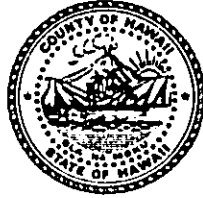


Rec'd 8/30/96

Stephen K. Yamashiro
Mayor



Virginia Goldstein
Director

Norman Olesen
Deputy Director

County of Hawaii
PLANNING DEPARTMENT

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-9615

August 26, 1996

Mr. Gary Gill, Director
Office of Environmental Quality Control
220 S. King Street, 4th Floor
Honolulu, HI 96813

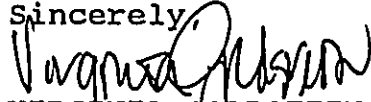
Dear Mr. Gill:

Final Environmental Assessment -
Finding of No Significant Impact (FONSI)
Mauna Kea Ranch Pipeline
Koholalele, Hamakua District, Hawaii
Tax Map Key: (3) 4-2-05:01

Enclosed is the OEQC Bulletin Publication Form for a Final Environmental Assessment - Finding of No Significant Impact (FONSI) for this project that proposes to use some County of Hawaii owned property. We received and reviewed one public comment and have determined that this project will not have significant environmental effects, thus an environmental impact statement will not be required. It is our understanding that the required four (4) copies of the Final Environmental Assessment are being submitted to you by Waimea Water Services, Inc.

Please contact Rodney Nakano of my staff at 961-8288 if you have any questions.

Sincerely,


VIRGINIA GOLDSTEIN
Planning Director

VG:mjs
F:\WP60\MICHELLE\1996\LGILL.VG
Enclosure

xc: Waimea Water Services

110

1996-09-23-HI-FEA - Mauna Kea Ranch Pipeline

SEP 23 1996

FILE COPY

MAUNA KEA RANCH PIPE LINE
HAMAKUA COAST, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

Applicant:
Mauna Kea Ranch
John Hancock Insurance

AUGUST 1996

E.A. Prepared by:
Waimea Water Services Inc.

OFFICE OF THE
DEPARTMENT OF
ENVIRONMENTAL
QUALITY

96 SEP -9 09:48

RECEIVED

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SECTION 1
INTRODUCTION AND SUMMARY

Mauna Kea Ranch (MKR) proposes to install a 3" diameter high density polyethylene (HDPE) water pipeline in the Hamakua district of the Big Island of Hawaii. The pipeline will take water from a Hawaii Dept. of Water Supply (DWS) meter near Paauilo town and deliver it to the existing MKR water system. The project includes disconnecting the existing DWS meter along Mamalahoa Highway. Construction of this pipeline will enable MKR to provide more water to its system while eliminating the low pressure conditions created at Kukaiau Village on the DWS system. A portion of this pipeline passes over County of Hawaii lands, thus necessitating the filing of an Final Environmental Assessment.

The few impacts which have been identified in this Final Environmental Assessment should be adequately minimized by the suggested mitigative measures. In accordance with Chapter 343, *Hawaii Revised Statutes*, it has been determined that an Environmental Impact Statement is not required for the proposed MKR pipeline project. Therefore, this document constitutes a notice of anticipated Negative Declaration.

1.1 PROPOSING AGENT

Mauna Kea Ranch, John Hancock Insurance, owner.

1.2

AGENCIES CONSULTED IN MAKING THE ASSESSMENT

- 1. Commission on Water Resources Management,
Department of Land and Natural Resources, State
of Hawaii**
- 2. Hawaii State Land Use Commission**
- 3. Hawaii State Office of Environmental Quality Control**
- 4. Historic Sites Preservation Office, Department of Land and
Natural Resources, State of Hawaii**
- 5. Safe Drinking Water Branch, Hawaii State
Department of Health**
- 6. Department of Water Supply, County of Hawaii**
- 7. Planning Department, County of Hawaii**
- 8. Finance Department, County of Hawaii**
- 9. Corporation Counsel, County of Hawaii**
- 10. Public Works, County of Hawaii, Engineering Div. for Road
Crossing and Grading.**

SECTION 2

PROJECT DESCRIPTION

Mauna Kea Ranch (MKR) proposes to install a 3" diameter high density polyethylene (HDPE) water pipeline in the Hamakua district of the Big Island of Hawaii. The pipeline will take water from a Hawaii Dept. of Water Supply (DWS) meter near Paauilo town and deliver it to the existing MKR water system. The project includes disconnecting the existing DWS meter along Mamalahoa Highway. Construction of this pipeline will enable MKR to provide more water to its system while eliminating the low pressure conditions created at Kukaiau Village on the DWS system.

The pipeline entails the installation of a new DWS meter below the Paauilo water reservoirs on the existing 6" DWS water main, a booster station and tank, burial of 10,300 feet of 3" HDPE pipe, crossing over 6 small and large gulches, and connection to the existing MKR water system.

2.1 PROJECT SITE

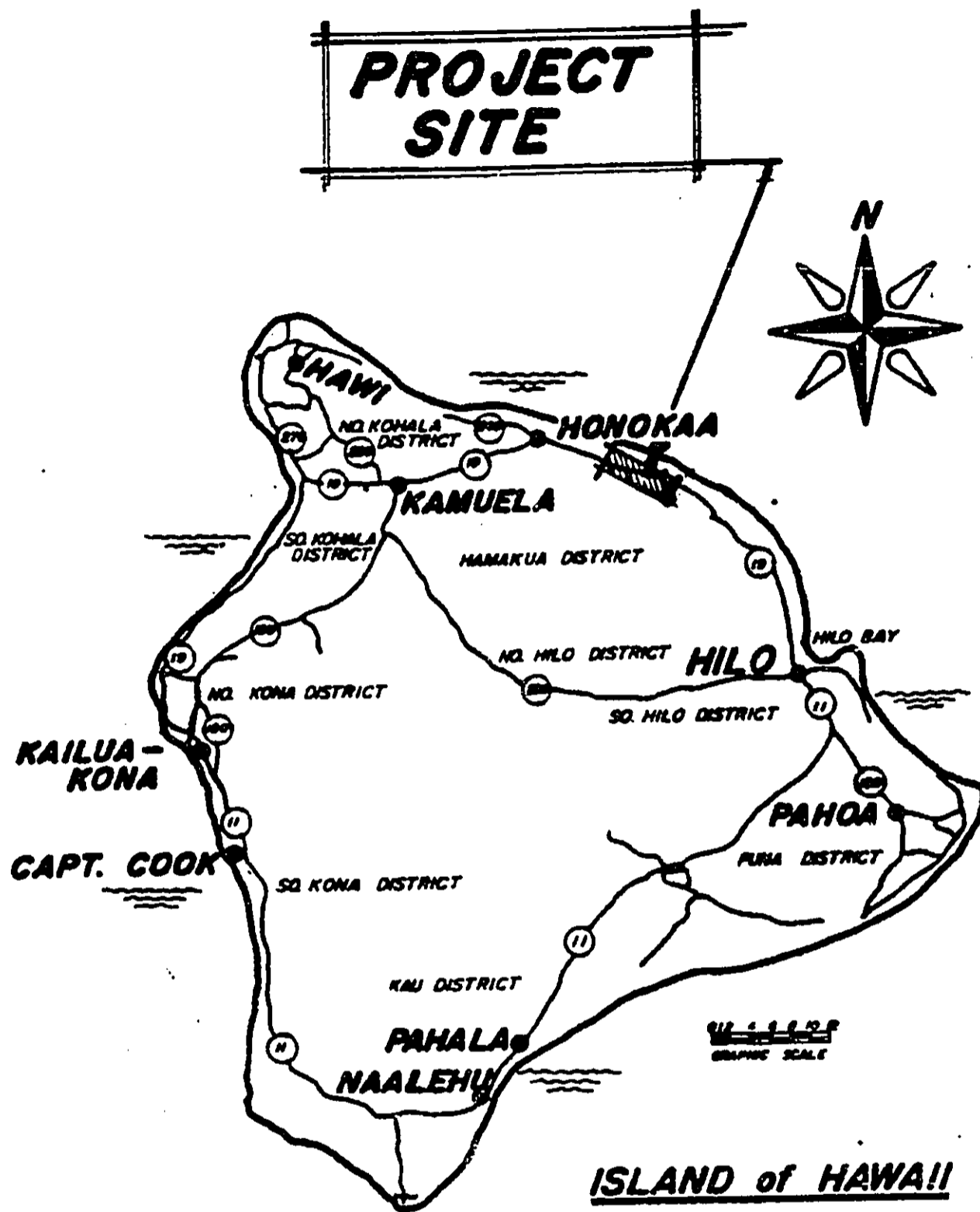
The project site is located on the northwest region of the Big Island of Hawaii, near the town of Paauilo, as shown in Figure 2-1. The pipeline is situated on the eastern slope of Mauna Kea Mountain, and parallels the Mamalahoa Highway. The pipeline will begin at a meter connected to the DWS Paauilo Water System #134. The pipeline is located next to a cane haul road and follows an old railroad alignment at an elevation of 910 to 1150 feet above

mean sea level (MSL), as shown in Figure 2-2. Access to the meter connection site is via Highway 19 and a two-lane rural road, which runs next to Paauilo Town and travels mauka past the DWS storage reservoirs mauka of the pipeline.

