. And I thought we were going to do an environmental study on that as far as the runoff and ending into the ocean because we live right across the ocean. My other comment was I noticed a lot of tourists walk and jog on the lower road. And the only reason they do that is because they don't feel safe walking and jogging on the highway. Now, you build a highway in the back of my house. Why can't you build the sidewalks up there? Why do you have to come on the lower road where it's a residential area where people like seeing koa trees, where they like seeing people walking with their dogs, children riding their bicycles. It's not made for another lower highway. It's a residential area.

(6)

We have children that ride their bicycles on the road. We have parents that visit neighbors on the road. We hang out on the road because that's how we

know what's going on in our environment. So I guess my main concern is that if we as a community, we're not against you coming in and doing what needs to be done. But what made you decide to pick us when there's a highway right in the back of my house that all of this could go on. And would save us as being, quote, a quiet neighborhood. All we needed was to resurface our road and have the drainage system worked on basically. We don't want anything else done. We just wanted our road to be resurfaced, and don't expand the road because I saw what you did in the front of the Dollie's and Falls of Kahana. You expanded the road, and now it's parking.

(7)

I thought that was supposed to be a bike path, and people speed on the lower road now ever since you guys widened that road. Anyway, this is my comment.

(8)

MR. MUNEKIYO: Thank you very much. Anyone else wishing to speak? And introduce yourself.

MR. HAWKINS: My name is Will Hawkins again. It was kind of ironic that the gentleman that drafted part of the plans here, he said that his first indication when he came into the neighborhood was that it was unsafe for people walking on the roads, and I can't disagree with that thought. I mean plenty of times I've had to slow down because a mother is

pushing a baby in the center of the road. It's just absolutely insane, so I definitely understand the need for all of this improvement. But the ironic thing about it is that, you know, whereever you are, mainland or on the islands, if you improve the road, people are going to go faster.

So instead of, you know, the lesser of two evils, not that I'm encouraging it, of course, but you either get bumped by a bumper, which is the condition that it is now, and you have to go slow because the road is all potholes and in terrible shape. Or the other option is to have some guy on a motorcycle going 90 miles an hour because the road is nice and smooth to ride on and he plows through someone's house and kills two people in the house. I mean it's just the irony is that you're trying to make the road safe, but the realism is you're going to have people speeding up and down the highway, and I think that issue really needs to be addressed if this improvement does follow through.

(9)

You need to provide some kind of speed enforcement or signage or whatever, you need to provide that. And personally, the lesser of two evils for me, I like the road the way it is because I don't really like the whole modern road thing that we've got

Written Comments Received at or Following the August 29, 2001 Public Hearing

DOCUMENT CAPTURED AS RECEIVED

COMMENT CARD
PUBLIC HEARING

2444

Comments are due by September 12, 2001 and may be turned-in at the public hearing or mailed to: Mr. David Goode, Director, Department of Public Works and Waste Management, 200 S. High Street, Wailuku, Hawaii 96793.

2001 ... 11 P 3:34

PLEASE PRINT

Name: KAWIKA JAMES ROBINSON

Address: 4695-A HONOAPIILANI RD.

Phone: Home 669-5269 Business

Representing: SELF

Comments: My concern is our tree line along the road. The trees are at least 80 years old. My great grandmother planted them. If you take them away, they will be gone forever. We have a common mango tree, a hayden mango tree and about fifty false olives. They protect our home from the road... which is already really close to our home. Any closer and it would seem dangerous for us to even walk outside to get the mail. ①

(The other side of this card may be used if more space is required)

2kaw\pw\goode\card.001 Another concern I have is that toward the end of our land→ they found 500 year old artifacts. This is an archeological site. This is hawaiian land... please consider our wishes and concerns first before you consider the wishes of those who just stepped off the plane. Our trees as well as our neighbors trees make Kahana the most beautiful place in the world. Give the land the respect it deserves. Mahal ② One more thing, why can't you just use the space you have without stealing our families' land? Do what you can with the space you have. ③

[illegible] CARD
PUBLIC HEARING

Comments are due by September 12, 2001 and may be turned-in at the public hearing or mailed to: Mr. David Goode, Director, Department of Public Works and Waste Management, 200 S. High Street, Wailuku, Hawaii 96793.

