1949 - 1999: Celebrating 50 Years of Service
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833

May 11, 2000

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Finding of No Significant Impact (FONSI) for Ulumalu-Peahi Water System Improvements
TMK: 2-8-01:61 and 64, Haiku, Maui, Hawaii

The County of Maui, Department of Water Supply has reviewed the comments received during the 30-day public comment period which began on April 8, 2000. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the May 23, 2000 OEQC Environmental Notice..

We have enclosed a completed OEQC Publication Form and four copies of the final EA. Please call me at 270-7816 if you have any questions.

Sincerely,

David R. Craddick
Director

WKT
enclosures
cc: Warren S. Unemori Engineering, Inc.

Established 1969

2000-06-08-MA-FEA-

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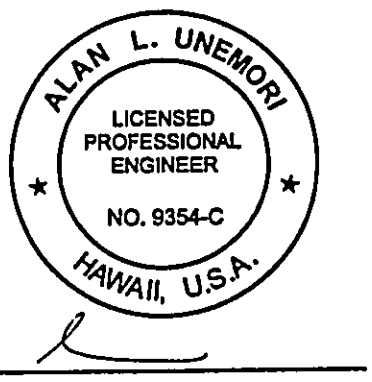
FINAL ENVIRONMENTAL ASSESSMENT

ULUMALU-PEAHI WATER SYSTEM IMPROVEMENTS
Ulumalu, Peahi, Maui, Hawaii

Job Number WC0208

Prepared For:

Department of Water Supply
County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793



Warren S. Unemori Engineering, Inc.
Civil and Structural Engineers - Land Surveyors
2145 Wells Street, Suite 403
Wailuku, Hawaii 96793

May, 2000

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PREFACE

The County of Maui, Department of Water Supply (DWS), proposes to construct a 300,000 gallon reinforced concrete Storage Reservoir, Booster Pump Station, 8-inch water distribution system with service laterals and fire hydrants within the Maui Ranch Estates subdivision and Upper Ulumalu Road, and connect an 8-inch line to the 200,000 gallon Kaupakalua tank located south of Kaupakalua Road/West Kuiaha Road intersection.

Pursuant to Chapter 343, Hawaii Revised Statutes; and, Chapter 200 of Title 11, Hawaii Administrative Rules; this Environmental Assessment documents the project's technical characteristics, environmental impacts and alternatives, and advances findings and conclusions relative to the project.

COUNTY OF MAUI
DEPARTMENT OF WATER SUPPLY PROPOSED ULUMALU-PEAHI WATER SYSTEM IMPROVEMENTS

AGENCY: County of Maui, Department of Water Supply.

PROJECT DESCRIPTION: The County of Maui, Department of Water Supply (DWS), proposes to construct a 300,000 gallon reinforced concrete Storage Reservoir, Booster Pump Station, 8-inch water distribution system with service laterals and fire hydrants within the Maui Ranch Estates subdivision and Upper Ulumalu Road, and connect to the 200,000 gallon Kaupakalua tank located south of Kaupakalua Road/West Kuiaha Road intersection.

The project involves Federal participating funds through the U. S. Department of Agriculture, Rural Service Utilities, the U. S. Department of Housing and Urban Development (HUD) through the County of Maui's Community Development Block Grant (CDBG) Program. The project is also funded by the Department of Water Supply and the County of Maui through a grant and contributions of the Maui Ranch Estates Owners Association. The HUD Environmental Assessment Checklist is attached as Appendix C. It summarizes the salient points and findings made in this Final Environmental Assessment Report.

The DWS has prepared the present Final Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. 4332(2)(c), 49 U.S.C. 303, and Chapter 343, Hawaii Revised Statutes. In the Final EA, three (3) alternatives were considered: (1) Alternative "1": the Proposed Action; and (2) Alternative "2": the Modify Existing System" alternative; and (3) Alternative "3": the "No-Build" alternative .

PROJECT SUMMARY:

The existing water distribution system within Maui Ranch Estates subdivision and adjoining properties are woefully inadequate from both pressure and fire flow standpoints. The existing water distribution system consists of 4, 3 and 2 inch lines that are too corroded to provide the minimum fire flow of 250 gpm required for agricultural lots. Moreover, this system is privately owned and metered through two 2-inch meters. The only storage provided is by the 100,000 gallon Kokomo tank at elevation 1500 feet, about 4.0 miles away. Consequently, should there be a line break between the tank and Ulumalu Road, consumers would be without water for fire protection or domestic use.

This project will replace the existing, substandard private water distribution system in Maui Ranch Estates subdivision and adjoining properties with a new 8-inch distribution system and regular fire hydrants (vs. existing standpipes). The project will serve approximately 81

lots. Existing water laterals and meters will also be replaced with standard DWS laterals and electronic meters. The construction of the 300,000 gallon storage reservoir will minimize disruption of service to consumers along Upper Ulumalu Road and areas below elevation 1160 feet on Kaupakalua Road. With the exception of the Tank Site and Booster Pump Station, all other construction will take place within existing private roadway and utility right-of-ways.

Based on the EA and supporting analyses, the DWS is satisfied that potential improvement and long-term impacts have been identified and addressed.

FOR FURTHER INFORMATION, CONTACT: Mr. David Craddick, Director, Department of Water Supply, County of Maui, 200 South High Street, Wailuku, Maui, Hawaii 96793; telephone: (808) 270-7816.

5/11/00

Date

David Craddick, Director
Department of Water Supply

I. PROJECT OVERVIEW:

A. APPLICANT:

The applicant is the Department of Water Supply, County of Maui (hereinafter referred to as DWS).

B. LOCATION:

The applicant is proposing to construct a 300,000 gallon reinforced concrete Storage Reservoir, Booster Pump Station, 8-inch water distribution system with service laterals and fire hydrants within the Maui Ranch Estates subdivision and Upper Ulumalu Road, and connect a 12-inch line to the Kaupakalua well and 200,000 gallon tank located south of Kaupakalua Road/West Kuiaha Road intersection (hereinafter referred to as the "Kaupakalua tank").

The 300,000 gallon reinforced concrete reservoir itself will be located in pasture land above the end of an unpaved section of Upper Ulumalu Road on land currently owned by the Souza Family Trust (TMK 2-08-01:61) at an approximate elevation of 1300± feet. The area of the tank site is expected to be approximately 1.0 acre, and will be purchased by the County (see Figure 1).

A Booster Pump Station is also proposed to be located across an unpaved section of Upper Ulumalu Road from the southwest corner of the Maui Ranch Estates subdivision. This parcel is also currently owned by the Souza Family Trust (TMK 2-08-01:64) and will be purchased by the County. An alternate Booster Pump Station site is also being considered between elevation 1040 feet and 1060 feet.

All other water system improvements will occur within the right-of-ways for Upper Ulumalu Road, within right-of-ways in the Maui Ranch Estates subdivision, Kaupakalua Road (between the existing 8-inch "Maldonado line" and the "Kaupakalua tank"), and a short segment of Pakanu Street.

C. LAND OWNERSHIP:

The proposed project extends over portions of private roadway right-of-ways and utility easements which are owned privately. Easements will be conveyed to the Department of Water Supply. The Tank and Booster Pump site will be transferred to the Department of Water Supply by quitclaim deed.

D. EXISTING LAND USE:

The site of the proposed 300,000 gallon reservoir and the site of the proposed Booster Pump Station are currently being used as ranch land for cattle. It is zoned to be "Agricultural" in the latest "Paia-Haiku Community Plan", effective May 17, 1995. All other components of the proposed water distribution system will be constructed within existing private roadway right-of-ways and utility easements which are currently being used for the same purpose.

E. PROJECT NEED:

The Ulumalu-Peahi Water System Improvement will replace the existing, substandard water distribution system in Maui Ranch Estates subdivision and adjoining properties along Upper Ulumalu Road with one that meets or exceeds current minimum County DWS Standards, as well as meet some of the major goals of the "1995 Paia-Haiku Community Plan", which was adopted on May 17, 1995.

The current source of water for the distribution system serving the Kokomo to Peahi areas is the Kamole Water Treatment Plant. Storage for the Kokomo to Peahi area is provided by a 100,000 gallon steel tank located south of the Haiku-Kokomo Road/Kaupakalua Road intersection at elevation 1500 feet.

At present, water from Kokomo tank is conveyed down Haiku-Kokomo Road, then to Kaupakalua Road to its intersection with Awalau Road. A pressure reducing valve downstream of the Awalau Road/Kaupakalua Road intersection reduces this pressure in this system before it feeds into a pair of parallel 12- and 6-inch lines on Kaupakalua Road. These lines tie back into a single 12-inch line about one-half mile northeast (downgrade) of the Awalau Road intersection. This 12-inch line discharges into a 100,000 gallon steel tank at elevation 1012.5 feet.

At a point approximately 500 feet above the 100,000 gallon tank, an 8-inch line referred to as the "Maldonado line" conveys water from the 12-inch line through a pressure sustaining valve across Awalau gulch to Upper Ulumalu Road. Pressure readings taken at fire standpipe 289 on Upper Ulumalu Road indicates that the 24-hour pressure reading ranges between 75 to 80 psi.

Although the existing line to Upper Ulumalu Road has adequate capacity and pressure to provide fire flow and pressure up to fire hydrant 289 on this road, the distribution within Maui Ranch Estates subdivision and adjoining properties in this area are woefully inadequate. The distribution system consists of 4, 3 and 2-inch lines that are too corroded to provide the minimum fire flow of 250 gpm required for

agricultural lots. Moreover, this system is privately owned and metered through two 2-inch meters. The only storage provided to service this subdivision is the 100,000 gallon Kokomo tank at elevation 1500 feet, about 4.0 miles away. Consequently, should there be a line break between the tank and Ulumalu Road, consumers would be without water for fire protection or domestic use.

With respect to the goals of the "1995 Paia-Haiku Community Plan", the Community Plan, Part III, "Policy Recommendations, Implementing Actions and Standards for the Paia-Haiku Region", Section B, "Goals, Objectives, Policies and Implementing Actions", "Physical Infrastructure", "Water", page 28, states the following (only relevant points listed for brevity):

> "***Goal***
>
> *An adequate supply of potable and irrigation water to meet the needs of the region.*
>
> ***Objectives and Policies***
>
> 1. *Increase water storage capacity with a reserve for drought periods.*
>
> 2. *Ensure that adequate water capacity is available for domestic and agricultural needs of the region.*
>
> 5. *Improve the existing potable water distribution system and develop new potable water sources prior to further expansion of the State Urban District boundary or major subdivision of land in the State Agricultural or Rural Districts.*
>
> 6. *Ensure adequate supply of groundwater to residents of the region before water is transported to other regions of the island."*

Part III, Section B, "Goals, Objectives, Policies and Implementing Actions", "Social Infrastructure", "Health and Public Safety", page 34:

> "***Goal***
>
> *A sense of security for all residents and visitors, and aid in the protection of life and property.*

Objectives and Policies

1. *Improve fire protection capabilities in the Haiku area and ensure adequate water pressure for fire protection, particularly in urban and rural areas."*

Clearly, the intent of the most recent "Paia-Haiku Community Plan" is that water system improvements are made where necessary. The proposed project will implement the objectives of the Paia-Haiku Community.

F. PROPOSED ACTION:

Anticipated improvements include (see Figures 2 and 3):

(1) Construction of a 300,000 reinforced concrete reservoir in pasture land above the end of a currently unpaved section of Upper Ulumalu Road at an elevation of approximately 1300± feet, approximately 1-1/4 miles south and uphill from the southwest corner of the Maui Ranch Estates subdivision

(2) Construction of a Booster Pump Station with 10,000 gallon control tank immediately off a currently unpaved section of Upper Ulumalu Road across from the southwest corner of Maui Ranch Estates subdivision.

(3) Construction of approximately 3900 feet of 12-inch and 2700 feet of 8-inch outflow lines along Upper Ulumalu Road, including standard DWS water laterals, electronic meters and regular fire hydrants, increasing DWS standard fire flow from a minimum 250 gpm/2-hour rating to a 1000 gpm/2-hour rating

(4) Construction of an 8-inch water distribution system within Maui Ranch Estates subdivision right-of-ways, including

(a) Mamao Place
(b) Lanikai Place
(c) Koolau Road
(d) Kapuai Road
(e) Waipalani Road
(f) Kalipo Place
(g) Maluna Place

(5) Connection of the new 8-inch line on Maluna Place with an existing 8-inch line on the east end of Pakanu Street, including a pressure reducing valve on this line.

(6) Installation of pressure regulating valve assemblies at appropriate locations on Upper Ulumalu Road, Waipalani Road, Kapuai Road and Lanikai Place

(7) Interconnecting lines at cul-de-sacs between Waipalani Road and Lanikai Place, and between Kalipo Place and Upper Ulumalu Road to enhance circulation and minimize dynamic pressure losses in the system

(8) Construction of an 12-inch inflow line on Kaupakalua Road between the 200,000 gallon "Kaupakalua tank" and the western end of the "Maldonado line". This 12-inch inflow line will also be connected to existing lines supplying consumers on East and West Kuiaha Road to supplement their water supply.

(9) Construction of an 8-inch inflow line on Upper Ulumalu Road between the eastern end of the "Maldonado line" and the Booster Pump Station, and on Upper Ulumalu Road between the Booster Pump Station and the 300,000 gallon reinforced concrete tank

II. ALTERNATIVES ANALYSIS:

A. ALTERNATIVE "1" (*This is Alternative "C" in the Revised Preliminary Engineering Report dated March, 2000*):

Alternative "1" represents the proposed action. The tank site itself was selected based on the availability of the Upper Ulumalu Road right-of-way and the required elevation of the tank site above the Maui Ranch Estates subdivision, consumers along Upper Ulumalu Road and areas below elevation 1160 feet on Kaupakalua Road.

The "Kaupakalua tank" was chosen as the source of inflow for the proposed 300,000 gallon storage reservoir for the following reasons:

(1) It has its own on-site well with groundwater as its source vs. the surface water treated at the Kamole Water Treatment Plant (which, in turn, feeds the 100,000 gallon Kokomo tank)

(2) It is situated in close proximity of Kaupakalua Road at the 1235-feet elevation, nearly 2.7 miles closer (by existing pipe line) than the Kokomo steel tank

(3) At 200,000 gallons, it has a larger capacity than the 100,000 gallon Kokomo tank

(4) Its lower elevation (static pressure) allows it to serve consumers on West and East Kuiaha Road from the proposed new water system without the need for pressure reducing valves

The Booster Pump Station is needed to pump the relatively lower pressure water exiting the eastern end of the "Maldonado line" at approximately elevation 1135 feet up to the proposed site of the new tank at elevation 1300± feet since the "Kaupakalua tank" is lower than the proposed 300,000 gallon tank. Should DWS decide on a delivery rate of 1000 gpm at the Booster Pump site, the booster pump station will have to be moved to between elevation 1040 feet and 1060 feet to compensate for friction loss in the transmission line.

B. ALTERNATIVE "2" (*This includes Alternatives "A" and "B" in the Revised Preliminary Engineering Report dated March, 2000*):

Alternative "2" represents the "Modify Existing System" alternative. This Alternative represents two Options which initially considered the aging steel tank at Kokomo at elevation 1500 feet as the source the proposed water distribution system. For both Options, the water distribution system above the connection to the eastern end of the "Maldonado line" are identical to that for Alternative "1".

By Option 1 (Alternative "A" in the Engineering Report), a Booster Pump Station and 10,000 gallon Control Tank is proposed to tie into the eastern end of the "Maldonado line" to feed the proposed 300,000 gallon tank.

By Option 2 (Alternative "B" in the Engineering Report), a gravity flow system is proposed instead of a Booster Pump Station ***provided*** the pressure at the Awalau Road/Kaupakalua Road intersection can sustain a pressure of 125 psi or more. Within Option 2 two different routes were considered for the inflow gravity lines. Route A considered installing a new gravity feeder line along Awalau Road, across Kalakohi Gulch to Upper Ulumalu Road. Route B considered utilizing the existing "Maldonado line" for the gulch crossing. Route A was quickly abandoned in favor of Route B since Route A would require nearly 1700 linear feet of new gravity feeder line more than Route B, as well as require an additional gulch crossing.

Options 1 and 2 of Alternative "2" were considered before use of the "Kaupakalua tank" as a source was made available to the County. Once the "Kaupakalua tank" was made available, Route B became infeasible as a gravity-flow line since the "Kaupakalua tank" and well site (at elevation 1235 feet) is ***lower*** than the proposed new tank (at elevation 1300± feet).

For these reasons, the Options 1 and 2 of Alternative "2" were subsequently combined into the Hybrid alternative which is currently referred to as Alternative "1".

C. ALTERNATIVE "3":

Alternative "3" represents the "No-Build" alternative. This Alternative leaves the Maui Ranch Estates subdivision and consumers along Upper Ulumalu Road and areas below elevation 1160 feet on Kaupakalua Road with the same substandard and potentially-dangerous water distribution system which continues to deteriorate with time. It ***completely contradicts*** the Project Needs and the stated "Goals, Objectives and Policies" of the latest "Paia-Haiku Community Plan, including

"Physical Infrastructure - Water", and "Social Infrastructure - Health and Public Safety".

For these reasons, Alternative "3" was eliminated in favor of Alternative "1".

III. DESCRIPTION OF THE EXISTING ENVIRONMENT:

A. PHYSICAL ENVIRONMENT:

1. Surrounding Environment

The proposed 300,000 gallon tank site will be located in pasture land above the end of an unpaved section of Upper Ulumalu Road, approximately 1-1/2 miles up from the "five corners" intersection of Ulumalu Road, Kaupakalua Road, and Paia-Huelo Roads. Exhibit "B" shows the "Site Photographic Location/View Direction Map" corresponding to the photos in the vicinity of the tank site displayed in Exhibit "C".

The proposed Tank site is surrounded by Opana Gulch to the east, Kalakohi Gulch to the west, Maui Ranch Estates subdivision (which will be serviced by the proposed Tank) downhill to the north, and by the Koolau Forest Reserve to the southeast. The Wailoa Ditch (Tunnel) crosses east-to-west just above (and south) of the proposed Tank site.

2. Climate

The Ulumalu area has a mean annual temperature of 70° F with a typical diurnal (daily) range of 10° - 15° F experienced locally. The annual variation in mean monthly temperatures is only about 9° F statewide. Air temperature in Hawaii has a muted annual cycle because of the small season-to-season changes in solar radiation and the ocean's moderating influence. Differences in temperature from place to place are mainly due to elevation. Small differences in average temperature occur between cloudier, wetter, windward locations and sunny, dry, leeward areas at similar elevation. The rate of temperature decrease with elevation, called the lapse rate, is fairly constant at about 3.6° F per 1,000 feet below 4,100 feet (Atlas of Hawaii, Third Edition, 1998).

Annual rainfall amounts in the Ulumalu project site area range between 80 to 100 inches and is well distributed throughout the year.

3. Topography and Soils

The proposed Tank site is situated between Opana Gulch to the east and Kalakohi Gulch to the west, and consists mainly of pasture land and

woodland areas. The pasture land generally slopes up to 15 percent in the north-south direction.

According to the "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii", August, 1972, there are two soil classifications found in the vicinity of the project site - the Pauwela Series on the pasture land, and Rough Broken Land in the gulches. Figure 4 shows a map of the soil area. The Pauwela Series consists of well-drained soils on the uplands of the island of Maui. These soils developed in material weathered from basic igneous rock. They are gently sloping to moderately steep. Elevations run from 150 to 1,500 feet. The Pauwela clay, 7 to 15 percent slopes, (PfC) are used for pasture and water supply. Small acreages are used for pineapple and woodland. The natural vegetation consists of California grass, guava and ricegrass.

Rough, broken land (rRR) consists of very steep land broken by numerous intermittent drainage channels. In most places it is not stony. It occurs in gulches and on mountainsides on all the islands except Oahu. The slope is 40 to 70 percent. Elevations range from nearly sea level to about 8,000 feet. The local relief is generally between 25 and 500 feet. Runoff is rapid, and geologic erosion is active.

4. Flood and Tsunami Hazard

The project site is at elevation 1300± feet, surrounded on both the east and west by deep gulches and approximately 3.4 miles inland from the nearest coastline at Uaoa Bay. This is consistent with Panel Number 150003 0225B of the Flood Insurance Rate Map (effective date June 1, 1981, prepared by the U. S. Federal Emergency Management Agency, Federal Insurance Administration), which shows that the project site is entirely within Flood Zone C, outside the tsunami inundation limits and subject to Minimal Flooding (see Exhibit A)

5. Flora and Fauna

Natural vegetation on the Pauwela Series of soil consists of California grass, guava and ricegrass.

6. Wetlands

Given the location of the tank site at elevation 1300+ feet, situated on sloping pasture land between two large gulches and forest lands just uphill, it is no surprise that there are no wetlands within miles of the tank site.

7. Archaeological Resources

An Archaeological Inventory Survey was performed by Cultural Surveys Hawaii in February, 2000, and is attached in Appendix B. The Abstract in that document states the following [note that underlined portion is not highlighted in original document]:

> *"The specific project area includes a proposed reservoir site, access road corridor, and a booster pump station site, all located on gently sloping short-grass pasture between 1120' and 1320' elevation. No evidence of significant cultural resources were observed during surface inspection. While a portion of the "New Hamakua Ditch" (built in 1904) is shown as bisecting the project area no sign of this ditch was observed and it is assumed to be a tunnel in this stretch which will not be affected by the proposed water system improvements.*
>
> *The surveyed portions of the project area had excellent ground visibility, being either low pasture grass or an existing dirt and gravel roadway. No historic sites of any kind were observed during the survey. Thus, based on the absence of Historic Properties in the surveyed area* ***no further archaeological research is warranted****."*

8. Air Quality

There are no point sources of airborne emissions in the immediate vicinity of the project site. The air quality of the Ulumalu area is considered good with existing airborne pollutants attributed primarily to automobile exhaust from the roadways, although automobile traffic in this primarily agricultural and rural area is quite light compared to urban areas to the west. Prevailing trade winds quickly disperse any airborne pollutants.

9. Noise Characteristics

Traffic noise from Kaupakalua Road to the north, Awalau Road to the southwest, and the Maui Ranch Estates subdivision (which is more than 1/2

mile downhill of the Tank site) are the predominant sources of noise in the vicinity of the Tank site.

10. Scenic and Open Space Resources

The subject property will be located approximately 1-1/4 miles uphill from the intersection of Maluna Place and Upper Ulumalu Road at a very remote site, and is not considered to be part of a scenic corridor.

B. COMMUNITY SETTING:

1. Community Character

The Ulumalu-Haiku-Kaupakalua area is typically rural in character, with small urban nodes at Kuiaha, Haiku and Pauwela to service residents in these outlying rural and agricultural areas. The public infrastructure in this areas is limited; i.e., there is no municipal sewage treatment system and roadways are typically rural collectors.

The nearest local residential community is the single family Maui Ranch Estates subdivision, which is designated as "Agricultural" by the "1995 Paia-Haiku Community Plan". This subdivision is surrounded by Opana Gulch to the east, Kalakohi Gulch to the west, the Koolau Forest Reserve to the south, and the "five corners" intersection to the south. This community is quite remotely situated in the Kaupakalua area.

2. Population

The population of the County of Maui has exhibited relatively strong growth over the past decade, with the 1990 population estimated at 100,504, a 41.8 percent increase over the 1980 population of 70,847. Growth in the County is expected to continue, with resident population projected to the Years 2000 and 2010 estimated to be 124,562 and 145,872, respectively (Community Resources, Inc., January, 1994).

Just as the County's population has grown, the resident population of the Paia-Haiku Community has grown. The region had a resident population of 3,732 in 1970, 5,277 in 1980, and 7,788 persons in 1990 (1995 Paia-Haiku Community Plan). Over the past ten years, most of the residential growth in this area is the result of new subdivisions developed on agricultural lands. The forecasts used in preparation of the 1995 Paia-Haiku Community Plan

indicate a projected population of approximately 9,902 to 10,379 residents over the next 20 years. This translates into approximately 856 to 1,059 additional housing units.

3. Economy

The economy of Maui County is heavily dependent upon the visitor industry. In 1993, for example, total visitor arrivals numbered 2.5 million (Maui County Data Book, 1994). In the Paia-Haiku Community, light industrial activities have also grown and now occupy several renovated facilities that were once pineapple canneries. Agricultural activities include pineapple cultivation, nursery operations, and diversified agriculture.

4. Police and Fire Protection

The Maui Police Department (MPD) consists of five (5) patrol divisions and includes 410 employees. These divisions provide police services through its Hana, Lahaina, Lanai, Molokai and Wailuku districts. On Maui, the MPD includes 373 administrative, patrol and support personnel.

The closest Fire Stations to the Ulumalu area are the Makawao Fire Station and the Paia Fire Station, which are located at approximately 6 and 11 miles away, respectively.

5. Medical Facilities

Maui Memorial Medical Center, the only major medical facility on the island, services the Paia-Haiku region. Acute, general and emergency care services are provided by the 185-bed facility which is located in Wailuku.

6. Recreational Facilities

Over the past ten years, windsurfing has grown into a major sport, adding to other traditional activities in this North Shore area. The Hamakuapoko coast is important today as a world-renown surfing and windsurfing area. Public parks in the area include Baldwin Park and "Small Park" in the Paia area, Hookipa Park, and various other public beaches.

7. Schools

The two schools in the Paia-Haiku Community are the Paia School on Baldwin Avenue, and Haiku School which is mauka from Hana Highway.

8. Solid Waste

Single-family residential solid waste collection service is provided by the County of Maui on a once-a-week basis. Residential solid waste collected by County crews are disposed at the County's 55-acre Central Maui Landfill located four miles southeast of the Kahului Airport. In addition to County-collected refuse, the Central Maui Landfill accepts commercial waste from private collection companies.

C. INFRASTRUCTURE

1. Roadway System

All roadways leading up to the Upper Ulumalu Road are rural collectors, typically two-lane roadways which are narrow and do not meet current County standards as they were constructed before the existing standards were adopted. These roads include Ulumalu Road, Kaupakalua Road, and the Paia-Huelo Road which intersect at the "five-corners" area.

2. Water

The current source of water for the distribution system serving the Kokomo to Peahi areas is the Kamole Water Treatment Plant. Storage for the Kokomo to Peahi area is provided by a 100,000 gallon steel tank located south of the Haiku-Kokomo Road/Kaupakalua Road intersection at elevation 1500 feet.

At present, water from Kokomo tank is conveyed down Haiku-Kokomo Road, then to Kaupakalua Road to its intersection with Awalau Road. A pressure reducing valve downstream of the Awalau Road/Kaupakalua Road intersection reduces this pressure in this system before it feeds into a pair of parallel 12- and 6-inch lines on Kaupakalua Road. These lines tie back into a single 12-inch line about one-half mile northeast (downgrade) of the Awalau Road intersection. This 12-inch line discharges into a 100,000 gallon steel tank at elevation 1012.5 feet.

At a point approximately 500 feet above the 100,000 gallon tank, an 8-inch line referred to as the "Maldonado line" conveys water from the 12-inch line through a pressure sustaining valve across Awalau gulch to Upper Ulumalu Road. From here, water is distributed to the Maui Ranch Estates subdivision through a privately owned system of 4, 3 and 2-inch lines.

3. Drainage

Drainage in most of the agricultural areas surrounding Ulumalu consists of sheet flow into the natural gulches and streams. There is no extensive drainage system such as curbs, gutters, swales and catch basins as the land is designated as "Agricultural".

4. Wastewater System

There is no municipal sewage treatment system for the Ulumalu area. Wastewater is typically diverted to cesspools or septic tanks and leach fields or seepage pits, generally on an individual houselot basis.

5. Electrical and Telephone System

Electrical and telephone service in the Ulumalu region is provided by Maui Electric Company, Ltd., and GTE Hawaiian Tel., respectively.

IV. POTENTIAL IMPACTS AND MITIGATION MEASURES:

A. IMPACTS TO THE PHYSICAL ENVIRONMENT:

1. Surrounding Uses

The proposed Tank site resides in a remote area in pasture land above the end of a currently unpaved section of Upper Ulumalu Road. The 300,000 gallon reinforced concrete tank is 61 feet in diameter, and 17 feet high. The Tank site is expected to occupy approximately 1.0 acre of existing pasture land. No adverse impact is anticipated.

2. Flora, Fauna and Wetland Considerations

Since the proposed Tank site will occupy 1.0 acre of existing pasture land, it is not expected to displace any flora or fauna of significance. As there is no wetland nearby, no adverse impacts are anticipated.

3. Archaeological Resources

As mentioned in Section III(A)7 above, an Archaeological Inventory Study was performed by Cultural Surveys Hawaii in February, 2000. The result of that study (the full Report is attached as Appendix B) concluded that ***"based on the absence of Historic Properties in the surveyed area no further archaeological research is warranted."***

4. Air Quality

Air quality impacts attributed to the project will include dust generated by short-term construction-related activities. Sitework, such as clearing, grubbing and grading, and utilities and pavement construction, for example, will generate air-borne particulates. Dust control measures, such as regular watering and sprinkling, will be implemented to minimize wind-blown emissions. In the long term, the Tank site itself will not increase airborne pollutants from increased automobile traffic in any significant way.

5. Noise

Short-term noise impacts associated with construction activities along the project corridor may occur. These impacts are lessened by the generally rural distances between the project corridor and immediate neighbors. Also,

the Tank site itself nearly 1/2 mile uphill from the highest elevation lots of the Maui Ranch Estates subdivision However, construction activities will be restricted to normal daylight working hours, from Monday through Friday, excluding certain holidays. Long term automobile traffic is not expected to increase due to the construction of the 300,000 gallon reinforced concrete storage reservoir.

6. Scenic and Open Space Resources

The subject property is not currently considered to be part of a scenic corridor.