This Final Environmental Assessment encompasses the land owned by the County of Hawaii as delineated in Figure 2-2, 2-3 and 2-4.

Figure 2-1

LOCATION MAP

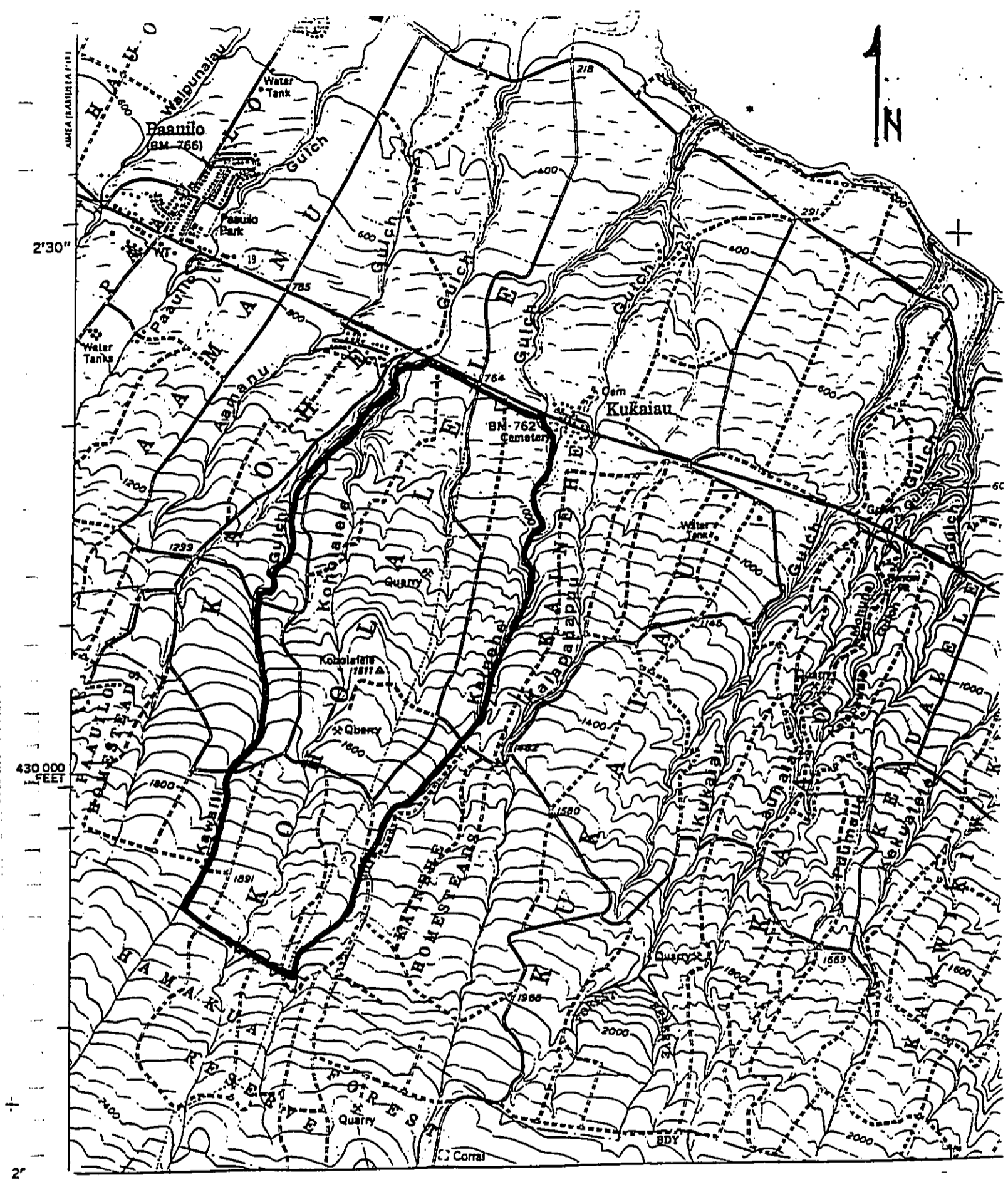


LOCATION MAP

N.T.S.

FIGURE 2-1

Figure 2-2
TOPO MAP



Mauna Kea Ranch Pipe Line
 TOPO MAP
 scale 1" = 2000 ft.

FIGURE 2-2

Figure 2-3

ENGINEERING SITE PLAN

**OVERSIZED
DRAWING/MAP**

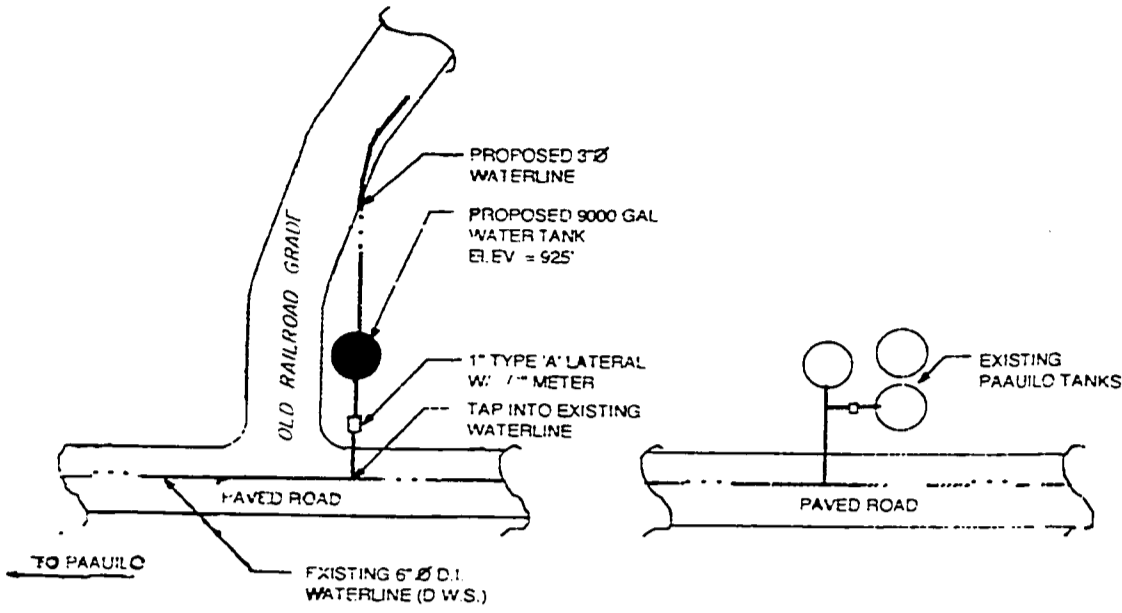
**PLEASE SEE
35MM ROLL**

0048 E

**OVERSIZED
DRAWING/MAP**

**PLEASE SEE
35MM ROLL**

0049 F

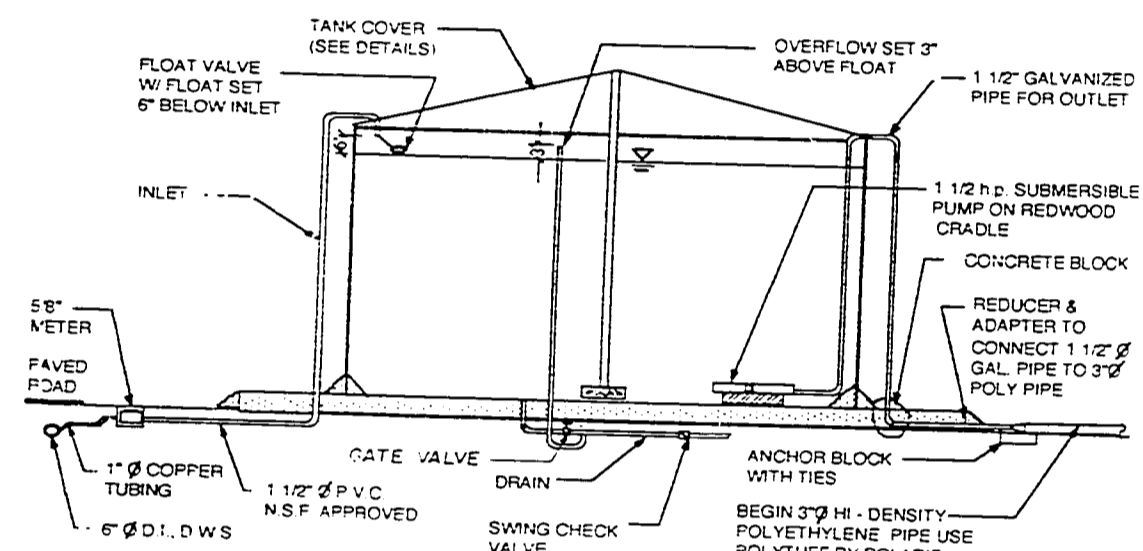


PROPOSED WATERLINE CONNECTION TO D.W.S. 6" WATERLINE

N.T.S.

