

JOHN WAIHEE
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
HISTORIC PRESERVATION PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

RECEIVED

FILE NO: MHA-5/12/92-2556
DOC. ID.: 715

MAY 19 1992

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

MEMORANDUM

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

FROM: William W. Paty, Chairperson
Board of Land and Natural Resources
John P. Keppeler II

SUBJECT: Document for Publication in the OEQC Bulletin
Environmental Assessment for Conservation District Use
Application HA-5/12/92-2556 for a Subdivision to Create a
Larger Land Area Under Executive Order, and for Subsequent
Land Use to Construct a New 8,500 S.F.
Climatological/Atmospheric Research Center

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 Roy Schaefer of our Office of
Conservation and Environmental Affairs, at 587-0377, if you have
any questions.

1992-06-08-HI-FEA-NOAA Climatological / Atmospheric Research Center

ENVIRONMENTAL ASSESSMENT

PROPOSED CLIMATOLOGICAL / ATMOSPHERIC RESEARCH CENTER

MAUNA LOA OBSERVATORY

29 MAY 1991

APPROVING AGENCIES:

Office of Ecology and Environmental Conservation
National Oceanic and Atmospheric Administration
Washington, D.C.

Division of Land Management
Hawaii Department of Land and Natural Resources
Honolulu

SUBMITTED BY:

Mountain Administrative Support Center; Boulder, Colorado
National Oceanic and Atmospheric Administration
Carol Ciufolo (303) 497-5769

PREPARED BY:

DMJM
Los Angeles, California
John Pearson (213) 381-3663

TABLE OF CONTENTS

	<u>PAGE</u>
EXISTING MAUNA LOA OBSERVATORY FACILITIES	1
DESCRIPTION OF PROPOSED PROJECT	4
AFFECTED ENVIRONMENTS AND POTENTIAL IMPACTS	6
Biological Resources	6
Archaeological/Historic Resources	6
Visual Impacts	7
Utility Requirements	8
Potential Hazards	8
MITIGATION MEASURES	10
DETERMINATION	11
APPENDICES	
1. Agencies Contacted	12
2. References	13
3. U.S. Fish and Wildlife Service Findings	14

LIST OF FIGURES

	<u>PAGE</u>
1. Vicinity Map - Island of Hawaii	2
2. Existing and Proposed MLO Facilities	3

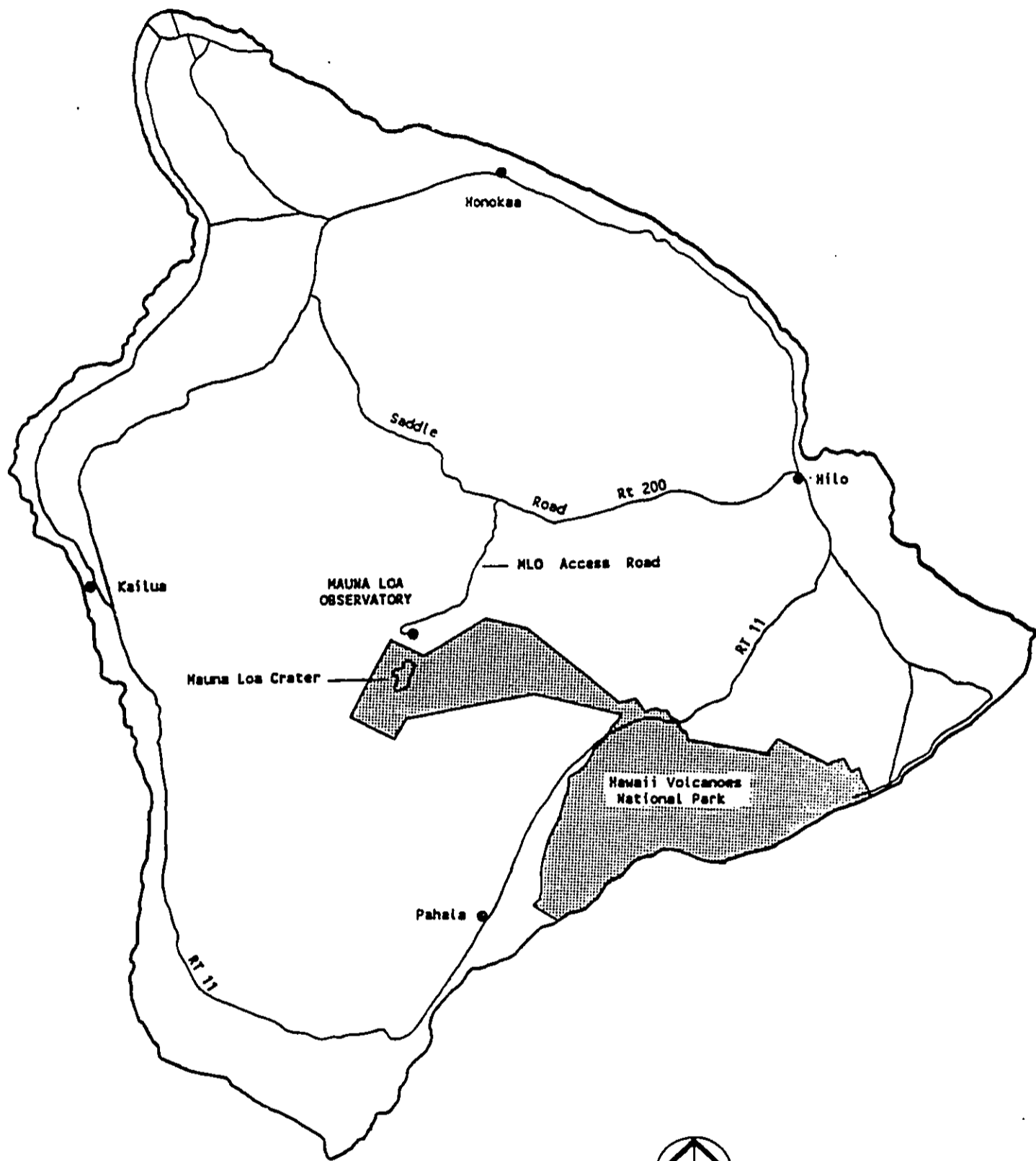
EXISTING MAUNA LOA OBSERVATORY FACILITIES

The Mauna Loa Observatory (MLO) is one of the country's most important atmospheric data collection and experimentation stations. Current work includes monitoring of concentrations of a variety of atmospheric gases, monitoring of aerosol concentrations, solar radiation measurements, and monitoring of meteorological data such as temperature, wind, precipitation, and humidity. The station plays a key role in the collection of data and the development of monitoring systems for several high-priority research programs focusing on the analysis of long-term climatological changes, including stratospheric ozone depletion and global warming.

Though the National Oceanic and Atmospheric Administration (NOAA) is the principal user of the facility, cooperative research programs involving the use of MLO facilities are carried on with a number of U.S. and foreign agencies and with a number of universities, including the University of Hawaii. There has also been cooperative use of the MLO facility by personnel of the U.S. Geological Survey's Hawaiian Volcano Observatory.

The Observatory was originally constructed in 1956. It is located at approximately 11,150 feet elevation on the north slope of the Mauna Loa Volcano, about 5.8 miles from the crater, or caldera, of the volcano, and about 2.3 miles from the boundary of the Volcanoes National Park, (see Figure 1). The Observatory is located well above the upper vegetation limit on a relatively recent (estimated 1832) lava flow.

Mauna Loa is the world's largest volcano and one of its most historically active. The last eruption at Mauna Loa occurred in 1984, lasting for three weeks and covering an area of about eighteen square miles with new lava. The Observatory is located in an area of substantial volcanic hazard (References 1 and 2). In 1983, a wishbone-shaped diversion barrier was constructed above the site to provide limited protection from lava flows (see Figure 2).



