BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

KEITH W. AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER, II

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

REF:OCEA:SOR

FILE NO.: HA-2728
DOC. NO.: 38

RECEIVED
DEC 14 1994
DIRECTOR
INSTITUTE FOR ASTRONOMY

Dr. Donald N.B. Hall, Director
University of Hawaii
Institute for Astronomy
2680 Woodlawn Drive
Honolulu, Hawaii 96822

DEC 13 1994

Dear Dr. Hall:

SUBJECT: Modification to Condition Five (5) (CDUA HA-2728) of Board Approval Letter Dated November 30, 1994

This is to correct our Board approval letter dated November 30, 1994.

Per your written request, our staff has reviewed the minutes of the November 18, 1994 Board meeting in which your CDUA for the Smithsonian Institution submillimeter telescope at Mauna Kea was approved, subject to eighteen (18) conditions.

Condition five (5) states as follows:

> All construction related activities, including the stockpiling of construction material, in the summit area shall be confined to approved areas demarcated by fencing to ensure protection of two small shrines (Sites 50-10-5224 and 50-10-5225) located in the general area of the observatory.

Minutes of the Board meeting indicate that condition five (5) was modified by the Board at the request of UHIfA to read as follows:

> All construction related activities, including stockpiling of construction material, shall be confined to approved areas. To ensure protection of two small shrines (Sites 50-10-5224 and 50-10-5225) located in the general area of the observatory, a linear fence approximately 12 feet in length shall be installed between the shrine and the construction area.

Please note this change for your files. Thank you for your cooperation in this matter. Please feel free to contact Sam Lemmo of our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions on this matter.

Very truly yours,

KEITH W. AHUE

Receipt acknowledged
Donald NB Hall Dec 14, 1994

MOD. LTR. REGARDING
BOARD APVL. LTR.
dated
NOV. 30, 1994

JOHN WAIHEE
GOVERNOR OF HAWAII

RECEIVED
DEC 0 1 1994
DIRECTOR
INSTITUTE FOR ASTRONOMY

KEITH W. AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER, II

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STATE PARKS
WATER AND LAND DEVELOPMENT

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

REF: OCEA:SOR

FILE NO.: HA-2728
DOC. ID.: 5144

NOV 30 1994

Dr. Donald Hall, Director
University of Hawaii
Institute for Astronomy
2680 Woodlawn Drive
Honolulu, Hawaii 96822

Dear Dr. Hall:

As a follow-up to Board action on your application, this is to inform you that your request to construct a submillimeter array telescope and associated facilities/infrastructure; temporary use of a portion of the batching plant site, construction of up to two (2) 8-person cabins in the existing construction camp, use of the approved materials staging area to the south of the construction camp site at Mauna Kea, Hamakua, Hawaii, on land identified as TMKs: 4-4-15: 09 and 4-4-15: 12, was approved on November 18, 1994, 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 shall comply with all applicable Department of Health Administrative Rules;

3. 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;

4. Since the application is for the use of conservation lands only, the applicant shall obtain appropriate authorization through the Division of Land Management, State Department of Land and Natural Resources for the occupancy of State lands;

5. All construction related activities, including the stockpiling of construction materials, in the summit area shall be confined to approved areas demarcated by fencing to ensure protection of two small shrines (Sites 50-10-23-5224 and 50-10-23-5225) located in the general area of the observatory;

Modified as per letter of Dec 13, 1994

6. Should historic remains such as artifacts, burials, or stone pavings or walls be found during construction, the applicant shall stop work in the area and contact the State Historic Preservation Division immediately, at 587-0046;

7. The control building and antenna maintenance facility shall be painted to blend in with the surrounding environment;

8. Prior to construction of any cabins, the applicant shall initiate formal consultation with the Secretary of the Interior in compliance with Section 7 of the Endangered Species Act of 1973;

9. To insure that recreational activities are protected and perpetuated, the applicant shall minimize the impact of the facility on skiing/snowplay to the greatest extent practicable. The applicant shall remove any fencing around the observing pads when they are not in use;

10. The applicant shall fabricate all exposed surfaces of the observing pads with colored concrete or paint to match the surrounding terrain;

11. The applicant shall notify the Department when construction is initiated and when construction is completed;

12. Any work or construction to be done on the land shall be initiated within two (2) year of the approval of such use, and all work and construction must be completed within seven (7) years of the approval of such use;

13. The applicant shall submit four (4) copies of the construction plans and specifications to the Chairperson or his authorized agent for approval with the permit 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 Conditions 1 and 2 remain the responsibility of the applicant;

14. That all applicable mitigation measures set forth in the final environmental impact statements for this project are hereby incorporated as conditions of approval;

15. That in issuing this permit, the Department and Board have 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;

16. All conditions imposed under CDUA HA-1573 shall remain in effect;

17. That failure to comply with any of these conditions shall render this Conservation District Use Application null and void; and

18. Other terms and conditions as prescribed by the Chairperson.

Please acknowledge receipt of this permit, with the above noted conditions, in the space provided below. Please sign two copies. Retain one and return the other within thirty (30) days.

Should you have any questions on any of these conditions, please feel free to contact Sam Lemmo of our Office of Conservation and Environmental Affairs staff, at 587-0377.

Very truly yours,

Keith W. Ahue

KEITH W. AHUE

Receipt acknowledged Note: Condition 5 modified as per letter of Dec 13, 1994

Donald HB Hall

Applicant's Signature

Date 14 Dec, 1994

cc: Hawaii Board Member
Hawaii Land Agent
Hawaii Planning Dept.
Hawaii DPW, DP&R, DWS
DOH/OHA/OSP/OEQC/DHHL

RECEIVED
95 JAN 4 P3:27
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
Department of Land and Natural Resources
Office of Conservation and Environmental Affairs
Honolulu, Hawaii

File No.: HA-2728
Acceptance Date: 7/14/94
180-Day Exp. Date: 1/9/95

November 18, 1994

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

REGARDING:	Conservation District Use Application for Construction of the Smithsonian Astrophysical Observatory Submillimeter Array Telescope and Associated Facilities/Infrastructure; Temporary Use of a Portion of the Batching Plant Site, Construction of Up to Two (2) 8-Person Cabins in the Existing Construction Camp, Use of the Approved Materials Staging Area to the South of the Construction Camp Site at Mauna Kea, Hamakua, Hawaii
APPLICANT:	University of Hawaii, Institute of Astronomy (UH IfA) on Behalf of the Smithsonian Institution Astrophysical Observatory (SOA) 2680 Woodlawn Drive, Honolulu, Hawaii 96822
LANDOWNER:	State of Hawaii (General Lease No. S-4191 to the University of Hawaii, TMK: 4-4-15:09)
LOCATION/ TMKs:	Mauna Kea, Hamakua, Hawaii 4-4-15:09 (Science Reserve), 4-4-15:12 (Hale Pohaku)
AREA OF PARCEL/	±11,214 Acres (Science Reserve) ±19 Acres (Hale Pohaku)
USE:	Astronomy
SUBZONE:	Resource

DESCRIPTION OF AREA/CURRENT USE:

The project includes the proposed telescope facilities at the summit of Mauna Kea (Science Reserve) and the telescope support facilities located at the mid-level (Hale Pohaku) elevation of the

mountain. The project is in the Hamakua District of Hawaii (Exhibits 1-3). Both sites are situated within the State Land Use Conservation District, Resource subzone (Exhibit 4). Parcel 4-4-15: 9 (Science Reserve) is encumbered by the University of Hawaii under General Lease No. S-4191, through the year 2033. Parcel 4-4-15: 12 (Hale Pohaku) is unencumbered State land.

SCIENCE RESERVE (Summit Area)

Topography/Flora and Fauna:

Elevations in the summit area of the Mauna Kea Science Reserve range from about 13,000 to 13, 796 feet. Topography in the project area is relatively flat ranging in elevation from 13,280 to 13,407 feet.

According to the botanical study, vegetation in the summit area of consist mainly of lichen. The survey identified 25 different species of lichen, about half of them endemic.

According to the applicant, fauna in the summit area consist of various arthropod species. Eleven native species have been discovered in the area including representatives of two major groups of invertebrates, the Arachnids (spiders) and the Insecta. None are considered an endangered or threatened species.

The spider has been identified as common to the project area. The Lycosa is not an endangered or threatened species and its lava flow habitat is less vulnerable to human impacts that the tephra cinder cones. Little can be done to mitigate except to minimize the disturbed area within the project site.

There are no streams within the project area.

In terms of historic sites, reconnaissance surveys of portions of the Science Reserve were conducted by Bishop Museum. Forty sites have been located thus far. Two sites are located about 400 and 700 feet respectively from one of the proposed observation pads.

Existing Facilities/Uses:

The proposed telescope site is currently undeveloped. There are presently 11 telescopes and one antenna facility in the Science Reserve, either in operation or under construction (Exhibits 5- 6). All of the telescope facilities are used for basic astronomical research to study objects in our galaxy and in other galaxies.

There are a number of other activities being conducted at Mauna Kea including scientific research unrelated to astronomy, skiing, snow play, hiking and sightseeing.

Potable water is trucked in from Hilo to the Science Reserve and is stored in a 5,000-gallon water tank. Each telescope has its own on-site water storage and distribution system. Individual

wastewater disposal facilities, consisting of either cesspools or septic tanks with leach fields, are present at each telescope site. Solid waste is transported off the mountain to an appropriate disposal site near each organization's sea-level base facilities.

Electric power to the summit is provided by a 12.47 kV underground distribution system that runs from the substation near the mid-level facilities to the summit area. The system is part of HELCO's power grid.

Access to the upper elevations of Mauna Kea from Hilo or Waimea is via the Saddle Road to Pu'u Huluhulu and from there via a 6-mile long, 20 foot-wide paved portion of the Mauna Kea Access Road to mid-level facilities, at the 9,200-foot elevation. From there, the Access Road continues 8.3 miles to the summit. The Access Road is paved from the summit down to approximately the 11,800-foot elevation. From there, down to the mid-level facilities, the road is dirt/gravel (See Exhibit 1).

HALE POHAKU (Mid-level Facilities)

Topography/Flora and Fauna:

Slopes at the construction camp site vary from about 5 to 15 percent. There are no streams in the vicinity.