B. IMPACTS TO COMMUNITY SETTING

1. Land Use and Community Character

Since the Ulumalu area is itself quite remote, and the proposed Tank site is even more remotely located, it is not expected to adversely impact either the land use or the community character of the area. The increased fire flow and reduced likelihood of water service interruption provided by the much closer, higher capacity new storage tank will increase the health and public safety of the communities serviced by the tank.

2. Population

On a short-term basis, the project will support construction and construction-related employment. The water system itself will not create long term employment, nor provide long-term residential housing. It will, however, improve the water distribution and fire mitigation capacities for the existing and anticipated future residential subdivisions and properties within the immediate and surrounding vicinity.

3. Police, Fire and Medical Services

The proposed action will not increase demands placed upon police, fire and medical services. On the contrary, it will enhance fire fighting capabilities to the Maui Ranch Estates subdivision and other consumers on Upper Ulumalu Road.

4. Recreation

As most of the parks and other recreational facilities are located nearer the coastline, the nearest of which is at least 3.4 miles away, the proposed water system improvements is not expected to affect recreational facilities in any adverse way.

5, Solid Waste

The completed project is not considered a direct solid waste generator.

C. IMPACTS TO INFRASTRUCTURE

1. Roadways

The proposed 300,000 gallon reinforced concrete tank and 8-inch water distribution system will not increase traffic except during the transportation of construction equipment during the Construction period. All roadway right-of-ways used to install the new water distribution system will be left at their present condition or better.

2. Water and Wastewater

The proposed project will not increase the consumption of (potable) water nor generate any wastewater, but will improve the capacity and service requirements for fire protection and domestic irrigation in the Ulumalu area as well as along East and West Kuiaha Roads.

3. Drainage

Existing drainage systems will not be affected in any way by the proposed 300,000 gallon reinforced concrete tank and the replacement water distribution systems.

V. RELATIONSHIPS 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 major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural" and "Conservation". The State Land Use district designation for both the proposed Tank and Booster Pump Station sites are "Agricultural". The proposed action involves the construction of a 300,000 gallon reinforced concrete storage reservoir, which are permitted uses within lands with the "Agricultural" designation.

B. 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 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 preserve for present and future generations existing geographic, cultural and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County."

Policy:

"Formulate a directed land use growth strategy which will encourage the redevelopment and infill of existing communities allowing for mixed land uses, where appropriate."

C. PAIA-HAIKU COMMUNITY PLAN

Refer to Section I.E "Project Need" in this Final Environmental Assessment for detailed ***Goals*** and ***Objectives*** in the 1995 Paia-Haiku Community Plan which are relevant to the proposed project. This Project is clearly consistent with the goals and objectives of this Community Plan.

D. ZONING

The Maui County Zoning designation for the proposed Tank site is "Agricultural". The proposed action involves the construction of a 300,000 gallon reinforced concrete storage reservoir, which are permitted uses within lands with the "Agricultural" designation.

E. COUNTY OF MAUI SPECIAL MANAGEMENT AREA

The project is ***not within the Special Management Area***. The southernmost (mauka) boundary of the Special Management Area on the North Shore of Maui is the Hana Highway. As the proposed Tank site is approximately 2-1/2 miles south (mauka) and inland from the nearest segment of Hana Highway an SMA Permit is not required.

VI. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED:

The proposed development will result in some unavoidable 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. To mitigate noise impacts from the pump station, fully encased submersible booster pumps and motors will be specified.

The proposed project is not anticipated to create any significant, long-term adverse environmental effects.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES:

The proposed project will result in the loss of approximately 1.0 acre of pasture land for the development of the Tank site. While the loss of this land is considered irretrievable, the project need for the water system improvements in the upper Ulumalu area is considered essential.

No other irreversible and irretrievable commitments of resources have been identified in connection with the proposed action.

VIII. FINDINGS AND CONCLUSIONS:

The proposed Project involves the construction of a 300,000 gallon reinforced concrete Storage Reservoir, Booster Pump Station, 12-inch transmission line from the tank to the 8-inch water distribution system with service laterals and fire hydrants within the Maui Ranch Estates subdivision and Upper Ulumalu Road, and connection of an 12-inch line to the 200,000 gallon Kaupakalua tank located south of Kaupakalua Road/West Kuiaha Road intersection.

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 herein in accordance with the "Significance Criteria" of Section 11-200-12 of the Administrative Rules. Based on the analysis, the proposed project will not result in any adverse impacts. Discussion of project conformance to the criteria is given below:

1. ***No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resource Would Occur as a result of the Proposed Project.***

   There are no known habitats of rare, endangered or threatened species of flora and fauna within the project limits.

2. ***The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment.***

   The project would not curtail the 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, Hawaii Revised Statutes.***

   The State Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statutes. The proposed action is in conformance with the following policies and guidelines:

   Environmental Policy:

   Enhance the quality of life by:

   "(c) 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:

Community life and housing

"(b) Develop communities which provide a sense of identify and social satisfaction in harmony with the environment...

(d) Foster safe, sanitary, and decent homes

(e) Recognize community appearances as major economic and aesthetic assets of the counties and the State; ... and preserve and promote mountain-to-ocean vistas."

4. The Economic or Social Welfare of the Community or State Would not be Substantially Affected

The project would directly benefit the local economy during the construction phase. In the long term, the project should have an indirect beneficial effect of providing higher fire flow and water supply capacities.

5. The Proposed Action does not Affect Public Health

No 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 major population changes are anticipated as a result of the proposed project. The project is not anticipated to have adverse impacts upon medical, police and fire protection services as well as other public service systems. In fact, the project will improve fire protection services within the Ulumalu-Peahi area.

7. No Substantial Degradation of Environmental Quality is Anticipated

No substantial degradation of environmental quality is anticipated as a result of the project.

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 does not involve a commitment to larger actions and should have no cumulative impacts on the environment.

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 on the subject property. Also, the "footprint" of the tank itself is only an area which will be approximately 100 feet in diameter.

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, will be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from construction equipment. Construction will be limited to daylight working hours.

In the long term, the project is not anticipated to have an impact on air quality or noise levels.

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.***

The entire project area is located in Zone C, areas of minimal flooding. The project does not involve lands subject to tsunami inundation, erosion-prone areas, geologic hazards, estuaries, fresh waters or coastal waters. Drainage patterns in the area surrounding the project will not be altered.

12. ***The Proposed Project would not Substantially Affect Scenic Vistas and Viewplanes Identified by County or State Plans or Studies***

Scenic vistas and viewplanes from the subject property are not identified in any County or State plans or studies.

13. The Project would not Require Substantial Energy Consumption

The project will only require reasonable energy consumption due to the operation of construction equipment, which will be limited to the period of construction.

Pumping water from elevation 1135 feet to 1300± feet will also require additional power cost. However, the increase per thousand gallons will be minimal, at $0.12 to $0.15 per 1000 gallons pumped.

Based on the foregoing findings, it is concluded that the proposed action will not result in any significant impacts.

IX. AGENCIES CONTACTED IN THE PREPARATION OF THE ENVIRONMENTAL ASSESSMENT:

The following agencies and organizations were (or will be) contacted during the Environmental Assessment review process:

1. Department of Land and Natural Resources
   State Historic Preservation District
   1151 Punchbowl Street
   Honolulu, Hawaii 96813

2. State of Hawaii
   Department of Health
   54 High Street
   Wailuku, Hawaii 96793

3. Department of Planning
   County of Maui
   250 South High Street
   Wailuku, Hawaii 96793

4. Paia Main Street Association
   P. O. Box 995
   Paia, Hawaii 96779

5. Haiku Community Association
   P. O. Box 1036
   Haiku, HI 96708

6. Maui Ranch Estates
   141 Kapuai Road
   Haiku, HI 96708

X. COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND APPLICABLE RESPONSES:

The only comments received during the 30-day Public Comment Period from April 8, 2000, through May 8, 2000, were the comments by the OEQC. A copy of the letter, dated April 27, 2000, and the letter of response are included in this Section.

BENJAMIN J. CAYETANO
GOVERNOR

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 27, 2000

Mr. David Craddick, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Subject: Draft Environmental Assessment for the Ulumalu-Peahi Water System Improvements, Maui

Thank you for the opportunity to review the subject document. We have the following comments and questions.

1. Will this project promote new development in the area? If so, describe the extent of development that could be supported by this project. What are the environmental and social impacts of the new development?

2. What are the height and width of the 300,000 gallon reservoir? Please illustrate the visual impacts of the proposed reservoir from public places such as roads and lookouts. Renderings of future structures superimposed on photos of existing views should be provided. We recommend constructing and painting the reservoir with materials and colors that blend with the surroundings. We also recommend landscaping with native Hawaiian plants to reduce the visual impacts.

3. Please list all federal, state and county permits that would be required for this project in the final environmental assessment.

4. Please consult with the State Historic Preservation Division and the U.S. Fish and Wildlife Service and include any comment letter or meeting minutes in the final environmental assessment.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson
Director

c: Warren Unemori Engineering, Inc.

1949 - 1999: Celebrating 50 Years of Service
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
TELEPHONE (808) 270-7816 • FAX (808) 270-7833

May 8, 2000

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Re: Your Letter, dated April 27, 2000, Regarding Draft Environmental Assessment for the Ulumalu-Peahi Water System Improvements, Maui

Dear Ms. Salmonson:

Thank you for your comments and questions regarding the Ulumalu-Peahi Water System Improvements Project. The following is an item-by-item response to your questions.

"1. *Will this project promote new development in the area? If so, describe the extent of the development that could be supported by this project. What are the environmental and social impacts of the new development?"*

The primary objective of this project is to replace the existing substandard private water system at the Maui Ranch Estates subdivision with a water system that meets existing County Standards for both water distribution and fire control. It is not being designed to significantly increase capacity to the point where substantial new development would be supported and is consistent with the County of Maui's, Haiku-Paia Community Plan.

"2. *What are the height and width of the 300,000 gallon reservoir? Please illustrate the visual impacts of the proposed reservoir from public places such as roads and lookouts. Rendering of future structure superimposed on photos of existing views should be provided. We recommend constructing and painting the reservoir with materials and colors that blend with the surroundings. We also recommend landscaping with native Hawaiian plants to reduce the visual impacts."*

Recognize that Upper Ulumalu Road is an unpaved dirt road that extends 5400 feet (more than a mile) from the paved section of road at the entrance of Maui Ranch Estates to the point where even the unpaved section of Upper Ulumalu Road ends at pasture land near an existing corral.

Sheet 1 displays the existing terrain, including contours and vertical sections in elevation, between a point (designated as Section 1) just downhill from the existing corral (at station 54+00), up to the location of the proposed replacement tank. The tank itself is another 1300 feet uphill from this point. On this sheet, we have defined 5 sections, starting at Section 1, at 300 foot intervals, going uphill towards the tank. In the lower left corner of Sheet 1, we have superimposed the existing ground at each of these cross-sections. Note that approximately in the vicinity of Section 3, there is an existing forest of trees which will completely obstruct any view of the tank from a person standing either at Sections 1 or 2. (The existence of the forest of trees is confirmed in Photos 5 and 6 shown in Exhibit "C", and the corresponding locations from which Photos 5 and 6 were taken, as shown in Exhibit "B" in the Draft EA Report)

Sheet 2 and 3 together show in both plan and profile what a 6-ft tall person standing at Section 1 would see ***even if the trees were removed completely.*** Namely, all he would be able to see is the top 5 feet of the tank from a distance of 1300 feet (or a quarter of a mile). To put that in more perceptible terms, the tank will look like a quarter laying on the ground from 19 feet away (if you were looking for it!).

The color chosen for the tank will be compatible with that of the existing landscape, which is predominantly pasture land on site and surrounded by forest reserve.

"3. *Please list all federal state and county permits that would be required for this project in the final environmental assessment"*

Agreed. A list of the anticipated applicable permits to one of your staff members, Jeyan Thirugnanam, on March 31, 2000. A copy of that list is attached for your information.

"4. *Please consult with the State Historic Preservation Division and the U. S. Fish and Wildlife Service and include any comment letter or meeting minutes in the final environmental assessment."*

A full copy of the Draft EA Report has been sent to each of the State Historic Preservation Division and U. S. Fish and Wildlife Service with a request for their review and comments.

Should you have any further questions on the contents to be included in the Final Environmental Assessment Report, please direct them to Alan Unemori at Warren S. Unemori Engineering -- Phone (808) 242-4403, Fax (808) 244-4856, e-mail: alan@wsue.com. Thank you.

Very truly yours,

David Craddick
Director

D:\MyFiles\Ulumalu\ULUMALU6.DOC

Anticipated Permits Needed for Ulumalu-Peahi Water Improvements Project

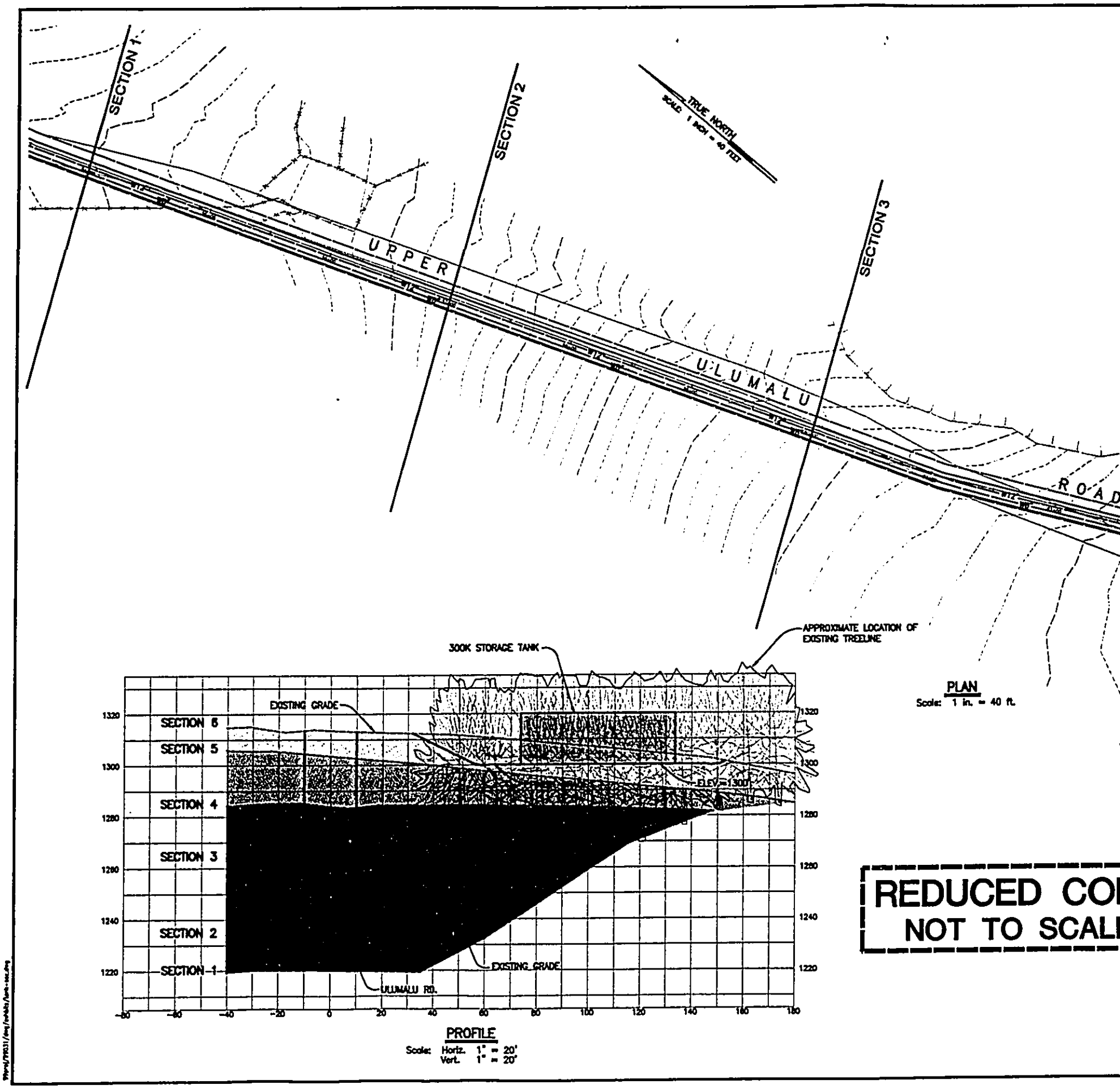
(1) NPDES General Permit for Discharge of Stormwater Associated with Construction Activity

(2) Maui County Grading Permit

(3) Maui County Building Permit

(4) Maui County Permit for Working Within County Right-of-Way

DOCUMENT CAPTURED AS RECEIVED

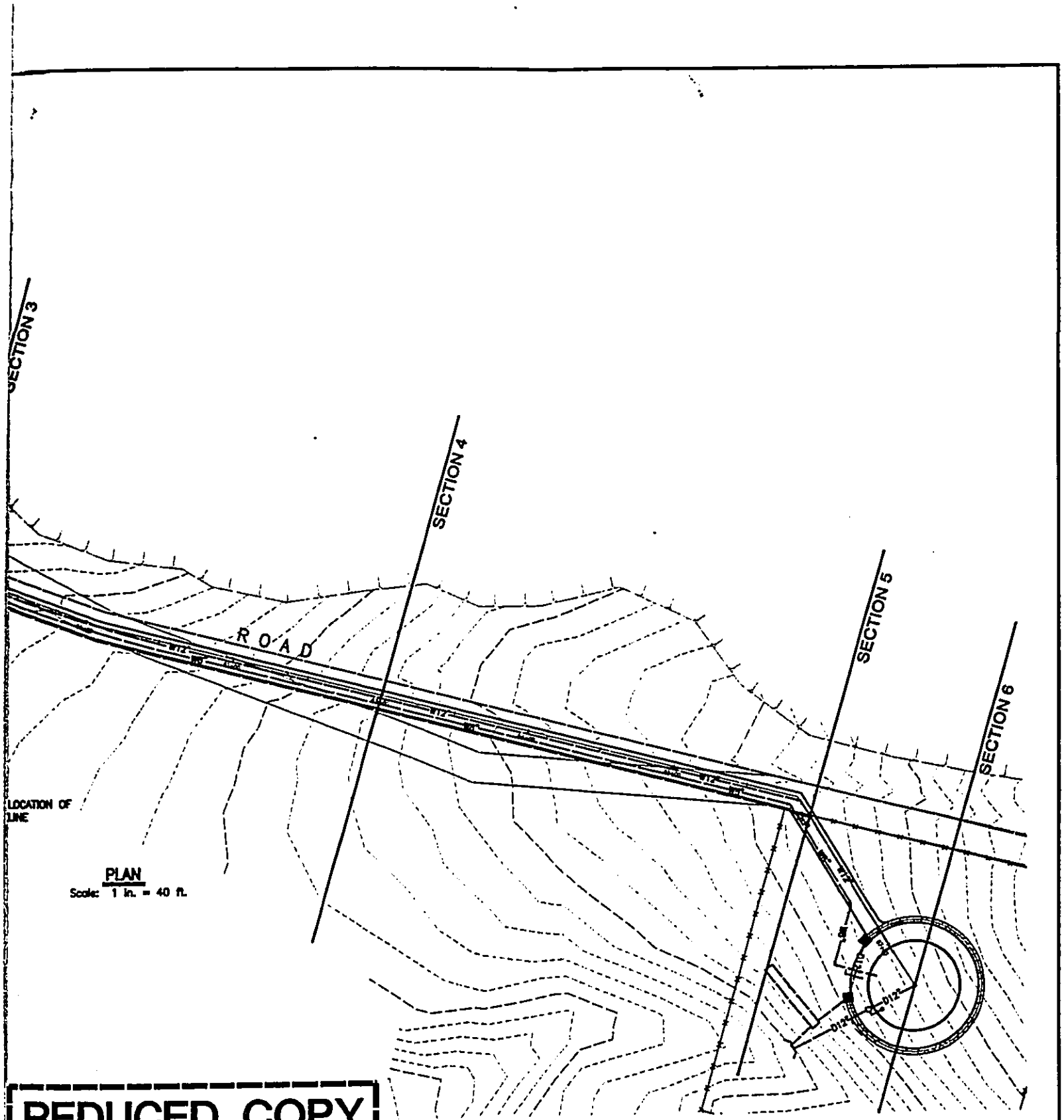


PLAN
Scale: 1 in. = 40 ft.

PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 20'

REDUCED CO
NOT TO SCALE

DOCUMENT CAPTURED AS RECEIVED



REDUCED COPY
NOT TO SCALE

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS/LAND SURVEYORS
WELLS STREET PROFESSIONAL CENTER, SUITE 403
2145 WELLS STREET, WAILUKU, MAUI, HAWAII 96793

ULUMALU - PEAHI WATER SYSTEM
ULUMALU, PEAHI, MAKAWAO, MAUI, HAWAII

TITLE SECTIONS ALONG UPPER ULUMALU RD.

M.M.M. DESIGNED BY	W.S.U. CHECKED BY	99031 JOB NUMBER	1 SHEET
D.P.T. DRAWN BY	W.S.U. APPROVED BY	Mar. 20, 2000 DATE	OF SHEETS
SCALE AS NOTED			

SIGNATURE DATE
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

LETTER	DESCRIPTION	DATE

TMK: 2-6-01 : 65
Charles Hamilton
(Owner)

TMK: 2-6-01 : 66
Mark S. Hanks
& wf. Tracy L.
Kenneth A. Breece
(Owners)

Ext'g. Driveway

Ext'g. Driveway

Ext'g 30' R.O.W.

Ext'g Electrical Fence

Ext'g Barbwire Fence

Ext'g Electrical Fence

Ext'g Shed

UPPER ULUMALU ROAD

Ext'g Barbwire Fence

TMK: 2-6-01 : 63
Wilfred J. Souza, Etal
(Owner)

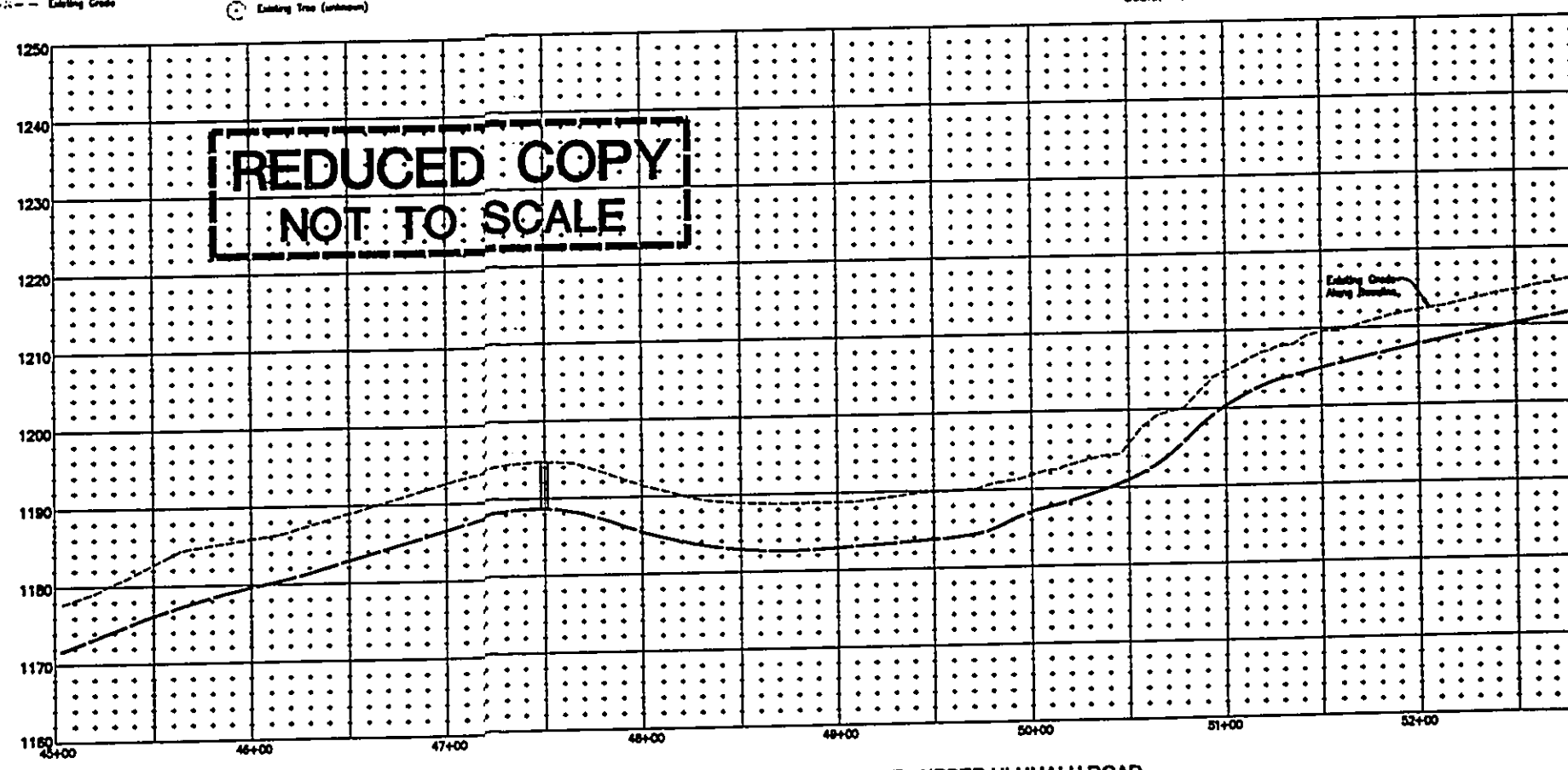
TMK: 2-6-01 : 64
Wilfred J. Souza, Etal
(Owner)

LEGEND:

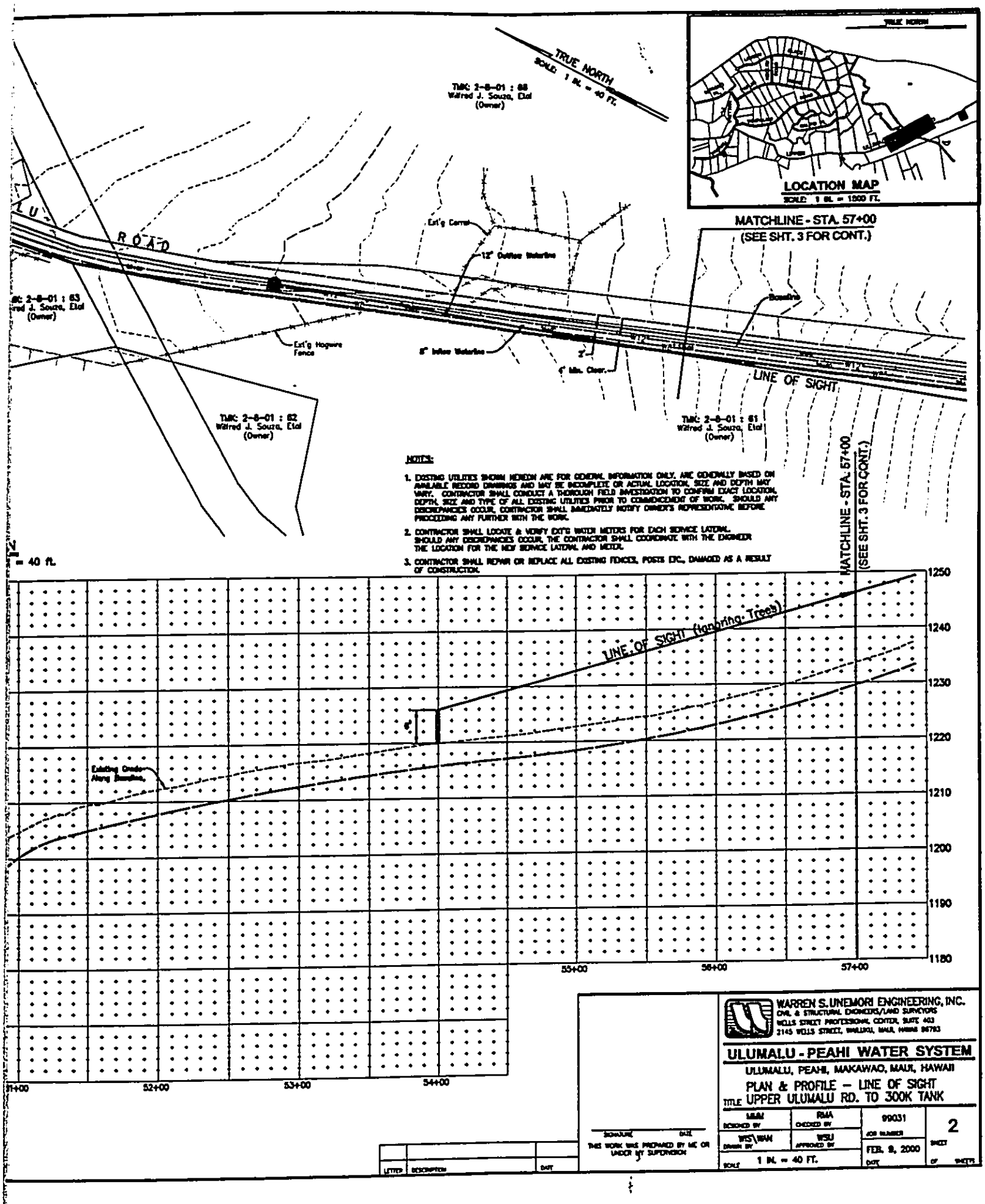
- Existing Fire Hydrant
- Existing Power Pole w/Guy Wire
- Existing Sign
- Existing Stormdrain
- Existing Water Meter
- Existing Water Valve
- Existing Water Manhole
- Existing Waterline w/Size
- New Fire Hydrant
- New Water Meter
- New PRV
- Single Service Water Lateral
- Double Service Water Lateral
- New Waterline w/Size
- Existing Grade

- Existing Banana Tree
- Existing Eucalyptus Tree
- Existing Ironwood Tree
- Existing Kukui Tree
- Existing Pine Tree
- Existing Palm Tree
- Existing Plum Tree
- Existing Umbrella Tree
- Existing Tree (unknown)

PLAN
Scale: 1 in. = 40 ft.



