

JOHN WAIHEE
GOVERNOR OF HAWAII



WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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OFC. OF ENVIRONMENTAL
QUALITY CONTROL

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

NOV 5 1991

FILE NO.: OA-9/23/91-2519
DOC. NO.: 1949E

MEMORANDUM

TO: The Honorable Brian J. J. Choy
Office of Environmental Quality Control

FROM: William W. Paty, Chairperson *W. Paty*
Board of Land and Natural Resources

SUBJECT: Document for Publication in the OEQC Bulletin -
Environmental Assessment for Conservation District Use
Application OA-9/23/91-2519 for Telecommunication
Facility, Palehua, Ewa, Oahu; TMK: 9-2-005: 013

The above mentioned Chapter 343 Document was reviewed and a negative declaration was declared based upon the environmental assessment provided with the CDUA.

Please feel free to call me or Ed Henry of our Office of Conservation and Environmental Affairs, at 587-0380, if you have any questions.

Attachment

201

1991-11-23-OA-FEA-

FILE COPY

ENVIRONMENTAL ASSESSMENT ADDENDUM

T O

CHRISTIAN BROADCASTING ASSOCIATION APPLICATION FOR
CONSERVATION DISTRICT USE FOR PALEHUA RIDGE FM BROADCAST
AND TELECOMMUNICATION TOWER

T M K 9-2-05 : POR: 13

Christian Broadcasting Association
3555 Harding Ave
Honolulu, Hawaii 96816

ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL IMPACT INFORMATION.

NEW ROADBED.

This would be 1050 feet long . The terrain that we will be following will just take clearing of brush, leveling and clearing. No earth moving "cuts" will need to be made. The path to be followed has mostly small wild guava brush of less than 1 inch diameter at base...some as large as 2 inch at base. Larger live trees to be removed will be as follows 1- 8 inch diameter Eucalyptus tree, 4- 6 inch Eucalyptus trees. 8 dead 8 to 10 inch trees. 6 to 8 large rocks will need to be removed.

Roadbed to be 10 feet wide with ditches on both sides to take care of run off water. These ditches will be seeded with grass seed to help retain the soil and deter erosion.

Road bed will be surfaced with a first coat of coarse crushed rock , and then topped with finer crushed rock and compacted. The steeper slope is in the first 700 feet and the plan is to blacktop this in addition to the crushed rock base. This would deter any erosion and lower the maintainence needed to keep the road in good shape. See Photo display in Exhibit # 1 for a visual concept of the area where the road will be developed.

Trees and underbrush will keep this road bed obscured from view from the Diamond head side of the road. Also there will be no visibility from the west side.

BUILDING SITE

The space to be cleared will be 50 x 100 feet. In this area there are 2-8inch of a type of Oak trees, 8 dead trees of 8 inch diameter, and a dense growth of wild Guava brush and small saplings ranging from 1 to 2 inches in diameter at the base. In this 5,000 square foot area we would be removing approximately 3,000 of the wild guava saplings and brush.

This area is quite flat so will take only a little leveling for preparation of the concrete slab for the building. Soil borings will be needed to determine how deep the piers for the tower will need to be and also will determine the footings needed under the concrete slab for the building , the generator pad, and the fuel storage tank.

Trees and Guava brush will be left on the Diamond Head side of the site to shield the building from view. Picture in Exhibit #1 Photo #15 depicts the area.

POWER COMPANY EASEMENT

The Hawaiian Electric Company has stated that a 10 foot easement will be adequate to install the 5 poles from the connecting point of Pole # 22 on the Palehua road to the proposed building site. Approximately 30 -8 to 10 inch diameter trees will need to be removed to clear space for the electric lines. In addition to this some of the Guava brush will be disturbed during the construction but will re-grow and not interfere with the power lines after installed.

When the power lines reach the building site plateau, an underground intallation will be made the balance of the distance to the building.

See Exhibit # 2 for the planned easement route for the power lines.

See Exhibit # 1- Photo 16 & 17 for view of connecting pole and path for easement.

TOWER

A 199 foot self supporting tower will be constructed on the north side of the building. This tower will be able to accomodate primarily, 1 broad band 6 bay FM antenna, which will have capacity for multiple use by 4 to 5 FM stations.

See Exhibit # 3 for specifications of the FM antenna.

See Exhibit # 1 Photo # 18 for an example of proposed Antenna.

Applicant proposes to paint the tower green to diminish visibility. This however is subject to approval of FAA who may dictate the traditional orange and white.

A top beacon will be required by the FAA so that will be installed on the tower.

This will be the same as on other towers on the ridge.

All Antennas on the tower that can be painted green without interfering with their operation will be painted green.

Sending and receiving dishes to be used on the tower will be of the type outlined in Exhibit # 4. The size to be used would be 6 feet in diameter and would stand out on a bracket from a tower leg by 27 inches. This is an open grid antenna.

One of these would be required by each station using the site for STL (Studio Transmitter Link) from the studio to the transmitter.

The building and tower would be fenced in by a 6 foot high chain link security fence. The gate would be locked at all times.

Provisions are made so that should there be a future demand for T.V. antenna space, the site is developed with space available for an addition to the FM building for the TV transmitters, and space on the south side of the building for the T.V. tower. The structures would be virtually the same as proposed for the FM. The proposed clearing would be large enough to accomodate the future expansion without any new disruption of the vegetation.

The future expansion area would be fenced the same as the FM site if and when this area would be built.

BUILDING INFORMATION.

Floor plan of the proposed building is in Exhibit # 5 .

The building dimensions will be 26 x 38 feet. A 6 inch reinforced concrete slab with appropriate footings will be the base for the building. Building will be painted green with a green roof to blend in with the surroundings.

There will be a 10' by 6' 8 inch deep concrete pad adjacent to the building to support the Auxilliary generator. There will be a ventilated shelter attached to the main building to house the Generator. For details on the Generator see Exhibit # 6.

This generator has the capacity to supply power for 3 FM stations. When a 4th station is on location an additional generator will be added at that time. An EPA type approved 2,000 gallon above ground fuel tank will be installed adjacent to the generator. See specifications in exhibit # 7

As outlined in the building plan, the building will house 4 FM stations, and the potential mobil radio users would have adequate space for their equipment in the Communication rack room. Each one only needs about 2 feet in an equipment rack.

The Joiner room or Multiplex room is to install the equipment necessary to join all FM stations signals into one Coax cable to the multiple use antenna.

Building compartments will be ventilated by fan or by air conditioners according to the occupants needs.

K A I M is the EBS (Emergency Broadcast System) backup station therefore it is mandatory that there be a generator on site in the event of power failure.

F M ANTENNA INFORMATION

Applicant proposes to use either the ERI or Harris antenna (Both are manufactured by ERI) The Antenna would be a 6 bay broad band tuned to accomodate frequencies between 90 and 100 on the FM Band. Applicants frequency is at 95.5. Total length of the antenna with spacing of 10 feet between bays would be 50 feet. Each bay protrudes from the tower $47\frac{1}{2}$ inches and each bay is 30 inches high and wide.

See photo of similar antenna used by KDEO also on Palehua Ridge Exhibit # 1
Photo # 18.

SIDE MOUNTED WHIP ANTENNAS.

This is the type antenna used by Mobil radios. The tower will accomodate at least 4 of these.

Their dimensions are as follows:

Stand out bracket extends from the tower 24 inches (2 feet) .

The whip antenna is $1\frac{1}{2}$ inches diameter at the base and tapers to $\frac{3}{4}$ inch or less at the top. Standard length of the whip antennas is 20 feet.

An example of whip antenna is in Exhibit # 1 Photo # 19

DISPOSAL OF BRUSH AND TREES

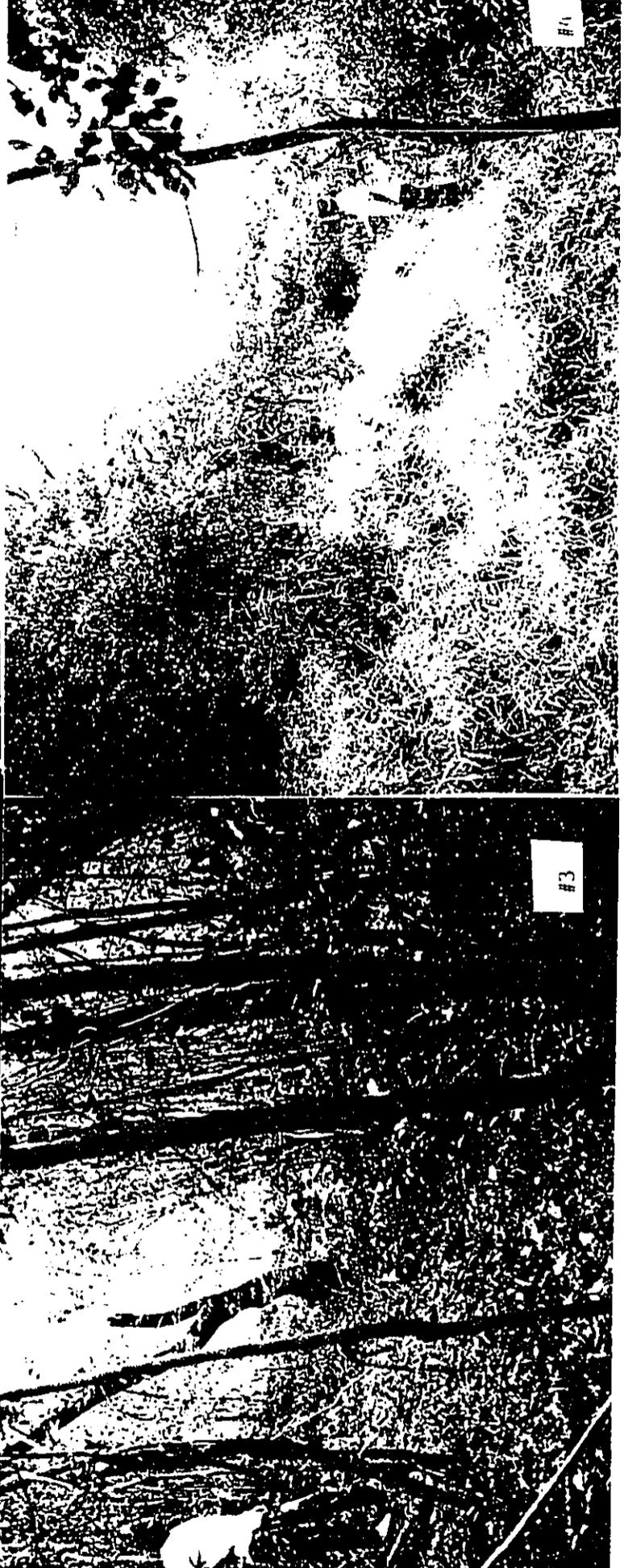
Smaller trees and brush will be chipped up in a composting machine and disposed of. Larger trees , both live and dead , will be cut up and hauled away for firewood for whoever needs firewood. If no demand for firewood, it will be disposed of in an approved area.

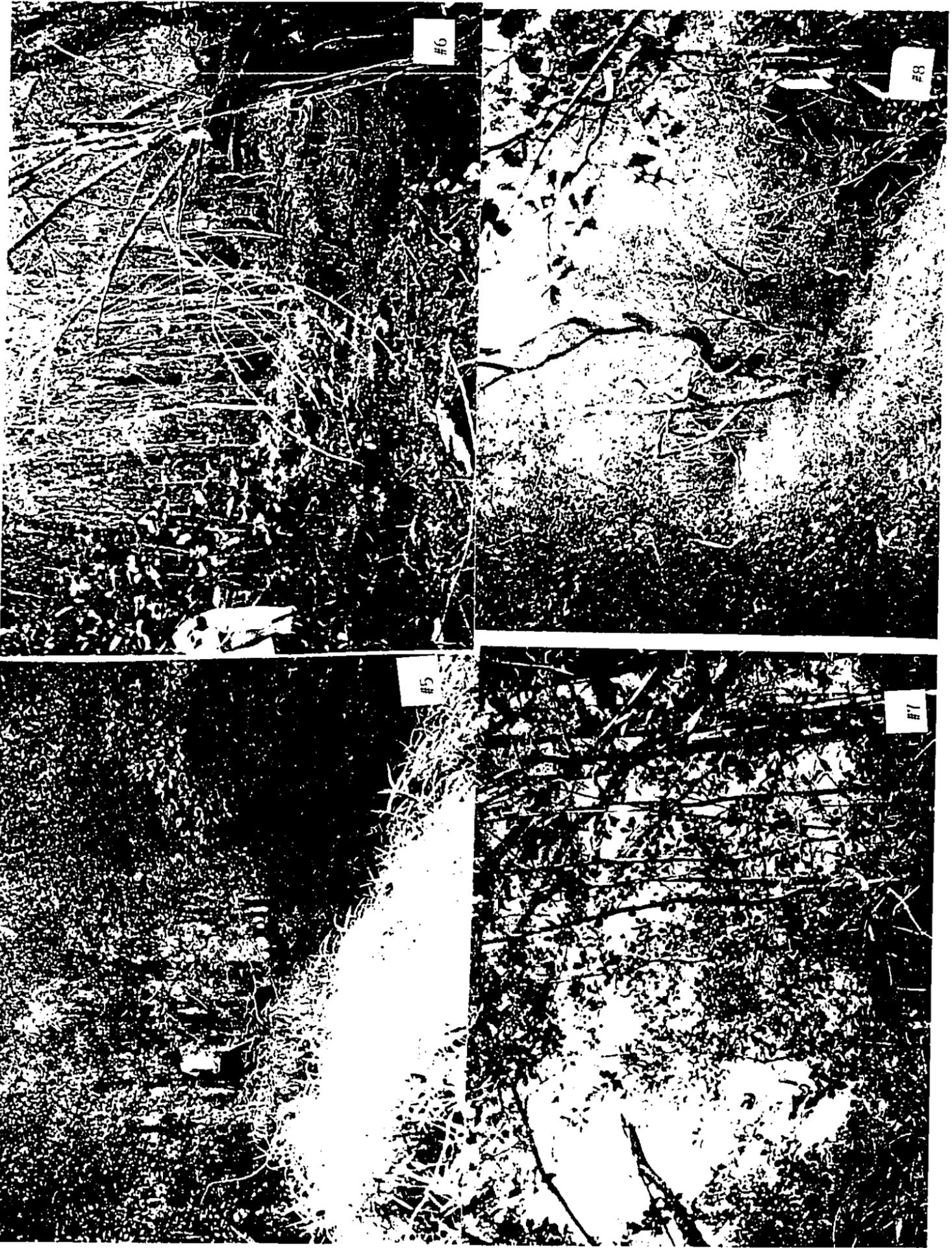
EXHIBIT # 1

LEGEND

Photos taken of proposed area where new roadbed would be developed.

- #1 Starting at existing driveway.
- #2 View of where first turn would be, just beyond trees.
- #3 Next 100 feet. Dead tree in center to be removed.
- #4 Grassy area where left side will be cut about 2 feet to level up the roadbed.
- #5 Last approach to the ridge where second turn would be.
- #6 Beginning of following the ridge to the proposed building site .
Road bed would stay to the left, missing any larger trees.
- #7 Continuation,, No large trees to be removed.
- #8 Area to right would stay intact for screen ..development would be to the left.
Only small wild guava brush and saplings.
- #9 Rocks to be removed...Roadbed would be between the large trees.
- #10 Very little needs to be done here except to remove dead trees.
- #11 Dead trees and wild Guava to be removed...otherwise surface is O.K. for roadbed.
- #12 Same as before, Only wild Guava and dead trees to be removed...no dirt need be moved.
- #13 Open spot in middle of development site.
- #14 Sample photo of dense growth of wild Guava to be removed to develop site
Area is quite level, will need very little dirt readjustment to prepare site for building.
- #15 View of foliage screen to remain on the Diamond Head side of building site.
- #16 Pole # 22 where Hawaiian Electric Proposes to "tie in" for power.
- #17 Beginning of where 10 foot power company easement would be. This view is taken from Pole # 22 . As is noticable, several larger trees will of necessity be removed for the power line installation on the 10 foot right of way.
- #18 This is a picture of KDEO's ERI 5 bay antenna. The Antenna proposed by applicant is also an ERI ..same as pictured however would have 6 bays instead the 5 in this picture.
- #19 Communication "Whip" antennas on a nearby building. They are exemplary as to 20 foot length and tapered diameter from 1 $\frac{1}{4}$ inch down to 3/4 inch at top.
When there would be Communication "Whip" antennas on applicants tower they would be mounted on brackets that would protrude about 2 feet from tower leg.
- #20 View toward central valley from proposed site.
- #21 View toward Pearl Harbor and Diamond Head from proposed site.

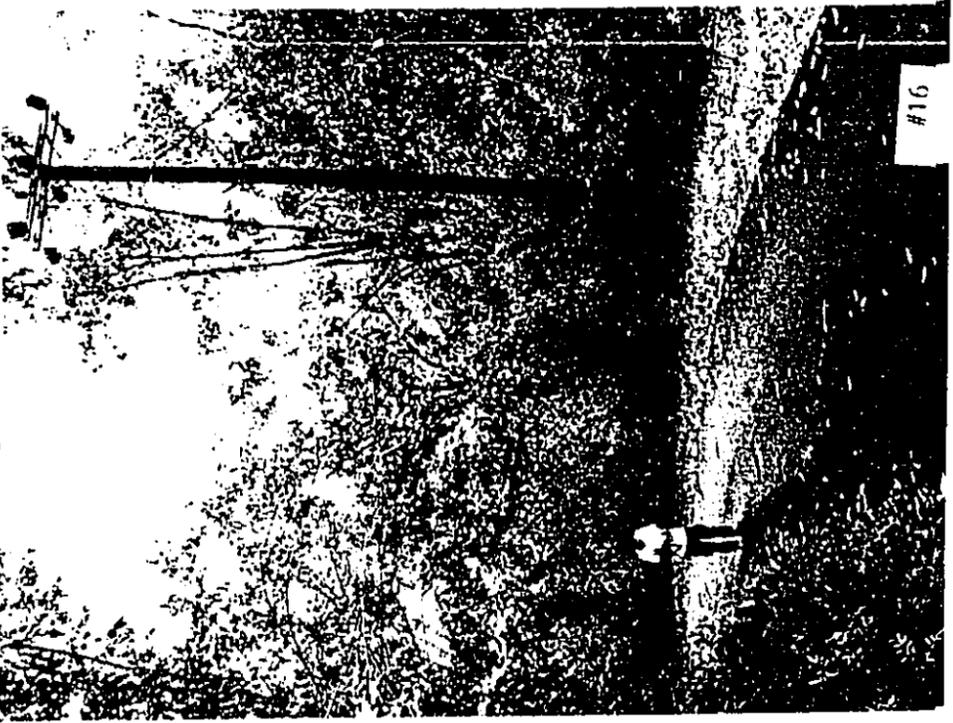




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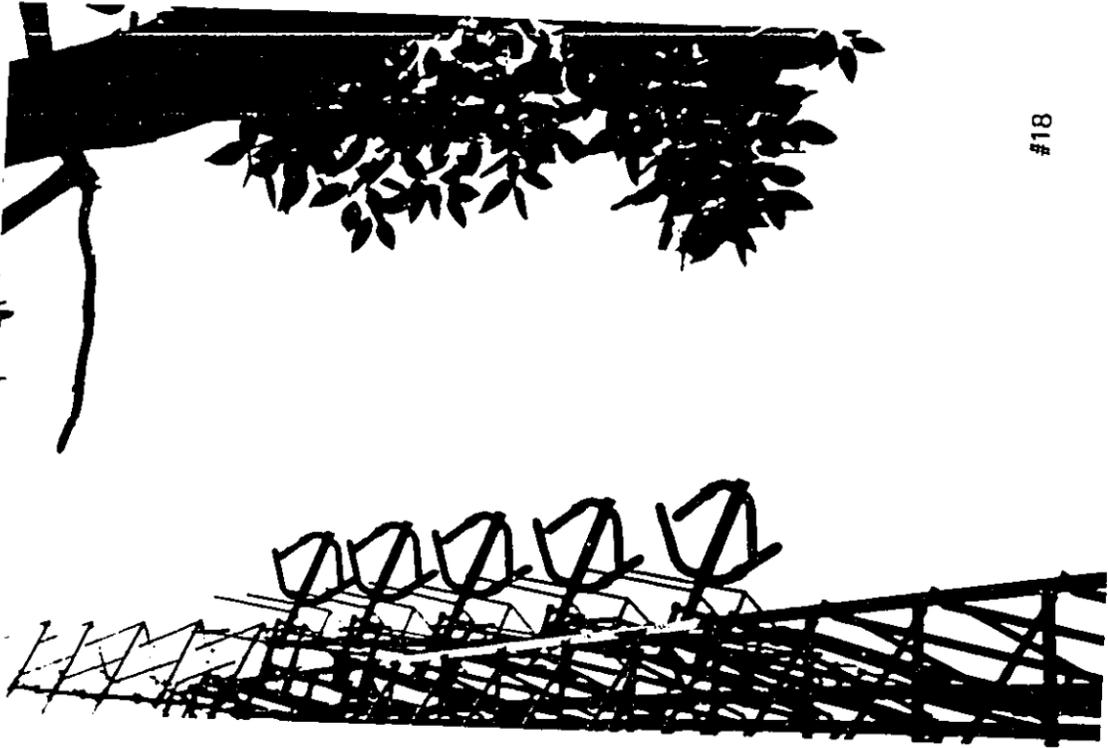


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#18



#17



#19

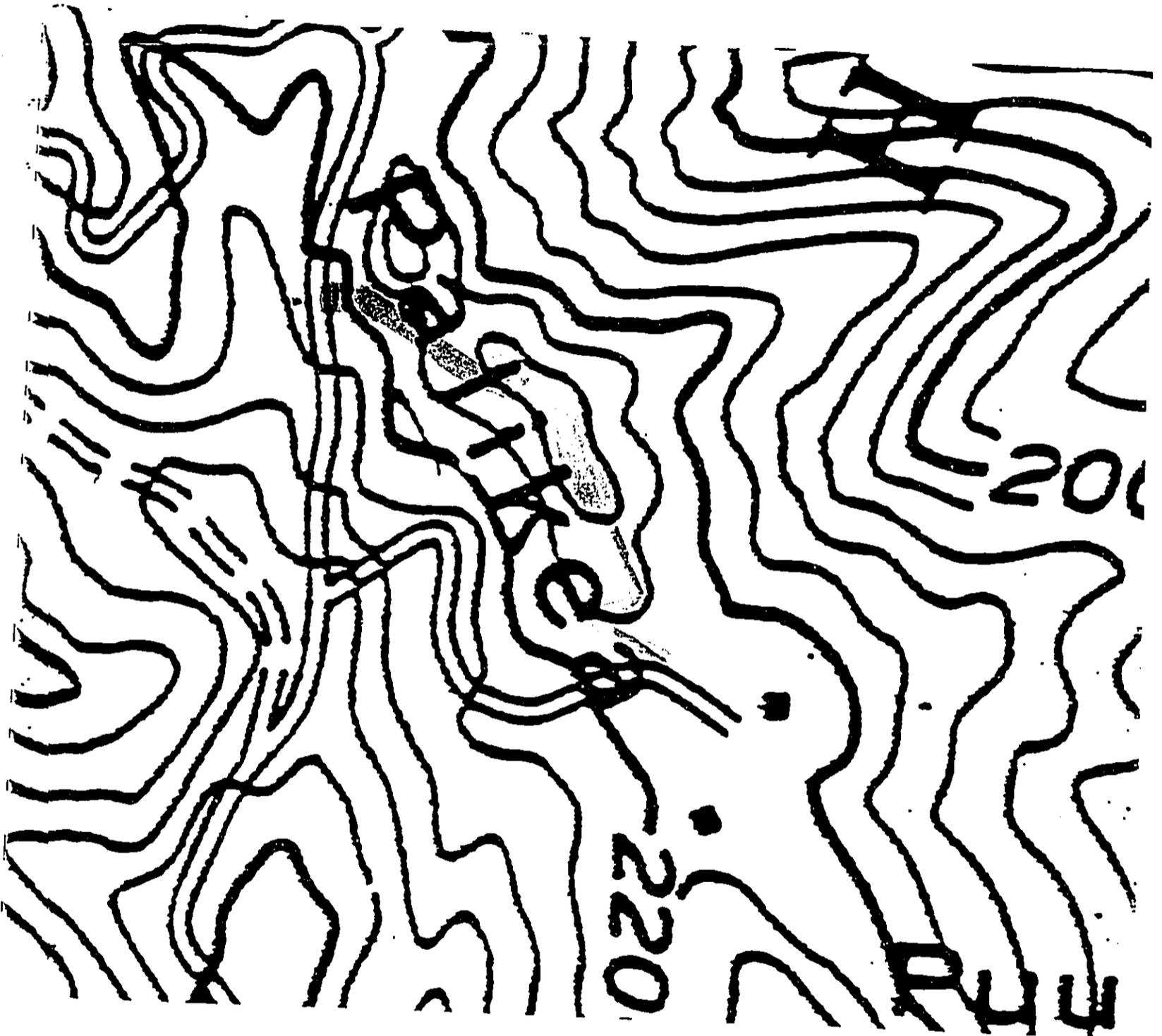
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EXHIBIT # 2

EXHIBIT # 2

NOTE: After surveying the area for the roadbed more closely, the path for the roadbed on this display starts at a different point on the driveway than shown in C D U A Application Exhibit AAA and Exhibit C. By making this change, it will virtually eliminate the removal of soil and cutting into hillsides.



LEGEND

-  Development area
-  Electric Easement from Pole 22
-  New road from existing driveway.

EXHIBIT # 3

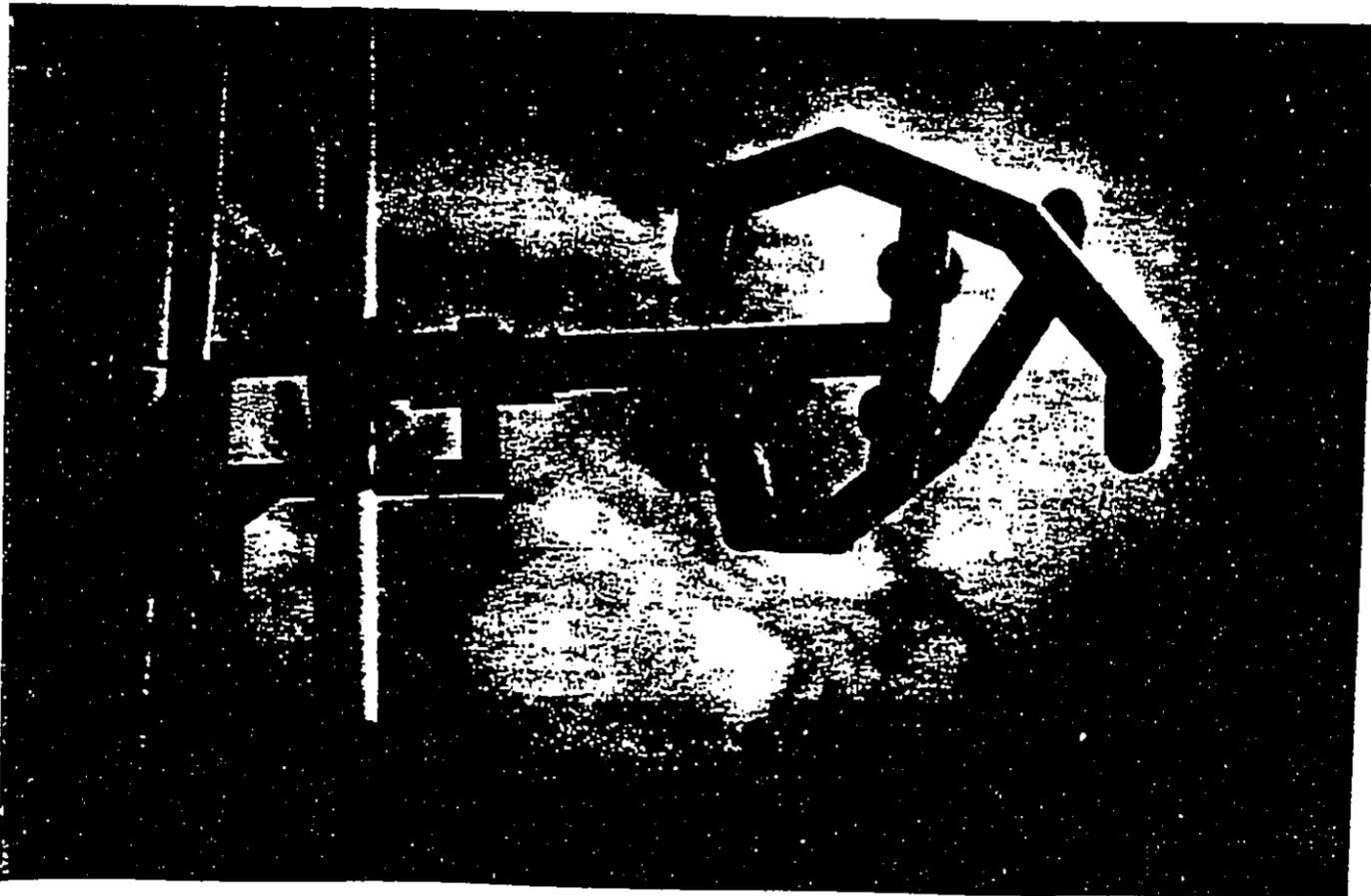


**FMH
SUPER-POWER
CIRCULARLY POLARIZED
FM ANTENNA**

- High power handling capability
- Internal feed point to radiating element
- Multi-station capability
- Excellent bandwidth characteristics
- Rugged brass construction
- Silver plated inner-conductor connectors
- Radlused element tips to avoid corona problems
- Stainless steel support brackets and hardware

The Harris super-power FMH circularly polarized FM antennas feature unusually high power handling capabilities, excellent bandwidth characteristics, and multi-station capability.

RADIATING ELEMENT. The radiating element is of brass construction, and has an outside diameter of 3-1/4". The feed point is completely internal, with a pressurized environment up to the feed point. Each element is rated at 40 kW, with the exceptions of the "A" series and fed 1 and 2 bay antennas and the center fed 2 bay, which are rated at 32, 35 and 39 kW respectively. Element ratings are limited only by the average power handling capability of the 3-1/4" rigid coaxial line, which we have conservatively derated from 48 kW to 40 kW.



The rugged construction means these antennas will withstand the most severe weather extremes and wind velocities up to 150 miles per hour.

BANDWIDTH CAPABILITY. The FMH antenna has a low standing wave ratio of 1.07:1 or less, \pm 200 kHz per given channel with field trimming. VSWR at antenna input without field trimming is 1.1:1 for pole mounting atop a tower. VSWR at antenna input without field trimming is 1.5:1 or less when side mounted on a tower.

Due to the excellent bandwidth characteristics of the radiating element, multi-station operation is possible using a common antenna system. The necessary filtering components are available from Harris for such diplexing or multiplexing operations. Stations having a frequency separation of up to 4 MHz may be diplexed on a common antenna. However, in the case of 40 kW transmitters, a minimum frequency separation of 1.2 MHz is advisable to avoid excessive heating of filter components.

CIRCULARITY. The horizontally polarized radiation pattern is omni-directional when the antenna is pole mounted atop a tower, and circularity is typically \pm 2 dB when the antenna is mounted on a 14" diameter steel pole. When side mounted, the antenna pattern will be somewhat affected by the supporting structure.

DEICING. Deicers are not required in a normal environment, as the typical VSWR is 1.5:1 or less with $\frac{1}{2}$ -inch of radial ice. However, heaters for deicing are available.

ANTENNA MODELS. The Harris FMH super-power FM antenna is available in three versions. The "A" version uses a 3- $\frac{1}{4}$ " element feed stem, and 3- $\frac{1}{2}$ " rigid interbay line. It is available in 3- $\frac{1}{2}$ " end fed, 3- $\frac{1}{2}$ " center fed and 6- $\frac{1}{2}$ " center fed models, in arrays of up to 12 bays.

The FMH "B" version uses a 4- $\frac{1}{2}$ " element feed stem, and a 4- $\frac{1}{2}$ " rigid interbay line. It is available in either 6- $\frac{1}{2}$ " end fed or 6- $\frac{1}{2}$ " center fed models in arrays of up to 12 bays.

The FMH "C" version uses a 4- $\frac{1}{2}$ " element feed stem, and 6- $\frac{1}{2}$ " rigid interbay line, with 6- $\frac{1}{2}$ " end feed. It is available in arrays of up to 6 bays.

Each antenna is supplied with a 6-foot input transformer. The input is 50 ohm EIA with either a 3- $\frac{1}{4}$ " flange or a 6- $\frac{1}{2}$ " flange, depending on the model type. All antennas are completely assembled and tuned to the customer's frequency at the factory. Also, pressure testing is done at that time to assure the customer of a leak-free antenna, provided the antenna is properly installed by a qualified erector and is free of damage.

MOUNTING. Stainless steel mounting brackets and hardware are supplied for standard constant cross section towers or steel poles at no additional cost. Brackets for mounting on tapered towers are available at additional cost.

DIMENSIONS. Each FMH element is approximately 47- $\frac{1}{2}$ inches long, and 30 inches high. Weight is approximately 57 pounds per element with line block.

MODEL NUMBERS. Because of the many variations within each FMH model category, it is helpful in ordering to understand the Harris model numbers:

FMH-1BE	FMH-4AC8
1 = 1 bay	4 = 4 bay
B = "B" Model	A = "A" Model
E = End Fed	C = Center Fed
	6 = 6- $\frac{1}{2}$ " input

CP-1 5M-180

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"A" Model, 3 $\frac{1}{4}$ " Interbay Line, 3- $\frac{1}{4}$ " Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² INPUT CAPABILITY	CALCULATED WT. [LBS]	CALCULATED WIND-LOAD [LBS]
	POWER	dB				
FMH-1AE	0.4611	-3.3623	3 $\frac{1}{2}$ "	32kW	114	137
FMH-2AE	0.9971	-0.0128	3 $\frac{1}{2}$ "	32kW	225	304
FMH-2AC	0.9971	-0.0128	3 $\frac{1}{2}$ "	39kW	250	319
FMH-2AC8	0.9971	-0.0128	6 $\frac{1}{2}$ "	64kW	301	421
FMH-3AE	1.5888	1.9278	3 $\frac{1}{2}$ "	32kW	338	470
FMH-4AE	2.1332	3.2903	3 $\frac{1}{2}$ "	32kW	447	637
FMH-4AC	2.1332	3.2903	3 $\frac{1}{2}$ "	39kW	472	652
FMH-4AC8	2.1332	3.2903	6 $\frac{1}{2}$ "	64kW	523	758
FMH-5AE	2.7154	4.3384	3 $\frac{1}{2}$ "	32kW	558	804
FMH-6AE	3.3028	5.1888	3 $\frac{1}{2}$ "	32kW	669	971
FMH-6AC	3.3028	5.1888	3 $\frac{1}{2}$ "	39kW	694	986
FMH-6AC8	3.3028	5.1888	6 $\frac{1}{2}$ "	64kW	745	1098
FMH-7AE	3.8935	5.9034	3 $\frac{1}{2}$ "	32kW	780	1138
FMH-8AE	4.4872	6.5197	3 $\frac{1}{2}$ "	32kW	891	1305
FMH-8AC	4.4872	6.5197	3 $\frac{1}{2}$ "	39kW	916	1320
FMH-8AC8	4.4872	6.5197	6 $\frac{1}{2}$ "	64kW	967	1433
FMH-10AC	5.6800	7.5435	3 $\frac{1}{2}$ "	39kW	1138	1653
FMH-10AC8	5.6800	7.5435	6 $\frac{1}{2}$ "	64kW	1189	1770
FMH-12AC	6.8781	8.3747	3 $\frac{1}{2}$ "	39kW	1360	1987
FMH-12AC8	6.8781	8.3747	6 $\frac{1}{2}$ "	64kW	1411	2108

"B" Model, 4 $\frac{1}{2}$ " Interbay Line, 4- $\frac{1}{2}$ " Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² INPUT CAPABILITY	CALCULATED WT. [LBS]	CALCULATED WIND-LOAD [LBS]
	POWER	dB				
FMH-1BE	0.4611	-3.3623	6 $\frac{1}{2}$ "	40kW	159	201
FMH-2BE	0.9971	-0.0128	6 $\frac{1}{2}$ "	56kW	297	407
FMH-2BC	0.9971	-0.0128	6 $\frac{1}{2}$ "	80kW	336	468
FMH-3BE	1.5888	1.9278	6 $\frac{1}{2}$ "	56kW	435	613
FMH-4BE	2.1332	3.2903	6 $\frac{1}{2}$ "	56kW	573	818
FMH-4BC	2.1332	3.2903	6 $\frac{1}{2}$ "	112kW	612	879
FMH-5BE	2.7154	4.3384	6 $\frac{1}{2}$ "	56kW	711	1024
FMH-6BE	3.3028	5.1888	6 $\frac{1}{2}$ "	56kW	849	1229
FMH-6BC	3.3028	5.1888	6 $\frac{1}{2}$ "	112kW	888	1290
FMH-7BE	3.8935	5.9034	6 $\frac{1}{2}$ "	56kW	987	1435
FMH-8BE	4.4872	6.5197	6 $\frac{1}{2}$ "	56kW	1125	1641
FMH-8BC	4.4872	6.5197	6 $\frac{1}{2}$ "	112kW	1164	1702
FMH-10BC	5.6800	7.5435	6 $\frac{1}{2}$ "	112kW	1440	2113
FMH-12BC	6.8781	8.3747	6 $\frac{1}{2}$ "	112kW	1718	2524

"C" Model, 6- $\frac{1}{2}$ " Interbay Line, 4- $\frac{1}{2}$ " Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² INPUT CAPABILITY	CALCULATED WT. [LBS]	CALCULATED WIND-LOAD [LBS]
	POWER	dB				
FMH-1CE	0.4611	-3.3623	6 $\frac{1}{2}$ "	40kW	205	260
FMH-2CE	0.9971	-0.0128	6 $\frac{1}{2}$ "	80kW	410	520
FMH-3CE	1.5888	1.9278	6 $\frac{1}{2}$ "	120kW	615	780
FMH-4CE	2.1332	3.2903	6 $\frac{1}{2}$ "	120kW	820	1040
FMH-5CE	2.7154	4.3384	6 $\frac{1}{2}$ "	120kW	1025	1300
FMH-6CE	3.3028	5.1888	6 $\frac{1}{2}$ "	120kW	1230	1560

FOOTNOTES-(Apply to all models)

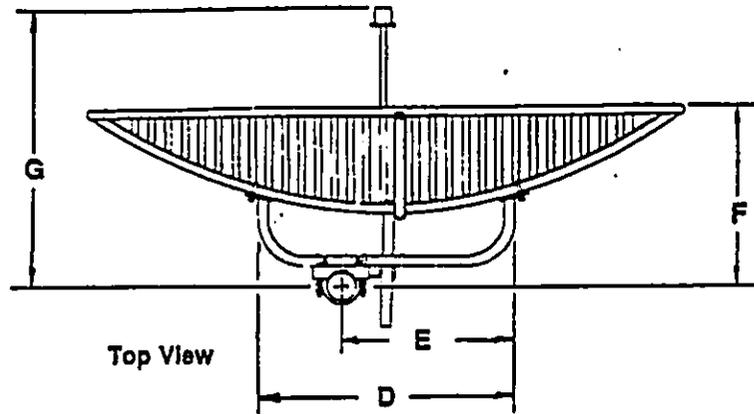
1. Horizontal and vertical power gain and dB gain are the same. 2. Power input capability up to 2,000 ft. above mean sea level. Derating required above 2,000 ft. 3. Windload based on 50/33 PSF. 112 m.p.h. actual wind velocity NOTE: Brackets included in weight and windload calculations.

ADV 462A PTD. IN U.S.A.

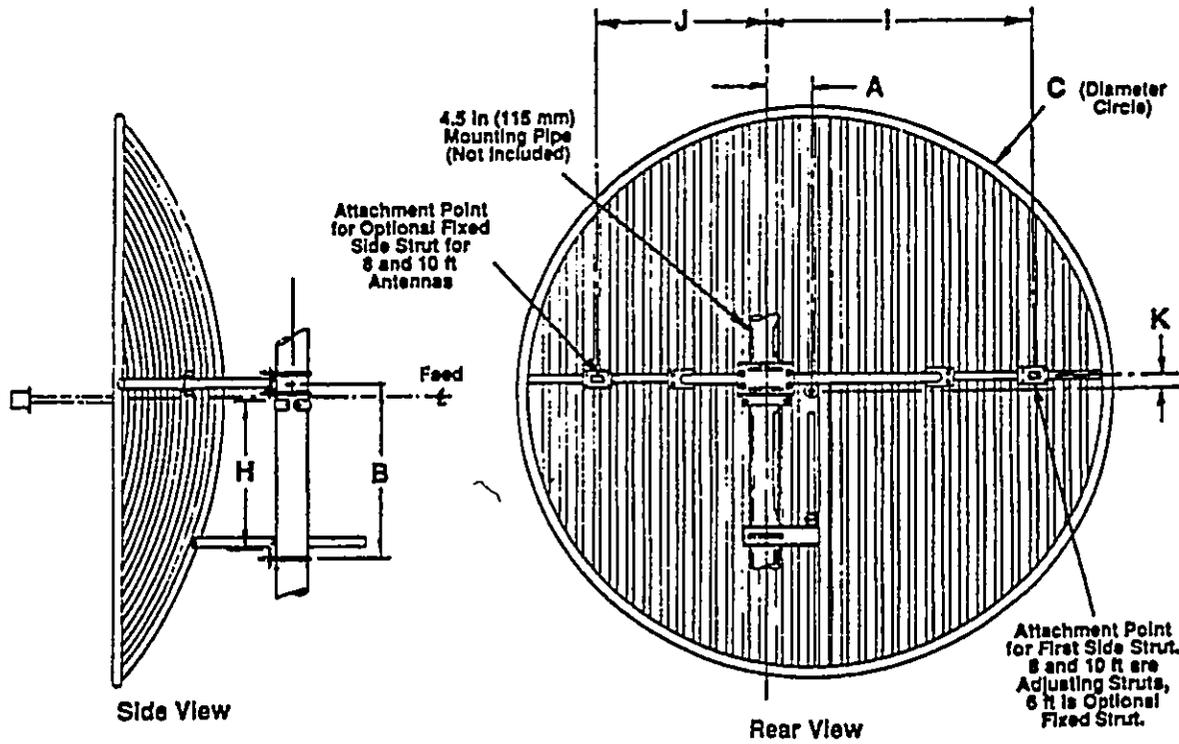
EXHIBIT # 4

Tower Interface Information

4, 6, 8 and 10 ft Grid



Top View



Side View

Rear View

Microwave Antennas

Dimensions in Inches (mm)

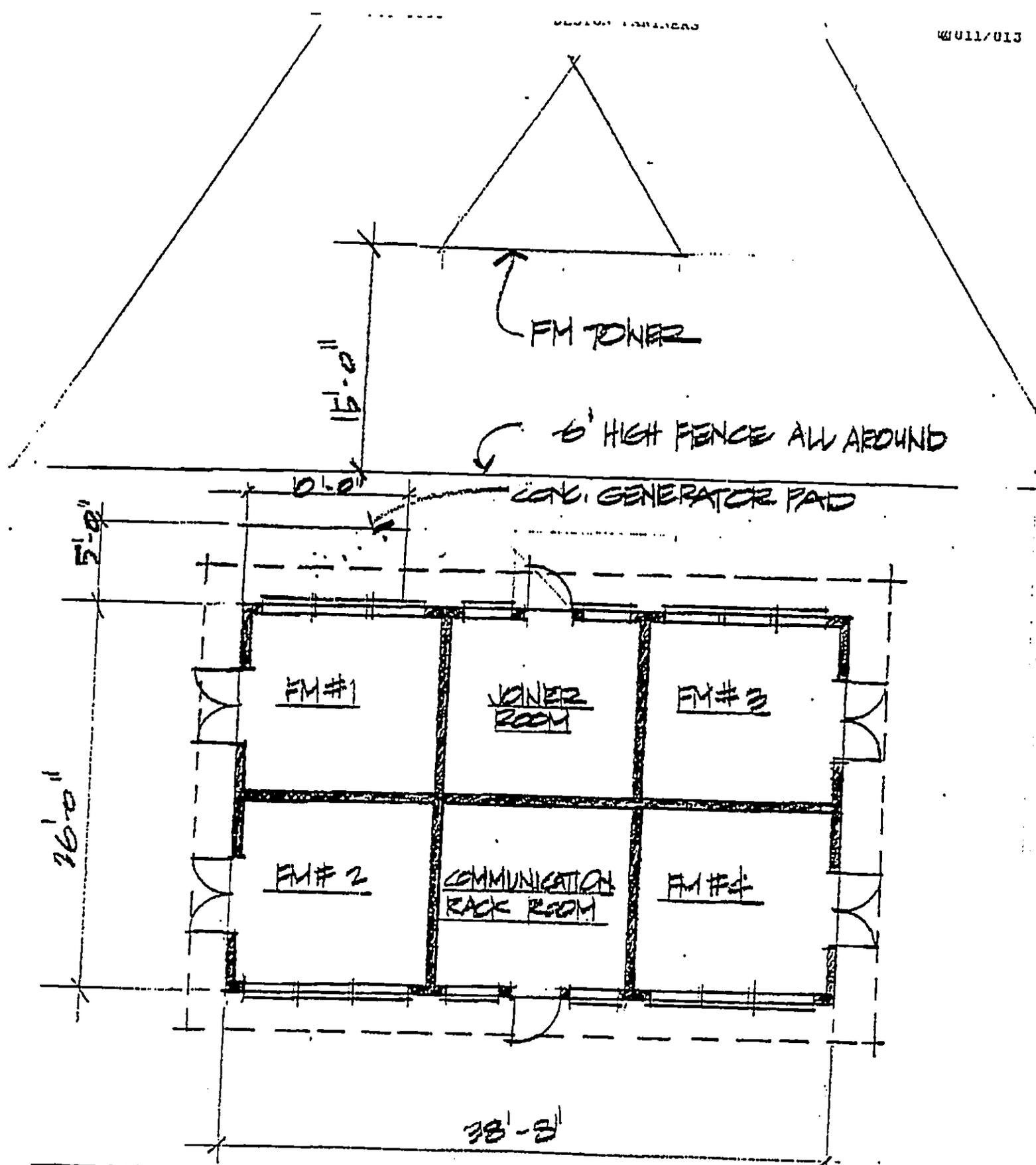
Antenna Size, ft (m)	A	B	C	D	E	F	G	H	I	J	K
4 (1.2)	4 (100)	39 (990)	53-1/2 (1360)	50-1/2 (1280)	30-3/4 (780)	19-1/4 (490)	30-1/2 (775)	35-1/2 (900)	—	—	—
6 (1.8)	6-7/8 (175)	25 (635)	75 (1905)	38-1/2 (980)	26-1/4 (665)	27 (685)	46-1/2 (1180)	21 (535)	29 (735)	—	1-1/2 (40)
8 (2.4)	6-7/8 (175)	37 (940)	99 (2515)	50 (1270)	32 (815)	32-3/4 (830)	55-3/4 (1415)	33 (840)	39 (990)	25 (635)	1-3/4 (45)
10 (3.0)	6-7/8 (175)	37 (940)	124 (3150)	50 (1270)	32 (815)	42-1/4 (1075)	55-3/4 (1415)	33 (840)	39 (990)	25 (635)	2 (50)



EXHIBIT # 5

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

KAIM - TOWER SITES (FM)

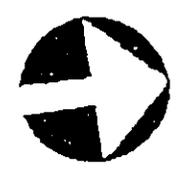
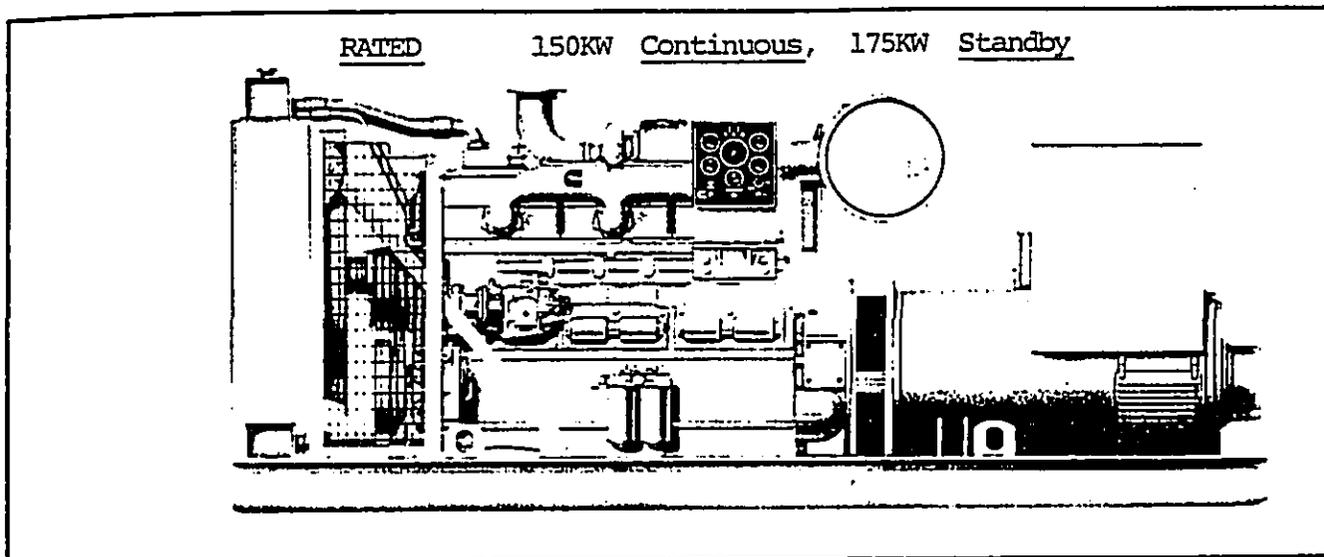


EXHIBIT # 6



NT-855-GS4/GC4

BIG CAM III
GENERATOR SET



SPECIFICATIONS

Four Stroke Cycle, Turbocharged,
In-Line, 6 Cylinder Diesel Engine.