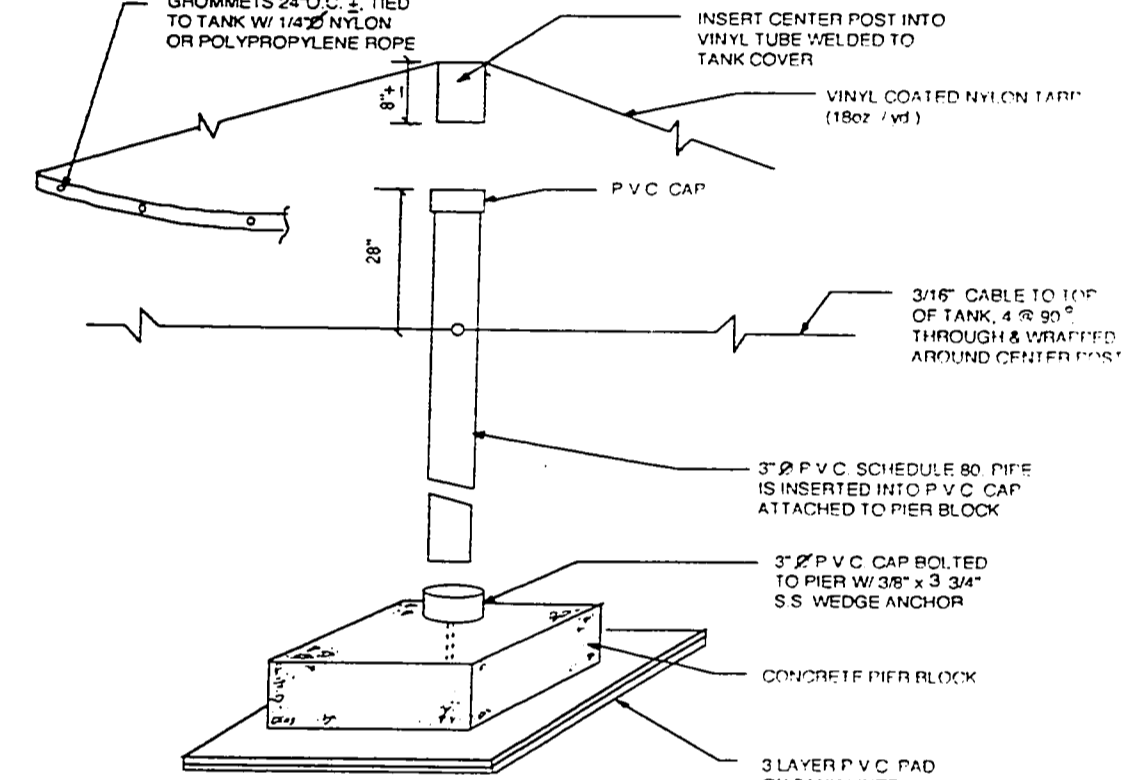
WATERLINE NOTES:

1. USE POLYUFF SDR 17, 100 PSI, HIGH DENSITY POLYETHYLENE PIPE, NSF APPROVED FOR POTABLE WATER BY POLARIS OR EQUAL.
2. PIPELINE IS SHOWN Laid ON SURFACE EXCEPT WHEN CROSSING ROADWAYS OR WHEN SPANNING STREAMS.
3. TO CROSS STREAMS OR DRAINAGEWAYS ATTACH WATERLINE TO BRIDGE OR BURY IN BRIDGE ROADWAY IF A USABLE BRIDGE EXISTS. OTHERWISE USE SUSPENDED CABLE CROSSING.
4. MINIMUM WATERLINE COVER FOR BURIED PIPE, 3' FOR TRAFFIC AREAS, 2' FOR OTHER AREAS. NATIVE SOIL CAN BE USED FOR COVER AND BEDDING. MINIMUM CURVE RADIUS IS 7'.
5. ALL PIPE TO BE PRESSURE TESTED AT 150 PSI TO ENSURE THERE ARE NO LEAKS AT FUSED JOINTS OR FITTINGS.
6. INSTALL ANCHORS (CONCRETE BLOCKS) AT ALL VERTICAL AND HORIZONTAL CHANGES OF DIRECTION AND CLOSE TO FLANGED JOINTS.
7. ENTIRE SYSTEM TO BE SUPERCHLORINATED PRIOR TO USE.
8. DESIGN PARAMETER: 9,000 GALLONS PER DAY FLOW.



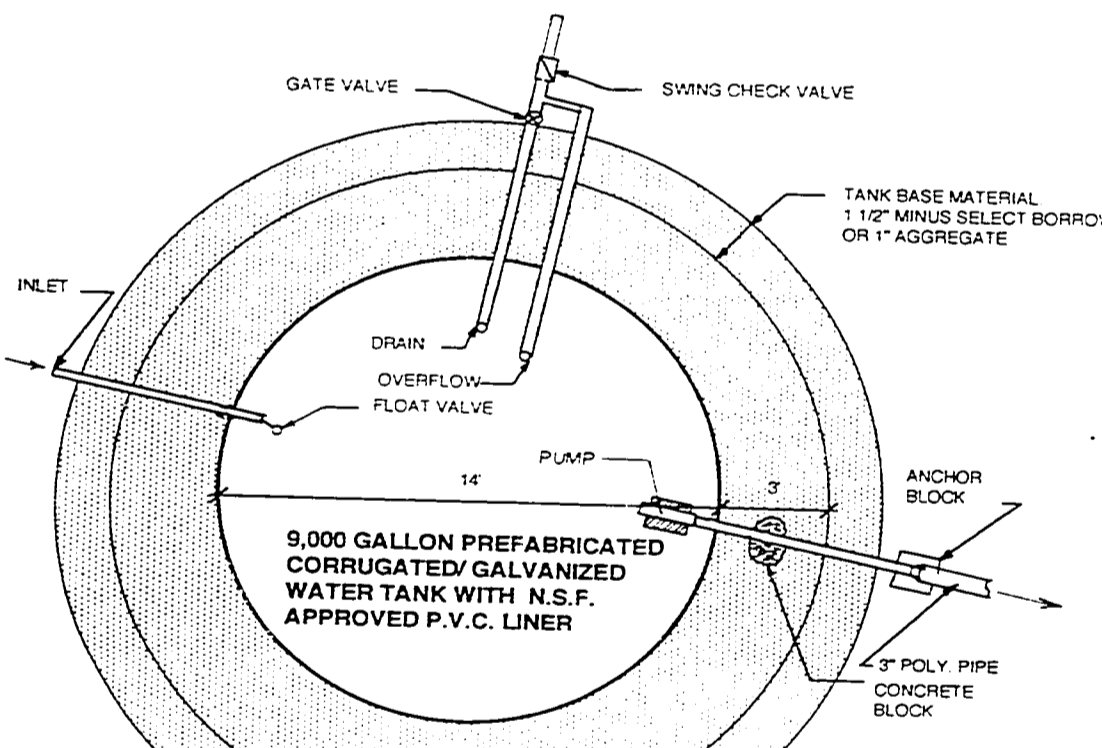
PROPOSED 9,000 GALLON WATER TANK SECTION

N.T.S.

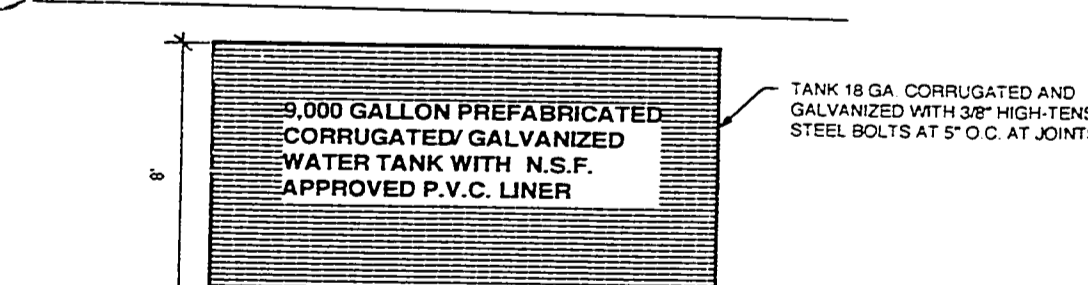


CENTER POST ASSEMBLY

N.T.S.

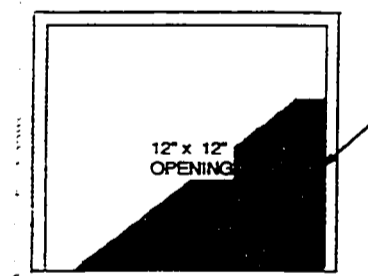


PLAN VIEW



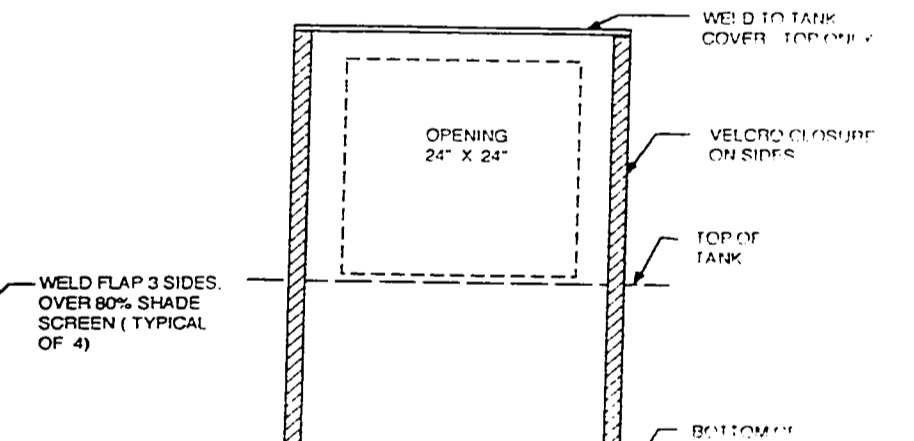
ELEVATION VIEW

N.T.S.