-2-



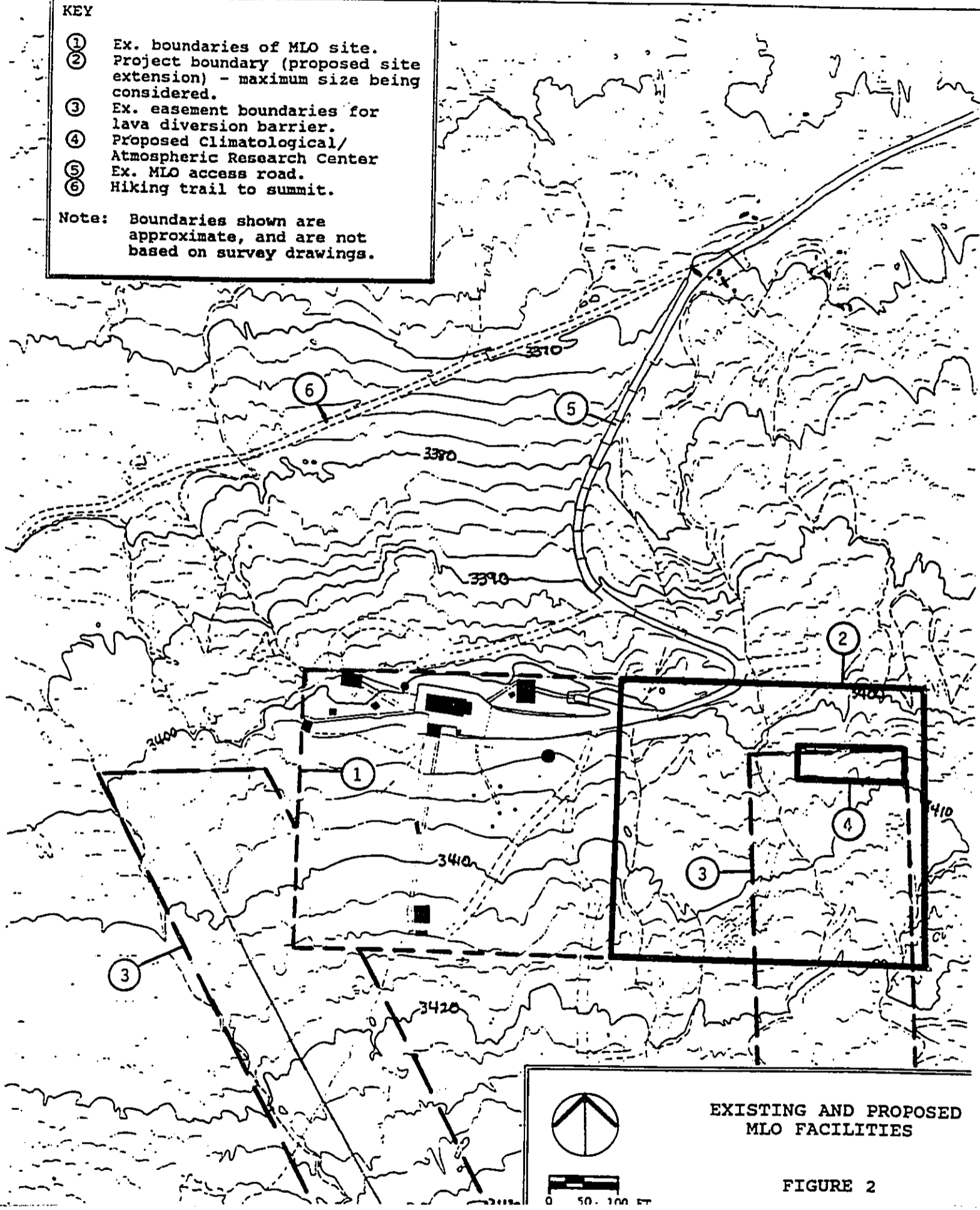
VICINITY MAP
ISLAND OF HAWAII

FIGURE 1

KEY

- ① Ex. boundaries of MLO site.
- ② Project boundary (proposed site extension) - maximum size being considered.
- ③ Ex. easement boundaries for lava diversion barrier.
- ④ Proposed Climatological/ Atmospheric Research Center
- ⑤ Ex. MLO access road.
- ⑥ Hiking trail to summit.

Note: Boundaries shown are approximate, and are not based on survey drawings.



EXISTING AND PROPOSED
MLO FACILITIES

FIGURE 2

DESCRIPTION OF PROPOSED PROJECT

Since the discovery of the ozone hole over the Antarctic continent in 1985, atmospheric scientists have become increasingly aware of the inadequate monitoring of stratospheric changes, both from natural and human-induced causes. While satellites can provide crucial global coverage, not all stratospheric species can be monitored by satellite, and there is a critical need for data from ground sources for calibration of spaceborne sensors.

In response to this need, NASA and NOAA, in cooperation with several foreign governments and industry, are deploying a network of five stations situated around the globe. This network is called the Network for the Detection of Stratospheric Change (NDSC). Each site is being equipped with state-of-the-art, ground-based, remote sensing instruments which can provide the earliest possible detection of changes in the composition and structure of the stratosphere, as well as the means to understand the causes of those changes.

In searching for observatory sites, Mauna Loa Observatory, located on the northern flank of Mauna Loa mountain, has been strongly recommended by the NDSC executive committee as one of the five sites for the NDSC. The present Observatory has been in operation for many years. It has produced many of the measurements currently used in understanding the earth's climate and in determining the global changes that have occurred in atmospheric trace species. It has been one of the most important environmental monitoring facilities in the world for producing data for understanding the atmosphere. The addition of this stratospheric network station at the present Observatory site will significantly enhance its overall mission and provide a strategic mid-tropospheric clean air site which is necessary for this new global network.

The proposed project involves the addition of a new 8,500-square foot single-story Climatological/Atmospheric Research Center. The building will be approximately 55 feet by 155 feet, of masonry construction with a reinforced concrete foundation and slab. It will contain the following:

- o Twelve individual laboratories connected to a central core.
- o Lavatory with shower.
- o Sleeping quarters for two people.*
- o Kitchen area.*
- o Mechanical/Electrical room
- o Utility/Storage room

* For occasional use during experiments.

Facilities and equipment associated with the building include the following:

- An asphalt parking landing area of approximately 10,000 square feet.
- Driveway to parking area.
- Septic sewer system.
- Non-potable cistern water collection system.
- Underground electrical lines from existing electrical distribution building.
- Electrical grounding system.

The asphalted area will provide parking space for a maximum of twelve cars and for a 45-foot semi-trailer containing monitoring instruments.

The new building and the facilities associated with it will be located east of the present MLO site on an adjacent parcel which must be added to the MLO site for this purpose (see Figure 2).

Terrain at the proposed building site is presently very uneven, consisting of loose, rubbly a'a type lava. It will be necessary to grade a smooth area for the facility with a bulldozer. No ripping or blasting will be required, and no export or import of soil from the site will be required.

Expansion or moving of the lava diversion barrier will not be required for the project.

At present an average of about five vehicle trips per week are made to the site. It is anticipated that implementation of the proposed project will increase vehicular travel to the site to about 7 to 10 trips per week.

AFFECTED ENVIRONMENTS AND POTENTIAL IMPACTS

Biological Resources

The project site is located at 11,150-foot elevation on a barren lava flow with no apparent plant or animal life. Uppermost signs of vegetation in the project area occur at about 10,000 feet. Lichens and scrub plants can be found on much older prehistoric lava flows to the west, but because of the harsh alpine environment, biota (with the exception of some spiders and insects), have not yet become established on the younger lava flow (estimated 1832) in the site area.

The only biota known to be established in the general area of the site are small populations of insects and spiders found in lava caves. Dr. Francis Howarth, an entomologist with the Bishop Museum in Honolulu, is familiar with the locations of known caves in the general project area, and is aware of none in the immediate vicinity of the site. The U.S. Fish and Wildlife Service (see Appendix 3) and The National Park Service Resource Management Office indicated that no protected species are known to exist in the vicinity of the site. None of the biologists contacted (see Appendix 1) considered it likely that any significant biota could be found at the site.