Rated Output	60 Hz		50 Hz	
	1800 RPM Standby ¹	Prime ²	1500 RPM Standby ¹	Prime ²
kW @ 0.8 PF with fan	230	210	200	180
KVA	288	262	250	225
kW @ 0.8 PF without fan	245	225	205	185
KVA	306	281	256	231

Approx. fuel consumption at
¾ rated output (with fan)

	60 Hz	50 Hz	60 Hz	50 Hz
Litres/hr.	53.0	49.2	44.3	40.5
U.S. gals/hr.	14.0	13.0	11.7	10.7

Bore and Stroke	140x152 mm	(5½x6 in.)
Displacement	14 L	(855 cu. in.)

Approx. Dry Weight	2 769 kg	(6,101 lbs.)
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¹Standby Rating (GS) is applicable for supplying electric power in the event of normal utility power failure and it may be used for continuous service for as long as the emergency may last. This rating conforms to ISO-3046 overload power and fuel stop power. The engine may be operated at the standby rating up to 1 500 m (5,000 ft.) altitude and 38°C (100°F) ambient temperature without deration.

²Prime Power Rating (GC) is applicable for supplying electric power with intermittent overload (or 10%) up to the standby rating. This rating conforms to ISO-3046 continuous power. The engine may be operated at the prime power rating up to 2 250 m (7,500 ft.) altitude and 38°C (100°F) ambient temperature without deration.

BS 5514 and DIN 6271 are based on ISO-3046.

AVAILABLE EQUIPMENT

Air Cleaners:

Dry type: Normal duty. Heavy duty.

Controls:

Engine Instrument Panel: Starting switches, hourmeter, battery charging meter, electrical instruments for: coolant temperature, lube oil temperature and pressure, alarm lights for overspeed, coolant, low lube oil pressure.
 Tachometer.

Monitoring Switches: Low oil pressure. High coolant temperature. Low coolant level. Engine overspeed.

Generator Control Panel: Generator mounted.
 Manual start. Auto start. Prealarm controls.

Circuit Breaker: Main line. Exciter field.

Cooling System:

Radiator with fan guards. 38°C (100°F). 52°C (125°F) ambient temperature. Heat exchanger, copper nickel element. Raw water pump. Remote cooling.

Exhaust System: *Wet*

Manifold: type. Flexible conn.

Silencer: Industrial. Critical. Expansion adapter.

Filters:

Fleetguard. Lubricating oil: spin-on paper element full flow
 by-pass type. Fuel: dual spin-on paper element type.

Governors:

Cummins EFC. Electric (other). Hydraulic.

Operation: Droop. Isochronous.

Starting System:

Starters: 24V starter. Air starter.

Starting Aids: Starting fluid, pressurized cylinder type.

Coolant heater. Oil pan immersion heater.

Battery Chargers: 24V alternator. 24V static charger.

EXHIBIT # 7

EcoVAULT

CORPORATION



THE **ECONOMICAL**
AND
ECOLOGICAL
ABOVEGROUND PETROLEUM STORAGE ALTERNATIVE

ABOVEGROUND STORAGE OF PETROLEUM PRODUCTS

THE ECOVAULT ALTERNATIVE

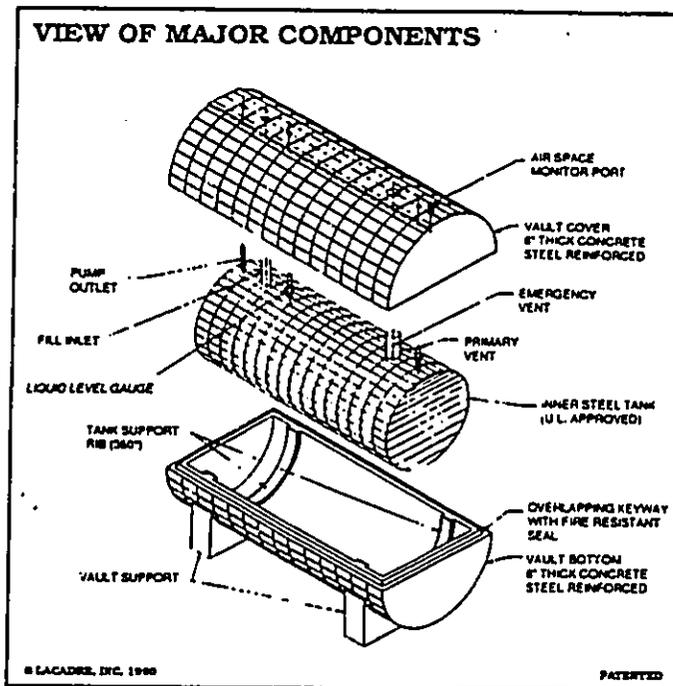
Economical, safe and environmentally sound, the above-ground EcoVault is a viable alternative to underground storage of a variety of petroleum products and toxic chemicals. Stringent and rigid requirements imposed by recent U.S. Environmental Protection Agency (EPA) regulations for underground storage tanks (USTs), including near-term deadlines for technical compliance and financial responsibility, are now forcing owners and operators of USTs to seriously consider aboveground vaulted-tanks. Although aboveground tanks and vaults are exempt from the UST regulations, they are governed by state and local safety codes which, while not having the force of law, often become law when a governing body adopts their provisions.

Historically, fire safety officials, in most jurisdictions, have been opposed to aboveground tanks for the storage of hazardous and flammable products, even though such use for private consumption was permitted. Recent environmental issues, however, have encouraged the two most widely accepted authorities, the National Fire Protection Association (NFPA) and the Western Fire Chiefs Association (WFCA) to amend their codes to also permit the dispensing of fuel at service stations for aboveground tanks encased in "special enclosures", which previously was prohibited. WFCA amended its Uniform Fire Code in August 1990; this code is followed by the majority of state and local fire jurisdictions located west of the Mississippi River. NFPA, followed by 35 Eastern States will be publishing its interim amendment governing retail fuel dispensing from aboveground tanks later in 1991.

EcoVault Corporation, anticipating the demand for product diversity created by these landmark code amendments, has increased the capacity of its vault product line to 10,000 gallons. To meet the tight delivery schedules required for near-term UST regulatory compliance, EcoVault has also established a nationwide fabricating and distribution network to ensure short lead-times and prompt delivery schedules, while also lowering transportation costs.

DESIGN ADVANTAGES OF THE ECOVAULT

- A cylinder is a more efficient use of space than a rectangular structure. It is stronger, has fewer welded seams and is the standard shape for the industry.
- Since cylindrical tanks are the industry standard, most accessories (vents, leak detection devices, etc.) can be utilized on the EcoVault.
- The ability to utilize an off-the-shelf UL listed internal tank and fabricate the external vault at widely dispersed, strategically located, manufacturing plants reduces transportation costs for the customer.
- The two-piece modular vault design ensures easier handling. Moreover, this feature also allows internal tank inspection.
- The annular space created by the internal rib construction provides increased thermal protection, 360 degree secondary containment and prevents corrosive interaction between the internal steel tank and the concrete encasement.
- Secondary containment, interstitial monitoring and overflow protection are advanced safety features currently mandated for USTs. If in the future, should federal, state, or local regulations also promulgate these requirements for aboveground vaulted-tanks, the EcoVault design will meet these standards and is also readily adaptable to accommodate any future advanced and improved safety monitoring technologies.

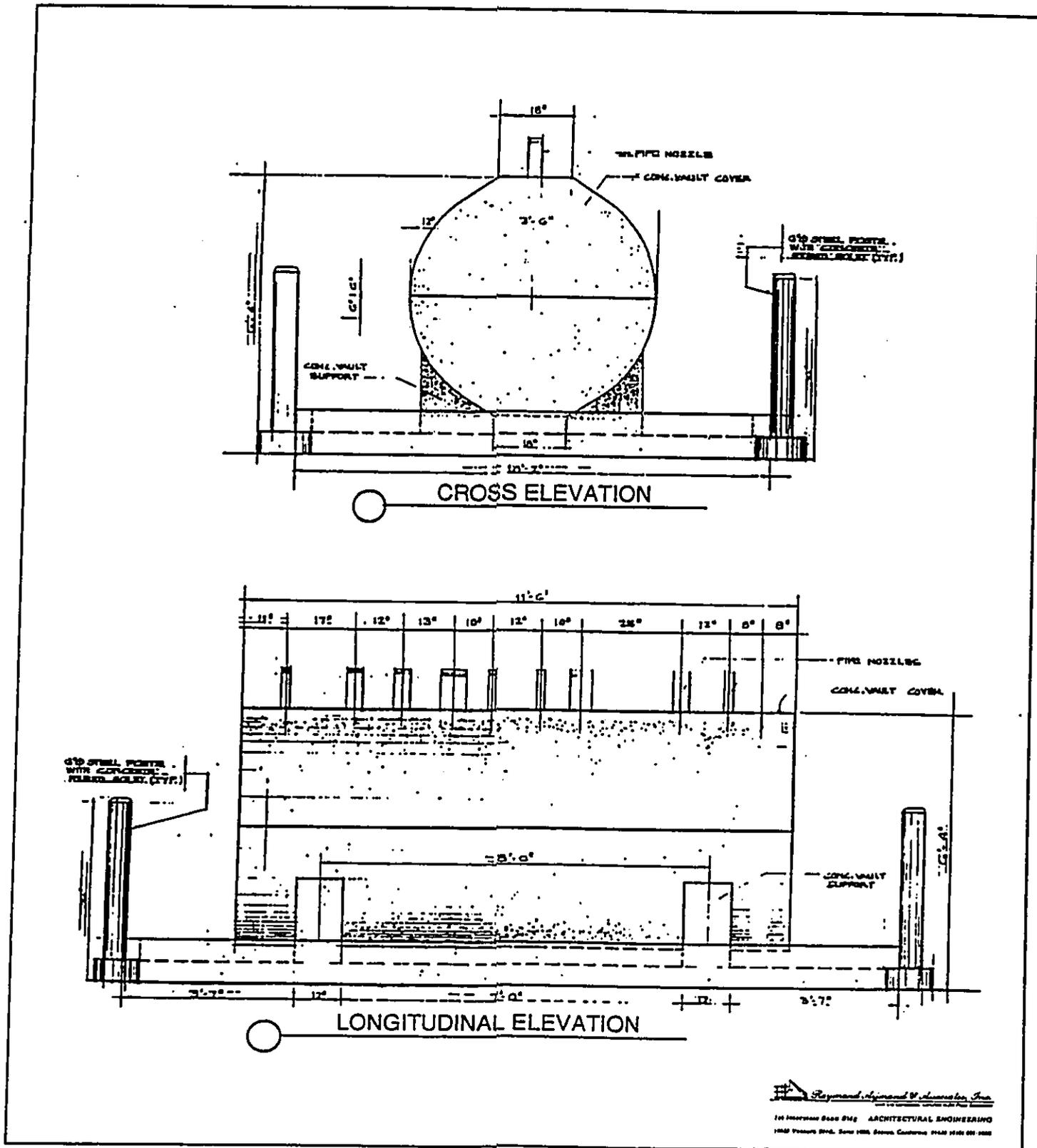


Economical, Safe and Environmentally Sound

The internal UL listed steel tanks in the vaults will be manufactured at eight strategically located plants then shipped to the closest precast concrete fabricating facilities near the final site destination. The EcoVault is the only aboveground vaulted tank on the market today in which the components are manufactured from a nationwide network of steel and concrete plants. Its unique and patented two-section concrete casting design allows it to be disassembled for visual inspection, the ability to be offered in larger sizes, and also facilitates easier handling. EcoVault has a projected lifecycle installed cost which is substantially less than that of conventional underground storage, is far less complicated and expensive to monitor, and reduces financial exposure.

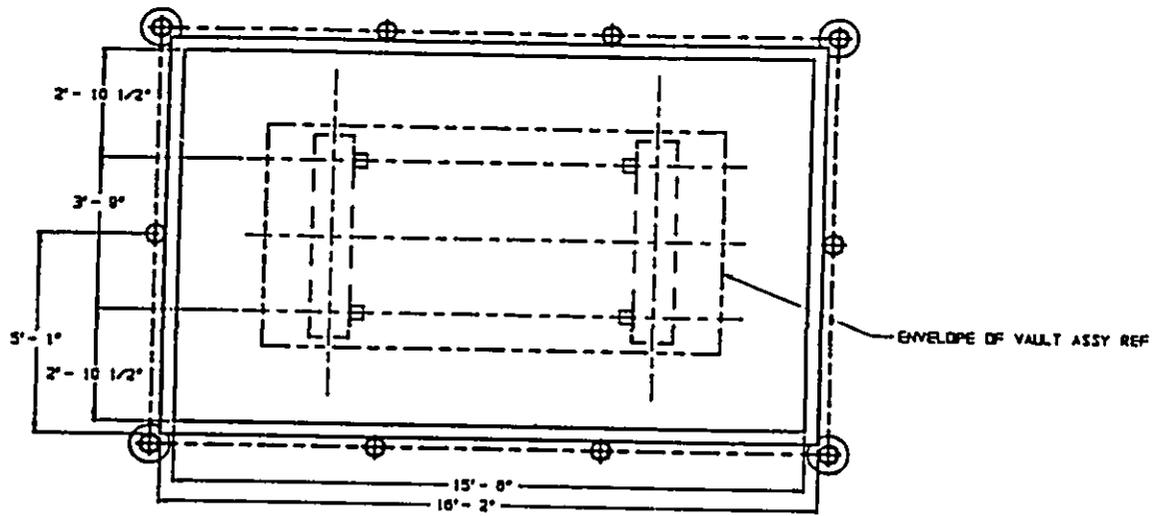
Elevation Views

1,000 Gallon Tank

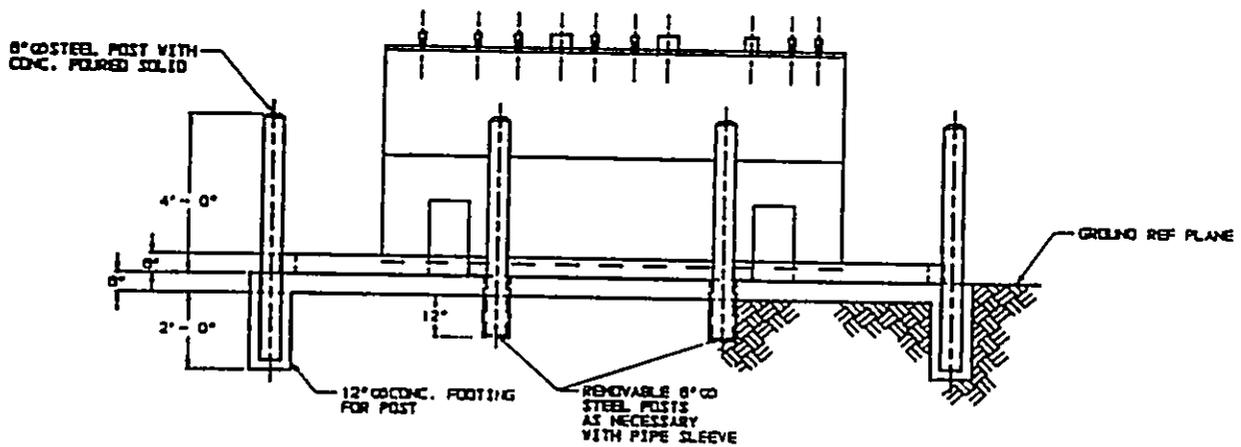


Raymond Raymond & Associates, Inc.
 ARCHITECTURAL ENGINEERING
 1414 HARRISON BLVD. SUITE 1000, SAN FRANCISCO, CALIFORNIA 94103

Spill Pad Foundation and Barrier Views



SPILL PAD FOUNDATION AND BARRIER
PLAN VIEW



SPILL PAD FOUNDATION AND BARRIER
SIDE VIEW

Manufacturing Specifications

I. Technical Description

The aboveground vaulted tank consists of a UL listed, cylindrical, single wall, internal steel tank encased in a six-inch thick, reinforced concrete vault. The internal steel tank is supported by a concrete rib configuration which creates a two-inch, interstitial air space providing additional thermal protection, 360° secondary containment and anti-galvanic action between tank and vault. The protective concrete outer vault shell is precast into two sections to enable easy handling and disassembly for internal tank inspection, repair or replacement. The vault is mounted on unitized support legs, completely self-contained and fully complies with all governing code requirements as interpreted by federal, state and local authorities having jurisdiction.

II. Manufacturing Specifications

A. Internal Steel Tank

1. The internal steel tank is designed for aboveground storage of flammable liquids at atmospheric pressure. The tank complies with requirements for stationary installation in accordance with NFPA No. 30.
2. Steel tank is constructed in accordance with UL 142 specifications, including pressure testing at 5 psig for one hour.
3. Steel tank is cylindrical in shape to meet industry standards and has fewer welded seams.
4. Steel tank has a wall thickness of 7 gage or greater and carries a written thirty year warranty.
5. Welding conforms to American Welding Society Standard continuous welds.
6. Exterior coating is of a rust preventative, oxide coating.
7. Steel tank is supported by cylindrical ribs lined with a petroleum resistant gasket to provide anti-galvanic action.

B. Concrete Vault

1. The vault shell is six inches (6") of factory poured, reinforced, precast concrete.
2. Portland cement concrete has a compressive strength of 4,000 PSI at 28 days.
3. Reinforcement bars conform to ASTM designation A615, Grade 40 minimum. Weld wire fabric conforms to ASTM designation A185.
4. Concrete shell is of two-piece construction (upper and lower.) Lower half includes support legs of unitized monolithic construction.
5. Interstitial air space (between tank and vault) exceeds 110% minimum requirement for secondary containment.
6. Concrete shell inside surface may be optionally coated with a petroleum resistant material for enhanced secondary containment.
7. The seam (joint) between the two shells is of an approved engineering design, two-stage, shiplap configuration, as fire tested by the Portland Cement Institute.
8. The seam (joint) includes an outer fire gasket of 2400°F rated, aluminum-silicon ceramic, refractory insulation, and an inner moisture and vapor gasket of petroleum-resistant, Concrete Sealant CS-440, extruded non-hydrocarbon elastomer.
9. Exterior coating (paint) is of weather resistant material with final glossy protective finish.
10. Warning signs and labels on vault exterior are of proper location and configuration to meet applicable code requirements.

**Archaeological Inventory Survey of Proposed
K-A-I-M Radio Tower, Palikea,
Honouliuli, 'Ewa, O'ahu
(TMK 9-2-005:013 Portion)**

by

Hallett H. Hammatt, Ph.D

Prepared for

KAIM, Honolulu

Cultural Surveys Hawaii
May 1992

ABSTRACT

An archaeological inventory survey was conducted on a 3 to 4 acre parcel at the top of Palikea Ridge in the *ahupua'a* of Honouliuli (TMK 9-2-005: 013 portion) to locate, describe and access archaeological sites. The project area - which includes two alternative development sites - consists of a ridgetop and surrounding sloping land which is covered with native and exotic species of trees. A review of previous literature shows no known sites in the immediate area, although sites were recorded by J. Gilbert McAllister at Mauna Kapu, Kaaikukai Gulch and Pu'uku'ua in surrounding areas. No archaeological sites were located in the project area. A trail - considered a modern powerline maintenance trail - and a curiously shaped rock were noted although they are located outside the area and are not evaluated as archaeological sites. No further archaeological research is recommended as the project should not impact archaeological sites. However, if discoveries of cultural remains are made during grading, work should be halted in that area and the State Historic Preservation Division of the Department of Land and Natural Resources should be notified.

ACKNOWLEDGMENTS

I would like to thank Mr. Paul Ruse of KAIM for providing all relevant materials on the project and guiding the archaeologists through the project area. Rodney Chiogioji assisted greatly with production of the report. Jennifer Robins prepared most of the Previous Land Use section of this report.

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I. INTRODUCTION

Cultural Surveys Hawaii was requested to perform an archaeological inventory survey of a parcel of land (TMK 9-2-005:013 portion) at the top of Palikea Ridge for a proposed KAIM radio station transmission tower in the Honouliuli Forest Reserve. This survey was requested by Mr. Paul Ruse of KAIM radio station as part of a submittal for a Conservation District Use application.

Description of Project Area

The survey area is located on a ridge adjacent to the access road to the Palihua Military Installation, at the 2200-ft. elevation on the east side of the ridge separating Nanakuli (Waianae) from Honouliuli ('Ewa) (Figs 1-5). The project area is located in the *ahupua'a* of Honouliuli and within the Forest Reserve. The site overlooks Honouliuli Gulch and the Waipahu/Pearl Harbor area to the southeast.

The entire project area is forested with various species of acacia including native *koa* as well as ironwood, guava and white monkeypod trees. The terrain, except for the ridge top, is fairly steep. Understory consisting of various shrubs including strawberry guava was easily penetrable and ground visibility during the survey was excellent because of lack of grass cover (Figs. 6-7). The ridge on the east side is steep and cliff-like; to the west it is more gradual and could be traversed easily. An existing private residence - a cabin with outhouse - lies about 500 feet to the southeast of the project area. This cabin is accessed by a road which curves to the south of the project area. The main paved road to Palikua lies 100 to 400 feet west of the project area.

Scope of Work

The scope of the study is that of a standard inventory survey as follows:

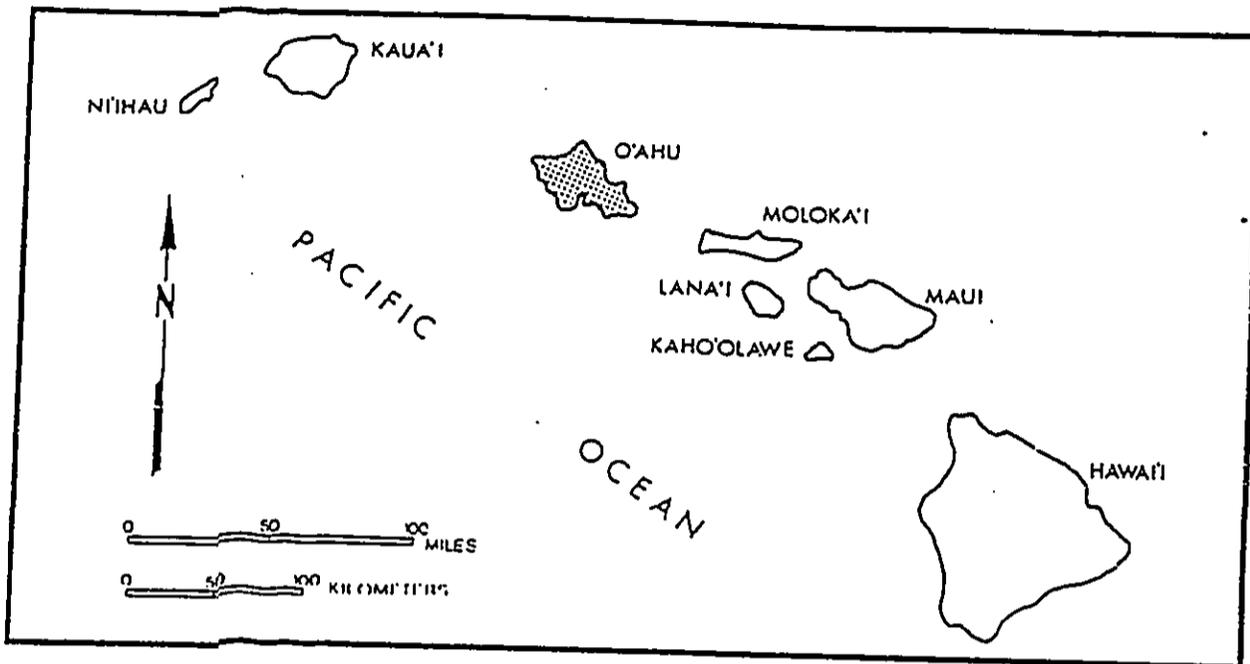


Fig. 1 State of Hawai'i

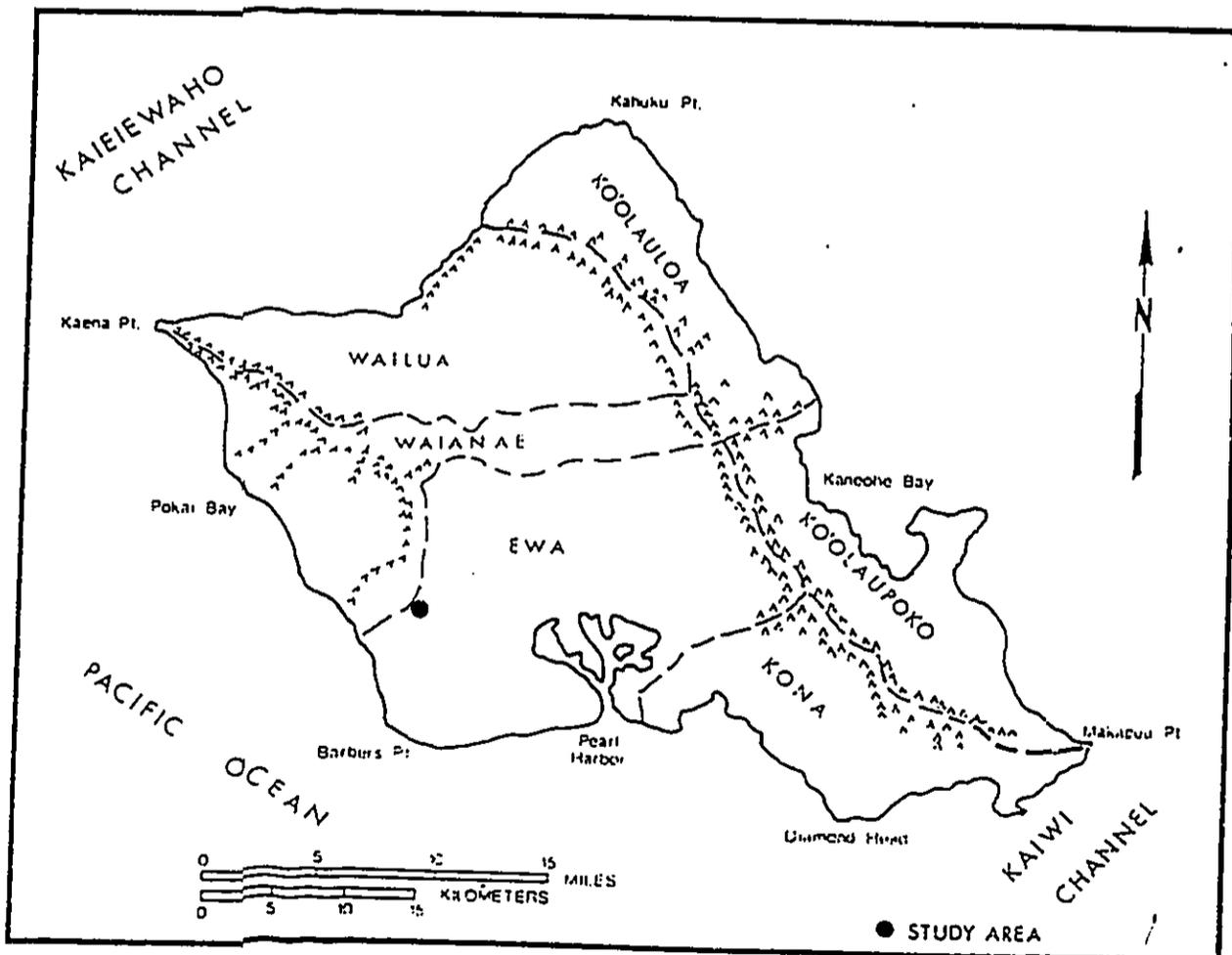


Fig. 2 O'ahu Island Location Map

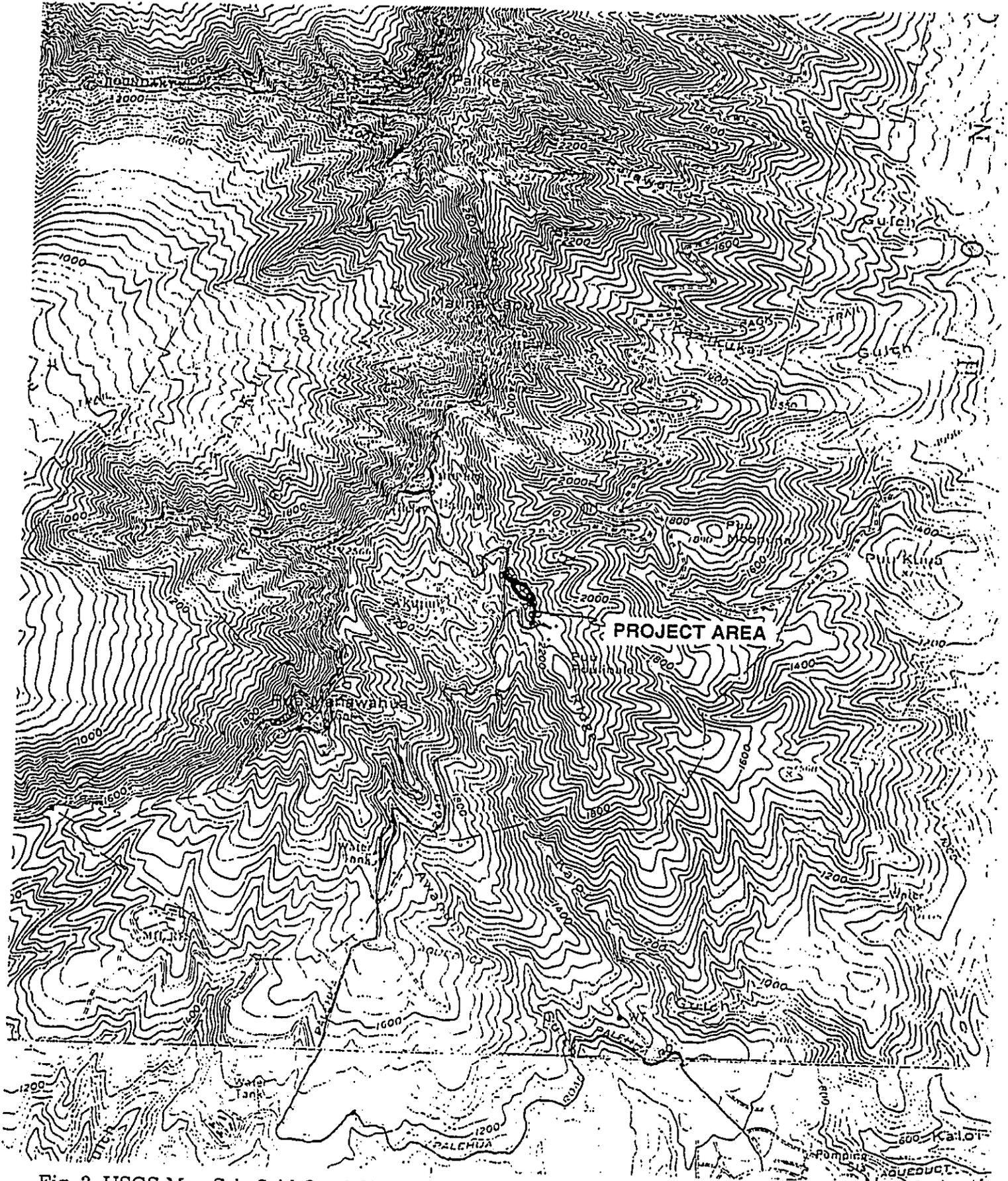
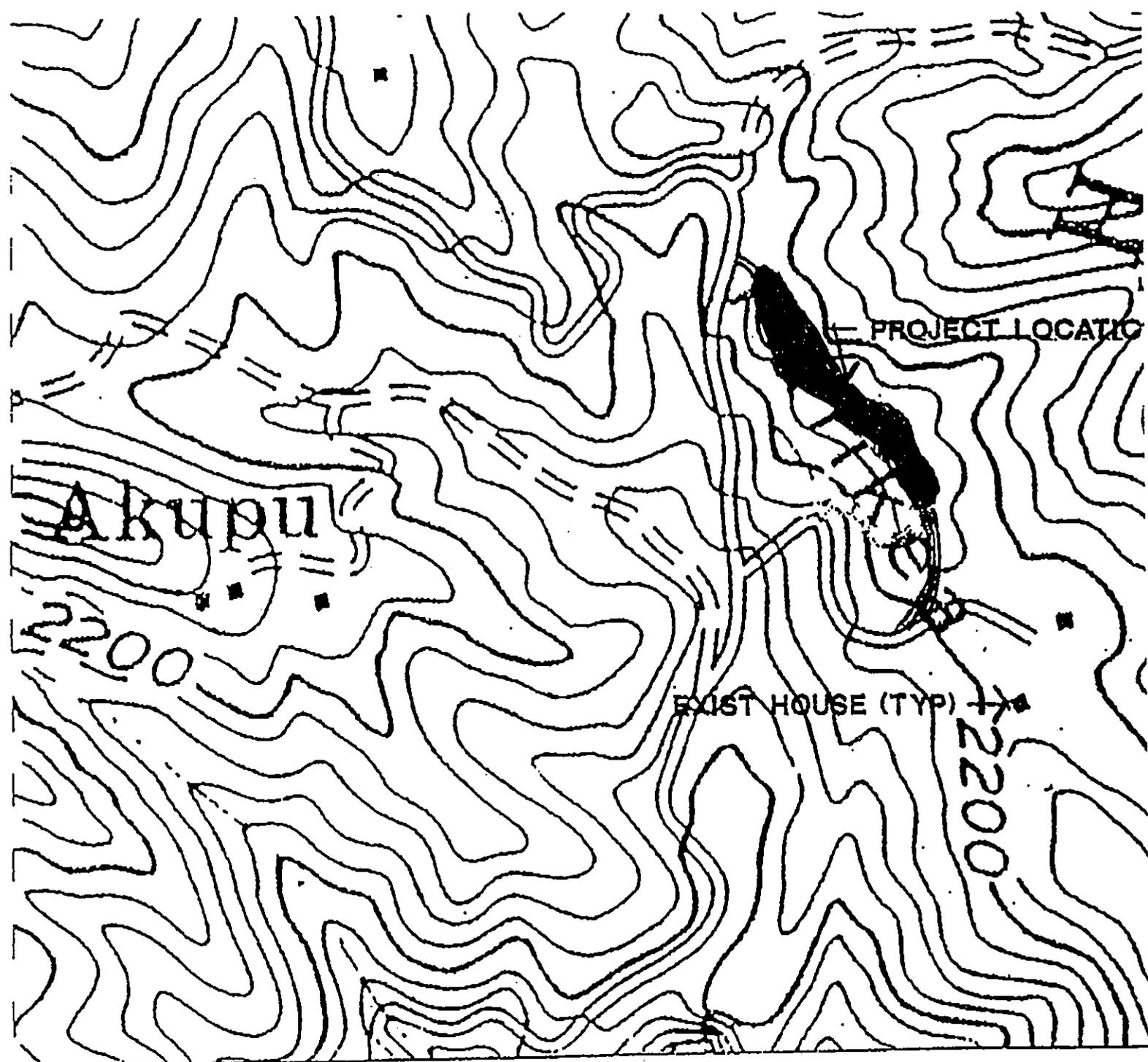


Fig. 3 USGS Map Schofield Quad Showing Project Area and Palihua Road



VICINITY MAP

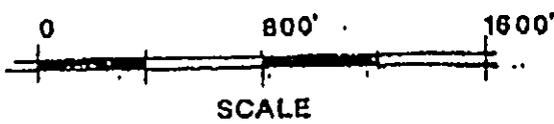


Fig. 4 USGS Map Schofield Quad (enlarged) Showing Project Area

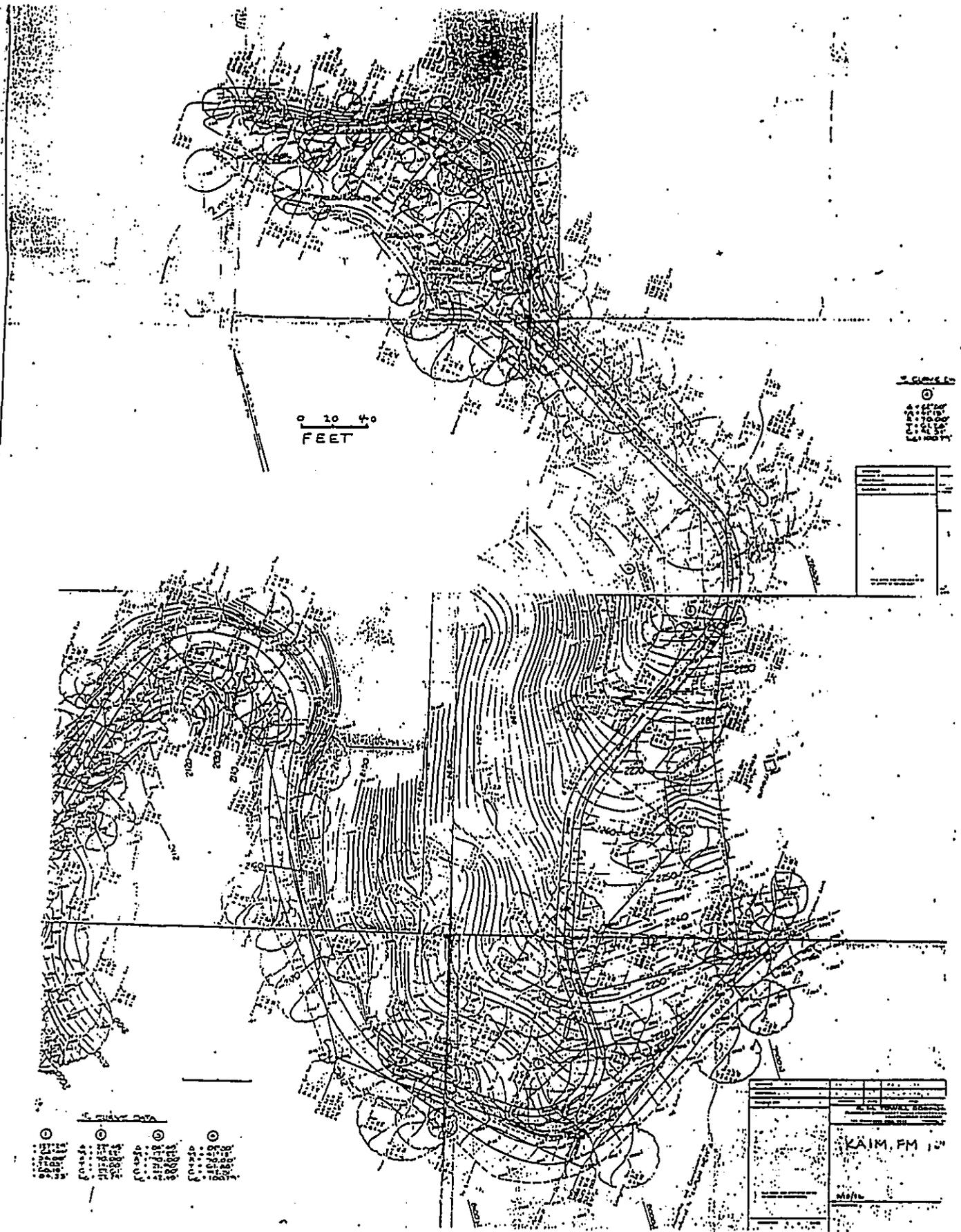


Fig. 5 Contour Map of Project Area



Fig. 6 Northern End of Project Area near Palihua Road, View South



Fig. 7 Southern End of Project Area on Ridge, View Southeast

1. A complete ground survey of the entire project area for the purpose of site inventory. All sites would be located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation will include photographs and scale drawings of selected sites and complexes. All sites will be assigned State site numbers.
2. Limited subsurface testing if sites are found 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, and 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 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;
 - 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.

This scope of work also includes full coordination with the State Historic Preservation Division (SHPD). All coordination takes place after consent of the owner or representatives.

The survey of the approximately 4-acre site was conducted on April 6, 1992 by two archaeologists: the author and Rodney Chiogioji of Cultural Surveys Hawaii. During the initial orientation to the project area we were accompanied by Mr. Paul Ruse of KAIM. Field location of most of the project area was made in reference to survey stations which were staked on the ground and on a one inch=20 foot topographic map prepared for the proposed

radio tower facility by R. M. Towill (see Fig. 5). The survey area was covered on foot with archaeologists spaced 30 to 50 feet apart.

The survey area actually includes two alternative locations for the tower facilities. One alternative is shown on Figure 5 and includes an access road connecting to a driveway off Palihua Road and the facility on the south side of the ridge line. The alternative site location is the area along the same ridge to the northwest and would have a shorter access road connecting directly from Palihua Road near an existing tower facility (see Fig. 4).

Both of these prospective sites, along with two possible access road alignments, were included in the survey area at the request of Mr. Ruse to allow for development flexibility. All areas which are likely to be impacted by a grading such as terrain downslope of the project area were inspected for archaeological remains.