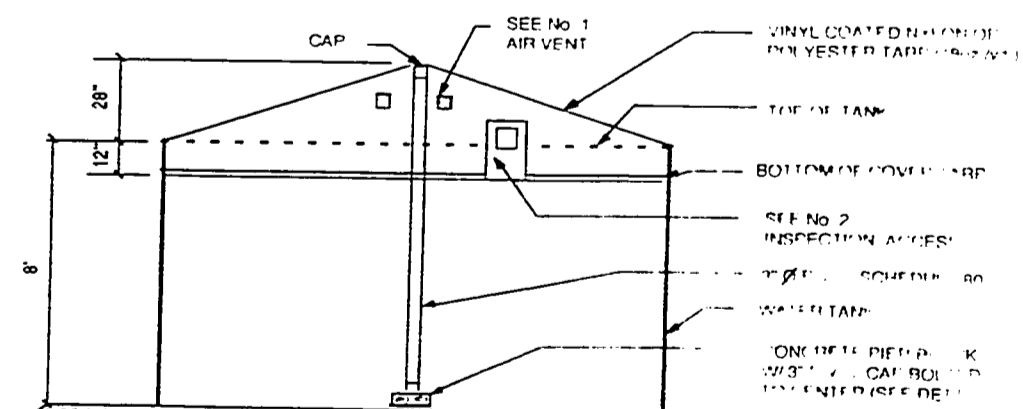
No. 1 AIR VENT

N.T.S.



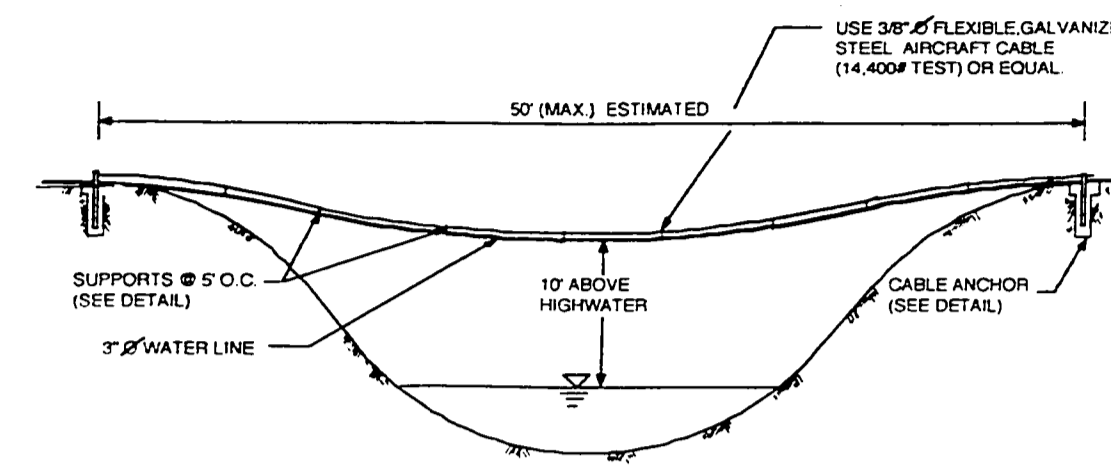
No. 2 INSPECTION ACCESS

N.T.S.



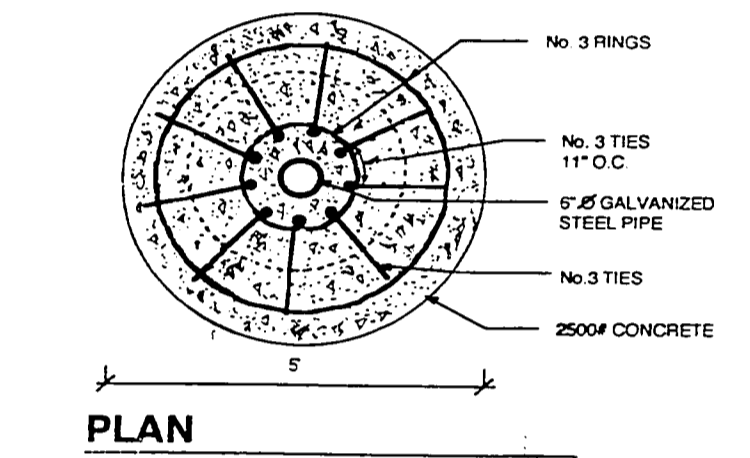
SOLID TANK TOP COVER

N.T.S.

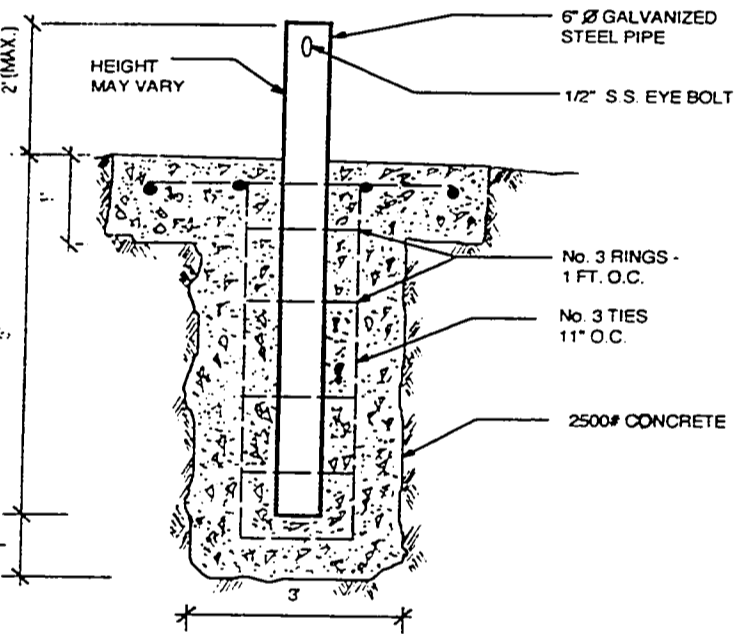


TYPICAL GULCH CROSSING DETAIL USING SUSPENDED CABLE

N.T.S.



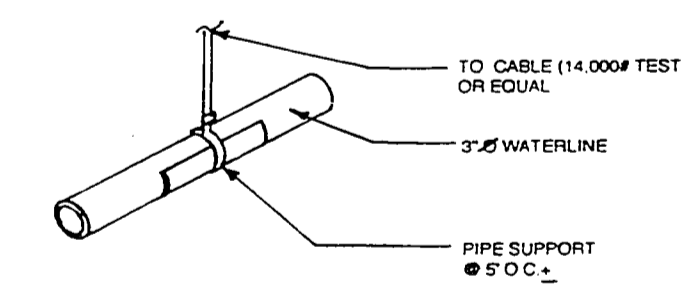
PLAN



SECTION

TYPICAL SUSPENDED CABLE ANCHOR DETAIL FOR GULCH CROSSING

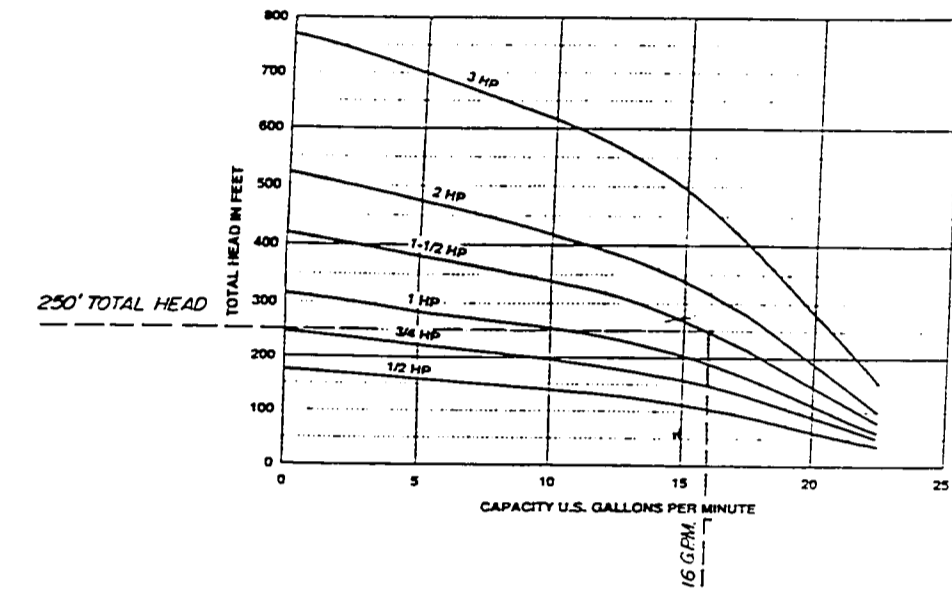
N.T.S.



TYPICAL SUPPORT

N.T.S.