PLEASE PRINT

Name: LORRAINE ROBINSON

Address: 4695-A HONOAPIILANI RD

Phone: Home 669-5269 Business

Representing: ROBINSON ESTATE - OCEAN SIDE

Comments: Where we live there is not enough land to be taken you would be right at my bedroom. Why don't you put whatever you want where the condos are and just pave where the residents live. You could put table bumps to slow traffic

(4)

(The other side of this card may be used if more space is required)

alahpwroad/card.001

COMMENT CARD
PUBLIC HEARING

Comments are due by September 12, 2001 and may be turned-in at the public hearing or mailed to: Mr. David Goode, Director, Department of Public Works and Waste Management, 200 S. High Street, Wailuku, Hawaii 96793.

PLEASE PRINT

Name: JAMES C. ROBINSON

Address: 4695-A HONOAPIILANI Rd.

Phone: Home 669-5269 Business 669-9514

Representing: OHANA LANDS

Comments: DO WHAT YOU WANT WITH WHAT IS THERE ALREADY WITHOUT TAKING MORE LAND AWAY FROM THE FAMILIES ALONG THIS ROAD. WHY ARE THESE IMPROVEMENTS BEING MADE BY PEOPLE WHO DON'T LIVE ON THIS ROADWAY? THE WAY IT IS IS THE WAY WE LIKE IT.

(5)

(The other side of this card may be used if more space is required)

ata/hpw030/card 001

COMMENT CARD
PUBLIC HEARING

Comments are due by September 12, 2001 and may be turned-in at the public hearing or mailed to: Mr. David Goode, Director, Department of Public Works and Waste Management, 200 S. High Street, Wailuku, Hawaii 96793.

PLEASE PRINT

Name: Keala Robinson-Calapini

Address: PO Box 12489 Lahaina 96761

Phone: Home 879-0838 Business

Representing: Robinson Family

Comments: My concern if the road is widened people will speed even faster than they do now. This new road will shorten my familys driveway. not to mention our

(6) (The other side of this card may be used if more space is required)

MB/hpwroad/card 001

yard. Who will take responsibility for any of my family members if they get hit by a speeding vehicle while getting the mail? Are any of you going to explain where are trees and hedges (7) have gone? There is no need to widen this lower road, no need to condemn any property along this road. Furthermore (8) if its not broke — don't fix it. We are happy with the way things are. Keep it that way.

COMMENT CARD
PUBLIC HEARING

Comments are due by September 12, 2001 and may be turned-in at the public hearing or mailed to: Mr. David Goode, Director, Department of Public Works and Waste Management, 200 S. High Street, Wailuku, Hawaii 96793.

PLEASE PRINT

Name: JEREMY ROBINSON

Address: 4695-A HONOAPIILANI ROAD

Phone: Home 669-5269 Business CABLE CONSTRUCTION

Representing: SELF

Comments:

(9) I OPPOSE THE WIDENING OF THE LOWER ROAD FOR MANY REASONS. 1) WHO WILL IT BENEFIT? RESIDENTS OR TOURISTS? TRAFFIC IS DANGEROUS AS IT IS, WIDENING THE ROAD WILL INCREASE TRAFFIC SPEED & RESIDENTS' CHANCES OF GETTING HIT & KILLED BY SPEEDING CARS. TOURISTS WILL HAVE SPACE TO WALK & RIDE BIKES PAST MY HOUSE FOR MINUTES WHILE WE LOSE OUR LAND FOREVER.

(The other side of this card may be used if more space is required)

(10) ata/hp/roads/card.001 NO MORE BEAUTIFUL TREES PROTECTING MY HOME, JUST TOURISTS WALKING & BIKING ON THE LAND WHERE THEY ONCE LIVED. IT OBVIOUSLY WILL NOT BENEFIT THE RESIDENTS IN THIS CASE.