II. LAND USE

A. Prehistory and Early History

Although no specific documentation of prehistoric or early historic land use is known for the project area, various Hawaiian legends and early historical accounts indicate that the surrounding area of Honouliuli *ahupua'a* was once widely inhabited by prehistoric populations, including the Hawaiian *ali'i*. This would be attributable for the most part to the plentiful marine resources available at the coast, along which several sites interpreted as permanent habitations and fishing shrines are located. Other attractive subsistence-related features of the area include the irrigated lowland suitable for wet land taro cultivation (Hammatt and Shideler, 1990), as well as perhaps the forest area of the mountain slopes (including the present project area) to procure forest goods.

Exploitation of the forest resources along the slopes of the Wai'anae Range - as suggested by E.S. and E.G. Handy - probably acted as a viable subsistence alternative during times of famine:

...The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the 'wao, or upland jungle, than was the case on the windward coast. Yet the 'wao here was more extensive, giving greater opportunity to forage for wild foods during famine time. (Handy and Handy 1972:469-470)

These upper valley slopes may have also been a significant resource for sporadic quarrying of basalt for the manufacturing of stone tools. Some Hawaiian *ali'i* were also attracted to the region, in which existed many places referred to in myth. An extensive summary of various legends and historical accounts of Honouliuli can be found in Sterling and Summers (1978:31-44). One historical account of particular interest refers to an *ali'i* residing in Ko'olina, an area located along the southwest shoreline of Honouliuli:

Ko'olina is in Waimanalo near the boundary of 'Ewa and Wai'anae. This was a vacationing place for chief Kakuhihewa and the priest Napuaikamao was the caretaker of the place. Remember reader, this Ko'olina is not situated in the Waimanalo on the Ko'olau side of the island but the Waimanalo in Ewa. It is a

lovely and delightful place and the chief, Kakuhihewa loved this home of his (Sterling and Summers 1978:41).

John Papa I'i describes a network of Leeward O'ahu trails (Figure 8) which in later historic times encircled and crossed the Wai'anae Range, allowing passage from West Loch to the Honouliuli lowlands, past Pu'u Kapolei and Waimanalo Gulch to the Wai'anae coast and onward circumscribing the shoreline of O'ahu (I'i 1973:96-98). Following I'i's description, a trail crossed the 'Ewa/Wai'anae ridge through Pohakea Pass in an east/west direction. However, no trails are shown paralleling the ridgeline or up Palikea Ridge near the present project area.

Other early historical accounts of the general region typically refer to the more populated areas of the 'Ewa district such as the *'ili* of Honouliuli where missions and schools were established and subsistence resources were perceived to be greater. However, the presence of archaeological sites along the barren coral plains and coast of southwest Honouliuli *ahupua'a*, as well as those identified along the lower slopes of the Wai'anae Range, indicate that prehistoric and early historic populations also adapted to these less inviting areas, despite the environmental hardships.

Subsequent to western contact in the area after ca. 1790, the landscape of the 'Ewa plains and Wai'anae slopes was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species. Domesticated animals including goats, sheep and cattle were brought to the Hawaiian Islands by Vancouver in the early 1790s, and allowed to graze freely about the land for some time after. It is unclear when the domesticated animals were brought to O'ahu. L.A. Henke reports the existence of a longhorn ranch in Wai'anae by at least 1840 (in Frierson 1972: 10). During this same time, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the dwindling sandalwood forest and erosional effects of animal grazing. The following dates of specific

vegetation introduced to Hawai'i are given by R. Smith and outlined by Frierson (1972: 10-11):

1) "early", c. 1790:
Prickly pear cactus, *Opuntia tuna*
Haole koa, *Leucaena glauca*
Guava, *Psidium guajava*

2) 1835-1840
Burmuda [sic] grass, *Cynodon dactylon*
Wire grass, *Eleusine indica*

3) Lantana, *Lantana camara*

The kiawe tree was also introduced during this period, either in 1828 or 1837 (*Ibid.*:11).

Intensive sandalwood harvesting, according to H. St. John (in Frierson 1972: 7) occurred in the islands between 1815 and 1830. As it is likely that sandalwood forests once occupied the lower, dry slopes of the Wai'anae Range, the present study area may have been extensively impacted by the cutting and burning of these forests.

B. Mid- to Late-19th Century

During the Great Mahele of 1848, 99 individual land claims in the *ahupua'a* of Honouliuli were registered and immediately awarded by King Kamehameha III. The largest award (Royal Patent 6071, LCA 11216, Apana 8) was granted in Honouliuli *ahupua'a* to Miriam Ke'ahi-Kuni Kekau'onohi on January 1848 (Native Register). Kekau'onohi acquired a deed to all unclaimed land within the *ahupua'a*, including a total of 43,250 acres.

Kamaukau relates the following about Kekau'onohi as a child:

'Kamehameha's granddaughter, Ke-ahi-Kuni Kekau'onohi...was also a tabu chiefess in whose presence the other chiefesses had to prostrate and uncover themselves, and Kamehameha would lie face upward while she sat on his chest.' (in Hammatt and Shideler 1990:19-20).

Kekau'onohi was one of Liholiho's (Kamehameha II's) wives, and after his death, she lived with her half-brother, Luanu'u Kahala'i'a, who was governor of Kaua'i (*Ibid.*:20).

Subsequently, Kekau'onohi ran away with Queen Ka'ahumanu's stepson, Keli'i-ahonui, and then became the wife of Chief Levi Ha'alelea. Upon her death on June 2, 1851, all her property was passed on to her husband and his heirs. When Levi Ha'alelea died the property went to his surviving wife, who in turn leased it to James Dowsett and John Meek in 1871 for stock running and grazing.

In 1877 James Campbell purchased most of Honouliuli *ahupua'a* - including the present study area - for a total of \$95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva, 1983:C-12). By 1881 the Campbell property of Honouliuli prospered as a cattle ranch with "abundant pasturage of various kinds" (Briggs in Haun and Kelly, 1984:45).

In 1889 Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway and Land Company in 1890. To attract business to his new railroad system, Dillingham subleased all land below 200 feet to William Castle who in turn sublet the area to the Ewa Plantation Company for sugar cane cultivation (Frierson, 1972:15). Throughout this time and continuing into modern times, cattle ranching continued in the area, and Honouliuli Ranch - established by Dillingham was - the "fattening" area for the other ranches (*Ibid.*).

Ewa Plantation Co. grew quickly and continued in full operation up into modern times. As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Co. installed ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (*Ibid.*:17).

C. Modern Land Use

Sometime after 1959, the United States Army purchased or exchanged land with the Campbell Estate for the construction of the Nike-Hercules anti-aircraft missile base located at the head of Waimanalo Gulch. The presence of this facility and other facilities along Palihua Road suggests that military activities of some sort may have occurred within the project area.

D. Historic Maps

Some information can be gleaned from various historic maps which show the project area. For example, Alexander's 1873 map of Honouliuli shows two survey stations along the ridge separating Ewa and Wai'anae to the west and northwest of the project area at Palikea Ridge. These stations are Manowahua (spelled "Manawahua" on modern maps) and Maunakapu. Palikea is shown and referred to as "the wooded hill" (Figure 9). A dotted line extends from Kapuai northwestwards up Palikea Ridge but what this line signifies is not known. It is possible that it marks a trail which is south of the project area.

The 1920 USGS map (Figure 10) shows Palihua Road following the same curvature - winding uphill from Puu Makakilo - as it does today. However, it dead-ends at a fenceline. Various vaguely marked trails lead to rectangular marks signifying houses. House structures on the ridge at this period were probably related to upland ranching. The fenceline extends along the more gentle slope of the ridge. Along the steep parts of the ridge - natural barriers to cattle - a fence was probably not necessary. On this map no trails are shown traversing the Palikea Ridge, however, a ridge trail is shown from Pu'u Manawahua, northward along the Wai'anae crest, to Mauna Kapu and and Mount Palikea.



Fig. 9 1873 Alexander Map of Honouliuli (Portion) Showing Palikea Area

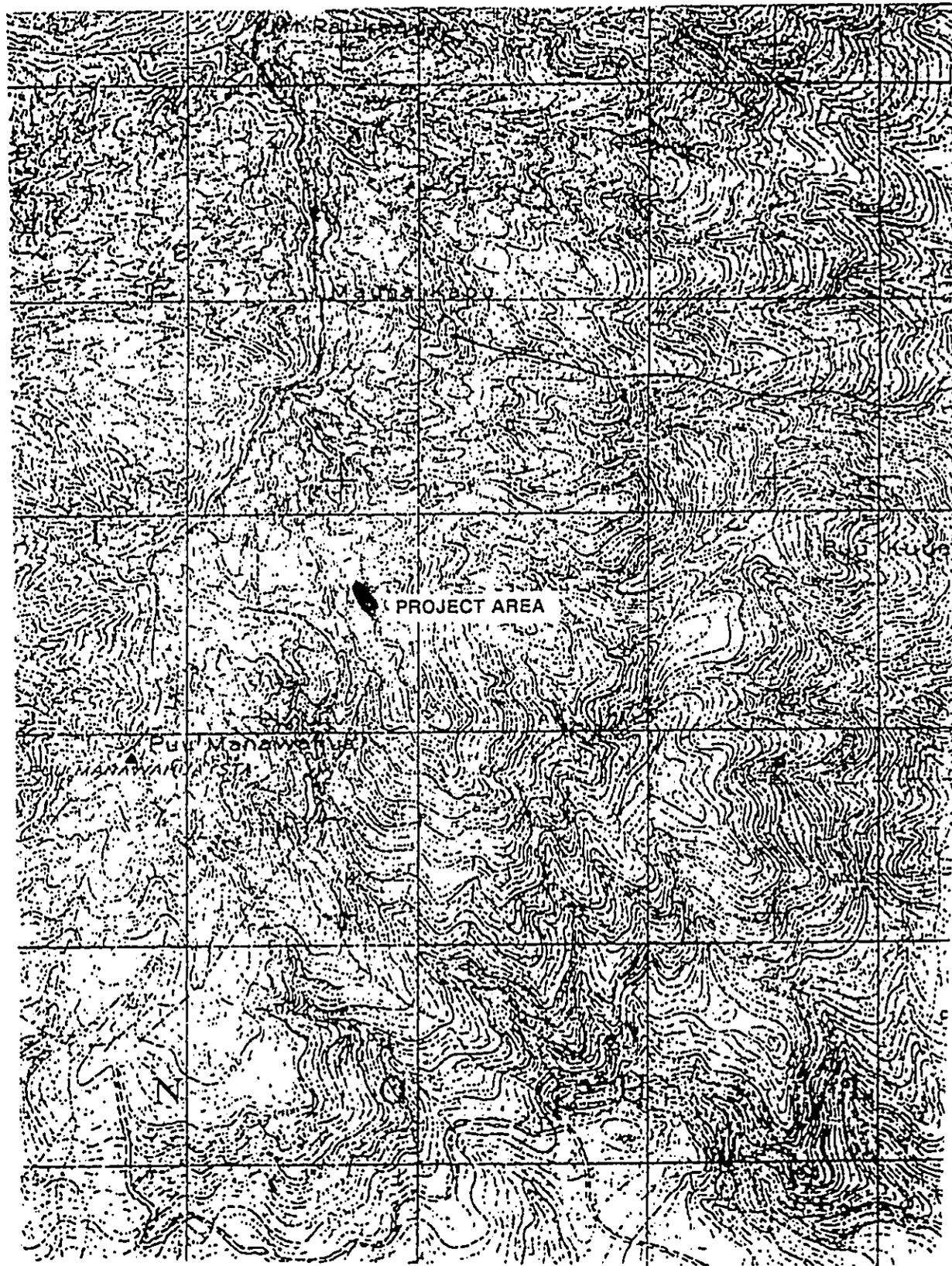


Fig. 10 1920 USGS Map of Honouliuli Showing Project Area (Shaded) and Roads, Trails, and Fencelines

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III. HONOULIULI SETTLEMENT PATTERNS

The Physical Layout

The *ahupua'a* of Honouliuli is the largest traditional unit on the island of O'ahu. Although there has been a noteworthy history of archaeological research within this *ahupua'a*, the author can find no *ahupua'a*-wide perspective on traditional land use and settlement. Such a comprehensive task is not attempted here. However, a broad *ahupua'a* sketch is needed to place the project area into the time and space of Hawaiian settlement.

Honouliuli (Figure 11) includes all the land from the western boundary of Pearl Harbor (West Loch) westward to the boundary between the 'Ewa and Wai'anae districts with the exception of the west side of the harbor entrance which is in the *ahupua'a* of Pu'uloa (the 'Ewa Beach/Iroquois Point area). This comprises approximately 12 miles of open coastline from Oneula westward to Pili O Kahe. The *ahupua'a* extends *mauka* (almost pie-shaped) from West Loch nearly to Schofield Barracks and the western boundary is the Wai'anae mountain crest running *makai* to the east ridge of Nanakuli Valley.

Not only is there a long coastline fronting the normally calm waters of leeward O'ahu but there are four miles of water front along the west side of West Loch. The land immediately *mauka* of the Pacific coast consists of a flat karstic raised limestone reef forming a level nearly featureless "desert" plain marked in prehistoric times (previous to illuviation caused by sugar cultivation) by thin or non-existent soil mantle. The microtopography is notable in containing countless sinkholes caused by chemical weathering (dissolution) of the limestone shelf. Proceeding *mauka* from this limestone plain, this shelf is overlain by alluvium deposited through a series of gulches draining the Wai'anae mountains. The largest of these is Honouliuli Gulch towards the east side of the plain which drains into West Loch. To the west are fairly steep gradient gulches forming a more linear than dendritic drainage pattern. The major gulches are, from east to west: Awanui, Palailai, Maka'iwa, Waimanalo

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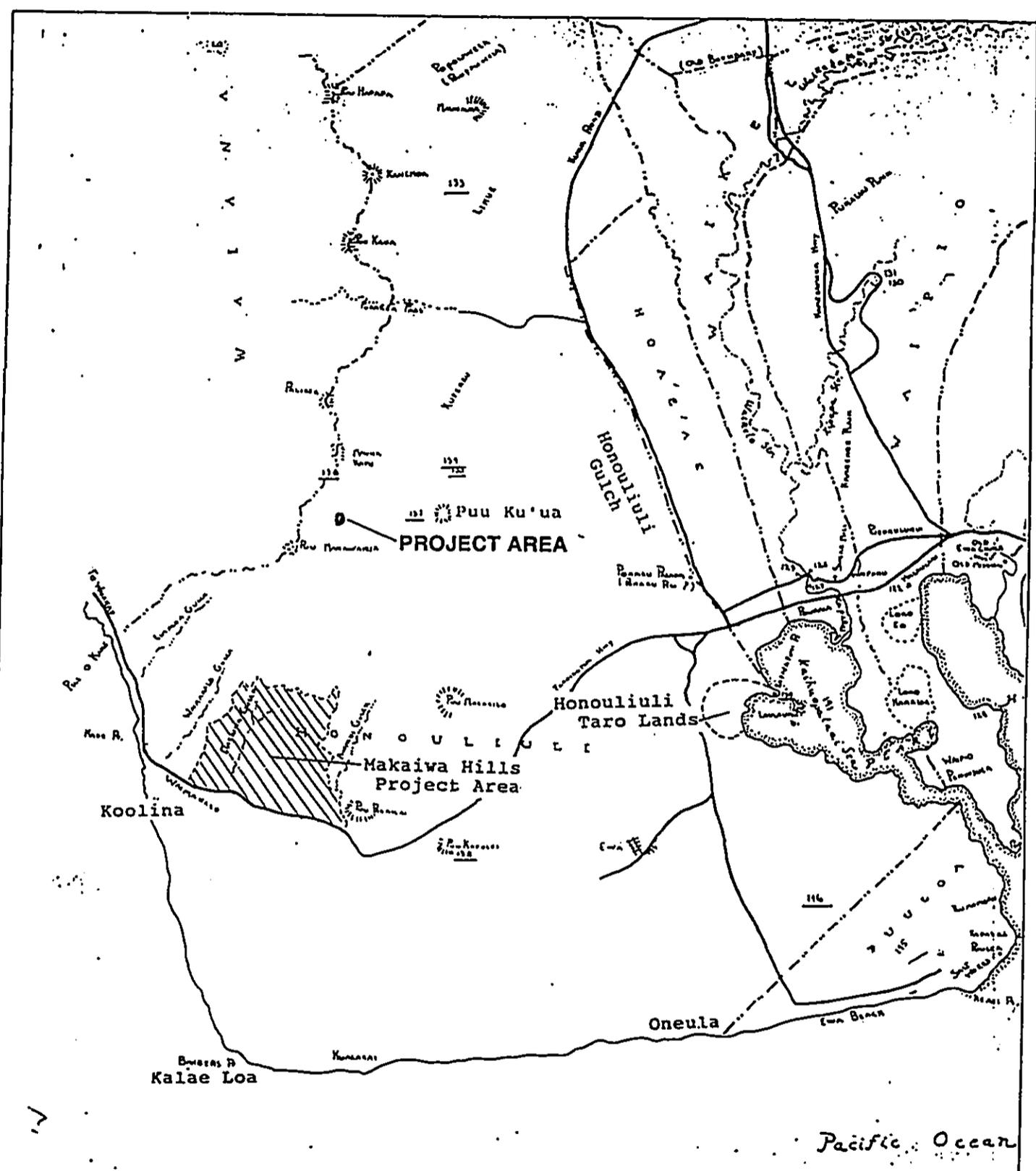


Fig. 11 Honouliuli Ahupua'a with Features Discussed in Text Adapted from Sterling and Summers (1978)

and Lumaloa. These gulches are steep-sided in the uplands and generally of a high gradient until they emerge onto the flat Ewa plain. The alluvium they have carried has spread out in delta fashion over the *mauka* portions of the plain, which comprises a dramatic depositional environment at the stream gradient change. These gulches are generally dry, but seasonal Kona storms carry immense quantities of runoff onto the plain and into the ocean. As typical drainages in arid slopes they are either raging uncontrollably, or are dry and as such do not form stable water sources for traditional agriculture in their upper reaches. The Honouliuli gulches, in contrast to those draining into Pearl Harbor to the east, do not have valleys suitable for extensive irrigated agriculture. However, this lack is more than compensated by the rich watered lowlands of the base of Honouliuli Gulch (the *'ili* of Honouliuli).

Honouliuli *ahupua'a*, as a traditional land unit, had tremendous and varied resources available for exploitation by early Hawaiians. The "karstic desert" and marginal characterization of the limestone plain — which is the most readily visible terrain — does describe the entire *ahupua'a*. The richness of this land unit is marked by the following available resources:

1. Twelve miles of coastline with continuous shallow fringing reef which offered rich marine resources.
2. Four miles of frontage on the waters of West Loch which offered extensive fisheries - including mullet, awa, and shellfish - as well as frontage suitable for development of fishponds (for example, Lauaunui).
3. The lower portion of Honouliuli Valley in the Ewa plain offered rich level alluvial soils with plentiful water for irrigation from the stream as well as abundant springs. This irrigable land would have stretched well up the valley.
4. A broad limestone plain which, because of innumerable limestone sinkholes, offered a nesting home for a large population of avifauna. This resource may

have been one of the early attractions to human settlement.

5. An extensive upland forest zone extending as much as 12 miles inland from the edge of the coastal plain. As E. S. Craighill and Elizabeth Handy have pointed out, the forest was much more distant from the lowlands here than on the windward coast, but it was much more extensive (1972:469). Much of the upper reaches of the *ahupua'a* would have had species-diverse forest with *kukui*, *ohia*, sandalwood, *hau*, *ti*, banana, etc.

Within this natural setting archaeological and traditional sources show a general pattern of three main areas of settlement within the *ahupua'a*:

The Coastal Zone

Kalaeloa (Barbers Point)

Archaeological research at Barbers Point has focused on the areas in and around the newly constructed Deep Draft Harbor (Barrera 1979; Davis and Griffin 1978; Hammatt and Folk 1981). Many small clustered shelters, enclosures and platforms show limited but recurrent use at the shoreline zone for marine oriented exploitation. This settlement covers much of the shoreline with more concentrated features around small marshes and wet sinks. Immediately behind the shoreline under a linear dune deposit is a buried cultural layer believed to contain some of the earliest habitation evidence in the area.

The attraction of the area to early Hawaiians was the plentiful and easily exploited bird population. Particular evidence for taking of petrel occurs at Site 2763 (Hammatt and Folk, 1981: 107,213). Initial heavy exploitation of nesting seabirds and other species in conjunction with habitat destruction probably led to early extinction.

There is some indication of limited agriculture in mulched sinkholes and limited soil areas. Considering rainfall, this activity would have been limited, but probably involved tree

crops and roots (sweet potatoes). The archaeological content of the sites indicates a major focus on marine resources.

Davis and Griffin (1978) distinguish functional classes of sites, based on surface area size and argue that the Barbers Point settlement consists of functionally integrated multi-household residence groups. Density contours of midden (by weight) and artifacts (by numbers) plotted for residence sites by Hammatt and Folk (1981) generally indicate narrowly defined spatial foci of discard, possibly indicating continuous use, or at least with no refurbishing or additions to the structures through time (Hammatt and Folk, 1981). The focus is small habitation sites, typically lacking the full range of features found in large permanent residence complexes such as high platforms, complex enclosures and ceremonial sites. Seasonal camping on a recurrent basis is postulated. It is of interest that Berthell Davis, in his Ph.D. dissertation, in discussing the marine environment along the west coast of O'ahu introduces an element of seasonality:

I suggest the west coast of O'ahu, including the area off Barbers Point, (a) probably became a well established fishery at least by AD 1000, perhaps much earlier; (b) the initial settlement at Barbers Point also began around this time or possibly earlier; and (c) the settlement initially involved task-specific groups exploiting the adjacent fishery on a seasonal round, probably during the winter months. (Davis 1990: 135)

Davis also points out the seasonality of nesting of various species of birds which is of relevance to the pattern of human habitation of the Honouliuli limestone plain (*Ibid.*: 136).

Honouliuli Taro Lands

Centered around the west side of Pearl Harbor at Honouliuli Stream and its broad outlet into the West Loch are the rich irrigated lands of the *'ili* of Honouliuli which give the *ahupua'a* its name. The major archaeological reference to this area is Dicks, Haun and Rosendahl (1987) who documented remnants of a once widespread wetland system (*lo'i* and fishponds) as well as dryland cultivation of the adjacent slopes.

Carol Silva has conducted "Historic Research Relative to the Land of Honouliuli" (Appendix A in Dicks *et al.* 1987) and the reader is referred to this work for an overview of the history of Honouliuli.

This area bordering West Loch was clearly a major focus of population within the Hawaiian Islands and this was a logical response to the abundance of fish and shellfish resources in close proximity to a wide expanse of well irrigated bottom land suitable for wet land taro cultivation. The earliest detailed map (Malden 1825) shows all the roads of southwest O'ahu coalescing and descending the *pali* as they funnel into the locality which gave the district of Honouliuli its name. Dicks *et al.* (1987: 78-79) conclude, on the basis of 19 carbon isotope dates and 3 volcanic glass dates, that "agricultural use of the area spans over 1,000 years." Undoubtedly, Honouliuli was a locus of habitation for thousands of Hawaiians. Prehistoric population estimates are a matter of some debate but it is worth pointing out that in the earliest mission census of 1831-1832, the land (*'āina*) of Honouliuli contained 1026 men, women, and children (Schmitt 1973:19). It is not clear whether this population relates to Honouliuli Village or district but the village probably contained the vast majority of the district's population. The nature of the reported population structure for Honouliuli (less than 20% children under 12 years of age) and the fact that the population decreased more than 15% in the next 4 years (*Ibid.*:22) suggests that the prehistoric population of Honouliuli Village may well have been significantly greater than it was in 1831-1832. A conservative estimate would be that tens of thousands of Hawaiians lived and died at Honouliuli Village.

Pu'uku'ua and Ekahanui: Inland Settlement

Documentation of inland settlement in Honouliuli *ahupua'a* is more problematic in that there is no clear archaeological sources. However, it is probable that the area around

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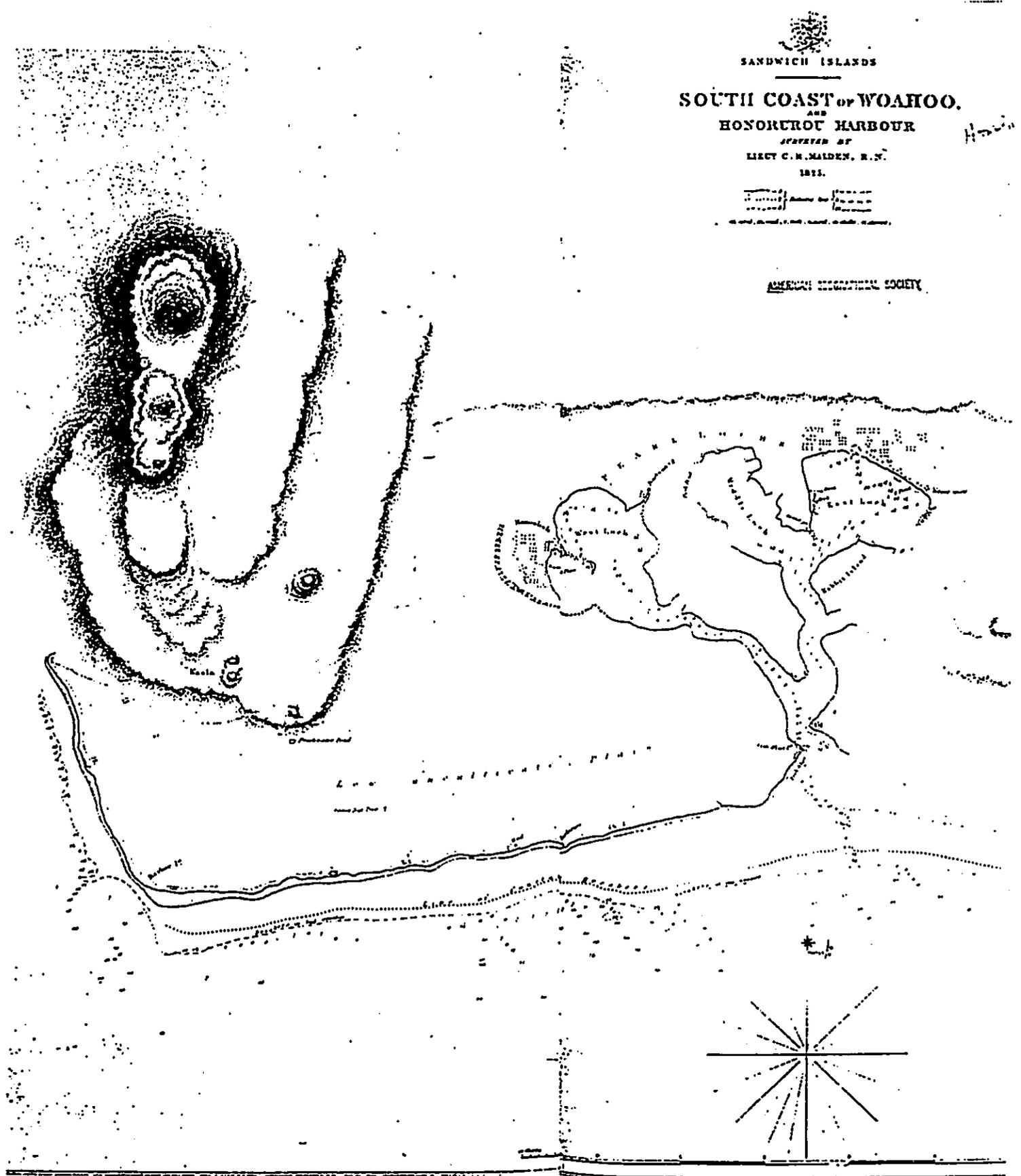


Fig. 12 Malden, 1824 Map Showing Honouliuli Trails

Pu'uku'ua, on the east side of the Wai'anae Ridge seven miles inland of the coast, was a Hawaiian place of some importance.

An 1899 Hawaiian newspaper, "Ka Lo ea Kalaiaina," relates a story of Pu'uku'ua as "a place where chiefs lived in ancient times" and a "battle field...thickly populated." The article summarizes:

- 1) This place was entirely deserted and left uninhabited and it seems that this happened before the coming of righteousness to Hawai'i Nei. Not an inhabitant is left.
- 2) The descendants of the people of this place were so mixed that they were all of one class. Here the gods became tired and returned to Kahiki. (in Sterling and Summers 1978: 33)

J. Gilbert McAllister recorded three sites in this area: two *heiau* (134, 137) - Pu'u Kuina and Pu'uku'ua (both destroyed) - and, most interesting, a series of enclosures in Kukuilua which he calls "*kuleana* sites" (McAllister 1933). There is no direct archaeological evidence available to the author's knowledge that Hawaiian settlement occurred here but it is considered as a place of high probability, based on the above indications. Geographically, the area is well-watered and would have had abundant locally available forest resources.

Thomas Riley, in a letter of July 9, 1980 to the Department of Land and Natural Resources, mentions the Ekaha Nui Complex-Site 1176 located in Ekaha Nui Gulch a southeast draining tributary of Waikele Stream in upland Honouliuli. A Hawaii Register of Historic Places form was prepared for the site in 1970. The site is recorded as consisting of a complex of terraces, house sites and burials covering 90,000 sq. meters (State site files and Sterling and Summer 1978: 67).

Summary

Based on the above summary of areas of Honouliuli settlement the following general considerations are made to place the project area in the context of the *ahupua'a* pattern:

1. There are three areas of Hawaiian settlement in the *ahupua'a*; two are well-documented and one is problematic:
 - a. the extensive limestone plain with recurrent use habitations for fishermen and gatherers and sometime gardeners;
 - b. the rich cultivated lands of Honouliuli *'ili* for extensive wetland taro and clearly the *ahupua'a* population center;
 - c. the uplands around Pu'uku'ua for presently uncertain reasons but probably agriculture and forest resource utilization.

2. Honouliuli is designed as a unit to contain all the geographic elements of a typical Hawaiian valley *ahupua'a*, except they are arranged geomorphically in an atypical relationship. The *ahupua'a* is not organized around a single drainage network but shares the west portions of Waikele drainage in its upper reaches. A typical and highly advantageous characteristics for human subsistence is included in a vast coastline and fringing reef, an extensive limestone plain which would support only limited agriculture but would be excellent for bird catching in early times — and perhaps most importantly for this project — a huge expanse of sloping forest land. The richest forest land for foraging for wood, birds, feathers, etc. would have been the east slope of the Wai'anae Range. The *mauka/makai* route would have been up Honouliuli Gulch or up the Makakilo ridge, paralleling the coast from Honouliuli Gulch to Kahe. The Makaiwa slope forms a kind of "side pocket" or dead space in both the *mauka/makai* and east/west orientation of trails in the *ahupua'a* (see Figure 8). For example, the most convenient route to *mauka* lands, even from the western end of the coast (Ko'olina) would have been *mauka* only to the base of the hills and then either up the Makakilo Ridge or northeast to a trail to Pu'uku'ua. The *makai* slope is the dry side of the ridge line. Here streams would respond to rainfall quickly but drain quickly

leaving little available water for even short-term use. Bordner's survey at Waimanalo Gulch to the west of the Makaiwa project but still in Honouliuli indicated no evidence of Hawaiian occupation but the gulch has been impacted in modern times (Bordner and Silva, 1983).

3. The Makaiwa Slope was not a major thoroughfare. There is some very limited evidence of part-time agriculture in and around gulches and two foci of sparse habitation. The first is limited to *makai* portions of gulches and lava flats. This habitation is considered a *mauka* component or continuation of the Ko'olina coastal settlement rather than an independent focus. The second focus, separated from the first by a barren zone, is generally above the 800-foot elevation. This *mauka* habitation which could have been supported by seasonal dryland planting and forest foraging may be the lower portion of a thinly scattered, but widespread zone of settlement which stretches eastward and northeast along the east Wai'anae Range slopes and may increase in intensity along the more watered lands forming the *mauka* western boundary of Honouliuli.

4. There is to date no direct archaeological evidence of high status residence in Honouliuli. Large residential structures are not present along the Pacific shoreline where they would be expected. The late prehistoric occurrence of chiefs' houses is not apparent, perhaps because the ocean shoreline, although rich in marine resources, is uninviting for sport and unsuitable for fishponds. The chiefly focus of 'Ewa District was Waipi'o. Whatever activities of this class which occurred in Honouliuli would have been in or near the rich lands fronting West Loch (the *'ili* of Honouliuli) but to date there is no direct archaeological evidence of this. Concerning status associations with Honouliuli, it is interesting to note the connection of the Pu'uku'ua settlement with slaves (*kauwā*), the lowest class of Hawaiians (Sterling and Summers 1978: 33).

5. The central place of the *ahupua'a* of Honouliuli in terms of population, as well as cultivated foods, was the *'ili* of Honouliuli. There is good reason to assume, given the lack of intensive agricultural resources in other settlement areas of the *ahupua'a* that at least by late prehistoric times, all other habitation zones were economically and socially co-dependent.

IV. PREVIOUSLY RECORDED SITES

To the author's knowledge, there has never been a modern systematic archaeological survey of forest lands in the environs of the present project area. We must rely on J. Gilbert McAllister's work of the 1930s to identify known nearby sites, some of which are of interest (see Fig. 11).

McAllister's Site 136 is located by Sterling and Summers (1978: 32) at Mauna Kapu northwest of the project area and is described as a small platform, now destroyed, near Mauna Kapu on the ridge dividing 'Ewa and Wai'anae. The other site is at Pu'uku'ua: a prominent landmark a few thousand feet to the east of the project area. This site (possibly a former site) is described in McAllister as:

(Destroyed) The heiau was located on the ridge overlooking Nanakuli as well as Honouliuli at the approximate height of 1800 feet. Most of the stones of the heiau were used for a cattle pen located on the sea side of the site. The portion of the heiau which has not been cleared for pineapple has been planted in ironwoods. (*Ibid.*: 32)

McAllister's description indicates that remnants of this site may still be present although fieldwork in the area has not yet confirmed this.

McAllister also mentions Site 134-Puu Kuina heiau (now destroyed) at Aikukai, a gulch descending eastwards from Mauna Kapu. Nearby is Site 135: a number of enclosures "probably kuleana sites" (*Ibid.*: 32).

None of these sites are directly relevant to the present project area and are located thousands of feet away. However, the presence of extant or former archaeological remains at or near this elevation demonstrates Hawaiian use of these *uka* lands.

V. SURVEY RESULTS

No archaeological remains of any kind were located on the ridge top and sloping terrain of the entire project area. There was no evident previous land disturbance and it is probable that no archaeological remains were ever extant here. Ground visibility was excellent along the ridge top and fair to good along the slopes. The project area was well marked with labelled survey stakes, survey orientation was accomplished with ease, and the survey coverage went well outside the actual limits of grading. Four stone outcrops were carefully inspected for petroglyphs but none were found. One fence post was observed at the south end of the ridge top.

Two features located near the survey area (Fig 13) are described as follows:

A trail - on the slope west of the project area (see Fig. 14) follows an existing powerline to a residence oriented east/west until the powerline drops westward down a cliff-like slope. The trail at this point turns northwest away from the powerline and consists of a cut in the slope averaging 50 to 80 cm. high and a levelled area averaging 1 - 1.5 meters wide. There are no trail markers or placed stones. The trail runs from the powerline for approximately 350 feet where it becomes unnoticeable as the slope becomes gentle. The trail is overgrown but has been cleared within the past few years. It is believed that this trail was constructed by Hawaiian Electric Company along the most convenient route to transport the power pole and installation equipment from Palikea Road (i.e. along the ridge and parallel to the slope). The trail is probably used by the power company for line maintenance. This trail therefore is not considered a significant archaeological site, and in any case is outside the study area.

Another feature is a stone outcrop typical of the 4 stone outcrops observed along the ridgeline except it has a curious shape, reminiscent of the well-known phallic rocks of central Moloka'i, except a smaller version and less realistic (Fig. 15).

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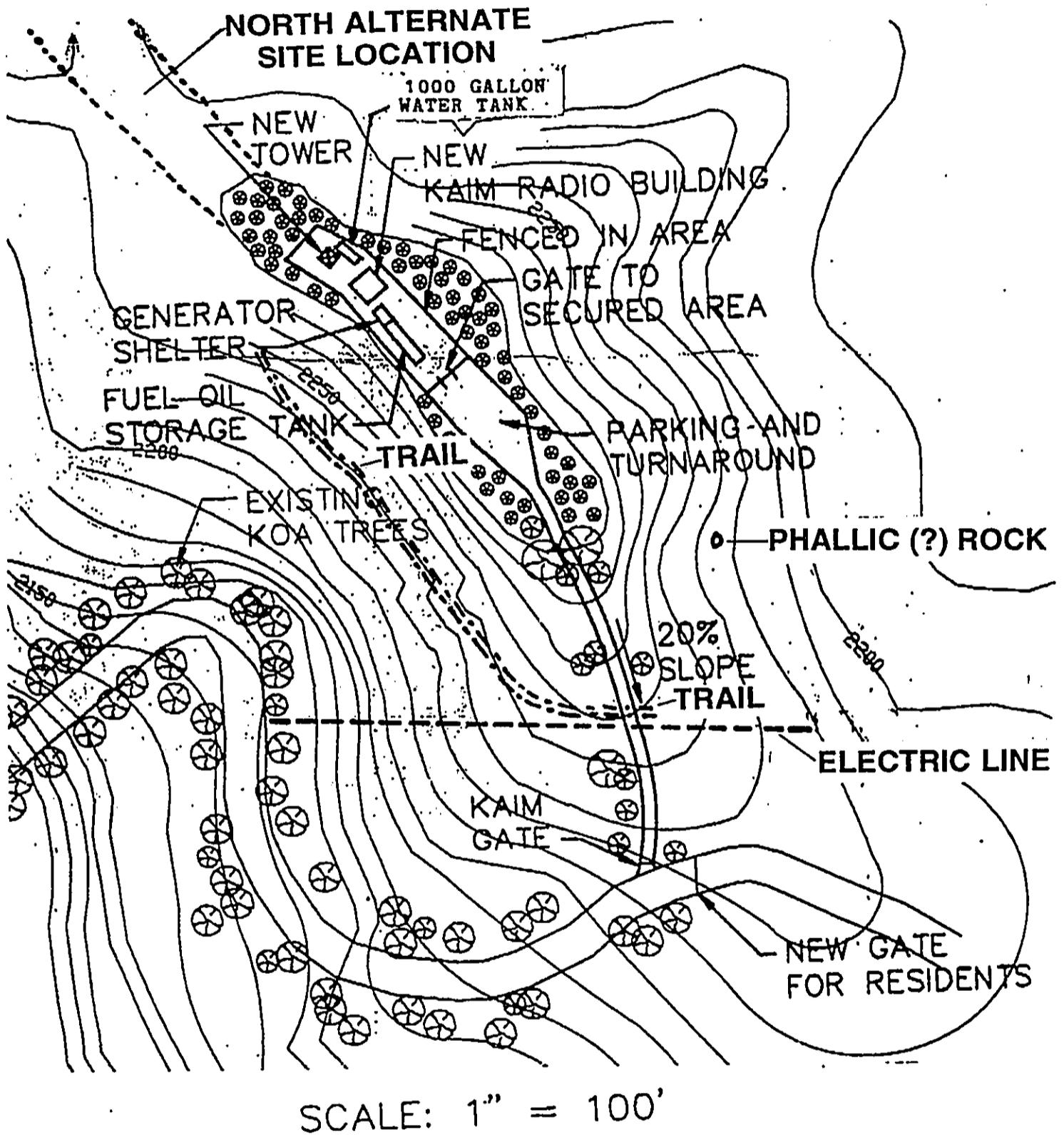


Fig. 13 Project Area Showing Nearby Features - Trail and Rock



Fig. 14 Trail Cut Bank by Powerline, View Northwest



Fig. 15 Possible Phallic Stone, Southeast of Project Area

Whether this rock had significance as a fertility stone is a matter of opinion. In the absence of evidence of human shaping, the question remains open. In any case the stone is at least 100 feet outside the boundaries of the proposed access road. If the northern alternative is chosen, which is most likely, then the stone will be well clear of the facility.

VI. RECOMMENDATIONS

Both adjoining proposed facilities are clear of archaeological sites. Whichever one is chosen, there will be no impact on archaeological resources. Further archaeological research is not justified. However, if inadvertent discoveries of cultural remains are located during grading of the access road and facility, work should be stopped in that area and the State Historic Preservation Division should be notified.

VII. REFERENCES

- Barrera, William M., Jr.
1979 *West Beach, Oahu: An Archaeological Survey*, Chiniago Inc., Honolulu.
- Bordner, Richard M. and Carol Silva
1983 *Archaeological Reconnaissance and Historical Documentation: Waimanalo Gulch, Oahu.*
- Davis, Bertell D. and P. Bion Griffin (eds.)
1978 "Studies in Natural History and Human Settlement at Barbers Point, O'ahu,"
Prepared for: U.S. Army Corps of Engineers by Archaeological Research Center
Hawaii (ARCH), Lawai, Kauai.
- Dicks, A. Merrill, Alan E. Haun and Paul H. Rosendahl
1987 *Archaeological Reconnaissance Survey for Environmental Impact Statement,
West Loch Estates Golf course and Parks, Honouliuli, 'Ewa, O'ahu*, PHRI, Inc.
- Frierson, Barbara
1972 "A Study of Land Use and Vegetation Change: Honouliuli, 1790 - 1925,"
University of Hawaii Geography Dept.
- Hammatt, Hallett H. and William H. Folk
1981 *Archaeological and Paleontological Investigation at Kalaeloa (Barber's Point),
Honouliuli, 'Ewa, O'ahu, Federal Study Areas 1a and 1b, and State of Hawai'i
Optional Area 1*, ARCH 14-115.
- Hammatt, Hallett H., Jennifer J. Robins, Mark Stride and Matthew J. McDermott
1991 *An Archaeological Inventory Survey for the Makaiwa Hills Project
Site Honouliuli, 'Ewa, O'ahu*, Cultural Surveys Hawaii.
- Hammatt, Hallett H. and David W. Shideler
1990 *Archaeological Inventory Survey of the West Loch Bluffs Project Site, Honouliuli,
'Ewa, O'ahu*, Cultural Surveys Hawaii.
- Hammatt, Hallett H., David W. Shideler and William H. Folk
1990 *Archaeological Reconnaissance of the 'Ewa Villages Project Site, Honouliuli,
'Ewa, O'ahu*, Cultural Surveys Hawaii.
- Handy, E.S. Craighill, and Elizabeth G. Handy
1972 *Native Planters of Hawaii*, Bishop Museum Press, Honolulu.
- Haun, Alan E. and Marion Kelly
1984 *Research Design for an Archaeological Survey of Naval Magazine, Lualualei;
Naval Communication Area Radio Transmission Facility, Lualualei; and Naval
Air Station, Barber's Point, O'ahu, Hawaii*, Dept. of Anthropology, Bishop
Museum, Honolulu.
- I'i, John Papa
1983 *Fragments of Hawaiian History*, tr. by M.K. Pukui, Bishop Museum Press,
Honolulu.

Land Commission Native Register
3 vols. in Archives of Hawaii.

McAllister, J.G.
1933 *Archaeology of Oahu*, B.P. Bishop Museum Bulletin 104, Honolulu.

Schmitt, Robert C.
1973 *The Missionary Censuses of Hawaii*, Bishop Museum, Honolulu.

Smith, R.F.
1971 "The Results of a Preliminary Investigation of Early Plant Introductions into Hawaii," Manuscript.

Sterling, Elspeth P. and Catherine C. Summers
1978 *Sites of Oahu*, B.P. Bishop Museum, Honolulu.

FILE COPY

CONSERVATION DISTRICT USE APPLICATION FOR
CHRISTIAN BROADCASTING ASSOCIATION'S
PALEHUA RIDGE FM BROADCAST AND
TELECOMMUNICATION TOWER

TMK 9-2-05 : POR: 13

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CHRISTIAN BROADCASTING ASSOCIATION
3555 HARDING AVE.
HONOLULU, HAWAII 96816

AUGUST 1991

August 22, 1991

Chairperson
Board of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Subject: Conservation District Use Application For Christian
Broadcasting Association's Palehua Ridge Telecommunication Tower
TMK 9-2-05: 13

Dear Chairperson:

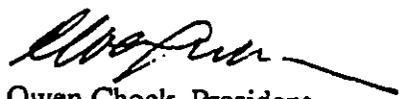
Enclosed is our Conservation District Use Application and report for the Construction of a multiple use Radio and T.V. and Telecommunication Tower and accompanying multiple use transmitter building. This request involves the construction of a 199 feet high self supporting tower to which will be attached a 6 Bay multiple use antenna, several micro-wave dishes and communication radio antennas as shown in Exhibit BB included as part of the application report.

We wish to emphasize that the Christian Broadcasting Association, (KAIM FM), will be using part of the capability of the FM antenna, plus one of the communication dishes, while the remainder of the capability of the tower and FM antenna will be rented out to other FM stations and communications users.

The facility is planned to be able to accomodate T.V. transmissions in future expansion of the site with an addition to the building and the construction of another tower to be dedicated to T.V. use. The sharing of tower and building space with other users is in keeping with your position of minimizing these facilities in the Conservation District.

Your assistance in processing this application is sincerely appreciated. Should there be questions or you require more information, please contact me or our planning consultant, Paul Ruse, who can be reached at 735-2424.