Vegetation in the vicinity of the construction camp consist of scattered clumps of mamane trees (Sophora chrysophylla) with a ground cover of mixed bunchgrass species. The mamane vary from young plants less than a meter tall to older 3 to 6 meters tall. Ground cover is greatest under the older trees and native mints are found in the shady areas under these trees.

According to the botanical report, no U.S. Fish and Wildlife Service listed threatened or endangered species occur on the construction camp site, nor are there any plants which are proposed for such status.

In terms of fauna, the critical habitat of the endangered Palila (Loxiodes bailleui) encompasses Hale Pohaku and extends above it to an altitude of 10,000 feet (Exhibit 7). According to the applicant, three ornithological surveys were completed prior to construction of the mid-level facilities to assess the avifaunal in the area (1979, 1985, 1990). Five bird species were detected during the 1990 survey. Of these, three native species were observed including: the Amakihi (Hemignathus virens virens), Apapane (Himatione sanguinea), and I'iwi (Vestiaria coccinea). The

Palila was not detected in the 1990 survey, however, it is seen in the vicinity of Hale Pohaku on a regular basis.

A reconnaissance survey of the construction camp area was conducted by the Bishop Museum in 1985. There are two areas of lithic scatters and a shrine in the vicinity of the site.

Existing Facilities/Uses:

The astronomers' mid-level facilities consist of six buildings: a common building; a maintenance building, and four dormitories (Exhibit 8).

There is a visitor information station and construction camp consisting of a dormitory building with sleeping accommodations for 24-29 workers, four 8-person dormitory cabins and a kitchen/recreation building.

Water is trucked in from Hilo and stored in two 40,000-gallon tanks located in the maintenance area of the mid-level facilities. Cesspools are used for wastewater disposal at most of the Hale Pohaku facilities. Sewage from the recently added cabins in the construction camp and dormitory is disposed of in septic tanks with leaching fields. Mauna Kea Support Services trucks the solid waste from Hale Pohaku to Hilo.

Electric power is provided from an overhead 69-kV power line which runs from the Saddle Road to a substation near Hale Pohaku. Distribution throughout the facility is accomplished by buried or otherwise hidden lines. Hawaiian Telephone presently provides standard voice communications and wide-band communications from Hale Pohaku to sea level.

Drainage improvements were constructed as part of the permanent mid-level facilities. There are drainage swales on each side of the Mauna Kea Access Road to collect excess storm runoff. Seepage pits were also installed at several locations throughout the area for the purpose of catching and controlling surface runoff.

PROPOSED USE (SCIENCE RESERVE):

The Smithsonian Institute Astrophysical Observatory (SOA) has asked the University of Hawaii, Institute of Astronomy (UH IfA) for permission to locate a submillimeter wavelength array telescope and associated infrastructure within the summit area of the Mauna Kea Science Reserve.

The telescope will initially consist of six (6) 20-foot-diameter parabolic antennas which will be placed in predetermined configurations on six (6) (out of a total of not more than 24) concrete observing pads (Exhibit 9). Although up to six (6) more antennas may be added to the array in the future, no additional observing pads will be required.

A telescope is not necessarily one contiguous structure; it can be composed of many small antennas, each of which can be considered as part of a larger telescope. The technique for combining and analyzing the signals from an array of antennas to simulate their resolution of a large telescope is called "aperture synthesis", more commonly referred to as interferometry. The subject telescope will operate as an aperture synthesis telescope (interferometer).

Four primary areas of astronomical research have been selected for the subject telescope. They are: (1) star formation, (2) structure of galaxies, (3) quasars and active galactic nuclei, and (4) solar system studies.

The telescope will be funded and operated by the Federal government. There are no military uses.

Telescope Site:

The proposed telescope site is in the saddle area west of Pu'u Hauoki and north of Pu'u Poliahu cinder cones (Exhibit 10).

The telescope will be located in telescope siting areas II and III (Exhibit 11).

The Smithsonian Institute Astrophysical Observatory proposes to enter into a sublease with UH for about three (3) acres. The proposed sublease area contains the operations/maintenance area and about half of the proposed observing pads (Exhibit 12). Right of entry will be obtained from UH for portions of the project which are not within the sublease area. The total developed area is expected to be less than five (5) acres.

Antennas and Carrier:

Each antenna structure has seven (7) primary elements: the pedestal base, pedestal structure with receiver cabin, the reflector support ring, the reflector backup structure, the reflector panels, the sub-reflector assembly, and the sub-reflector support.

When a 20-foot-diameter antenna is in its zenith position, it will be at a maximum height of approximately 30.5 feet above the ground (29.5 feet above the pad) (Exhibit 13).

The antennas have been designed so that they can be transported between various observing pads on a specially designed carrier (Exhibit 14).

Observing Pads:

Up to twenty-four 10-foot-diameter concrete observing pads will be constructed (Exhibit 15). The antennas can be mounted on any combination of observing pads, however, they will generally be configured in a ring.

Operations/Maintenance Area:

The operations/maintenance area will occupy an area of about 0.6 acres. Facilities will include: control and antenna maintenance buildings, paved parking for ten (10) vehicles, a transformer pad, sewage disposal facility, water storage tank, auxiliary power generator building and above-ground diesel fuel storage tank (Exhibits 16-18).

A two story 4,000-square-foot control building will house an electronics lab and shop, receiver assembly and correlator rooms on the first floor and a control room, offices, and visitor receiving/employees lounge area on the second floor.

The 2,500-square-foot antenna maintenance building will be a one-story high bay metal building with roll-up door. The antenna carrier will be stored in the building when not in use. A graded and paved 6,600-square-foot turning area will be located adjacent to the 24-foot-wide and 33-foot-high roll-up door. A small building to house the emergency generator will be located adjacent to the antenna maintenance building.

Access:

Access to the project site within the summit area will be along an existing road that branches off from the Mauna Kea Access Road and proceeds north through "millimeter valley" past two existing telescope facilities, the CSO and the JCMT, to Pu'u Poliahu Road and along Poliahu Road to the project site (Exhibit 19). The applicant will widen and pave this road from its junction with the JCMT access road to Pu'u Poliahu Road. The applicant also plans to pave a 90-foot section of the existing Pu'u Poliahu Road, from its

junction with the "millimeter valley" road to the project parking area.

Array Access:

About 3,800 linear feet of new service roads to the observing pads would be graded and excavated to provide a 20-foot-wide travelway for the antenna carrier (See Exhibit 9). Another two (2) to three (3) feet will be excavated along the travelway for power cables and signal and communication conduits. The travelways will remain unpaved after final grading.

In addition, the Smithsonian Institute would improve - but not pave - a 670 foot segment of Pu'u Poliahu road to provide non-exclusive access to several observing pads. About 880 linear feet of existing common access roads will be graded and widened for non-exclusive use as service roads.

Electrical power will be extended from the existing 12.47 kV line to the operations/maintenance facilities via an underground system. Communications lines will be laid in conduits within the same alignment (Exhibits 20-21). Direct-buried power cables will extend from a main switchboard at the antenna maintenance building to each of the antenna pads. All cables will be laid in two-(2)-to-three (3)-foot-wide trenches constructed along the service roads to a depth of about 51 inches.

Potable water will be trucked in from Hilo and stored in a 6,000-gallon storage tank which would be located in the operations/maintenance area.

Wastewater, consisting primarily of human washing and waste, will be disposed of by means of a septic tank with leaching field which would be located east of the buildings.

Construction of the Telescope:

The existing batch plant/staging area at the summit will be used periodically during construction of the telescope (See Exhibit 10).

A temporary construction field office trailer will be brought to the project site for use by supervisory personnel during Phase I construction. It will be removed after the antenna maintenance building is completed. Temporary offices and materials storage areas would then be established within the antenna maintenance building for use as the Phase II construction staging facility.

Overall construction and installation of the telescope facilities is divided into five phases.

Phase Ia (Month 1). Construction Camp Cabins at Hale Pohaku.

Phase Ib (Month 1). Site preparation and construction of the operations/maintenance area, extension of existing power and communications lines to the operations/maintenance area, and improvements to the existing Millimeter Valley Road and to Pu'u Poliahu road, from its junction with the Millimeter Valley Road to the parking lot in the operations/maintenance area.

Phase II (Month 3). Inner service roads and 12 observing pads.

Phase III (Month 15). Outer service roads and 12 observing pads.

Phase IV (Month 16). Delivery of antennas to site/on site assembly.

Phase V (Month 17). Testing and commissioning of the antennas.

Project completion is anticipated by late 1998 or early 1999.

Operation of the Telescope:

The telescope will be maintained and operated by the Smithsonian Institution, Astrophysical Observatory, through its Hawaii headquarters in Hilo. Operating costs are estimated at $4 million (in 1993 dollars), more than half of which would be spent in Hawaii.

In its normal operating mode, the telescope will have a permanent staff of about 34 people, with 23 located in Hilo and the rest in Cambridge, Massachusetts.

Security:

In order to protect the antennas and insure public safety, security fencing will be installed along the perimeter of each observing pad when an antenna is present. It will consist of three to four lengths of steel cable or chain connected to 5-foot high steel posts embedded in pipe sleeves within concrete foundations. The

fencing will be removed when the observing pad is not in use. Additional security methods will be implemented if necessary including: installing two surveillance cameras on the roof of the control building to monitor the arrays both day and night; installing proximity sensors or motion sensors; and or installing direct two-way voice communication capability at each antenna.

PROPOSED USE (HALE POHAKU)

Dormitories:

No additional dormitory construction at Hale Pohaku is anticipated to support the project as the telescope has been designed to be operated in a highly automated mode, with all of the routine observing functions controllable from other locations, such as Hilo.

Construction Camp Facilities:

Use of the construction camp at Hale Pohaku may be needed for about three years, one year to allow the initial preparation of the site, and two years to finish the installation of the antennas and electronics.

Because it is uncertain whether space will be available at the existing construction camp, Smithsonian is considering construction of one or two 8-person cabins and associated infrastructure at the approved construction camp site (Exhibit 22). The cabins would be nestled among the trees. The cabins would be one story in height, raise off the ground on wood posts and constructed on pier-type foundations to minimize marring the terrain. Although the cabins would be of modular construction, the exteriors of the buildings would be painted to blend in with the existing environment and not detract from the existing buildings at Hale Pohaku.