Though no lava caves or tubes are known to exist on the site, work should be stopped if any are encountered during construction until the caves or tubes are properly investigated (see Mitigation Measures).

Archaeological/Historical Resources

Both the existing MLO facility and the proposed expansion area are located on a relatively young lava flow, estimated to have occurred in 1832. This precludes the recovery of artifacts deposited on the site prior to this date. No structures, access trails, artifacts, or other evidence are apparent on the site to indicate human or animal use from the time of the lava deposit until construction of the Observatory in 1956.

Site conditions make it unlikely that such use has occurred. There is no vegetation or water in the vicinity of the site to attract animals or humans, and no caves or other shelter exist on the site. Lava at the site is of the a'a type, having very irregular surfaces

with loose, rough surface material. It is difficult to walk across a'ala lava, and it is likely that earlier native visitors to the site area travelled on older pahoehoe-type lava flows found a few thousand feet to the west that are smoother and easier to walk on. Virginia Goldstein of the Hawaii County Planning Department (Reference 1, p.3) indicated that traditional Hawaiian access to the Mauna Loa summit was from the south flank of the volcano. Holly McEldowney of the State Historic Preservation office agrees. She indicates that Historic Preservation has no record of historical findings or trails in the site area, and says that she would not anticipate the existence of significant historical artifacts on the site.

Though it is not likely that items of historical significance exist on the site, if potentially significant items are discovered during construction, work should stop until the findings are investigated. See Mitigation Measures.

Visual Impacts

The Climatological/Atmospheric Research Center will be a single-story structure of masonry construction, 55 feet by 155 feet in size, oriented approximately along an east-west axis (see Figure 2). The building has not yet been designed, and information is not yet available on colors, roofing materials, or layout of the parking area and other exterior facilities.

The area around the MLO site is unused and essentially untraveled for several miles in any direction. Except for aerial views, the site is visible only from a few lightly-used hiking trails on Mauna Loa and from a few spots along Saddle Road (see Figure 1). Traffic along Saddle Road is relatively light, and views of the site from Saddle Road are from a distance of twelve miles or more. The visual impact of the project will therefore be minimal.

However, it might be noted that almost all remote structures, such as research and utility buildings, in the higher undeveloped areas of the Island of Hawaii are highly visible because of white or reflective metallic surfaces that contrast strongly in color and texture with the lava fields or vegetation that surround them. Most of these facilities were constructed before concern over degradation of the State's natural areas became significant.

Given current attitudes toward protection of the State's natural resources, even projects with low public visibility should attempt to minimize visual impact in these areas. To the extent that operational requirements permit, colors and materials for the proposed project should be selected to maximize visual compatibility with the project surroundings and reduce long-range visibility.

Consideration might also be given to reducing visibility of the instrument trailer and parked automobiles by locating the parking area behind the building, away from the approach to the site and views from Saddle Road. (See Mitigation Measures.)

Utility Requirements

Electric power is delivered to the site on overhead lines constructed about 1965. Power will be carried to the new building from the existing electric distribution facility using underground lines. Addition of the new building will not significantly increase total power needs for the MLO. The Hawaii Electric Company has indicated that the additional power required can be supplied without the construction of new lines or other new facilities.

There are no water lines to the site, and none will be constructed for this project. Potable water is carried to the site by MLO staff. Non-potable water for sanitary needs is provided using a rainfall collection and storage system that includes a 4,200 gallon storage tank. The new building will have a similar but separate rainwater collection system. Potable water will continue to be carried to the site by staff members or trucked to the site.

A septic system is used for disposal of wastewater at the existing MLO facility. A new septic system will be added for the new building. No problems have been experienced at the site with the existing wastewater disposal system, and none are anticipated as a result of the proposed expansion.

Potential Hazards

The Uniform Building Code (UBC, Reference 3) shows the Island of Hawaii to be in a Zone 3 seismic risk area, on a scale designating Zone 4 as areas of highest risk and Zone 0 as areas of lowest risk. The building will be designed to meet UBC Zone 3 requirements, which are intended to prevent life-threatening damage under the maximum seismic loads estimated for Zone 3.

The Mauna Loa Observatory is located in an area of substantial volcanic hazard (References 1 and 2). Mauna Loa is one of the world's most historically active volcanoes. Its last eruption in 1984 lasted for three weeks and covered an area of about eighteen square miles with new lava. The Observatory is located on the eruptively active northwest flank of the volcano, in the zone of highest volcanic risk. A lava diversion barrier constructed above MLO in 1983 provides limited protection from lava flows from the volcano's caldera.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Consideration might also be given to reducing visibility of the instrument trailer and parked automobiles by locating the parking area behind the building, away from the approach to the site and views from Saddle Road. (See Mitigation Measures.)

Utility Requirements

Electric power is delivered to the site on overhead lines constructed about 1965. Power will be carried to the new building from the existing electric distribution facility using underground lines. Addition of the new building will not significantly increase total power needs for the MLO. The Hawaii Electric Company has indicated that the additional power required can be supplied without the construction of new lines or other new facilities.

There are no water lines to the site, and none will be constructed for this project. Potable water is carried to the site by MLO staff. Non-potable water for sanitary needs is provided using a rainfall collection and storage system that includes a 4,200 gallon storage tank. The new building will have a similar but separate rainwater collection system. Potable water will continue to be carried to the site by staff members or trucked to the site.

A septic system is used for disposal of wastewater at the existing MLO facility. A new septic system will be added for the new building. No problems have been experienced at the site with the existing wastewater disposal system, and none are anticipated as a result of the proposed expansion.

Potential Hazards

The Uniform Building Code (UBC, Reference 3) shows the Island of Hawaii to be in a Zone 3 seismic risk area, on a scale designating Zone 4 as areas of highest risk and Zone 0 as areas of lowest risk. The building will be designed to meet UBC Zone 3 requirements, which are intended to prevent life-threatening damage under the maximum seismic loads estimated for Zone 3.

The Mauna Loa Observatory is located in an area of substantial volcanic hazard (References 1 and 2). Mauna Loa is one of the world's most historically active volcanoes. Its last eruption in 1984 lasted for three weeks and covered an area of about eighteen square miles with new lava. The Observatory is located on the eruptively active northwest flank of the volcano, in the zone of highest volcanic risk. A lava diversion barrier constructed above MLO in 1983 provides limited protection from lava flows from the volcano's caldera.

MLO is not a public facility, and there is no public exposure at the Observatory to the volcanic hazard. Though volcanic activity is closely monitored by U.S. Geological Survey Hawaiian Volcano Observatory staff, some risk to MLO staff is unavoidable, and is accepted because of the importance of the work being done there.

MITIGATION MEASURES

Though no significant adverse impacts are identified in this assessment, the following recommendations are made:

- In the event of unexpected discovery during construction of items of potential biological, archaeological, or historical significance (lava caves or tubes; shell, bone, or charcoal deposits; human remains; rock or coral alignments; pavings; walls; etc.), work shall be stopped until the finding is investigated. Call Hawaii Department of Land and Natural Resources, Division of Land Management (808-548-2574).
- To the extent that operational requirements permit, the visual impact of the proposed facility on the conservation area should be minimized through the use of colors and textures compatible with the site's natural surroundings. Parking for the instrument trailer and autos should, if possible, be located behind the building to minimize visibility from Saddle Road and from the site approach.

DETERMINATION

On the basis of this assessment, no significant adverse impacts are apparent that would result from implementation of the proposed project. The following are therefore requested:

- Pursuant to National Oceanic and Atmospheric Administration Environmental Review Procedures, Chapter 2, Section 10, a Finding of "No Significant Impact" is requested.
- Pursuant to Chapter 343 of the Hawaii Revised Statutes and Title 11, Chapter 200 of the Hawaii Administrative Rules, a "Negative Declaration" is requested.