Sincerely,


Owen Chock, President
Christian Broadcasting Association

February 1983

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

FOR DLNR USE ONLY

Reviewed by _____
Date _____
Accepted by _____
Date _____
Docket/File No. _____
180-Day Exp. _____
EIS Required _____
PH Required _____
Board Approved _____
Disapproved _____
Well No. _____

DEPARTMENT MASTER APPLICATION FORM

(Print or Type)

I. LANDOWNER/WATER SOURCE OWNER
(If State land, to be filled
in by Government Agency in
control of property)

Name Estate of James Campbell

Address Suite 500

828 Fort St. Mall

Honolulu, HI 96813

Telephone No. 808-536-1961

SIGNATURE Howard Schubert

Date 9-23-91

II. APPLICANT (Water Use, omit if applicant
is landowner)

Name Christian Broadcasting Assn.

Address 3555 Harding Av.

Honolulu, HI 96816

Telephone No. 808-735-2424

Interest in Property Licensee
Leasee

(Indicate interest in property; submit
written evidence of this interest)

*SIGNATURE [Signature]

Owen Chock, Pres.
Date 9-23-91

*If for a Corporation, Partnership,
Agency or Organization, must be signed
by an authorized officer.

III. TYPE OF PERMIT(S) APPLYING FOR

() A. State Lands

(X) B. Conservation District Use

() C. Withdraw Water From A Ground
Water Control Area

() D. Supply Water From A Ground
Water Control Area

() E. Well Drilling/Modification

IV. WELL OR LAND PARCEL LOCATION REQUESTED

District EWA

Island OAHU

County HONOLULU

Tax Map Key 9-2-05 : 13

Area of Parcel 100 x 300 Ft = 30,000 Sq.Ft
(Indicate in acres or
sq. ft.)

Term (if lease) 15 yrs.

ENVIRONMENTAL REQUIREMENTS

(1) Identification of Applicant:

The applicant is Christian Broadcasting Association, Owners and operators of K A I M FM 95.5 Radio Station. K A I M provides Christian programming to all of the Hawaiian Islands operating on a license from Federal Communications Commission. K A I M FM has been licensed by FCC since November 1, 1953, and has been deemed financially and technically qualified to operate a broadcast station.

(2) Identification of approving agency:

State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809-0621

(3) General description of the action's technical, economic, social and environmental characteristics.

Christian Broadcasting Master Plan for Radio and Communications Site for FM radio multiple use is as follows:

The subject site will be used primarily for a multiple use FM Radio Transmitting Site with 199 foot tower. This height is selected for multiple use because the higher the FM antenna is from the ground the less radiation on the ground. This is a consideration taken to stay well within the ANSI guidelines. This is taking into account that there will likely be 3 or 4 FM stations transmitting from this antenna on this tower.

This installation will replace the multiple use tower in Kaimuki (where the applicants have lost the lease) Also this installation will accomodate other FM stations who now have antennas in highly populated areas.

In addition to this facility serving the applicants and other FM stations broadcast needs, the applicant proposes to utilize this facility for other communications users such as paging and mobil radio services.

With the constantly growing demand for communication facilities while at the same time being cognizant of their impacts on the environment, applican feels taht the multiple use of these facilities and it's location far away from populace areas is in the best interest of all concerned.

Illustrations on the following pages includes the following drawings.

A	Vicinity Map	AA	Close up vicinity map
B	Sketch of tower		
C	Site Use Plan	CC	Site Use Plan
D	Prelinary Building Plan		
E.	Visual Impact Photos	EE	Visual Impact Photos

The construction prosped under this application is for one 199 foot tower which will accomodate the following additional antennas:

1. 3 microwave dish antennas
2. 4 Land Mobile antennas

The proposed building is to be 864 square foot cement block building surrounded by a 5 foot concrete apron. The building is designed with separate compartments to accomodate the co-users of the facility.

The proposed facility will be un-manned and operated by remote control thereby

not requiring water and sewer. C.B.A. (K A I M) personnel and co-users personnel will visit the site periodically (Minimum of once a month) for maintainence.

Due to its remote location 3 miles north of Makakilo City on Palehua Ridge the visibility of the tower will be partially obscured by the trees bordering the site and the distance from visibility from H-1 or H-2 lessens the tower's visual impact on the area. See Exhibit E & EE

The applicant is mindful of the need to coordinate with the other communication operators occupying sites in the nearby area on Palehua Ridge. The applicant will initiate contact with existing operators to receive their acknowledgement that the applicant's operation will not interfere with their operations. Final clearance letters will be forwarded to be added to this application as soon as they are received.

(4) Summary description of the affected environment including suitable and adequate location and site maps.

The site at elevation of 2280 AMSL is located approximately 3 miles north of the northerly limits of Makakilo City. Access to the site is via a private one lane paved road to the driveway and then via the driveway as outlined on the proposed development site map.

The area is presently covered with undergrowth and small trees. Enough of this will of necessity be cut and removed to make way for the driveway and the building site. Enough trees and shrubs will be left on the east side of the parcel to obscure the building from view to the east. Being wilderness area to the west there would be no visual impact from that area.

(5) Identification of electro-magnetic impacts and alternatives considered if any.

Analysis of electro magnetic radiation in the environment. The American National Standards Institute has published recommendations concerning safety levels with respect to human exposure to electro magnetic fields in the frequency range for 300KHZ to 100GHZ range. Chart enclosed in Exhibit / indicates the projected levels produced by the FM operation.

The areas where the high density of electro magnetic radiation is in the close proximity of the tower. This area will be fenced in to keep any human or animal from getting close to the areas that are above safe levels. These areas will also be locked.

Any microwave receiving dishes will be on the tower at such a height that they will present no hazard to humans.

It should be noted that microwave density in a typical microwave oven used for cooking is 1.2W/cm squared or over 10,000 times greater than the maximum density allowed under the safety standards for microwave radio.

It is contemplated that other radio communications system users may wish to share the proposed site. Such radio communications systems users may include two way radio systems and radio paging systems.

Two way radio systems and radio paging systems typically operate on an intermittent transmitting cycle at frequencies below 1 GHZ. Effective radiated power of these facilities is below 1,000 watts which does not produce energy densities in excess of ANSI standards even at close distances to the antenna.

The potential power density exposure levels of CBA's K A I M FM in the non fenced areas at ground level will be below the guidelines and below the threshold at which biological effects have been reported.

Any other radio communications facilities proposed to share the facility will be subjected to an electro magnetic energy study to ensure the ANSI safety standard is met.

Therefore no significant impact on public health and safety is anticipated.

Alternative Sites Although alternative sites were considered by the applicant, the suitability of the property and it's remote location was the key factor in it's selection. The applicant has assurance from Hawaiian Electric Co. that they will build the line necessary from the existing road where the main line exists to the proposed development site.

See Exhibit 2 + 3

(6) Determination

Due to its remote location coupled with the very limited radiation and visual impacts stemming from the proposed facility, we are of the opinion that a negative determination is appropriate in this instance.

Also, the fact that there are already several radio and T.V. towers existing on this ridge the applicant is not introducing anything new to the area. This proposed development concurs with the "tower farm" concept for communications away from the populace area of Honolulu.

INFORMATION REQUIRED FOR ALL USES

I. Description of Parcel

- A. Existing structures/uses. There are no existing structures at at this location. The parcel is oval shaped but the development will utilize a clearing of 100' x 300' with the coordinates at the center of the plot as follows:

21 23' 43" N
158 05' 55" W

- B. Utilities The only utility servicing the area is Hawaiian Electric Co. As indicated in Exhibit 2 + 3 Hawaiian Electric will build line from their existing line by the road into this development site.

- C. Existing Access The proposed site is accessible via private paved road to the existing driveway to the adjacent property. Applicants new driveway construction will branch off from this existing driveway to proceed up the hillside to the site as illustrated in the enclosed site map. See Exhibit C C

- D. Vegetation The site presently is overgrown with underbrush and small trees or saplings. Enough of this will of necessity be cut and removed to make way for the driveway and the building site. Enough trees and shrubs will be left on the east side of the parcel to obscure the building from view to the east. Being wilderness area to the west there would be no visual impact from the west.

Based on our observation and knowledge, we are not aware of any rare plants or trees at this location.

- E. Topography As was noted in our earlier discussion, the subject parcel is a small plateau as part of Palehua Ridge. Being a gentle slope in all directions there is good natural drainage.

F. Shoreline Area Not applicable

G. Existing covenants, easements, restrictions. The subject property has never been developed but has been designated by Land Owner Campbell Estates as a future site to be developed as a Communications Transmitting and Tower Site. The only restrictions to applicants knowledge is that there to be no new dwellings in the area, and other restrictions would be imposed by Dept of Land Use and Federal Aviation Administration (FAA) as to height of and lighting of tower and to the low visibility factor of the building.

H. Historic Sites Affected To our knowledge, this project will not affect any historic site.

II Description of proposed activity Please refer to section (3) and (4) Part V Environmental requirements, Department Master Application Form.

III Commencement Date. As soon as all Government permits are obtained.

Completion Date Within 6 months after start of construction.

IV Type of use requested

1. Conditional Use: Resource Subzone G
2. Area of proposed use: 30,000 square feet plus driveway.
3. Name and distance from nearest town or landmark: Approximately 3 miles north of the northerly limits of Makakilo City on Palehua Ridge.
4. Conservation District Subzone: Resource Sub Zone G
5. County General Plan Designation: Conservation Land

ADDITIONAL INFORMATION.

Determination that the proposed development is outside the Special Management Area. See Exhibit # 4

Transmitting Equipment / Antenna Description

See Exhibit # 5

Placement and location of antennas on tower structure.

See Exhibit B

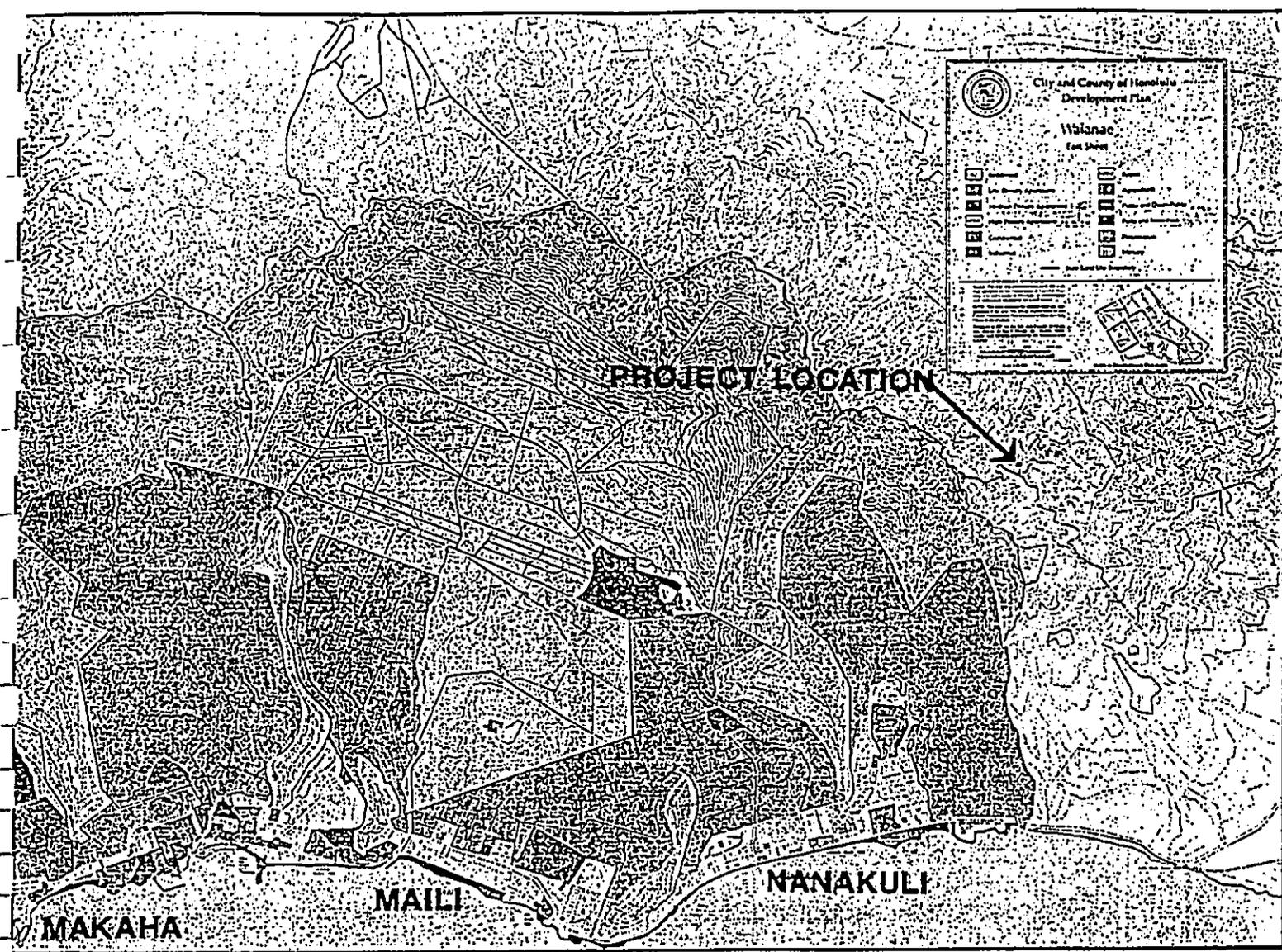
Geographical range of operations.

See FCC and FAA Applications in Exhibit # 6

Palehua Ridge Communication Facilities Master Plan
(The Estate of James Campbell)

See Exhibit # 7

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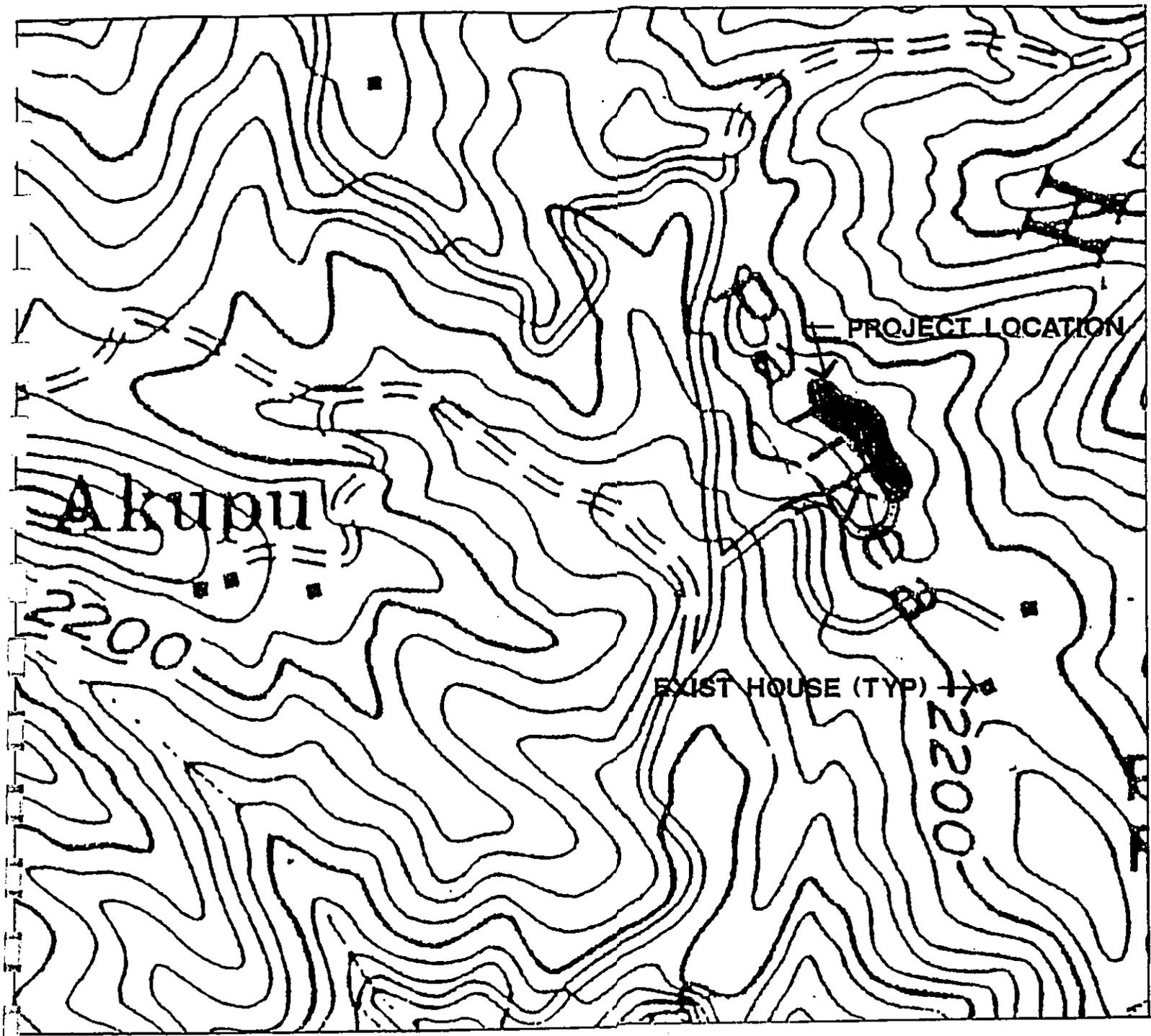
LOCATION MAP



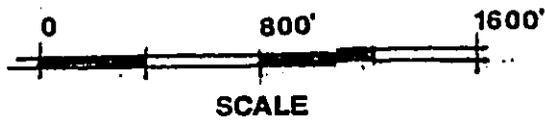
KAIM - TOWER SITES (FM)

EXHIBIT -A-

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VICINITY MAP

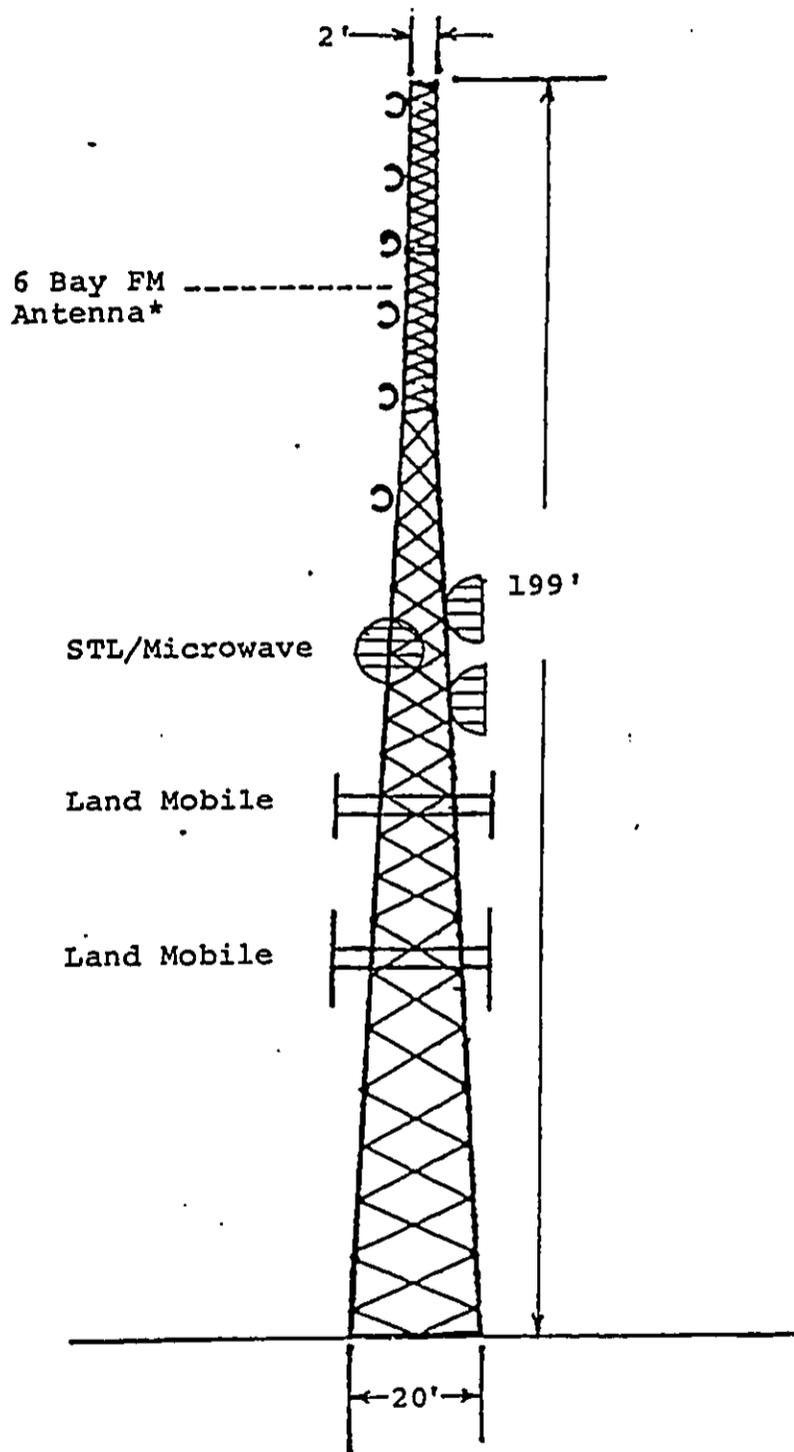


KAIM - TOWER SITES (FM)

EXHIBIT -AAA-

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TYPICAL VERTICAL PLAN FOR TOWER



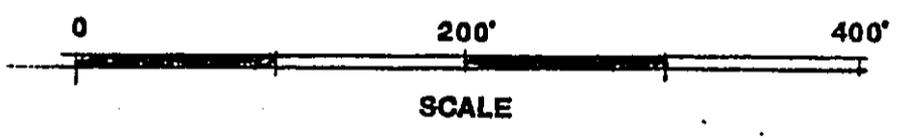
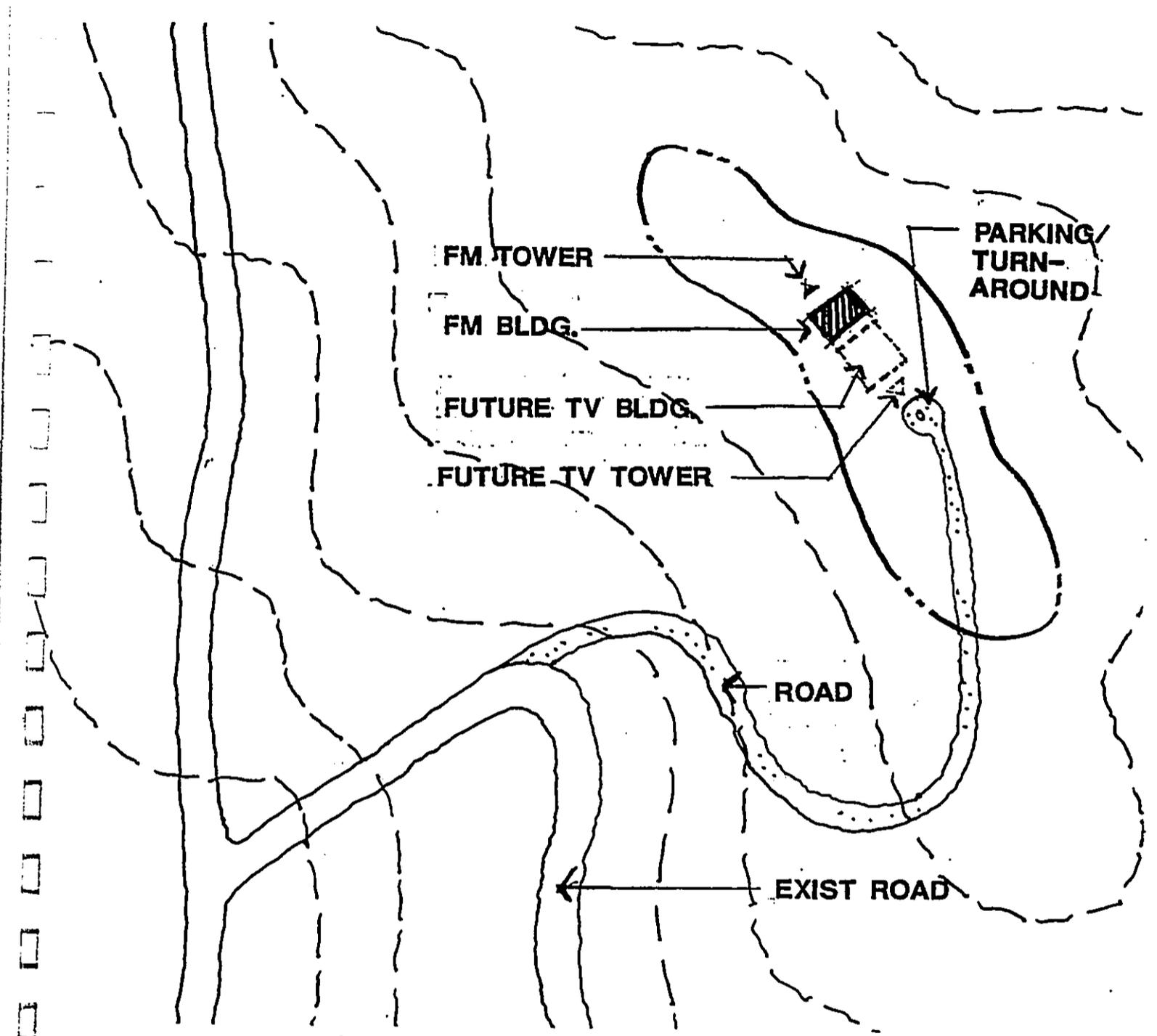
* FM antenna designed for multiple station use

TOWER ELEVATION



KAIM - TOWER SITES (FM)

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SITE PLAN

KAIM - TOWER SITES (FM)

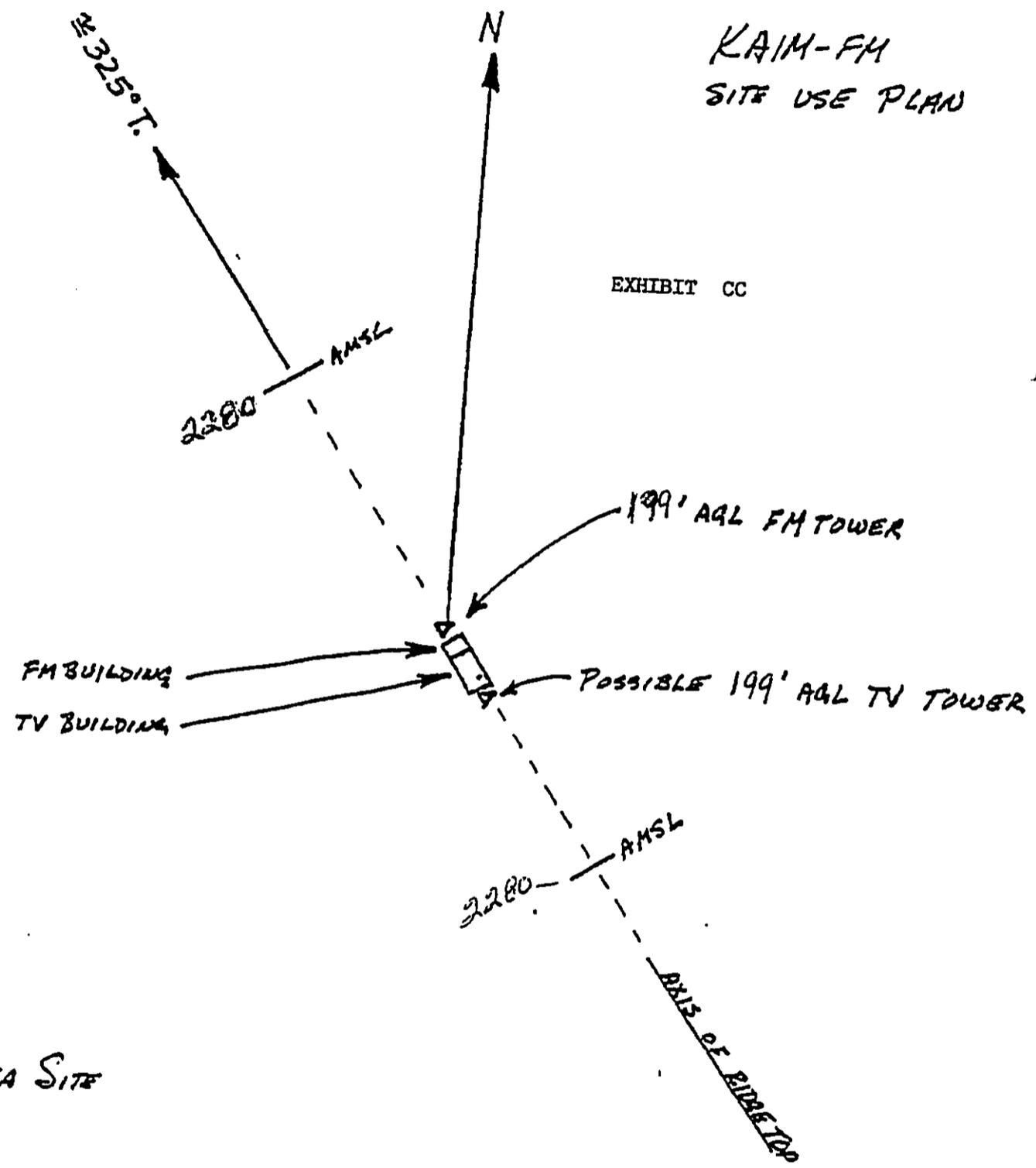
EXHIBIT -C-

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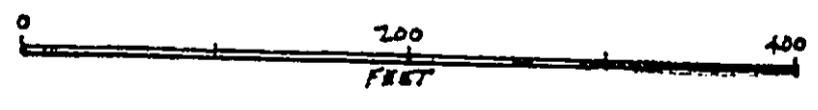
8/8/91

KAIM-FM SITE USE PLAN

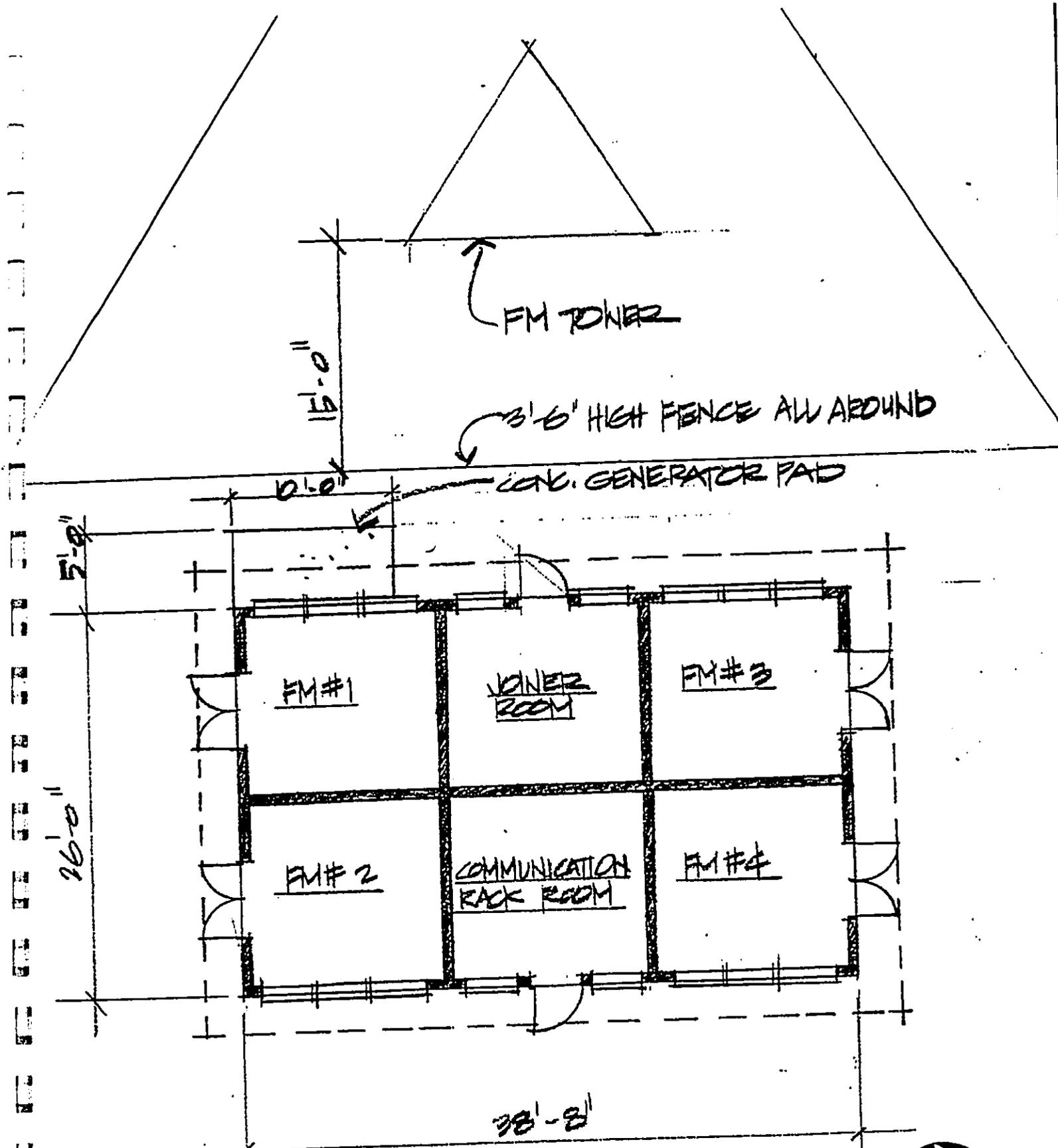
EXHIBIT CC



PALIKEA SITE



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

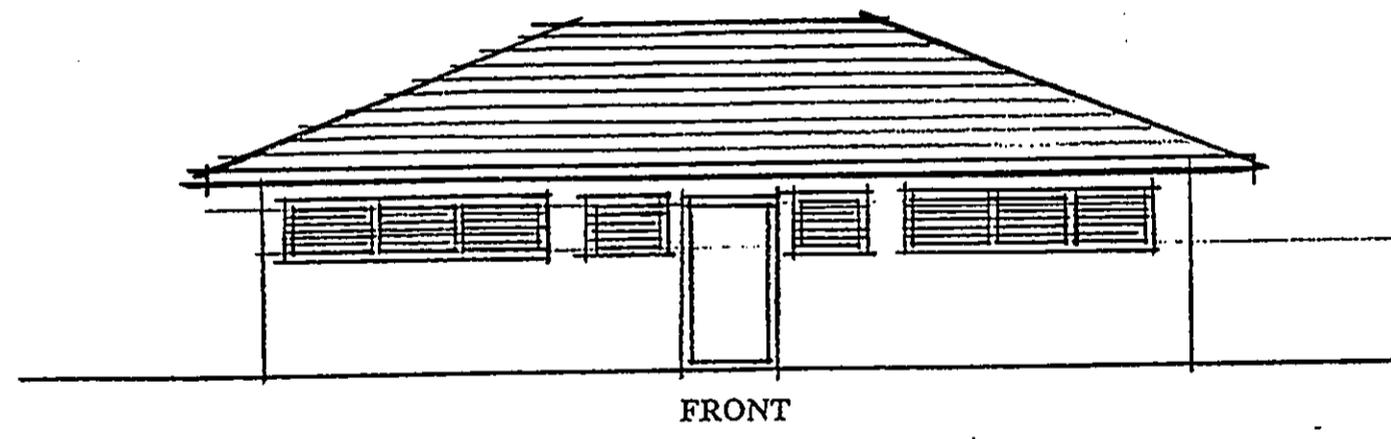
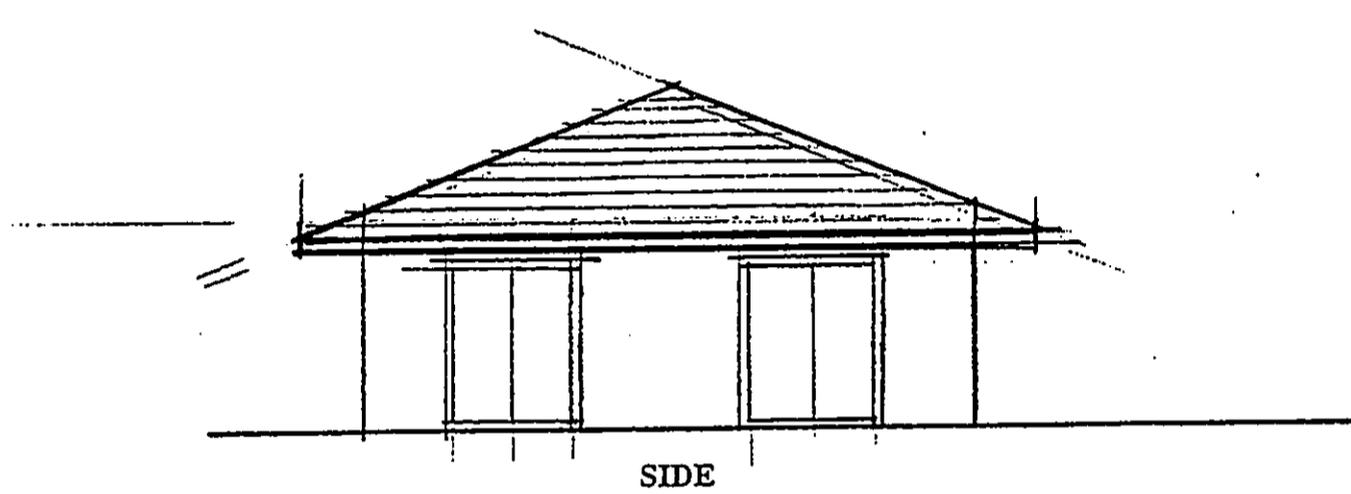
KAIM - TOWER SITES (FM)

EXHIBIT -D-



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

KAIM - TOWER SITES (FM)

EXHIBIT -DD-

EXHIBIT E

View from vicinity of H-1 and Kunea Road (Normal View)



View from vicinity of H-1 and Kunea Road (Telescopic View)



Visual Impact from this area will be similar to the existing towers. Applicant proposes to paint tower green to minimize visibility. Building will be painted foliage green plus will be obscured by trees.

EXHIBIT EE

View from H-2 south of Millilani (Normal View)



View from H-2 south of Millilani (Telescopic View)



Here again visual Impact from this area will be similar to the existing towers. As stated in Exhibit E, Applicant proposes to paint tower green to minimize visibility. Building will be painted foliage green plus will be obscured by trees.

EXHIBIT 2

AUG 26 '91 10:20 HCTC

P.2



Address reply to:

Two Waterfront Plaza, Suite 301
500 Ala Moana Boulevard
Honolulu, Hawaii 96813
(808) 528-6102

June 18, 1991

Honolulu Cellular Telephone Company
Attn: Dick Maki
1161 Kapiolani Boulevard
Honolulu, Hawaii 96813

Dear Richard Maki:

Your request for the evaluation of KAIM's proposal to locate their FM transmitter antenna on the microwave tower has been reviewed. At this time it is not in the best long term interest of HCTC to use their tower for this application.

Although the station and their representatives will offer many assurances, the potential liabilities far out weigh the financial gain.

The tower was designed to provide mounting for microwave dishes and land mobile radio applications. By changing the use to high power FM station the levels of RF radiation will be increased significantly. This could represent both a health and interference problem.

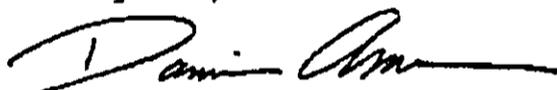
Although the reduction or cessation of transmission is one way to reduce the potential for a health hazard, it must be possible to shut down operations on a twenty four hour a day basis. This means that the radio station may have to shut down during prime times. Additionally HCTC has no control over other users on near by facilities which will be exposed the high levels of RF.

The second potential RF related issue is the effect on existing and future radio equipment at the site. The original site design was to accommodate mobile two-way radio, paging, cellular, mobile data and microwave. This site will be the main hub connecting the new MTSO facilities with virtually all other sites. High capacity digital microwave, crossconnect, and other hardware/software will be installed at the site. Especially sensitive to the higher levels is the RAM Mobile Data control system and RAM Paging Link Receivers.

Two of the major reasons for the new tower was to increase the number of transmission facilities and to reduce the potential for interference beyond HCTC's control. The installation of a high power FM station will compromise both of these objectives. Our original plan was to permit other mobile and paging services. This was covered in our application to both Campbell Estates and the Department of Land and Natural Resources.

There are several other issues which could negatively impact your operation. These include tower loading, antenna placement and the difficulty in having to shift antenna placements as HCTC's needs change. It is our recommendation that the application be denied.

Regards,



Damian Ameen

cc: Tom Sharp

7/2/91 - Verbal notification to
Paul Reese that HCTC denied
the KAIM request at the
recommendation of RAM Communications
Consultants.

R. Ameen

THE ESTATE OF JAMES CAMPBELL

September 19, 1991

Mr. William Paty
Chairman
Board of Land & Natural
Resources
c/o Mr. Ed Henry
Staff Planner
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Paty:

The Estate of James Campbell is currently negotiating an agreement with KAIM FM radio for transmission of their FM radio frequency from Palehua Ridge in the Waianae mountains. As you are aware, this area of the Waianae mountains is used extensively for telecommunications sites and most of these sites are designed for multiple use. However, none of the existing sites can accommodate KAIM FM's operation and so a new tower site is needed.

As with other sites recently approved by the DLNR for the area, the proposed KAIM site is also to be designed for multiple users and the site is consistent with the communication facility's master plan that was submitted to your staff in 1989 as indicated on the attached exhibit. The Estate shares the Department of Land and Natural Resources' goal of preserving Hawaii's natural resources and, therefore, we also seek to minimize the overall amount of land needed to accommodate such sites. To that end, the Estate will direct subsequent requests for transmission sites to the proposed KAIM site whenever feasible.

Sincerely,

Howard R. Schwiebert

Howard R. Schwiebert
Asset Manager
Telecommunications/Lanikuhonua

ga:01033400/K10018



August 29, 1991

Richard M. Sekiya
Manager
Distribution Engineering Department

K A I M
3555 Harding Avenue
Honolulu, Hawaii 96816

Attention: Delbert Gibbs
General Manager

Gentlemen:

Re: KAIM-FM Transmitter Building Site
Palikea Ridge, Palehua
HECO Request No. P182929

I will be preparing our Company's service requirements, work drawings, and cost of service for the above project as requested by your letter dated August 22, 1991.

Please be advised that transformers and material that may be required for this project, have a minimum of 6 to 8 months delivery time after an order is placed.

Please feel free to call me at 543-7807 should you desire information prior to receiving our proposal letter.

Very truly yours,

Franklin Y. C. Hu
Design Planner
Distribution Engineering Department

FYCH/JV

An HEI Company

EXHIBIT 3



August 29, 1991

Richard M. Sekiya
Manager
Distribution Engineering Department

K A I M
3555 Harding Avenue
Honolulu, Hawaii 96816

Attention: Delbert Gibbs
General Manager

Gentlemen:

Re: KAIM-FM Transmitter Building Site
Palikea Ridge, Palehua
HECO Request No. P182929

I will be preparing our Company's service requirements, work drawings, and cost of service for the above project as requested by your letter dated August 22, 1991.

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Please feel free to call me at 543-7807 should you desire information prior to receiving our proposal letter.

Very truly yours,

Franklin Y. C. Hu
Design Planner
Distribution Engineering Department

FYCH/JV

An HEI Company

EXHIBIT # 4

EXHIBIT # 5

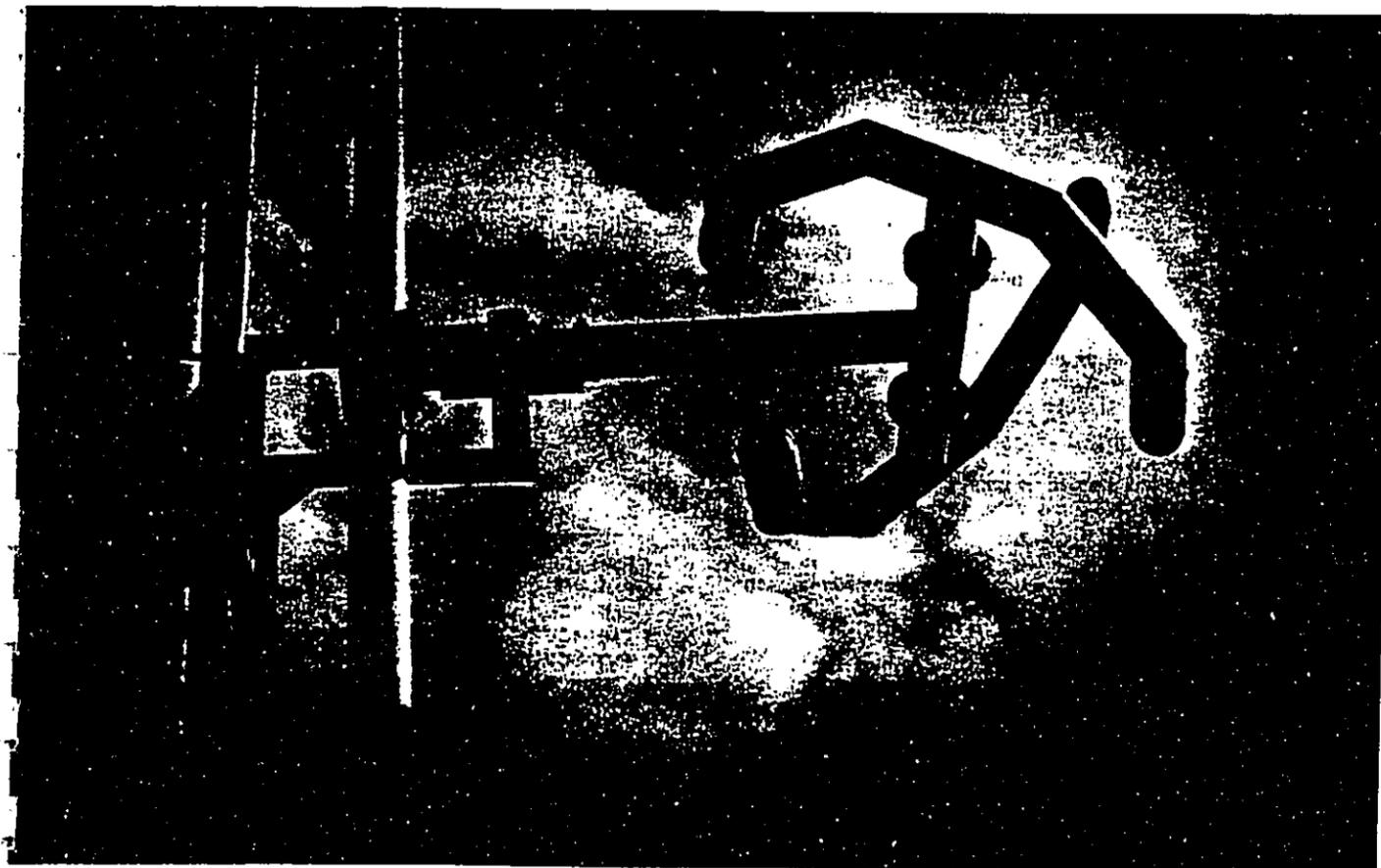


**FMH
SUPER-POWER
CIRCULARLY POLARIZED
FM ANTENNA**

- High power handling capability
- Internal feed point to radiating element
- Multi-station capability
- Excellent bandwidth characteristics
- Rugged brass construction
- Silver plated inner-conductor connectors
- Radiused element tips to avoid corona problems
- Stainless steel support brackets and hardware

The Harris super-power FMH circularly polarized FM antennas feature unusually high power handling capabilities, excellent bandwidth characteristics, and multi-station capability.