Access to the construction camp facilities would be on foot from the parking area. All buildings would be connected by walkways of crushed cinder or gravel confined with suitable curbing material. The capacity of the existing electrical and water storage systems are sufficient to accommodate the additional workers. A new septic tank with leach fields would be constructed with a capacity to serve both cabins.

Construction of the cabins would require the grading and/or excavation for footings, aseptic tank, extension of utility lines, trenching for extension of sewer lines to the septic tank and construction of drainage pipes to dry wells.

The critical habitat of the endangered Palila encompasses Hale Pohaku and extends above it to an altitude of 10,000 feet. The most important negative impacts of further construction on the Palila and other native bird species stem from direct habitat disturbance during construction. In addition, the removal of mature mamane trees would be expected to significantly reduce resource availability for all of the native passerine bird species because younger mamane are less productive than larger ones.

EXISTING COVENANTS, EASEMENTS, RESTRICTIONS:

Mauna Kea Science Reserve:

The Science Reserve is currently encumbered by the University of Hawaii, Institute of Astronomy via General Lease No. S-4191 through 2033.

Hale Pohaku:

On February 28, 1986, under agenda item F-14, the BLNR approved the UH lease request for a site of approximately 21 acres at the Hale Pohaku mid-level facilities. Subsequently, the County of Hawaii approved the subdivision of a 19.261-acre site (TMK: 4-4-15: 12). Shortly thereafter, the Survey Division of the Department of Accounting and General Services (DAGS) forwarded the survey map and metes and bounds description to the DLNR Land Management Division for preparation of the State lease document. The lease has not yet been executed.

AGENCY COMMENTS:

The application was referred to the following agencies for review and comment: The Department of Land and Natural Resources, Divisions of Aquatic Resources, Forestry and Wildlife, Conservation and Resources Enforcement, State Parks, Land Management, Water and Land Development, Commission on Water Resource Management, Historic Preservation, Natural Area Reserves System; Department of Health, Office of State Planning, Office of Hawaiian Affairs, Office of Environmental Quality Control, Department of Transportation, Department of Hawaiian Home Lands; County of Hawaii Planning Department, Department of Water Supply, Public Works, and Parks and Recreation.

Substantive comments received are as follows:

DEPARTMENT OF LAND AND NATURAL RESOURCES

Division of Land Management

DLNR-Land Management has no objections to the installation of the telescope and related facilities.

Historic Preservation Division

The area of potential effect for this project includes four small shrines that would be adversely affected should construction activities take place in their vicinity. We believe that the Smithsonian Institution Astrophysical Observatory Project will have "no adverse effect" on these significant historic sites if the following two conditions are attached to the Conservation District Use Permit. First, all construction related activities, including the stock-piling of construction materials, in the summit area shall be confined to a clearly demarcated and fenced project area to ensure the protection of two small shrines (Sites 50-10-23-5224 and 50-1023-5225) located in the general area of the observatory. Second, at Hale Pohaku the applicant shall erect plastic fencing to protect two shrines (Sites 50-10-23-10313 and 50-10-23-10315) at the Pu'u Kalepeamoa Site from possible damage in the use of the staging area.

Natural Area Reserves System

There is no mention of one of our most unique high-elevation organisms - the Wekiu Bug (Nyseius Wekiula). The summit is not a lifeless stone desert, but is home of some of our most unique life forms. Dr. Frank Howarth of the Bishop Museum should be contacted for advise on invertebrates.

This bug is only found at the summit of Mauna Kea and Mauna Loa. It is under the threat of lava on Mauna Loa and construction on Mauna Kea.

DEPARTMENT OF TRANSPORTATION

The proposal to construct a telescope associated support facilities, and related infrastructure at the Mauna Kea Science Reserve will not have significant impact on our transportation facilities.

COUNTY OF HAWAII

Planning Department:

The Planning Department has no objections to the proposed project.

Please be informed that the subject properties are outside the Special Management Area (SMA). Therefore, the proposed project is not subject to Planning Commission Rule No. 9 relating to Special Management Area.

Department of Water Supply:

Please be informed that the subject property is not within the service limits of the Department's existing water system facilities.

ANALYSIS:

Following review and acceptance of the application for processing, the applicant by letter dated August 15, 1994, was notified 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. No public hearing is required pursuant to Act 270 of the Hawaii Session Laws (1994) in that the proposed use is not of a commercial nature; and

3. In conformance with Title 11, Chapter 200, of the Department of Health Administrative Rules, the Office of Environmental Quality Control confirmed, by letter dated May 25, 1994, that all pertinent environmental concerns have been addressed in the previous Final Environmental Impact Statements. Accordingly, they find that the applicant has fulfilled the requirements of the State's Environmental Impact Statement Law (Exhibit 23).

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 of the Administrative Rules states that all applications shall be reviewed in such a manner that the objective of the subzone is given primary consideration.

According to the County of Hawaii Planning Department, the project sites are outside the Special Management Area.

Impacts to Fauna and Flora at Hale Pohaku:

The critical habitat of the endangered Palila encompasses Hale Pohaku and extends above it to an altitude of about 10,000 feet. According to the applicant, the U.S. Fish and Wildlife service was contacted informally during the preparation of the Mauna Kea Science Reserve Complex Development Plan (SRCDP) and the Final Supplemental Environmental Impact Statement for Construction Camp Housing (CC SEIS). In both cases, their informal opinion was that the proposed construction camp would not be expected to have a significant impact on the endangered Palila or its critical habitat if conservation measures suggested in the SRCDP are followed. The measures include:

- Development should be confined within 1/8-mile of the Mauna Kea Access Road;

- Few, if any, mamane trees should be destroyed. If possible, trees that must be removed should be transplanted to protected areas and cared for until established sufficiently to exist on their own. Disturbed areas should be re-planted with appropriate native species;

- Measures should be taken to control undergrowth in order to prevent natural fires from destroying the existing mamane and any inhabiting species, such as the Palila; and

- Construction should not be initiated during the Palila breeding season unless birds are discouraged from nesting in the construction area prior to and continuing into the nest site selection, paring and breeding/rearing season.

Staff notes that in previous environmental impact statements and CDUAs, mitigation measures have been discussed and imposed on construction activities. One of the most important measures is to ensure that proposed cabins have been sited to avoid removal of mature mamane trees.

In addition, prior to construction of any cabins, the Smithsonian Institution will initiate formal consultation with the Secretary of

the Interior in compliance with Section 7 of the Endangered Species Act of 1973.

To further mitigate any disturbance to vegetation at the site, disturbance of ground surface under and around buildings will be minimal since the buildings will be constructed on pier-type foundations. No new paved surfaces will be constructed so additional erosion protection measures will not be necessary.

The possibility of prefabricating the construction camp cabins elsewhere to minimize construction activity at the site will be investigated.

If the above mentioned measures are implemented, staff believes that any possible impacts to native birds including the Palila will be mitigated to the greatest extent practicable.

Impacts to Fauna and Flora at the Summit:

A portion of the Smithsonian Institution project site lies within an area identified by Smith et al. (SRCDP EIS) as a special interest area of high lichen concentrations (Exhibit 24).

According to Smith, lichens occur widely throughout the summit area. Lichen concentrations and diversity are highest on the north and west-facing andesite rock outcroppings where available moisture provided by the tradewinds can be intercepted without exposure to the full sun.

The majority of the observing pads and roads are sited in small swales or bowl areas on loose cinder material or small, fist-sized rocks. According to the applicant, areas with high lichen concentrations have been avoided; they will not be disturbed by the proposed project.

The Natural Area Reserve Systems indicates that there was no mention of a unique high-elevation invertebrate; the Wekiu Bug (Nyseius wekiula). They indicate that a Dr. Frank Howarth of Bishop Museum should be contacted for more information relative to invertebrates on Mauna Kea. Staff notes in reference to the SCRDP EIS, that there are some bug species on the mountain that may not be found elsewhere in the State.

Staff will note this as a condition of approval.

Recreation and Other Uses:

In 1985, the Board approved the Mauna Kea Management Plan (MKMP). The purpose of the plan is to protect the summit's resources and control and manage the use of the summit by the general public.

The primary objective of the plan is to preserve the natural features of the area and to protect the astronomical qualities of the site. The MKMP also identifies measures for the protection of the summit's biological and historical/cultural resources, enhancement of visitor experiences, public safety and security.

General lease no. S-4191 between UH and the BLNR specifically permits non-astronomy related scientific activities, as long as those activities are not inimical to astronomy operations. Also, Recreation uses (restricted to daylight hours) are specifically allowed in the lease.

The proposed project could possibly affect snow play/skiing, as the project area spans an area of about five (5) acres.

Maiden's run, a popular ski area, is located on the northern slope of Pu'u Poliahu which is near the Smithsonian Institution's proposed telescope site (Exhibit 25). The applicant identifies that operation of the telescope facility should not significantly affect skiing, as skiers would be able to ski over any unoccupied observing pads that are covered with snow. It appears that only a very small portion of the ski run would be affected.

Staff notes that although astronomical research is one of the primary uses allowed on the mountain at this time, the lease between UH and the BLNR does not exclude use of the mountain for recreational purposes.

The MKMP states that, "Mauna Kea belongs to the people of Hawaii and its resources should be available for all to enjoy". Staff, therefore, feels that the appropriate measures must be taken to insure that recreational activities such as skiing and snow play, as well as other non-astronomy related activities identified in the MKMP are protected and perpetuated.

To insure that recreational activities are protected and perpetuated, the Smithsonian Institution and UH Institute of Astronomy should work together to maintain accessible yet safe skiing/snowplay conditions throughout the project site. For instance, when observing pads are not in use, fencing should be removed and stored in a safe location. Also, interior and exterior

service roads should be maintained during snow periods to allow improved public access and use of ski/snow play areas.

Historic Sites Affected:

The DLNR Historic Preservation Division has indicated that the proposed project will have "no adverse effect" on significant historic sites provided that construction related activities, including the stock-piling of construction materials in the summit area, are confined to a clearly demarcated and fenced area to ensure the protection of two small shrines located in the general area of the proposed observatory. Also, at Hale Pohaku, the applicant must erect plastic fencing to protect two shrines at the Pu'u Kalepeamoa Site from possible damage in the use of the staging area.

These measures will be incorporated into the staff report as conditions of approval.