APPENDIX 1. AGENCIES CONTACTED

The following agencies and persons were contacted in the course of preparing the Environmental Assessment.

1. NOAA Mountain Administrative Support Center; Boulder, Colorado - Carol Ciufolo, Robert Zinter
2. NOAA Mauna Loa Observatory; Hilo, Hawaii - Elmer Robinson (Director)
3. NOAA Ecology and Environmental Conservation Office, Washington, D.C. - Donna Weeting
4. Hawaii Department of Land and Natural Resources, Honolulu
 - o Division of Land Management - Mary Spero
 - o State Land Use Commission - Bert Saruwatari
 - o Office of Conservation and Environmental Affairs - Iona Paga
 - o Historic Preservation Division - Holly McEldowney
5. Hawaii Volcanoes National Park, Island of Hawaii
 - o Resource Management Division
 - Dan Taylor (Division Chief)
 - Linda Cuddihy (botanist)
 - Larry Katahira (wildlife biologist)
6. U.S. Fish and Wildlife Service, Honolulu
 - Dr. Darral Herbst (botanist)
 - John Engbring (wildlife biologist)
7. Dr. Francis Howarth (Entomologist, Bishop Museum, Honolulu)
8. County of Hawaii Planning Department, Hilo - Alice Kawaha

APPENDIX 2. REFERENCES

1. J.P. Lockwood, U.S. Geological Survey, March 1983. Environmental Assessment: A Proposal to Construct Lava Diversion Barriers Above the NOAA Mauna Loa Observatory, Hawaii. Submitted by Mauna Loa Observatory, Hilo.
2. J.P. Lockwood, U.S. Geological Survey, September 1978. The Volcanic Environment of Mauna Loa Observatory, Hawaii. In Mauna Loa Observatory, a 20th Anniversary Report, ed. John Miller, pp.28-34. Boulder, Colorado: NOAA Environmental Research Laboratory Special Report.
3. International Conference of Building Officials, 1989. Uniform Building Code - 1988 Edition. Whittier, California.

ITEM C

Executive Order No. 1230

Setting Aside Land for Public Purposes

By this Executive Order, I, the undersigned, Governor of the Territory of Hawaii, by virtue of the authority in me vested by Section 91 of the Hawaiian Organic Act, and every other authority me hereunto enabling, do hereby order that the public land hereinafter described be, and the same is, hereby set aside for the uses and purposes of the United States of America.

FOR a United States Weather Bureau Station Site, to be under the control and management of the United States Department of Commerce.

U. S. Weather Bureau Station Site

Kaoho 5, Hanaleiua, Hawaii, T. H.

Being portion of the Government Land of Kaoho

Beginning at the reference station "STAIR 1955" (Spike in concrete marked "STAIR 1955") at the northeast corner of this parcel of land, the true azimuth and distance from said reference station "STAIR 1955" to the Government Survey Triangulation Station "AHUWA" being: 172° 56' 40" 99,804.00 feet, as shown on Government Survey Registered Map 1641, thence running by azimuths measured clockwise from True South:-

1. 4° 12' 30" 420.00 feet along Mauna Loa Forest and Game Reserve (Executive Order 1288) to a 3/4-inch pipe;
2. 94° 12' 30" 420.00 feet along Mauna Loa Forest and Game Reserve (Executive Order 1288) to a 3/4-inch pipe and passing over a 1/2-inch pipe at 210.00 feet;
3. 184° 12' 30" 420.00 feet along Mauna Loa Forest and Game Reserve (Executive Order 1288) to a 3/4-inch pipe;

4. 274° 12' 30" 420.00 feet along Mauna Loa Forest and
Gum Reserve (Executive
Order 1200) to the point
of beginning passing over
a 1/2-inch pipe at 210.00
feet and containing an AREA
OF 4.05 ACRES.

In Witness Whereof, I have hereunto set my hand and
caused the Great Seal of the Territory of Hawaii to be affixed.
Done at the Capitol at Honolulu this 28th day of
January, Nineteen Hundred and 1910.

RECORDATION REQUESTED BY:

DEPT OF LAND AND NATURAL RESOURCES
LAND MANAGEMENT DIVISION

OCT 8 1985

AFTER RECORDATION, RETURN TO:

DEPT OF LAND AND NATURAL RESOURCES
LAND MANAGEMENT DIVISION

12:58 P.M.

18992

RETURN BY: MAIL () PICKUP (x)

683

GRANT OF EASEMENT

THIS INDENTURE, made and entered into this 8th day of October, 1985, by and between the STATE OF HAWAII, by its Board of Land and Natural Resources, pursuant to the provisions of Section 171-95(a)(3), Hawaii Revised Statutes, hereinafter referred to as the "GRANTOR," and the UNITED STATES OF AMERICA, by its Department of Commerce for the National Oceanic and Atmospheric Administration's Environmental Research Laboratories, hereinafter referred to as the "GRANTEE,"

WITNESSETH THAT:

The Grantor, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and of the terms, conditions and covenants herein contained, and on the part of the Grantee to be observed and performed, does hereby grant unto the Grantee the following non-exclusive perpetual easement rights:

an area covering approximately 23.130 acres for a lava diversion barrier to protect the Grantee's Mauna Loa Observatory including the right to construct, maintain and repair said barrier

in, over, and across a portion of Government Land, situate at Kaohē 5, Hamakua, Island of Hawaii, Hawaii, set aside as the Mauna Loa Forest Game Reserve by Governor's Executive Order No. 1288, more particularly described on Exhibit "A" and shown on Exhibit "B," both of which are designated as C.S.F. No. 19,962 and dated May 11, 1984, attached hereto and made a part hereof,

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF LAND MANAGEMENT
P. O. BOX 221
HONOLULU, HAWAII 96809

TOGETHER WITH the rights of ingress and egress to and from said easement area for all purposes in connection with the rights hereby granted.

TO HAVE AND TO HOLD the said non-exclusive, perpetual easement rights unto the Grantee, SUBJECT, HOWEVER, to the following terms, conditions and covenants:

1. The Grantee shall be responsible for any claims for damage or injury caused by or resulting from any act or omission of the Grantee in connection with the Grantee's use of the premises described herein as provided in the Federal Tort Claims Act (62 Stat. 869-982, 28 U.S.C. 2671-2680), as amended. The Grantor shall not be responsible or liable for injuries or death to persons, or damage to property, when such injuries, death, or damage are caused by or result from the Grantee's use of the premises under the terms of this agreement and are not due to the negligence of the Grantor.

2. The Grantor reserves unto itself the full use and enjoyment of the said premises, and to grant to others rights and privileges for any and all purposes affecting the said premises, except as to the rights herein granted, provided, however, that the rights herein reserved shall not be exercised by the Grantor or any agent, representative or assign of the Grantor in such manner so as to interfere unreasonably with the Grantee in the use of said land for the purpose for which this easement is granted.

3. No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this agreement or to any benefit to arise therefrom.

4. Upon completion of any work performed in or upon the easement areas, the Grantee shall remove therefrom all equipment and unused or surplus materials, if any, and shall

leave the said areas in a clean and sanitary condition satisfactory to the Grantor.

5. This easement or any rights granted herein shall not be sold, assigned, conveyed, leased, mortgaged or otherwise transferred or disposed of, directly or by operation of law, except with the prior consent of the Grantor.

6. The Grantee shall keep the said premises and the improvements therein in a clean, sanitary and orderly condition, and shall not make, expressly permit or knowingly suffer, any waste, strip, spoil, nuisance or unlawful, improper or offensive use of said premises.

7. The Grantee covenants, for itself, its successors and assigns, that the use and enjoyment of the land herein shall not be in support of any policy which discriminates against anyone based upon race, creed, sex, color, national origin or physical handicap.