RADIATING ELEMENT. The radiating element is of brass construction, and has an outside diameter of 3-1/8". The feed point is completely internal, with a pressurized environment up to the feed point. Each element is rated at 40 kW, with the exceptions of the "A" series end fed 1 and 2 bay antennas and the center fed 2 bay, which are rated at 32, 35 and 39 kW respectively. Element ratings are limited only by the average power handling capability of the 3-1/8" rigid coaxial line, which we have conservatively derated from 48 kW to 40 kW.



The rugged construction means these antennas will withstand the most severe weather extremes and wind velocities up to 150 miles per hour.

BANDWIDTH CAPABILITY. The FMH antenna has a low standing wave ratio of 1.07:1 or less, ± 200 kHz per given channel with field trimming. VSWR at antenna input without field trimming is 1.1:1 for pole mounting atop a tower. VSWR at antenna input without field trimming is 1.5:1 or less when side mounted on a tower.

Due to the excellent bandwidth characteristics of the radiating element, multi-station operation is possible using a common antenna system. The necessary filtering components are available from Harris for such diplexing or multiplexing operations. Stations having a frequency separation of up to 4 MHz may be diplexed on a common antenna. However, in the case of 40 kW transmitters, a minimum frequency separation of 1.2 MHz is advisable to avoid excessive heating of filter components.

CIRCULARITY. The horizontally polarized radiation pattern is *omni-directional when the antenna is pole mounted atop a tower*, and circularity is typically ± 2 dB when the antenna is mounted on a 14" diameter steel pole. When side mounted, the antenna pattern will be somewhat affected by the supporting structure.

DEICING. Deicers are not required in a normal environment, as the typical VSWR is 1.5:1 or less with 1/2-inch of radial ice. However, heaters for deicing are available.

ANTENNA MODELS. The Harris FMH super-power FM antenna is available in three versions. The "A" version uses a 3-1/4" element feed stem, and 3-1/2" rigid interbay line. It is available in 3-1/2" end fed, 3-1/2" center fed and 6-1/2" center fed models, in arrays of up to 12 bays.

The FMH "B" version uses a 4-1/2" element feed stem, and a 4-1/2" rigid interbay line. It is available in either 6-1/2" end fed or 6-1/2" center fed models in arrays of up to 12 bays.

The FMH "C" version uses a 4-1/2" element feed stem, and 6-1/2" rigid interbay line, with 6-1/2" end feed. It is available in arrays of up to 6 bays.

Each antenna is supplied with a 6-foot input transformer. The input is 50 ohm EIA with either a 3-1/4" flange or a 6-1/2" flange, depending on the model type. All antennas are completely assembled and tuned to the customer's frequency at the factory. Also, pressure testing is done at that time to assure the customer of a leak-free antenna, provided the antenna is properly installed by a qualified erector and is free of damage.

MOUNTING. Stainless steel mounting brackets and hardware are supplied for standard constant cross section towers or steel poles at no additional cost. Brackets for mounting on tapered towers are available at additional cost.

DIMENSIONS. Each FMH element is approximately 47-1/2 inches long, and 30 inches high. Weight is approximately 57 pounds per element with line block.

MODEL NUMBERS. Because of the many variations within each FMH model category, it is helpful in ordering to understand the Harris model numbers:

FMH-1BE	FMH-4AC8
1 = 1 bay	4 = 4 bay
B = "B" Model	A = "A" Model
E = End Fed	C = Center Fed
	6 = 6-1/2" input

CP-1.5M-180

© Harris Corporation 1980

90

"A" Model, 3-1/4" Interbay Line, 3-1/2" Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² INPUT CAPABILITY	CALCULATED WT. [LBS]	CALCU. ³ LATED WIND-LOAD [LBS]
	POWER	dB				
FMH-1AE	0.4811	-3.3623	3 1/4"	32kW	114	137
FMH-2AE	0.9971	-0.0128	3 1/4"	32kW	225	304
FMH-2AC	0.9971	-0.0128	3 1/4"	39kW	250	319
FMH-2AC8	0.9971	-0.0128	6 1/2"	64kW	301	421
FMH-3AE	1.5588	1.9278	3 1/4"	32kW	336	470
FMH-4AE	2.1332	3.2903	3 1/4"	32kW	447	637
FMH-4AC	2.1332	3.2903	3 1/4"	39kW	472	652
FMH-4AC8	2.1332	3.2903	6 1/2"	64kW	523	758
FMH-5AE	2.7154	4.3384	3 1/4"	32kW	558	804
FMH-6AE	3.3028	5.1888	3 1/4"	32kW	689	971
FMH-6AC	3.3028	5.1888	3 1/4"	39kW	694	986
FMH-6AC8	3.3028	5.1888	6 1/2"	64kW	745	1098
FMH-7AE	3.8935	5.9034	3 1/4"	32kW	780	1138
FMH-8AE	4.4872	6.5197	3 1/4"	32kW	891	1305
FMH-8AC	4.4872	6.5197	3 1/4"	39kW	916	1320
FMH-8AC8	4.4872	6.5197	6 1/2"	64kW	987	1433
FMH-10AC	5.8800	7.5435	3 1/4"	39kW	1138	1653
FMH-10AC8	5.8800	7.5435	6 1/2"	64kW	1189	1770
FMH-12AC	6.8781	8.3747	3 1/4"	39kW	1380	1987
FMH-12AC8	6.8781	8.3747	6 1/2"	64kW	1411	2108

"B" Model, 4-1/2" Interbay Line, 4-1/2" Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² INPUT CAPABILITY	CALCULATED WT. [LBS]	CALCU. ³ LATED WIND-LOAD [LBS]
	POWER	dB				
FMH-1BE	0.4811	-3.3623	6 1/2"	40kW	159	201
FMH-2BE	0.9971	-0.0128	6 1/2"	56kW	297	407
FMH-2BC	0.9971	-0.0128	6 1/2"	80kW	336	468
FMH-3BE	1.5888	1.9278	6 1/2"	56kW	435	613
FMH-4BE	2.1332	3.2903	6 1/2"	56kW	573	818
FMH-4BC	2.1332	3.2903	6 1/2"	112kW	612	879
FMH-5BE	2.7154	4.3384	6 1/2"	56kW	711	1024
FMH-6BE	3.3028	5.1888	6 1/2"	56kW	849	1229
FMH-6BC	3.3028	5.1888	6 1/2"	112kW	888	1290
FMH-7BE	3.8935	5.9034	6 1/2"	56kW	987	1435
FMH-8BE	4.4872	6.5197	6 1/2"	56kW	1125	1641
FMH-8BC	4.4872	6.5197	6 1/2"	112kW	1164	1702
FMH-10BC	5.8800	7.5435	6 1/2"	112kW	1440	2113
FMH-12BC	6.8781	8.3747	6 1/2"	112kW	1718	2524

"C" Model, 6-1/2" Interbay Line, 4-1/2" Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² INPUT CAPABILITY	CALCULATED WT. [LBS]	CALCU. ³ LATED WIND-LOAD [LBS]
	POWER	dB				
FMH-1CE	0.4811	-3.3623	6 1/2"	40kW	205	260
FMH-2CE	0.9971	-0.0128	6 1/2"	80kW	410	520
FMH-3CE	1.5888	1.9278	6 1/2"	120kW	615	780
FMH-4CE	2.1332	3.2903	6 1/2"	120kW	820	1040
FMH-5CE	2.7154	4.3384	6 1/2"	120kW	1025	1300
FMH-6CE	3.3028	5.1888	6 1/2"	120kW	1230	1560

FOOTNOTES-(Apply to all models)

1. Horizontal and vertical power gain and dB gain are the same. 2. Power input capability up to 2,000 ft. above mean sea level. Derating required above 2,000 ft. 3. Windload based on 50/33 PSF, 112 m.p.h. actual wind velocity NOTE: Brackets included in weight and windload calculations.

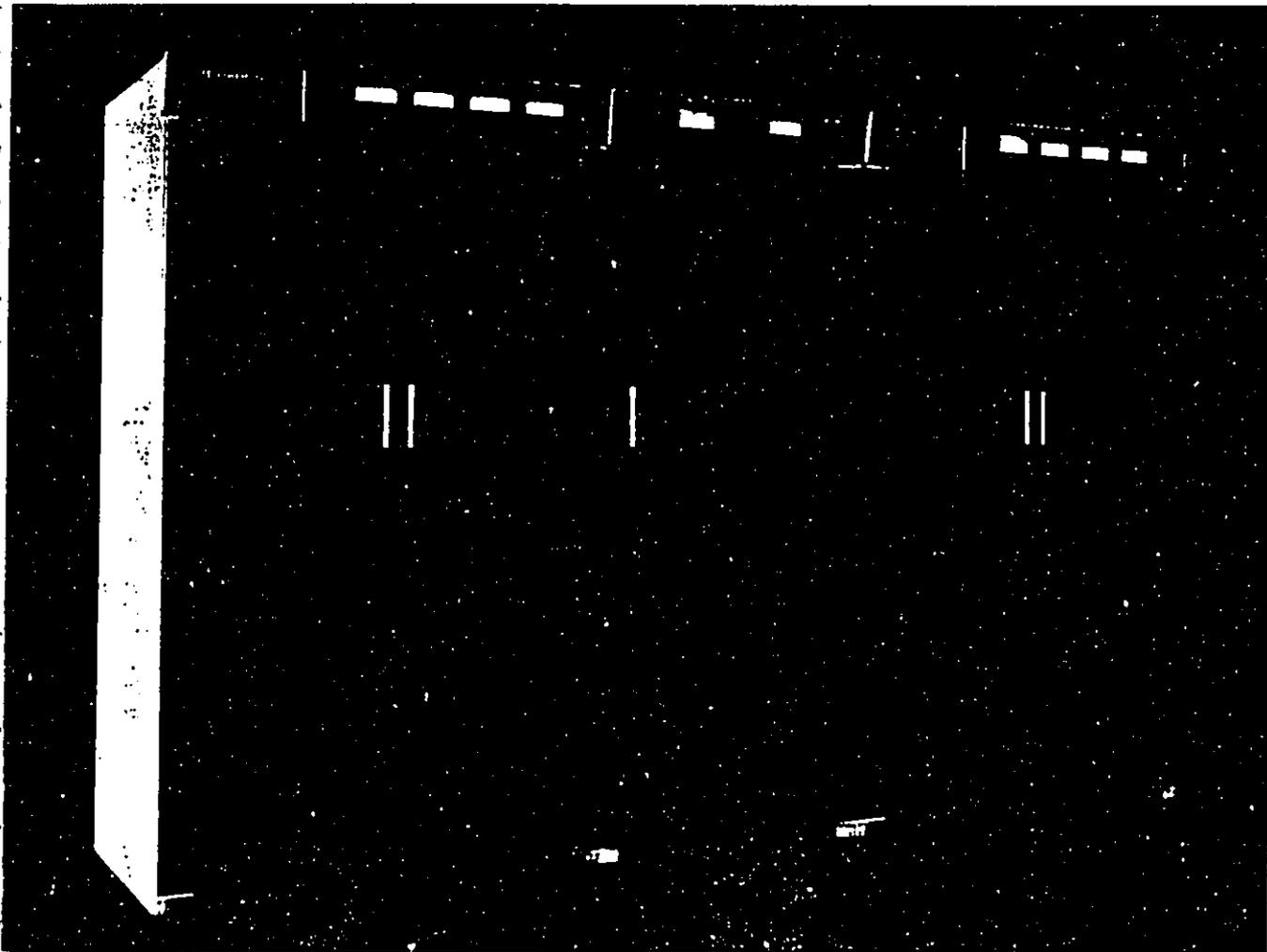
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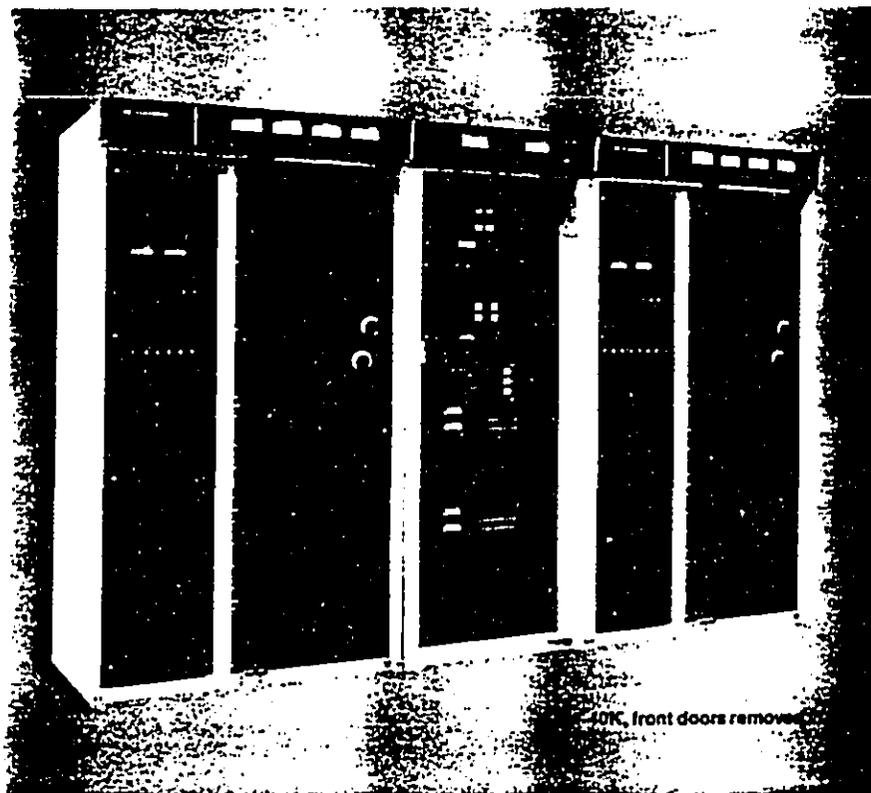


FM-40K

40-Kilowatt
FM
Broadcast
Transmitter

- Combines two 20-kilowatt amplifiers for highest reliability
- Solid-state Maximum Signal Exciter—MS-15
- Patented DSM (Digitally Synthesized Modulation) stereo generator provides separation exceeding accurate measurement capability of most monitors
- DTR (Dynamic Transient Response) filter technique limits overshoot to 2% or less, permitting a 2 to 6 dB increase in loudness with no audio quality degradation
- Lowest operating cost
- Stable, easy output tuning
- Built-in connections for remote control
- Automatic recycling
- Full metering
- Plug-in mono, stereo and SCA generators





Reliability through redundancy—that's the story on Harris' FM-40K, 40-kilowatt transmitter.

The basic FM-40K transmitter system consists of two 20-kilowatt amplifiers, and a center control cabinet containing the MS-15 exciter—and provides redundancy in all areas except the exciter and isolation amplifier. In case emergency operation is required, you stay on the air at one-quarter normal power output.

The complete 40-kilowatt FM transmitter system includes an optional Automatic Exciter Switching Kit and RF Output Switching Kit—and provides total redundancy! Should a malfunction occur anywhere in the system, you are still on the air at one-half normal power!

In the basic system, outputs of each amplifier are coupled through harmonic filters to the output combining network. This hybrid network sums the two 20-kilowatt signals to produce a 40-kilowatt output to the transmission line. However, the two amplifiers remain isolated from each other.

With the addition of the Automatic Exciter Switching Kit, automatic backup exciter protection is provided. And with the further addition of the RF Output Switching System, power output becomes one-half the normal output during emergency operation. Either or both of these options may be included in the FM-40K at the time you order—or added later in the field.

FINEST STEREO PERFORMANCE

Featuring the advanced-design MS-15 exciter, Harris' FM-40K provides the cleanest and the loudest stereo signal of any 40-kilowatt FM transmitter available today. The DSM (Digitally Synthesized Modulation) stereo generator allows the transmitter to provide stereo separation of 40 dB minimum (50 dB typical), 30-15,000 Hz—while the DTR (Dynamic Transient Response) filter permits a 2 to 6 dB increase in loudness, with no degradation of audio quality, by limiting overshoot to 2% or less.

The FM-40K may be equipped for mono or stereo operation, with or without SCA. The design versatility of the MS-15 exciter allows you to order for mono operation originally, then add stereo and/or SCA at a later date by plugging the appropriate module(s) into the exciter.

LOWEST OPERATING COST

In the FM-40K, each of the 20-kilowatt amplifiers operates at 80% efficiency or better. Add to this conservatively rated components and you have the lowest operating cost of any FM transmitter in the 40-kilowatt power range. The 4CX15,000A output tube in each 20-kilowatt amplifier assures excellent performance—and runs

at only one-third its dissipation rating for maximum service life.

VARI-LINE SILVER-PLATED TANK

Vari-Line is an advanced, Harris-developed method of tuning a single-ended FM amplifier for optimum output efficiency. A portion of a parallel tubular 2-1/4-inch copper transmission line (silver plated for efficient RF service) is made variable in order to inductively tune the line to operating frequency. This reduces the complexity of sliding contacts and consequent maintenance problems.

With Vari-Line tuning, greater reliability is possible. Mica capacitors are not used in the tank circuit.

DUAL HV SILICON POWER SUPPLIES

Two separate three-phase HV power supplies are used for each 20-kilowatt amplifier. With each amplifier one HV supply—for PA plate voltage—is housed in a separate enclosure; the other supply, which powers the IPA plate and screen circuit, and the PA screen, is housed in the amplifier cabinet.

The FM-40K employs a special power supply protective circuit to assure that transient voltages or on-off power surges will not damage the power transformer and related components.

AUTOMATIC RECYCLING

In case of momentary overload, the transmitter recycles automatically. Should the overload reoccur in excess of the number of times preset in the transmitter, the FM-40K will then remain off the air until reset, either locally or by remote control.

TESTING

Environmental tests, in conditions surpassing those of any location a transmitter is likely to encounter, have been imposed on the FM-40K. The transmitter is capable of operating at altitudes up to 7500 feet (2286 meters), in an ambient temperature range of -20° to +45° C (-4° to +113° F).

In addition, your FM-40K is fully tuned and operationally tested on your frequency before shipment.

REMOTE CONTROL

All connections for remote control are built

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—just connect the FM-40K to a transmitter control unit, and you are ready for remote operation. No additional equipment is required.

GENERAL

There are many other operational and convenience features incorporated into the FM-40K. These include:

PUSHBUTTON OPERATION. Daily operation of the FM-40K is simple, with on-off

functions controlled by lighted pushbuttons, which are clearly marked "Filament On-Off" and "Plate On-Off".

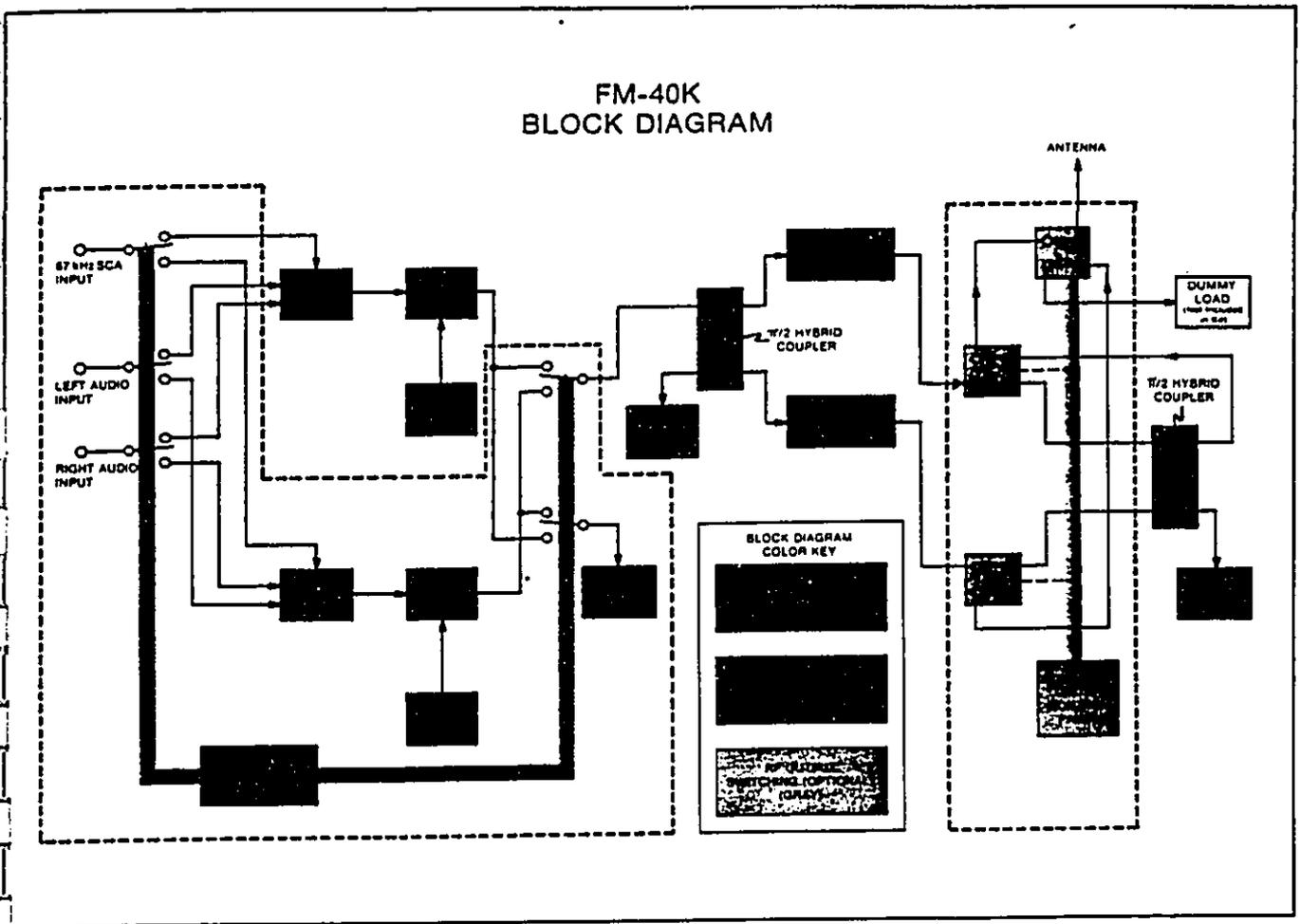
HIGH CAPACITY BLOWERS. (one in each 20-kilowatt amplifier). Backed up by precision air-pressure switches, these blowers provide complete protection to the IPA and PA tubes.

EASE OF MAINTENANCE. The FM-40K is designed to allow quick accessibility to all

components for easier maintenance and troubleshooting.

HANDSOME STYLING. Transmitter cabinets are attractively yet functionally styled, with double front doors on each 20-kilowatt amplifier. The finish is white, blue and black.

TYPE ACCEPTANCE. Harris' FM-40K is FCC type accepted for mono, stereo and SCA broadcasting in the 87.5 to 108 MHz band.



HARRIS' FM-40K FM TRANSMITTER CONFIGURATIONS

- Basic Dual System**
- Two FM-20K transmitters, less exciter
 - One MS-15 exciter
 - One isolation amplifier with power supply
 - One center cabinet
 - One high-power hybrid coupler (combiner) with plumbing to interconnect two transmitters
 - One low-power hybrid coupler
 - One 10-kilowatt reject load
 - One 50-watt reject load

Automatic Exciter/Isolation Amplifier Switching Kit (Optional)

For exciter redundancy, the following ad-

- ditional equipment (included in this kit) should be added to the basic system:
- One MS-15 exciter
 - One isolation amplifier with power supply
 - One test load for exciter
 - One automatic changeover contact panel (mounts in center cabinet)

RF Output Switching (Optional)

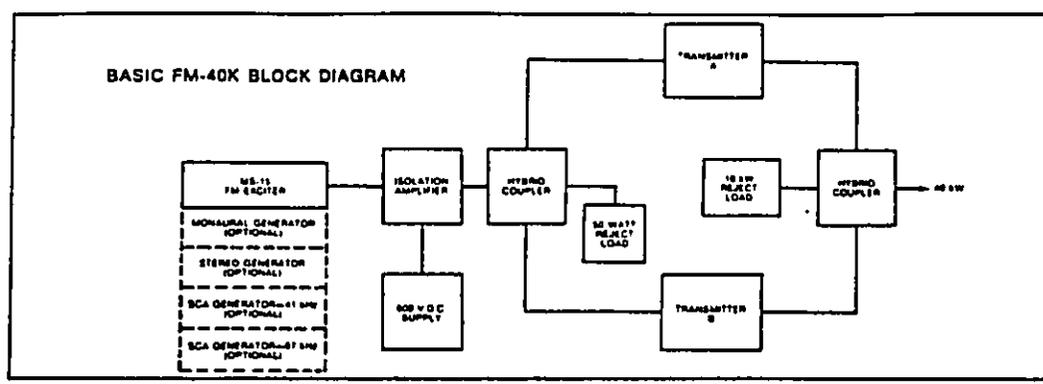
For RF switching of the high-power output amplifiers, the following equipment (included in this kit) should be added to the basic system:

- One control panel (mounts in center cabinet)

- Three coaxial transfer switches
- One kit consisting of rigid coaxial line, elbows and flanges
- One 50-kilowatt test load required (not included in kit)

- Optional Equipment For FM-40K**
- Mono generator module
 - Stereo generator module
 - SCA generator module(s)
 - VSWR overload protection for each 20-kilowatt amplifier
 - Status light system for each 20-kilowatt amplifier
 - 50-kilowatt air-cooled load
 - 50-kilowatt water-cooled load

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FM-40K SPECIFICATIONS

GENERAL

POWER OUTPUT: 20 kW to 40 kW.
FREQUENCY RANGE: 87.5 to 108 MHz, tuned to specified operating frequency.
RF OUTPUT IMPEDANCE: 50 ohms.
OUTPUT TERMINATION: 3/4" EIA flange.
FREQUENCY STABILITY: ±300 Hz 0° to 45°C TCXO.
TYPE OF MODULATION: Direct Carrier Frequency Modulation.
MODULATION CAPABILITY: ±100 kHz.
AC INPUT POWER: 208/240 V, 3-phase, 60 Hz. (50 Hz available on special order.) Power consumption: 80,000 watts (approx.), 115/230 V, 80 or 50 Hz, 150 watts for MS-15.
RF HARMONICS: Suppression meets all FCC requirements.
ALTITUDE: 7500 feet (2286 meters).
AMBIENT TEMPERATURE RANGE: -20°C to +45°C (-4° to +113°F).
MAXIMUM VSWR: 1.7 to 1.
SIZE: Transmitter: 113"W (287cm) x 78"H (198cm) x 33"D (84cm). HV power supply cabinets (2): each 30"W (76cm) x 49"H (125cm) x 30"D (76cm).
FRONT DOOR SWING: 21" (53cm).
FINISH: White, blue and black.
WEIGHT AND CUBAGE: Export: 6800 lbs. (3087 kg). Domestic: 6000 lbs. (2724 kg). 270 cubic feet (7.5 cubic meters).

MONAURAL MODE

AUDIO INPUT IMPEDANCE: 600 ohms balanced, resistive, adaptable to other impedances.
INPUT FILTER: Controlled response LPF, defeatable.
AUDIO INPUT LEVEL: +10 dBm ±1 dB for 100% modulation at 400 Hz.
AUDIO FREQUENCY RESPONSE: Standard 75 microsecond FCC pre-emphasis curve ±0.5 dB, 30-15,000 Hz. Selectable: flat, 25 or 50 microsecond pre-emphasis.
HARMONIC DISTORTION: 0.2% or less, 30-15,000 Hz.
IMD: 0.2%, 60/7000 Hz, 4:1 ratio.
FM NOISE: 68 dB below 100% modulation (ref. 400 Hz @ ±75 kHz deviation).
AM NOISE: 50 dB below reference carrier AM modulation 100%.

STEREOPHONIC MODE

TYPE OF MODULATION: Digitally Synthesized Modulation (DSM).
AUDIO INPUT IMPEDANCE: (left and right) 600 ohms balanced, resistive. Adaptable to other impedances.
AUDIO INPUT LEVEL: (left and right) +10 dBm ±1 dB for 100% modulation at 400 Hz.
AUDIO FREQUENCY RESPONSE: (left and right) Standard 75 microsecond, FCC pre-emphasis curve ±0.5 dB 30-15,000 Hz. Selectable: flat, 25 or 50 microsecond pre-emphasis.
INPUT FILTERING: 15 kHz LPF, 45 dB rejection at 19 kHz.

OVERSHOOT PROTECTION: Dynamic transient response (DTR) filter.
AUDIO TRANSIENT RESPONSE: 2% maximum overshoot beyond steady state. Defeatable for test purposes.
HARMONIC DISTORTION: (left or right) 0.4% or less, 30-15,000 Hz.
IMD: 0.4%, 60/7000 Hz, 4:1 ratio.
FM NOISE: (left or right) 65 dB minimum below 100% modulation. Reference 400 Hz, 75 microsecond de-emphasis, ±75 kHz deviation.
PILOT OSCILLATOR: Crystal controlled.
PILOT STABILITY: 19 kHz ±1 Hz, 0° to 45°C.
PILOT PHASE: Automatically controlled.
STEREO SEPARATION: 40 dB minimum 30-15,000 Hz.
CROSSTALK: (main to stereo sub-channel or stereo sub-to main channel) 4: dB below 90% modulation.
SUB CARRIER SUPPRESSION: 50 dB below 90% modulation.
76 kHz SUPPRESSION: 60 dB minimum below 100% modulation.
MODES: Stereo, mono (L + R), mono (L), mono (R). Remoteable.

SCA SPECIFICATIONS

MODULATION: Direct FM.
FREQUENCY: 41 or 67 kHz programmable, any frequency between 25 and 7 kHz on special order.
FREQUENCY STABILITY: ±500 Hz.
MODULATION CAPABILITY: ±7.5 kHz.
AUDIO INPUT IMPEDANCE: 600 ohms balanced (AC coupled) and 2000 ohm unbalanced (DC coupled).
AUDIO INPUT LEVEL: +10 dBm ±1 dB for 100% modulation at 400 Hz.
AUDIO FREQUENCY RESPONSE: 41 kHz and 67 kHz, 150 microsecond pre-emphasis ±1 dB, standard. Selectable: flat, 50 or 75 microsecond pre-emphasis.
INPUT FILTERING: Programmable LPF, 4.5 kHz standard.
DISTORTION: Less than 1%, 30-5000 Hz. ±5 kHz deviation.
FM NOISE: (main channel not modulated) 55 dB minimum (ref: 100% = ±5 kHz deviation at 400 Hz).
CROSSTALK: (SCA to main or stereo sub-channel): -60 dB or better.
CROSSTALK: (main or stereo sub-channel to SCA): 50 dB below ±5 kHz deviation of SCA, with mono or stereo channels modulated by frequencies 3 to 15,000 Hz, SCA demodulated with 150 microsecond de-emphasis.
CROSSTALK: SCA to SCA (41 kHz/67 kHz) 50 dB demodulated with 15 microsecond de-emphasis.
AUTOMATIC MUTE LEVEL: Variable from 0 to -30 dBm.
MUTE DELAY: Adjustable 0.5 to 20 seconds.
INJECTION LEVEL: 1% to 30% of composite. Adjustable.

WIDEBAND MODE

INPUT IMPEDANCE: Greater than 5000 ohms resistive, unbalanced.
INPUT LEVEL: 1.0 VRMS nominal for ±75 kHz deviation.
AMPLITUDE RESPONSE: ±0.25 dB, 30 Hz to 75 kHz.
PHASE LINEARITY: ±2°, 30 Hz to 75 kHz.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

ORDERING INFORMATION

FM-40K, 40-kilowatt FM transmitter, basic system, for wideband operation, 60 Hz	994-8053-001
Automatic exciter/isolation amplifier switching kit	994-8876-001
RF output switching package	994-6877-001
Monaural generator (add for mono operation)	994-8019-001
DSM stereo generator with DTR (add for stereo operation)	994-8020-001
SCA generator (add for SCA operation, specify 41 or 67 kHz)	994-7992-001
VSWR interlock unit (two required for FM-40K)	994-7004-001
Status light system (two required for FM-40K)	994-7108-001
50-kilowatt air-cooled test load	700-0317-000
50-kilowatt water-cooled test load	700-0239-000

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EXHIBIT # 6

DOCUMENT CAPTURED AS RECEIVED

DO NOT REMOVE CARBONS

US Department of Transportation
Federal Aviation Administration
NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION
Aeronautical Study Number

1. Nature of Proposal

A Type <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> Alteration	B Class <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary (Duration _____ months)	C Work Schedule Dates Beginning <u>after FCC</u> End <u>approval</u>
--	---	---

2. Complete Description of Structure

A Include effective radiated power and assigned frequency of all existing proposed or modified AM, FM or TV broadcast stations utilizing this structure

B Include size and configuration of power transmission lines and their supporting towers in the vicinity of FAA facilities and public airports

C Include information showing site orientation, dimensions, and construction materials of the proposed structure

Single, self-supporting steel tower for FM Broadcast on 95.5 MHz, 14.45 kW ERP.

Note: Site is shielded by higher terrain to the west and north-west

(if more space is required, continue on a separate sheet.)

3A. Name and address of individual, company, corporation, etc. proposing the construction or alteration. (Number, Street, City, State and Zip Code)

(808) 735-2424
area code Telephone Number

Christian Broadcasting Association
3555 Harding Ave.
Honolulu, HI 96816

B. Name, address and telephone number of proponent's representative if different than 3 above

E. Harold Munn, Jr. & Associates, Inc.
Box 220
Coldwater MI 49036 (517) 278-7339

4. Location of Structure

A Coordinates (To nearest second) 21° 23' 42" Latitude 158° 05' 55" Longitude	B Nearest City or Town, and State Waipahu, HI (1) Distance to 4B 3.7 Miles (2) Direction to 4B East	C Name of nearest airport, heliport, flight park or seaplane base Barbers Pt. (1) Distance from structure to nearest point of nearest runway 5.5 (2) Direction from structure to airport south
--	---	--

5. Height and Elevation (Complete to the nearest foot)

A Elevation of site above mean sea level	2280
B Height of Structure including all appurtenances and lighting (if any) above ground, or water if so situated	199
C Overall height above mean sea level (A + B)	2479

D Description of location of site with respect to highways, streets, airports, prominent terrain features, existing structures, etc. Attach a U.S. Geological Survey quadrangle map or equivalent showing the relationship of construction site to nearest airport(s). *(if more space is required, continue on a separate sheet of paper and attach to this notice.)*

Palikea Ridge, W of Waipahu. See portion of map, attached.

Notice is required by Part 77 of the Federal Aviation Regulations (14 C.F.R. Part 77) pursuant to Section 1101 of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1101). Persons who knowingly and willingly violate the Notice requirements of Part 77 are subject to a fine (criminal penalty) of not more than \$500 for the first offense and not more than \$2,000 for subsequent offenses, pursuant to Section 902(a) of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1472(a)).

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge. In addition, I agree to obstruction mark and/or light the structure in accordance with established marking & lighting standards if necessary.

Date August 28, 1991	Typed Name, Title of Person Filing Notice E. Harold Munn, Jr. Consultant	Signature <i>E. Harold Munn, Jr.</i>
-------------------------	---	---

FOR FAA USE ONLY

FAA will either return this form or issue a separate acknowledgement.

The Proposal:

- Does not require a notice to FAA.
- Is not identified as an obstruction under any standard of FAR, Part 77, Subpart C, and would not be a hazard to air navigation.
- Is identified as an obstruction under the standards of FAR, Part 77, Subpart C, but would not be a hazard to air navigation.
- Should be obstruction marked, lighted per FAA Advisory Circular 70/7460-1, Chapter (s) _____
- Obstruction marking and lighting are not necessary.

Supplemental Notice of Construction FAA Form 7460-2 is required any time the project is abandoned, or

- At least 48 hours before the start of construction.
- Within five days after the construction reaches its greatest height.

This determination expires on _____ unless:

- (a) extended, revised or terminated by the issuing office;
- (b) the construction is subject to the licensing authority of the Federal Communications Commission and an application for a construction permit is made to the FCC on or before the above expiration date. In such case the determination expires on the date prescribed by the FCC for completion of construction, or on the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be postmarked or delivered to the issuing office at least 15 days prior to the expiration date.

If the structure is subject to the licensing authority of the FCC, a copy of this determination will be sent to that Agency.

Remarks:

Issued In	Signature	Date
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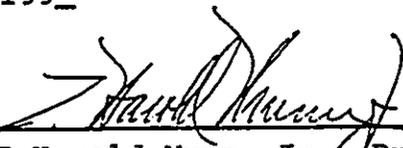
STATEMENT REGARDING HARMONIC AND SPURIOUS EMISSIONS

All harmonic and spurious emissions in the band of frequencies between 118 - 137 MHz and 225 - 400 MHz will be attenuated 100 dB below the level of the unmodulated carrier.

All harmonic or spurious emissions in the band of frequencies between 162 - 174 MHz will be attenuated at least 80 dB below the level of the unmodulated carrier.

I hereby certify this statement to be true and accurate to the best of my knowledge and belief.

Dated this 28 day of August 1991

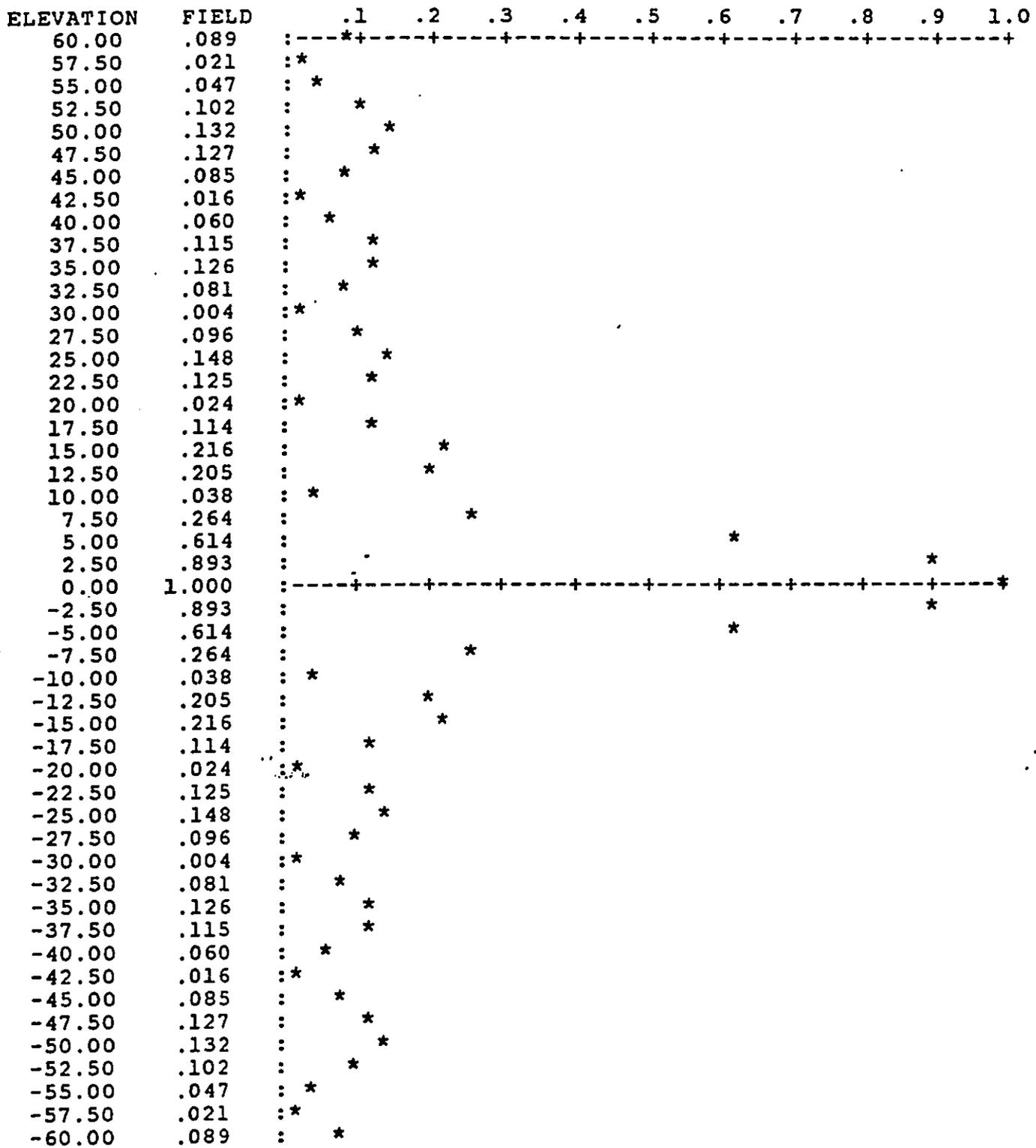
by 
E. Harold Munn, Jr., President

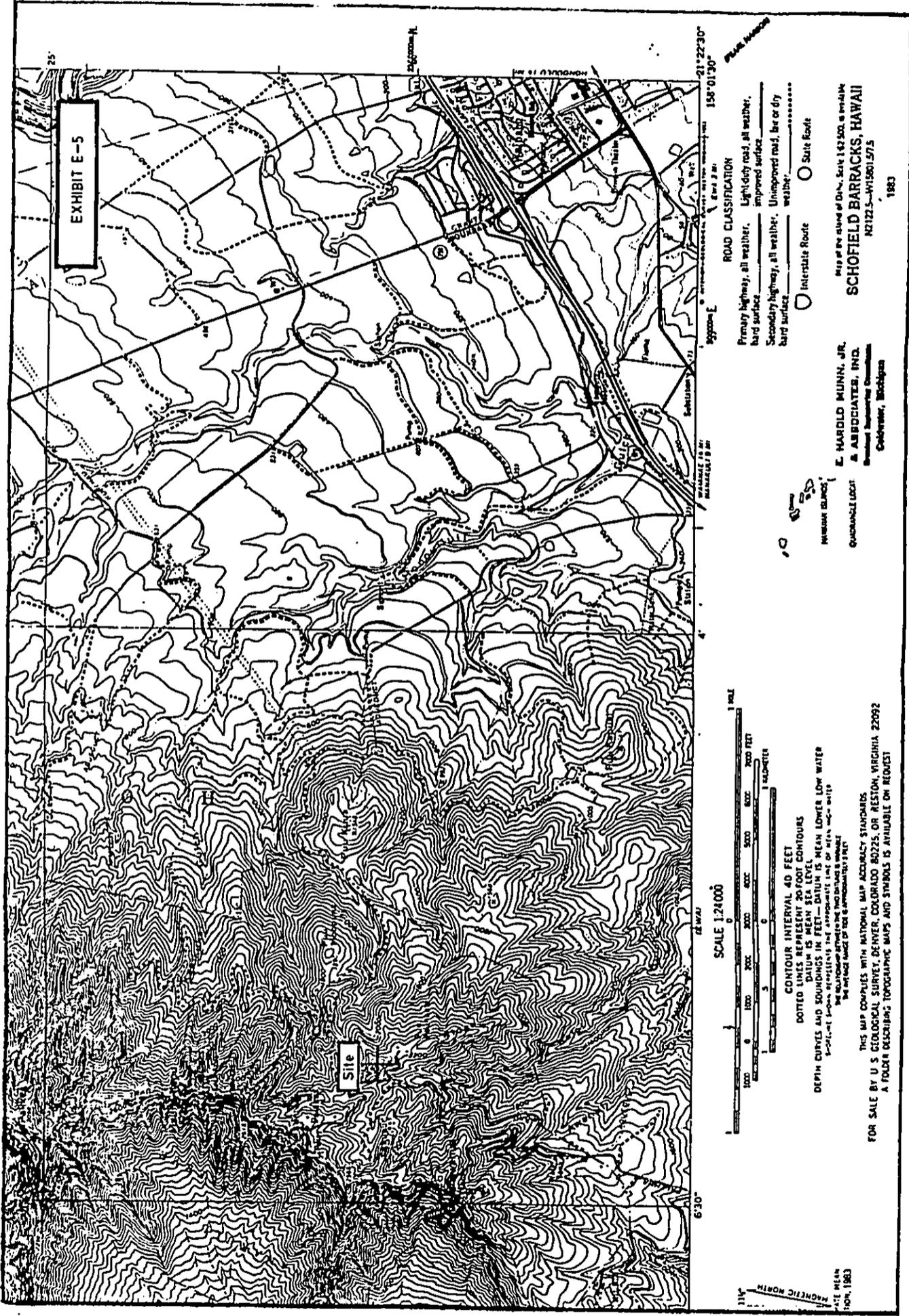
E. Harold Munn, Jr. &
Associates, Inc.
Box 220, Coldwater, MI
49036

RF SPECIALTIES
 ELEVATION PATTERN
 SHP-6AC - 6
 ERP: 14.45 kW H & V
 PLOT PREPARED FOR:

DATE: AUGUST 28, 1991
 RMS GAIN= 3.3028

PROGRAM NO. FMP
 BEAM TILT= 0%
 NULL FILL= 0%
 FREQ: 95.5 MHz





ENGINEERING REPORT

FOR FM BROADCAST STATION

KAIM(FM)

Honolulu, Hawaii

Change of Site

August 1991

PREPARED BY:

E. HAROLD MUNN, JR. &
ASSOCIATES, INC.

ONE HUNDRED AIRPORT DRIVE

COLDWATER, MICHIGAN

(517) 278-7339

APPLICATION FOR CONSTRUCTION PERMIT FOR COMMERCIAL BROADCAST STATION

For COMMISSION Fee Use Only	FEE NO:	For APPLICANT Fee Use Only Is a fee submitted with this application? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	FEE TYPE:	
	FEE AMT:	If fee exempt (see 47 C.F.R. Section 1.1112), indicate reason therefor (check one box): <input type="checkbox"/> Noncommercial educational licensee <input type="checkbox"/> Governmental entity
	ID SEQ:	FOR COMMISSION USE ONLY FILE NO.