15 GPM

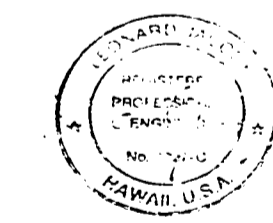


PUMP PERFORMANCE CURVE

FOR 1-1/2 HORSE POWER STA-RITE, SIGNATURE 2000 SERIES 4" SUBMERSIBLE PUMP

PUMP NOTES:

1. PUMP HYDRAULICS: TOTAL HEAD = ELEV. GAIN (200') + HEIGHT OF HWY TANK (15') + PIPE FRICTION LOSS (5') @ 14 GPM, LENGTH = 10,000', C=140. TOTAL HEAD = 250' + 92.3 PSI. THIS USE 1-1/2 HP, STA-RITE SIGNATURE 2000 SERIES, SUBMERSIBLE PUMP AT INTERSECTION OF OLD RR GRADE AND DEPT. OF WATER SUPPLY 6" DUCTILE IRON WATERLINE NEAR PAAULO TANKS, AT ELEV. 525.
2. PUMP CONTROLS: IF DEDICATED TELEPHONE LINES CAN BE MADE AVAILABLE AT BOTH THE PROPOSED PUMP SITE AND THE RELOCATED HIGHWAY TANKS SITE, A COMBINATION OF A FLOAT SWITCH RELAY AT THE HIGHWAY TANKS AND MAGNETIC STARTER AT THE PROPOSED PUMP CAN CONTROL PUMPING AT MINIMAL COST (LESS THAN \$1000). IF DEDICATED TELEPHONE LINES ARE NOT AVAILABLE AT BOTH SITES, FULLY AUTOMATED TELEMETRIC CONTROLS WILL COST \$7000 - \$10,000. ANOTHER LOW COST ALTERNATIVE, BUT NOT AS EFFICIENT, WOULD BE TO INSTALL A MAGNETIC STARTER AT THE PUMP SITE CONTROLLED BY A TIME CLOCK.



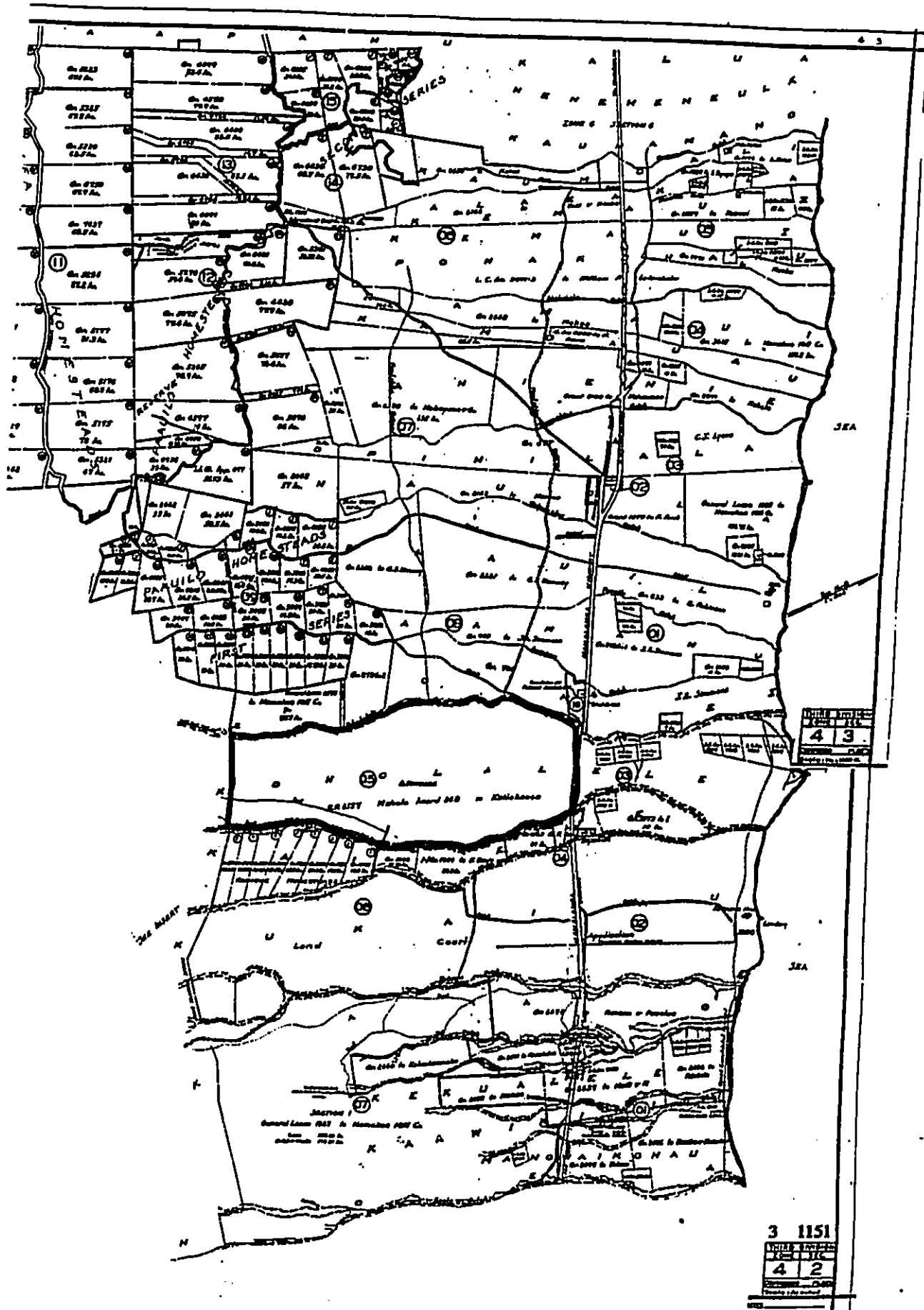
TITLE: MAUNA KEA RANCH WATER SUPPLY LINE - DETAILS

PREPARED BY: **JACOBY ENGINEERING**
P.O. BOX 10323
HILO, HAWAII 96721

SHEET: **2**
OF 2 SHEETS

0049 F

Figure 2-4
TMK MAP



Mauna Kea Ranch Pipe Line
TMK MAP

FIGURE 2-4

TMK 3/4-2-05:01, is currently owned by the County of Hawaii and referenced as Koholalele ahupuaa. The pipeline traverses the parcel at elevation 1000 feet and higher. The site lot size is 1040 acres, and is adjacent to lands owned by Kamehameha Schools / Bishop Estate (KS/BE). The lands are shown in Figure 2-4.

2.2 PROPOSED FACILITIES

The proposed pipeline project involves connecting to the DWS system, constructing a booster station and tank, burying the 3" HDPE pipe along the designated easement on the County lands, spanning gulches via suspension cable as shown in the engineering drawings, Figure 2-3, and connecting the pipe to the existing MKR water system located on KS/BE lands.

The following improvements will need to be included for the operation of the pipeline: preparatory site work; fencing of the booster station; booster pump installation, including piping and controls; piping, including burial, connections to the booster station and MKR water system; electrical system, including electric power motor controls, and telemetering.

The Department of Water Supply will provide the DWS meter as a standard hookup. The DWS water will be servicing 14 to 15 lots with a planned maximum day delivery of 600 gpd per lot, or a total of 9,000 gallons per day (GPD).

The foot print of the concrete pad for the booster pump, tank and piping total is approximately 400 square feet in area. This facility is not located on the County lands. Figure 2-3 shows the location of the system components in relation to the County lands and in reference to its surroundings and land divisions.

2.3 DEVELOPMENT SCHEDULE AND COST

Construction is scheduled to begin in the third quarter of 1996. The construction cost for this project is estimated at \$176,000.

2.4 PROJECT NEED

The current water demands in the MKR water system are met with DWS water from the Paauilo Water System at Kukaiau Village. The MKR system is presently supplied via a 5/8" DWS meter specified to deliver at a maximum of 600 gallons per day (gpd). The Paauilo System serves the town of Paauilo and some users along Mamalahoa Highway, including Kukaiau. The DWS system delivers about 25,000 gallons per day (gpd). The pressure at the end of the DWS system, where the existing MKR meter is located is old and small diameter. A heavy draw on the MKR system causes pressure drops at other users meters.

By relocating the meter connection, MKR can obtain more water from the DWS system and eliminate the pressure impact on the DWS system when MKR draws water.

Alternatives to a new pipeline are limited and are expected to be more expensive. Section 5 discusses the alternatives to the installation of the proposed pipeline across the County lands.

SECTION 3

EXISTING CONDITIONS

This section describes the existing conditions of the project including the existing land use designation, surrounding land uses, climate, geology and topography, soils, hydrology, flood hazards, earthquake hazards, flora and fauna, and archaeological and historic sites.

3.1 EXISTING LAND USE DESIGNATIONS

The MKR pipeline project boundaries fall within the State Agricultural Land Use District. Therefore, a Conservation District Use Permit is not required. The existing state land use designations are shown in Figure 3-1.