(11) 2) THE DRAINAGE WILL KILL THE REEFS & FISHES. I FISH, DIVE, & SURF HERE, & ALL OF THAT SHOULD NOT BE DESTROYED FOR A DRAINAGE SYSTEM THAT IS NOT EVEN NEEDED. IT HAS BEEN DRAINING NATURALLY FOR HUNDREDS OF YEARS. WHY IS IT, THAT ONLY NOW WE "NEED" IT?

(12) 3) THIS IS JUST ANOTHER CASE OF THE HAWAIIANS HAVING THEIR LAND UNLAWFULLY TAKEN AWAY. STOLEN. WHY? FOR THE PROMISE OF PROGRESS? FOR WHO? SOMEONE WHO CAN DRIVE MUCH FASTER PAST MY HOUSE FOR A FRACTION OF THEIR LIFE, FOR SOMEONE WHO CAN WALK & BIKE COMFORTABLY ON WHAT USED TO BE OUR LAND, WHILE WE LOSE OUR LAND & RIGHTS AS LAND OWNERS FOREVER.

(13) AS A HAWAIIAN, I REFUSE TO GIVE UP MY LAND, BUT I KNOW THEY WILL TAKE IT, & WE WILL END UP GETTING THE SHORT END OF THE STICK. THIS PROJECT WILL NOT BENEFIT THE RESIDENTS IN ANY CASE.

DOCUMENT CAPTURED AS RECEIVED

COMMENT CARD
PUBLIC HEARING

2419

Comments are due by September 12, 2001 and may be turned-in at the public hearing or mailed to: Mr. David Goode, Director, Department of Public Works and Waste Management, 200 S. High Street, Wailuku, Hawaii 96793.

PLEASE PRINT

Name: Edna Farden Bekeart

Address: 4760 Honoapiilani L Road.

Phone: Home 669-6151 **Business** —

Representing: Kahana community member, retired

Comments: Thank you for the information in your bulletin "Lower Honoapiilani Road Improvements Project", under discussion at this meeting. Of concern to me is, with these improvements, can we now continue to maintain the unique quality of life we have been used to in this community? This segment of the lower road, unlike the segments of Honokowai and Mahinahina, is residential

(14)

(The other side of this card may be used if more space is required)

ats/hpwroad/card.001

It is less dense, the land is flat and close to the seashore. It has an old-style, friendly feeling about it and the incredible views of the islands of Lana'i and Moloka'i make it a most unusual piece of Hawaii, not duplicated at any other scenic places in our islands. Yes, we do need paved roadways, curbs, adequate drainage, better lighting, etc. We also need to keep the charm of this place. Must the Kahana Bridge be demolished? It is narrow, but it also deters people from speeding along our lower road and indeed this corridor has become a speedway for souped-up vehicles, mega-trucks and giant delivery vans. The lower road from Honokowai to Napilihau should have signage to declare the region a "scenic" or "historic" section of West Maui. Also, a stop-sign should be located at the intersection of Napilihau and Honoapiilani at the northern point. turning left on Napilihau is difficult and dangerous. As citizens we can learn to beautify our [illegible] along this scenic [illegible] be careful about "modernizati

(15)

(16)

(17)

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COMMENT CARD
PUBLIC HEARING

Comments are due by September 12, 2001 and may be turned-in at the public hearing or mailed to: Mr. David Goode, Director, Department of Public Works and Waste Management, 200 S. High Street, Wailuku, Hawaii 96793.

PLEASE PRINT

Name: Jo Anne Johnson

Address: 200 S. High St. - Rm. 813, Wailuku, Hi 9679

Phone: Home 661-3237 **Business** 270-5503

Representing: Self

Comments: Historic Trail designation should be sought to allow possible deviations from regular standards, permit historic trail signage & also Kake lighting which is similar to that on Front Street.

18

(The other side of this card may be used if more space is required)

stphpwordoc.doc

2455

☐ RUSH (2)

DEPT. OF PUBLIC WORKS

INFO / ACTION / FILE / COMMENTS / COPY

DIRECTOR
DEP. DIR
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STAFF CE
LUCA
WW RECL.
SOLID W.
ENGR.
HWYS.
SECTY.