8. The Grantee shall comply with all applicable requirements of all municipal, state and federal authorities and observe all applicable municipal ordinances and state and federal statutes, pertaining to the said land, now in force or which may hereinafter be in force.

9. These easement rights shall cease and terminate, without any action on the part of the Grantor, in the event of abandonment by the Grantee of the easement area, for a period of one (1) year.

10. If the easement rights granted herein terminate, the Grantee shall leave the premises in good condition.

11. Upon application and justification by the Grantee, the Chairperson of the Board of Land and Natural Resources may approve modification to the lava diversion barrier and easement.

12. The following terms, conditions and agreements contained in the Conservation District Use Permit No. HA 7/29/83-1564 issued to the Mauna Loa Observatory for this lava diversion barrier are incorporated by reference:

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 of Title 13, Chapter 2, Administrative Rules, as amended;
2. The State of Hawaii shall not be responsible for any loss, liability, claim or demand for property damage, property loss, or personal injury including death caused by or resulting from any act or omission of the Grantee or its contractor in connection with its exercise of the privileges herein granted;
3. In the event that any unanticipated sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings, or walls are encountered during construction, the applicant shall stop work and contract the Historic Preservation Office at 548-7460 or 548-6406;
4. The Grantee comply with all applicable Public Health Regulations;
5. A fire contingency plan, acceptable to the Division of Forestry and Wildlife shall be implemented during and after the construction of the structure;
6. The Grantee or its contractor shall obtain grading and grubbing permits and other permits as appropriate from the Department of Public Works, County of Hawaii;
7. Four (4) sets of construction plans shall be submitted to the Department of Land and Natural Resources for review and approval once they become available prior to initiation of construction;
8. All construction shall be initiated within one (1) year of approval by the Board of Land and Natural Resources and that all work shall be completed with three (3) years of approval;
9. The Grantee shall obtain consent from the Department in the event that the barrier needs to be relocated, modified or demolished;

10. The Grantee shall bear all expenses incurred for any work connected with the barrier;
11. The Grantee shall be responsible as provided in the Federal Tort Claims Act (62 Stat. 869-982, 28 U.S.C. 2671 et. seq.), as amended, for all personal injury including death and any loss, claim or demand for property damage resulting from any future lava flows diverted by this barrier;
12. This approval makes no reference to water use.

IN WITNESS WHEREOF, the parties hereto have caused this Indenture to be executed by their duly authorized officers as of the day and year first above written.

STATE OF HAWAII

By *S. Ono*
 Chairperson and Member
 Board of Land and
 Natural Resources

APPROVED BY THE BOARD OF
 LAND AND NATURAL RESOURCES
 AT ITS MEETING HELD ON

December 16, 1985
[Signature]

And By *[Signature]*
 Member
 Board of Land and
 Natural Resources

UNITED STATES OF AMERICA

By *[Signature]*
 Its
 Chief Administrative Services Branch

APPROVED AS TO FORM
 AND LEGALITY:

William H. Law
 Deputy Attorney General

Dated: *4/22/85*



STATE OF HAWAII
SURVEY DIVISION
DEPT. OF ACCOUNTING AND GENERAL SERVICES
HONOLULU

C.S.F. No. 19,962

May 11, 1984

PERPETUAL NON-EXCLUSIVE
LAVA DIVERSION BARRIER EASEMENT

Kaohē 5, Hamakua, Island of Hawaii, Hawaii

Being a portion of the Government Land of Kaohē 5.

Being also a portion of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288.

Beginning at the northeast corner of this easement, the direct azimuth and distance from reference station "STAIR 1955" at the northeast corner of United States Weather Bureau Station, Governor's Executive Order 1720 being $286^{\circ} 24' 25''$ 416.98 feet, the coordinates of said point of beginning referred to Government Survey Triangulation Station "AHUHOA" being 99,166.01 feet South and 12,659.09 feet East, thence running by azimuths measured clockwise from True South:-

1. $360^{\circ} 00'$ 2000.00 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
2. $90^{\circ} 00'$ 264.17 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
3. $156^{\circ} 00'$ 2189.27 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
4. $270^{\circ} 00'$ 246.29 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
5. $336^{\circ} 00'$ 165.69 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
6. $4^{\circ} 12' 30''$ 119.22 feet along United States Weather Bureau Station, Governor's Executive Order 1720;

May 11, 1984

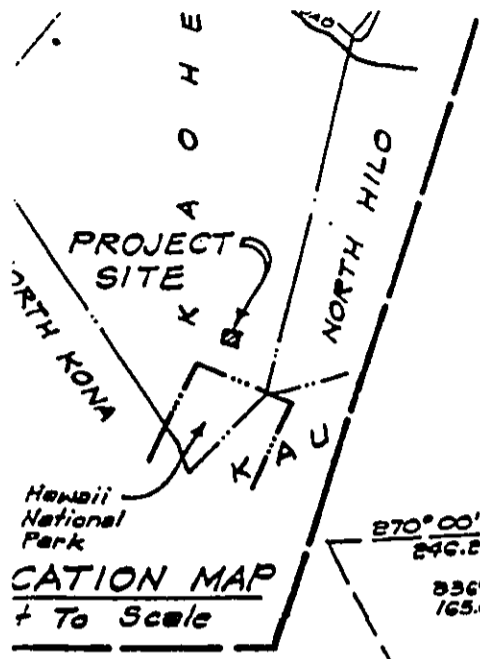
- 7. 274° 12' 30" 63.95 feet along United States Weather Bureau Station, Governor's Executive Order 1720;
- 8. 336° 00' 585.67 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
- 9. 270° 00' 322.70 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
- 10. 180° 00' 810.00 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
- 11. 270° 00' 225.00 feet along the remainder of Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288 to the point of beginning and containing an AREA OF 23.130 ACRES.

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

By: Raymond S. Nakamura
Raymond S. Nakamura
Land Surveyor

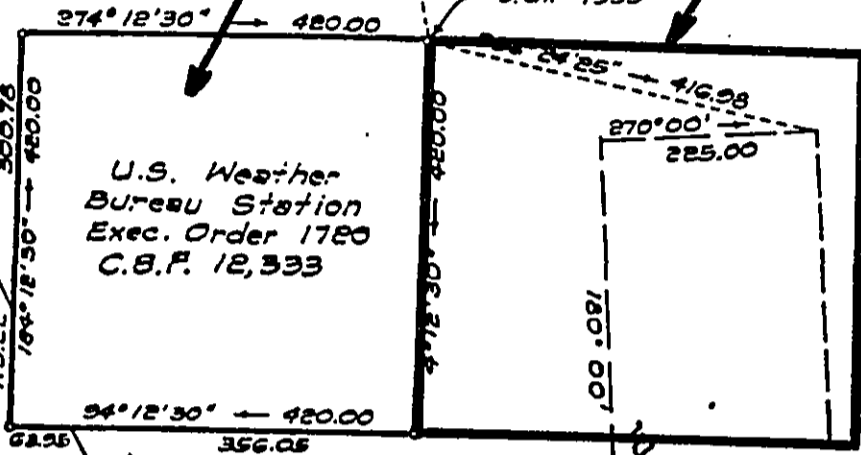
pt

Compiled from map furn.
by Austin, Tsutsumi &
Assoc., Inc., CSF 12,333
and Govt. Survey Records.



Existing NOAA Station

Maximum expansion area being considered



True North
Scale: 1 in. = 200 ft.