PROFILE - UPPER ULUMALU ROAD
Scale: Horiz. 1" = 40'
Vert. 1" = 10'



NOTES:

1. EXISTING UTILITIES SHOWN HEREON ARE FOR GENERAL INFORMATION ONLY, ARE GENERALLY BASED ON AVAILABLE RECORD DRAWINGS AND MAY BE INCOMPLETE OR ACTUAL LOCATION, SIZE AND DEPTH MAY VARY. CONTRACTOR SHALL CONDUCT A THOROUGH FIELD INVESTIGATION TO CONFIRM EXACT LOCATION, DEPTH, SIZE AND TYPE OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF WORK. SHOULD ANY DISCREPANCIES OCCUR, CONTRACTOR SHALL IMMEDIATELY NOTIFY OWNER'S REPRESENTATIVE BEFORE PROCEEDING ANY FURTHER WITH THE WORK.
2. CONTRACTOR SHALL LOCATE & VERIFY EXT'G WATER METERS FOR EACH SERVICE LATERAL. SHOULD ANY DISCREPANCIES OCCUR, THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER THE LOCATION FOR THE NEW SERVICE LATERAL AND METER.
3. CONTRACTOR SHALL REPAIR OR REPLACE ALL EXISTING FENCES, POSTS ETC., DAMAGED AS A RESULT OF CONSTRUCTION.

SIGNATURE DATE
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

LETTER	DESCRIPTION	DATE

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS/LAND SURVEYORS
WELLS STREET PROFESSIONAL CENTER, SUITE 403
2145 WELLS STREET, WAILUKU, MAUI, HAWAII 96793

ULUMALU - PEAHI WATER SYSTEM

ULUMALU, PEAHI, MAKAWAO, MAUI, HAWAII

PLAN & PROFILE – LINE OF SIGHT

TITLE UPPER ULUMALU RD. TO 300K TANK

DESIGNED BY: MMA	CHECKED BY: RMA	JOB NUMBER: 99031	SHEET: 2
DRAWN BY: WSI\WAH	APPROVED BY: WSU	DATE: FEB. 9, 2000	OF SHEETS
SCALE: 1 IN. = 40 FT.			

MATCHLINE - STA. 57+00
(SEE SHT. 2 FOR CONT.)

TMK: 2-8-01 : 68
Wilfred J. Souza, Etal
(Owner)

UPPER ULUMALU ROAD

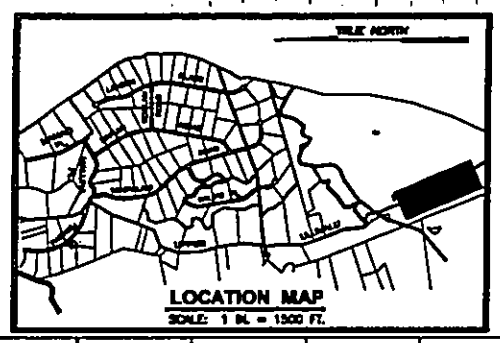
Existing 20' R.O.W.

12" Outflow Waterline

8" Inflow Waterline

LINE OF SIGHT

TMK: 2-8-01 : 81
Wilfred J. Souza, Etal
(Owner)



LEGEND:

- Existing Fire Hydrant
- Existing Power Pole w/Guy Wire
- Existing Sign
- Existing Standpipe
- Existing Water Meter
- Existing Water Valve
- Existing Water Manhole
- Existing Waterline w/Size
- New Fire Hydrant
- New Water Meter
- New PIV
- Single Service Water Lateral
- Double Service Water Lateral
- New Waterline w/Size
- Existing Grade
- Existing Banana Tree
- Existing Eucalyptus Tree
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- Existing Kukui Tree
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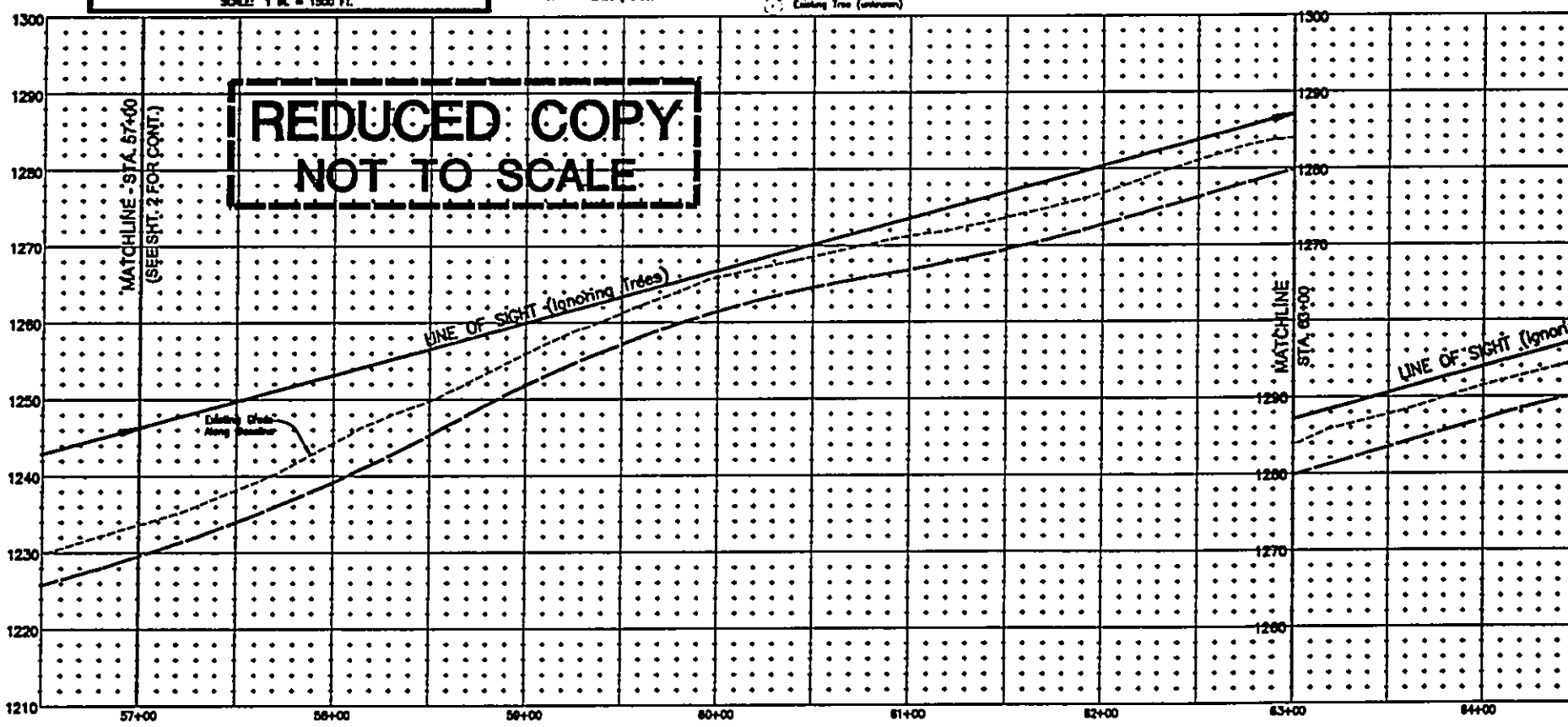
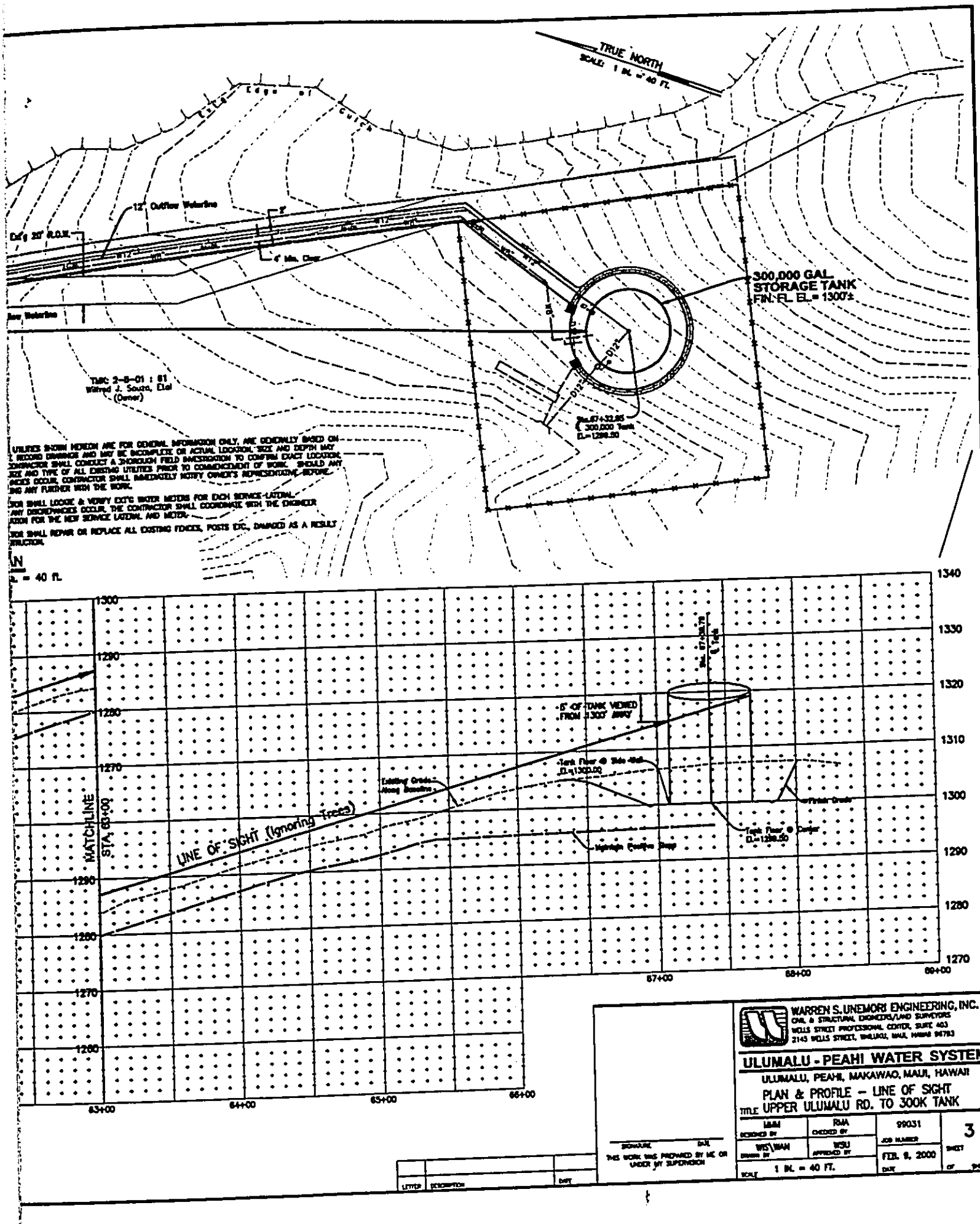
2. CONTRACTOR SHALL LOCATE & VERIFY EXIT'S WATER METERS FOR EACH SERVICE LATERAL. ... SHOULD ANY DISCREPANCIES OCCUR, THE CONTRACTOR SHALL COORDINATE WITH THE EN... THE LOCATION FOR THE NEW SERVICE LATERAL AND METER.
3. CONTRACTOR SHALL REPAIR OR REPLACE ALL EXISTING FENCES, POSTS ETC., DAMAGED ... OF CONSTRUCTION.

PLAN
Scale: 1 in. = 40 ft.



PROFILE - UPPER ULUMALU ROAD
Scale: Horiz. 1" = 40'
Vert. 1" = 10'



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CIVIL & STRUCTURAL ENGINEERS/LAND SURVEYORS
WELLS STREET PROFESSIONAL CENTER, SUITE 403
2145 WELLS STREET, WAILUKU, MAUI, HAWAII 96793

ULUMALU - PEAHI WATER SYSTEM

ULUMALU, PEAHI, MAKAWAO, MAUI, HAWAII

PLAN & PROFILE – LINE OF SIGHT

TITLE: UPPER ULUMALU RD. TO 300K TANK

DESIGNED BY: MJM	CHECKED BY: RMA	JOB NUMBER: 99031	SHEET: 3
DRAWN BY: WS\MAH	APPROVED BY: WSU	DATE: FEB. 9, 2000	OF SHEETS
SCALE: 1 IN. = 40 FT.			

SIGNATURE DATE
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

LETTER	DESCRIPTION	DATE

REFERENCES

- Community Resources, Inc., "Maui County Community Plan Update Program Socio-Economic Forecast Report", January, 1994
- "Paia-Haiku Community Plan (1995)", May 17, 1995
- Maui Economic Development Board, Inc., "Maui County Data Book", December, 1994
- Warren S. Unemori Engineering, Inc., "Revised Preliminary Engineering Report, Ulumalu-Peahi Water System Improvements", March, 2000, Prepared for County of Maui, Department of Water Supply
- State of Hawaii, Department of Business, Economic Development and Tourism, "Data Book", March, 1993
- U. S. Department of Agriculture, Soil Conservation Service, "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii", 1972
- University of Hawaii at Hilo, Department of Geography, "Atlas of Hawaii", Third Edition, 1998
- University of Hawaii, Land Study Bureau, "Detailed Land Classification-Island of Maui", May 1967

APPENDICES

APPENDIX A

Preliminary Engineering Report

Established 1969

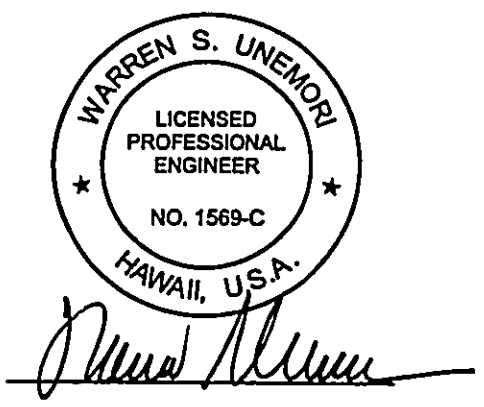
Revised Preliminary Engineering Report

ULUMALU-PEAHI WATER SYSTEM IMPROVEMENTS
Contract Number WC-0208

Ulumalu, Peahi, Maui, Hawaii

Prepared For:

Department of Water Supply
County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793



Warren S. Unemori Engineering, Inc.
Civil and Structural Engineers - Land Surveyors
2145 Wells Street, Suite 403
Wailuku, Hawaii 96793

Revised Date: March, 2000

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APPENDIX:

Engineering Report
for
Ulumalu-Peahi Water System Improvements

I. INTRODUCTION

This report provides a brief description of the existing system in the Upper Ulumalu area of Maui. It also describes the improvements proposed which includes the installation of a 300,000 gallon reinforced concrete storage reservoir and alternative means of getting water into this tank at elevation 1300 feet.

II. BACKGROUND

The current source of water for the distribution system serving the Kokomo to Peahi areas is the Kamole Water Treatment Plant. Storage for the Kokomo to Peahi area is provided by a 100,00 steel tank located south of the Haiku Kokomo Road/Kaupakulua Road intersection at elevation 1500 feet. A new well was recently drilled south of the Kaupakulua Road/West Kuiaha Road intersection by the Kulamalu Limited Partnership. The DWS is planning to construct a new storage reservoir south of this well at elevation 1500 feet and connect it to the distribution system for the Kokomo-Peahi water system. Water for this proposed storage reservoir will be provided by the new Kaupakulua well.

At present water from Kokomo tank is conveyed down Haiku Kokomo Road, then to Kaupakulua Road to its intersection with Awalau Road. A pressure reducing valve downstream of the Awalau Road/Kaupakulua Road intersection reduces the pressure in this system before it feeds into a pair of parallel 12 and 6 inch lines on Kaupakulua Road. These lines tie back into a single 12 inch line about one-half mile northeast (down grade) of the Awalau Road intersection. This 12 inch line discharges into a 100,000 gallon steel tank at elevation 1012.50 feet. At a point around 500 feet above the 100,000 gallon tank, an eight inch line referred to

as the "Maldonado line" conveys water from the 12-inch line through a pressure sustaining valve across Awalau gulch to Upper Ulumalu Road. Pressure readings taken at fire standpipe 289 on Upper Ulumalu Road indicates that the 24 hour pressure reading ranges between 75 and 80 psi.

III. EXISTING DEFICIENCIES

Although the existing line to Upper Ulumalu Road has adequate capacity and pressure to provide fire flow and pressure up to fire hydrant 289 on said road, the distribution system within Maui Ranch Estates and adjoining properties are woefully inadequate. The distribution system consist of 4, 3 and 2 inch lines that are too corroded to provide the minimum fire flow of 250 gpm required for agricultural lots. Moreover this system is privately owned and metered through two 2-inch meters. The only storage provided is by the 100,000 gallon Kokomo tank at elevation 1500 feet, about 4.0 miles away. Consequently should there be a line break between the tank and Ulumalu Road, consumers would be without water for fire protection or domestic use.

IV. PROPOSED IMPROVEMENTS AND DESIGN CRITERIA

DWS standard fire flow in agricultural zoned district is 250 gpm for a duration of two hours. This equates to minimum storage requirement of 30,000 gallons. However, because of the service area's remoteness and also since the proposed storage and distribution system is intended to provide backup storage and fire flow for areas below elevation 1160 feet along Ulumalu Road and Kaupakulua Road it is recommended that a higher fire flow rate of 1000 gpm be used. Also in lieu of standpipes, it is recommended that regular fire hydrants be installed. The existing laterals and meters should also be replaced with standard DWS Type A laterals and electronic meters.

The construction of a 300,000 gallon storage reservoir as proposed by DWS will minimize disruption of service to consumers along Upper Ulumalu Road and areas below elevation 1160 feet on Kaupakulua Road.

In order to fill the proposed 300,000 gallon tank utilizing the existing Kokomo-Peahi fire protection distribution system the following two alternatives were initially evaluated:

Alternative A (Booster Pump Option)

a. Install a 10,000 gallon steel control tank and booster pump station at the end of the existing County line on Upper Ulumalu Road near standpipe 289 at approximate elevation 1020 feet. Also install a standby power generator.

b. Install an 8-inch feeder line between this pump station and the proposed 300k tank along Upper Ulumalu Road right-of-way.

Alternative B (Gravity Flow Option by Modifying Existing System)

a. Relocate existing pressure reducing valve downstream of the Awalau Road/Kaupakulua Road intersection onto the existing 6-inch line.

b. Add approximately 1300 feet of 8-inch line on Kaupakulua Road between the end of the existing 12-inch line and 8-inch "Maldonado line" across Awalau gulch.

c. Remove and relocate the existing pressure sustaining valve from the "Maldonado line" to the interconnector line between the parallel 8 and 12 inch lines on Kaupakulua Road.

d. Extend 8-inch inflow line along Upper Ulumalu Road right-of-way between end of existing "Maldonado line" and new 300,000 gallon tank at elevation 1300 feet.

A cost comparison of these two alternatives are attached in Appendix A.

The feasibility of installing a gravity feeder line along Awalau Road, across Kalakohi Gulch to Upper Ulumalu Road was first considered. However this option was abandoned when it was learned that a gravity system utilizing the existing "Maldonado line" referred to in Alternative "B" would be more cost effective. The length of new line required in Alternative "B" would be 1700 feet less than in the Awalau Road option. Alternative "B" would also avoid the necessity of a second gulch crossing.

The following improvements to distribution system within Maui Ranch Estates are also proposed.

a. Extend new 12-inch outflow line along Upper Ulumalu Road right-of-way to the intersection of Maluna Place. Install water laterals and fire hydrants along this line.

b. Install new 8-inch distribution system, new service laterals and fire hydrants within Kalipo Road, Waipalani Road, Kapuai Road, Ko Road, Lanikai Place, Manao Place, and Maluna Place.

c. Interconnect new line on Maluna Place with existing 8-inch line on Pakanu Street. Also install pressure regulator valve on this interconnector line.

d. Install pressure regulating valve assembly at appropriate locations on Ulumalu Road, Waipalani Road, Kapuai Road, and Lanikai Place.

e. Interconnect lines between Waipalani Road and Lanikai Place, and Kalipo Place and Ulumalu Road, provided easements can be secured from the affected land owners to enhance circulation and minimize dynamic pressure losses in the system.

Alternative C (Hybrid System)

After reviewing the systems discussed in Alternatives A and B, the Department (DWS) decided to create a two level distribution system for the Kokomo-Peahi areas utilizing water from the recently completed Kaupakulua well and tank. The two systems are briefly described below.

All consumers located between elevation 1120 feet on Kaupakulua Road and West Kuiaha Road and the existing 100K Kokomo tank will remain in the high level system. All consumers along Haiku-Kokomo Road and Haiku will also remain in the high level service area. A new tank is also being designed to be constructed above the Kaupakulua well site at elevation 1500 feet. When completed, water from the Kaupakulua well will be pumped into this new tank. This new tank will replace the Kokomo tank and serve all consumers in the high level service area described above.

Consumers in the low level system along West and East Kuiaha Road, Upper and Lower Ulumalu (including Maui Ranch Estates) will be served by the Kaupakulua well and a 200,000 gallon tank at elevation 1235 feet near the well site. Since this Kaupakulua tank is located lower than the proposed 300,000 gallon tank on Upper Ulumalu Road, booster pumps will have to be installed at elevation 1135 feet west of Ulumalu Road to fill the new tank. An alternate booster pump site is proposed between elevation 1040 and 1060 feet (see Appendix C). Exhibit "C" shows the schematic layout of the proposed two level system.

V. SUMMARY

A pipe analysis of the proposed system was conducted using a maximum draw of 1000 gpm. The analysis indicates that at this rate, the lowest pressure would occur at the southerly end of Lanikai Place but would still be around 31 psi. A copy of the analysis is attached in Appendix B.

The two level hybrid system described in Alternative C and new distribution system proposed for Maui Ranch Estates will help to strengthen the distribution system in the Kokomo-Peahi area. It will also help to maintain better working pressure for the lower elevation consumers and reduce system failures often caused by excessive line pressures.

EXHIBITS

A. SCHEMATIC DIAGRAM OF ALTERNATIVE A

B. SCHEMATIC DIAGRAM OF ALTERNATIVE B

C. SCHEMATIC DIAGRAM OF ALTERNATIVE C

ULUMALU WATER SYSTEM IMPROVEMENTS

ALTERNATE "A"

(w / PUMP STATION)

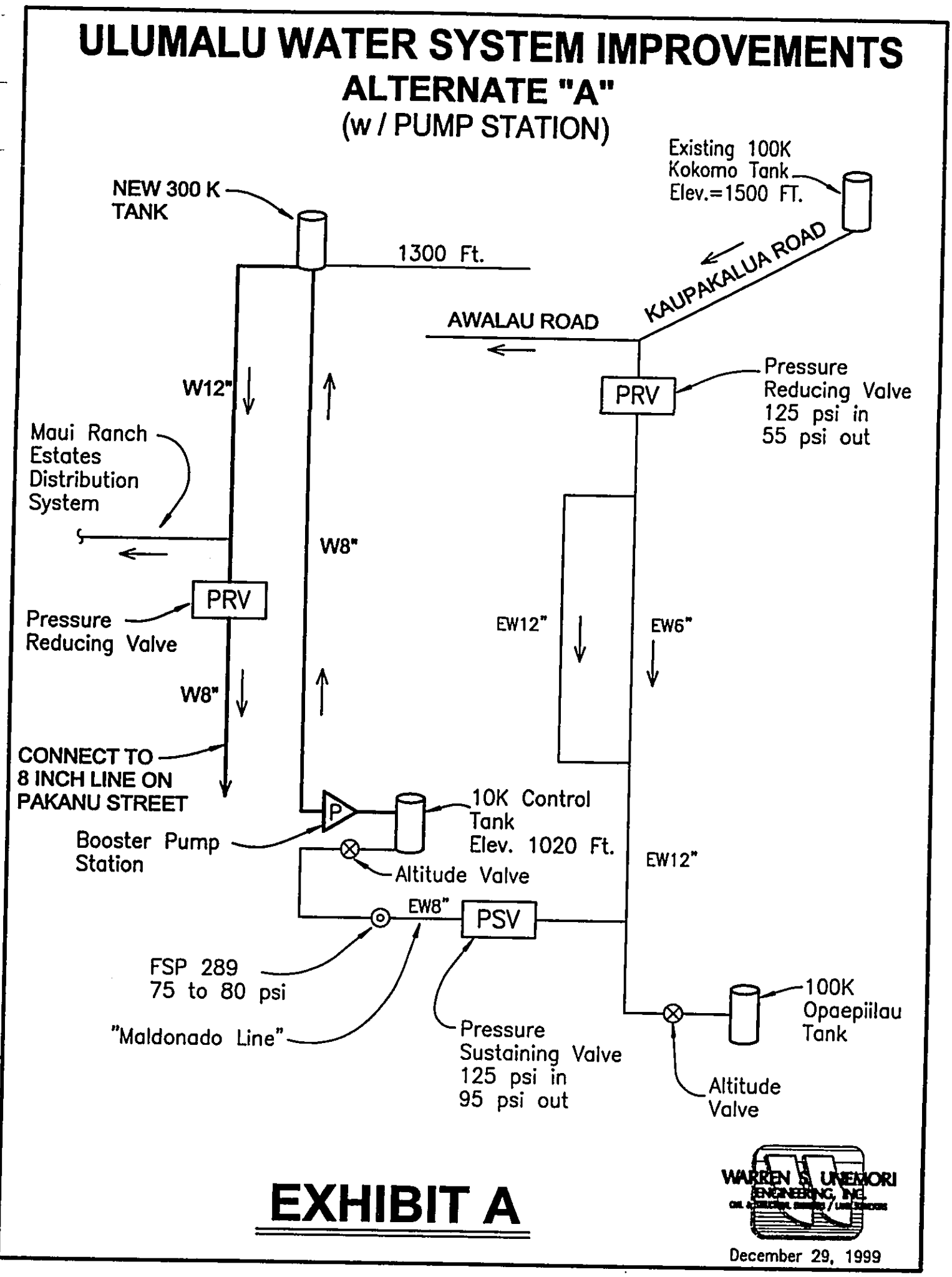

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EXHIBIT A

WARREN S. UNEMORI ENGINEERING, INC.

December 29, 1999

ULUMALU WATER SYSTEM IMPROVEMENTS
ALTERNATE "B"
(GRAVITY SYSTEM)

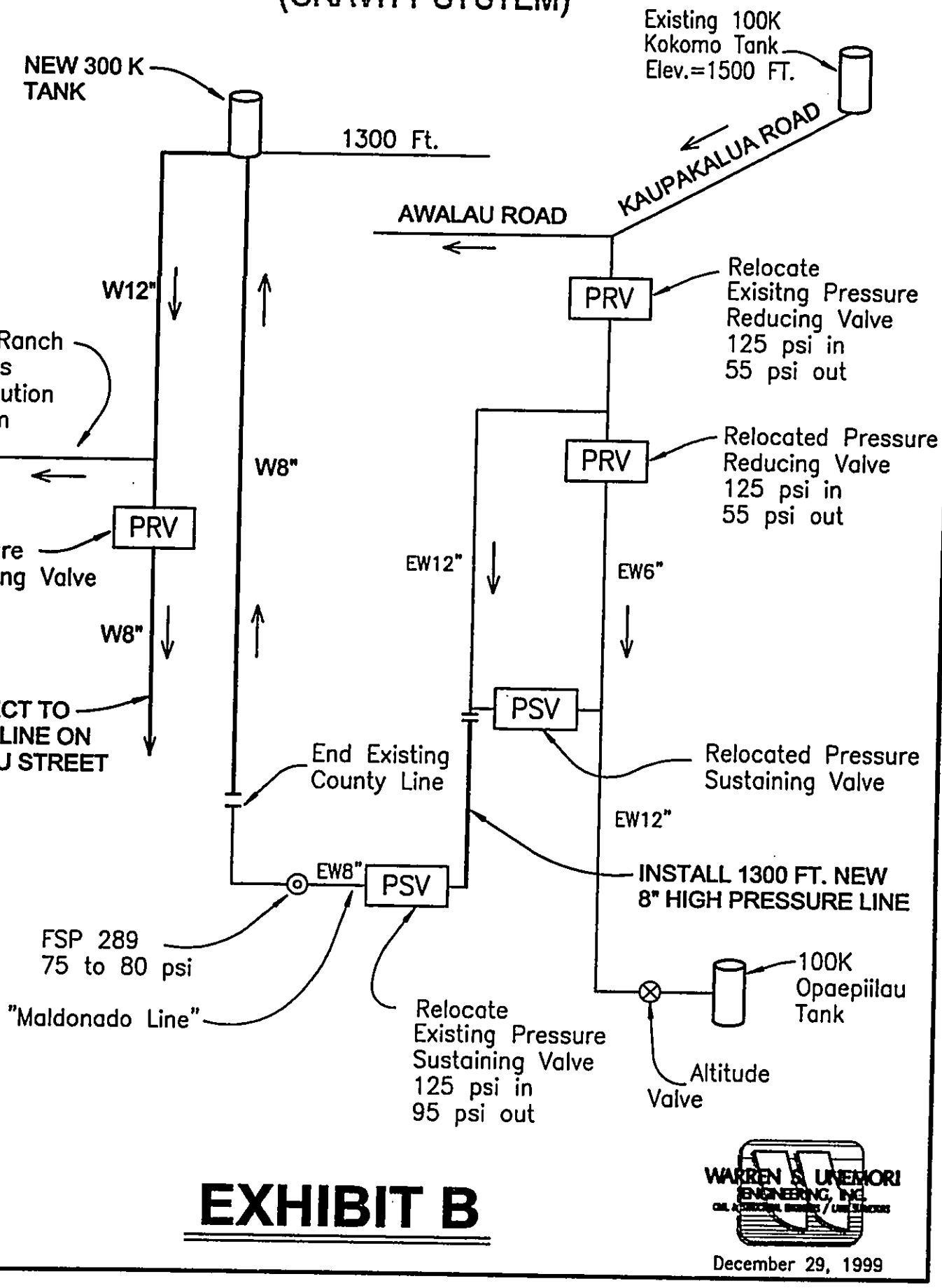

EXHIBIT B

WARREN S. UNEMORI ENGINEERING, INC.