Return to _____ Date _____

Ref. No. _____

By: _____ Date: _____

Mary Liebner
Lower Honoapiilani Rd.
Lahaina, HI 96761

2001 SEP 13 A 11:01

01 SEP 11 A10:17

COUNTY OF MAUI
PUBLIC WORKS

September 10, 2001

David Goode, Director
Department of Public Works and Waste Management
County of Maui
Wailuku, HI 96793

Via fax: 270-7955

Dear Mr. Goode:

I am writing this because I am very concerned about the impact that the proposed "improvements" to the Lower Honoapiilani Road will have on the neighborhood community that I have been a part of for the past 23 years.

19 I believe that there is a need for making this road more safe for pedestrians. And, as someone who must drive this road on a daily basis, I have found a way to dodge the potholes in a zig zag fashion. Having said that, I have concerns that your "improvements" will only encourage people to drive faster. I have seen too many accidents in front of my home over the years. I have not heard of anything concrete that the County proposes to do to discourage speeding once you widen, straighten and smooth out the road. Will the speed limit remain at 25 mph? Can you install more and bigger speed limit signs? Perhaps you could invite a representative of the police department to some of the public meetings to suggest what can be done to enforce the speed limit law.

20 I am also concerned and very saddened to learn of the trees that the County plans on destroying in order to implement the existing plan. Among the trees you plan to kill are the old rubber trees at the Pohailani, practically every tree along the Robinson property, and--what would be a real sin--the ancient monkey pod I saw X'd out on your map that grows across the street from where I live (next to the culvert that empties into Kaopala Bay). The draft environmental assessment I

21 read indicated that this bay that I live on, and in particular at it's southern end along the Robinson's land, is an archeological area that has been labeled of "significant importance". What impact would the removal of trees in such an area have on this site? I've heard it said that the "improvements" would have no adverse impact on archeological sites. Yet, Erik Fredericksen, the archeologist at the public meeting held at Lahaina Intermediate School on August 29th cringed when I pointed out to him that trees in this area were scheduled to be removed.

22 This leads to my biggest concern: that your "improvements" will cause us to lose part of the quality that makes our neighborhood special. In the midst of the development that has overtaken

our island, and in particular the West Side, I feel fortunate to live in an area that, certainly to us who live here, still has the feel of "Old Hawaii". I know that your engineers have scaled back the original plan, but I believe more should be done. I left the last public meeting on August 29th with more questions and concerns about the proposed "improvements" than assurances. It was stated that Sept. 12th is the deadline for public input. All I can do now is write this, and wonder if it is all just a formality. Has time run out?

(23) Please reconsider your plans to destroy any trees for the sake of some arbitrary footage requirements on travel lanes, buffer zones, sidewalk and swale. We don't need all that pavement.

Sincerely,

Mary Liebner

2457

KAANAPALI BEACH PROPERTIES, INC.

COMMENT CARD FROM THE PUBLIC HEARING

TO: MR. DAVID GOODE, DIRECTOR
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 S. HIGH STREET, WAILUKU, HI 96793

FROM: KENNETH M. ROTHMAN
P.O. BOX 10672
LAHAINA, HI 96761
HOME: 870-8380
BUSINESS; 667-5900
REPRESENTING MYSELF, FRIENDS, AND CLIENTS IN THE AREA

There were two issues raised continually during the meeting.

(24) **Issue 1: *Maintain the quality of the area.*** *The Kahana area has a rare quality on Maui.* While many oceanfront areas have grown and require a larger road, this area is different. The trees, older homes, and quiet nature of this area should be preserved as much as possible. You will find in your traffic count that there is still very little traffic in this area.

(25) The road widening project through Honokowai and Kahana has led to speeding. I hope that when the road gets wider and sidewalks are built, the speed limit is reduced. Let's try to insure that this area does not become a speed zone.

(26) **Issue 2: Bury the utility lines.** I believe funds can be raised by owners in the area from 4750 L. Honoapiilani Road to 4950 L. Honoapiilani Road to bury the utility lines in their area. Since the poles are being moved for the improvement project, Maui Electric should to a study on the difference in cost. There are about a dozen homeowners that are willing to help make this happen. I will do whatever I can, including forming a neighborhood committee, if I can get cooperation from Maui Electric and the Department of Public Works.