Visual Impacts:

An analysis of long-range visual impact, using various antenna configurations and the operations/maintenance area buildings at the proposed site was conducted (Exhibit 26). The results indicated that under certain conditions the Smithsonian Institution telescope would be visible from some areas of North Kona, North Kohala, South Kohala, including the towns of Waimea, a small portion of Hamakua, and from Mauna Loa. Exhibit 27 illustrates the short-range visual impact of the telescope from a point within the summit area.

In terms of mitigation, the applicant proposes fabricating all exposed surfaces of the observing pads with colored concrete or paint to match the surrounding terrain.

The applicant has not indicated what if any measures would be taken to address any long-range impacts anticipated from the proposed facilities.

Batch Plant:

Presently, the 2-acre site is being used as a concrete batch plant facility and temporary staging area for construction of the Japan National Large Telescope (Subaru) telescope. Use of the site as a batch plant and staging area was approved under CDUPs HA-2462 and HA-2509.

Staff understands that the existing batch plant/staging area has been used as a parking lot by the public at times during the snow season. Staff is uncertain what, if any impact, construction of the Smithsonian Institution's telescope would have on use of the mountain by the public.

Phasing:

As stated in the application document, the project will take place in five (5) phases. Construction is scheduled to begin in mid 1995 and end sometime in late 1998 or early 1999.

The applicant has asked that the Board modify its standard one (1) year initiation and three (3) year completion deadline to two (2) years and seven (7) years respectively from the date of approval.

Waste Disposal:

Between 100 and 250 gpd of wastewater would be discharged into a septic tank and seepage pit system located in the operations/maintenance area. According to the applicant, percolation through the gravely soils and andesite rock is expected to be relatively rapid. It is unlikely that the treated wastewater will percolate beyond the immediate area, so that no impact from wastewater discharge is expected. Solid and liquid waste generated by antenna maintenance activities will be stored in a specially designed area on site and periodically trucked to an approved disposal site.

Consistency with Existing Master Plans:

According to the applicant, the thirteen telescopes planned for development in the summit area of Mauna Kea comprised the nine telescopes that were either in operation, under construction or committed for future construction at the time the Mauna Kea Science Reserve Complex Development Plan (SRCDP) was prepared and four additional unspecified facilities. The four unspecified telescopes were expected to include: three large optical/infrared telescopes (8 to 10-meter class), and one large single-dish (25-meter) millimeter-wave facility. Two new optical/infrared telescopes are now under construction - Japan National Large Telescope (Subaru) and the second telescope of the W. M. Keck Observatory (Keck II); the CDUA for the third, the Gemini Northern 8-Meter Telescope, was approved by the BLNR on April 8, 1994. The Smithsonian Institution telescope is proposed in place of the 25-meter single-dish millimeter-wave telescope discussed in the SRCDP. It will be

located in SRCDP Telescope siting Areas II and III (See Exhibits 5-6 & 11).

Subzone Consistency:

Section 13-2-21 of the Administrative Rules states that all applications shall be reviewed in such a manner that the objective of the subzone is given primary consideration.

Both project sites and the batch plant are within the Resource subzone. The objective of this subzone is to develop, with proper management, area to ensure sustained use of the natural resources of the area.

According to the applicant, the proposed telescope will add to the research capabilities of the Mauna Kea observatories and meets the objective of the subzone by utilizing the excellent astronomical resources that Mauna Kea possesses.

Hale Pohaku is also within the Resource subzone. Drainage improvements at the existing facility have served to correct the erosion problems that were present before the facilities were constructed and thus acted to ensure the sustained use of the natural resources of the area. Similar drainage improvements will be incorporated into the design of the new buildings.

Staff adds that the proposed telescope use is consistent with the on-going use of Mauna Kea for astronomical observation and research as evidenced by past Board actions.

Staff furthermore feels that with the continuation of non-astronomy related activities such as research, recreation and hunting, the proposed use is in keeping with a multiple use conservation ethic.

Staff finds no objections to the proposed activity.

As such, staff recommends the following:

RECOMMENDATION:

That the Board of Land and Natural Resources approve the Smithsonian Institution Astrophysical Observatory Submillimeter Array Telescope and associated facilities/infrastructure; temporary use of a portion of the batching plant site, construction of up to two (2) 8-person cabins in the existing construction camp, use of the approved materials staging area to the south of the

construction camp site, at Mauna Kea, Hamakua, Hawaii, on land identified as TMK: 4-4-15: 09 & 12, 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 shall comply with all applicable Department of Health Administrative Rules;

3. 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;

4. Since this application is for the use of conservation lands only, the applicant shall obtain appropriate authorization through the Division of Land Management, State Department of Land and Natural Resources for the occupancy of State lands;

5. All construction related activities, including the stock-piling of construction materials, in the summit area shall be confined to a clearly demarcated and fenced project area to ensure protection of two small shrines (Sites 50-10-23-5224 and 50-10-23-5225) located in the general area of the observatory;

6. At Hale Pohaku, the applicant shall erect plastic fencing to protect two shrines (Sites 50-10-23-10313 and 50-10-23-10315) at the Pu'u Kalepeamoa Site from possible damage in the use of the staging area;

7. Should historic remains such as artifacts, burials, or stone pavings or wall be found during construction, the applicant shall stop work in the area and contact the State Historic Preservation Division immediately, at 587-0046;

8. All structures shall be painted to blend in with the surrounding environment;

9. The applicant shall contact Dr. Frank Howarth of the Bishop Museum for comments and recommendations to protect important invertebrates in the project area;

10. Prior to construction of any cabins, the applicant shall initiate formal consultation with the Secretary of the Interior in compliance with Section 7 of the Endangered Species Act of 1973.

11. To insure that recreational activities are protected and perpetuated, the applicant shall maintain accessible yet safe skiing/snowplay conditions throughout the project site to the greatest extent practicable.

    a. Interior and exterior service roads shall be maintained during snow periods to allow improved public access and use of ski/snow play areas.

    b. The applicant shall remove any fencing around the observing pads when they are not in use.

12. The applicant shall fabricate all exposed surfaces of the observing pads with colored concrete or paint to match the surrounding terrain.

13. The applicant shall notify the Department when construction initiated and when construction is completed;

14. Any work to be done on the land shall be initiated within two (2) years of the approval of such use, and all work and construction must be completed within seven (7) years of the approval of such use;

15. The applicant shall submit four (4) sets of the construction plans and specifications to the Chairperson or his authorized agent for approval with the permit 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 by other agencies. Compliance with condition 1 and 2 remain the responsibility of the applicant;

16. That all applicable mitigation measures set forth in the final environmental impact statements for this project are hereby incorporated as conditions of approval;

17. That is issuing this permit, the Department and Board has relied on the information and data which the permittee has provided in connection with this 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;

18. All conditions imposed under CDUA HA-1573 shall remain in effect;

19. That failure to comply with any of these conditions shall render this Conservation District use Application null and void; and

20. Other terms and conditions as prescribed by the Chairperson.

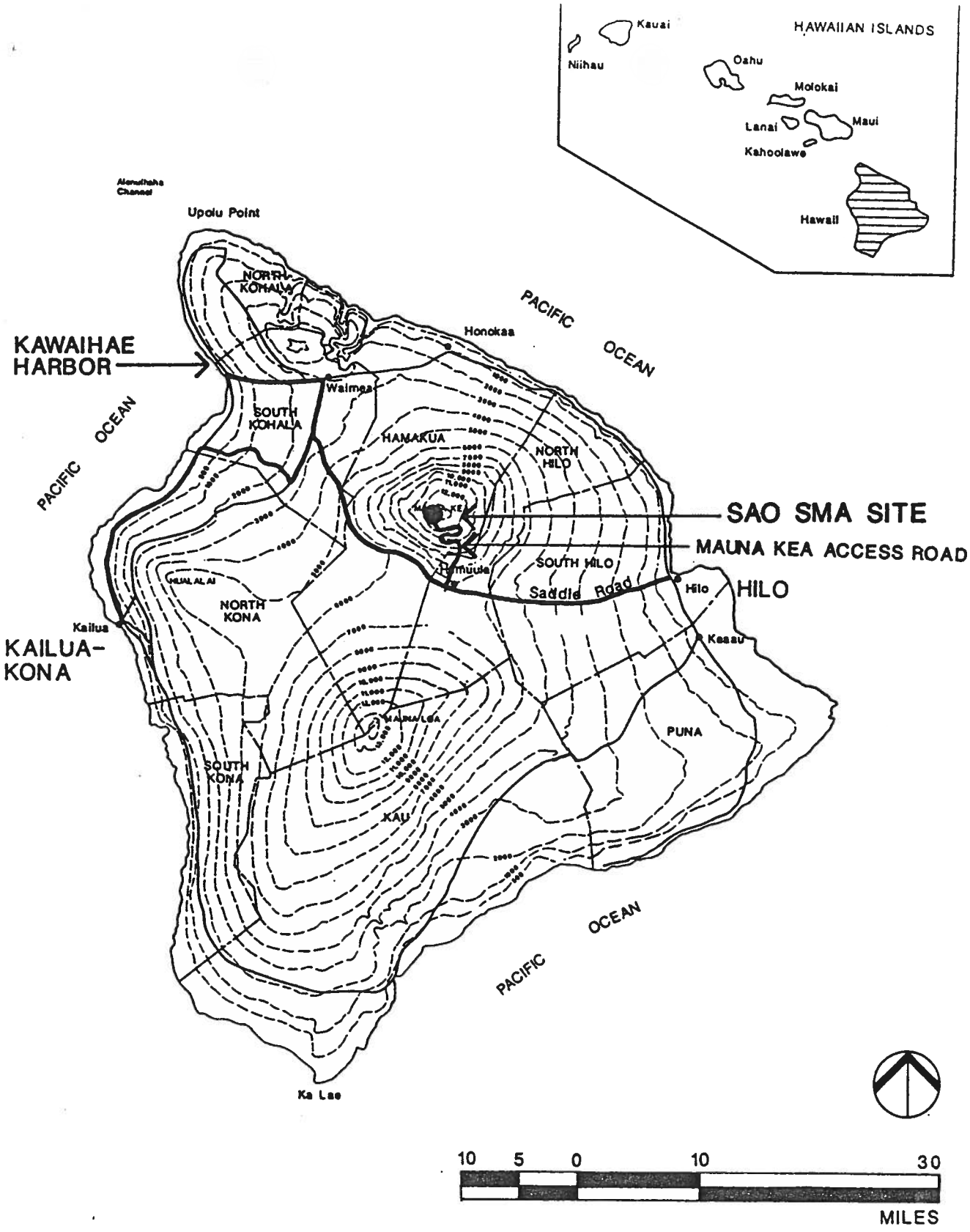
Respectfully Submitted,

Samuel J. Lemmo

SAMUEL J. LEMMO
Staff Planner

Approved for submittal:

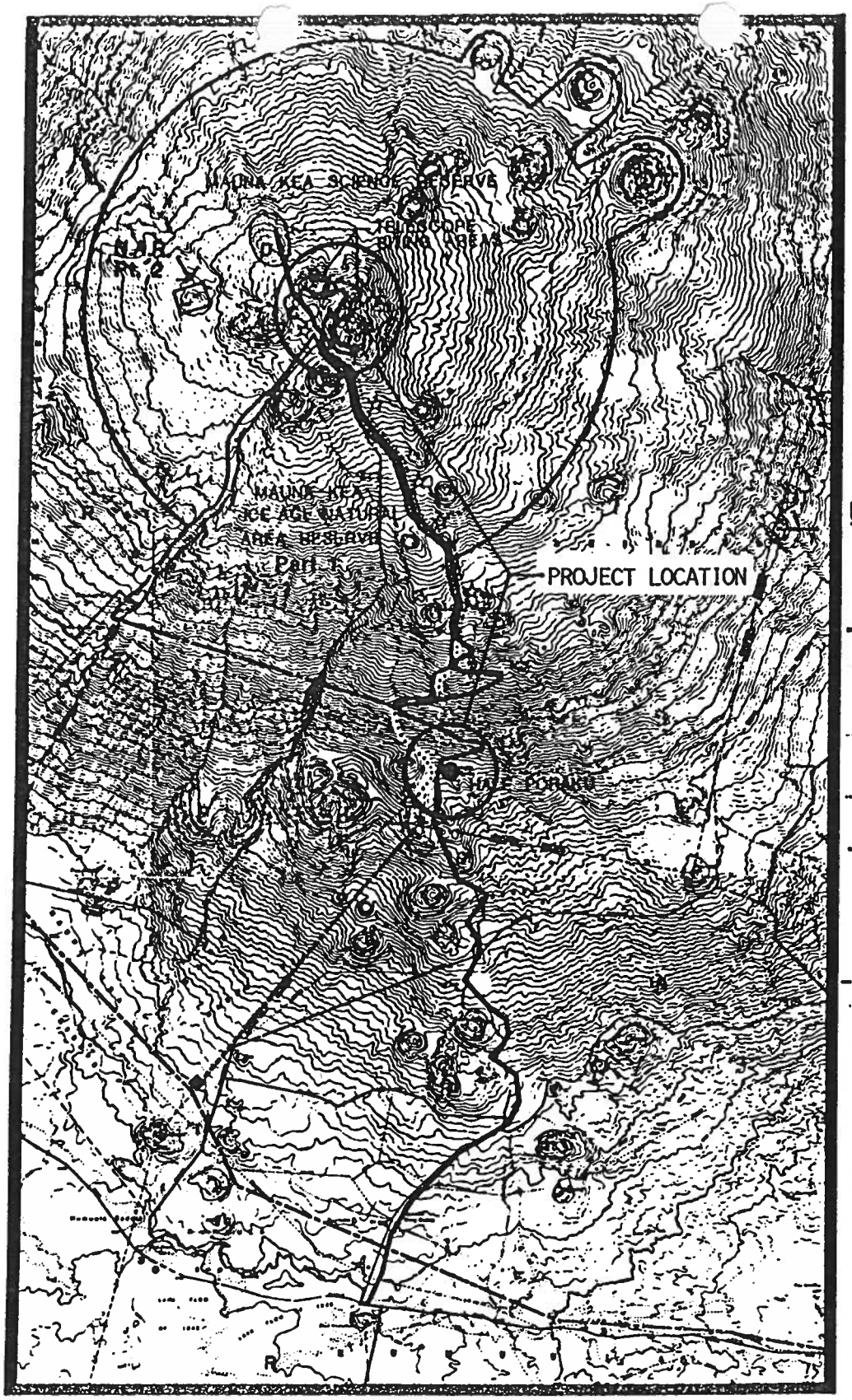
KEITH W. AHUE, Chairperson
Board of Land and Natural Resources