Section I - GENERAL INFORMATION

1. Name of Applicant Christian Broadcasting Association			Send notices and communications to the following person at the address below: Name Mr. Owen Chock, Pres. (cc: E. Harold Munn, Jr., Asst. Sec., 27 Parsons Ct., Coldwater, MI 49036)		
Street Address or P.O. Box 3555 Harding Avenue			Street Address or P.O. Box 3555 Harding Avenue		
City Honolulu	State HA	ZIP Code 96816	City Honolulu	State HA	ZIP Code 96816
Telephone No. (include Area Code) (808)735-2424			Telephone No. (include Area Code) Chock: (808)735-2424 (Munn: (517)278-7339)		

2 This application is for: AM FM TV

(a) Channel No. or Frequency 238	(b) Principal Community Honolulu	City Honolulu	State
-------------------------------------	-------------------------------------	------------------	-------

(c) Check one of the following boxes:

- Application for NEW station
- MAJOR change in licensed facilities; call sign: _____
- MINOR change in licensed facilities; call sign: KAIM-FM
- MAJOR modification of construction permit; call sign: _____
File No. of construction permit: _____
- MINOR modification of construction permit; call sign: _____
File No. of construction permit: _____
- AMENDMENT to pending application; Application file number: _____

NOTE: It is not necessary to use this form to amend a previously filed application. Should you do so, however, please submit only Section I and those other portions of the form that contain the amended information.

3 Is this application mutually exclusive with a renewal application? Yes No

If Yes, state:

Call letters	Community of License	
	City	State

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Section V-B - FM BROADCAST ENGINEERING DATA	FOR COMMISSION USE ONLY File No. _____ ASB Referral Date _____ Referred by _____
---	---

Name of Applicant
Christian Broadcasting Association

Call letters (if issued) KAIM-FM	Is this application being filed in response to a window? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, specify closing date: _____
--	---

Purpose of Application: (check appropriate box(es))

<input type="checkbox"/> Construct a new (main) facility	<input type="checkbox"/> Construct a new auxiliary facility
<input type="checkbox"/> Modify existing construction permit for main facility	<input type="checkbox"/> Modify existing construction permit for auxiliary facility
<input checked="" type="checkbox"/> Modify licensed main facility	<input type="checkbox"/> Modify licensed auxiliary facility

If purpose is to modify, indicate below the nature of change(s) and specify the file number(s) of the authorizations affected.

<input type="checkbox"/> Antenna supporting-structure height	<input checked="" type="checkbox"/> Effective radiated power
<input checked="" type="checkbox"/> Antenna height above average terrain	<input type="checkbox"/> Frequency
<input checked="" type="checkbox"/> Antenna location	<input type="checkbox"/> Class
<input type="checkbox"/> Main Studio location	<input type="checkbox"/> Other (Specify briefly)

File Number(s) BLH-790122AD

1. Allocation:

Channel No.	Principal community to be served:			Class (check only one box below)
	City	County	State	
238	Honolulu	Honolulu	HI	<input type="checkbox"/> A <input type="checkbox"/> B1 <input type="checkbox"/> B <input type="checkbox"/> C3 <input type="checkbox"/> C2 <input checked="" type="checkbox"/> C1 <input type="checkbox"/> C

2. Exact location of antenna. **Palikea Ridge, 6 km W-NW of Waipahu, Honolulu Co., Hawaii**

(a) Specify address, city, county and state. If no address, specify distance and bearing relative to the nearest town or landmark.

(b) Geographical coordinates (to nearest second). If mounted on element of an AM array, specify coordinates of center of array. Otherwise, specify tower location. Specify South Latitude or East Longitude where applicable; otherwise, North Latitude or West Longitude will be presumed.

Latitude	21°	23'	42"	Longitude	158°	05'	55"
----------	-----	-----	-----	-----------	------	-----	-----

3. Is the supporting structure the same as that of another station(s) or proposed in another pending application(s)? Yes No

If Yes, give call letter(s) or file number(s) or both. _____

If proposal involves a change in height of an existing structure, specify existing height above ground level including antenna, all other appurtenances, and lighting, if any. DNA

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SECTION V-B - FM BROADCAST ENGINEERING DATA (Page 2)

4. Does the application propose to correct previous site coordinates?
If Yes, list old coordinates.

Yes No

Latitude	o	Longitude	o
----------	---	-----------	---

6. Has the FAA been notified of the proposed construction?

If Yes, give date and office where notice was filed and attach as an Exhibit a copy of FAA determination, if available.

Yes No

Date 8-28-1991 Office where filed Western-Pacific Region

Exhibit No.

8. List all landing areas within 8 km of antenna site. Specify distance and bearing from structure to nearest point of the nearest runway.

	Landing Area	Distance (km)	Bearing (degrees True)
(a)	NONE		
(b)			

7. (a) Elevation: *(to the nearest meter)*

(1) of site above mean sea level;

695 meters

(2) of the top of supporting structure above ground (including antenna, all other appurtenances, and lighting, if any); and

61 meters

(3) of the top of supporting structure above mean sea level [(aX1) + (aX2)]

756 meters

(b) Height of radiation center: *(to the nearest meter)* H - Horizontal; V - Vertical

(1) above ground

53 meters (H)

(2) above mean sea level [(aX1) + (bX1)]

53 meters (V)

748 meters (H)

(3) above average terrain

748 meters (V)

610 meters (H)

610 meters (V)

8. Attach as an Exhibit sketch(es) of the supporting structure, labelling all elevations required in Question 7 above, except item 7(b)(3). If mounted on an AM directional-array element, specify heights and orientations of all array towers, as well as location of FM radiator.

Exhibit No.
E-3

9. Effective Radiated Power:

(a) ERP in the horizontal plane

14.45 kw (H-) 14.45 kw (V-)

(b) Is beam tilt proposed?

Yes No

If Yes, specify maximum ERP in the plane of the tilted beam, and attach as an Exhibit a vertical elevational plot of radiated field.

Exhibit No.

-Polarization

kw (H-) kw (V-)

SECTION V-B - FM BROADCAST ENGINEERING DATA (Page 3)

10. Is a directional antenna proposed?

Yes No

If Yes, attach as an Exhibit a statement with all data specified in 47 C.F.R. Section 73.318, including plot(s) and tabulations of the relative field.

Exhibit No.

11. Will the proposed facility satisfy the requirements of 47 C.F.R. Sections 73.318(a) and (b)?

Yes No

If No, attach as an Exhibit a request for waiver and justification therefor, including amounts and percentages of population and area that will not receive 318 mV/m service.

Exhibit No.

12. Will the main studio be within the protected 318 mV/m field strength contour of this proposal?

Yes No

If No, attach as an Exhibit justification pursuant to 47 C.F.R. Section 73.1126.

Exhibit No.

13. (a) Does the proposed facility satisfy the requirements of 47 C.F.R. Section 73.207?

Yes No

(b) If the answer to (a) is No, does 47 C.F.R. Section 73.213 apply?

Yes No

(c) If the answer to (b) is Yes, attach as an Exhibit a justification, including a summary of previous waivers.

Exhibit No.

(d) If the answer to (a) is No and the answer to (b) is No, attach as an Exhibit a statement describing the short spacing(s) and how it or they arose.

Exhibit No.

(e) If authorization pursuant to 47 C.F.R. Section 73.215 is requested, attach as an Exhibit a complete engineering study to establish the lack of prohibited overlap of contours involving affected stations. The engineering study must include the following:

Exhibit No.
DNA

- (1) Protected and interfering contours, in all directions (360°), for the proposed operation.
- (2) Protected and interfering contours, over pertinent areas, of all short-spaced assignments, applications and allotments, including a plot showing each transmitter location, with identifying call letters or file numbers, and indication of whether facility is operating or proposed. For vacant allotments, use the reference coordinates as the transmitter location.
- (3) When necessary to show more detail, an additional allocation study utilizing a map with a larger scale to clearly show prohibited overlap will not occur.
- (4) A scale of kilometers and properly labeled longitude and latitude lines, shown across the entire exhibit(s). Sufficient lines should be shown so that the location of the sites may be verified.
- (5) The official title(s) of the map(s) used in the exhibit(s).

14. Are there: (a) within 80 meters of the proposed antenna, any proposed or authorized FM or TV transmitters, or any nonbroadcast *except citizens band or amateur* radio stations; or (b) within the blanketing contour, any established commercial or government receiving stations, cable head-end facilities, or populated areas; or (c) within ten (10) kilometers of the proposed antenna, any proposed or authorized FM or TV transmitters which may produce receiver-induced intermodulation interference?

Yes No

If Yes, attach as an Exhibit a description of any expected, undesired effects of operations and remedial steps to be pursued if necessary, and a statement accepting full responsibility for the elimination of any objectionable interference (including that caused by receiver-induced or other types of modulation) to facilities in existence or authorized or to radio receivers in use prior to grant of this application. (See 47 C.F.R. Sections 73.315(b), 73.316(a) and 73.318.)

Exhibit No.
A

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SECTION V-8 - FM BROADCAST ENGINEERING DATA (Page 4)

15. Attach as an Exhibit a 7.5 minute series U.S. Geological Survey topographic quadrangle map that shows clearly, legibly, and accurately, the location of the proposed transmitting antenna. This map must comply with the requirements set forth in Instruction V. The map must further clearly and legibly display the original printed contour lines and data as well as latitude and longitude markings, and must bear a scale of distance in kilometers.

Exhibit No.
E-5

16. Attach as an Exhibit *in one the several* a map which shows clearly, legibly, and accurately, and with the original printed latitude and longitude markings and a scale of distance in kilometers:

Exhibit No.
E-1

(a) the proposed transmitter location, and the radials along which profile graphs have been prepared;

(b) the 0.16 mV/m and 1 mV/m predicted contours; and

(c) the legal boundaries of the principal community to be served.

17. Specify area in square kilometers (1 sq. mi. = 259 sq. km.) and population (latest census) within the predicted 1 mV/m contour.

Area 1,545 sq. km. Population 762,533

18. For an application involving an auxiliary facility only, attach as an Exhibit a map (*Sectional Aeronautical Chart or equivalent*) that shows clearly, legibly, and accurately, and with latitude and longitude markings and a scale of distance in kilometers:

Exhibit No.
DNA

(a) the proposed auxiliary 1 mV/m contour; and

(b) the 1 mV/m contour of the licensed main facility for which the applied-for facility will be auxiliary. Also specify the file number of the license.

19. Terrain and coverage data (*to be calculated in accordance with 47 C.F.R. Section 73.313*)

Source of terrain data: (*check only one box below*)

Linearly interpolated 60-second database 7.5 minute topographic map

(Source: _____)

Other (*briefly summarize*) 3" terrain from Defense Mapping Agency, through DataWorld, Inc.

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SECTION V-B - FM BROADCAST ENGINEERING DATA (Page 5)

Radial bearing (degrees True)	Height of radiation center above average elevation of radial from 3 to 16 km (meters)	Predicted Distances	
		To the 316 mV/m contour (kilometers)	To the 1 mV/m contour (kilometers)
112	716	52.2	75.8
0	291	33.4	52.8
45	511	43.9	66.9
90	675	50.8	74.3
135	706	51.9	75.4
180	693	51.4	75.0
225	707	51.9	75.5
270	722	52.4	76.0
315	576	47.1	70.5

*Radial through principal community, if not one of the major radials. This radial should NOT be included in the calculation of HAAT.

20. Environmental Statement (See 47 C.F.R. Section 1.1301 et seq.)

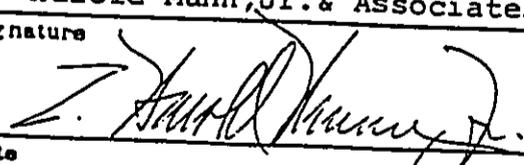
Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact? Yes No

If you answer Yes, submit as an Exhibit an Environmental Assessment required by Section 1.1311. Exhibit No.

If No, explain briefly why not. This application meets the requirements of OET Bulletin No. 65 and is categorically excluded from environmental processing pursuant to Section 1.1306 of the Commission's Rules, because it does not (1) involve a site location specified under Section 1.1307(a)(1)-(3); (2) involve high intensity lighting under Section 1.1307(a)(6); or, (3) result in human exposure to radio frequency radiation in excess of the applicable standards specified in Section 1.1307(b) of the Commission's Rules.

CERTIFICATION

I certify that I have prepared this Section of this application on behalf of the applicant, and that after such preparation, I have examined the foregoing and found it to be accurate and true to the best of my knowledge and belief.

Name (Typed or Printed)	Relationship to Applicant (e.g., Consulting Engineer)
E. Harold Munn, Jr. & Associates, Inc.	Technical Consultant
Signature	Address (Include ZIP Code)
	Box 220 Coldwater, MI. 49036
Date	Telephone No. (Include Area Code)
August 28, 1991	(517) 278-7339

SECTION VI - EQUAL EMPLOYMENT OPPORTUNITY PROGRAM

1. Does the applicant propose to employ five or more full-time employees?

Yes No

If Yes, the applicant must include an EEO program called for in the separate Broadcast Equal Employment Opportunity Program Report (FCC 396-A).

SECTION VII - CERTIFICATIONS

1. Has or will the applicant comply with the public notice requirement of 47 C.F.R. Section 73.3580?

Yes No

2. Has the applicant reasonable assurance, in good faith, that the site or structure proposed in Section V of this form, as the location of its transmitting antenna, will be available to the applicant for the applicant's intended purpose?

Yes No

If No, attach as an Exhibit, a full explanation.

Exhibit No.

3. If reasonable assurance is not based on applicant's ownership of the proposed site or structure, applicant certifies that it has obtained such reasonable assurance by contacting the owner or person possessing control of the site or structure.

Name of Person Contacted Mr. Howard R. Schweibert, Asset Manager
Telecommunications/Lanikuhonua
Estate of James Campbell

Telephone No. (include area code) (808)536-1961

Person contacted: (check one box below)

Owner Owner's Agent Other (specify)

The APPLICANT hereby waives any claim to the use of any particular frequency as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. (See Section 308 of the Communications Act of 1934, as amended.)

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations, and that all exhibits are a material part hereof and incorporated herein.

The APPLICANT represents that this application is not filed for the purpose of impeding, obstructing, or delaying determination on any other application with which it may be in conflict.

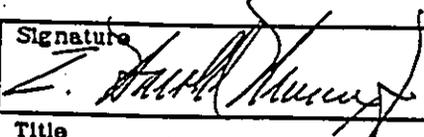
In accordance with 47 C.F.R. Section 1.65, the APPLICANT has a continuing obligation to advise the Commission, through amendments, of any substantial and significant changes in information furnished.

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SECTION VII - CERTIFICATION (Page 5)

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND IMPRISONMENT.
U.S. CODE, TITLE 18, SECTION 1001.

I certify that the statements in this application are true and correct to the best of my knowledge and belief, and are made in good faith.

Name of Applicant Christian Broadcasting Association	Signature 
Date August 29, 1991	Title Assistant Secretary

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT
AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The principal purpose for which the information will be used is to determine if the benefit requested is consistent with the public interest. The staff, consisting variously of attorneys, analysts, engineers and applications examiners, will use the information to determine whether the application should be granted, denied, dismissed, or designated for hearing. If all the information is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Accordingly, every effort should be made to provide all necessary information. Your response is required to obtain the requested authority.

Public reporting burden for this collection of information is estimated to vary from 71 hours 45 minutes to 801 hours 30 minutes with an average of 118 hours 28 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Office of Managing Director, Washington, D.C. 20554, and to the Office of Management and Budget, Paperwork Reduction Project (3060-0027), Washington, D.C. 20503.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

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7. Exhibit E-3 - Vertical Plan of Antenna System and Support Tower
8. Exhibit E-4 - Tabulation of Operating Conditions
9. Exhibit E-5 - Portion of Topographic Map Showing Site
10. Exhibit E-5A - Portion of Aero Chart Showing Site
11. Exhibit E-6 - Tabulation of Population and Area Served

E. HAROLD MUNN, JR.
& ASSOCIATES, INC.
Broadcast Engineering Consultants
Coldwater, Michigan

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E. HAROLD MUNN, JR.
& ASSOCIATES, INC.
Broadcast Engineering Consultants
Coldwater, Michigan

CERTIFICATION OF CONSULTANT

The firm of E. Harold Munn, Jr. & Associates, Inc., Broadcast Engineering Consultants, with offices at 100 Airport Drive, Coldwater, Michigan, has been retained for the purpose of preparing the technical data forming this report.

The report has been prepared by properly trained electronics specialists under the direction of the undersigned whose qualifications are a matter of record before the Federal Communications Commission.

I declare under penalty of perjury that the contents of this report are true and accurate to the best of my knowledge and belief.

E. HAROLD MUNN, JR. & ASSOCIATES, INC.

August 28, 1991

By  E. Harold Munn, Jr., President

100 Airport Drive, Box 220
Coldwater, Michigan 49036

(517) 278-7339

DISCUSSION

This firm was retained by the licensee of FM Broadcast Station KAIM-FM, Honolulu, Hawaii, to prepare the required engineering report in support of an application for a change of transmitter site.

The licensed KAIM-FM transmitter site is located in a built-up area of the city, on a tower shared with several AM broadcast stations. Environmental conditions dictate that an alternate transmitter site for KAIM-FM be established, to replace the facility now in use.

A transmitter site has been located which meets the spacing requirements of the rules, and which will afford KAIM-FM the possibility of future development.

The transmitter site proposed in this application results in an antenna height above average terrain of 610 meters. As a result, the effective radiated power has been reduced to provide for service equivalent to that obtained by 100 kW ERP at an antenna height above terrain of 299 meters.

The data contained in this report is responsive to the requirements of the rules, and provides the information for Section V-B of FCC Form 301.

The proposed service contours have been calculated, and are plotted as Exhibit E-1 of this report.

The topographic data source is detailed as Exhibit E-2.

Exhibit E-5 is a portion of the 7.5' series topographic map which shows the proposed transmitter site in detail. The transmitter will be operated by remote control from the existing main studio location.

The FAA has been notified of the proposed construction, and Form 7460-1 has been filed for that notification.

At this time, there are no other known FM or TV broadcast facilities within 60 meters of the site proposed in this application.

RADIATION PROTECTION: This proposal has been evaluated for compliance with FCC guidelines concerning human exposure to radiofrequency radiation. The standards employed are detailed in OST Bulletin No.65, October 1985.

Table 1 of Appendix B was employed for this study concerning FM broadcast radiation protection.

For the effective radiated power and type of antenna proposed, the minimum antenna radiation center above ground is specified as 31 meters.

This application proposes an antenna height above ground of at least 53 meters. Therefore, full compliance with the guidelines is attained by the instant application.

In addition to the protection afforded by the proposed antenna height above ground, the facility will be properly marked with signs, and entry to the facility will be restricted by means of locked fencing.

Any other means as may be required to protect employees and the general public will be employed.

In the event work would be required on the tower structure which would require that a person or persons be within the critical distance of the antenna, the effective radiated power will be reduced, or the station transmitter shut down if needed to attain protection.

Predicted Signal Contours:

212342 - KAIM FM
1580555 - SITE CHANGE

ERP = 14.45 kW, 11.599 dBk FM - 2-6 Tables

Radial	HAAT	kW	dBk	Field	70 dBu.5	60 dBu.5
0 Degr.	291.0M	14.450	11.599	1.000	33.4	52.8
45 Degr.	511.0M	14.450	11.599	1.000	43.9	66.9
90 Degr.	675.0M	14.450	11.599	1.000	50.8	74.3
135 Degr.	706.0M	14.450	11.599	1.000	51.9	75.4
180 Degr.	693.0M	14.450	11.599	1.000	51.4	75.0
225 Degr.	707.0M	14.450	11.599	1.000	51.9	75.5
270 Degr.	722.0M	14.450	11.599	1.000	52.4	76.0
315 Degr.	576.0M	14.450	11.599	1.000	47.1	70.5

Ave. HAAT= 610.1M,		Ant. COR= 748 M AMSL				
Other Azimuths:						
112 Degr.	716.0M	14.450	11.599	1.000	52.2	75.8

EXHIBIT "A"

The transmitting facility is so located that there is some resident population within the predicted "blanketing" contour, as defined in 47 C.F.R. 73.318. The applicant agrees that full compliance with the procedures and requirements of 73.318(b)(d) will be attained.

The applicant will take such engineering steps as may be required to satisfy complaints of "blanketing" including, but not limited to, the installation of filters, traps, or other devices to satisfy said complaints within the specified time period.

This applicant accepts full responsibility for the elimination of any objectionable interference.

The proposed transmitter is located within 10 km of existing or proposed FM and TV transmitters. This applicant does not believe that there would be any adverse effects on the operation of any other facility as a result of a grant of this application. The frequency separations, and the physical distance between the facilities should preclude any harmful effects.

In the event such harmful effects are noted, including but not limited to receiver-induced or other types of modulation, the applicant accepts full responsibility for the elimination of any objectionable interference to facilities in existence or authorized, or to radio receivers in use prior to grant of this application.

The applicant will take such engineering steps as may be required to satisfy complaints including, but not limited to, the installation of filters, traps, or other devices.

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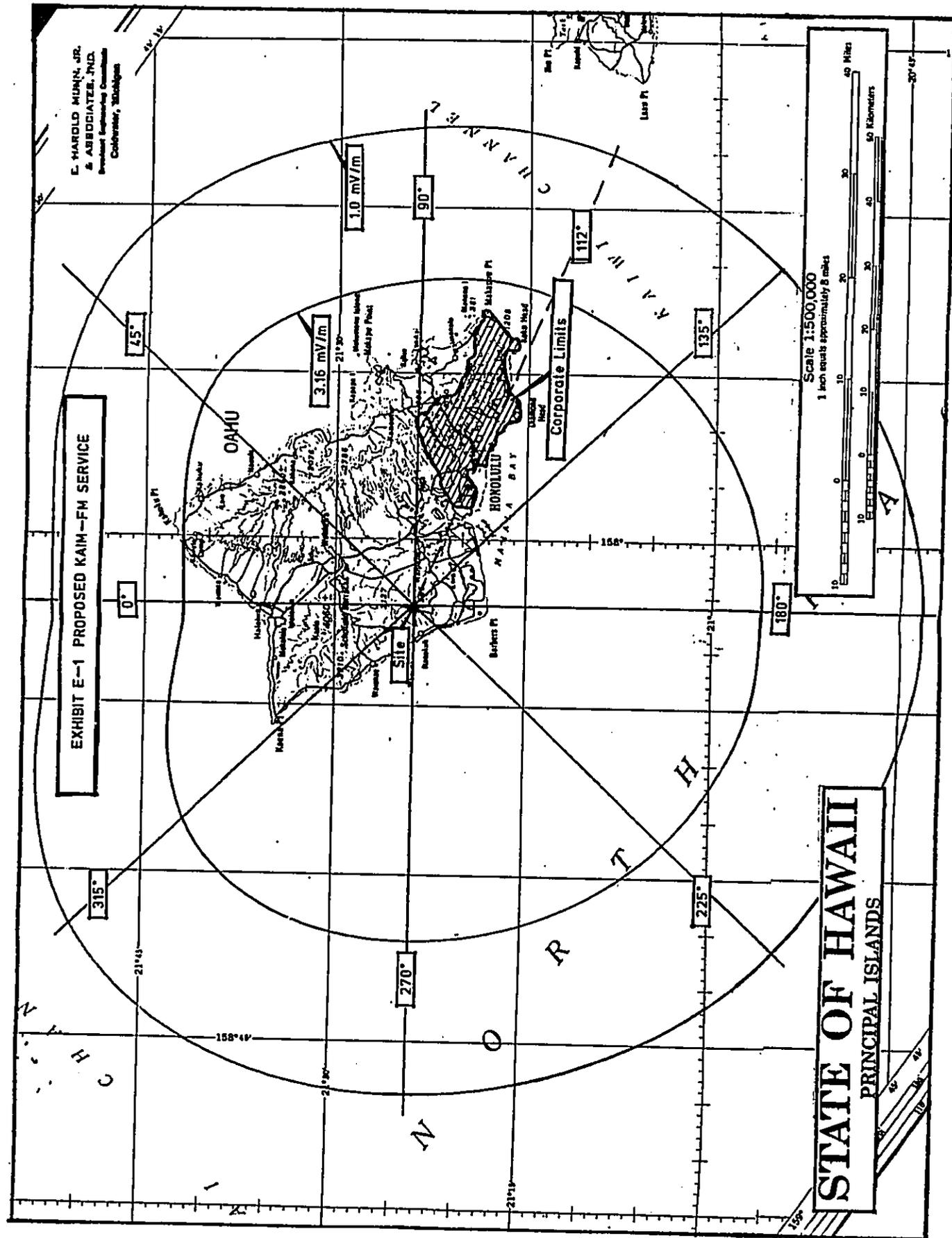


EXHIBIT E-2

TOPOGRAPHIC DATA EMPLOYED IN APPLICATION

The topographic data employed in this application was taken from the 3" database provided by the Defense Mapping Agency (DMA). The database was accessed through DataWorld, Inc. The terrain profile calculations to determine the antenna height above average terrain used that 3" data. The transmitter site elevation was derived from the 7.5' topographic map "Schofield Barracks, Hawaii", a portion of that map is included as Exhibit E-5. The site coordinates for the tower were also taken from the 7.5' map.

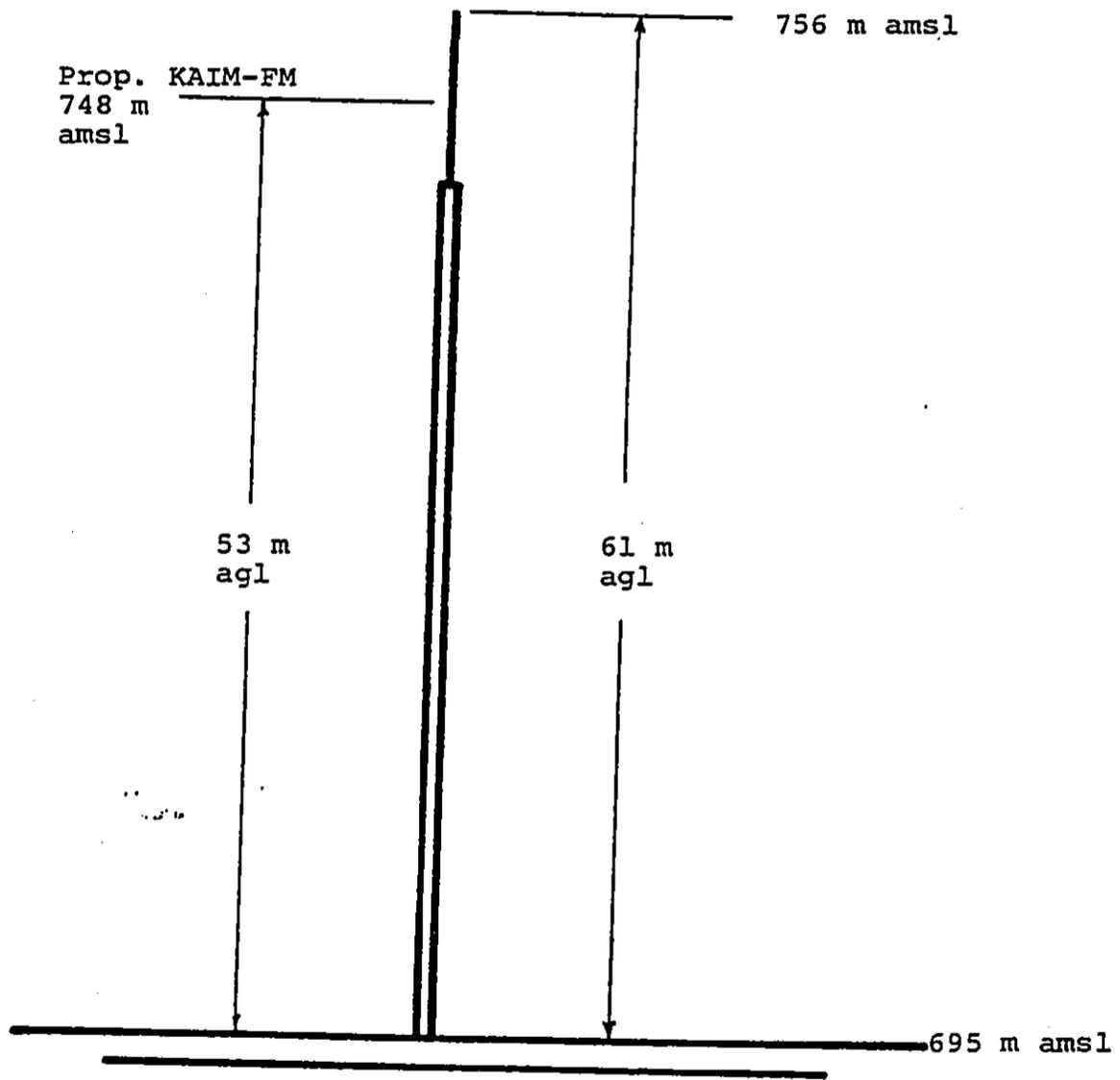
EXHIBIT E-3

VERTICAL PLAN

SITE LOCATION

Single, self-supporting steel tower
to hold FM Broadcast antenna

NL 21° 23' 42"
WL 158° 05' 55"
Palikea Ridge, 6 km W-NW of
Waipahu, Honolulu Co., HI



not to scale

guys not shown

E. HAROLD MUNN, JR.
& ASSOCIATES, INC.
Broadcast Engineering Consultants
Coldwater, Michigan

EXHIBIT E-4

PROPOSED FM OPERATING SPECIFICATIONS

Applicant: Christian Broadcasting Association

Frequency: 95.5 MHz Channel: 238C1 ERP: 14.45 kW HAAT: 610 (meters)

Transmitter Location: Palikea Ridge, 6 km W-NW of Waipahu

County: Honolulu

State: HI

Site Coordinates: NL 21°23'42"; WL 158° 05' 55" Site Elevation: 695 meters

Proposed Operation:

Effective Radiated Power: 14.45 (kW)H 14.45 kW(V)

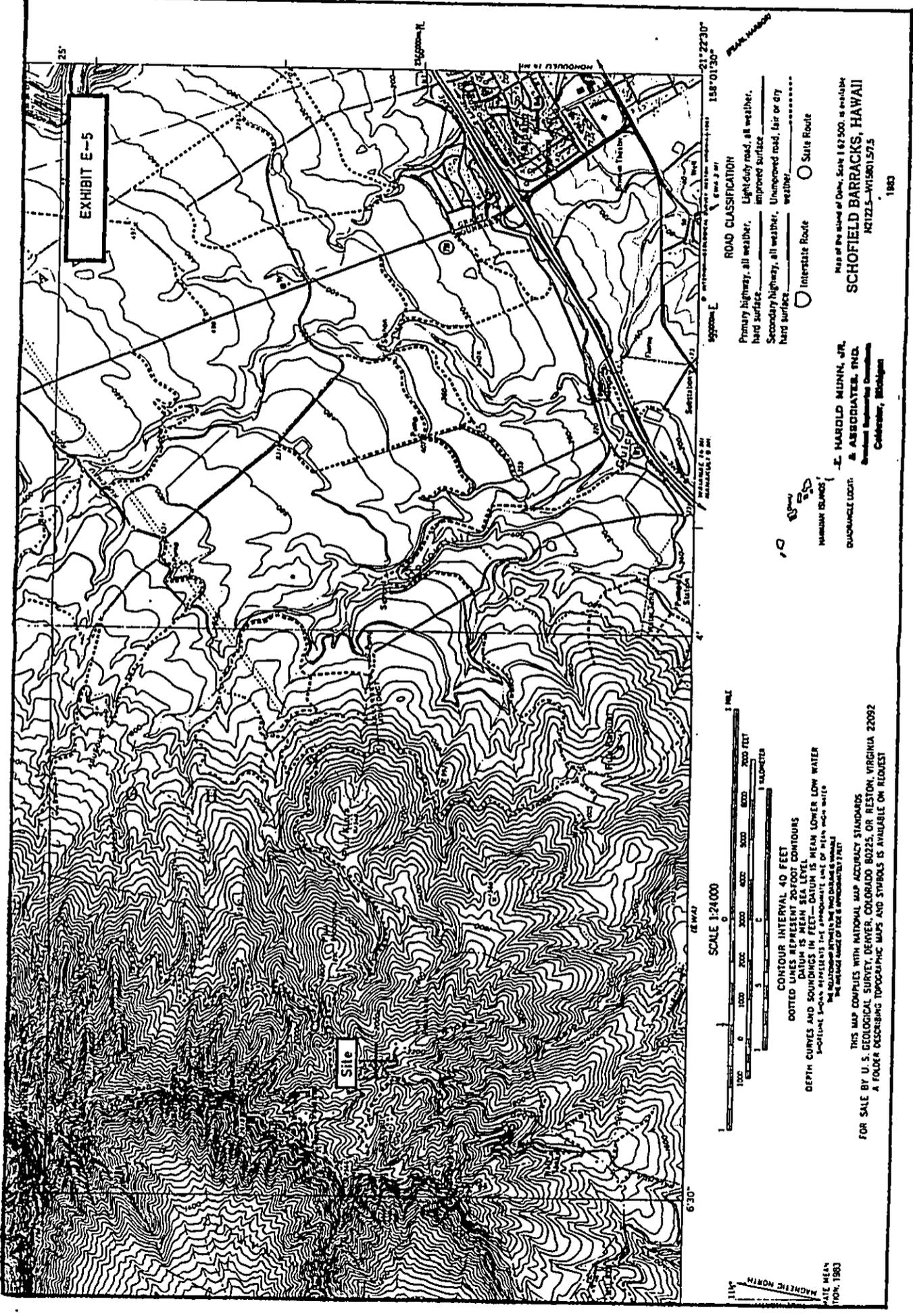
Height of Antenna Radiation Center Above:

	<u>Average Terrain</u>	<u>Mean Sea Level</u>	<u>Gnd.</u>
H	610 meters	748 m	53 m
V	610 meters	748 m	53 m

Overall Height of Structure Above Ground: 61 meters

Overall Height of Structure Above Mean Sea Level: 756 meters

E. HAROLD MUNN, JR.
& ASSOCIATES, INC.
Broadcast Engineering Consultants
Coldwater, Michigan



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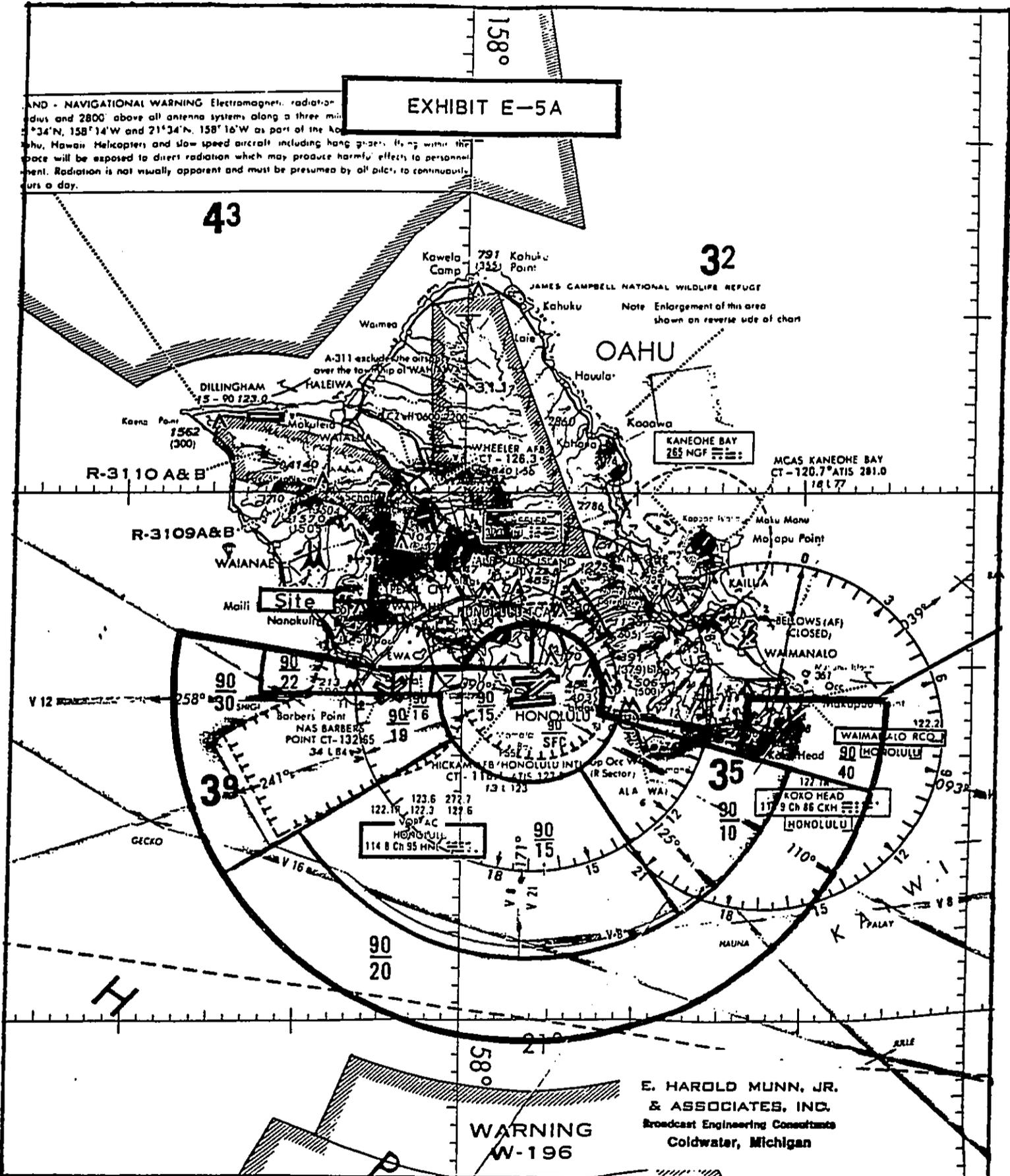


EXHIBIT E-6

TABULATION OF POPULATION AND AREA

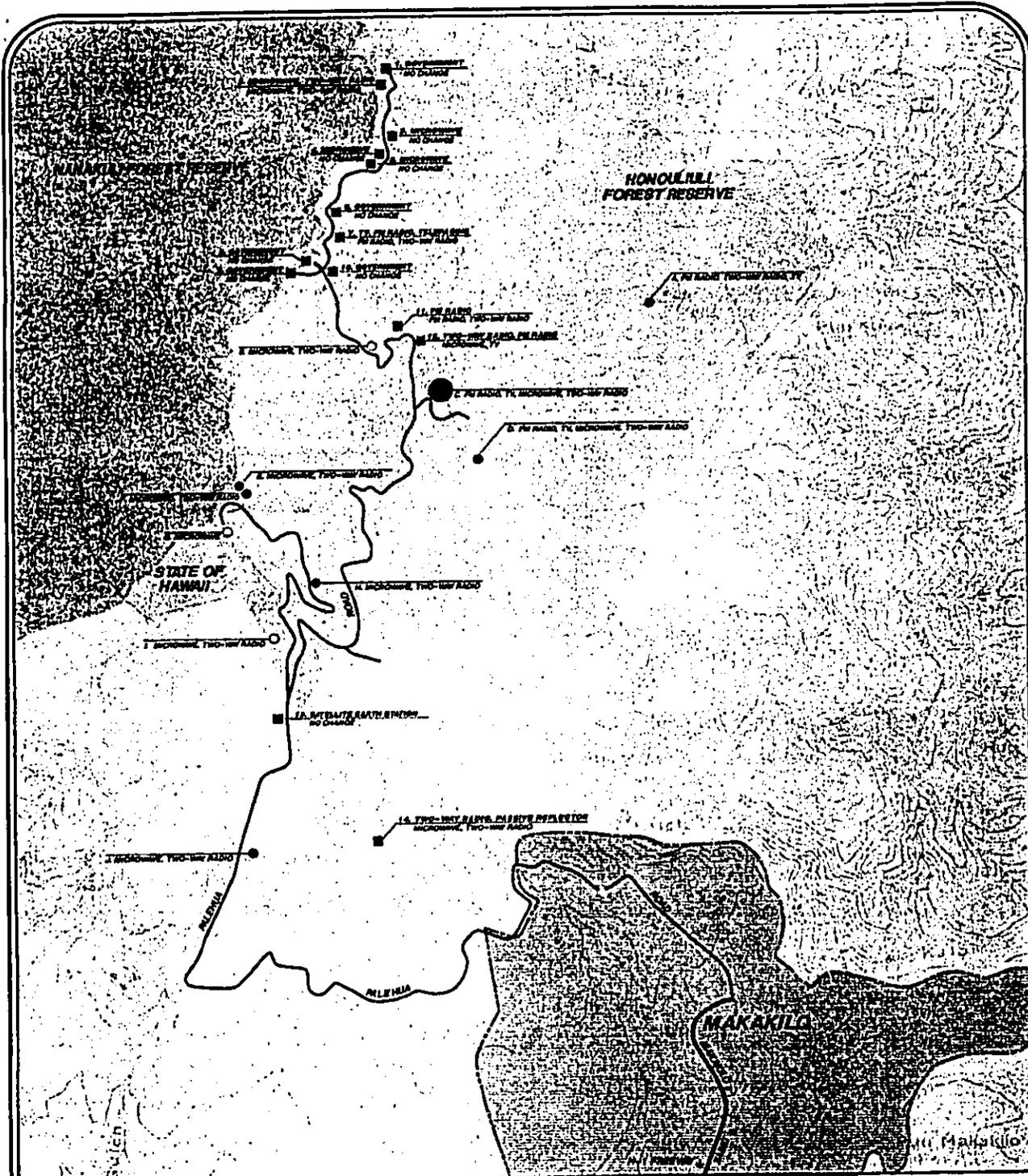
<u>CONTOUR</u>	<u>POPULATION</u>	<u>AREA</u>
1.0 mV/m	762,533	1,545 sq. km

The population within the 1.0 mV/m contour was determined by superimposing the desired contour onto U.S. Standard Civil Division maps of the 1980 Census, and assuming uniform population distribution within each minor civil division. The data was computer generated. The service area calculation was determined by measurement of the contour map exhibit using a calibrated polar planimeter. The population data above is corrected 1980 Census data.

A 1986 Census Update shows the population within the proposed 1 mV/m contour to be 816,666 persons.

For the purpose of this study, the area within the 1 mV/m contour over the Pacific Ocean was excluded from the calculation.

EXHIBIT # 7



PALEHUA RIDGE COMMUNICATION FACILITIES MASTER PLAN
The Estate of James Campbell

LEGEND
 ● PROPOSED PRIMARY SITE
 ○ PROPOSED SECONDARY SITE
 ■ EXISTING SITE
 ▨ EXISTING USE
 ▩ PROPOSED USE

Existing Tenants

Site	Tenant
1.	U.S. Army, Various Governmental Sub-Tenants
2.	TELNET, Motorola, Delta Comm. Honolulu Cellular, Reapaying, Ram Mobile Data
3.	Oceanic Cable
4.	GTE Hawaiian Telephone
5.	GTE Hawaiian Telephone
6.	F.A.A.
7.	KFVE, McCaw Telepage, KHPR

Site Tenant

Site	Tenant
8.	F.A.A.
9.	U.S. Navy
10.	F.A.A.
11.	RLS Radio, Honolulu Broadcasting, KHAI
12.	Hertz, KDED FM, Delta Communication
13.	King Broadcasting
14.	Aeronautical Radio, U.S. Navy

GROUP 70 - 100000 - 100000 - 100000

JOHN WAIALE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
John P. Keppeler, II
Dona L. Hanaike

AQUACULTURE DEVELOPMENT
PROGRAM
AQUATIC RESOURCES
CONSERVATION AND
ENVIRONMENTAL AFFAIRS
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

FILE NO.: OA-9/23/91-2519
180-Day Exp. Date: 3/21/92
DOC. ID.: 144

February 28, 1992

Board of Land and
Natural Resources
State of Hawaii
Honolulu, Hawaii

Conservation District Use Application for
A Telecommunication Facility at
Palehua, Ewa, Oahu

APPLICANT: Christian Broadcasting Association
3555 Harding Ave.
Honolulu, Hawaii 96816

LANDOWNERSHIP: The Estate of James Campbell

LOCATION: Palehua, Ewa, Oahu
TMK: 9-2-005: 13

AREA OF PARCEL/ 4,696 acres/
USE: 30,000 sq. ft. (Approximately)

SUBZONE: Resources

DESCRIPTION OF AREA/CURRENT USE:

The proposed project is located on Palehua Ridge at approximately the 2280 ft. MSL elevation, within the Honouliuli Forest Reserve, Ewa, Oahu (Exhibits A, B, & C). It is situated on portions of TMK: 9-2-05: 13 (Exhibit D). The property is within the State Land Use Conservation District, Resource Subzone (Exhibit E).