—

If someone needs more reason to look into the reason to bury the lines, the power poles in the 4200 block of Kahana are all over the place including in the middle of the sidewalks. Not only are they ugly but have been placed in the middle of the sidewalk. We all have the chance to make something positive happen here.

3350 L. HONOAPIILANI ROAD, BUILDING 6, KAANAPALI, MAUI, HAWAII 96761
SALES (808) 667-5900 , MANAGEMENT (808) 667-7776 FAX (808) 667-3544

Evaluation of Substantive Comments Received During and Following the August 29, 2001 Public Hearing

EVALUATION OF SUBSTANTIVE COMMENTS RECEIVED DURING AND FOLLOWING THE AUGUST 29, 2001 PUBLIC HEARING

A public hearing on the proposed Lower Honoapiilani Road Improvements, Hoohui Road to Napilihau Street (Project No. STP-3080(8)) was held on August 29, 2001. The transcript for the public hearing identifies substantive comments raised for which evaluation has been completed. In addition, the public was requested to submit additional written comments following the public hearing (up to September 12, 2001). These comments are included in this chapter as well. Comments raised at the public hearing, as well as through written submittals have been identified and numbered. An evaluation of these comments are provided below. The number preceding each evaluative response corresponds to the identifying number found on the transcript or on the written comments.

Evaluation of Comments Contained in Transcript

Transcript Comment No. 1. (page 18)

The project's need is based on existing sub-standard conditions of the Lower Honoapiilani Road, between Hoohui Road and Napilihau Street. The proposed improvements are intended to address safety, traffic operating and drainage conditions which are judged to be less than desirable under current conditions. For example, the installation of sidewalks is considered a significant safety enhancement for pedestrians. Projected increases in traffic volumes which may be attributed to regional population growth are also a consideration in defining the project's need. As vehicle counts increase on the Lower Honoapiilani Highway, improvements will be needed to facilitate the safe movement of traffic along the roadway.

Transcript Comment No. 2. (page 18)

The need to balance neighborhood character with roadway improvements is important. It is noted that neither the horizontal or vertical alignment of this roadway section will be altered substantially. Improvements relate primarily to the typical roadway section, as well as drainage improvements along the

roadway. Towards ensuring minimal impacts to neighborhood character, the County has determined that roadway width requirements where existing roadway rights-of-way are narrow will be modified. The modification involves the elimination of a roadway buffer zone (up to 5 feet on each side of the typical roadway section). The elimination of the buffer zone will minimize right-of-way acquisition requirements, as well as construction impacts to landscaped areas and private properties. In addition, where permitted, the roadway section was shifted in the makai or seaward direction to minimize impacts to properties on the mauka side.

Transcript Comment No. 3. (page 33 and 34)

The scope of the proposed project does not include designation of areas along the roadway which may be recognized as points of historical interest. With the exception of new drainage outlets or repairs to existing drainage outlets, there will be no encroachment onto shoreline areas. In this regard, shoreline recreational and scenic opportunities are not anticipated to be affected by the proposed action.

Transcript Comment No. 4. (page 34)

See evaluation of Transcript Comment No. 2, above.

Transcript Comment No. 5. (page 35 and 36)

Resurfacing of the roadway would not address the County's objective of providing improved safety and functional conditions of the roadway. The proposed action is not anticipated to adversely affect water quality conditions. Total additional runoff attributed to the pavement widths is estimated to be 2.3 cubic feet per second, spread over the 1.4 mile project limits.

Transcript Comment No. 6. (page 36)

The Honoapiilani Highway (upper road) is a State facility functioning as a major regional arterial. The Lower Honoapiilani Road falls in a lower functional classification for which the proposed improvements are deemed appropriate from safety and motor vehicle operating standpoints. With this in mind, the proposed improvements are intended to improve safety conditions for pedestrians and bicyclists, as well as the driving public.

Transcript Comment No. 7. (page 37)

The purpose of the proposed project is to provide adequate travel lane width for shared use by motorists and bicyclists along with sidewalks for pedestrial use. In addition, the improvements will include the installation of curbs and gutters to collect roadway runoff which currently sheet flows off of the pavement surface. (This condition promotes pavement edge undermining which creates hazards for motor vehicles, bicyclists and pedestrians.) The provision of new parallel parking areas along the roadway is not an objective of the project.