December 29, 1999

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ULUMALU WATER SYSTEM IMPROVEMENTS

ALTERNATE "C"

(w / PUMP STATION)

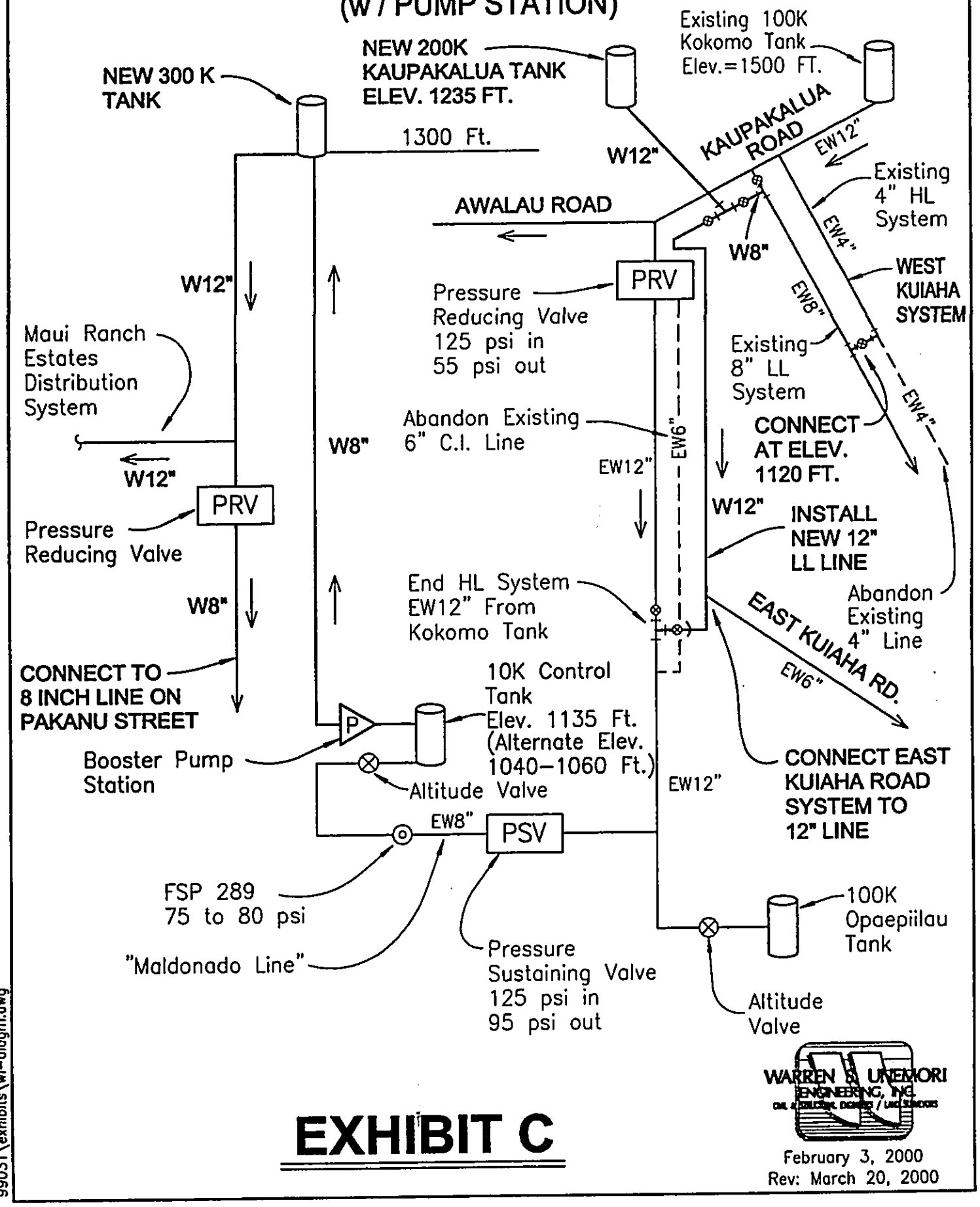

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EXHIBIT C

WARREN S. UNEMORI ENGINEERING, INC.

February 3, 2000
Rev: March 20, 2000

APPENDIX A

ORDER OF MAGNITUDE ESTIMATE FOR ALTERNATIVES A AND B

ORDER OF MAGNITUDE ESTIMATE
OFFSITE ONLY

12/20/99

Description of Item	Approx. Quan.	Unit		Unit Prices		Total
ALTERNATIVE A (WITH BOOSTER STATION)						
Booster Pumps including MCC and Electrical (2 pumps)		L.S.			$	200,000
Generator		L.S.			$	40,000
Pump Station Site Improvement		L.S.			$	20,000
8" Inflow Line	4,200	l.f.	$	55	$	231,000
8" Bends	8	each	$	350	$	2,800
Thrust Block	10	each	$	300	$	3,000
Traffic Control				Allow	$	2,000
Testing and Chlorination				Allow	$	3,000
Pavement Restoration (42,000 s.f./2) - 21,000 s.f.:						
2" A.C.	262	ton	$	80	$	20,960
6" UTB	788	ton	$	32	$	25,216
Primer	817	gal.	$	3	$	2,451
				SUM OF ITEMS:	$	550,427
				10% CONTINGENCY:	$	55,043
				PROBABLE CONSTRUCTION COST:	$	**605,470**

BASIS OF PROPOSAL

1. Assumes booster pump station with standby generator to be installed on TMK 2-8-01:13 on south side of Upper Ulumalu Road.
2. 3600 feet of 8 inch feeder line to 300k tank to be installed along Upper Ulumalu Road.
3. Outflow line from tank, onsite improvements, and tank cost not included since they are common to both Alternatives.
4. Assumed pumping capacity at 500 gpm per pump.
5. Assumed inflow to control tank at 1000 gpm.
6. O&M cost for pump station not included.
7. Acquisition cost of pump station/control tank site not included also.

v:\projdata\99proj\99031\est\offsite water sys impr.xls Alt A w-booster sta.

ORDER OF MAGNITUDE ESTIMATE
(OFFSITE ONLY)

12/21/99

Description of Item	Approx. Quan.	Unit		Unit Prices		Total
ALTERNATIVE B (GRAVITY LINE)						
8" Line on Kaupakuloa Road	1,300	l.f.	$	55	$	71,500
8" Line on Ulumalu Road	4,200	l.f.	$	55	$	231,000
New 6" PRV w/ MH	1	each	$	12,000	$	12,000
New 8" Pressure Reducing/Pressure Sustaining Valve w/ MH	1	each	$	18,000	$	18,000
8" Tee	3	each	$	450	$	1,350
12x8 Reducer	1	each	$	300	$	300
8" Sleeve	2	each	$	150	$	300
6" Sleeve	2	each	$	100	$	200
8" GV w/ SVB	3	each	$	900	$	2,700
8" Bends	8	each	$	350	$	2,800
Traffic Control				Allow	$	5,000
Thrust Blocks	11	each	$	300	$	3,300
Testing and Chlorination				Allow	$	5,000
Pavement Restoration:						
• Kaupakulua Road						
2½" A.C.	129	ton	$	80	$	10,320
4" ATB	210	ton	$	78	$	16,380
6" SBC	300	ton	$	28	$	8,400
Primer	327	gal.	$	3	$	981
• Ulumalu Road						
2" A.C.	262	ton	$	80	$	20,960
6" UTB	788	ton	$	32	$	25,216
Primer	817	gal.	$	3	$	2,451
				SUM OF ITEMS:	$	438,158
				10% CONTINGENCY:	$	43,816
				PROBABLE CONSTRUCTION COST:	$	**481,974**

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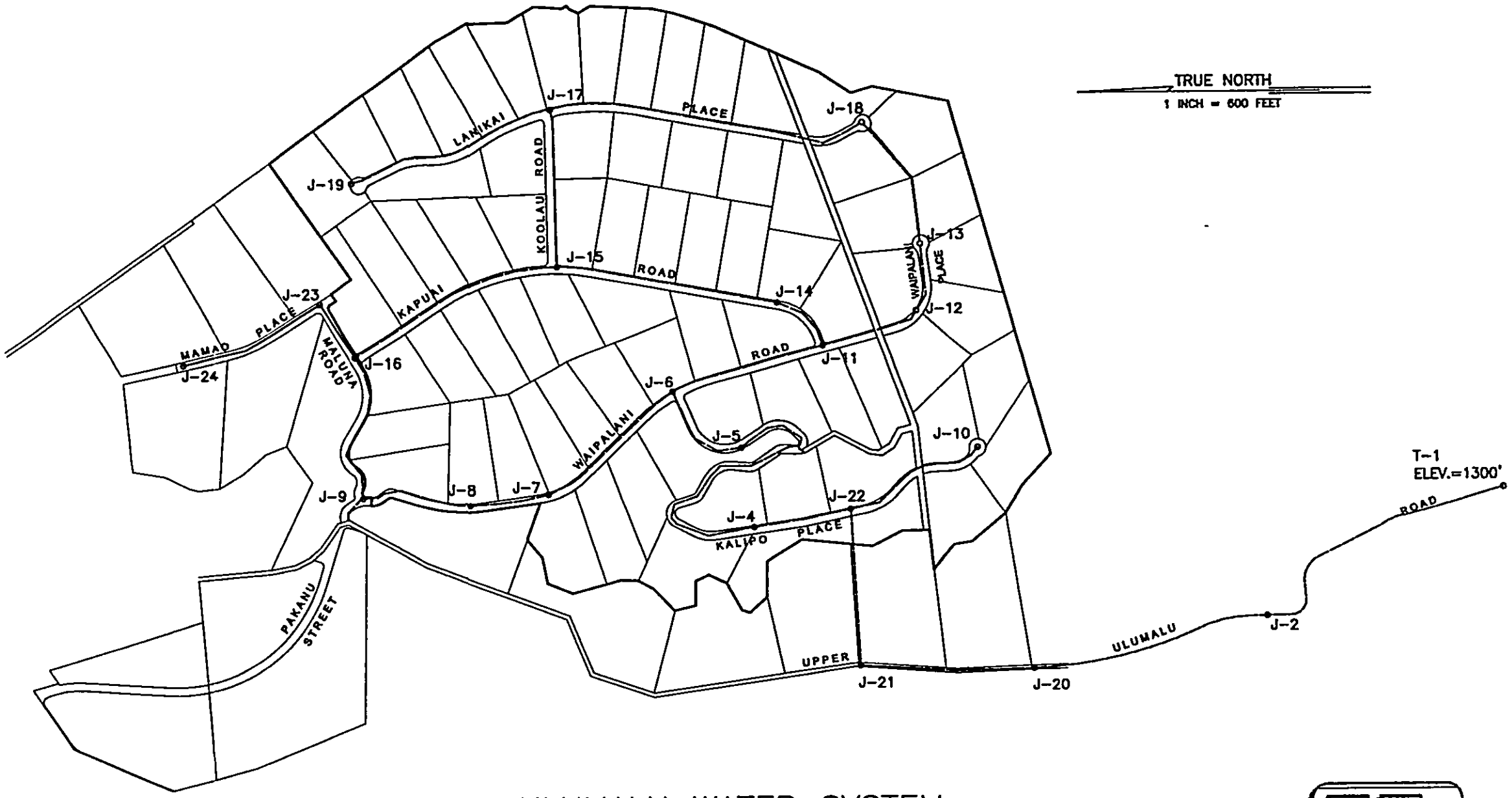
APPENDIX B

PIPE ANALYSIS OF DISTRIBUTION SYSTEM



ULUMALU WATER SYSTEM
PRESSURE ANALYSIS EXHIBIT

0 600 1200 1800 2400

SCALE: 1 INCH = 600 FEET

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

March 20, 2000

8.5"x14"

WSUE #99031

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Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	1,175.00	Demand	0.00	Fixed	0.00	1,310.67	58.67
J-4	1,026.00	Demand	0.00	Fixed	0.00	1,291.21	114.69
J-5	1,008.00	Demand	0.00	Fixed	0.00	1,251.85	105.45
J-6	1,014.00	Demand	0.00	Fixed	0.00	1,239.71	97.61
J-7	970.00	Demand	0.00	Fixed	0.00	1,237.39	115.63
J-8	940.00	Demand	0.00	Fixed	0.00	1,236.24	128.10
J-9	913.00	Demand	0.00	Fixed	0.00	1,234.79	139.15
J-10	1,101.00	Demand	0.00	Fixed	0.00	1,300.73	86.37
J-11	1,062.00	Demand	0.00	Fixed	0.00	1,230.41	72.83
J-12	1,104.00	Demand	0.00	Fixed	0.00	1,225.76	52.65
J-13	1,104.00	Demand	0.00	Fixed	0.00	1,223.15	51.53
J-14	1,048.00	Demand	0.00	Fixed	0.00	1,230.24	78.81
J-15	987.00	Demand	0.00	Fixed	0.00	1,229.72	104.96
J-16	931.00	Demand	0.00	Fixed	0.00	1,232.74	130.48
J-17	1,003.00	Demand	0.00	Fixed	0.00	1,225.69	96.30
J-18	1,145.00	Demand	1,000.00	Fixed	1,000.00	1,217.59	31.39
J-19	944.00	Demand	0.00	Fixed	0.00	1,225.69	121.81
J-20	1,120.00	Demand	0.00	Fixed	0.00	1,306.87	80.81
J-21	1,060.00	Demand	0.00	Fixed	0.00	1,303.62	105.35
J-22	1,052.00	Demand	0.00	Fixed	0.00	1,300.73	107.56
J-23	918.00	Demand	0.00	Fixed	0.00	1,232.74	136.10
J-24	890.00	Demand	0.00	Fixed	0.00	1,232.74	148.21

* Analysis of proposed 8-inch distribution system and 12-inch outflow line on Upper Ulumalu Road at fire flow of 1,000 gpm

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	1,175.00	Demand	0.00	Fixed	0.00	1,310.67	58.67
J-4	1,026.00	Demand	0.00	Fixed	0.00	1,291.21	114.69
J-5	1,008.00	Demand	0.00	Fixed	0.00	1,251.85	105.45
J-6	1,014.00	Demand	0.00	Fixed	0.00	1,239.71	97.61
J-7	970.00	Demand	0.00	Fixed	0.00	1,236.93	115.43
J-8	940.00	Demand	0.00	Fixed	0.00	1,235.55	127.81
J-9	913.00	Demand	0.00	Fixed	0.00	1,233.81	138.73
J-10	1,101.00	Demand	0.00	Fixed	0.00	1,300.73	86.37
J-11	1,062.00	Demand	0.00	Fixed	0.00	1,231.22	73.17
J-12	1,104.00	Demand	0.00	Fixed	0.00	1,229.14	54.11
J-13	1,104.00	Demand	0.00	Fixed	0.00	1,227.97	53.61
J-14	1,048.00	Demand	0.00	Fixed	0.00	1,230.36	78.86
J-15	987.00	Demand	0.00	Fixed	0.00	1,227.73	104.10
J-16	931.00	Demand	0.00	Fixed	0.00	1,231.35	129.88
J-17	1,003.00	Demand	0.00	Fixed	0.00	1,219.63	93.98
J-18	1,145.00	Demand	0.00	Fixed	0.00	1,225.49	34.81
J-19	944.00	Demand	1,000.00	Fixed	1,000.00	1,194.34	108.26
J-20	1,120.00	Demand	0.00	Fixed	0.00	1,306.87	80.81
J-21	1,060.00	Demand	0.00	Fixed	0.00	1,303.62	105.35
J-22	1,052.00	Demand	0.00	Fixed	0.00	1,300.73	107.58
J-23	918.00	Demand	0.00	Fixed	0.00	1,231.35	135.50
J-24	890.00	Demand	0.00	Fixed	0.00	1,231.35	147.61

* Analysis of proposed 8-inch distribution system and 12-inch outflow line on Upper Ulumalu Road at fire flow of 1,000 gpm

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	1,175.00	Demand	0.00	Fixed	0.00	1,310.67	58.67
J-4	1,026.00	Demand	0.00	Fixed	0.00	1,291.21	114.69
J-5	1,008.00	Demand	0.00	Fixed	0.00	1,251.85	105.45
J-6	1,014.00	Demand	0.00	Fixed	0.00	1,239.71	97.61
J-7	970.00	Demand	0.00	Fixed	0.00	1,234.27	114.28
J-8	940.00	Demand	0.00	Fixed	0.00	1,231.57	126.08
J-9	913.00	Demand	0.00	Fixed	0.00	1,228.16	136.29
J-10	1,101.00	Demand	0.00	Fixed	0.00	1,300.73	86.37
J-11	1,062.00	Demand	0.00	Fixed	0.00	1,234.52	74.61
J-12	1,104.00	Demand	0.00	Fixed	0.00	1,233.93	56.19
J-13	1,104.00	Demand	0.00	Fixed	0.00	1,233.60	56.04
J-14	1,048.00	Demand	0.00	Fixed	0.00	1,233.51	80.22
J-15	987.00	Demand	0.00	Fixed	0.00	1,230.39	105.25
J-16	931.00	Demand	0.00	Fixed	0.00	1,223.35	126.42
J-17	1,003.00	Demand	0.00	Fixed	0.00	1,231.22	98.69
J-18	1,145.00	Demand	0.00	Fixed	0.00	1,232.89	38.01
J-19	944.00	Demand	0.00	Fixed	0.00	1,231.22	124.20
J-20	1,120.00	Demand	0.00	Fixed	0.00	1,306.87	80.81
J-21	1,060.00	Demand	0.00	Fixed	0.00	1,303.62	105.35
J-22	1,052.00	Demand	0.00	Fixed	0.00	1,300.73	107.56
J-23	918.00	Demand	0.00	Fixed	0.00	1,215.99	128.86
J-24	890.00	Demand	1,000.00	Fixed	1,000.00	1,198.02	133.20

* Analysis of proposed 8-inch distribution system and 12-inch outflow line on Upper Ulumalu Road at fire flow of 1,000 gpm

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	1,175.00	Demand	0.00	Fixed	0.00	1,310.67	58.67
J-4	1,026.00	Demand	0.00	Fixed	0.00	1,291.21	114.69
J-5	1,008.00	Demand	0.00	Fixed	0.00	1,251.85	105.45
J-6	1,014.00	Demand	0.00	Fixed	0.00	1,239.71	97.61
J-7	970.00	Demand	0.00	Fixed	0.00	1,232.53	113.53
J-8	940.00	Demand	0.00	Fixed	0.00	1,228.97	124.96
J-9	913.00	Demand	1,000.00	Fixed	1,000.00	1,224.48	134.69
J-10	1,101.00	Demand	0.00	Fixed	0.00	1,300.73	86.37
J-11	1,062.00	Demand	0.00	Fixed	0.00	1,235.97	75.23
J-12	1,104.00	Demand	0.00	Fixed	0.00	1,235.55	56.88
J-13	1,104.00	Demand	0.00	Fixed	0.00	1,235.31	56.78
J-14	1,048.00	Demand	0.00	Fixed	0.00	1,235.24	80.97
J-15	987.00	Demand	0.00	Fixed	0.00	1,232.99	106.37
J-16	931.00	Demand	0.00	Fixed	0.00	1,227.92	128.40
J-17	1,003.00	Demand	0.00	Fixed	0.00	1,233.59	99.71
J-18	1,145.00	Demand	0.00	Fixed	0.00	1,234.80	38.83
J-19	944.00	Demand	0.00	Fixed	0.00	1,233.59	125.23
J-20	1,120.00	Demand	0.00	Fixed	0.00	1,306.87	80.81
J-21	1,060.00	Demand	0.00	Fixed	0.00	1,303.62	105.35
J-22	1,052.00	Demand	0.00	Fixed	0.00	1,300.73	107.56
J-23	918.00	Demand	0.00	Fixed	0.00	1,227.92	134.02
J-24	890.00	Demand	0.00	Fixed	0.00	1,227.92	146.13

* Analysis of proposed 8-inch distribution system and 12-inch outflow line on Upper Ulumalu Road at fire flow of 1,000 gpm

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-4	1,026.00	Demand	0.00	Fixed	0.00	1,172.81	63.48
J-5	1,008.00	Demand	0.00	Fixed	0.00	1,151.17	61.91
J-6	1,014.00	Demand	0.00	Fixed	0.00	1,123.85	47.50
J-7	970.00	Demand	0.00	Fixed	0.00	1,037.93	29.38
J-8	940.00	Demand	0.00	Fixed	0.00	995.36	23.94
J-9	913.00	Demand	250.00	Fixed	250.00	941.67	12.40
J-10	1,101.00	Demand	0.00	Fixed	0.00	1,172.81	31.05
J-11	1,062.00	Demand	0.00	Fixed	0.00	1,102.20	17.38
J-12	1,104.00	Demand	0.00	Fixed	0.00	1,102.20	-0.78
J-13	1,104.00	Demand	0.00	Fixed	0.00	1,102.20	-0.78
J-14	1,048.00	Demand	0.00	Fixed	0.00	1,092.24	19.13
J-15	987.00	Demand	0.00	Fixed	0.00	1,061.41	32.18
J-16	931.00	Demand	0.00	Fixed	0.00	990.07	25.55
J-17	1,003.00	Demand	0.00	Fixed	0.00	1,061.41	25.26
J-18	1,145.00	Demand	0.00	Fixed	0.00	1,061.41	-36.15
J-19	944.00	Demand	0.00	Fixed	0.00	1,061.41	50.77
J-21	1,104.00	Demand	0.00	Fixed	0.00	1,102.20	-0.78
J-22	1,115.00	Demand	0.00	Fixed	0.00	1,061.41	-23.17
J-23	985.00	Demand	0.00	Fixed	0.00	1,061.41	33.04

Analysis of existing distribution at fire flow of 250 gpm.

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-4	1,026.00	Demand	0.00	Fixed	0.00	1,172.80	63.48
J-5	1,008.00	Demand	0.00	Fixed	0.00	1,151.17	61.91
J-6	1,014.00	Demand	0.00	Fixed	0.00	1,123.85	47.50
J-7	970.00	Demand	0.00	Fixed	0.00	1,065.85	41.45
J-8	940.00	Demand	0.00	Fixed	0.00	1,037.12	42.00
J-9	913.00	Demand	0.00	Fixed	0.00	1,000.88	38.00
J-10	1,101.00	Demand	0.00	Fixed	0.00	1,172.80	31.05
J-11	1,062.00	Demand	0.00	Fixed	0.00	1,083.80	9.43
J-12	1,104.00	Demand	0.00	Fixed	0.00	1,083.80	-8.74
J-13	1,104.00	Demand	0.00	Fixed	0.00	1,083.80	-8.74
J-14	1,048.00	Demand	0.00	Fixed	0.00	1,065.38	7.51
J-15	987.00	Demand	0.00	Fixed	0.00	1,008.34	9.23
J-16	931.00	Demand	250.00	Fixed	250.00	876.37	-23.62
J-17	1,003.00	Demand	0.00	Fixed	0.00	1,008.34	2.31
J-18	1,145.00	Demand	0.00	Fixed	0.00	1,008.34	-59.10
J-19	944.00	Demand	0.00	Fixed	0.00	1,008.34	27.82
J-21	1,104.00	Demand	0.00	Fixed	0.00	1,083.80	-8.74
J-22	1,115.00	Demand	0.00	Fixed	0.00	1,008.34	-46.12
J-23	985.00	Demand	0.00	Fixed	0.00	1,008.34	10.09

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-4	1,026.00	Demand	0.00	Fixed	0.00	1,172.80	63.48
J-5	1,008.00	Demand	0.00	Fixed	0.00	1,151.17	61.91
J-6	1,014.00	Demand	0.00	Fixed	0.00	1,123.85	47.50
J-7	970.00	Demand	0.00	Fixed	0.00	1,095.51	54.27
J-8	940.00	Demand	0.00	Fixed	0.00	1,081.47	61.17
J-9	913.00	Demand	0.00	Fixed	0.00	1,063.76	65.19
J-10	1,101.00	Demand	0.00	Fixed	0.00	1,172.80	31.05
J-11	1,062.00	Demand	0.00	Fixed	0.00	1,050.82	-4.83
J-12	1,104.00	Demand	0.00	Fixed	0.00	1,050.82	-23.00
J-13	1,104.00	Demand	0.00	Fixed	0.00	1,050.82	-23.00
J-14	1,048.00	Demand	0.00	Fixed	0.00	1,017.23	-13.31
J-15	987.00	Demand	0.00	Fixed	0.00	913.24	-31.89
J-16	931.00	Demand	0.00	Fixed	0.00	1,002.92	31.10
J-17	1,003.00	Demand	0.00	Fixed	0.00	741.73	-112.98
J-18	1,145.00	Demand	0.00	Fixed	0.00	741.73	-174.39
J-19	944.00	Demand	250.00	Fixed	250.00	-23,585.00	-10,607.16
J-21	1,104.00	Demand	0.00	Fixed	0.00	1,050.82	-23.00
J-22	1,115.00	Demand	0.00	Fixed	0.00	741.73	-161.41
J-23	985.00	Demand	0.00	Fixed	0.00	453.88	-229.68

APPENDIX C

PIPE ANALYSIS OF TRANSMISSION SYSTEM

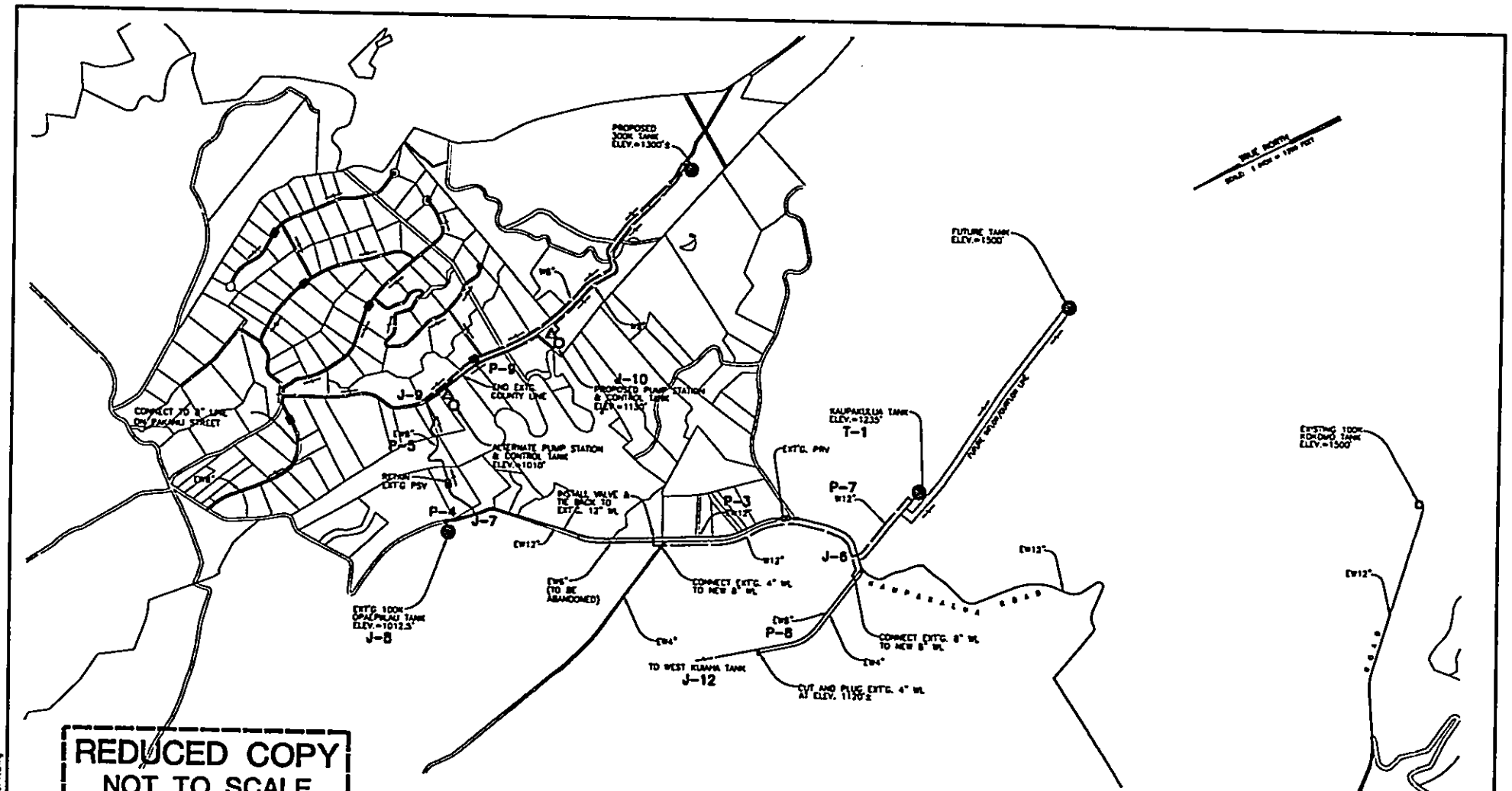


EXHIBIT
ULUMALU WATER SYSTEM IMPROVEMENTS

0 1200 2400 3600 4800

SCALE: 1 INCH = 1200 FEET

WARREN S. UNEMORI ENGINEERING, INC.