NOTES:
Origin of Azimuths is "Ahumoa" Δ
Location of Lava Barrier is approximate

LAND USE COMMISSION
STATE OF HAWAII
MAR 27 2 43 PM '91

Easement A
23.130 Acres

Forest Executive Order and Game 1288

Boundary Interpretation No. 91 15

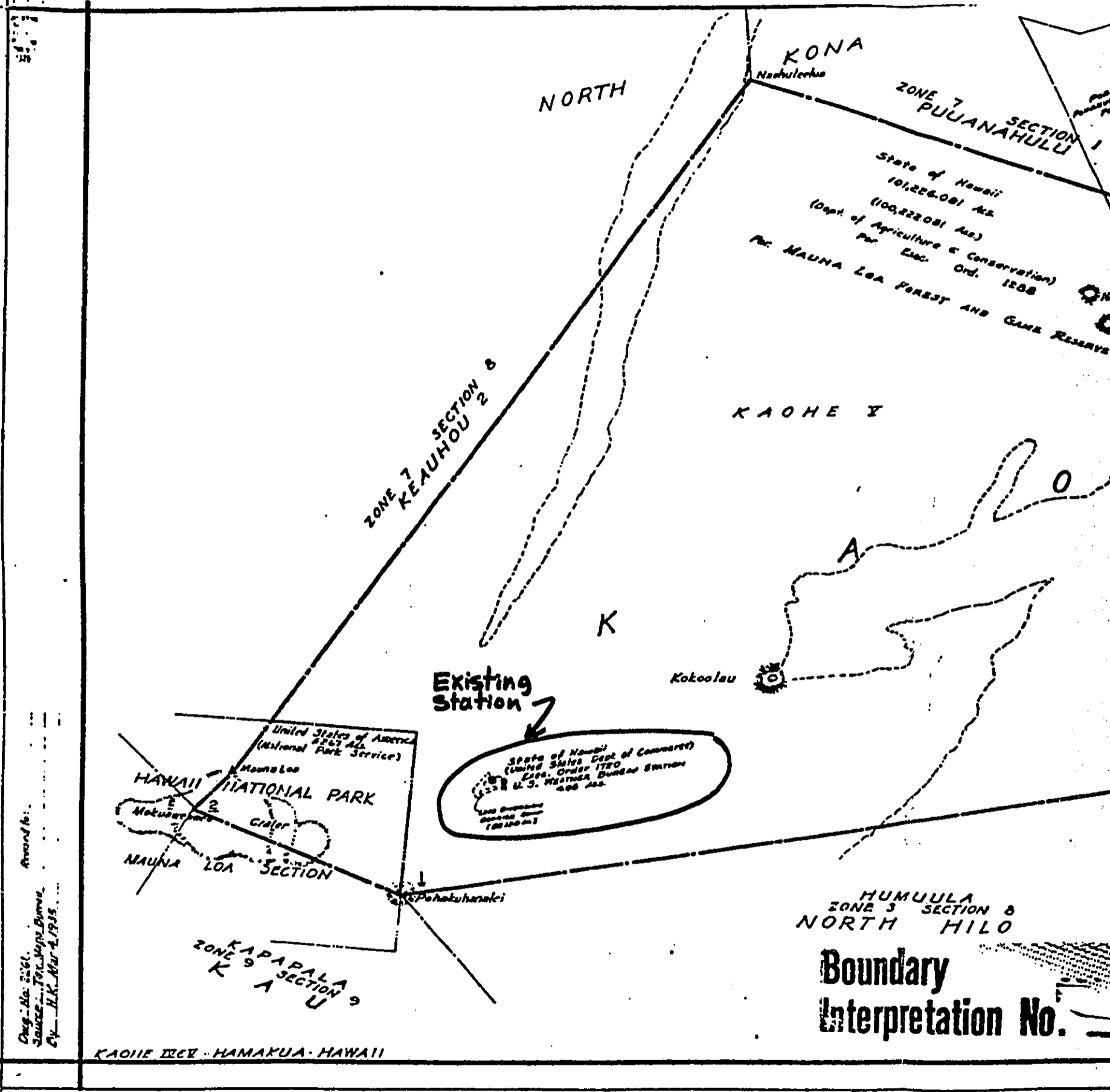
Mauna

Loa

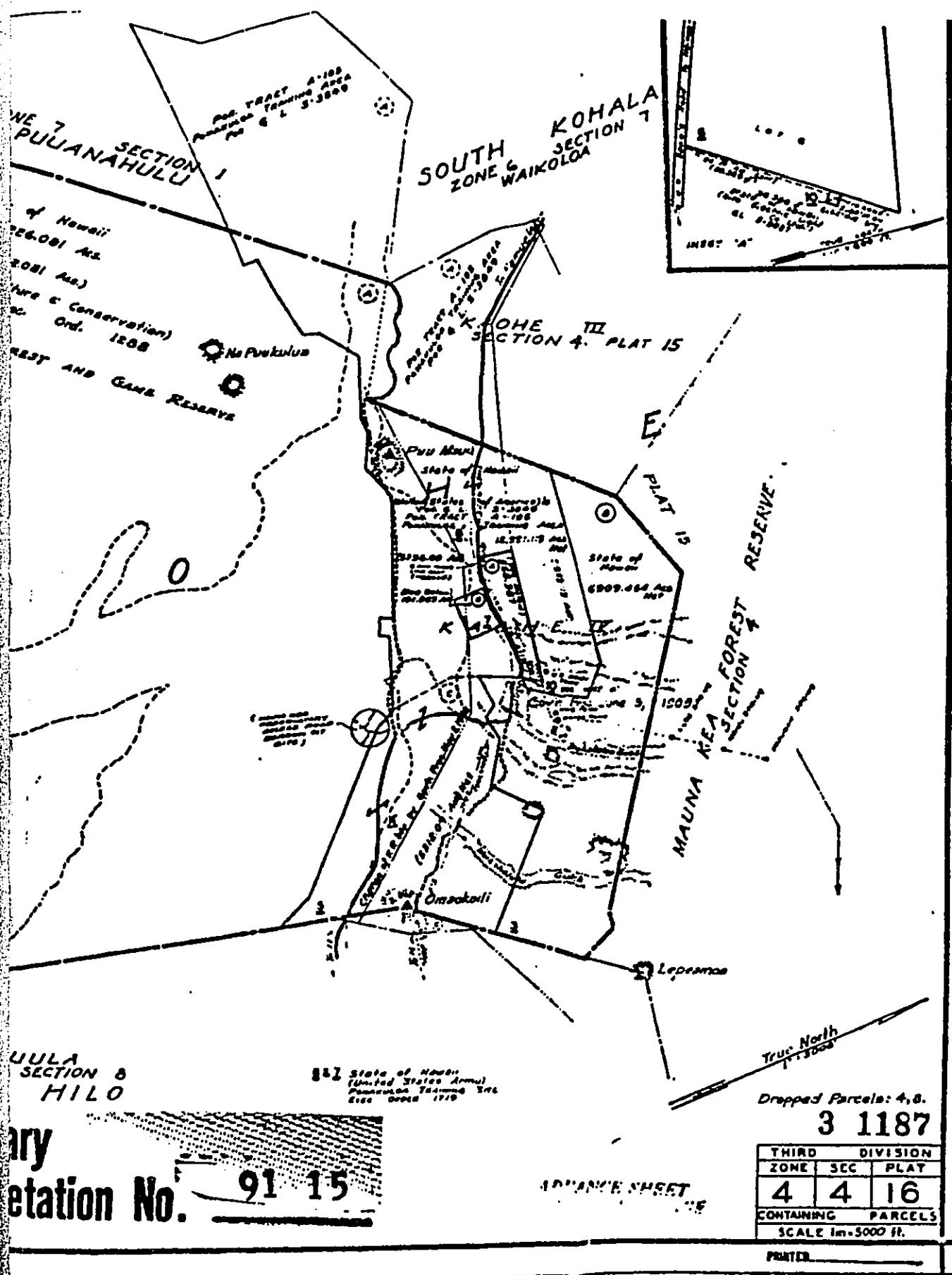
Reserve

0.00

8000.00



Boundary Interpretation No.