MAUNA KEA ACCESS /ISLAND MAP

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

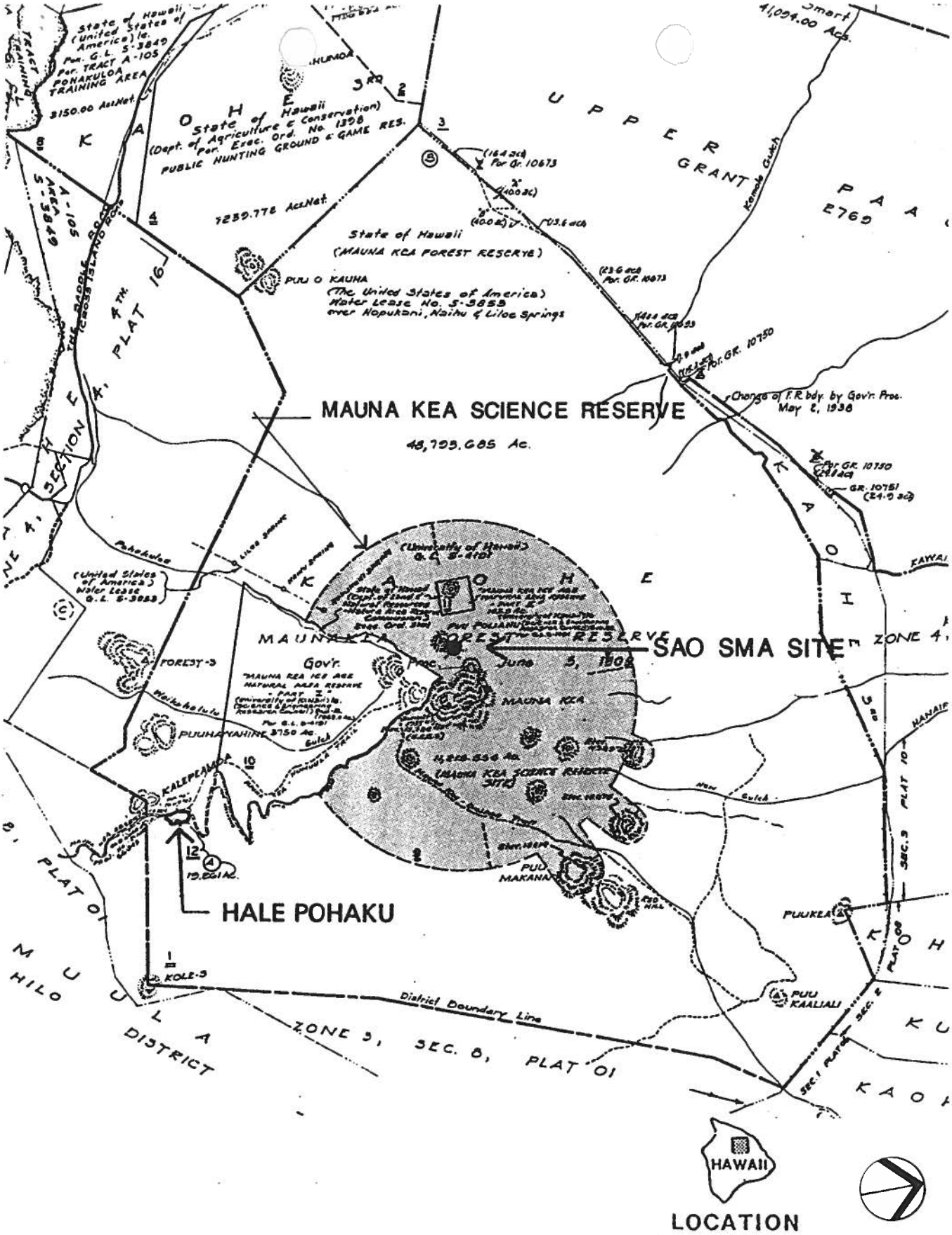
CDUA: HA-2728 **EXHIBIT 1**



MAUNA KEA SCIENCE RESERVE

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

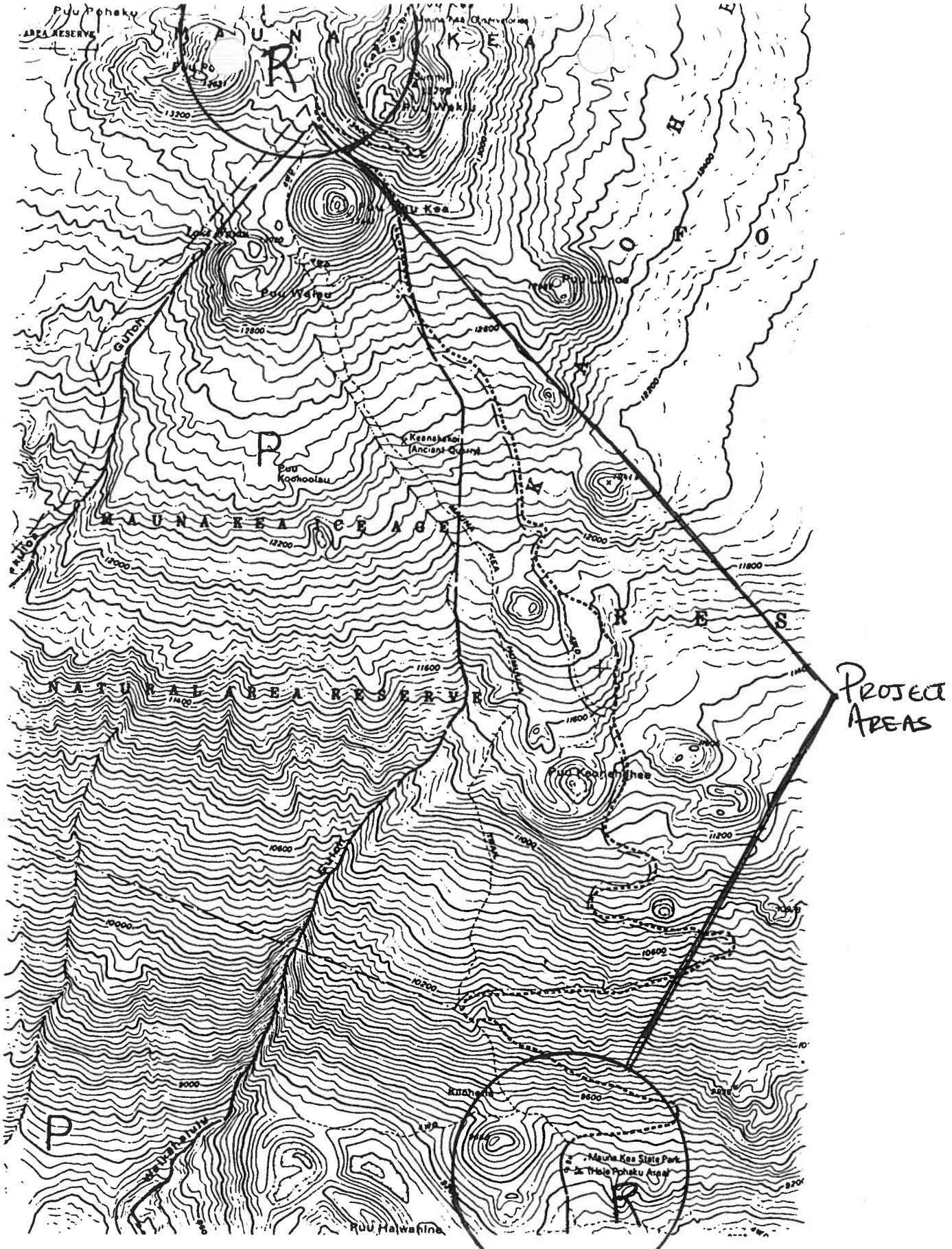
CDUA: HA-2728 **EXHIBIT 2**



TAX MAP KEY: 4-4-15:09 & 12

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 3**



SUBZONE MAP "RESOURCE SUBZONE"

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 4**

MAUNA KEA OBSERVATORIES TELESCOPES

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

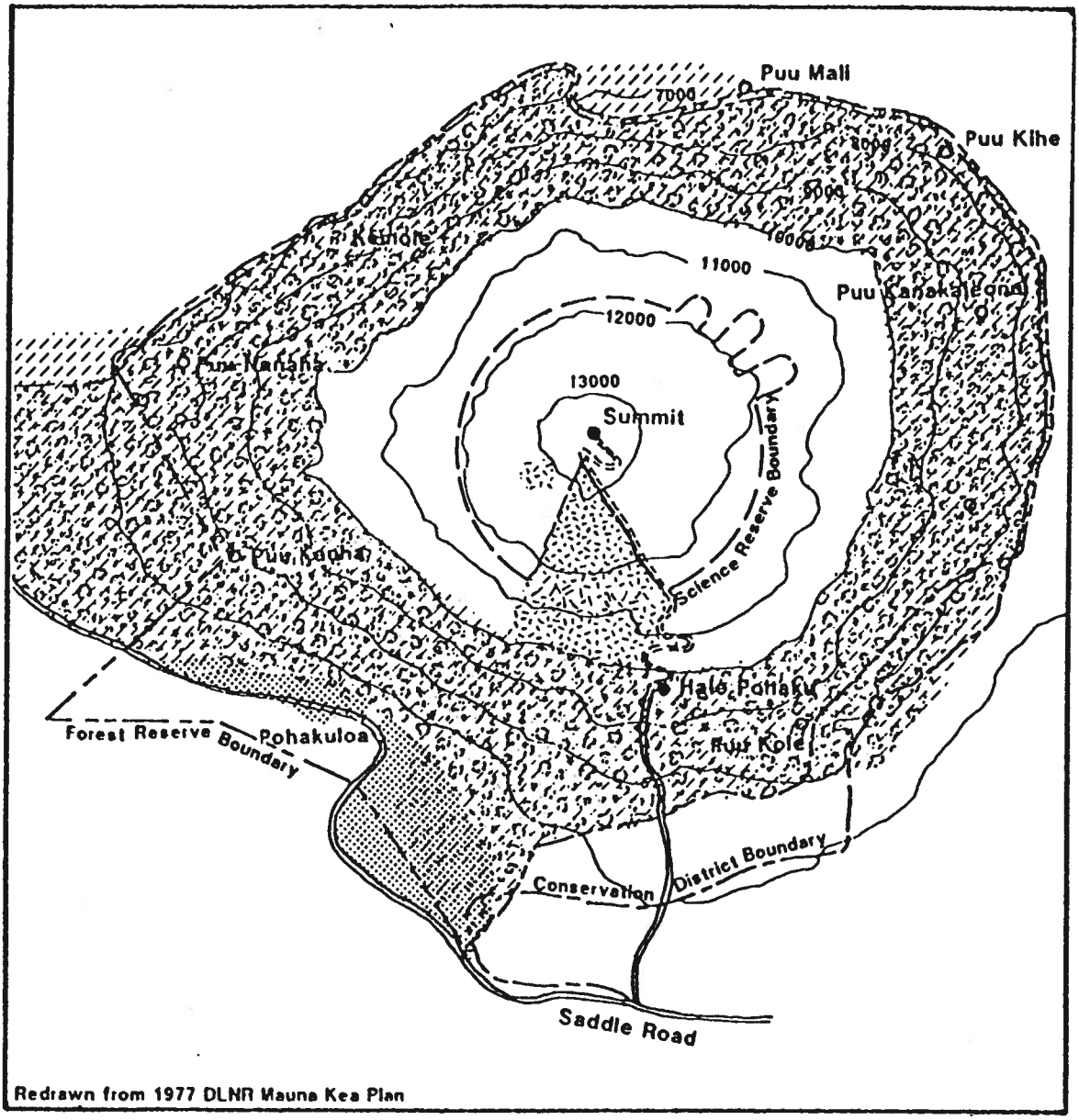
CDUA: HA-2728 **EXHIBIT 5**

Table 1.0 **TELESCOPES ON MAUNA KEA BY YEAR OPERATIONAL**

Telescope	Year Operational
Summit Ridge	
UH 24-inch Telescope #1	1968
UH 24-inch Telescope #2 (Planetary Patrol)	1969[a]
UH 88-inch Telescope	1970
NASA Infrared Telescope Facility(IRTF)	1979
Canada-France-Hawaii Telescope (CFHT)	1979
United Kingdom Infrared Telescope (UKIRT)	1979
W.M. Keck Observatory (Keck I)	1992
W.M. Keck Observatory (Keck II)	1996[b]
Japan National Large Telescope (Subaru)	1999[b]
Gemini Northern 8-Meter Telescope	1999[a]
Millimeter Valley	
Caltech Submillimeter Observatory (CSO)	1987
James Clerk Maxwell Telescope (JCMT)	1987
12,220-Foot Elevation	
Very Long Baseline Array Antenna (VLBA)	1992

[a] The Conservation District Use Application for the Gemini Northern 8-Meter Telescope (CDUA HA-2691) was approved on April 8, 1994. The UH 24-inch Planetary Patrol Telescope will be removed to provide an adequate site for the Gemini facility.

[b] Under construction.



LEGEND:

- Palila Critical Habitat
- Silversword Area
- Mamane-Naio and Associated Ecosystem
- Natural Area Reserve
- Military Area