March 24, 2000

11"x17"

WSUE #99031

\99031\dwg\exhibits\booster1.dwg

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-6	1,200.00	Demand	0.00	Fixed	0.00	1,216.05	6.94
J-7	1,020.00	Demand	0.00	Fixed	0.00	1,159.11	60.15
J-8	1,012.50	Demand	1,000.00	Fixed	1,000.00	1,157.72	62.80
J-9	1,000.00	Demand	0.00	Fixed	0.00	1,123.89	53.57
J-12	705.00	Demand	1,000.00	Fixed	1,000.00	1,014.50	133.84
J-10	1,040.00	Demand	850.00	Fixed	850.00	1,116.48	33.07

Steady State Analysis
Pipe Report

Link Label	Length (ft)	Diameter (in)	Material	Roughness	Initial Status	Current Status	Discharge (gpm)	Start Hydraulic Grade (ft)	End Hydraulic Grade (ft)	Headloss (ft)	Friction Slope (ft/1000ft)	Velocity (ft/s)
P-3	5,250.00	12	Ductile Iro	110.0	Open	Open	1,850.00	1,216.05	1,159.11	56.94	10.85	5.25
P-7	1,200.00	12	Ductile Iro	110.0	Open	Open	-2,850.00	1,216.05	1,245.00	28.95	24.13	8.08
P-8	8,050.00	8	Ductile Iro	110.0	Open	Open	1,000.00	1,216.05	1,014.50	201.55	25.04	6.38
P-4	400.00	12	Ductile Iro	110.0	Open	Open	1,000.00	1,159.11	1,157.72	1.39	3.48	2.84
P-5	1,900.00	8	Ductile Iro	110.0	Open	Open	850.00	1,159.11	1,123.89	35.22	18.54	5.43
P-9	400.00	8	Ductile Iro	110.0	Open	Open	850.00	1,123.89	1,116.48	7.41	18.54	5.43

Warren S. Unemori Engineering, Inc.
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-6	1,200.00	Demand	0.00	Fixed	0.00	1,216.05	6.94
J-7	1,020.00	Demand	0.00	Fixed	0.00	1,159.11	60.15
J-8	1,012.50	Demand	1,000.00	Fixed	1,000.00	1,157.72	62.80
J-9	1,000.00	Demand	0.00	Fixed	0.00	1,123.89	53.57
J-12	705.00	Demand	1,000.00	Fixed	1,000.00	1,014.50	133.84
J-10	1,050.00	Demand	850.00	Fixed	850.00	1,112.77	27.14

Steady State Analysis
Pipe Report

Link Label	Length (ft)	Diameter (in)	Material	Roughness	Initial Status	Current Status	Discharge (gpm)	Start Hydraulic Grade (ft)	End Hydraulic Grade (ft)	Headloss (ft)	Friction Slope (ft/1000ft)	Velocity (ft/s)
P-3	5,250.00	12	Ductile Iro	110.0	Open	Open	1,850.00	1,216.05	1,159.11	56.94	10.85	5.25
P-7	1,200.00	12	Ductile Iro	110.0	Open	Open	-2,850.00	1,216.05	1,245.00	28.95	24.13	8.08
P-8	8,050.00	8	Ductile Iro	110.0	Open	Open	1,000.00	1,216.05	1,014.50	201.55	25.04	6.38
P-4	400.00	12	Ductile Iro	110.0	Open	Open	1,000.00	1,159.11	1,157.72	1.39	3.48	2.84
P-5	1,900.00	8	Ductile Iro	110.0	Open	Open	850.00	1,159.11	1,123.89	35.22	18.54	5.43
P-9	600.00	8	Ductile Iro	110.0	Open	Open	850.00	1,123.89	1,112.77	11.12	18.54	5.43

Warren S. Unemori Engineering, Inc.
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Steady State Analysis
Junction Report

Node Label	Elevation (ft)	Demand Type	Demand (gpm)	Demand Pattern	Calculated Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-6	1,200.00	Demand	0.00	Fixed	0.00	1,216.05	6.94
J-7	1,020.00	Demand	0.00	Fixed	0.00	1,159.11	60.15
J-8	1,012.50	Demand	1,000.00	Fixed	1,000.00	1,157.72	62.80
J-9	1,000.00	Demand	0.00	Fixed	0.00	1,123.89	53.57
J-12	705.00	Demand	1,000.00	Fixed	1,000.00	1,014.50	133.84
J-10	1,060.00	Demand	850.00	Fixed	850.00	1,109.06	21.22

Steady State Analysis
Pipe Report

Link Label	Length (ft)	Diameter (in)	Material	Roughness	Initial Status	Current Status	Discharge (gpm)	Start Hydraulic Grade (ft)	End Hydraulic Grade (ft)	Headloss (ft)	Friction Slope (ft/1000ft)	Velocity (ft/s)
P-3	5,250.00	12	Ductile Iro	110.0	Open	Open	1,850.00	1,216.05	1,159.11	56.94	10.85	5.25
P-7	1,200.00	12	Ductile Iro	110.0	Open	Open	-2,850.00	1,216.05	1,245.00	28.95	24.13	8.08
P-8	8,050.00	8	Ductile Iro	110.0	Open	Open	1,000.00	1,216.05	1,014.50	201.55	25.04	6.38
P-4	400.00	12	Ductile Iro	110.0	Open	Open	1,000.00	1,159.11	1,157.72	1.39	3.48	2.84
P-5	1,900.00	8	Ductile Iro	110.0	Open	Open	850.00	1,159.11	1,123.89	35.22	18.54	5.43
P-9	800.00	8	Ductile Iro	110.0	Open	Open	850.00	1,123.89	1,109.06	14.83	18.54	5.43

APPENDIX B

Archaeological Inventory Study Report

ARCHAEOLOGICAL INVENTORY SURVEY FOR THE ULUMALU-PEAHI WATER SYSTEM IMPROVEMENTS ULUMALU *AHUPUA`A*, HĀMĀKUALOA DISTRICT, MAUI (TMK 2-8-01:Por. 4, 54, 61, 63, 65, 68)

by
David W. Shideler, M.A., A.B.D.
Douglas F. Borthwick, B.A.
and
Hallett H. Hammatt, Ph.D.

Prepared for

Warren S. Unemori Engineering Inc.

Cultural Surveys Hawai`i

ABSTRACT

At the request of Warren S. Unemori Engineering, Inc., Cultural Surveys Hawai'i Inc. conducted an archaeological inventory survey for a portion of the proposed Ulumalu-Peahi Water System Improvement project in Ulumalu *Ahupua'a*, Hāmākualoa District, Maui. The specific project area includes a proposed reservoir site, access road corridor, and a booster pump station site, all located on gently sloping short-grass pasture between 1120' and 1320' elevation. No evidence of significant cultural resources were observed during surface inspection. While a portion of the "New Hāmākua Ditch" (built in 1904) is shown as bisecting the project area no sign of this ditch was observed and it is assumed to be a tunnel in this stretch which will not be affected by the proposed water system improvements.

The surveyed portions of the project area had excellent ground visibility, being either low pasture grass or an existing dirt and gravel roadway. No historic sites of any kind were observed during the survey. Thus, based on the absence of Historic Properties in the surveyed area no further archaeological research is warranted.

TABLE OF CONTENTS

LIST OF FIGURES

I. INTRODUCTION

A. Project Background

Warren S. Umemori contacted Cultural Surveys Hawai`i, Inc. to conduct an inventory-level survey for a portion of the Ulumalu-Peahi Water System Improvement Project in Ulumalu, Maui (Figures 1-5). Draft plans for the proposed water system originally had two alternative alignments. Subsequently, a modified alternative, "Alternative C" was decided upon. The present project thus incorporates State Historic Preservation Division/ Department of Land and Natural Resources (SPHD/DLNR) concerns related to where inventory work was necessary and where it was not. SHPD/DLNR indicated that Inventory Survey was necessary where land previously undeveloped (*e.g.*., pasture and gulches) will be affected. Thus, for Alternative C, inventory work was necessary for the access road from the *mauka* end of Upper Ulumalu Road to the proposed tank site and the booster pump station site.

B. Scope of Work

The scope of work called for:

1. A complete ground survey of the proposed waterline alignments, access road, reservoir tank site, portion of upper Ulumalu Road, and booster pump station tank site for Alternative C. All sites would be located, described, and mapped with evaluation of function, interrelation-ships, and significance. Documentation will include photographs and scale drawings of selected sites and complexes. All sites will be assigned State site numbers.

2. If warranted, limited subsurface testing to determine depth and quantity of cultural materials within archaeological sites and to obtain datable samples for chronological information if none is available for sites in the immediate area from previous studies.

3. Research on historic and archaeological background, including search of historic maps, written records, Land Commission Award documents. This research will focus on the specific area with general background on the *ahupua`a* and district and will emphasize settlement patterns.

4. Preparation of a survey report which will include the following:

   a. A topographic map, if available, of the survey area showing all archaeological sites and site areas;

   b. Description of all archaeological sites with selected photographs, scale drawings, and discussions of function;

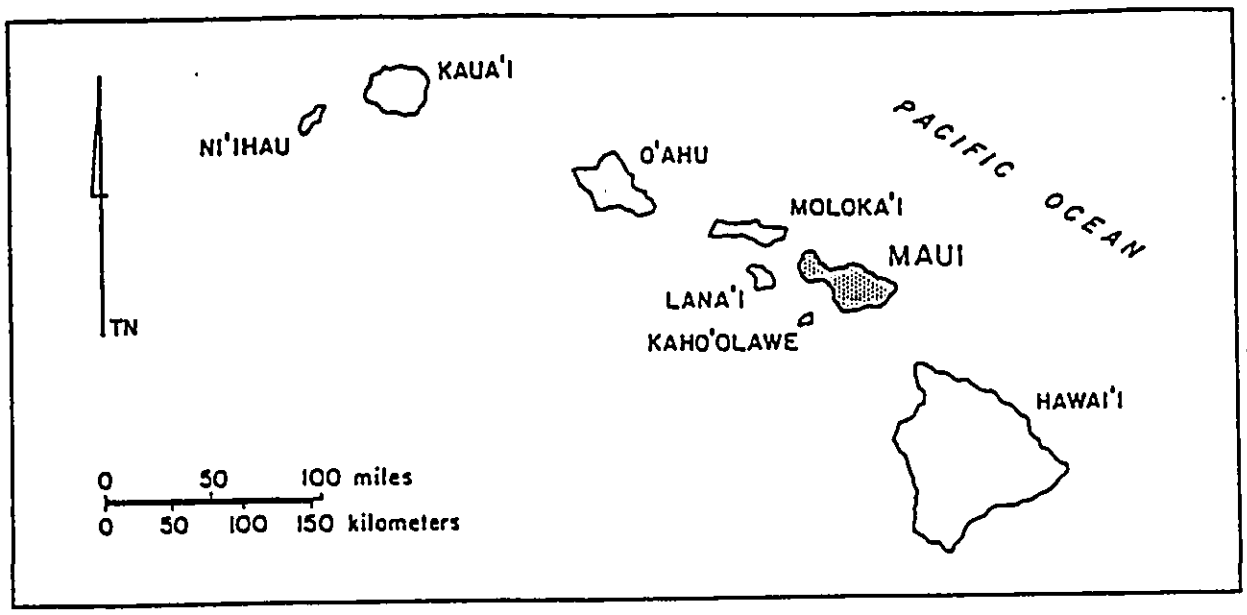


Figure 1 State of Hawai`i

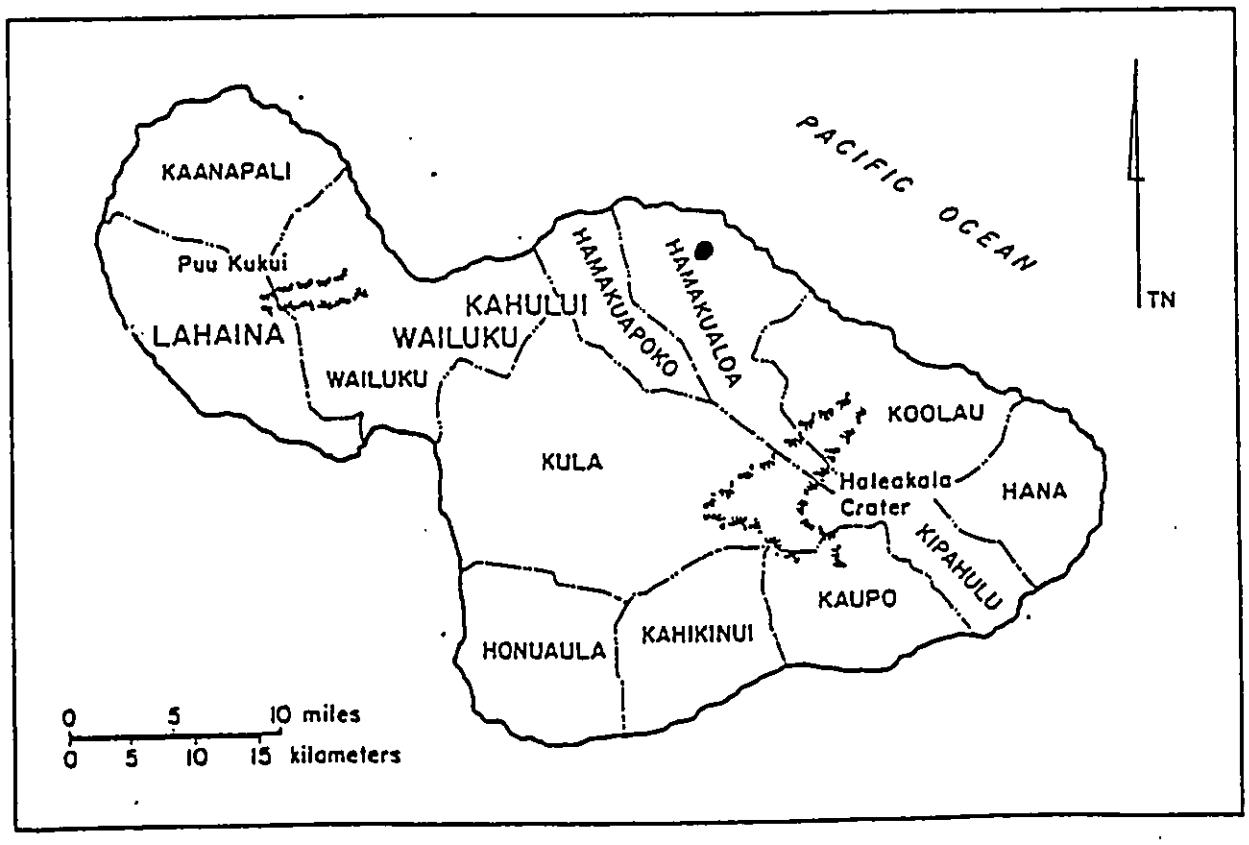


Figure 2 General Location Map, Maui Island

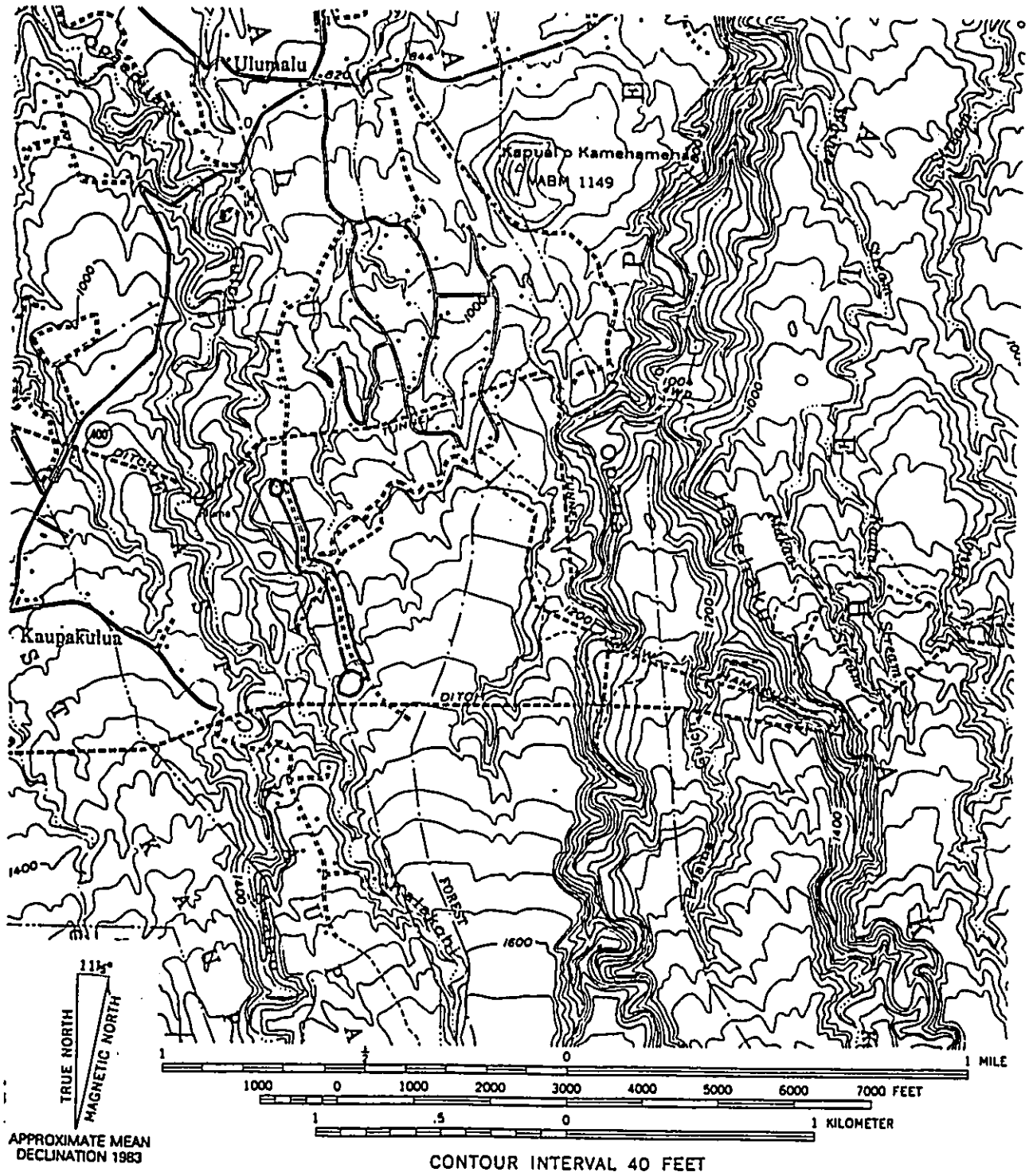


Figure 3 Portion of USGS 7.5 minute series, Haiku Quad, displaying project area

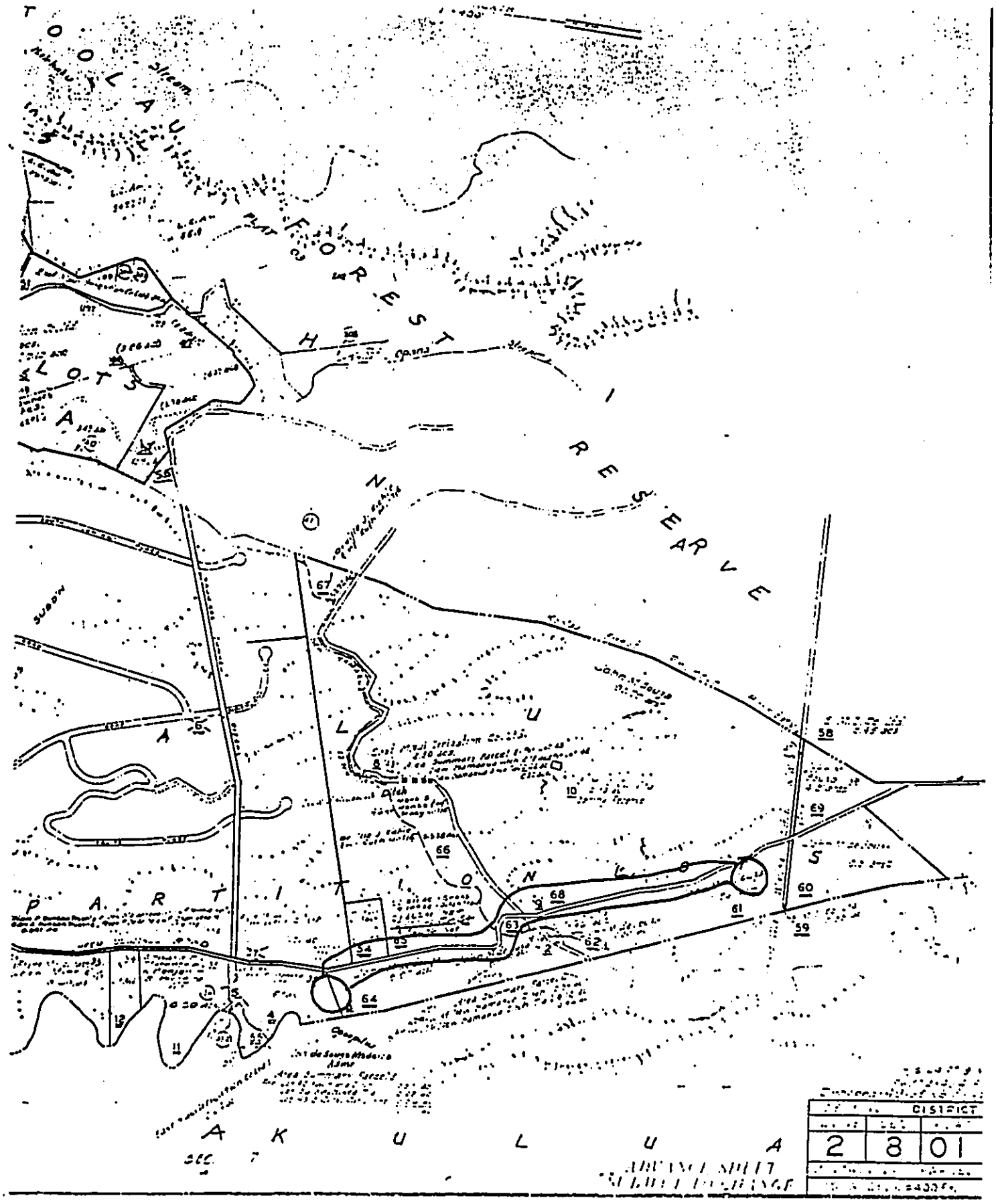


Figure 4 Portion of Tax Map Key 2:8:01 Showing Location of Project Area

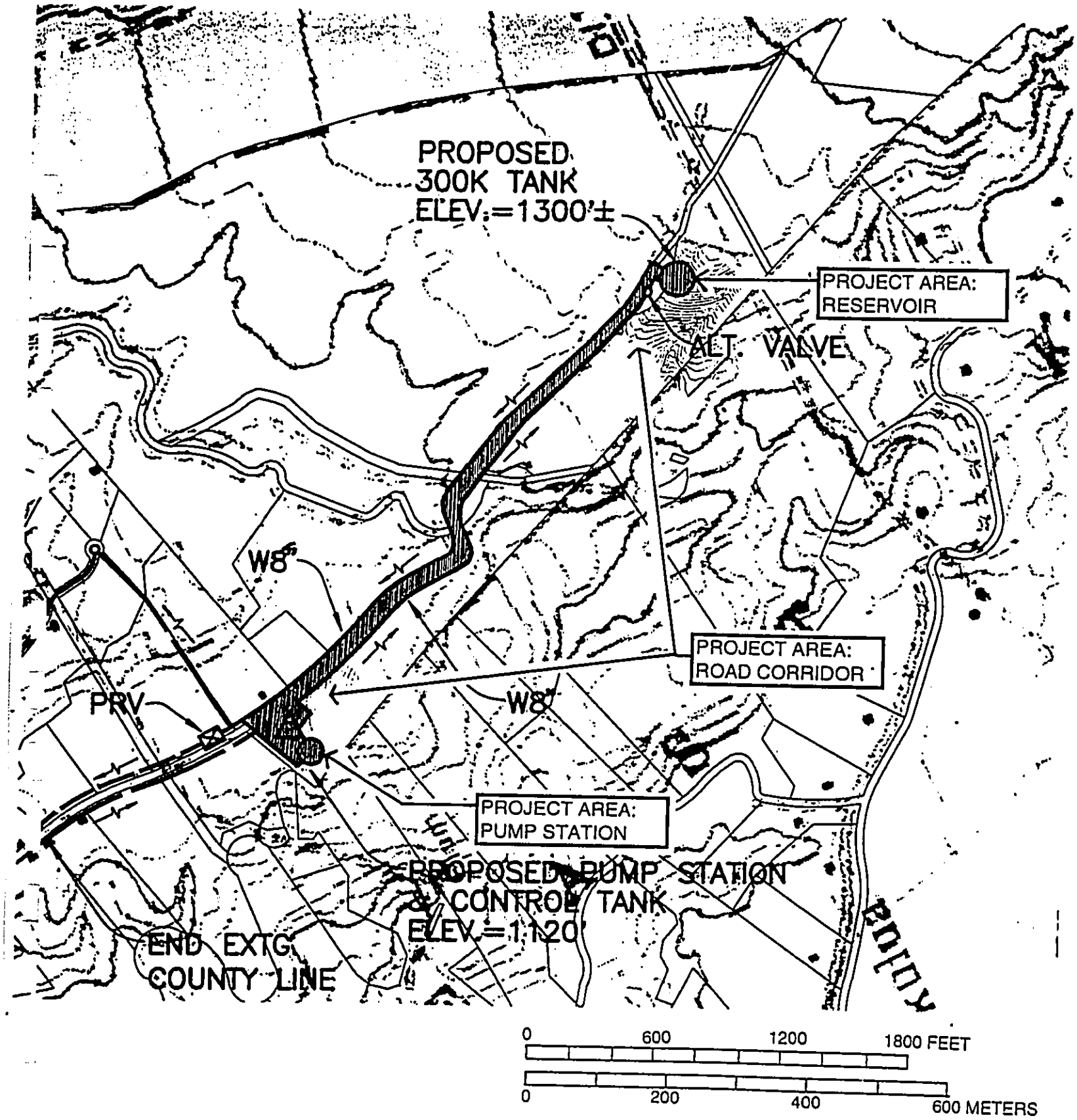


Figure 5 Plans for the Proposed Ulumalu-Peahi Water System Improvements Showing Location of Proposed Reservoir, 8" Waterline, and Pump Station

c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the archaeological features;

d. A summary of site categories, their significance in an archaeological and historic context;

e. Recommendations based on all information generated which will specify what steps should be taken to mitigate impact of development on archaeological resources - such as data recovery (excavation) and preservation of specific areas. These recommendations will be developed in consultation with the client and the State agencies.

C. Methods

Field work was conducted on February 8, 2000 by two qualified archaeologists from Cultural Surveys Hawai`i, Inc.; Douglas F. Borthwick, B.A. and Brian Colin, B.A. Field work consisted of a 100% ground survey, on foot, of the proposed access road, reservoir tank site, and the booster pump site. Additionally, the existing dirt and gravel Upper Ulumalu Road section between the proposed access road and booster pump station was also surveyed.

The surface survey was accomplished by walking *mauka/makai* transects (roughly north / south) for all portions of the project. The archaeologists were spaced between five and 10 meters apart. Ground visibility was excellent due to only ankle-high pasture grass vegetation. During the survey erosional and road cut exposed soil profiles were also examined. Photographic documentation of the project area and surroundings was also conducted during the survey.

D. Project Area Description

The project area was dominated by various pasture grasses and low weeds, such as sleeping grass (*Mimosa pudica*). There were a few guava trees (*Psidium guajava*), in the shallow gulches and along the edge of Upper Ulumalu Road.

The project area is situated between the 1120 and 1330 ft. a.m.s.l. elevation within Ulumalu *Ahupua`a* within Hāmākualoa District, on the northern slopes of Haleakalā. The soil type is Pauwela clay (PFC) which is characterized as "developed in material weathered from basic igneous rock," and that "the soils are used for pasturage and water supply. Small acreages are used for pineapple and woodland. The natural vegetation consists of California Grass, Guava, and Rice Grass" (Foote *et al.* 1973:111,112). Rainfall averages between 75 and 100 inches per year (Armstrong, ed. 1973).

II. HISTORIC BACKGROUND

The present study parcel is situated in Ulumalu, an *ahupua`a* in the Hāmākualoa District of Maui. Historical documentation by E. F. Craighill Handy and Elizabeth Handy outline likely general patterns in the several *ahupua`a* of Hāmākualoa:

> Hāmākua Poko (Short Hāmākua) and Hāmākua Loa (Long Hāmākua) are two coastal regions where gently sloping *kula* lands intersected by small gulches come down to the sea along the northern coast line of East Maui....Stream taro was probably planted along the watercourses well up into the higher *kula* land and forest taro throughout the lower forest zone. The number of narrow *ahupua`a* thus utilized along the whole of the Hāmākua coast indicates that there must have been a very considerable population. This would be despite the fact that it is an area of only moderate precipitation because of being too low to draw rain out of trade winds flowing down the coast from the rugged and wet northeast Ko`olau area that lies beyond. It was probably a favorable region for breadfruit, banana, sugar cane, arrowroot; and for yams and `awa in the interior. The slopes between the gulches were covered with good soil, excellent for sweet-potato planting (Handy and Handy 1972:498).

The Handys' observations suggest that the lands of and surrounding the present study parcel would have offered an area amenable to plantings of several crops by the Hawaiian population; sweet potato being specific to the subject area along with gathering of non-cultivated plants (i.e. *olona* and medicinal plants). This area would also likely have contained habitation sites -both permanent and temporary- associated with agriculture near the coast. The Kaupakalua Complex (State site 50-50-06-1221), consisting of irrigated terraces and associated features, *makai* (north), approximately one mile, of the present study area, supports their discussion.