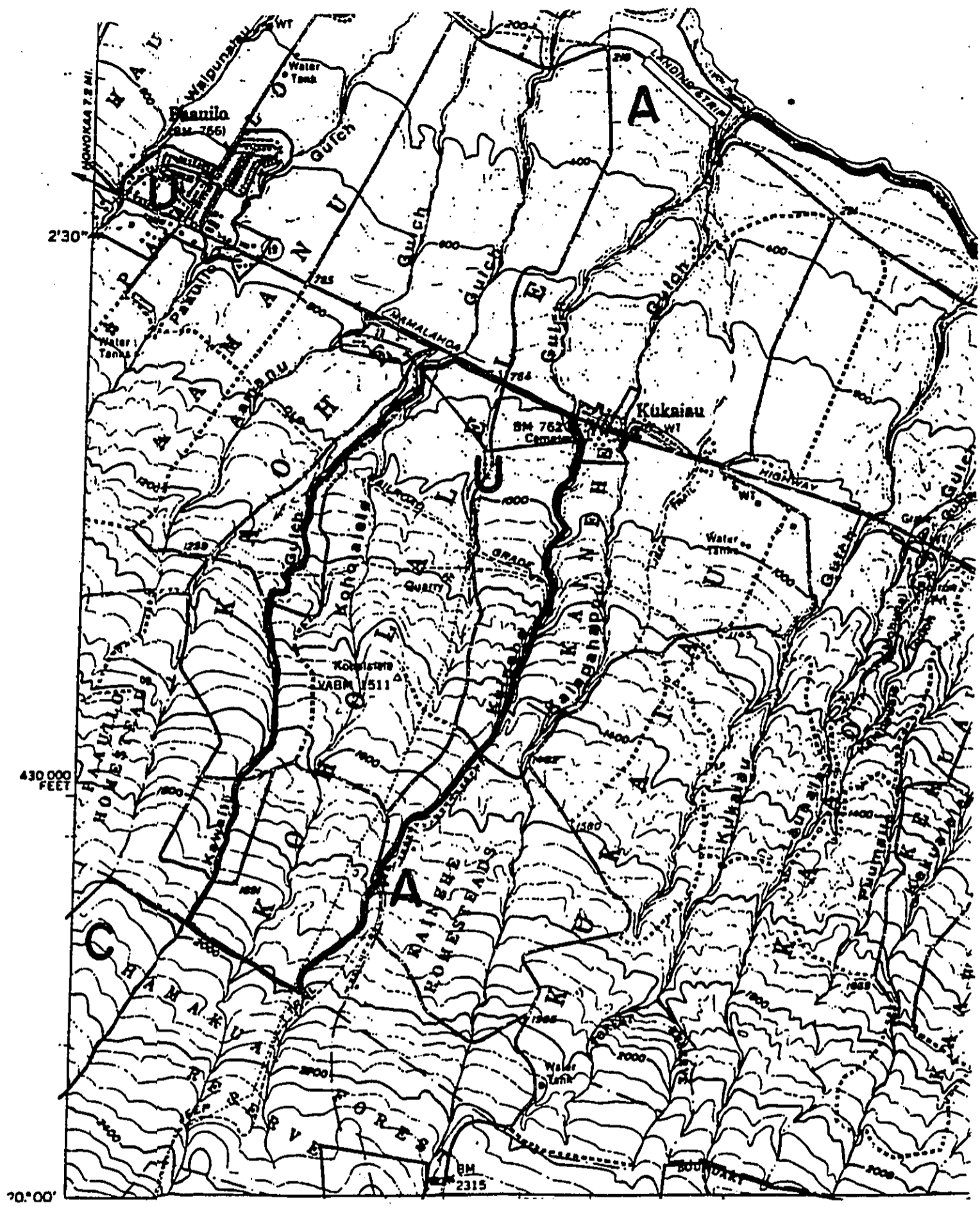
The County land use zoning designation is A-40a, which refers to agricultural lots greater than 40 acres.

3.2 SURROUNDING LAND USES

The surrounding lands have been extensively used for agriculture, both sugar cane and now forestry. A Conservation District/Forest Reserve is located 8,000 feet to the west (mauka) of the project site. The town of Paauilo is located to the north and east of the north end of the project. Paauilo falls under both Urban State Land Use Designations.

FIGURE 3-1

STATE LAND USE MAP



Mauna Kea Ranch Pipe Line
 STATE LAND USE MAP
 scale 1" = 2000 ft.

FIGURE 3-1

3.3 CLIMATE

The project area receives an average of 75 to 100 inches of precipitation per year, most of which occurs during the winter months. Due to the elevation of the project site, the average annual temperature is 70 F to 72 F.

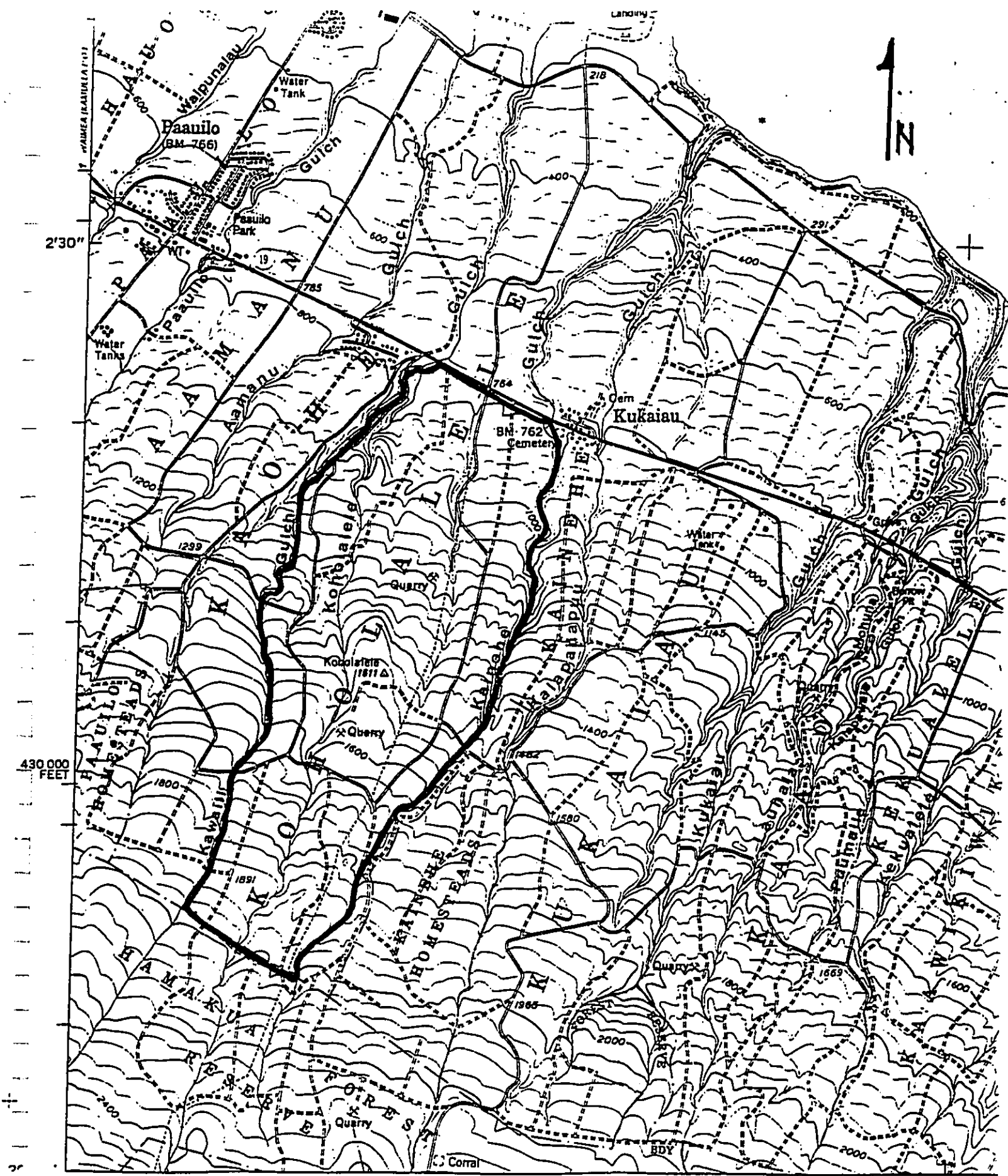
3.4 GEOLOGY AND TOPOGRAPHY

The project traverses over soils created from basalt flows from Mauna Kea mountain laid down in prehistoric time, containing a few inter-stratified beds of volcanic ash.

The groundwater level below the pipeline occurs at about elevation 10' MSL. No wells have been drilled above the highway nearby, but the Paauilo shaft taps the groundwater table at elevation 3.4 feet. This aquifer contains a basal fresh water lens.

The pipeline route is located on the slopes of Mauna Kea. The area is best characterized as gently sloping makai and is intersected by six narrow, steep sided gulches. A topographic map of the area is shown in Figure 3-2.

FIGURE 3-2
SITE TOPO MAP



Mauna Kea Ranch Pipe Line
 TOPO MAP
 scale 1" = 2000 ft.

FIGURE 3-2

3.5 SOILS

The soil at the project site is classified as Honokaa and Kukaiiau silty clay loams with slopes of 10 to 35 percent. This soil overlays the bedrock to a depth of less than 5 feet and consists of well drained silt loam formed from volcanic ash. These soils are found on the uplands at elevations ranging from 500 to 1,500 feet. Site inspections confirm soil with some exposed bedrock.

3.6 HYDROLOGY

The geology and known hydrology of the area confirms the presence of a basal aquifer within the basalt lavas of Mauna Kea. The water table likely stands at 10 feet above mean sea level, but has been unconfirmed by drilling.