SECTION 1
PUUANAHULU

SOUTH ZONE 6
KOHALA SECTION 7
WAIKOLOA

SECTION 4 PLAT 15

of Hawaii
226-081 Ac.
2081 Ac.)
(Wild & Conservation)
No. Ord. 1208
REST AND GAME RESERVE

Na Puukulu

PLAT 15

MAUNA KEA FOREST RESERVE

Omakali

Lepesman

SECTION 8
HILO

State of Hawaii
(United States Army)
Pensioners Training Site
Site Order 1719

True North
1:5000

Dropped Parcels: 4, 8.

3 1187

ary
etation No. 91 15

ADVANCE SHEET

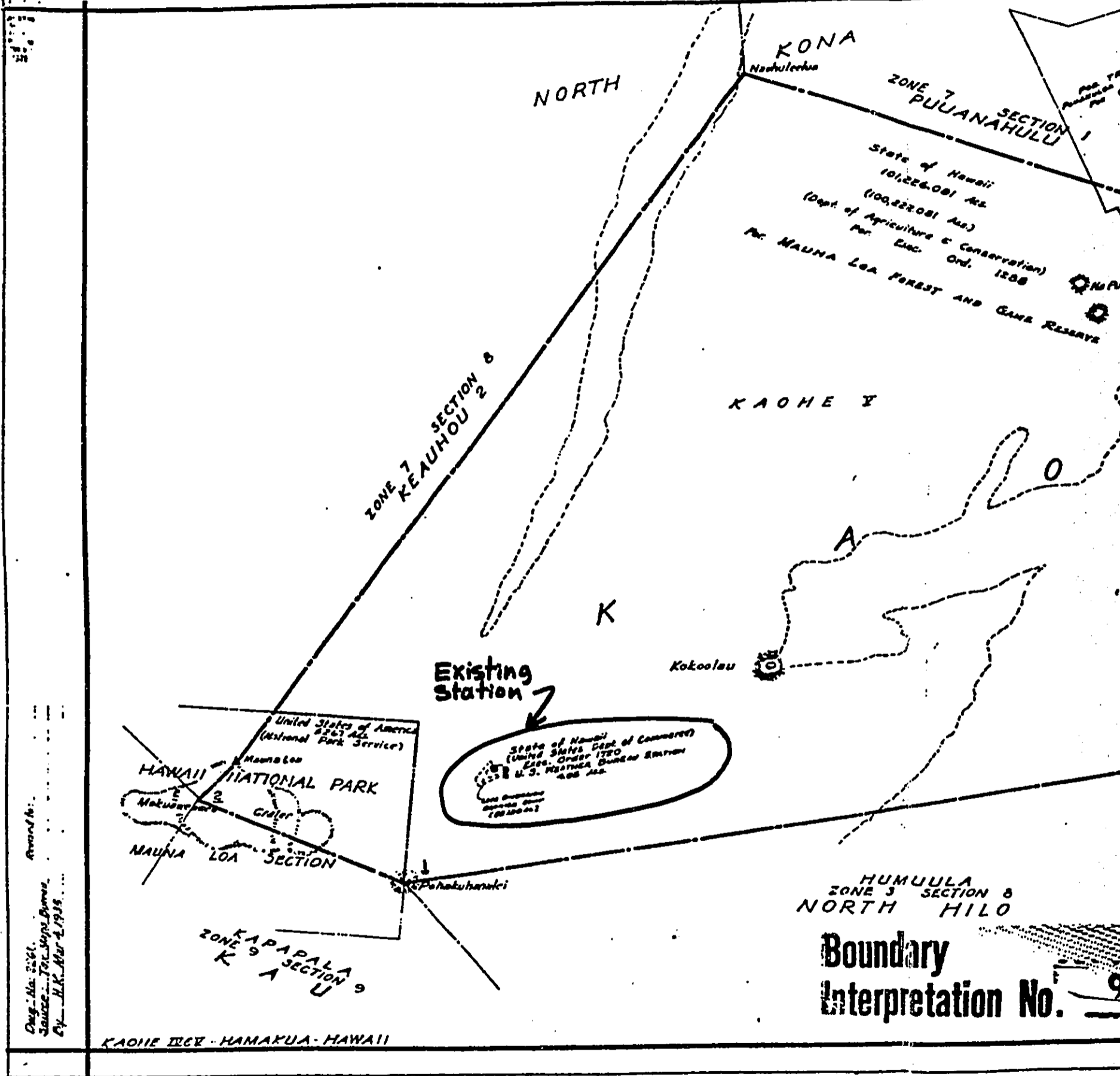
THIRD DIVISION		
ZONE	SEC	PLAT
4	4	16
CONTAINING		PARCELS
SCALE 1 in = 5000 ft.		

PRINTED

LAND USE COMMISSION
 HAWAII
 MAR 27 2 43 PM '91

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING



KONA
Nashulehu

ZONE 7 SECTION 1
PUUANAHULU

State of Hawaii
10,226,081 Ac.
(100,222,081 Ac.)
(Dept. of Agriculture & Conservation)
Per. Lic. Ord. 1208
MC MAUNA LOA FOREST AND GAME RESERVE

ZONE 7 SECTION 8
KEAUHOU 2

Existing Station

State of Hawaii
(United States Dept. of Commerce)
Exec. Order 1720
U.S. REATHER BUREAU EMPLOY
408 Ac.

United States of America
8267 Ac.
(National Park Service)

MAUNALO

HAWAII NATIONAL PARK

Makua

Crater

MAUNA LOA SECTION

Pahakuhonuki

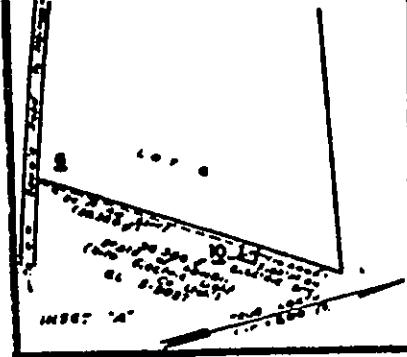
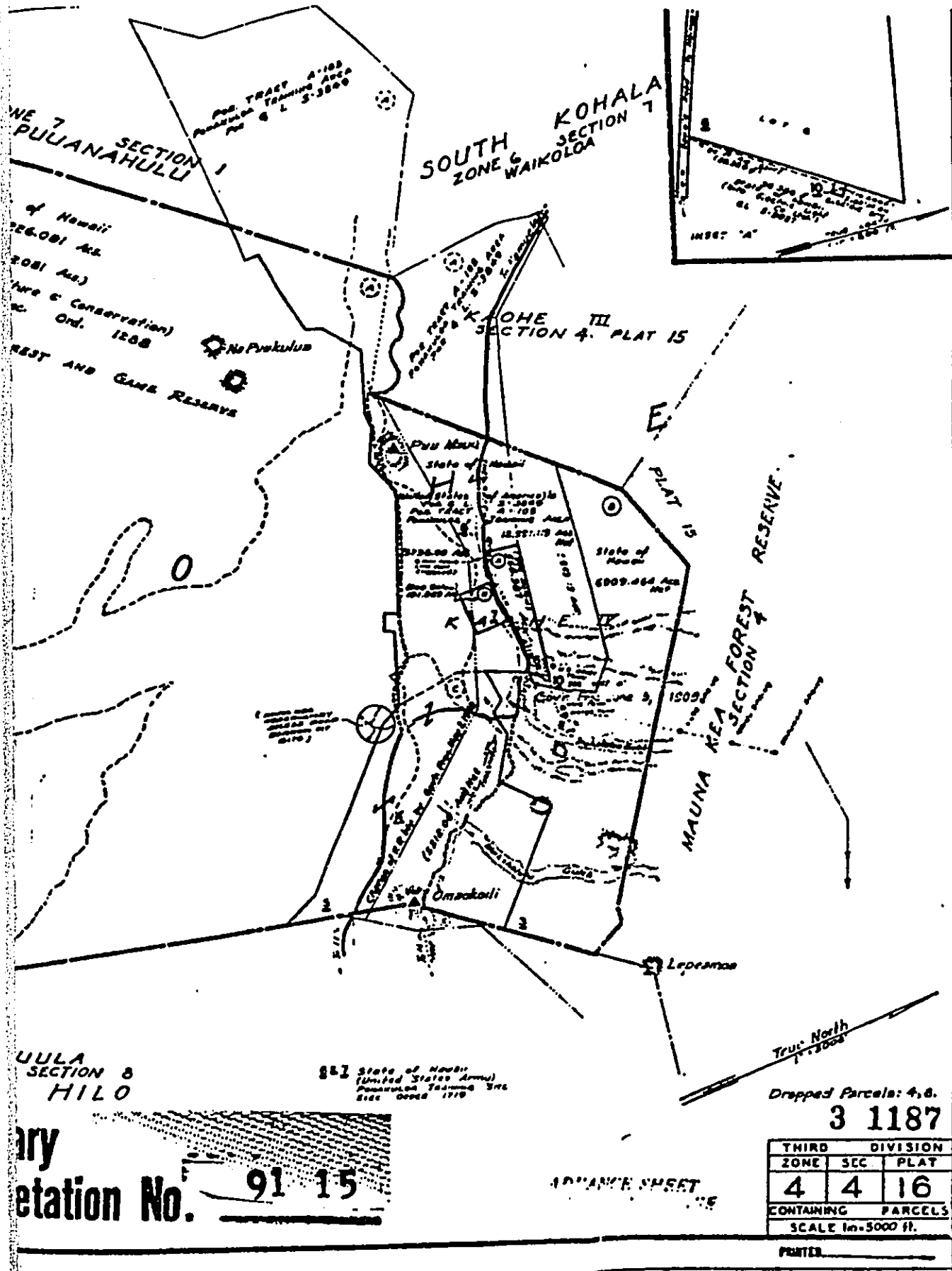
KAPAPALA
ZONE 9 SECTION 9
K A U