Hāmākualoa in general and Ulumalu specifically are very poorly documented in pre-contact traditions. No traditions specific to Ulumalu *Ahupua`a* were identified. Hāmākualoa seems to have been most associated as a residence of the *kauwā* or pariah caste as documented in the proverbial saying: "*Pe`epe`e pū hala*" which Pukui (1983: saying 2623) glosses as "Hiders among the hala trees - An epithet for the *kauwā* of Hāmākualoa, Maui". Perhaps the association of the district with kauwā was a factor in the traditions of this area not being better known.

The low hill known as "Kapuai o Kamehameha", located roughly 1 mile northeast of the project area in the *ahupua`a* of Opana and Peahi, is said to have been a camp of the forces of Kamehameha the Great in 1778 during his wars against Kalaniopu`u.

Along with nine or ten other *ahupua`a* on Hawai`i, O`ahu, and Maui Islands, the entire *ahupua`a* of Ulumalu was awarded to Nueku Namau`u, Land Commission Award #10474 and Royal Patent No. 4490 (Boundary Commission, Maui, Vol. 3: page 496-528). In Marion Kelly's "Gardens of Kona" (1983:26) she relates the following on Namau`u:

Through his father, Manena, Nueku Namau`u was a distant cousin of Mataio Kekuanao`a, father of Kamehameha IV and V and Governor of Oahu in the 1840s (Pukui, Elbert, and Mookini 1974:106). Manena worked for Kamehameha I, serving perhaps as an assistant to John Young on Oahu in 1812 (Reynolds 1938:110-111). Namau`u was a brother-in-law of Manuia, who was nephew of Ke`eaumoku and was one of several *kahu* (guardians) of Liholiho (Kamakau 1961:220); he accompanied Liholiho to England in 1823 (Ibid.:256). On his return, Manuia was placed in charge of "Fort Ke-kua-nohu, of the fortified hill of Punchbowl, and the harbor of Kou [Honolulu] and made...Chief Marshall" (Kamakau 1961:273). Having such politically powerful relatives encouraged Namau`u to be active in government affairs. He served the Kamehameha family and was a *konohiki* of lands on Oahu (Native Testimony 3:25 ff). Before Manuia left Hawaii to accompany Boki to the New Hebrides in 1829, he gave his property to Liliha, Boki's wife, and she in turn gave it to Kapoli, the wife of Namau`u, according to testimony by M. Kekuanao`a (Probate 885, First Circuit Court).

Namau`u was given control of the *ahupua`a* of Ho`ae`ae in `Ewa by Manuia, who had received it from Liholiho (Native Testimony 3:65). Manuia had given permission to Lewis Rees to raise goats on Ualena, an *`ili* within Ho`ae`ae. The arrangement was that Rees would care for the goats and would receive as his compensation half interest in any new kids born there. Rees was awarded 3,453 acres (LCA 193), the whole seaward portion of Ho`ae`ae, after many pages of testimony had been taken by the Commissioners (Award Bk. 1:523-531); the award to Namau`u was reduced by the acreage awarded Rees (Award Bk. 10:624-625).

In the *Māhele* of 1848, Namau`u received eleven lands. Some of his land came in recognition of his and his father`s services, and some because he and his sister, Kaupena, had inherited them from her husband Manuia (Native Testimony 3:25-30, 54-56, 64-66).

On August 18, 1847, N. Namau`u was appointed to the Board of Commissioners to Quiet Land Titles in place of John Young Kanehoa, eldest son of John Young, Sr., who resigned (Kuydendall 1938:280, note 37). Upon his death in 1848, Namau`u was replaced on the Board by S.M. Kamakau (Ibid.).

There were two other land claims in Ulumalu *Ahupua`a* in the *Māhele*. F. Coswell claimed a 50-acre parcel (L.C.Aw. 311) on the coast and Hanakahi claimed a 0.02 acre parcel (6510-SS).

Namau`u's lands were incorporated into the Haiku Sugar Company which was established after the mid-nineteenth century by Samuel T. Alexander and Henry Perrine Baldwin (Speakman 1978:120). Haiku Sugar Company was subsumed in the larger Maui Agricultural Company in 1904. Several roughly parallel major ditch systems were constructed across the slope in the vicinity of the present project area including the (old)

Figure 6 Portion of Map of Haiku Plantation and Adjoining Lands (circa 1900) Showing Location of the Project Area

III. PREVIOUS ARCHAEOLOGICAL RESEARCH

No archaeological studies have been conducted within the project area or the immediate vicinity. Archaeological studies in Hāmākualoa District reviewed include: Walker (1931), Donham (1992), Sinoto and Pantaleo (1992), Xamanek Researchers (1993), Colin and Hammatt (1996), Hammatt and Chiogioji (1998).

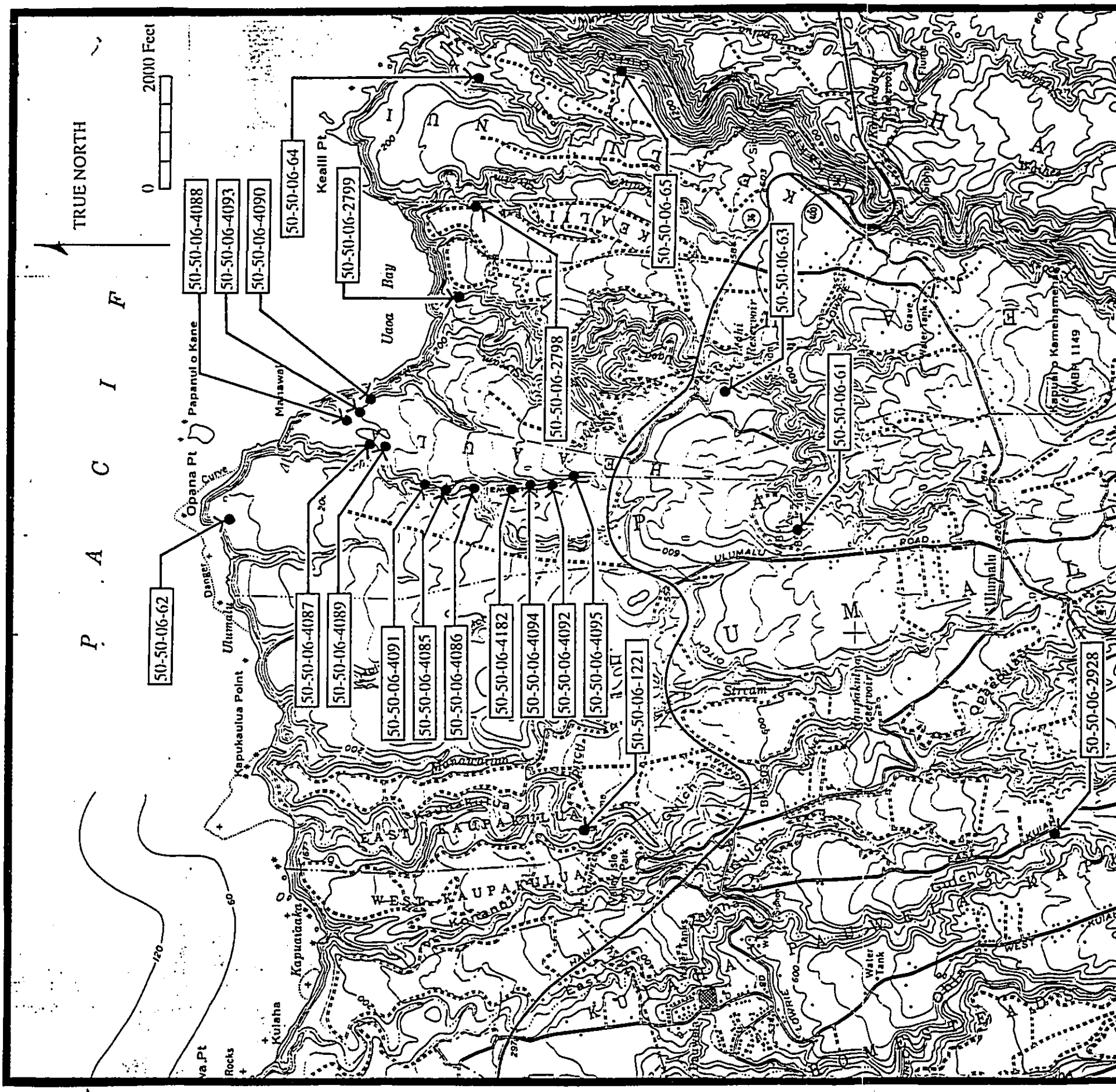
Winslow M. Walker (1931:151,) recorded a number of sites (Figure 7) in the region including:

> Site 61: Kapuai o Menehune *Heiau* at Kuloli, Ulumalu, a destroyed *heiau* site. Site 50-50-06-61, was reported destroyed by the Statewide Inventory Survey. It was situated inland at Kuloli in the *ahupua`a* of Opana.
>
> Site 62: Pahoa *Heiau* at Opana; only a remnant of a small platform remains, a destroyed *heiau* site. Site 50-50-06-62, was also reported destroyed by the Statewide Inventory Survey. It was situated along the coastal point in the *ahupua`a* of Opana.
>
> Site 63: Pu`uokaniau *Heiau* at Peahi, a destroyed *heiau* site. Site 50-50-06-63, Pu`uokaniau *Heiau* site was also reported destroyed by the Statewide Inventory Survey. It was situated inland near the Peahi Reservoir.
>
> Site 64: Mokahio *Heiau*, Peahi region, an irregular structure terraced on several sides.
>
> Site 65: Kaapahu *Heiau* at Kakipi, a destroyed *heiau* site.

The Kaupakalua agriculture complex (State site 50-50-06-1221) is situated within the Kaupakalua gulch along the *makai* (north) side of the Hana Highway. The Kaupakalua Winery (State site 50-50-06-1576) is located at the junction of East Kuiaha Road and Kaupakalua Road approximately 2 kilometers to the west of the project area. The third site, the Kaupakalua Village (State site 50-50-06-1569) is located mid-way between Makawao and Pauwela. In the neighboring bays and gulches within surrounding *ahupua`a* a number of sites have been recorded. The closest of these sites is approximately 1.2 kilometers away. The following is a short synopsis of these sites :

> Site 50-50-06-2928, an unmarked grave site, was reported by Donham (1992). This site is briefly reported on by Xamanek Researchers (1993). It is situated to the northwest of the present study area on the eastern edge of East Kuiaha.
>
> Site 50-50-06-1221, Kaupakalua Complex, this site consists of an agricultural complex comprised of irrigated terraces and associated features. It is located approximately one mile from the coast and is situated approximately four

DOCUMENT CAPTURED AS RECEIVED



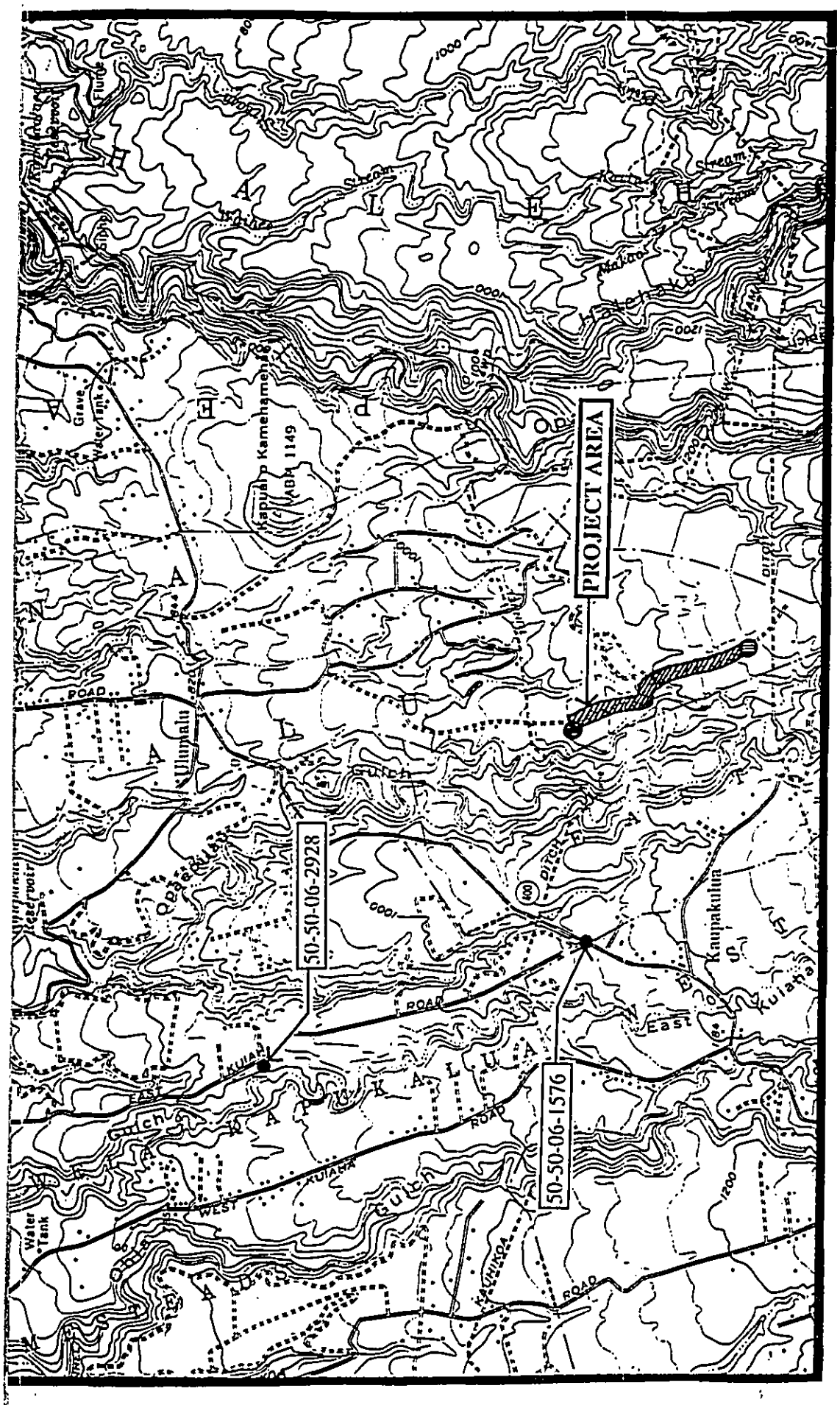


Figure 7 Portion of USGS 7.5 minute series, Haiku Quad, showing archaeological sites in the vicinity

kilometers northwest of the present study area. It was recorded during the 1973 Statewide Inventory.

Site 50-50-06-2798, Possible shrine, this site "consists of a badly deteriorated segment of a retaining wall, a scatter of rocks and boulders, and one prominent boulder in a central area on a 30% slope (Sinoto and Pantaleo 1992:7). It is situated in Kealiʻi iki Gulch within the *ahupuaʻa* of Peahi. This site was recorded in 1992 by Aki Sinoto and Jeffrey Pantaleo in "Archaeological Inventory Survey of the Proposed Pili Hale Agricultural Subdivision, Peahi, Makawao, Maui, TMK 2-8-04:15 and :30."

-50-50-06-2799, a historic roadway, situated in the *ahupuaʻa* of Peahi, also recorded in the aforementioned study (Pantaleo and Sinoto 1992:9-10).

-50-50-06-1576, the Kaupakalua Winery, is a historic winery, situated in the *ahupuaʻa* of Kaupakalua. It was recorded by J.C. Wright in March of 1974 and the only evidence left of the site consists of two cisterns and a small waterhole. The site is listed as being of reserved value.

-50-50-06-1569, the Kaupakalua Village, situated mid-way between Makawao and Pauwela, was noted by J.C. Wright in March 1974 and is listed as being of marginal value.

There have been two recent inventory surveys *makai* (north) of the Hana Highway in the adjacent *ahupuaʻa* (to the east) of Opana and Keaʻaula with a portion of one extending into the subject *ahupuaʻa* of Ulumalu. The survey related to the then proposed Sea Ranch Estates, consisted of some 73 acres in Ulumalu, Opana, and Keaʻaula (Dunn and Spear 1996). The survey of Manawai Homesteads Subdivision included some 121 acres of plateau and undeveloped gulch terrain (Dunn, Burgett and Spear 1995).

The two projects had some overlapping site boundaries. Thus combined, there were a total of 12 sites documented. Of the twelve sites four were historic, two roads and two ditch segments with eight considered pre-Contact. The pre-Contact site interpretations include, agricultural (3), quarry(s) and lithic scatter (4), and habitation (1) (Dunn, Burgett and Spear 1995; Dunn and Spear 1996). The site locations are depicted on Figure 7.

The historic period sites include: 50-50-067-4086, Spreckles Ditch; -4092, Haʻiku Ditch, and two roads, -4093 and -4095. The pre-Contact sites include: agriculture 50-50-06-4085, 40989 and 4091, Quarry/Lithics -4087, 4088, 4094, and 4182; and habitation 50-50-06-4090.

The conclusion drawn from these two surveys included: (1) that the more favorable plateau lands have been extensively altered by commercial pineapple and therefore only sites in the gulches still exist; (2) though sites were found only in the gulches, the majority of gulches were not suitable for sites, "Due to the steep sites and relatively narrow bottoms of the gulches there is a lack of habitation and agricultural sites" (Dunn and Spear 1996:16), and (3) C14 analysis of samples from the only pre-Contact site 50-50-06-4090 yielded date ranges into the historic period - suggesting late pre-Contact habitation use (Dunn, Burgett and Spear 1995:32, 33).

IV. SETTLEMENT PATTERN SUMMARY AND EXPECTED FINDINGS

The settlement pattern for the area surrounding the project would have probably been typical for the Hamakualoa District of Maui. It would be expected that habitation would have been concentrated near the coast and within the larger valley systems with permanent stream flow. Within these valleys intensive agricultural pursuits (i.e. taro *lo`i*) would have been taking place in association with habitation activities. For areas without constant stream flow (i.e. the project area) agricultural activities would not have been as intensive but rather more opportunistic with sweet potato being the main crop although the gathering of non-cultivated agricultural crops (i.e. *olonā* and possibly medicinal plants) would also be expected. Habitation within areas without constant stream flow would still be expected to be concentrated near the coast. Therefore, within the project area, site density would be relatively low, habitation activities would be expected further *makai* along the coast and agricultural activities would be expected to be non-intensive. Although agricultural activities most likely took place within the project area the probability for evidence of this activity remaining is extremely low due to the non-intensive nature of the agriculture.

Additionally, based on background research, it is probable that commercial agriculture, pineapple and/or sugar cane, occurred within the presently open pasture lands within which the project area lies. Portions of the ditch systems related to these agricultural ventures also traverse through or near the project area, although based on map references the ditches are tunnels in this area.

V. FINDINGS AND RECOMMENDATION

The surface survey was initiated from the *mauka* end of Upper Ulumalu Road. The initial transect was *mauka* (southward) along the proposed roughly 427 m. (1,400 ft.) long by 6 m. (20 ft.) wide access road. Approximately 400 ft. along the proposed access road is an existing, still-utilized cattle corral and loading chute. Barbed wire fences extend east and west from the corral. Continuing *mauka* the proposed access road, in part, follows an existing dirt path road, either an overgrown ranch or commercial agricultural (sugar or pineapple) roadway.

The proposed reservoir tank site was marked in the field by a recently surveyed benchmark. The tank site is roughly 60 m (200 ft.) by 60 m. (200 ft.), though a much larger area was actually surveyed.

The return transect included the access road corridor, again, and also observations into the two gulches to the west and east.

The survey of Upper Ulumalu Road to the proposed booster pump station was some 300 m. (1000 ft.) long. During this portion of the survey the cut banks of the roadway, where exposed, were inspected. No evidence of traditional cultural activity (*i.,e.*. charcoal flecking, features, etc.) was observed, through modern fence lines and driveway are present.

The proposed booster pump station area is to be situated immediately adjacent (west) to Upper Ulumalu Road. The proposed steel tank site is roughly 100 ft. square, though a much larger area was surveyed.

No historic properties of any type were observed within the project area. The cattle corral location may be old, but recent lumber, fencing and piping clearly indicate modern construction and use. Some 200 ft. *mauka* of the larger reservoir tank site is a concrete shaft that is part of the Waiola Ditch System. The concrete structure is about 1.5 meters in diameter, 1 meter high, with a vertical drop to the ditch floor of 5 meters.

Upper Ulumalu road is a narrow (4-6 meters) dirt and gravel roadway. Presently, the road ranges from .5 to 1 meter below the adjacent ground surface indicating periodic episodes of erosion, followed by road grading. The only feature observed was a row of basalt boulders utilized for modern road drainage purposes.

The smaller booster pump tank site is also low pasture grass terrain with no observed historic properties.

Due to the absence of historic sites no further archaeological research is warranted.

If, in the unlikely event, any archaeological remains are encountered during construction, work should be halted in that area and State Historic Preservation Division (SHPD) should be contacted at 587-0047 to determine appropriate treatment of any findings.

VI. REFERENCES CITED

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1993 *Subsurface Testing of an Unmarked Grave Site (#50-06-2928), East Kuiaha, Hamakualoa, Maui, (TMK 2-7-12:63)*

PHOTOGRAPHIC APPENDIX

Figure 8 Along Proposed Access Road to Reservoir Tank Site, View *Mauka* (South)

Figure 9 From Proposed Reservoir Tank Site, Looking *Makai* (North) where Access Road is Proposed

Figure 10 Existing Corral Feature in Path of Proposed Reservoir Access Road, View to South

Figure 11 Corral Feature with Low Bushes in Central Background, View along Proposed Access, View to North

Figure 12 Portion of Upper Ulumalu Road Where Waterline Will Be Placed, View to North

Figure 13 Portion of Upper Ulumalu Road Where Waterline Will Be Placed, View to South

Figure 14 Booster Pumping Station Tank Site, View to North

Figure 15 Booster Pumping Station Tank Site, View to East

APPENDIX C

HUD Environmental Assessment Checklist

ENVIRONMENTAL ASSESSMENT

FOR ACTIONS THAT DO NOT REQUIRE AN EIS UNDER NEPA OR LOCAL LEGISLATION

1. 1. Name of Project/Activity Ulumalu-Peahi Water System Improvement I.D. No. _____

2. Type of Action: X Application: ___ Agency (County of Maui, Department of Water Supply) (Hawaii only)
Name of Applicant or Agency

3. Approving/Implementing Agency: County of Maui - Department of Water Supply

4. Head of Agency: (Authorized Signature) _____
(name, Title, Date)

5. Environmental Assessment Prepared By Warren S. Unemori Engineering, Inc.
Agency or Consultant/Name, Title, Date

II. DESCRIPTION OF PROPOSED ACTION(S)

1. Single Activity X; Aggregation of Activities ____; Multi-Year Activities ____;
Construction of a 300,000 gallon reinforced concrete storage reservoir, booster pump station, 8-inch water distribution system with service laterals and fire hydrants within Maui Ranch Estates and Upper Ulumalu Road.

2. Project Location: Ulumalu, Maui, Hawaii

3. TMK (Hawaii only): TMK 2-08-01:61 & 64 Location Map Attached: X Yes; ____ No

III. ENVIRONMENTAL ASSESSMENT PREPARED FOR COMPLIANCE WITH HUD REQUIREMENTS AND ENVIRONMENTAL REVIEW REQUIREMENTS OF OTHER LEVELS OF GOVERNMENT AS FOLLOWS:

1. N/A State of Hawaii, Supplemental Form EA-S-SOH
2. ____ Guam, Supplemental Form EA-S-Guam
3. ____ Northern Mariana Islands, Supplemental Form EA-S-NMI
4. ____ Trust Territories of the Pacific Islands, Supplemental Form EA-S-TTPI
5. ____ American Samoa, Supplemental form EA-S-ASG

IV. FINDINGS AND CONCLUSIONS RESULTING FROM THE-ENVIRONMENTAL REVIEW:
(To be prepared after environmental analysis is completed)

1. ENVIRONMENTAL FINDING:
X Finding of No Significant Impact on the Environment (FONSI)
____ An Environmental Impact Statement is required

2. Agencies/Interested Parties Consulted (Contact Person, Title, Tel. No., Date)

3. Alternatives Considered:
(1) Proposed Action
(2) Modify Existing System
(3) No Build

4. Special conditions imposed or actions taken to achieve compliance with HUD, other federal authorities or local policies and standards:
Archaeological inventory study performed. Hawaii Draft Environmental Assessment Report prepared

5. a. FINDING OF NO SIGNIFICANT IMPACT ON THE ENVIRONMENT AND REQUEST FOR RELEASE OF FUNDS (Combined Notice)
(1) Date FONSI/RROF published in local newspaper _____
(2) Last day for recipient to receive comments _____
(3) Last day for HUD to receive comments _____
(4) Date FONSI transmitted to Federal, State, or local governmental agencies or interested groups or individuals _____
(5) Date HUD released grant conditions _____

b. NEGATIVE DECLARATION (Hawaii only)
(1) Date Draft EA Published in OEQC Bulletin N/A
(2) Date Final EA/FONSI Published in OEQC Bulletin N/A
(3) Documentation attached: ____ Yes, X No

Part V

Check the appropriate column that best describes the project/activities' impact on the environmental component listed.

Column 1. Proposed action will provide beneficial impacts.
Column 2. Proposed action will not create any adverse impacts nor will it be impacted by adverse conditions.
Column 3. Minor impacts anticipated, mitigative measures can be taken by:
a. Taking special precautions during construction period (short term impact) or
b. Routinely monitor potential concern upon completion or project (long term impact).
Column 4. Technical analysis required to establish proper mitigative measures.
Column 5. Modification of project through site planning or construction techniques required to mitigate adverse impacts.
Column 6. Provide succinct comments and/or make reference to maps, technical reports, site visits, or personal contacts made that will support the determinations made under each environmental component.

Impact Categories	1 Potentially Beneficial Impact	2 No Impact Anticipated/NA	3 Minor Adverse Impacts Anticipated: Short Term	3 Minor Adverse Impacts Anticipated: Long Term	4 Adverse Impact Requires Mitigation	5 Adverse Impact Requires Modification to Project/ Activity	6 SOURCE DOCUMENTATION
Land Development							
Conformance with Comprehensive Plans and Zoning		X					See Draft Environmental Assessment Report, February, 2000
Compatibility and Urban Impact		X					See Draft Environmental Assessment Report, February, 2000
Slope			X				See Draft Environmental Assessment Report, February, 2000
Erosion				X			See Draft Environmental Assessment Report, February, 2000
Soil Suitability				X			See Draft Environmental Assessment Report, February, 2000
Hazards and Nuisances. Including Site Safety		X					See Draft Environmental Assessment Report, February, 2000
Energy Consumption				X			See Draft Environmental Assessment Report, February, 2000
Environmental Design and Historic Values							
Visual Quality-Coherence, Diversity, Compatible Use, and Scale			X				See Draft Environmental Assessment Report, February, 2000
Socioeconomic							
Demographic/ Character Changes			X				See Draft Environmental Assessment Report, February, 2000
Displacement			X				See Draft Environmental Assessment Report, February, 2000
Employment and Income Patterns			X				See Draft Environmental Assessment Report, February, 2000

Other commentary/discussion: The Ulumalu-Peahi Water System Improvement will replace the existing, substandard water distribution system in Maui Ranch Estates Subdivision and adjoining properties along Upper Ulumalu Road with one that meets or exceeds current minimum County DWS standards.

Impact Categories	1 Potentially Beneficial Impact	2 No Impact Anticipated/NA	3 Minor Adverse Impacts Anticipated: Short Term	3 Minor Adverse Impacts Anticipated: Long Term	4 Adverse Impact Requires Mitigation	5 Adverse Impact Requires Modification to Project/ Activity	6 SOURCE DOCUMENTATION Agency or other contact: List Name, Title, Tel. No., Date Reference Material(Reports,Studies,etc.) - List Title, Author, Date - Note if it is attached Field Observation - Note significant condition(s) that support conculusion of observation
Community Facilities and Services							
Educational Facilities		X					See Draft Environmental Assessment Report, February, 2000
Commercial Facilities		X					See Draft Environmental Assessment Report, February, 2000
Health Care		X					See Draft Environmental Assessment Report, February, 2000
Social Services		X					See Draft Environmental Assessment Report, February, 2000
Solid Waste		X					See Draft Environmental Assessment Report, February, 2000
Waste Water		X					See Draft Environmental Assessment Report, February, 2000
Storm Water		X					See Draft Environmental Assessment Report, February, 2000
Water Supply	X						See Draft Environmental Assessment Report, February, 2000
Public Safety — Police		X					See Draft Environmental Assessment Report, February, 2000
Public Safety — Fire	X						See Draft Environmental Assessment Report, February, 2000
Public Safety — Emergency Medical		X					See Draft Environmental Assessment Report, February, 2000
Open Space and Recreation — Open Space		X					See Draft Environmental Assessment Report, February, 2000
Open Space and Recreation — Recreation		X					See Draft Environmental Assessment Report, February, 2000
Open Space and Recreation — Cultural Facilities		X					See Draft Environmental Assessment Report, February, 2000
Transportation	X						See Draft Environmental Assessment Report, February, 2000
Natural Features							
Water Resources		X					See Draft Environmental Assessment Report, February, 2000
Surface Water		X					See Draft Environmental Assessment Report, February, 2000

Part VI
STATUTORY CHECKLIST/HUD STANDARDS

Federal statutes, regulations or executive orders address specific resources that may be impacted by the proposed action. HUD policies and standards address conditions that may require mitigative measures or modifications to be proposed action to achieve compliance with HUD requirements.

Page 5 and 6 of this form lists those authorities and the implementing regulations or guidelines that must be followed to achieve compliance with the applicable authority.

Complete analysis of the proposed action on page 5 and 6 and enter the determination in column 2 or 3 below.