Surface water flows down the sloping lands and finds its way to several gulches. These gulches are noted in Figure 3.2. During heavy rains the gulches convey run off water to the ocean. No interim instream standards are impacted as the pipeline crossings are overhead and will clear the high water level.

3.7 FLOOD HAZARDS

Flood Insurance Rate Maps (FIRM) were used to evaluate the potential flooding for the study area. Based on map number 155166-0250-C, dated September 16, 1988, the project site is designated as "other areas, Zone X - areas which are determined to be outside of the 500-year flood plain".

3.8 EARTHQUAKE HAZARDS

The island of Hawaii is classified as a Seismic Zone 3 area, as per the Uniform Building Code (1991). Given that the least active zone is Zone 0, and the most active zone is Zone 4, the possibility of an earthquake occurring on the Island of Hawaii is fairly high. All new structures will be designed and constructed to resist stresses produced by lateral forces which apply to the Seismic Zone 3. There is no known damage to other water systems in the area due to earth quakes in recent times.

3.9 FLORA AND FAUNA

Most of the plant species in the area are introduced, and there are no rare or endangered flora species in evidence on the County lands, along the pipeline. The areas along the tops of the gulches will be surveyed, but no known rare or endangered flora are known. The construction at these gulch sites is marginal and the impact is minimal. The area near and along the

pipeline site was, and probably will be cultivated and planted or grazed in the future.

No endangered fauna species are known to live along the project site. The Hawaiian Hawk (*Buteo solitarius*) and Short Eared Owl (*Asio Flammeus Sandwichensis*) are often sighted nearby, but there is no evidence of nesting along the pipeline route. Common species which could be found nearby include feral pigs, mynas, pheasant, quail, plovers, mongoose, and mice and other exotic species.

3.10 ARCHAEOLOGY AND HISTORIC SITES

According to the Department of Land and Natural Resources, State Historic Preservation Division (letter from Don Hibbard, dated June 7, 1996), the probability of finding any historic or archaeological site in the vicinity of the pipeline within the County lands is unlikely. The site has been severely altered and used for agriculture. However, should burials be found during construction, work must stop and the State Historic Preservation office must be contacted immediately.

SECTION 4

PROJECT IMPACTS AND MITIGATIVE MEASURES

The project impacts and their mitigative measures are discussed in the following sections. Some of the impacts discussed are construction noise, air quality,

flora and fauna, surface water and groundwater quality, archaeological and historic, traffic, public health and safety, and socioeconomic.

4.1 SHORT-TERM IMPACTS AND MITIGATIVE MEASURES

Short-term impacts will result from site clearing, grubbing and grading, and installation. These activities will be limited to the project site during construction period of approximately one month. The following sections discuss the short-term impacts and their mitigative measures.

4.1.1 Construction Noise

Noise generated from the mobilization of equipment along the access road, and the burying of the pipeline will be the primary impact during construction at the pipeline along the County lands area. Mobilization of equipment should be done only during daylight hours. Nearby residences may be as close as 1,800 feet to the pipeline route, and the noise impact on the nearby residential areas should not be significant.

In order to mitigate any noise impacts, the use of muffled construction equipment is recommended. Construction equipment is also expected to be properly maintained. Heavy vehicles must be in compliance with Title III Administrative Rules, Department of Health (DOH), Chapter 42, Vehicular Noise Control for Hawaii. Construction work will most likely not be done during the weekends and holidays.

4.1.2 Air Quality

Short-term air pollution from dust/dirt due to clearing, grubbing and grading, along with vehicular emissions from construction equipment, is expected to be insignificant. All operations will be conducted in conformance with the State Department of Health regulations regarding vehicular emissions.

All construction equipment shall be equipped with adequate emission control. All open-bed trucks shall be covered when transporting materials, which have the potential to become airborne, overall, the project is not expected to have significant impacts on air quality.

4.1.3 Flora and Fauna

No known endangered species of flora and fauna are known to be found along the pipeline route. Therefore, no short-term impacts are expected.

4.1.4 Surface Water and Groundwater Quality

Impacts on surface water and groundwater are expected to be insignificant. The surface water features are intermittent and normally dry streams. All crossings will be suspended over the gulches. If a line break did occur the water discharge from the pipe would be DWS quality, fresh water, posing no risk to the area.

Any storm runoff from the route will be mitigated by erosion control measures including berms at road crossings as needed. Dewatering is not necessary for this project. There are no expected discharges from this project. An NPDES permit is not required. All surface waters drain into existing drainage ditches, which may be used by the contractor. No flooding is expected to be caused by the contractor or run off water due to the capacity of the gulches.

4.1.5 Archaeological and Historical

No archaeological or historic sites are known to exist along the route, and no short-term impacts due to construction are expected.

4.1.6 Traffic

Because the pipeline route crosses only semi-paved side roads and no primary road or highway are impacted, and equipment needs are minimal, traffic impact is expected to be minimal.

4.1.7 Public Health and Safety

The construction contractor shall be responsible for implementing appropriate measures to ensure public health and safety during the construction period. Construction areas will be delineated with no-trespassing and safety signs.

4.1.8 Socioeconomic

Construction of the pipeline and related improvements will provide several related short-term jobs for the local workers. The purchase of materials from local suppliers will help the local building economy.

4.2 LONG-TERM IMPACTS AND MITIGATIVE MEASURES

No long-term impacts are expected for the pipeline project.

The following sections describe the production well's long-term impacts on noise, flora and fauna, drainage, stream flow, infrastructure, socioeconomic, land use and planned development.

4.2.1 Noise

Very little noise at the booster site will be generated from the pumping of the DWS water into the pipeline. This booster station is not on the County lands.

4.2.2 Flora and Fauna

Since there are no known endangered flora and fauna species along the pipeline route, no significant long-term impacts are expected.

4.2.3 Drainage

Any minimal amount of additional runoff generated from the project improvements will be allowed to sheet flow into existing natural drainage ways. No significant impacts on drainage are expected.

4.2.4 Stream Flow

The project should not have any significant effect on stream flow as the gulches are to be free-spanned via cables.

4.2.5 Infrastructure

Power will be required to operate the booster pump motor and control center. The horse power rating of the motor is 1.5 hp and the consumption is minimal and will not cause a burden on HELCO's existing power grid.

4.2.6 Socioeconomic

The Department of Water Supply (DWS), County of Hawaii is responsible for providing safe drinking water in a reliable manner to the people of the island of Hawaii. MKR is improving this reliability and service by allowing the DWS to provide better service support for the residential, commercial and agricultural water users of the water system service area and MKR to provide better service on its system.

4.2.7 Land Use and Planned Development

The proposed improvements are expected to remain consistent with the land use designation of the area. Both the County and State designations fall under agriculture.

SECTION 5

ALTERNATIVES TO THE PROPOSED ACTION

Four alternatives were considered for this project:

- 1) no action,
- 2) delayed action,
- 3) DWS pipeline extension and diameter increase,
- 4) alternate well or catchment sources.

These alternatives are discussed below.

5.1 NO ACTION

A no-action alternative is not practical, because the Department of Water Supply pressure problems will not be taken care of and MKR system needs will not be serviced.

5.2 DELAYED ACTION

Delayed action is also not a practical alternative. This would result in additional strain on the local water system infrastructure and the MKR water system.

5.3 DWS PIPELINE EXTENSION

The Department of Water Supply has an existing water system pipeline along Mamalahoa Highway, but the varying size causes pressure variations. Increasing the pipeline size would likely meet the needs of both the DWS and MKR, however the cost per lineal foot would be about \$100 as compared to the \$18 per lineal foot of the proposed project. This makes the cost burden prohibitive to MKR to make the improvements to the DWS pipeline.

5.4 ALTERNATE SOURCES

The use of catchment for home and agricultural use on the MKR is currently used. However, during dry periods this alternate source is unreliable. One of the purposes of the project is to maintain a reliable supply from the DWS water system. Any centralized catchment alternative would result in the need for a large additional reservoir storage capacity of perhaps 1 million gallons of covered storage. The use of diverted surface water would also require treatment under the Surface Water Rules of the Safe Drinking Water Act and its amendments. Such alternatives would be costly to place in service and include significant maintenance, regardless of the actual use.

SECTION 6

NEGATIVE DECLARATION DETERMINATION

The few negative impacts which have been identified in this Final Environmental Assessment should be adequately minimized by the suggested mitigative measures. In accordance with Chapter 343, *Hawaii Revised Statutes*, it has been determined that this project will not have significant environmental effect and an Environmental Impact Statement is not required for the proposed Mauna Kea Ranch Pipeline project. Therefore, this document constitutes a negative declaration.

SECTION 7

LIST OF NECESSARY PERMITS AND APPROVALS

The following permits and approvals are anticipated for the development of the proposed MKR pipeline project:

1. Plan Approval - Department of Water Supply, County of Hawaii.
2. Routing review - Commission of Water Resource Management, State DLNR.
3. Department of Land and Natural Resources, State of Hawaii.
4. State Historic Preservation Office Review Department of Land and Natural.