Transcript Comment No. 8. (page 37)

Upon completion, the posted speed limit for the roadway segment between Hoohui Road and Napilihau Street will remain the same (generally at 25 mph). (Appropriate traffic signage will be installed along the roadway corridor to notify drivers of speed limits.) The posted speed is in keeping with the design speed for the roadway. Should enforcement issues relating to speeding arise, traffic calming measures can be investigated and implemented, as needed, in problem areas (e.g., speed tables). As appropriate, enforcement solutions will also be coordinated with the Police Department to further address speeding concerns. It is noted that the elimination of the buffer zone in sections having limited existing rights-of-way is also anticipated to have a traffic calming effect.

Transcript Comment No. 9. (page 38)

See evaluation of Transcript Comment No. 8, above.

Evaluation of Comments Contained in Written Submittals

Written Comment No. 1. (Kawika James Robinson)

Due to the limited width available in the vicinity of the Robinson's property (4695-A Honoapiilani Road), the buffer zones will be eliminated and the drainage swale will be constructed at the edge of the travelway. This adjustment in the typical section along this roadway segment will minimize land taking requirements, as well as reduce impacts to existing landscaping.

Written Comment No. 2. (Kawika James Robinson)	As reported by the project archaeologist, an inventory level survey has been completed for the project corridor. Three (3) sites, significant under Criteria "D" of the State and Federal historic preservation guidelines, have been identified. Sites 4798 and 4799 are no longer considered significant for their information content since both are post-contact features associated with the old Lower Honoapiilani Road. Site 4797 is deemed a relatively large habitation area. Archaeological data recovery will be conducted for this site in coordination with the State Historic Preservation Division. In addition, archaeological monitoring will be conducted for all ground-altering activities.
Written Comment No. 3. (Kawika James Robinson)	As noted in the evaluation for Transcript Comment No. 2, the roadway alignment was carefully studied with the objective of minimizing the need for right-of-way acquisition. Also see Written Comment No. 1.
Written Comment No. 4. (Lorraine Robinson)	See Transcript Comment Nos. 2 and 8, and Written Comment No. 1.
Written Comment No. 5. (James C. Robinson)	See Transcript Comment Nos. 1 and 2, and Written Comment No. 1.
Written Comment No. 6. (Keala Robinson-Calapini)	Existing roadway conditions do not meet current design standards which, in part, are intended to address safety concerns for pedestrians and bicyclists. Also see Transcript Comment No. 8 and Written Comment No. 1.
Written Comment No. 7. (Keala Robinson-Calapini)	See Transcript Comment No. 2 and Written Comment No. 1.
Written Comment No. 8. (Keala Robinson-Calapini)	See Transcript Comment No. 1.
Written Comment No. 9. (Jeremy Robinson)	See Transcript Comment Nos. 1 and 8.

Written Comment No. 10. (Jeremy Robinson)	See Transcript Comment No. 2 and Written Comment No. 1.
Written Comment No. 11. (Jeremy Robinson)	Runoff from the existing roadway currently sheet flows off the paved area along a majority of the alignment. This current condition creates ponded areas along the roadway which may lead to unsafe driving, bicycling and walking conditions. Roadway drainage improvements are designed to mitigate these conditions. The total increase attributed to the project is 2.3 cubic feet per second. This increase, over the length of the roadway corridor, is not anticipated to create new impacts to the marine environment.
Written Comment No. 12. (Jeremy Robinson)	The purpose of the project is to provide for improved and safer roadway system for the general public, both in terms of safety and functionality.
Written Comment No. 13. (Jeremy Robinson)	See Written Comment No. 1.
Written Comment No. 14. (Edna Farden Bekeart)	Project design parameters for this segment of Lower Honoapiilani Highway, between Hoohui Road and Napilihau Street have been adjusted to consider land uses along the project corridor. As previously noted, the buffer zone will be eliminated along narrower sections of the project alignment. To the extent that land acquisition is required, full coordination will be undertaken with affected landowners to ensure that properties impacted by construction are appropriately restored. Further, construction-related restoration of impacted properties will, to the extent practicable, be conducted in a manner which minimizes adverse effects upon the functional utility of the affected property.
Written Comment No. 15. (Edna Farden Bekeart)	See Transcript Comment No. 8.
Written Comment No. 16. (Edna Farden Bekeart)	As previously noted, the scope of the proposed project does not include designation of areas along the roadway which may be recognized as points of historical interest. Related to this, there are no plans

to place signage related to historic or scenic points of interest planned in connection with the proposed improvements.