(1) Statutes, Executive Orders and HUD Regulations/Notices	(2) Not applicable as Certified on Pages 5 & 6	(3) Compliance Required. Make Reference to And Attach Source Documentation and Analysis to Show Compliance with Applicable Authorities per 58.5
Historic Properties	X	See Draft Environmental Assessment, February, 2000
Floodplain Management	X	See Draft Environmental Assessment, February, 2000
Wetlands Protection	X	See Draft Environmental Assessment, February, 2000
Coastal Zones	X	See Draft Environmental Assessment, February, 2000
Endangered Species	X	See Draft Environmental Assessment, February, 2000
Farmlands Protection	X	See Draft Environmental Assessment, February, 2000
Air Quality	X	See Draft Environmental Assessment, February, 2000
Water Quality	X	See Draft Environmental Assessment, February, 2000
Noise	X	See Draft Environmental Assessment, February, 2000
Thermal/Explosives	X	See Draft Environmental Assessment, February, 2000
Airport Clear Zones	X	See Draft Environmental Assessment, February, 2000
Solid Waste Disposal	X	See Draft Environmental Assessment, February, 2000
Toxic Chemicals and Radioactive Wastes	X	See Draft Environmental Assessment, February, 2000
Coastal Barrier Resources Wild and Scenic Rivers	Federal legislation and implementing regulations concerning these resources do not apply to the State of Hawaii, Guam, NMI, TTPI, or American Samoa.	

Other environmental concerns not addressed under Parts V or VI_____

HISTORIC PROPERTIES: The National Historic Preservation Act of 1966 (P.L. 89-665) (16 U.S.C. 470); Preservation of Historic and Archeological Data Act of 1974 (P.L. 93-291) (16 U.S.C. 469): Executive Order 11593. Implementing Regulations: Protection and Enhancement of the Cultural Environment, 36 CFR Part 800 or 801 F:R. 1/30/79.

A X The site for the proposed action is not listed nor eligible for listing on the National Register of Historic Places based on: X consultation with the SHPO; ____ information checks with the Federal Register; ____ local authorities and interest groups; X field observation.

B ____ Action is subject to compliance with Section 106 of the National Preservation Act of 1966. Compliance achieved on ____ (date), documentation attached.

FLOODPLAIN MANAGEMENT: Flood Disaster Protection Act of 1973 (P.L. 93-234)and implementing regulations; National Flood Insurance Program (44 CFR Parts 59-79); Executive Order 11988; Water Resources Council Guidelines on Implementing E.O.11988; Section 404 of the Clean Water Act of 1977.

A X The project/activity is located outside of the 100 year flood hazard area identified by the FIRM or FIA Flood Hazard Boundary map panel number 150003 0225B and not subject to compliance with E.O. 11988.

B ____ The proposed action is located within the 100 year floodplain and compliance with E.O. 11990 is required. Documentation for compliance with the E.O. was completed on ____ (date) and is attached.

C ____ Proposed action requires construction or fill in waters of the U.S. or adjacent wetlands, Department of Army permit required (Section 404 of the Clean Water Act). Its issuance is contingent upon a federal consistency determination with the local Coastal Zone Management Program.

____ Flood insurance required. Policy issued to: ____ .

ETLANDS PROTECTION: Executive Order 11990; Water Resources Council Guidelines for Implementing E.O.11988.

A X The proposed action is not within a wetland area nor will it have an adverse impact on an adjacent wetland area. This determination is made by: X Field observation; ____ consultation with the U.S. Corps of Engineers; ____ Other ____

____ The proposed action is located within a wetland or will impact on one nearby. Documentation for *compliance with the E.O. was completed on* ____ *(date) and is attached. If* action requires fill, a Department of Army Permit is required (Section 404 of the Clean Water Act). Its issuance is contingent upon a consistency determination with the local Coastal Zone Management Program. Copy of permit is attached.

____ Flood insurance required. Policy issued to: ____

OASTAL ZONE MANAGEMENT Coastal Zone Management Act of 1972 (P.L. 92-583) (16 U.S.C. 1451, et seg.): Executive Order 11990; 15 CFR Part 930.

A X The proposed action is consistent with the approved Coastal Management Program for the area. Consistency determination is attached.

____ The proposed action will have an impact on the coastal area which required a permit from the ____ ____ agency/department. The permit was issued on ____ (date) and a copy is attached.

NDANGERED SPECIES: The Endangered Species Act of 1973 (16 U.S.C. 1531-1543) Section 7; 50 CFR Part 402.

A X The proposed action will not affect any endangered species of plants or animals, nor any critical habitat. This determination was made based on: ____ consultation with U.S. Fish and Wildlife Service (FWS);____ consultation with local authority ____ (Dept./Agency); X Field Observation.

B ____ Formal Consultation required with the U.S. FWS under Section 7 (16 U.S.C. 1536). Compliance achieved on ____ (date) documentation attached.

FARMLANDS PROTECTION: Farmland Protection Policy Act of 1981 7 U.S.C. 4201, et seg.; 7 CFR Part 658 (Subtitle I of the Agriculture and Food Act of 1981).

X The proposed action will not adversely impact prime or unique farmland nor farmlands designated as important by State and Local Government that have been approved by the Secretary of Agriculture. This determination was made by: ____ review of local land use plans; ____ consultation with the District Conservationist, SCS, USDA; X Field Observation.

____ The proposed action impacts on agricultural lands however mitigative measures were identified in the attached analysis in accordance with 7 CFR Part 658. Compliance achieved on ____ (date). Documentation attached.

AIR QUALITY: Clean Air Act (P.L. 90-148) (42 U.S.C. 7401-7642) as amended; applicable EPA implementing regulations; Volume 1 Guide for Rapid Assessment of Air Quality at Housing Sites by R.H. Thuillier, May 1978 and HUD Format AP #1, Rapid Evaluation Procedure for Carbon Monoxide Concentrations.

A X Project/activity is located within an attainment area in accordance with the State Implementation Plan; is not located near a power plant or sugar mill; and is not adjacent to a traffic thoroughfare that generates CO concentrations in excess of the 8 hour standard of 10 mg/m³ at project site.

B ____ Project/activity is located within a non-attainment area and/or is exposed to air pollutants that threatens the federal air quality standard for ____ (pollutant). Analysis and recommendations for clearance is attached.

WATER QUALITY: Federal Water Pollution Control Act (P.L. 92-500) as amended (33 U.S.C. 1251-1376), the Safe Drinking Water Act of 1974 (P.L. 93-523) as amended (42 U.S.C. 300f-300j-10); particularly section 1424(e) (42 U.S.C. 300h-303(e)).

A X Project/activity does not impact a sole source aquifer designated by EPA in accordance with Section 1424(e) of the Safe Drinking Water Act of 1974, as amended.

B ____ Project/activity is located within the Northern Groundwater Aquifer on Guam. Guam EPA has reviewed proposal in accordance with MOU between HUD, U.S. EPA, Guam EPA and GHURA. Their recommendation for clearance is attached. (Activities on Guam only)

NOISE: Noise Control Act 42 U.S.C. 4903; 24 CFR Part 51 Subpart B: Noise Abatement and Control; HUD Noise Assessment Guidelines March 1984.

A ___X___ Project/activity is not subject to current or projected noise levels that exceed 65 LDN as determined by: ___X___ a site inspection; _____ an evaluation using HUD Noise Assessment Guidelines; or _____ other acoustical data (_____)

B ____ Project/activity requires mitigative action to comply with 24 CFR Part 51B Noise Abatement and control. Report prepared by _____, consultant, outlines mitigative measures for compliance with HUD standards. Copy attached.

THERMAL/EXPLOSIVE HAZARDS: 24 CFR Part 51 Subpart C - Environmental Criteria and Standards; Siting of HUD-Assisted Projects Near Hazardous Operations Handling Petroleum Products or Chemicals of an Explosive or Flammable Nature.

A ___X___ Project/activity is not subject to hazards from explosive or flammable fuels or other hazardous chemicals based on site inspection and information on file.

B ____ Project/activity is subject to hazards from explosive or flammable fuels or other hazardous chemicals. Evaluation of these hazards and recommended mitigative measures are: _____ included in attached study; _____ mitigative measures will be incorporated into project design.

CLEAR ZONES AT AIRPORTS 24 CFR Part 51 Subpart D - Siting of HUD Assisted Projects in Runway Clear Zones at Civil Airports and Clear Zones and Accident Potential Zones at Military Airfields.

A ___X___ Project/activity is not located in or near a Clear Zone at a civil or military airfield nor in or near an Accident Potential Zone at a military airfield.

____ Project/activity is located within an existing or future Clear Zone or Accident Potential Zone. Approval of proposed action is consistent with Part 51.302, 51.303 and 51.305(b). _____ _____ Documentation attached.

SOLID WASTE DISPOSAL: Resources Conservation and Recovery Act (42 U.S.C. 6901-6987); 40 CFR Part 250.43-1.

___X___ Project/activity does not involve the disposal of hazardous materials nor siting of sanitary landfills or closing of open dumps.

B ____ Project/activity is subject to provisions of EPA Guidelines; _____ Documentation of evaluation and coordination with EPA attached.

TOXIC CHEMICALS & RADIOACTIVE WASTES: HUD Notice 79-33, September 10, 1979, Policy Guidance to Address the Problems Posed by Toxic Chemicals an Radioactive Materials Chemicals and Radioactive Materials.

A ___X___ Project/activity is not affected by toxic chemicals or radioactive material based on: ___X___ site inspection; _____ information check with local Health Dept.; _____ other source _____.

____ Project/activity's site was suspected of containing toxic chemicals or radioactive materials. HUD and local responsible agency contacted. _____ Evaluation of hazard was made in accordance with Notice 79-33 and found acceptable. Documentation attached, _____ Yes, _____ No.

Grantees are advised not to utilize CDBG funds on activities supporting new development for habitation at locations affected by toxic chemicals and radioactive materials.

Other policies, standards or guidelines used in preparing the environmental analysis:

FIGURES

1. Project Location Map

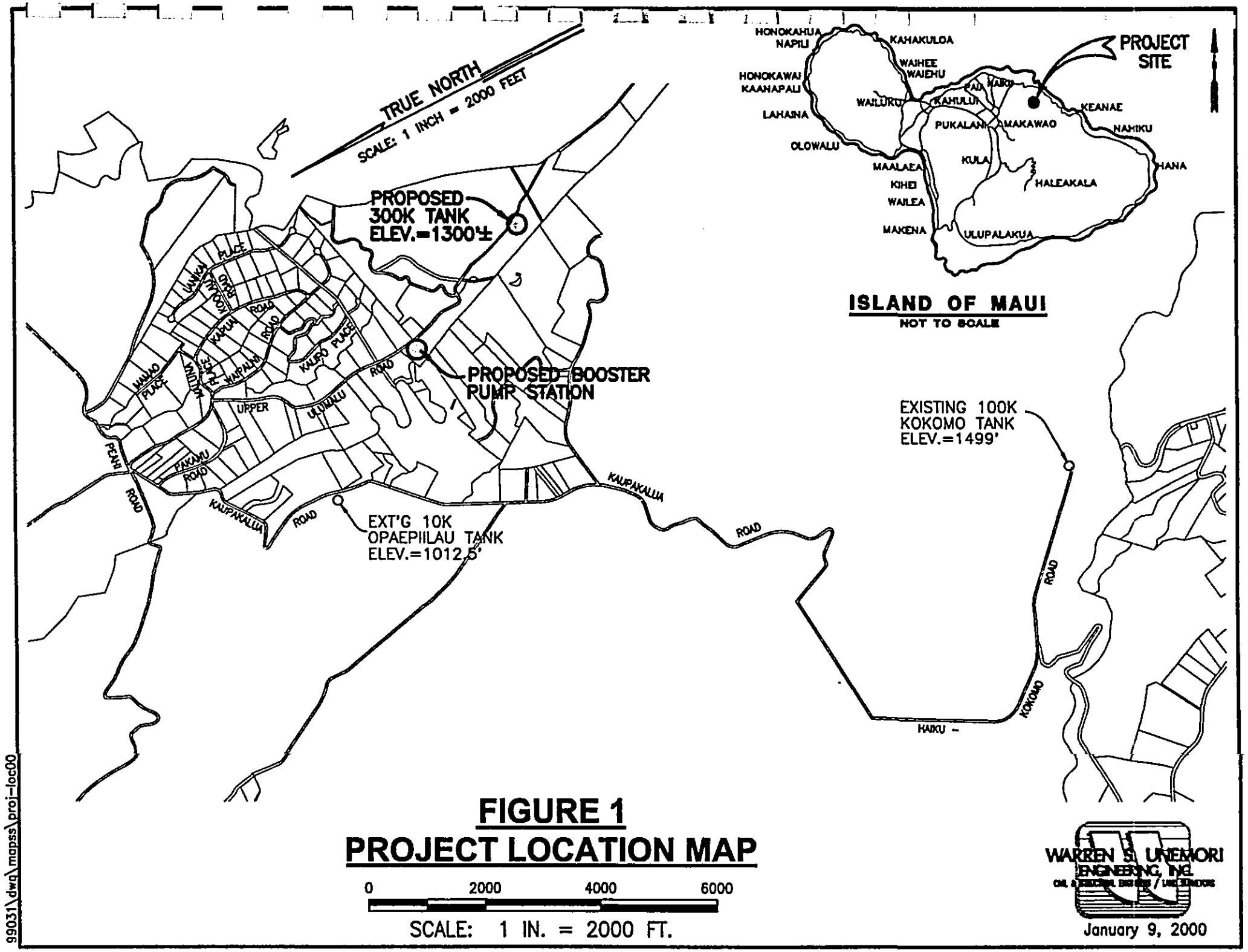
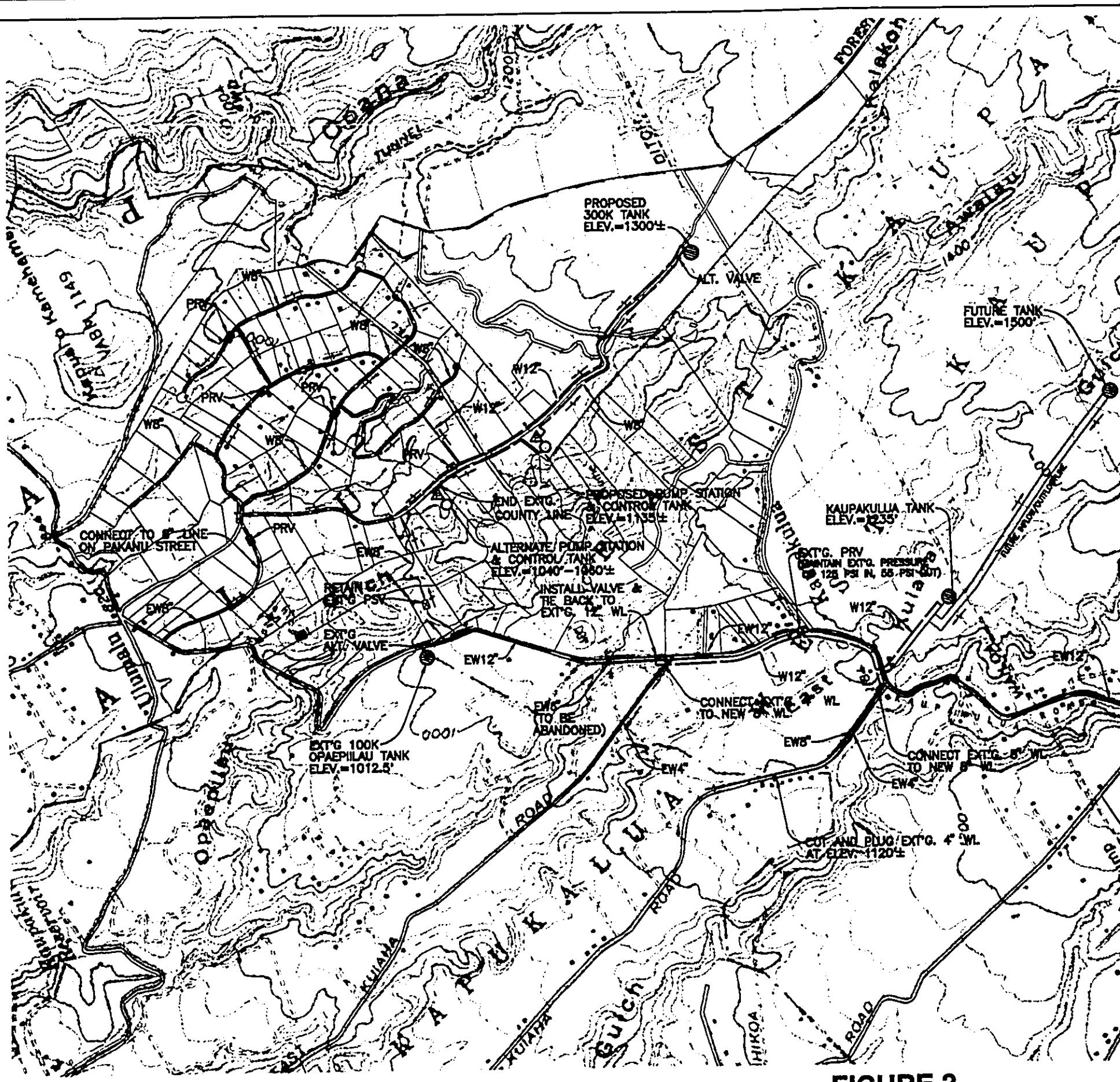


FIGURE 1
PROJECT LOCATION MAP

2. Site Map Showing Locations of Project Improvements



LEGEND:

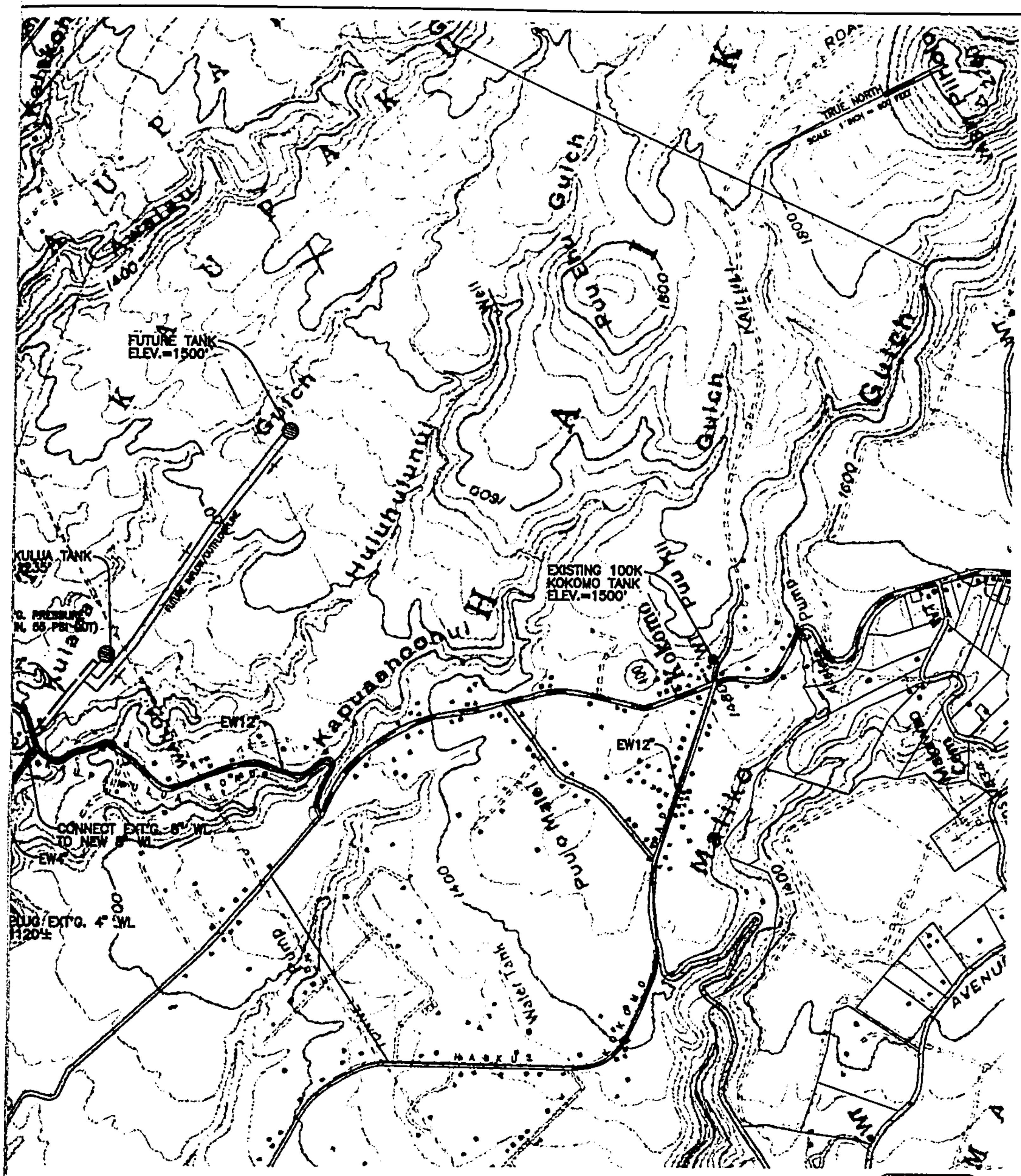
- PROPOSED HIGH PRESSURE LINE
- PROPOSED REDUCED PRESSURE LINE
- EXISTING WATERLINE
- FUTURE WATERLINE

FIGURE 2

SITE MAP SHOWING LOCATIONS OF PROJECT IM

0 600 1200 1800 2400

SCALE: 1 INCH = 600 FEET



GURE 2

NS OF PROJECT IMPROVEMENTS

1200 1800 2400

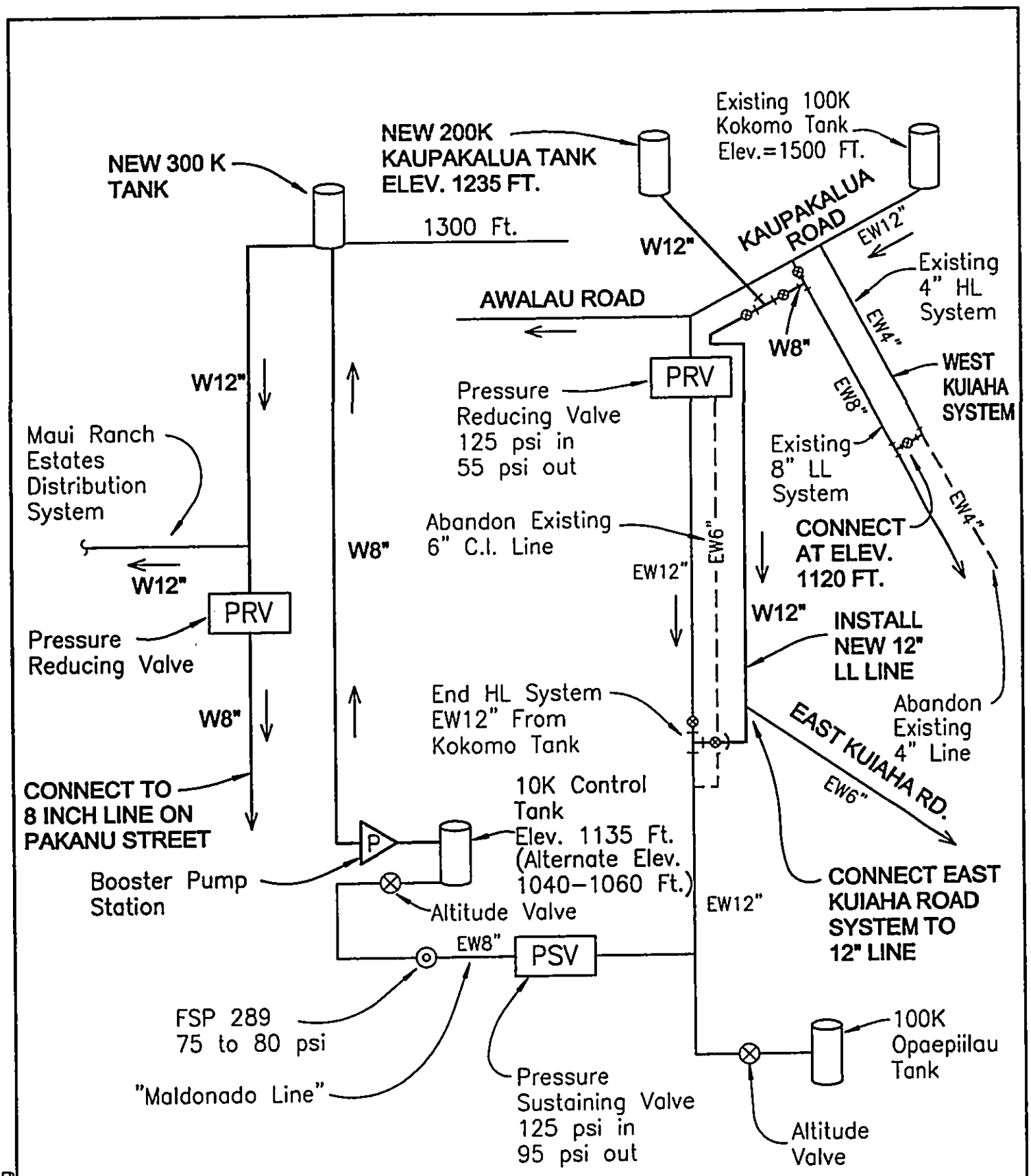
1 INCH = 600 FEET

REDUCED COPY
NOT TO SCALE

WARREN S. UNEMORI ENGINEERING, INC.

February 2, 2000
Revised: February 17, 2000
Revised: March 20, 2000

3. Schematic Diagram of Water System Improvements



99031\exhibits\wl-diagm.dwg

FIGURE 3

SCHEMATIC DIAGRAM OF WATER SYSTEM IMPROVEMENTS

WARREN S. UNEMORI ENGINEERING, INC.

February 9, 2000
Rev: March 20, 2000

4. Site Specific Soil Classification Map

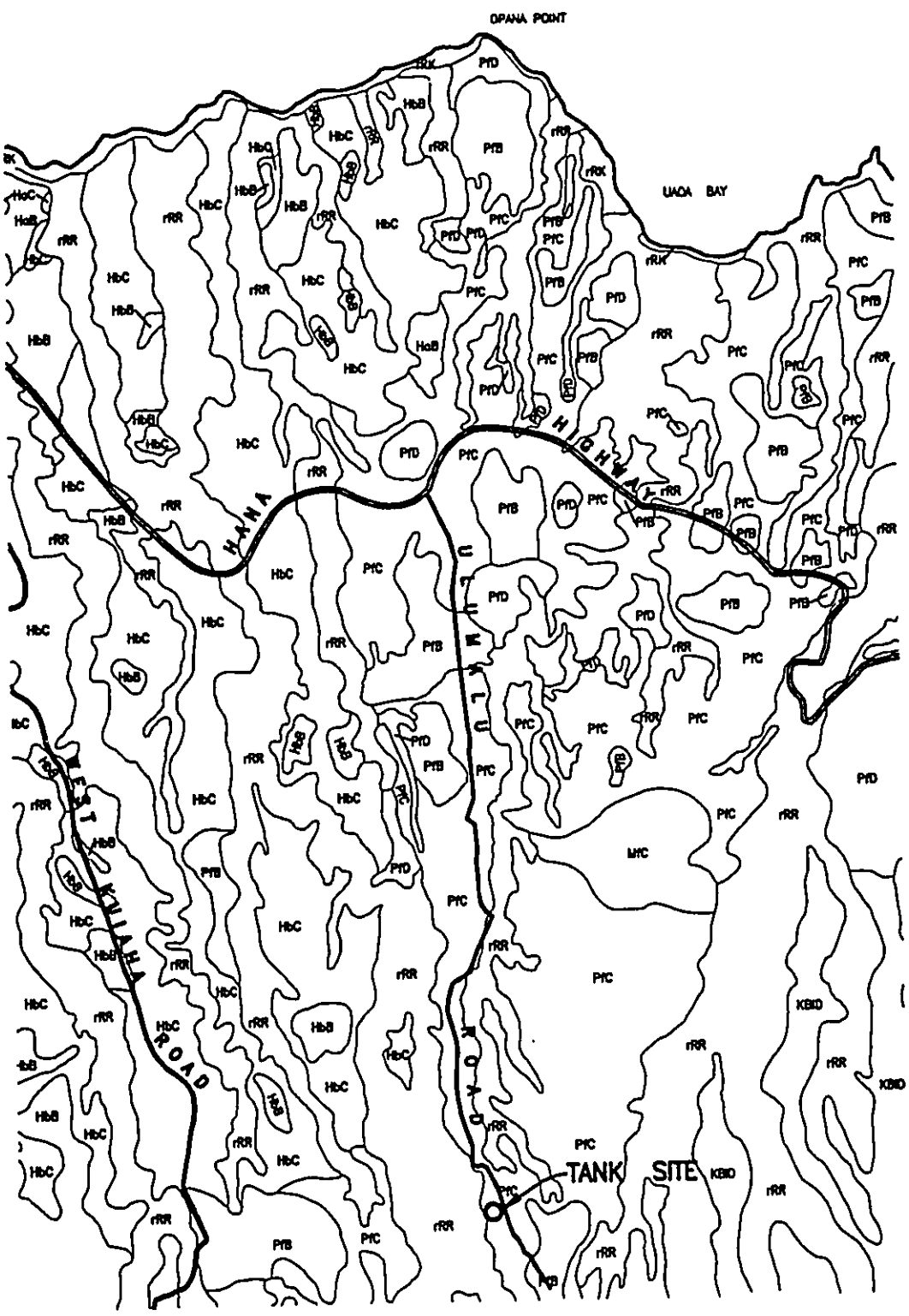


FIGURE 4

SITE SPECIFIC SOIL
CLASSIFICATION MAP

WARREN S. UNEMORI
ENGINEERING, INC.