According to the applicant, there are no existing structures at this location. The site presently is overgrown with underbrush and small trees, predominantly strawberry guava with some selected species of koa and eucalyptus. As identified, there are no rare or endangered native vegetation in or around the proposed site.

The site is accessible via a private roadway and is serviced by a nearby electric transmission corridor. The larger parcel includes a number of private residents and several telecommunication-broadcast transmission facilities.

ITEM H-2

PROPOSED USE:

As proposed by the applicant, a new telecommunication facility will be developed at the site. It will include the clearing and development of a roadway and parking turnaround, an equipment building and a 199-ft. high tower capable of accommodating a number of antenna (Exhibits F, G, and H). A future tower is also planned but is not included in this application.

Roadway:

As originally proposed, the roadway would be approximately 1,050 feet long. It will necessitate the clearing of brush and minor leveling. Minimal earth moving "cuts" will need to be made. The alignment to be followed has mostly small wild guava brush of less than one (1) inch diameter at the base. Some larger eucalyptus trees and a number of large rock formation would also need to be removed. The roadbed is to be ten (10) feet wide with ditches on both sides to take care of runoff water. These ditches will be seeded with grass to help retain the soil and deter erosion. The roadbed will be surfaced first with coarse crushed rock and then topped with finer crushed rock and compacted. A steep slope in the first 700 feet will also be black topped with asphalt.

Amendment:

In December 1991 and January 1992, following comments received at the public hearing and during a departmental field trip attended by community residents, the applicant and the landowner, the subject roadway design was modified so as to lessen potential site impacts.

As represented by the applicant, a more direct route is proposed such that the total length would be approximately 450 ft. This road will avoid large trees and will eliminate the cutting of half the vegetation that was originally planned. An estimated 380 cubic yards of soil would need to be excavated.

A locked wood gate at the entrance of the access road and at the adjoining entrance to the residential lot is also proposed to screen the area from adverse view impacts and to improve security.

Equipment Building:

The site of the equipment building will need to be cleared, approximately 50 ft. by 100 ft., total of 5,000 sq. ft. In this area, there are two (2) eight-inch oak trees and a number of guava bushes, etc.

This area is quite flat so it will take a little leveling for preparation of a concrete slab. The proposed building is to be 864 sq. ft., made of cement block surrounded by a five-foot apron. The building is designed with separate compartments to accommodate potential co-users. It will be painted green to reduce visual impact. Further, there will be a 150 KW diesel generator on the site plus a 2,000-gallon above ground diesel fuel storage tank.

The facility will be surrounded by a 6 ft. high security fence.

Amendment:

As recommended by the Division of Forestry and Wildlife, the applicant also proposes to address potential fire contingency plans by clearing trees, shrubs, and foliage within ten (10) feet of the equipment building and outside security fence. An 1,000-gallon water storage tank fed by rainwater catchment from the equipment building roof is also proposed.

Tower:

At this time, applicant proposes development of one 199-foot self-supporting tower. It will be developed to accommodate a number of antenna, including a six (6) bay FM antenna array capable of accommodating a number of FM radio stations, (perhaps 4), four six ft. diameter microwave antenna, and at least 4 mobile radio whip antennas (Exhibit H).

The tower will be painted green, unless the FAA requires a different painting scheme. Deployed antennas are also to be painted green to minimize viewplane impact.

Electric Power Utility Easement:

As originally proposed, the Hawaiian Electric Company has stated that a 10-foot easement would be adequate to install approximately five (5) poles from Palehua Road to service the equipment building.

Amendment:

The applicant has proposed that rather than develop a separate electrical easement, the electric line utilize the revised roadway corridor. This would necessitate 3-4 poles with some underground wiring from the site transformer pole to the equipment building and tower.

SUMMARY OF COMMENTS:

The application was referred to the following agencies for their review and comment: the State of Hawaii, Department of Budget and Finance, Department of Health, Office of State Planning, Office of Hawaiian Affairs, the Department of Land and Natural Resources, Divisions of Aquatic Resources, Forestry and Wildlife, Conservation and Resources Enforcement, State Parks, Land Management, Water Resource Management, Historic Preservation, and Natural Area Reserves System; and the City and County of Honolulu, Department of General Planning and the Department of Land Utilization. Comments received include:

STATE OF HAWAII

Department of Budget and Finance

We have reviewed the subject CDUA and have some concerns regarding possible electromagnetic interference problems the applicant may cause to the State systems located in or proposed for the area. The State systems include: (1) Hawaii Interactive Television

System, (2) Emergency Medical Service Mobile Radio Repeater, (3) Governor's Mobile Radio Repeater, (4) Future 800 MHz Trunking Mobile Radio Repeater, and (5) Motorola's 800 MHz Trunking Mobile Radio Repeater which provides service to the Attorney General's Office and the Department of Transportation.

We recommend that the Board of Land and Natural Resources (BLNR) withhold approval of the applicant's CUA until such time that a frequency compatibility and power interference study is done by the Applicant. The study must show that they will not cause interference to any of the State systems. Furthermore, if any interference is caused by the applicant, they must immediately cease operations in that area and be held accountable to eliminate the interference at no cost to the State.

Department of Health

We have no comments to offer at this time.

Office of State Planning

The applicant has provided exhibits which reveal three other elevated structures in the area. Telecommunication facilities should be designed and sited to minimize visual impacts.

Department of Land and Natural Resources

The Division of Aquatic Resources has no concerns regarding the proposed project.

Division of Forestry and Wildlife

(Comments of January 29, 1992)

The following are DOFAW's comments after Dr. Carolyn Corn and Irv Kawashima visited the site on January 13, 1992:

PLANTS:

1. John Obata's earlier report of the plants and surrounding area gives a good description of the site. Dr. Corn's findings were similar.
2. No rare plants that are proposed or listed for endangered status or under review for threatened and endangered status were seen during Dr. Carolyn Corn's 1-1/2 hour visit. She followed the red and white flagging of the presently proposed road alignment and the proposed towers/buildings site on top of the ridge.
3. The steeper slopes, particularly along the ridge facing NE, have a higher percent native species cover. These areas should be left intact without disturbance.
4. Since the roadway alignment and the four corners of the project site along the ridge have not been delineated on the ground and there is the potential of soil spilling over into steeper portions, verification of the project location in relation to the vegetation, plants, and species impacted should be completed before the project is approved.

ROCK:

Within the flatter plateau on the ridge proposed for development is a large rock that is sculptured by weathering, which is a fine example illustrating the geological/climatological process. If Campbell Estate is not interested in placing it on display, Bishop Museum is the state repository for such artifacts and should be given a chance to display it.

FIRE:

1. All motorized machinery operating within the proposed site be equipped with a factory installed spark arrester during and after construction.
2. All right-of-way, including roads and power line access, be maintained at a serviceable level.
3. Provide "defensible space" for all improvements on the project site.
4. A "Fire Contingency Plan" be approved by the Administrator, Division of Forestry and Wildlife.

(Comments of November 5, 1991)

Inasmuch as the applicant is part of the emergency broadcast system, we have no objections to the proposed request.

Division of Conservation and Resources Enforcement

No construction underway at this time.

Division of State Parks

Our department should continue to strive for alternatives to control the proliferation of communication paraphernalia that mars our scenic views of ridgelines.

Historic Preservation Division

This proposed use would construct a 1000-foot road and a transmitting facility on Palikea Ridge at an elevation of about 2200 feet. A review of our records shows that there are no known sites at the project area. However, the project area has not been surveyed for historic sites, so they may be present. Puu Kuua Heiau was located at an elevation of about 1800 feet on Palikea Ridge but has been destroyed, and State Site 50-80-08-136, a small structure built of coral and basalt and thought to be a religious shrine, is located on a ridge above the project site. Thus, in the absence of information to the contrary, it is possible that historic sites are extant at the project location.

We recommend that an archaeological inventory survey of the proposed road and transmitting facility be attached as a condition to any approved permit for this project. A second condition should state that if any significant historic sites are present, then an acceptable mitigation plan must be developed in consultation with our division.

The Division of Water Resource Management has no comments regarding the proposed project.

The proposed land use will have no effect on the existing Natural Area Reserves Program.

CITY AND COUNTY OF HONOLULU

Department of Land Utilization

This is to inform you that the above mentioned Tax map Key is zoned P-1 Restricted Preservation and is not within the Special Management Area.

Department of General Planning

In response to your department's request of November 5, 1991, we have reviewed the subject CDUA and offer the following comments and recommendations:

1. The project site is designated Preservation on the Ewa Development Plan Land Use Map. Item 5 of Section IV, page 5, of the subject application lists an incorrect designation.
2. With regard to the Palehua Ridge Communication Facilities Master Plan (Exhibit #7), we are concerned with the adverse visual impact of the existing and future towers and facilities along the ridgeline. We recommend that all proposed towers be located at a less visible lower elevation to avoid detracting further from the mountain's silhouette.
3. We recommend that DLNR conduct an islandwide study on the need and locations for future telecommunication towers and facilities. The visual and environmental impacts of these facilities should be assessed and recommendations should be developed to minimize their dominance on the skyline. It may be necessary to restrict towers to areas below ridgelines and to require facilities to be consolidated and visually less obtrusive.

PUBLIC HEARING SUMMARY:

A public hearing was held by the Board on December 19, 1991 for this proposed project.

Staff presented information relevant to the application as received at that date. Staff noted that the applicant had submitted additional information regarding the roadway and electrical service easement.

Staff presented a number of letters that have been submitted from the general public regarding this project, raising questions regarding the adequacy of the submitted application and Environmental Assessment, as it relates to potential impacts to native flora and fauna and adverse impacts of radio frequency health affects (Exhibit J).

The applicant made a presentation to the Board complete with viewplane impact photograph exhibits. He clarified the site assessment process that led to this proposal. Further, he noted the site would accommodate other radio (FM) needs, including that KAIM is a designated Civil Defense station.

In response to the submitted letters from concerned parties, he noted that KAIM had prepared a botanical survey that found no endemic threatened or endangered species. Further, the driveway to the site had been modified to avoid rock outcropping and to reduce the number of trees that would be cut down within the electrical easement.

An electrical engineering consultant to the applicant made a short presentation to the Board to outline the radio frequency - and health aspects of the proposed project. It was his conclusion that there are no public health impacts as it relates to radio frequency exposure level.

A representative from the landowner, Campbell Estate, made a short presentation to the Board relative to the site telecommunication master plan. He identified that there are five existing government (Federal, State, City) telecommunication facilities in the broader forest reserve area. He elaborated on the biological survey work done by the Nature Conservancy of Hawaii. Most endangered species sitings/habitat are in areas mauka of the proposed site. Campbell Estate set aside to the Nature Conservancy 3,700 acres of the 4,800 acre (70% approx.) forest Reserve for a wilderness preserve, under a 50-year lease, rent free. This is the area that most of the endangered species have been observed.

The proposed site is one of three identified in the property master plan for potential telecommunication facility use, particularly for F.M. radio and television broadcasting.

Following Board questions, it was identified that a total of nine more sites have been identified within the broader property area. The applicant's engineer clarified that the total power of the facility will be about 16 kilowatts.

Several residents from the area testified before the Board. Concerns expressed included: 1) potential radio frequency power - public health impacts, 2) potential loss of ground cover, increasing runoff and reducing watershed capability, 3) trash accumulation, 4) presence of endemic flora and fauna at or near the site (i.e. sandalwood trees), and 5) potential view plane/scenic vista impacts.

One resident identified that he thought the conducted biological survey was done inadequately. Furthermore, he believes that there are trails nearby and there may be a religious/aesthetic nature to this location.

ANALYSIS:

Following review and acceptance of the application for processing, the applicant was notified by letter, dated November 5, 1991, that:

1. The proposed use is a conditional use within the Resource subzone of the Conservation District according to Administrative Rules, Title 13, Chapter 2, as amended;
2. A public hearing pursuant to Section 183-41, Hawaii Revised Statutes (HRS), as amended, will be required in that the proposed use is of a commercial nature; and

3. In conformance with Title 13, Chapter 200 of the Administrative Rules, a negative declaration has been issued on the proposed project.

The objective of the Resource subzone is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas.

Section 13-2-21(b)(1) relating to standard requires all applications be reviewed in such a manner that the objective of the subzone is given primary consideration.

The City and County of Honolulu has affirmed that the subject project site is not situated within the Special Management Area.

The applicant has submitted a System Master Plan and the landowner has submitted a Site Master Plan as required by Board direction.

Staff has assessed submitted agency comments and public testimony/comments on the proposed project. In this regard, staff has discussed the project with the Department of Budget and Finance and it was agreed that standard Board imposed conditions related to non-interference would mitigate their concerns.

As identified by the Division of Forestry and Wildlife, the applicant's original botanical report was deemed to be adequate. This was affirmed by DOFAW staff during the site field trip. However, staff affirms that conditions should be imposed relative to ground disturbance, a unique rock formation, and fire contingency. Further, a refined archaeological inventory survey of the proposed road and transmitting facility should be done.

In addressing other concerns related to potential viewplane impacts, radio frequency power-public health impacts, potential loss of ground cover, trash accumulation and flora and fauna degradation, the applicant and landowner have submitted written responses to address and/or mitigate specific areas of concern (Exhibit K).

For example, the applicant's photographic survey identifies that there will be minimal viewplane impacts, particularly in that the applicant will utilize existing vegetation cover and appropriate painting schemes to mask the facility as best as possible.

The public health issue of radiation was attended to by obligating the applicant to do a radiation field check at the proposed location to obtain a base record (Exhibit L). The applicant affirms that the proposed future facility can operate within acceptable public health standards. Nevertheless, staff recommends that periodic radiation surveys be conducted by the applicant and landowner to ensure future compliance and to inform the residential community.

Conditions are also proposed for Board review relative to erosion management, fire control, removal of grubbed vegetation, appropriate protection of unique rock and flora formation and trash control.

All standard Board imposed conditions relative to telecommunication facilities are incorporated. A new standard Board condition is proposed regarding departmental notice when construction activity is initiated and completed.

As such, staff recommends:

RECOMMENDATION:

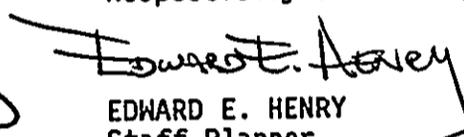
The the Board approve the subject telecommunication-broadcast facility at Pahehua Ridge, Ewa, Oahu, subject to the following conditions:

1. The applicant shall comply with all applicable statutes, ordinances, rules and regulations of the Federal, State and County governments, and applicable parts of Section 13-2-21, Administrative Rules, as amended;
2. The applicant, its successors and assigns, shall indemnify and hold the State of Hawaii harmless from and against any loss, liability, claim or demand for property damage, personal injury and death arising out of any act or omission of the applicant, its successors, assigns, officers, employees, contractors and agents under this permit or relating to or connected with the granting of this permit;
3. The applicant shall comply with all applicable Department of Health Administrative Rules;
4. That all wildlife strikes resulting from the tower be reported to the Division of Forestry and Wildlife on Oahu;
5. That the applicant submit a landscaping plan and painting scheme to ensure the structure is compatible with the surrounding environment;
6. Before proceeding with any work authorized by the Board, the applicant shall submit four (4) copies of the construction plans and specifications to the Chairperson or his authorized representative for approval for consistency with the conditions of the permit and the declarations set forth in the permit application. Three (3) of the copies will be returned to the applicant. Plan approval by the Chairperson does not infer approval required of other agencies. Compliance with Condition 1 remains the responsibility of the applicant;
7. That the applicant shall be held responsible for the removal of all litter from the project and surrounding areas generated from the construction and maintenance of the project;
8. That the applicant ensure that all existing and future telecommunication equipment operates at the facility in a manner so that it does not interfere with existing broadcasters, and other electrical equipment. Should interference be reported, the applicant will notify the Department of Land and Natural Resources immediately and will take all appropriate actions, as directed, to mitigate adverse conditions;

9. That the applicant ensure that all technical requirements relative to transmitter power and frequency usage be approved by the Federal Communication Commission with the understanding that any interference with the operations of the Department of Budget and Finance, and other governmental agencies be eliminated by the applicant at no cost to the State;
10. That the applicant shall notify the Department of Land and Natural Resources when specific parties and uses are consummated in the sublease/allocation of antennas and facility equipment. Any modification to building and equipment plans must be reviewed and approved by the Chairperson, or his authorized representative;
11. That the applicant will accommodate all necessary equipment for governmental agencies (i.e. Civil Defense, etc.);
12. Any work or construction to be done on the land shall be initiated within one (1) year of the approval of such use, and all work and construction must be completed within three (3) years of the approval of such use;
13. That the applicant obtain an archaeological inventory survey of the proposed road and transmitting facility prior to construction plan submittal;
14. That the applicant agree that if any significant historic sites are present, an acceptable mitigation plan be developed in consultation with the State Historic Preservation Division;
15. That the applicant shall submit for departmental approval an acceptable fire contingency plan, to include design criteria regarding "defensible space" around the facility, and water tank, and other items as requested;
16. That the applicant flag and, if necessary, fence significant trees and vegetation within the project to avoid damage during grading and grubbing activities;
17. That all grubbed vegetation be removed from the site and disposed of in an acceptable manner;
18. That the applicant shall implement appropriate measures to control potential erosion during and after construction;
19. That all exposed and disturbed ground shall be revegetated within thirty (30) days unless otherwise provided for in a plan on file with and approved by the Department;
20. That the landowner undertake a yearly radiation study for the entire telecommunication master plan study area. This study shall result in a report which affirms no public health risks are present;
21. That the applicant submit to the Department within thirty (30) days after the signal is activated, a radiation study for this particular site;

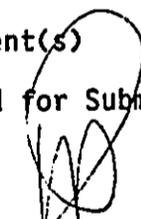
22. That the applicant notify the department in writing when construction activity is initiated and when it is completed;
23. That in issuing this permit, the Department and Board has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Department may, in addition, institute appropriate legal proceedings;
24. That all representations relative to mitigation set forth in the accepted Environmental Assessment for this proposed use are hereby incorporated as conditions of this approval;
25. That failure to comply with any of these conditions shall render this Conservation District Land Use application null and void; and
26. Other terms and conditions as prescribed by the Chairperson.

Respectfully submitted,

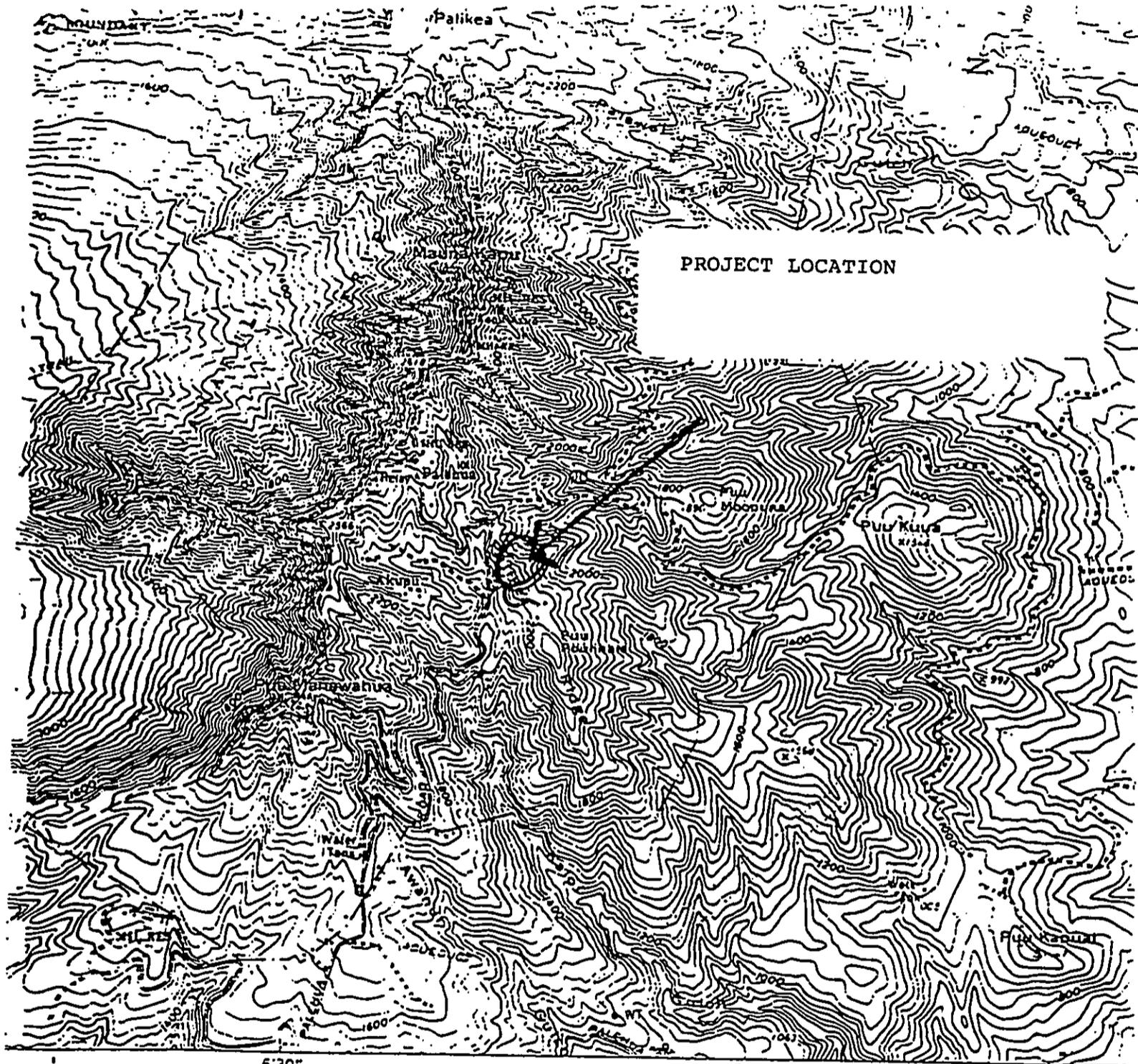

EDWARD E. HENRY
Staff Planner

Attachment(s)

Approved for Submittal:


WILLIAM W. PATY

DOCUMENT CAPTURED AS RECEIVED

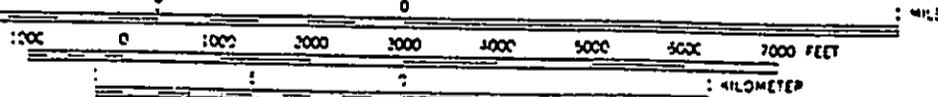


PROJECT LOCATION

6°30''

(EWA)

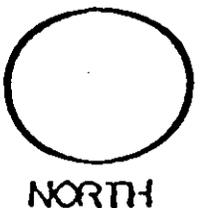
SCALE 1:24,000



CONTOUR INTERVAL 40 FEET
 DOTTED LINES REPRESENT 20-FOOT CONTOURS
 DATUM IS MEAN SEA LEVEL
 DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOWER LOW WATER

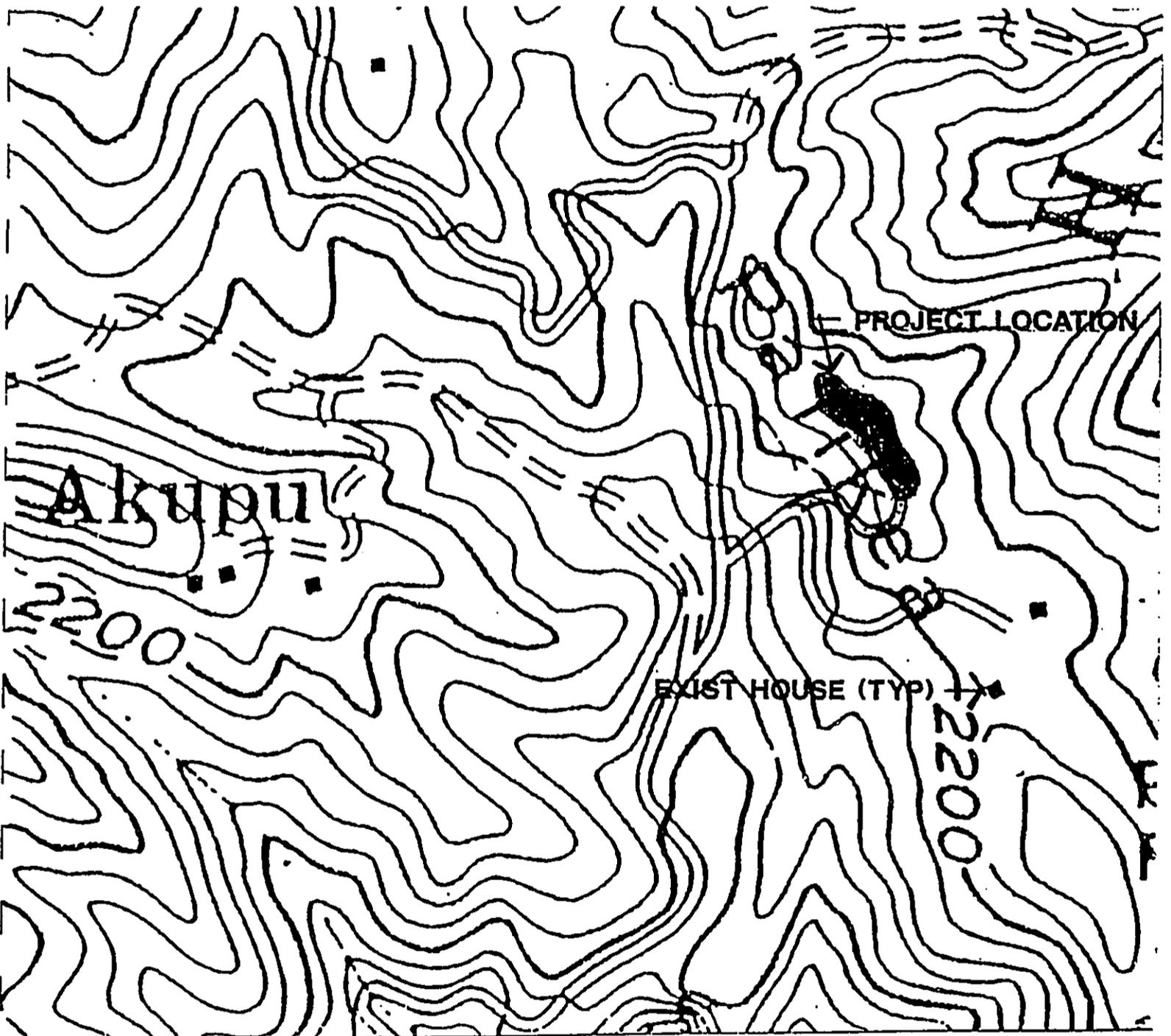
APPROXIMATE
 DECLINATION 1983

EXHIBIT B

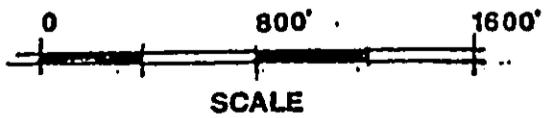


COUA NO. OA-9/23/91-2519
 APPLICANT Christian Broadcasting Assn.
 AGENT _____
 TMK 9-2-005:013

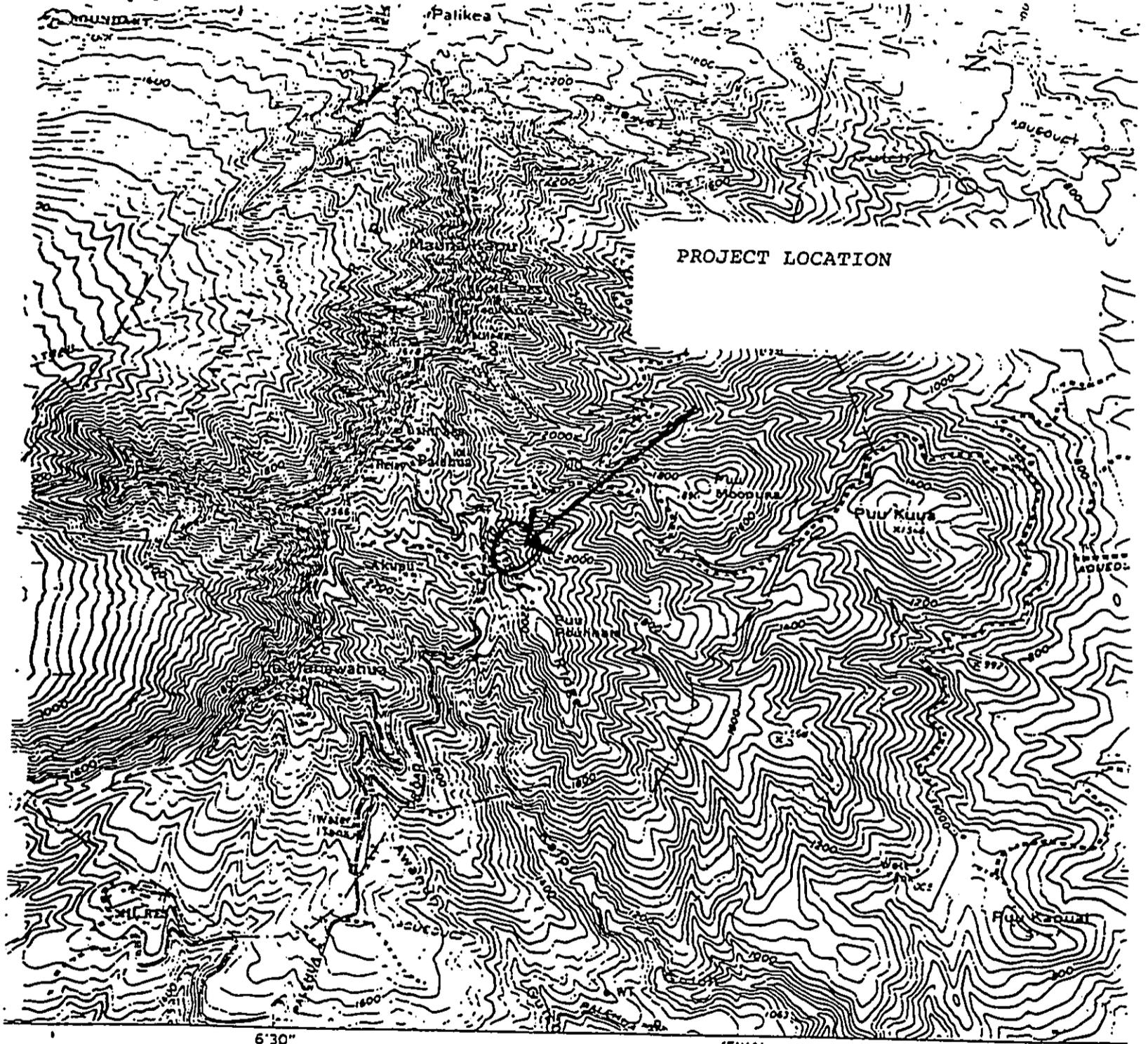
- SUBZONE PROTECTIVE
- RESOURCE
- LIMITED
- GENERAL



VICINITY MAP



DOCUMENT CAPTURED AS RECEIVED

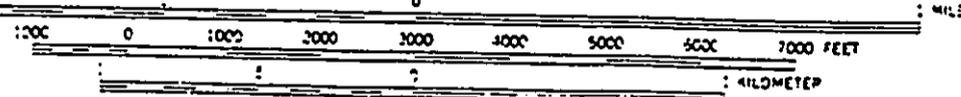


PROJECT LOCATION

6°30''

(EWA)

SCALE 1:24000



CONTOUR INTERVAL 40 FEET
 DOTTED LINES REPRESENT 20-FOOT CONTOURS
 DATUM IS MEAN SEA LEVEL
 DEPTH CURVES AND SOUNDINGS IN FEET — DATUM IS MEAN LOWER LOW WATER

APPROXIMATE
 DECLINATION 1983

— R

DOCUMENT CAPTURED AS RECEIVED

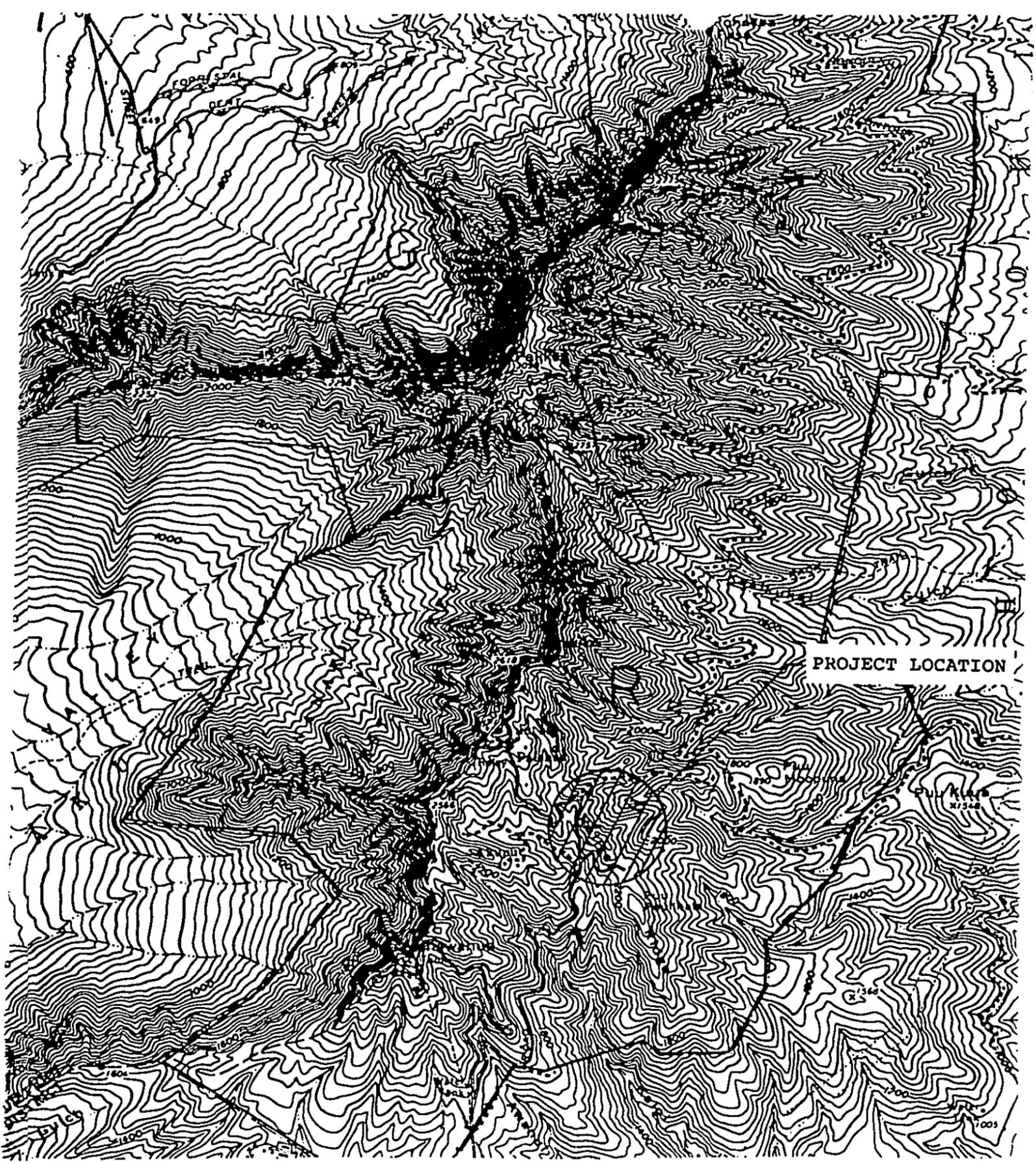
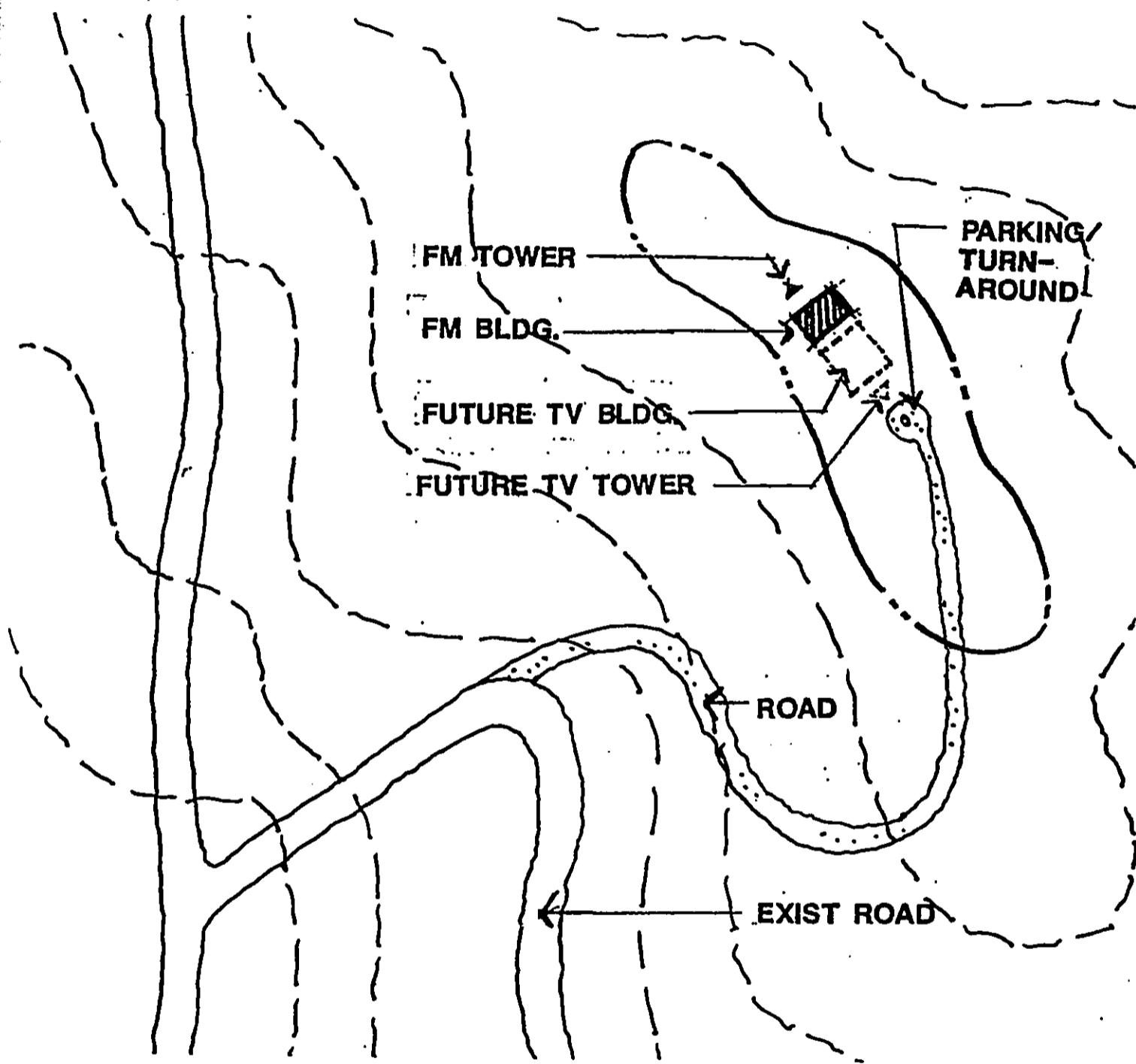
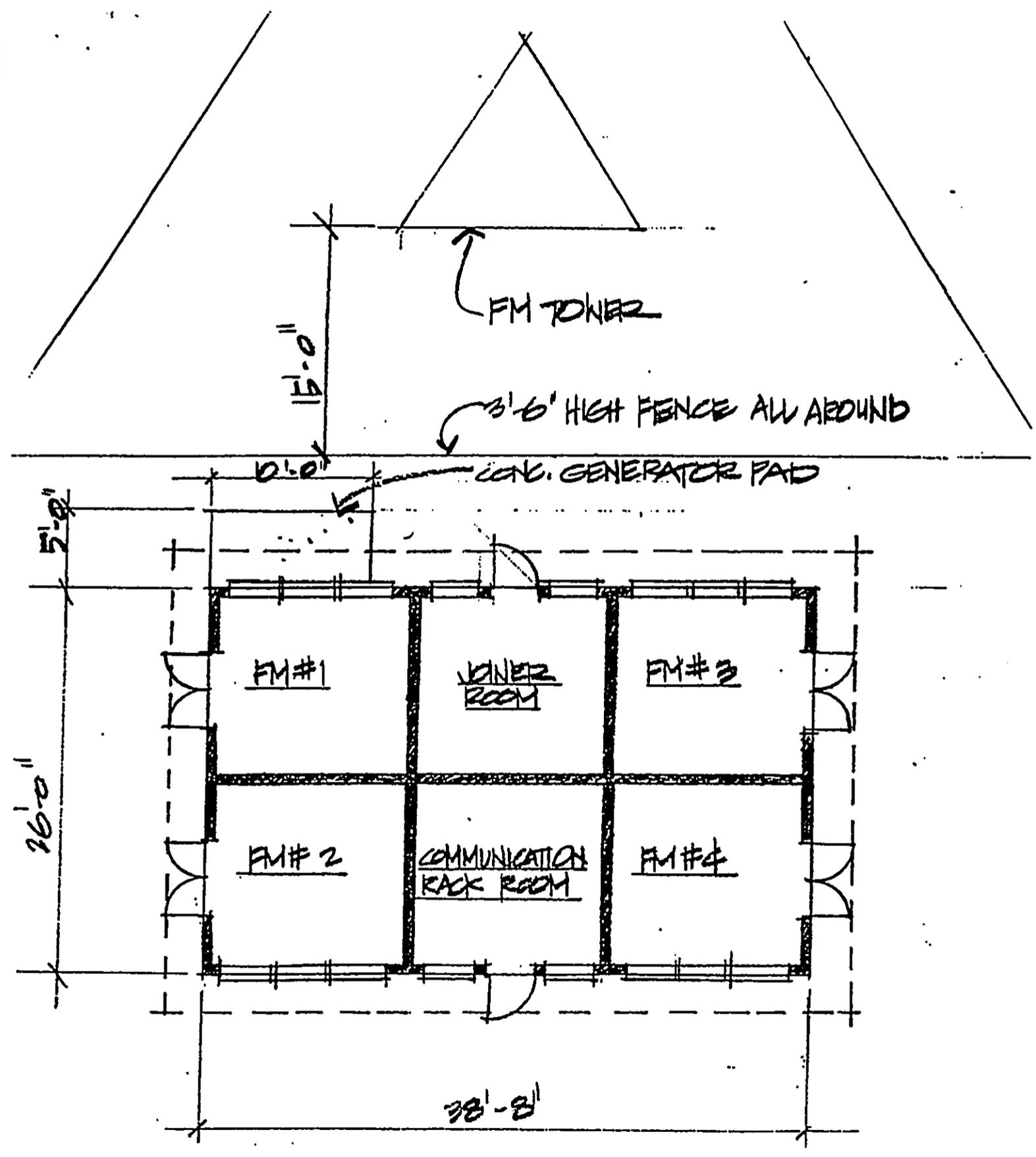
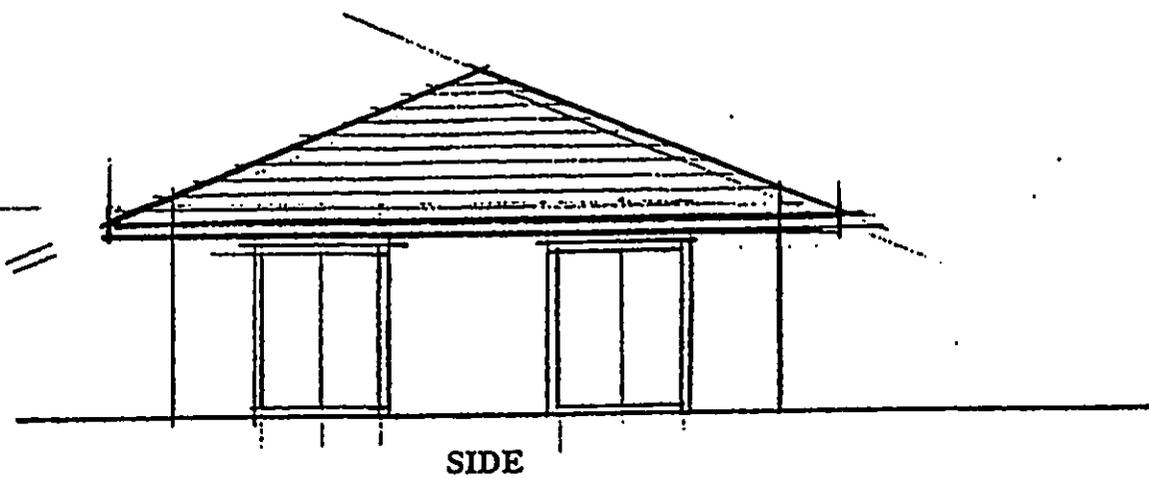