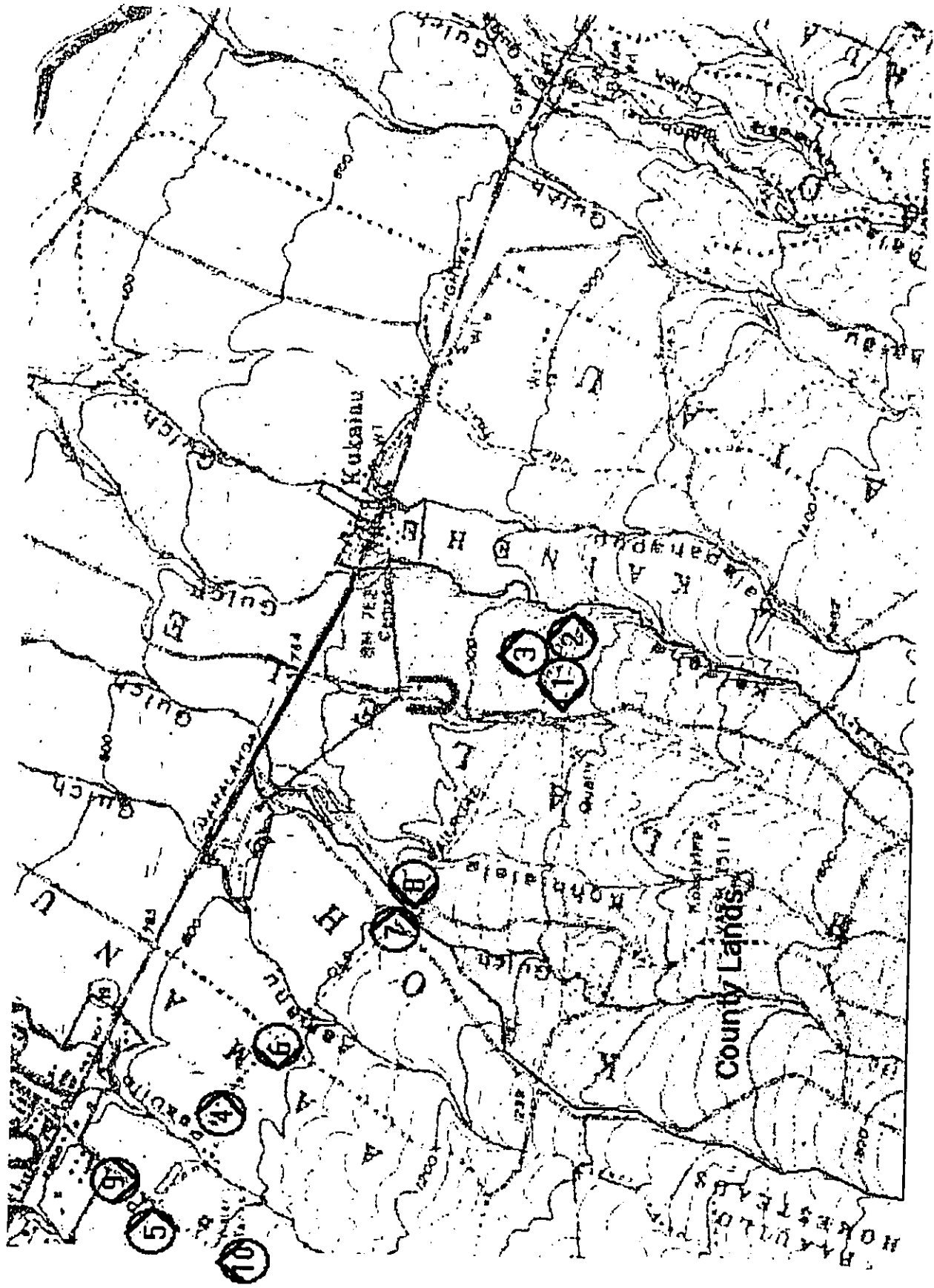
5. Pipeline Clearings and Grading Approvals, Mauna Kea Soil and Water Conservation District.
6. Utility Company Approvals - HELCO, Hawaiian Telephone.

REFERENCES

1. Island of Hawaii, Water Systems, Dept. of Water Supply, County of Hawaii.
2. Letter from Don Hibbard, Department of Land and Natural Resources, State Historic Preservation Division. July 27, 1994.
3. Megumi Kon, Inc. State of Hawaii, Commission of Water Resource Management, Department of Land and Natural Resources. *Hawaii County Water Use and Development Plan*. Review Draft, February 1992.
4. H.T. Stearns and G.A. MacDonald, *Geology and Ground-Water Resources of the Island of Hawaii*, Bulletin 9, Hawaii Division of Hydrography, 1946.
5. State of Hawaii, *Environmental Assessment Booklet*
6. State of Hawaii, Department of Land and Natural Resources, Division of Water and Land Development. *Rainfall Atlas of Hawaii*. R76. June 1986.
7. U.S. Department of Agriculture, Soil Conservation service. *Soil Survey of Island of Hawaii, State of Hawaii*. August 1972.
8. *Land Use District Boundaries, District Map H-50*, State of Hawaii, Land Use Commission, Dec. 20, 1974.
9. County of Hawaii General Plan.

APPENDIX A

PHOTOS OF PIPELINE ROUTE



Route Map and Photo Number References.



1. View north on County lands along railroad grade.



2. View south on County lands along railroad grade.



3. View makai of County lands along road way.



4. View of proposed pipeline route on railroad grade.



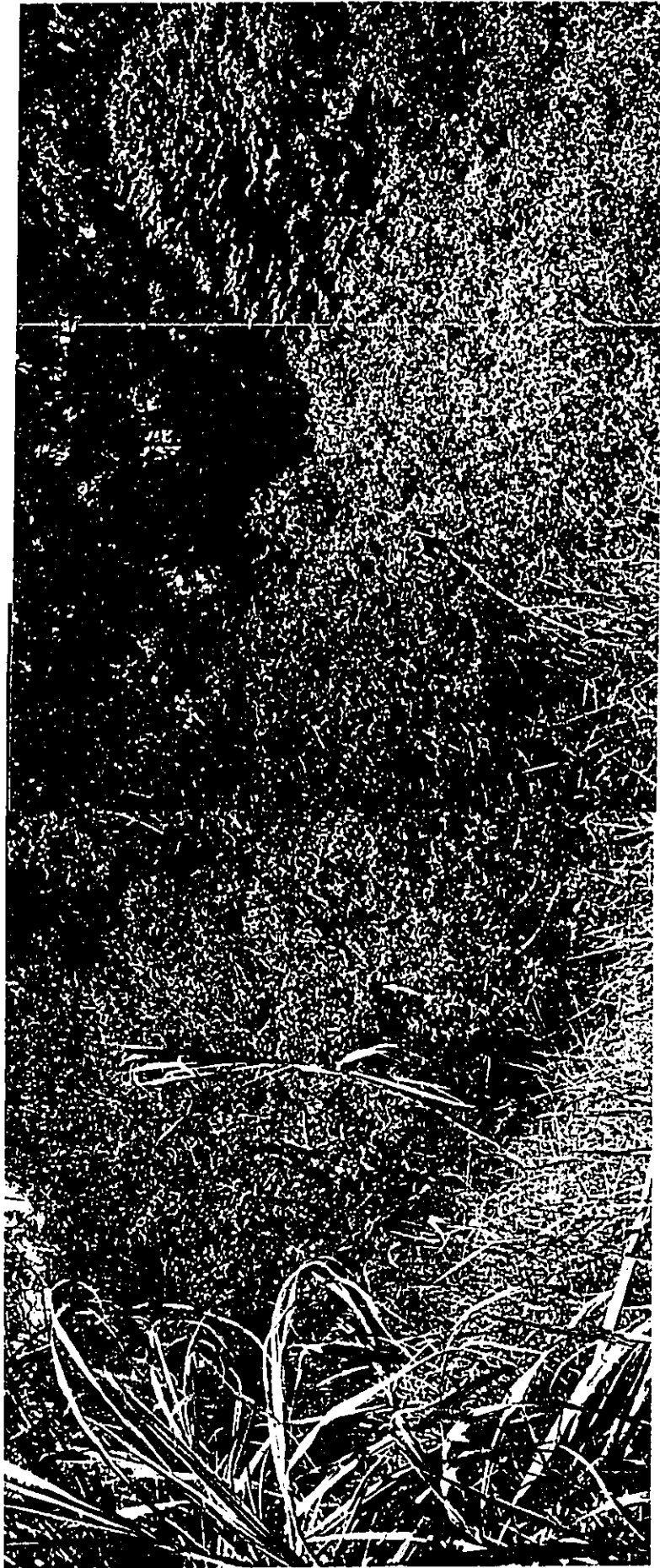
5. View south of proposed pipeline route start, booster location.



6. View north of proposed pipeline route on railroad grade.



7. Old railroad gulch
crossing structure.



8. Large gulch crossing area at Kawaili Gulch.



9. View mauka along road to DWS tanks at railroad grade.



10. View makai of DWS tanks.

LETTERS OF CORRESPONDENCE
DLNR, State Historic Preservation Division

PHOTO HEADINGS

Route Map and Photo Number References.

1. View north on County lands along railroad grade.
2. View south on County lands along railroad grade.
3. View makai of County lands along road way.
4. View of proposed pipeline route on railroad grade.
5. View south of proposed pipeline route start, booster location.
6. View north of proposed pipeline route on railroad grade.
7. Old railroad gulch crossing structure.
8. Large gulch crossing area at Kawaili Gulch.
9. View mauka along road to DWS tanks at railroad grade.
10. View makai of DWS tanks.