February 4, 2000

EXHIBITS

1. **Exhibit A - Flood Rate Insurance Map**

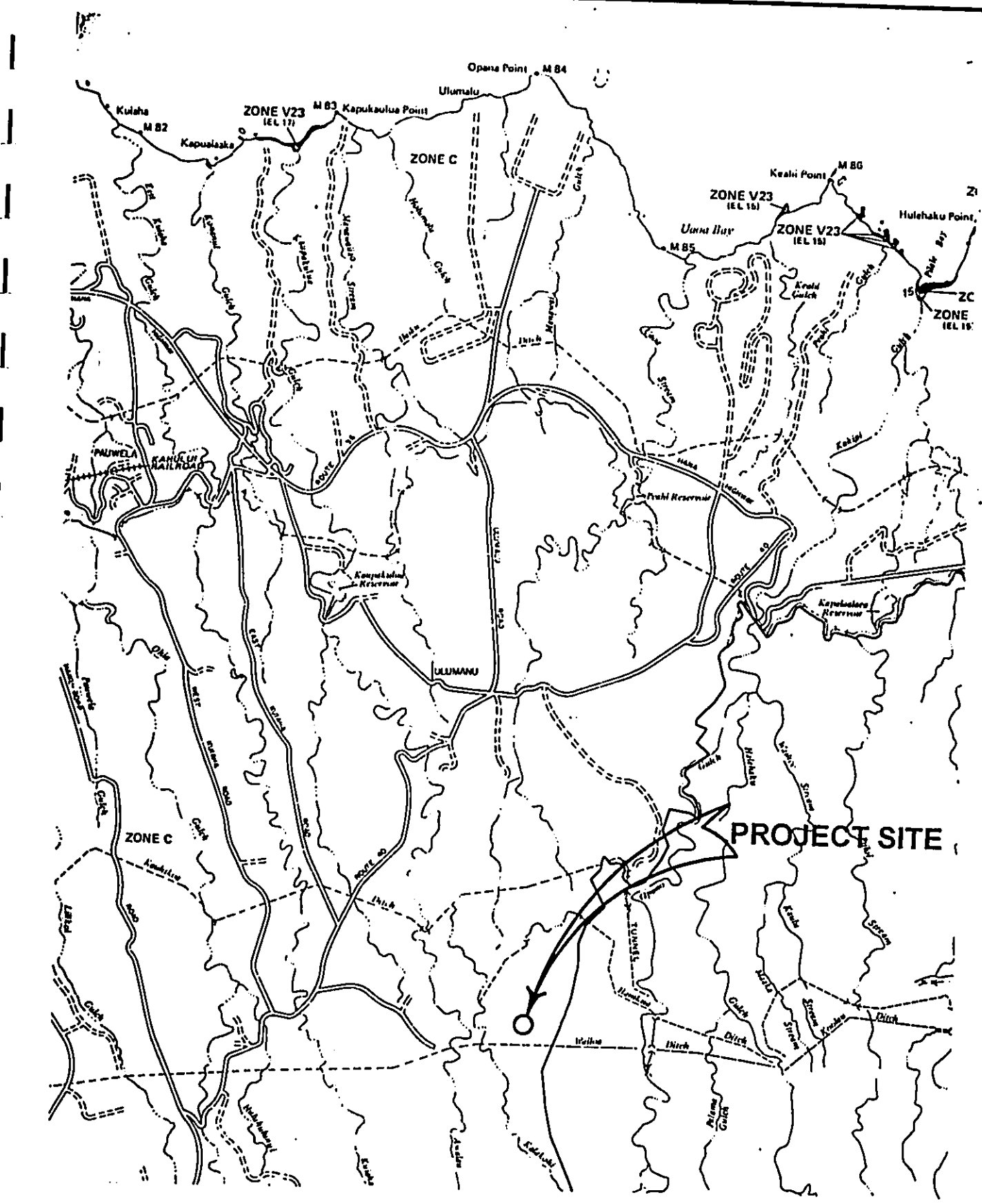


EXHIBIT A

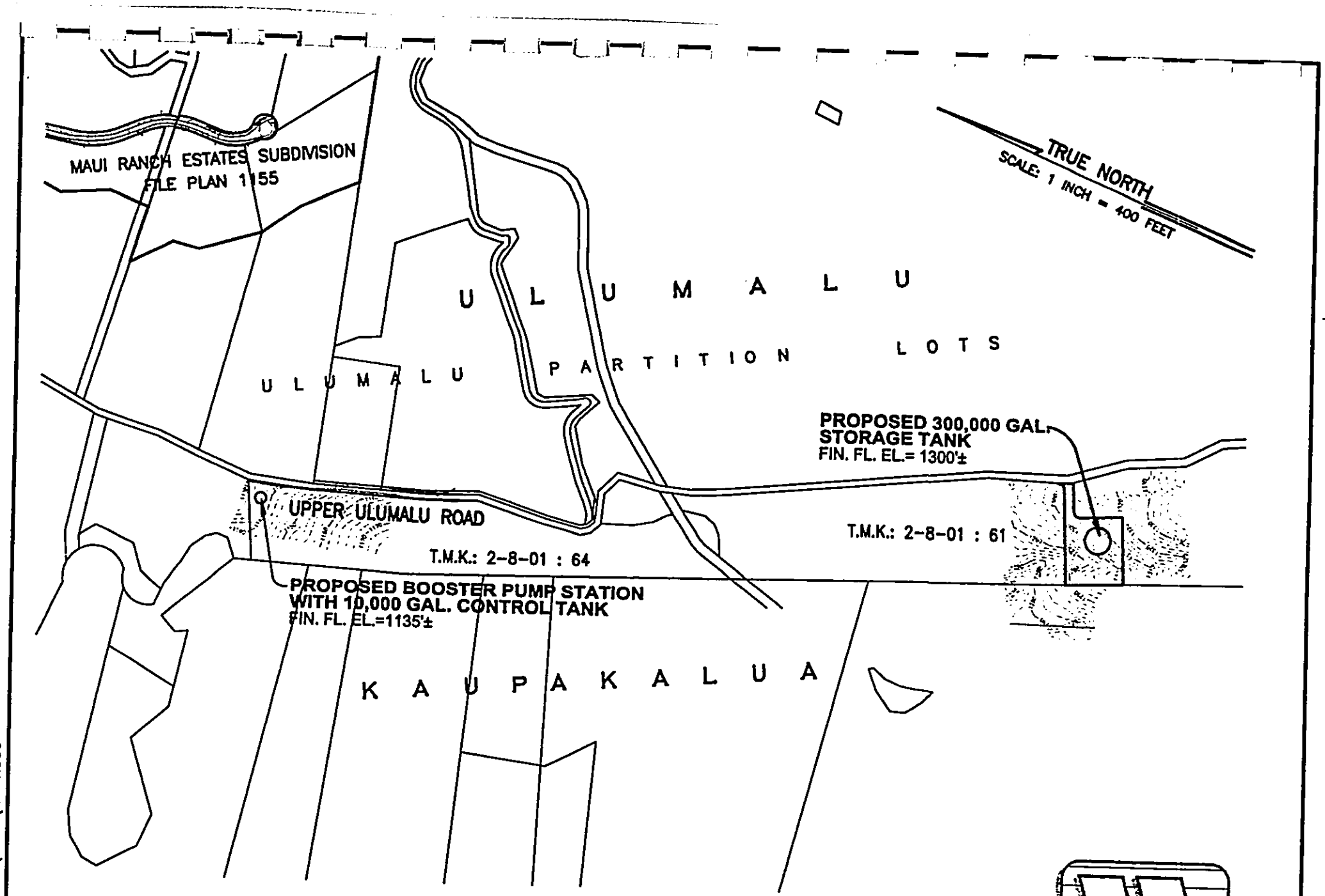
FLOOD INSURANCE RATE MAP

WARREN S. UNEMORI ENGINEERING, INC.

CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

February 2, 2000

2. Exhibit B - Site Photographic Location/ View Direction Map



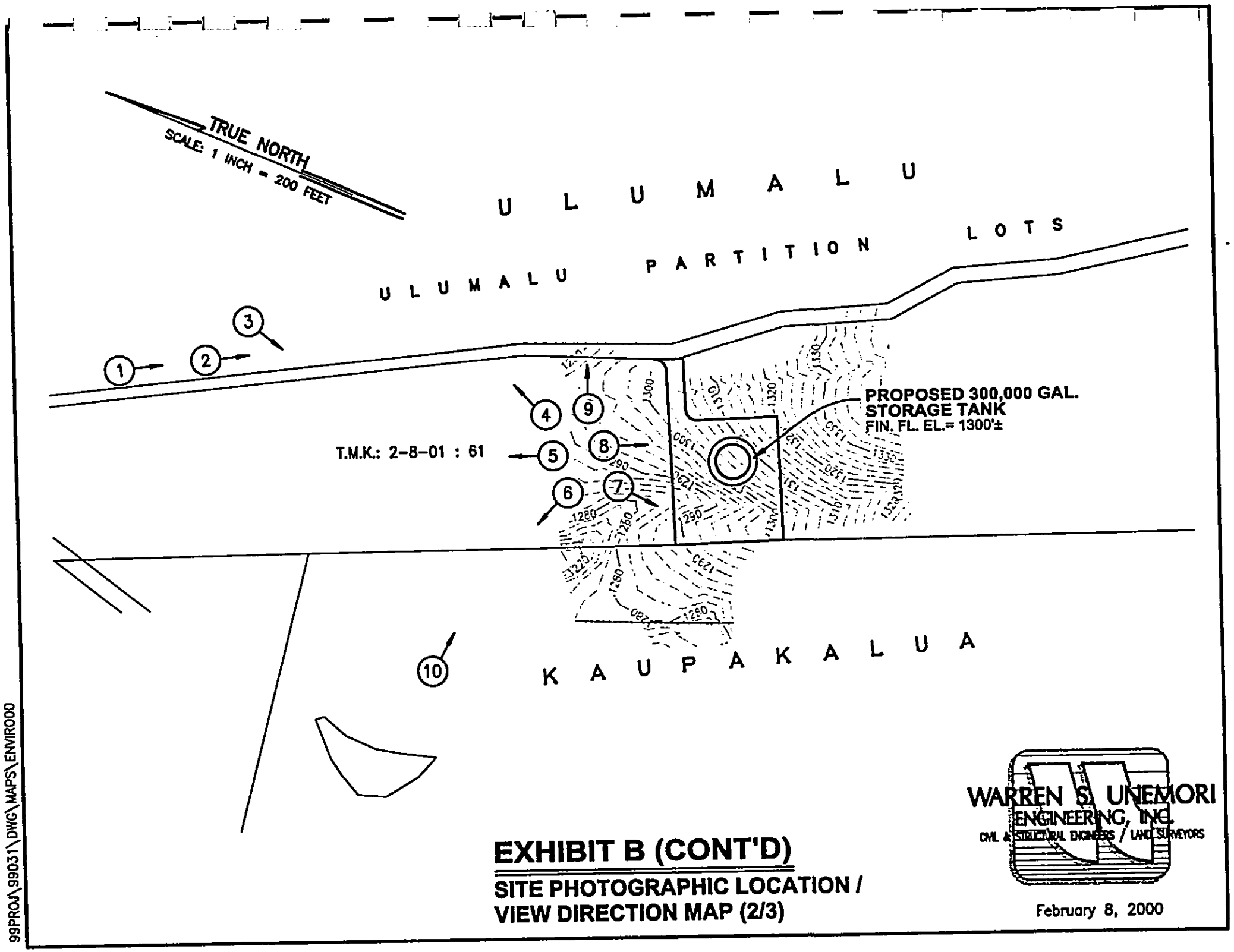
99PROJ\99031\DWG\MAPS\ENVIR000

EXHIBIT B

SITE PHOTOGRAPHIC LOCATION / VIEW DIRECTION MAP (1/3)

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

February 8, 2000



99PROJ\99031\DWG\MAPS\ENVIR000

EXHIBIT B (CONT'D)

SITE PHOTOGRAPHIC LOCATION / VIEW DIRECTION MAP (2/3)

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

February 8, 2000

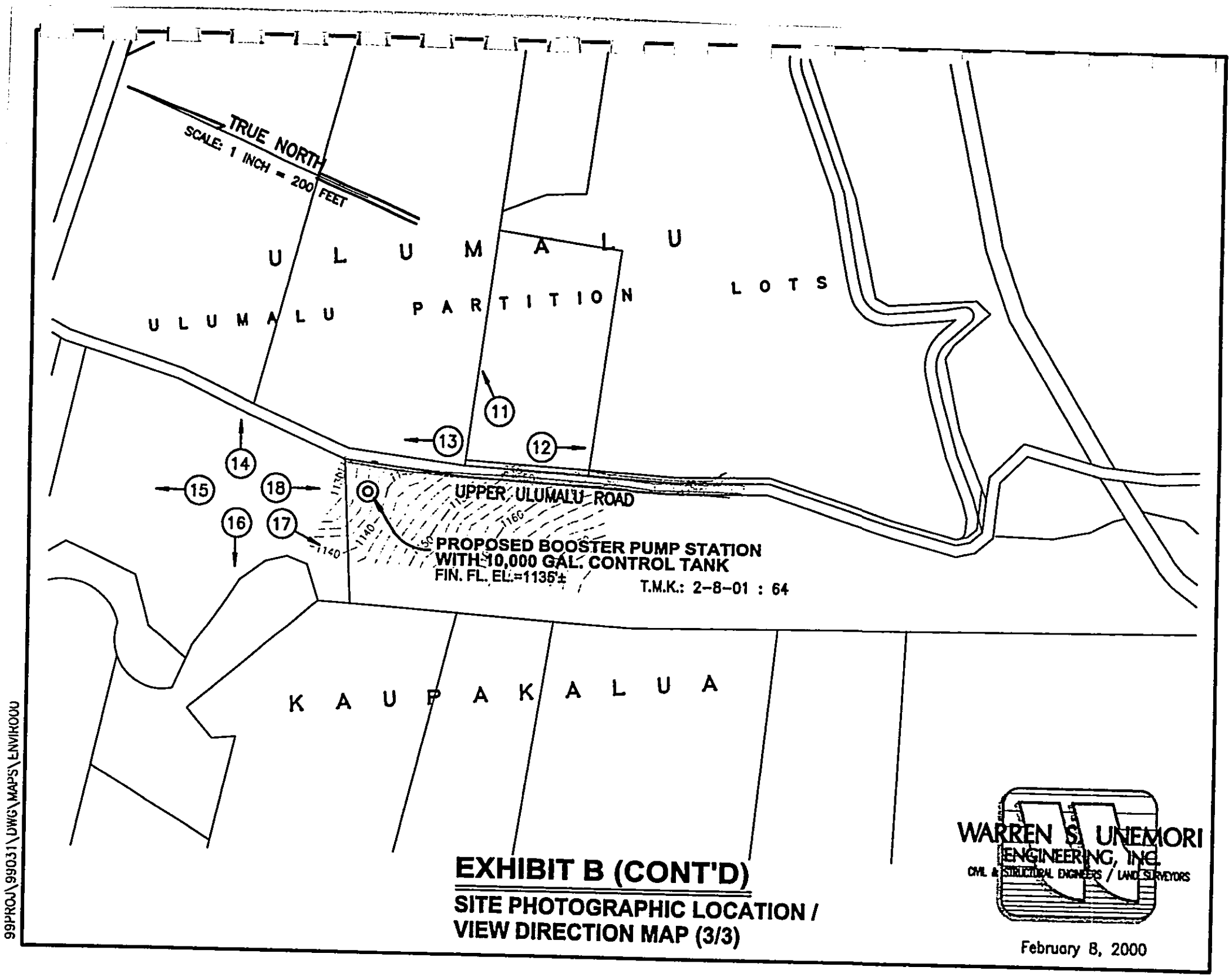


EXHIBIT B (CONT'D)

SITE PHOTOGRAPHIC LOCATION / VIEW DIRECTION MAP (3/3)

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

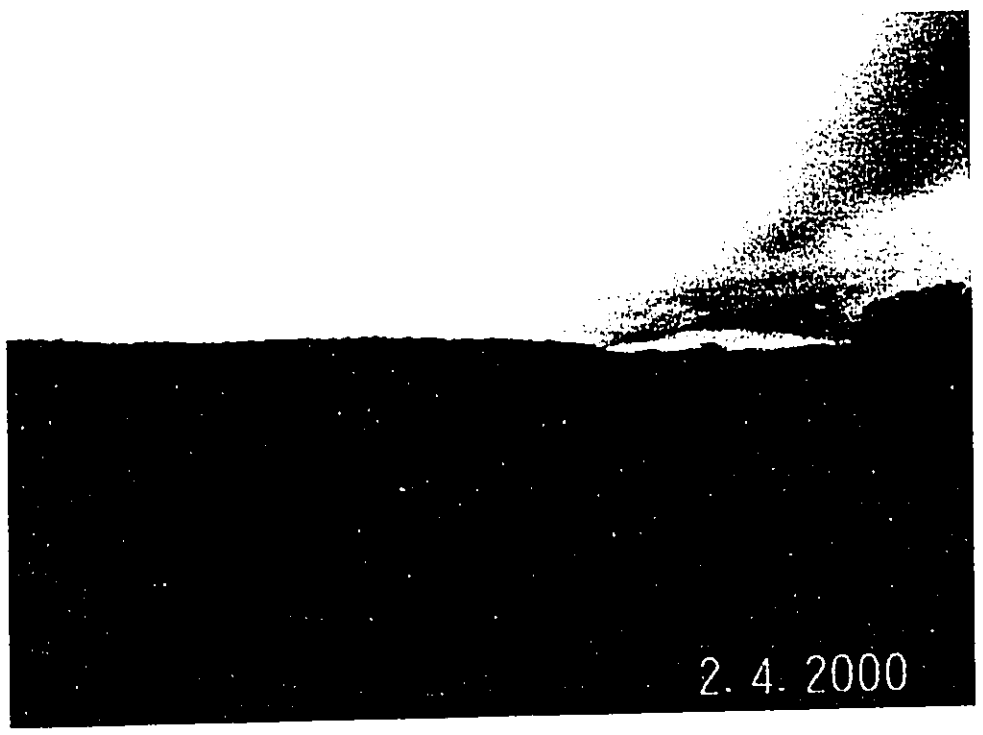
February 8, 2000

3. **Exhibit C - Site Photos of Existing Property**

Exhbit C - Site Photos of Existing Property

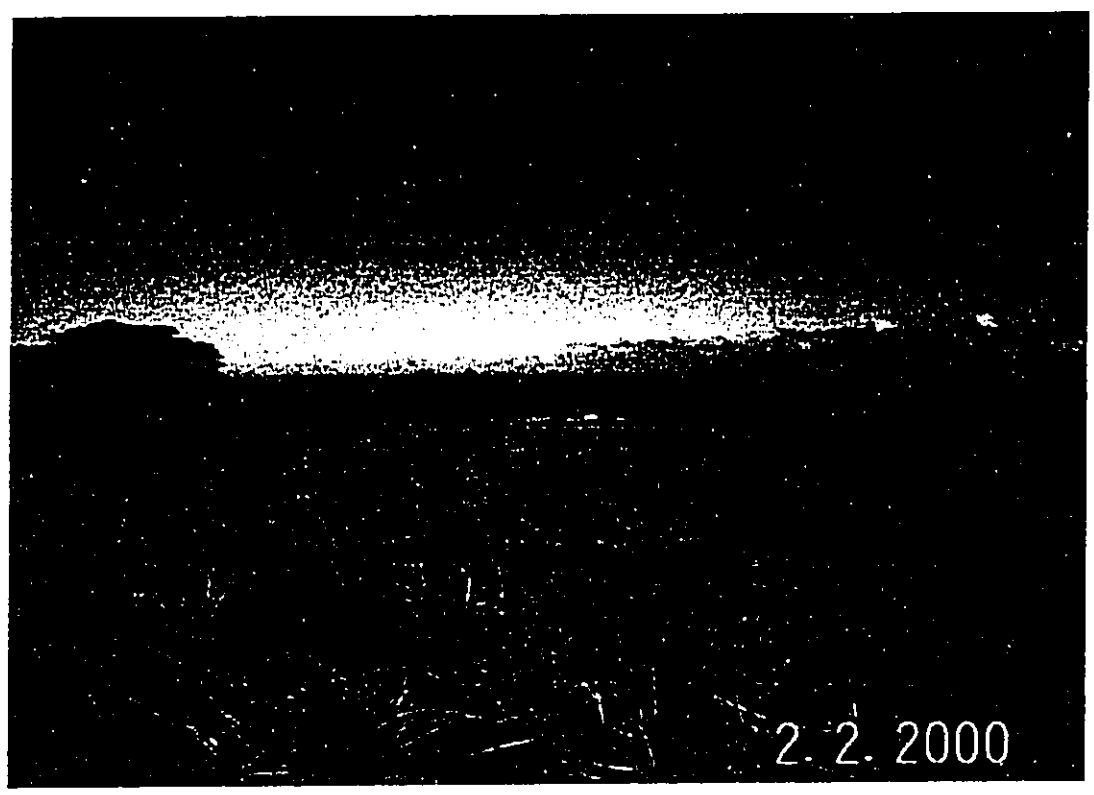
(1) Photo 1 - End of Unpaved Road, looking upslope (south), gate in foreground

(2) Photo 2 - Looking upslope toward Tank Site, Koolau Forest Reserve in background



(3) **Photo 3 - Looking upslope to Tank Site, Cattle Gate in foreground**

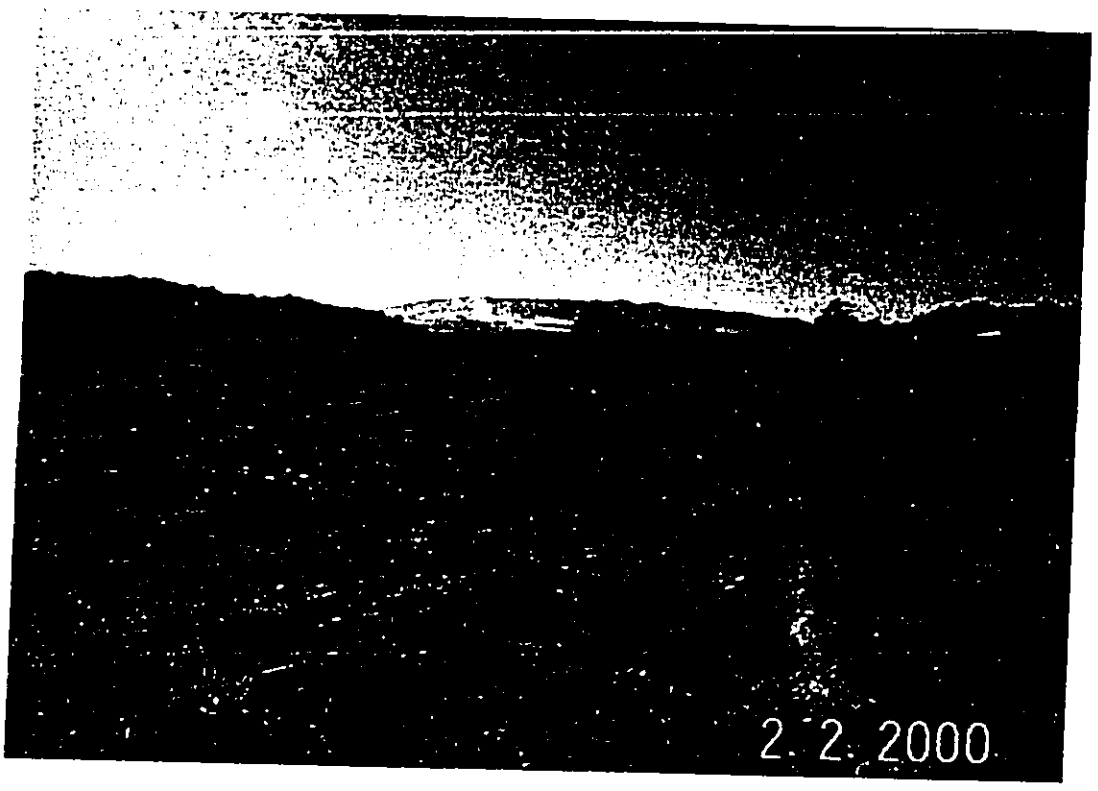
(4) **Photo 4 - At Tank Site, looking downslope (north)**



(5) Photo 5 - At Tank Site, looking downslope (northwest)

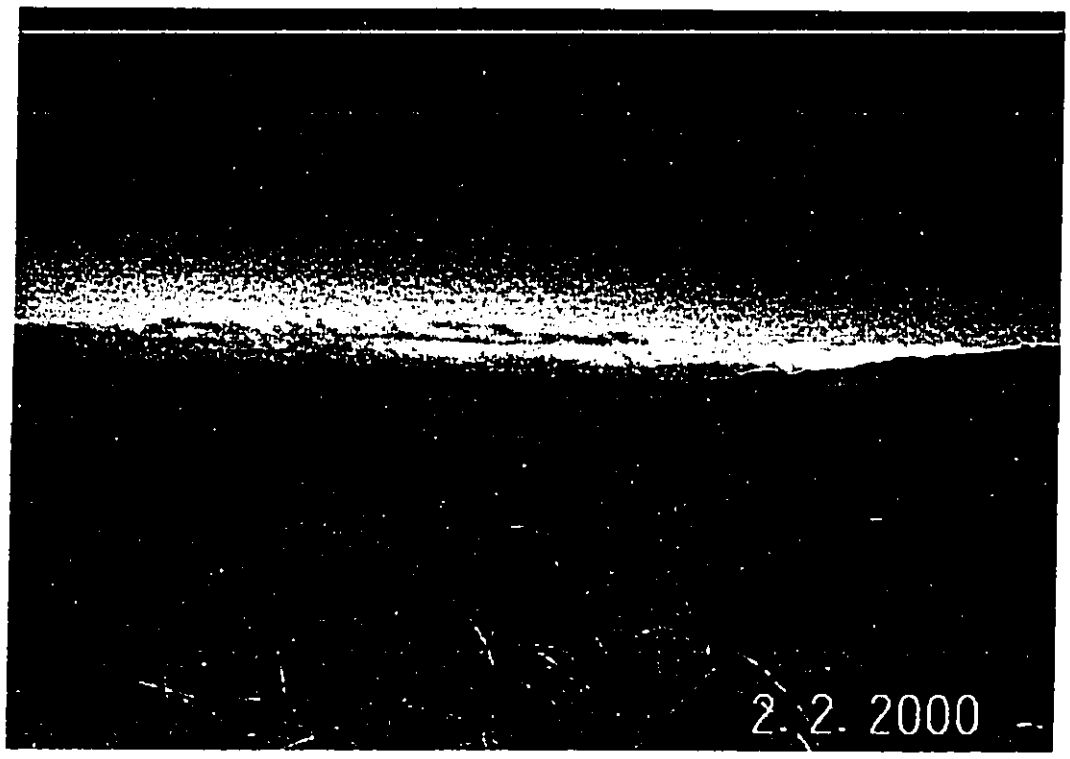
(6) Photo 6 - At Tank Site, looking west

(7) **Photo 7 - At Tank Site, looking upslope (southwest)**



(8) **Photo 8 - At Tank Site, looking southeast**

(9) **Photo 9 - At Tank Site, looking east**



(10) **Photo 10 - 400 feet northwest of Tank Site, looking southeast**

(11) **Photo 11 - At southwest corner of Maui Ranch Estates, looking northeast**

(12) **Photo 12 - Near Booster Pump Site, looking upslope on Upper Ulumalu Road**

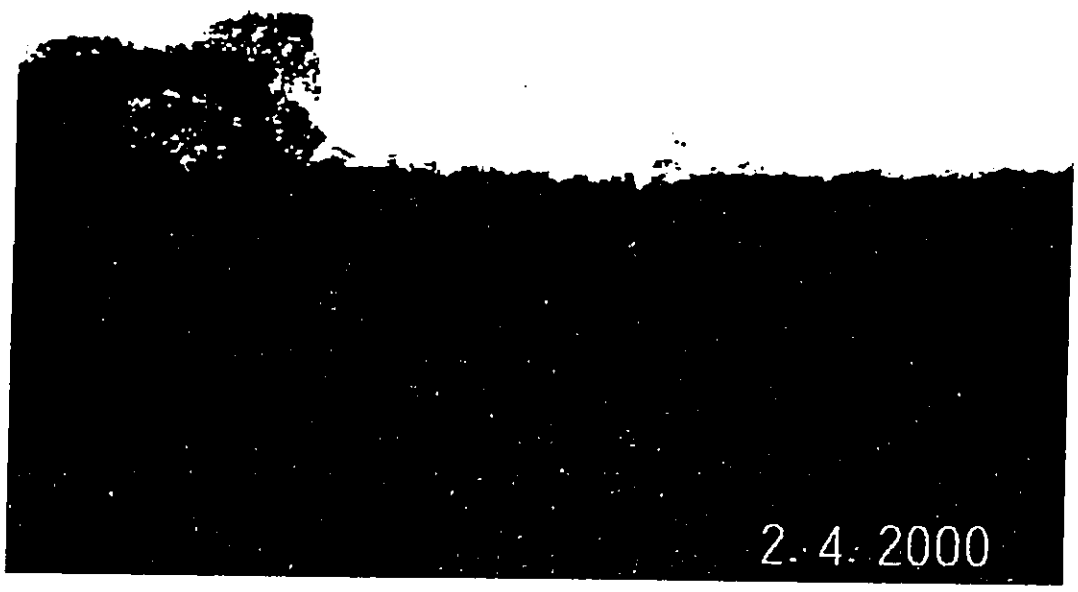
(13) **Photo 13 - Near Booster Pump Site, looking downslope on Upper Ulumalu Road**

(14) **Photo 14 - At Booster Pump Site, looking toward Maui Ranch Estates (east)**

(15) Photo 15 - At Booster Pump Site, looking downslope (north)

(16) Photo 16 - At Booster Pump Site, looking west

(17) **Photo 17 - At Booster Pump Site, looking upslope (southwest)**



(18) **Photo 18 - At Booster Pump Site, looking upslope (south)**