EXHIBIT E

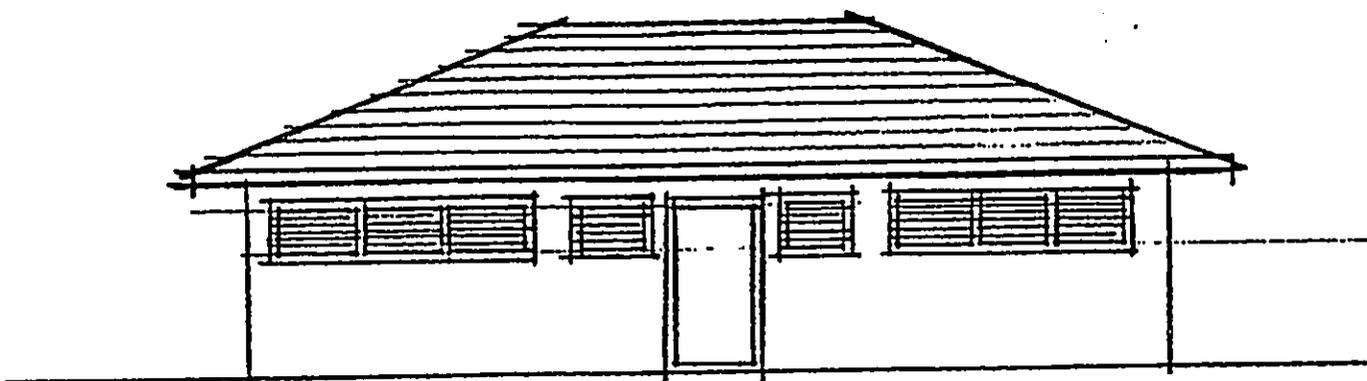


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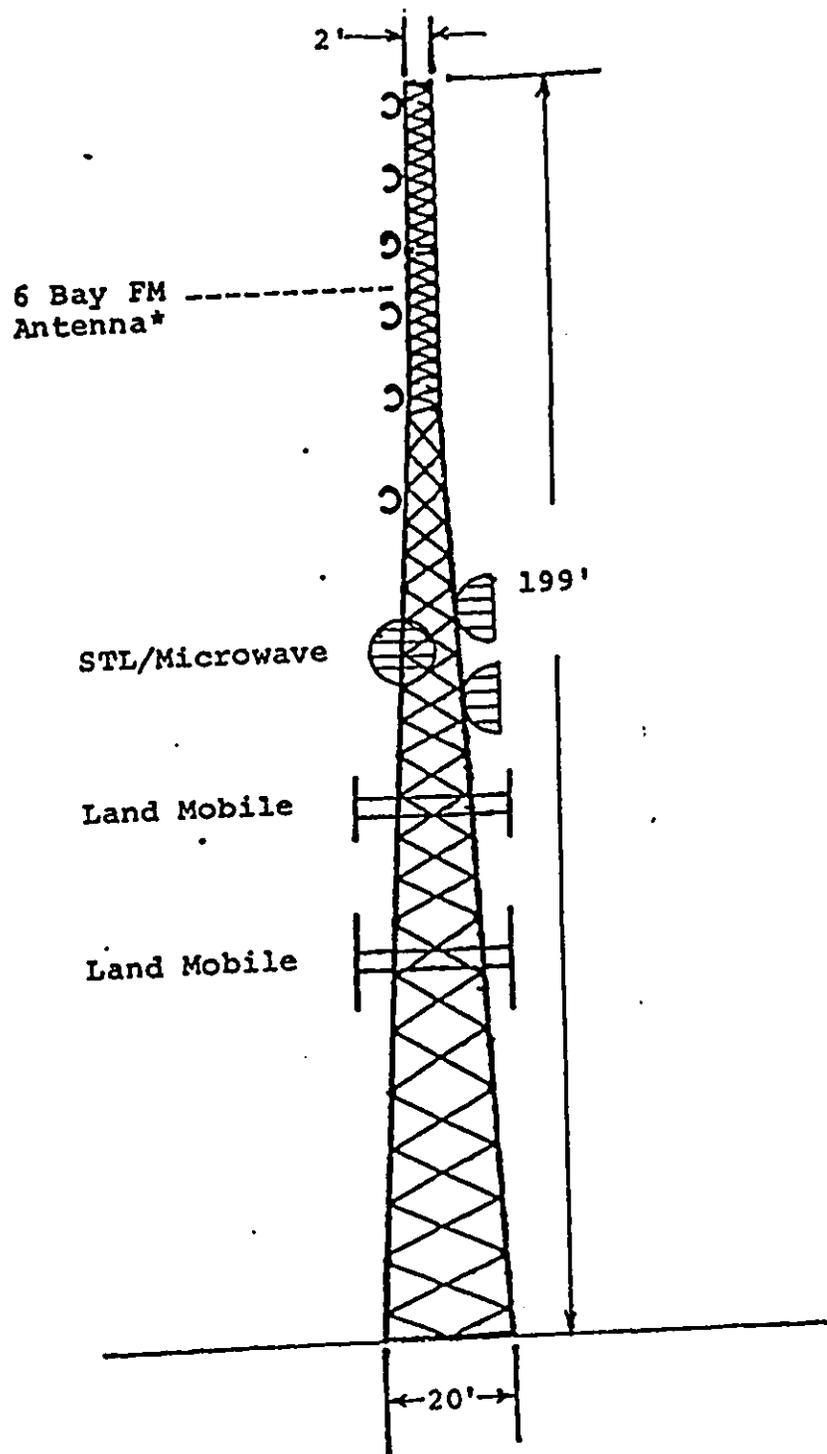




SIDE



FRONT



* FM antenna designed for multiple station use

TOWER ELEVATION

EXHIBIT H

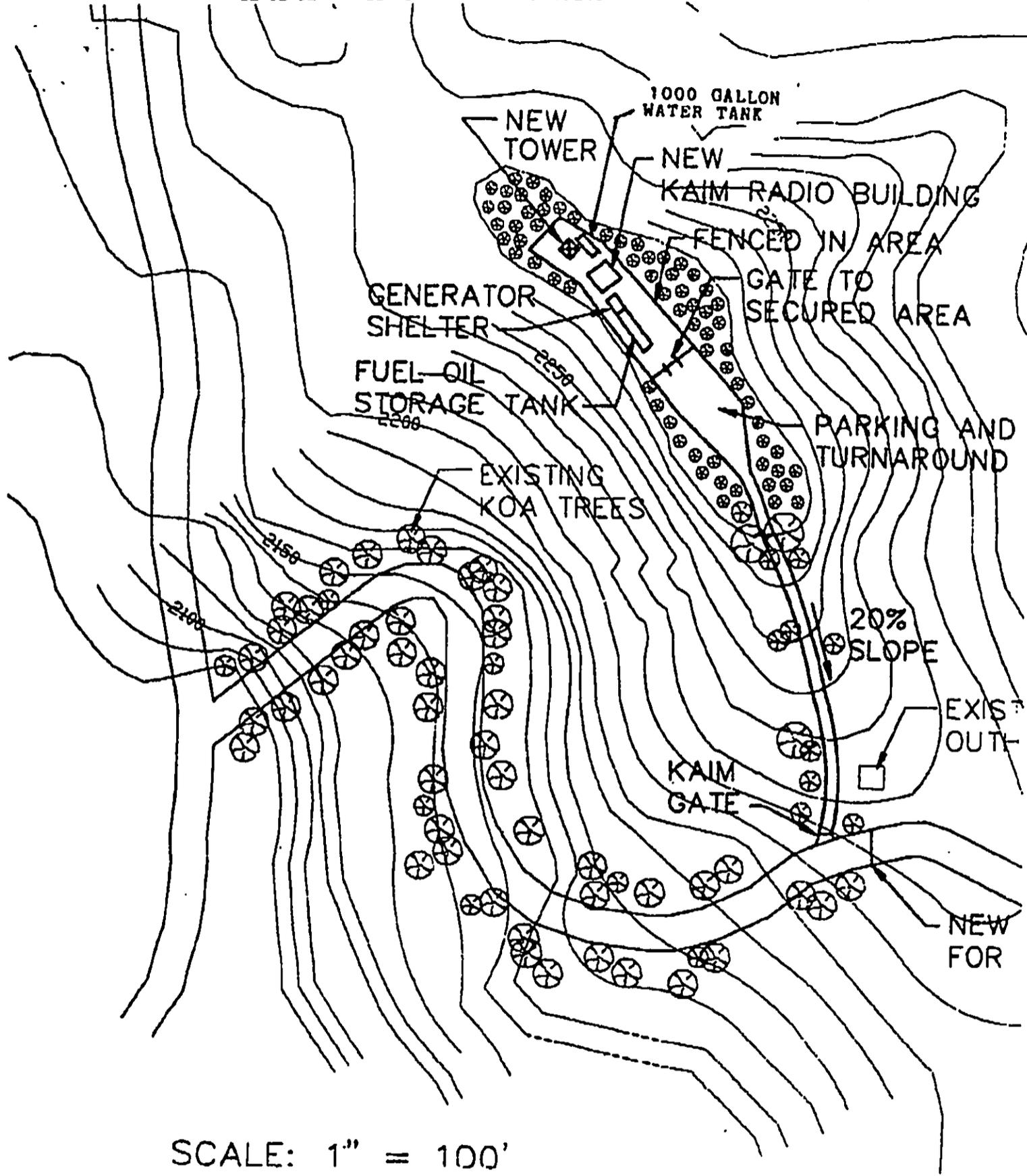
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02/12/92

03:43

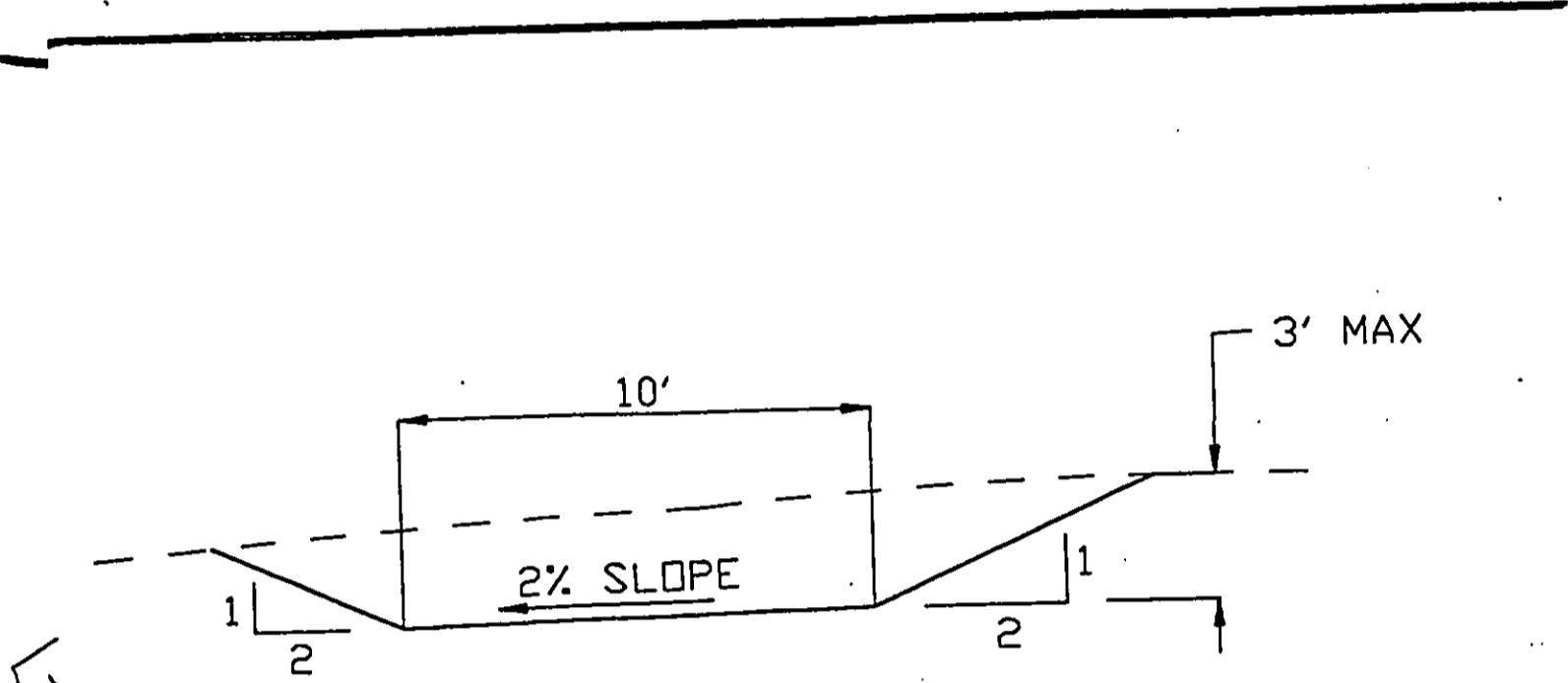
KAIM RADIO STATION

02



SCALE: 1" = 100'

1 10F3



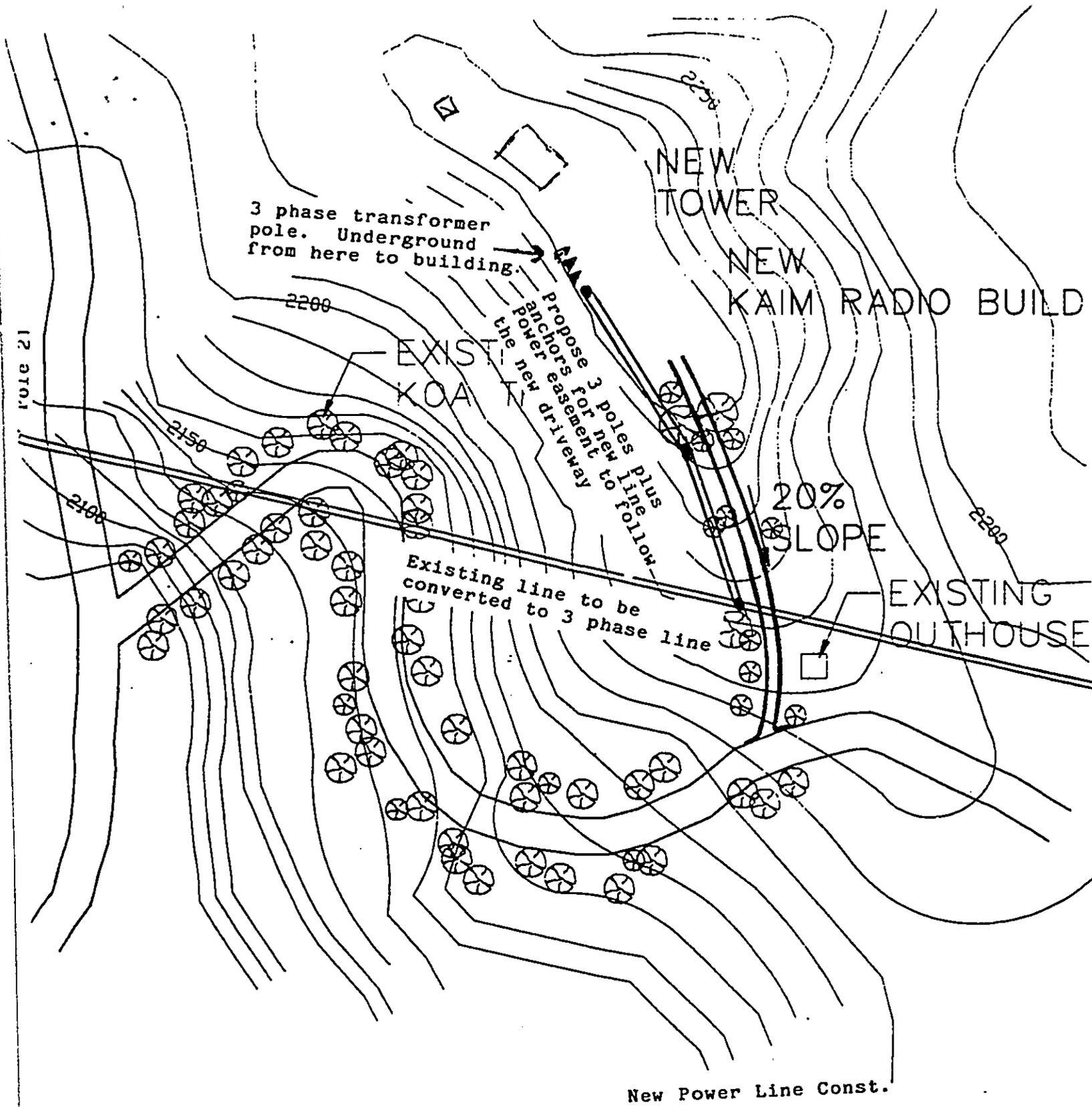
TYPICAL ROAD SECTION

SCALE: 1" = 4'

EARTHWORK QUANTITIES

EXCAVATION = 380 CY.

EMBANKMENT = 0



SCALE: 1" = 100'

Hawaii Loa College

45-045 Kamehameha Highway
Kaneohe, Oahu, Hawaii 96744-5297
(808) 233-3100
FAX (808) 233-3190
(800) 445-6221

RECEIVED

'91 DEC 3 PM 4:17

DLNR
OCEA

Mr. Edward Henry, Staff Planner
Department of Land & Natural Resources
State of Hawaii
1151 Punchbowl
Honolulu, Hawaii 96813

December 7, 1991



Dear Mr. Henry:

KAIM radio station has recently applied for a permit to construct a transmitting tower on a site at about 2,500 feet elevation on Palehua Ridge. The proposed site has an uninterrupted vista of the entire expanse of the Koolau mountain range from the Northshore to Diamond Head. When visibility is right, one can see Haleakala on Maui and the major peaks on the Big Island. On the proposed site are also native Hawaiian plants including but not limited to Sandalwood trees that are desperately trying to make a comeback after being deforested by the early visitors to Hawaii. The Sandalwood trees on the site are being seeded by older Sandalwood below the site. The seeds are blown by the wind, find an open area (this is the only open spot in the general area), germinate, and luckily find a root of a less endangered Koa tree of which it has a natural symbiotic relationship. There are several large Koa trees on the site that serve as hosts for Sandalwood seedlings. The seedlings cannot be transplanted and any disruption of the host Koas means an inevitable death to the Sandalwood seedlings.

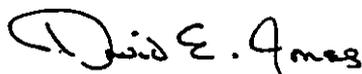
The area is also geologically significant with unique rock formations along the ridge caused by geologic upheaval when this island was formed and subsequent erosion. The planned access road would pave over this unique geological area and its native plants. This particular site has been the location of classroom visits by island colleges and universities for both its geological and botanical features. Not only is the area significant for its aesthetic, botanical, and geological features, but

also for the various bird species that inhabit the area. I have personally heard what sounded like the Hawaiian Bat call and believe I have seen its erratic flight pattern at late dusk and in the night sky. It is conceivable the any type of transmissions from this part of the ridge would could play havoc with the bat's ability to navigate with its natural sonar and it is possible that the construction of a road, building with exhaust fans, and a tower would disrupt its fragile ability to adapt to even more changes in its environment. The location is also an area for some varieties of Hawaiian owls. The proposed site is a unique and fragile classroom for understanding and appreciating the formation of our islands, the creation of its unique and fragile habitat, and the place of human beings in the world's greater context. I strongly urge you not to issue a permit to KAIM and its affiliates. Their signal already reaches out into the Pacific as far as the Philippines and from what I understand, they only want this site to reach a small number of isolated outer island pockets where their signal currently does not reach. These pockets are only possible listeners for their very specific non-mainstream message. The ruination of a very special environmental area for such a limited few is irresponsible and unethical.

One of my teaching and research areas is environmental ethics. I team teach a course with ecologists and earth scientists on the environment at Hawaii Loa College where I enjoy a faculty position. I also teach a religion course at Leeward Community College. I strongly urge you to deny a permit for this commercial project in a conservation area where native plants and animals are trying to make a comeback from earlier devastation. Those of us interested in this area have been working hard to work with--instead of against--the ridge as KAIM plans to do. Unlike KAIM, we work without profit.

Thank you for your serious attention to this most important matter.

Sincerely yours,



David E. Jones Ph.D.

cc Mr. William Paty, Chairman DLNR

. | ZOF11

 Hawaii Loa College

45-045 Kamehameha Highway
Kaneohe, Oahu, Hawaii 96744-5297
(808) 235-3641
FAX (808) 247-8166

RECEIVED

'91 DEC 19 PM 1:11

DLNR
OCEA

December 17, 1991

Mr. Edward Henry
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl St.
Honolulu, Hawaii 96813



Dear Mr. Henry:

I am writing regarding the proposed construction of a radio transmission tower by station KAIM on a ridge near Palehua in the Waianae Mountains of Oahu. I understand that the site in question near the 2,500-foot elevation is designated for conservation use, but that the proposed facility would involve building a new road and intensive construction activity.

My own experience in the Palehua area is limited, but I have enjoyed hikes there at various times with groups such as the Sierra Club and Hawaii Audubon Society. As a biologist and naturalist I do know that the site in question contains a mixed forest of native and introduced species, but it is on the lower edge of a nearly pristine native mountain ecosystem that contains endangered plants, *Achatinella* snails, and perhaps endangered native birds. Further intrusive development, such as radio tower construction, at Palehua will only tend to degrade what endemic natural value is still left in this part of Waianae Mountains.

The plants that spring up along any new road and around a new bulldozed site are not the natives, but the aggressive aliens. They in turn attract introduced birds and insects from degraded habitat below. The alien birds spread alien seeds; some of the new insects move into areas of native vegetation and damage our Hawaiian plants more extensively than their former host plants. I am sure you know these facts and many of the unfortunate examples that illustrate them in our remaining native forest ecosystems. The problem is one of progressive encroachment. How many new projects like the one proposed by KAIM and Campbell Estate in this case can be tolerated in sensitive areas such as Palehua?

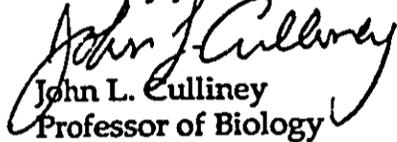
| 30F11

Mr. Edward Henry
December 17, 1991
Page 2

In the last few years, DLNR has begun to improve its image vis`a vis protecting the native Hawaiian environment which is, nevertheless, still on the decline. We have so little left, especially on Oahu, that I feel the situation is already past the critical stage. Unless the line is drawn on encroachment, how long will it be until the Palehua area succumbs and turns into just another scruffy ridgeline overgrown by the weeds of the world's tropics.

I recall watching a small flock of amakihi (*Hemignathus virens*) feeding in mesic native forest just a short distance above the proposed KAIM site. As you know, Oahu's amakihi is not yet endangered, but its population is not growing and may well be declining. Might DLNR consider helping the amakihi not to become endangered by taking a stand on ecological encroachment at Palehua?

Sincerely yours,


John L. Culliney
Professor of Biology



University of Hawaii at Manoa

Department of General Science
Dean Hall 2 • 2450 Campus Road
Honolulu, Hawaii 96822

RECEIVED

'91 DEC 13 PM 2:14

DLNR
OCEA

November 22, 1991

MEMORANDUM

TO: To Whom It May Concern

FROM: Mark Merlin, Ph.D. *Mark Merlin*
Associate Professor, General Science Department

SUBJECT: Aspects for consideration regarding the potential construction of
of a radio transmission tower site on ridge by Pu'u Manawahua,
Palehua, Oahu.

This site has number of special environmental, cultural and esthetic attributes which I believe are worthy of consideration before permission is granted to construct a radio transmission tower at this particular place on the ridge. As a former full and part-time resident in the Palehua area for some 15 years (1971-1986), who has studied the area extensively, I offer the list of recommendation below for your information and possible consideration.

1. Although there may not be any officially listed endangered species on the site, or nearby, there is a possibility that some may exist — for example, an endemic shrub in the genus Alsinodendron sp., and an endemic land snail in the genus Achatinella. Over the years, I have observed these in the "neighborhood." A biological survey should take place before final decisions are made.
2. The area does have a number of endemic trees close by and in the general vicinity, such as Acacia koa (Koa) and Santalum freycinetianum (Sandalwood). Indeed, the number of native plants near the site is unusual for Palehua in general. Most of the forest is now comprised of introduced trees and other alien weedy plants. The population of this sandalwood species in the ridge site area is certainly one of the best in the Southern Waianae Mts. Perhaps the largest individual tree (dbh. about 12 inches) on the island (?) can be found below the proposed site along the descending trail.
3. Geologically, the site is interesting in that many large, nearby rocks exhibit fine examples of surface solution weathering known as lapiés. These dike rock outcrops are notable from both a scientific and aesthetic point of view.
4. Aesthetically, in addition to the natural "rock garden" type of environment, the ridge area has an attractive botanical appearance, especially as it is approached from the house complex to the south. Furthermore, the site itself has some of the best unobstructed views in the Palehua area. The

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aesthetic aspects may be more valuable for future use as a public view point or part of a hiking trail, or even as a future private home site. It is an especially nice view area in a prime mountain location.

5. There is a complex of trails leading from the old Von Holt housing complex out to the site along the ridge and down slope and around and below the houses. This could be upgraded and maintained for its native and other interesting components. It is a relatively unique windward trail system in the dry forest ecosystem of the Palehua area; the proposed tower complex would limit this biological and cultural resource.

If you would like to pursue these consideration further before making a final decision. Please contact me. I encourage you to keep this place free of such an intrusive development as planned in the radio tower construction. I am quite aware of the communication resources that Palehua has to offer. However, due to the present and future ecological, cultural and economic value for the community at large and the Campbell Estate, the site referred to here should, in my humble opinion, be spared from this kind of development.

Thank you for your attention and consideration.

29

RECEIVED

'92 JAN 13 PM 12:58

JAN 25 1992

DLNR
OCEA.

January 2, 1992

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

Mr. William Paty
Chairman
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

→

DA-2519

Dear Chairman Paty:

In regard to KAIM's request for a permit to move its radio broadcasting transmitter tower to the Palehua area, I write this letter in protest to the granting of that move.

As you undoubtedly know, a state Health Department study in 1987 found that residents living near broadcasting towers in Honolulu had a "significantly higher" cancer rate than had been expected. At that time, Dr. John Lewin raised the possibility that we could be "microwaving ourselves to death" through radio-frequency radiation from such towers.

The study area included Kaimuki with the broadcast tower off Harding Avenue which served radio stations KAIM-FM, KAIM, KOHO and KUMU. The cancer rate in the adjacent Kaimuki district was found to be almost three times that to be expected among men residing nearby (among women it was more than twice as high). At the time of the publication of the study, Alden K. Henderson, its co-author, said: ". . . it [broadcast radiation] does contribute to a person's chances to develop cancer."

It was found then that the KAIM tower exceeded the broadcast industry's voluntary standards for AM-based magnetic waves by five and one-half times! This fact, alone, causes one to question any claims that KAIM might make regarding the "safety" of its transmitting tower in terms of the health hazards to nearby residents, and, further, to question the efficacy of relying on voluntary compliance on the delivery of safety standards.

Certainly, that transmitting tower must be relocated for the sake of those living in Kaimuki, and KAIM should be required to remain within the industry's standards for AM-based magnetic waves, wherever that location is to be. But to relocate it to Palehua is obviously unwise since its presence will constitute a health hazard of very serious dimensions to the residents there.

2

January 2, 1992
Mr. William Paty
Chairman
Department of Land and Natural Resources

Their lives are precious too, regardless of the numerical difference in the populations in the two areas. How ironic that a religiously oriented and owned station should beam its message of "salvation" while putting people's lives at risk here and now.

From 1979-1985, I was the Young Adult Librarian at Kaimuki Regional Library which is located about two blocks from the KAIM transmitting tower. I gave programs in the auditorium of the library during which I used a microphone to address the audience. After KAIM increased its magnetic wave signal, the microphone was worse than useless because the station's signal came through it instead of my voice. This fact indicates other problems, besides the major health hazard, that nearby residents in Palehua would have if the transmitting tower of KAIM were erected there in such close proximity to residents. They would surely suffer constant interference with their reception of television and all other radio programs because of the strength of KAIM's signal.

In conclusion, most importantly for the sake of the future health of nearby residents of Palehua, I urge you not to grant the permit for KAIM's transmitting tower to be moved there. A further consideration is that if the Board were to issue such a permit, to add insult to injury, the tower's signal would undoubtedly prevent the residents, who are nearby, access to the television and radio program of their choice, other than KAIM and its affiliates, which would be an infringement of their rights.

Sincerely yours,

Patrice McCarthy Nagley
(Mrs.) Patrice McCarthy Nagley
3620 Kawelolani Place
Honolulu, Hawaii 96816

| 80F11

Handwritten mark



University of Hawaii at Manoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawaii 96822
Telephone: (808) 956-7361

January 22, 1992
RN:0295

Department of Land
and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Handwritten mark

Dear Sir:

Negative Declaration
Conservation District Use Application
Palehua Ridge FM Broadcast and
Telecommunication Tower
Oahu

DIR
OCEA

92 JAN 30 AM 5:54

RECEIVED

The referenced document proposes construction of a multiple use Radio and T.V. and Telecommunication Tower and accompanying multiple use transmitter building. This will involve the construction of a 199 foot high self-supporting tower to which will be attached a 6 Bay multiple use antenna, several micro-wave dishes and communication radio antennas.

The Environmental Center has conducted a review of this document with the assistance of Mark Merlin, General Science; and Nancy Kanyuk and Alex Buttaro, Environmental Center.

Our reviewers have expressed serious concern as to the adequacy of the above referenced document. Given the nature of the project (i.e., construction of a high power FM broadcast and telecommunication tower) they found it rather unusual that the document made no reference to potential impacts of the project on area residents. In fact, the document failed to mention that there were residents there at all. Given the current controversy over potential health hazards of high frequency radio and micro wave towers (See Cancer Incidence in Census Tracts with Broadcasting Towers in Honolulu, Hawaii, 1986 prepared by the Department of Health), this omission seems quite startling. In fact the document itself includes a letter from Ram Communications Consultants, Inc. denying use of Honolulu Cellular Telephone Company's microwave tower due to the increased levels of RF radiation involved, and citing health and interference problems.

We would also suggest that since the area is part of a dry forest ecosystem, albeit a slightly degraded one, the observation that the

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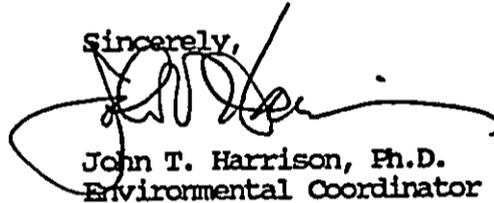
Department of Land
and Natural Resources
January 22, 1992
Page 2

vegetation consists of only guava and eucalyptus seems unlikely. In fact, our reviewers have visited the area and have found a number of endemic trees in the general vicinity, including Acacia koa (Koa) and Santalum freycinetianum (Sandalwood), the endemic shrub Alsinodendron obovatum and the lobeliad, Eugenia reinwardtiana. Hence we would strongly suggest the inclusion of a botanical survey of the proposed project area. There have also been unconfirmed sightings of the endangered Hawaiian Hoary Bat in the area.

In summary, our reviewers have expressed serious reservations as to the adequacy of the existing document and would suggest that, based on the information provided, the conservation district use application should be denied.

Thank you for the opportunity to review this document and we hope our comments are helpful.

Sincerely,



John T. Harrison, Ph.D.
Environmental Coordinator

cc: OEQC
Roger Fujioka, WRRC
Mark Merlin
Alex Buttaro
Nancy Kanyuk

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12/15/91

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LETTER - DEPT OF LAND & NATURAL RESOURCES

301

LA 2519

December 17, 1991

Mr. Edward Henry, Staff Planner
Department of Land & Natural Resources
State of Hawaii
1151 Punchbowl St.
Honolulu, Hawaii 96813

S

Dear Mr. Henry,

It has come to my attention that KAIM Radio has applied for a permit to construct a radio tower on Palohua Ridge. KAIM has been a concern in the Kaimuki area because of its powerful signal that exceeds the broadcast industry's voluntary standards for A-M-band magnetic waves by five and one-half times. Palohua Ridge lies within conservation lands and potentially contains rare indigenous birds, mammals, and insects. The ridge is also inhabited by numerous residents in close proximity to the proposed tower site.

As a health care professional, I am concerned about non-ionizing radiation produced by RF radiation as it affects humans and other species. A number of transmitting towers already exist on Palohua Ridge and the addition of yet another tower with KAIM's transmission frequency may produce negative health effects not only to the residents of Palohua Ridge and Makakilo, but to wildlife. The biological effects of low-level intensity exposures are ongoing concerns of scientists. The lack of conclusive evidence does not in any way indicate that there is no risk associated with long term exposure to RFR. In point of fact, the Radiation Sciences Division in the USAF School of Aerospace Medicine is conducting and evaluating research upon which to base Air Force safety guidelines for all types of radiation.

My concerns relate to: 1) what are the existing levels of RFR on Palohua Ridge?; 2) what frequency will KAIM broadcast from this new location; and 3) how many signals in addition to KAIM will be broadcasted from this tower? I am aware of the controversial nature surrounding biological effects of RFR, but from my review of the current literature the research is incomplete and the scientific community is unable to consistently reproduce their empirical findings.

I urge the Department of Land & Natural Resources to strongly consider denying KAIM the permit based on, 1] KAIM's unwillingness to broadcast within the voluntary standards, 2] the fact that numerous towers are already in place on Palohua Ridge, 3] the lack of information on the existing levels of radiation on the ridge, and 4] the potential effects of additional RFR on a sensitive ecosystem.

Thank you for your attention to this most sensitive issue.

Sincerely,
Sharon Lash, RN, BSN
The Queens Medical Center

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THE ESTATE OF JAMES CAMPBELL

January 31, 1992

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Mr. Ed Henry
Staff Planner
Dept. of Land & Natural Resources
P. O. Box 621
Honolulu, HI 96809

DINR
OCEA

Dear Mr. Henry:

Christian Broadcasting Association's
Conservation District Use Application
to Build a Communications Tower
at Palehua, Oahu, Hawaii

M

This letter is to provide additional information and background regarding points that were raised during the public hearing for the subject site held on December 19, 1991.

1. Two individuals, Dr. Jones and Dr. Klein, indicated they were speaking on behalf of and/or as Palehua tenants. Although we have no official record of their residence at Palehua, we have, through this CDUA process, learned of their subtenancy at Palehua under other Campbell Estate lessees. Campbell Estate has 17 Palehua lessees who live generally within the 1,200 acres of the 4,900-acre Honouliuli Forest Reserve, wherein various communications sites are located. The 17 residential leases occupy about 76 acres. The 12 telecom sites occupy about 13 acres. Subsequent to the December 19 public hearing, we mailed letters to all 17 Palehua residential lessees inviting their comments and questions. Eleven of the 17 lessees have responded either by letter or by telephone and none opposed the project. Nonetheless, Campbell Estate does understand the concerns that the tenants have about traffic, the potential for soil erosion, and potential disturbances caused by construction activity. Will continue to work with the lessees to keep them informed and mitigate any negative impacts from construction activities.
2. Dr. Jones stated in his testimony that Campbell Estate does not know where the property line of the adjacent leasehold parcel is. To the contrary, the lease document between the Campbell Estate lessee and the Estate contains delineated leasehold boundaries. The proposed site does not impose on the leasehold parcel. The proposed site has been discussed with the lessee (Dr. Jones's landlord) with the expectation that the proposed access road may be partially shared with the existing driveway to minimize cutting and clearing.
3. Dr. Jones stated that residents of Palehua's pets have had hideous and grotesque cancerous growths. In our letter to the tenants wherein we invited their comments, none indicated problems with such hideous and grotesque cancerous growths.

----- K 10F6

Mr. Ed Henry
January 31, 1992
Page 2

4. Finally, Mr. Klein stated that it seemed that Campbell Estate was trying to move residents out and replace them with communication sites. Campbell Estate has accommodated both residential and telecommunication uses at Palehua Ridge for over 40 years and, in that time, has not displaced any residential lessees for any reason.

In closing, the Palehua residential tenants have cohabitated with telecommunications sites for decades. Nonetheless, with the awareness that the demand for such sites will continue, the leases between the tenants and Estate makes provisions relating to telecommunications uses and regarding restrictions inherent in residential habitation of a Conservation District. The Estate has carefully master planned the area to accommodate the tenants, the 3,700-acre nature preserve, and the community's need for communications sites.

Sincerely,

Howard Schwiebert

Howard R. Schwiebert
Asset Manager
Telecommunications/Lanikuhonua

cg:01033400/K10048

----- K 20F6

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We wish to go on record to clarify some points, regarding this proposed project, that were brought up by some of the residents of Palehua Ridge at the public hearing on December 19, 1991.

Some will be addressed by us, (Christian Broadcasting Association) and some will be addressed by Campbell Estates.

1. The matter of proximity of nearest tower. Paul Ruse stated that the nearest tower was 1000 feet to one quarter of a mile to the north. This is on the transcript.

2. Regarding archeological sites, according to research done by the Bishop Museum, the nearest site is site # 137 as outlined on the attached map, EXHIBIT # 1. This is Puu Kuua Heiau, Palikea, Honouliuli. This Heiau was located on the ridge overlooking Nanukuli, as well as Honouliuli, at the approximate elevation of 1550 feet. Most of the stones of the Heiau were used for a cattle pen located on the sea side of the site. That portion of the Heiau which has not been cleared for pineapples has been planted in ironwoods.

IF ANY ARCHEOLOGICAL SITES ARE DISCOVERED IN THE CONSTRUCTION PROCESS OF THE PROPOSED SITE OR DRIVEWAY LEADING TO IT, CONSTRUCTION WILL BE STOPPED TILL IT CAN BE EVALUATED BY QUALIFIED PEOPLE FROM BISHOP ESTATES OR SIMILAR AGENCY.

3. Clarification of Botanist John Obata's report.

A point was raised that John Obata did not spend much time on the ridge.

John Obata is a long standing professional in his field and does not need a great deal of time to investigate the area and analyze it correctly.

John Obata has been doing studies of trees and plants on the Wainae ridge for 40 years and is one of the most qualified persons to make an analysis of what is endangered and what is not. Enclosed is his report in EXHIBIT # 2

4. In reference to the matter brought up about the newspaper article where K A I M was listed as having excessive radiation at it's Kaimuki location in 1985.

Here are the facts: When the station was originally built in the 1950's there was not the knowledge about RF ramifications. The main concern was to build a restraining fence to keep people from touching a "hot" tower.

When all of the stations in Honolulu were measured by the EPA in 1985 it was discovered that the radiation right at the metal fence enclosure around the K A I M AM tower exceeded the allowable limits. The FCC recommendation was for K A I M to build a non-conductive wooden fence that enclosed the immediate area around the tower 18 inches larger in all directions.

K 3 OF 6

#4 Continued:

This was done and new readings were taken which proved to be within the ANSI guidelines. I might note that this is in a semi-restricted area that only has access by those using the parking lot under the Board of Realtors Building and in the surrounding fenced in area. The general public was not affected by this radiation and even the employees using the parking lot were NOT in an RF field that exceeded ANSI standards unless they were closer than 2 feet to the fence before it was replaced.

See note in EXHIBIT # 3 reporting on the RF in Honolulu.

The other factor that needs to be emphasized is that this case was with an AM tower in addition to the FM antenna. Whereas the proposed tower on Palekeea Ridge will be strictly for FM and Microwave use where the radiation is from the top of the tower and is at allowable levels at ground level. This differs from AM where the radiation is on the entire tower but primarily at the base. SEE REPORT IN EXHIBIT # 4 that displays the typical readings at ground level with projected use by 3-100,000 watt FM stations on the same antenna. This projects the RF at ground level to be well within the ANSI guidelines of 1.0 mw IF THE ANSI GUIDELINES AT GROUND LEVEL AT THE TOWER BASE WOULD BE EXCEEDED BY FURTHER ADDITIONS TO THE SIGNALS ON THE SAME ANTENNA, THE FENCED IN AREA WOULD BE ENLARGED SO THAT THE ANSI MINIMUMS WOULD BE ADHERED TO OUTSIDE OF THE FENCED IN AREA. WITH THESE PRECAUTIONS THERE WILL BE NO ADVERSE EFFECT ON HUMANS OR ANIMALS WHO WOULD COME NEAR THE AREA.

- #5 A statement was made that the construction area would take up the space of a football field and that the guy wires would disrupt an even larger area. In our CDUA application it is stated that the area on the plateau is 30,000 square feet but the fact is as stated in the Environmental Impact Statement, that only the amount of space needed for the building, tower and driveway will be cleared for construction. This would relate to an area about 50 feet wide by 100 to 150 feet long for the building site. Also it is stated in the CDUA that the tower is to be self supporting with legs 20 feet apart at the base. This type of tower does not need guy wires and anchors.

#6 The comment was made that KAIM was developing this site for a profit motive.

CLARIFICATION:

K A I M, first of all is a non profit organization. Secondly, the development of this site takes a considerable investment to give the applicant a site to broadcast from for the FM station. The best K A I M can expect from this development is to re-coup a percentage of the original investment from the co-users of the facility. The multiple use facility makes it possible for other communications operations to use the same site and minimize the disruption of land and foliage.

#7 A speculation was made that a residents computer had ceased to function and that it was possible that RF was to blame. Also it was stated that this computer was replaced by a new computer. Nothing was said about it's operation so apparently it is working properly which would indicate that there was some other cause of the old computers demise. If there is radio frequency that affects the operation of radio, T.V., or computers, this usually can be trapped out quite easily. The better quality electronic equipment has filter traps built in and usually cause no problems.

#8 Another comment was made about pets on the ridge having growths on their body. presumed to be caused by RF. This we recognize as speculation and something that cannot be substantiated. If the pets get too close to restricted areas for long periods of time there is some theory that this could possibly affect their health. RF has a heating effect and the parts of the body that has lower blood circulation could become "overheated" by extended exposure. Residence areas near and far from the towers have been measured for RF and have proved no RF reading. See Exhibit # 6 of this report.

#9 Also it is to be noted that there are 2 kinds of radiation, the Non Ionizing and the Ionizing. This is referred to on Page # 3 of EXHIBIT # 5. In laymans terms, the Ionizing radiation comes from TV screens, Computer screens, X-Ray machines and the like. Non-Ionizing radiation comes from Radio and TV transmissions which is similar in effect to a microwave oven. it gives a heating effect if it is strong enough. The effects of being near a TV set or computer screen is generally regarded as being more hazardous to humans and animals than being in the general area of Radio and TV transmissions,

#10 A comment was made about the poor housekeeping at other sites on Palehua Ridge. We welcome anyone at anytime to inspect our broadcast transmission facilities and it will prove that everything is neat, well cared for and in good order. This will also be the way we will maintain this site.

#11 As to the reference made to erosion. As stated in the Environmental Assessment which has been filed, the ditches and moved and bare earth will be seeded with appropriate grass seed to help retain the soil and deter erosion. This to be similar to the way highway departments seed loosened and bare earth only on a smaller scale.

R E S U L T S O F R F S T U D Y O N P A L E H U A

R I D G E

Readings were taken on January 23, 1992

Measurements were made with a N A R D A BROADBAND ISOTROPIC
RADIATION MONITOR manufactured by Narda Microwave Corp. of
Hauppauge, New York, USA

This instrument was factory calibrated in July of 1991.

FCC-ANSI recommended standards are that readings below 1.0 mw are safe
for humans to be in for extended periods of time. If radiation exceeds
the 1.0 mw readings it is recommended that maintenance personnel who
must work in these areas to do so in short periods of time.

READINGS MADE ARE AS FOLLOWS:

Location	Electrical Field	Magnetic Field
At residence just inside second gate.	-0-	-0-
On road by entrance to Ken Taylors driveway	-0-	-0-
At residence of Ken Taylor and Dr. Jones	-0-	-0-
By residence at Pole 27 and Palehua Road	-0-	-0-
In roadway 200 feet away from K-5 tower	-0-	-0-
At base of KDEO & KSSK Tower	.20 mw	.25mw
25 feet from fence by road	.08 mw	.10mw
100 feet from fence Makai from fence	.019 mw	.03mw
200 feet from fence Makai from fence	.002 mw	-0-
Half way between KDEO-KSSK tower and Fox tower	.03 mw	.05 mw
200 feet downhill Mauka from Fox tower	.002 mw	-0-

It is to be noted that the readings where the RF shows up is in the close proximity of the KSSK KDEO tower and the FOX tower. Also there is some RF readings at the proposed building site. This is due to the proposed site being on the same plane as the antennas of KDEO & KSSK, putting the proposed site somewhat in the working signal path of those 2 antennas. The readings are not excessive but should be taken into consideration when readings are taken after the proposed tower and operation are "in operation" The readings in the proposed construction area are as follows:

Location	Electrical	Magnetic
At Proposed site for building	.008 mw	-0-
50 feet North of building site	.025 mw	-0-
By KOA stake	.025 mw	.2 mw
At fork in Koa tree	.08 mw	.3 mw
By Chair Stake	.01 mw	.1 mw
Pole A Stake	.005 mw	.05 mw
Pole B Stake	.005 mw	.15 mw
Trail Stake	.005 mw	.05 mw
Narrow Stake	.001	-0-
Stone Stake	-0-	-0-

Note: Some of the names above are the names on survey markers.
Surveyer says that these locations will be noted on the map.