2 0 2

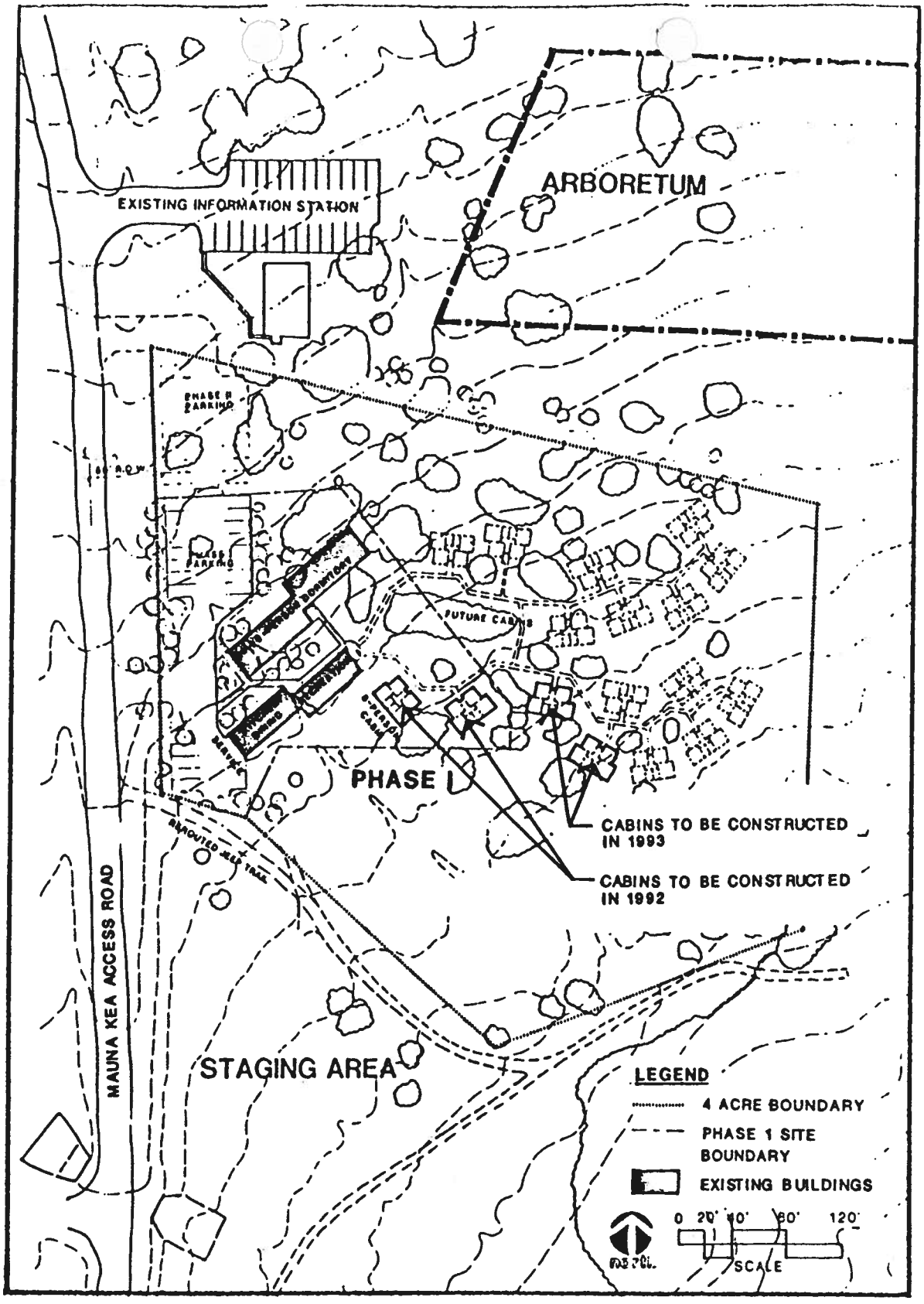
Scale in Miles

Location

PALILA CRITICAL HABITAT

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

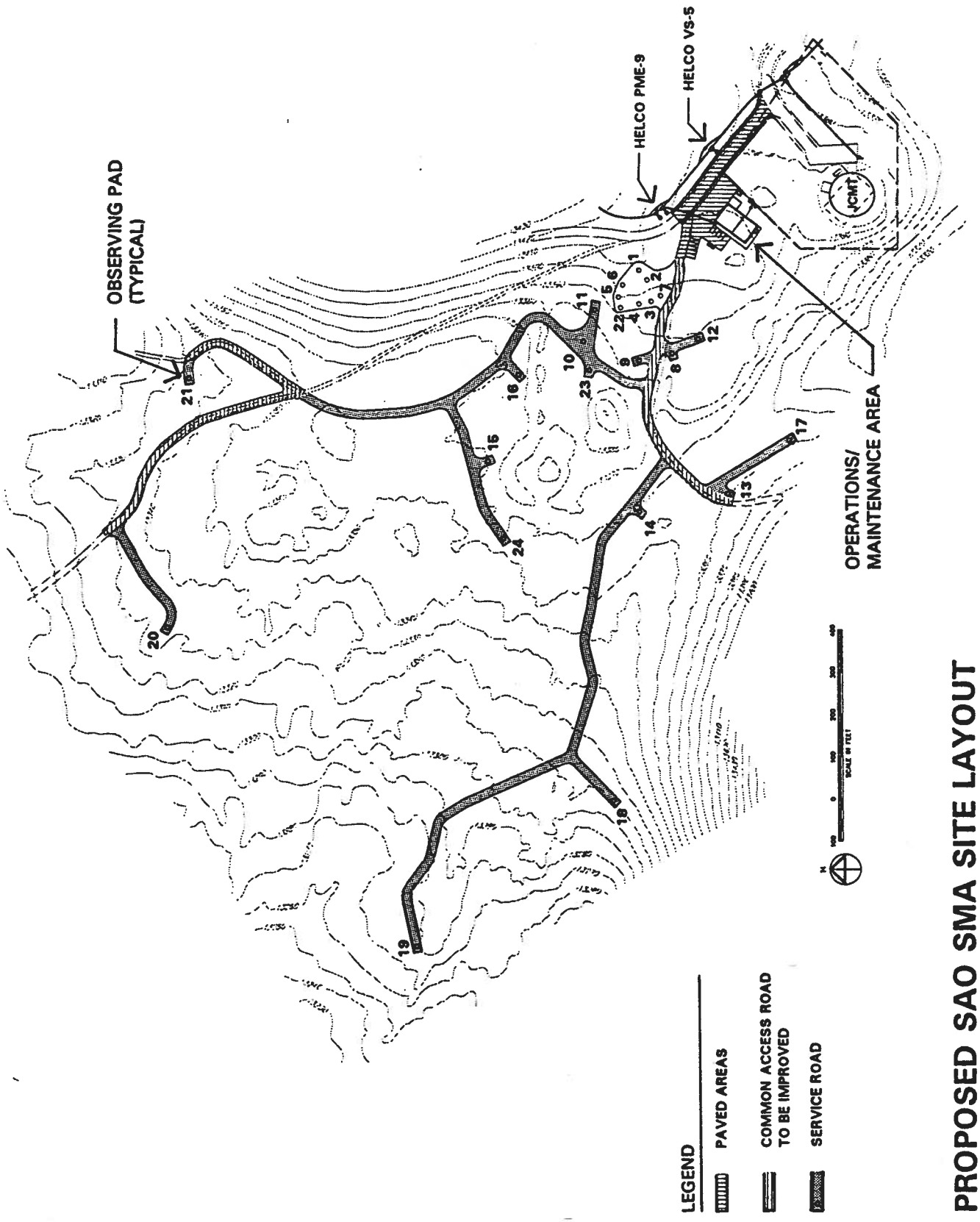
CDUA: HA-2728 **EXHIBIT 7**



CONSTRUCTION CAMP MASTER PLAN

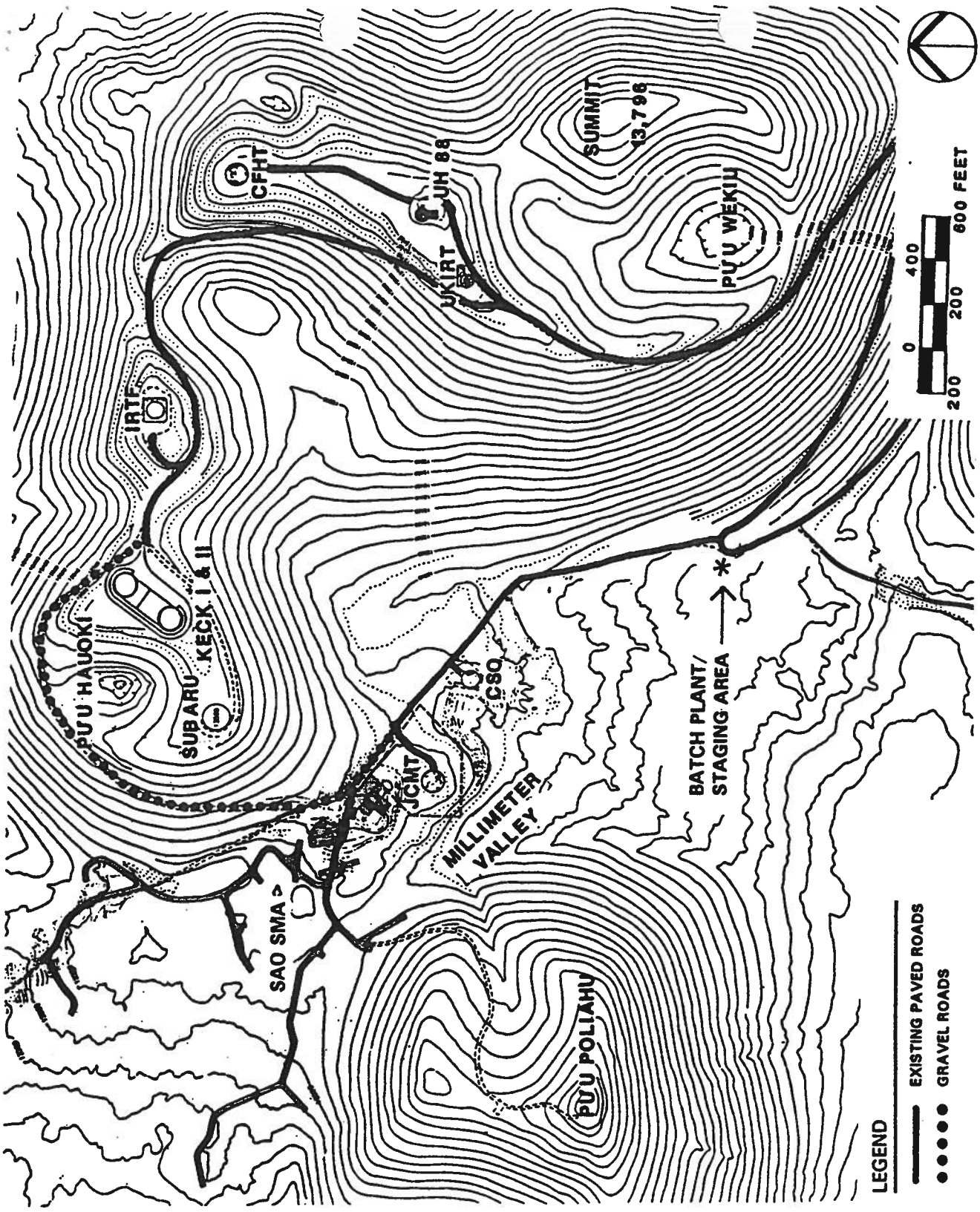
CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 8**