HUMUULA
ZONE 3 SECTION 8
NORTH HILO

Boundary Interpretation No. 9

Drawn by: S. G. L.
Source: Top. Maps, Bureau.
City: H.K. Mar 2, 1938.

KAHOE I - HAMAKUA - HAWAII



LAND USE COMMISSION
HAWAII
MAR 27 2 43 PM '91

HILO SECTION 8

State of Hawaii
(United States Army)
Punaluu Training Area
Site Order 1719

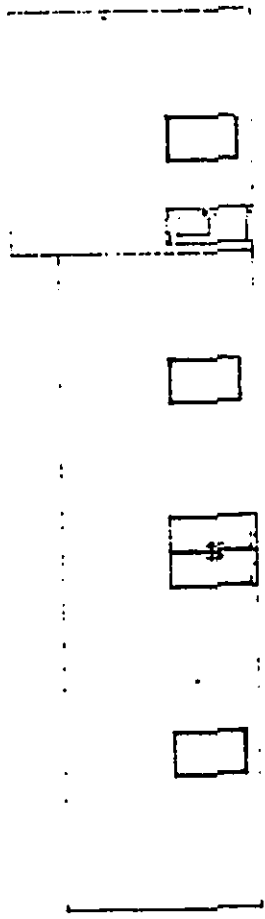
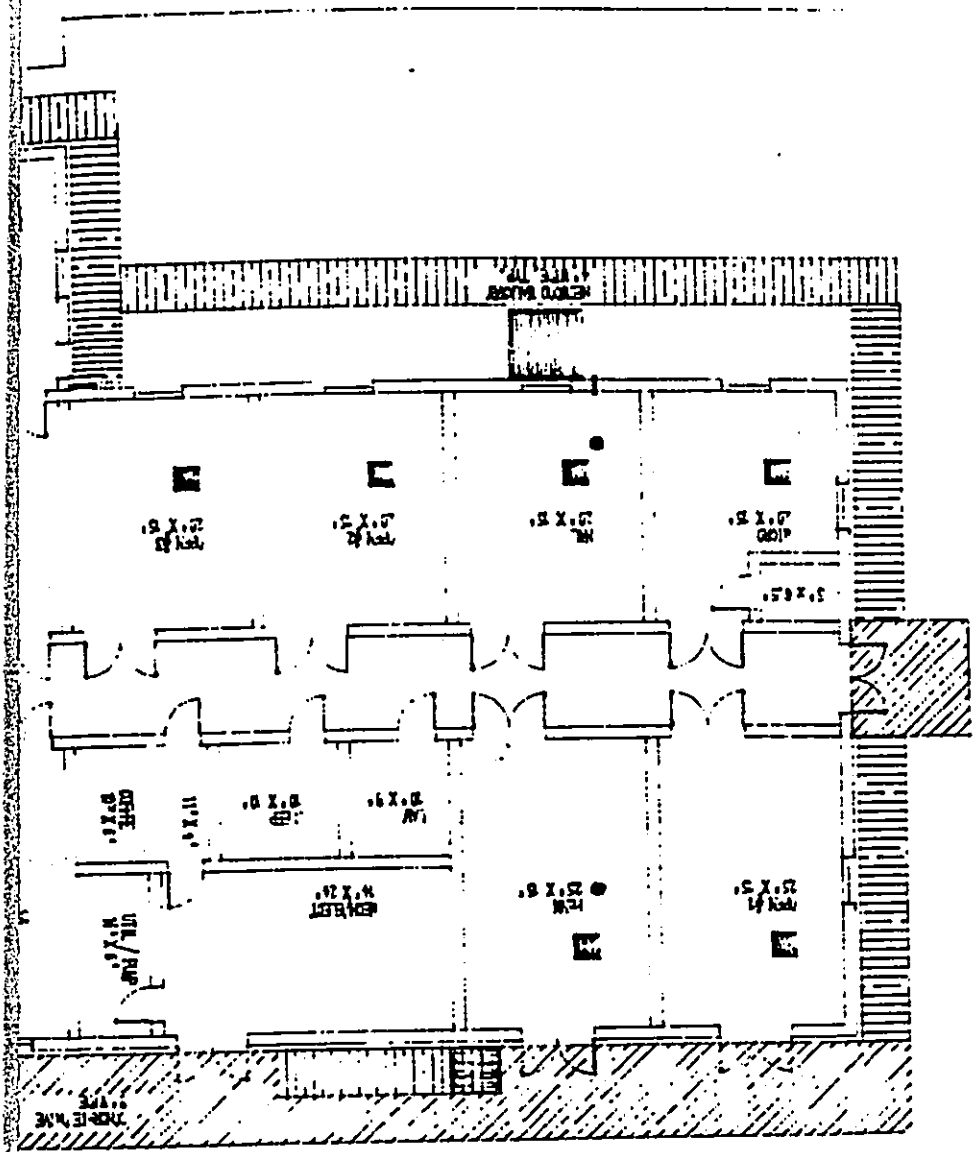
Dropped Parcels: 4, 8.
3 1187

Registration No. 91 15

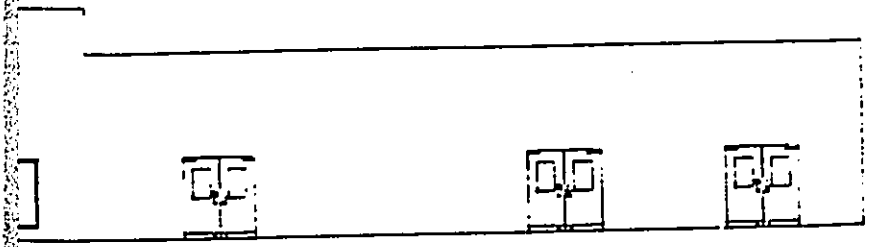
ADJACENT SHEET

THIRD DIVISION	
ZONE	SEC PLAT
4	4 16
CONTAINING PARCELS	
SCALE 1 in = 5000 ft.	

PRINTED



EAST FACE ELEVATION



WEST FACE ELEVATION