Written Comment No. 17. (Edna Farden Bekeart)

An existing left-turn storage lane for movement from Lower Honoapiilani Highway onto Napilihau Street is currently in place. Traffic volumes at this intersection indicates that a stop control on Napilihau Street only is adequate at this time.

Written Comment No. 18. (JoAnne Johnson)

Although there are no plans to establish Lower Honoapiilani Road as a historic trail or landmark, flexible design standards are being used to address physical constraints. Also see Transcript Comment No. 3.

Written Comment No. 19. (Mary Liebner)

Speed limit signs will be posted at key locations to facilitate public awareness of speed limits. See Transcript Comment No. 8.

Written Comment No 20. (Mary Liebner)

See Transcript Comment No. 2 and Written Comment No. 1.

Written Comment No. 21. (Mary Liebner)

Archaeological Site 4797 has been determined significant under historic preservation Criteria "A", "C", and "D". Inventory level survey work has been completed for the site. Additional work will be implemented in the form of data recovery. A data recovery plan for this site will be submitted to the State Historic Preservation Division for review and approval prior to the start of construction. The intent of the data recovery work is to mitigate potential impacts to the site resulting for roadway improvement work.

Written Comment No. 22. (Mary Liebner)

See Transcript Comment No. 2.

Written Comment No. 23. (Mary Liebner)

See Transcript Comment No. 2.

Written Comment No. 24. (Kenneth Rothman)

See Transcript Comment No. 2.

Written Comment No. 25. (Kenneth Rothman)

See Transcript Comment No. 8 and Written Comment No. 19.

Written Comment No. 26. (Kenneth Rothman)

The cost differential between the installation of overhead and underground utility lines is $350 per lineal foot. At this time, there are no plans for the County of Maui to place utility lines underground. However, should there be third party funds available to implement underground utilities, the County of Maui is willing to work with the third party and Maui Electric Company to achieve this goal.

Chapter XIV

Summary of Meetings with Groups and Individuals

XIV. SUMMARY OF MEETINGS WITH GROUPS AND INDIVIDUALS

In addition to the public hearing that was held in Lahaina on August 29, 2001 (see Chapter XII), the applicant met with groups and individuals who reside in the project corridor to discuss the project. A summary of their comments follows.

Date of Meeting	*Summary*
February 16, 2001	The applicant met with Andrew Keen, a resident of the Hololani condominium. Mr. Keen, who lives across from the Pohailani, was concerned about preserving the large monkeypod trees along the Pohailani's street frontage.
March 15, 2001	The applicant met with approximately 10 residents of the Pohailani condominium. The residents were concerned that the large monkeypod trees along their roadway frontage and their off-street parking areas in the vicinity of the road would be impacted by the project.
March 16, 2001	The applicant met with three residents who live in the area around Kaopala Bay. The residents indicated that the trees along the embayment's roadside should be saved and that the rural character of the area should be maintained. They also mentioned that traffic-calming measures should be considered to slow down speeding motorists. In addition, the residents indicated that the would prefer to have the road resurfaced only and would rather not have curbs, gutters, and sidewalks.
May 17, 2001	The applicant held a public informational meeting at the Lahaina Civic Center. Notification of the meeting was published in the Lahaina News. The meeting was attended by approximately 50 to 60 persons. Comments that surfaced during the meeting include the following: • Individuals were interested in the specific nature of the improvements that would occur in front of their property. • The existing roadside landscaping should be saved. • The proposed roadway improvements could result in speeding. • The existing adjacent off-street parking areas could be affected.

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Appendices

LIST OF APPENDICES