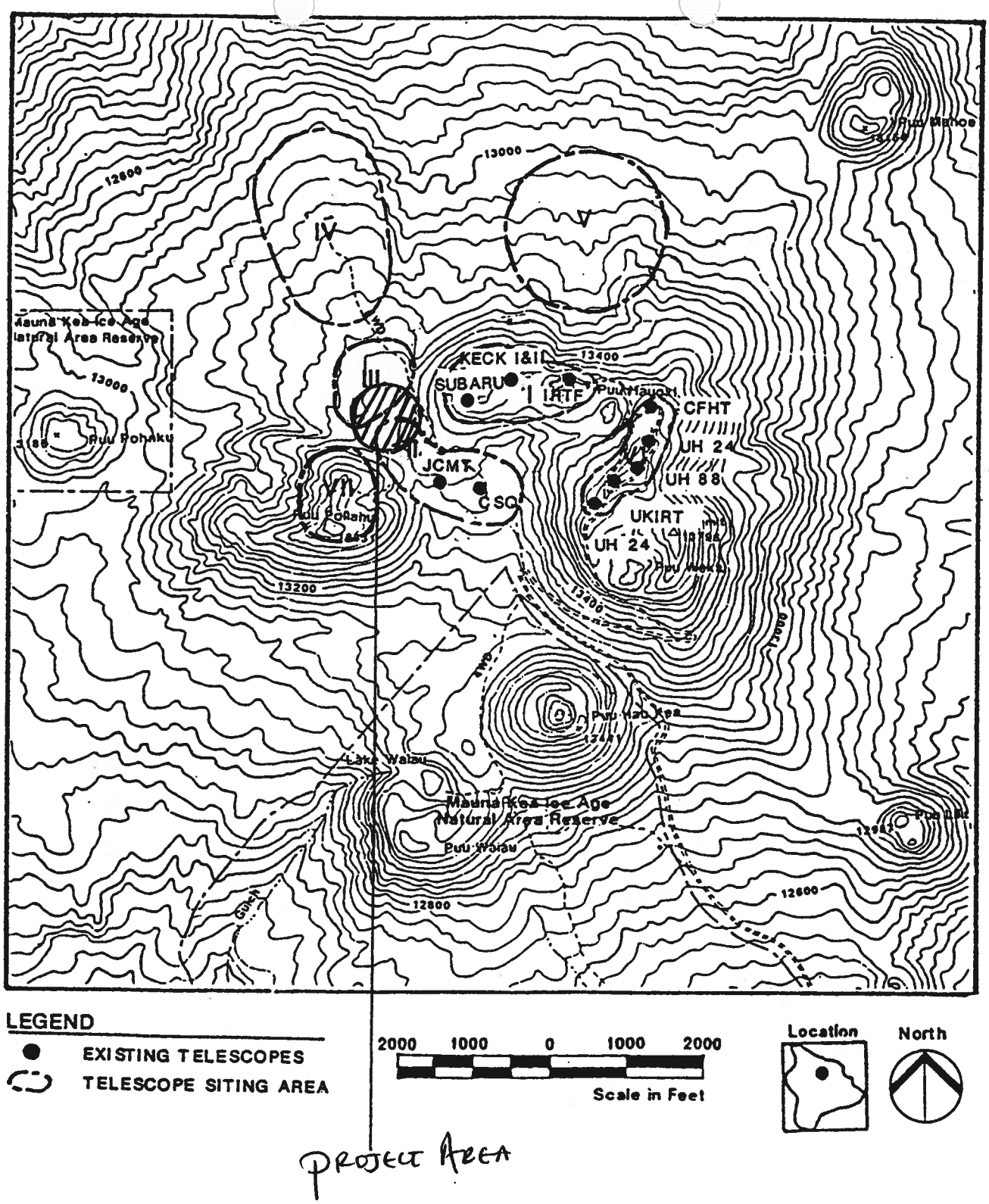
CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 9**



SAO SMA LOCATION

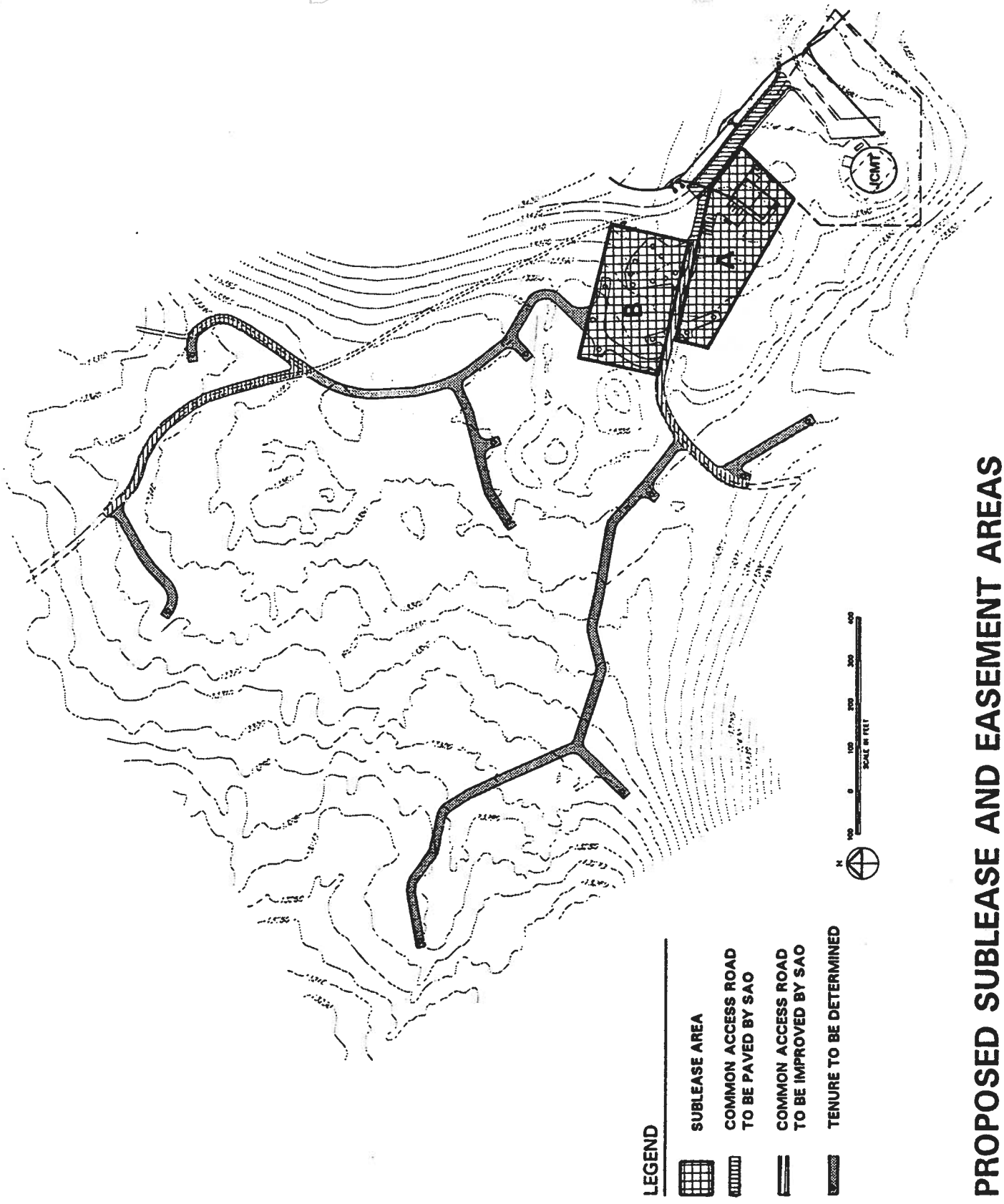
CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12



SRCDP FEIS: TELESCOPE SITING AREAS

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

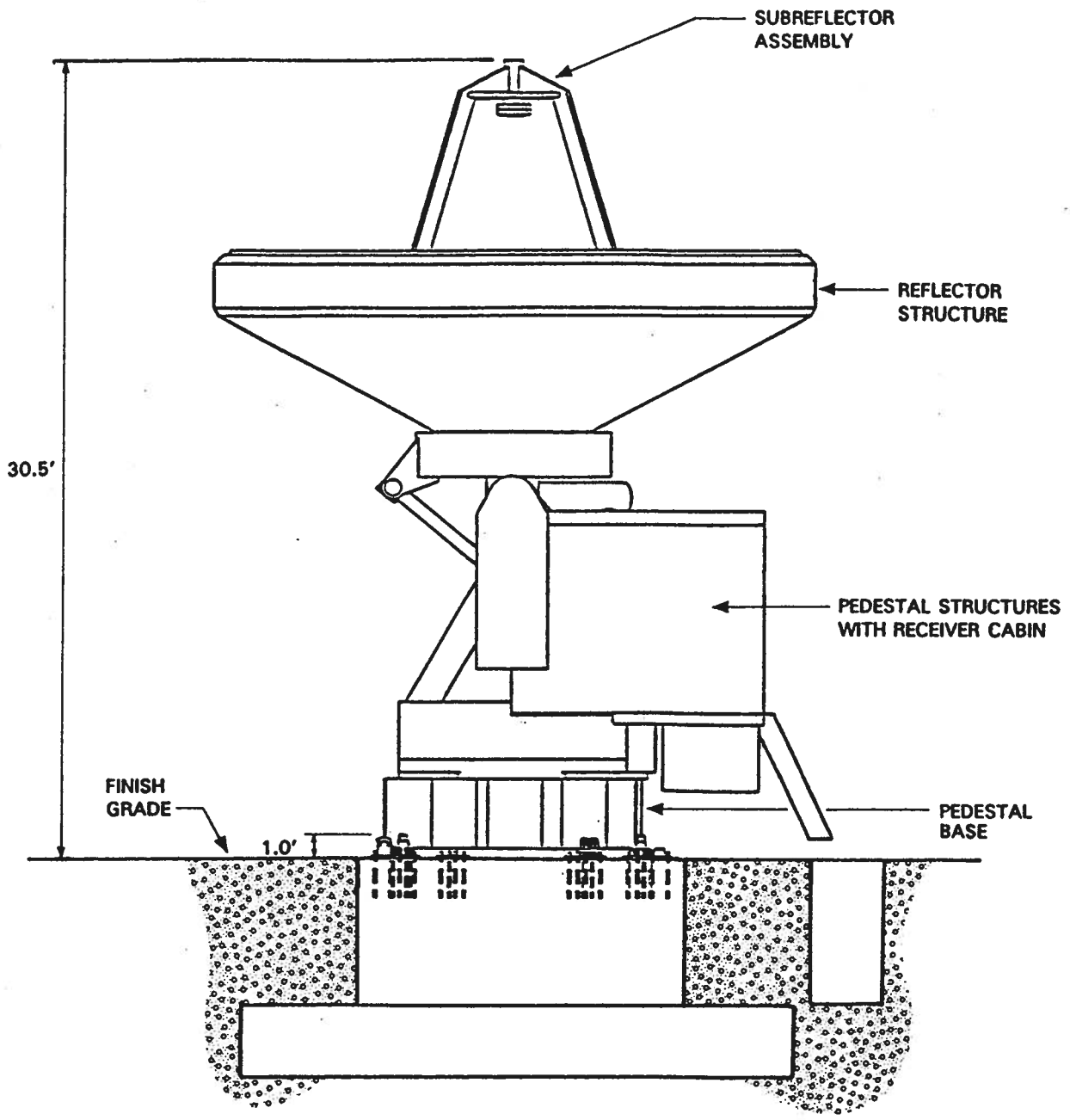
CDUA: HA-2728 **EXHIBIT 11**



PROPOSED SUBLEASE AND EASEMENT AREAS

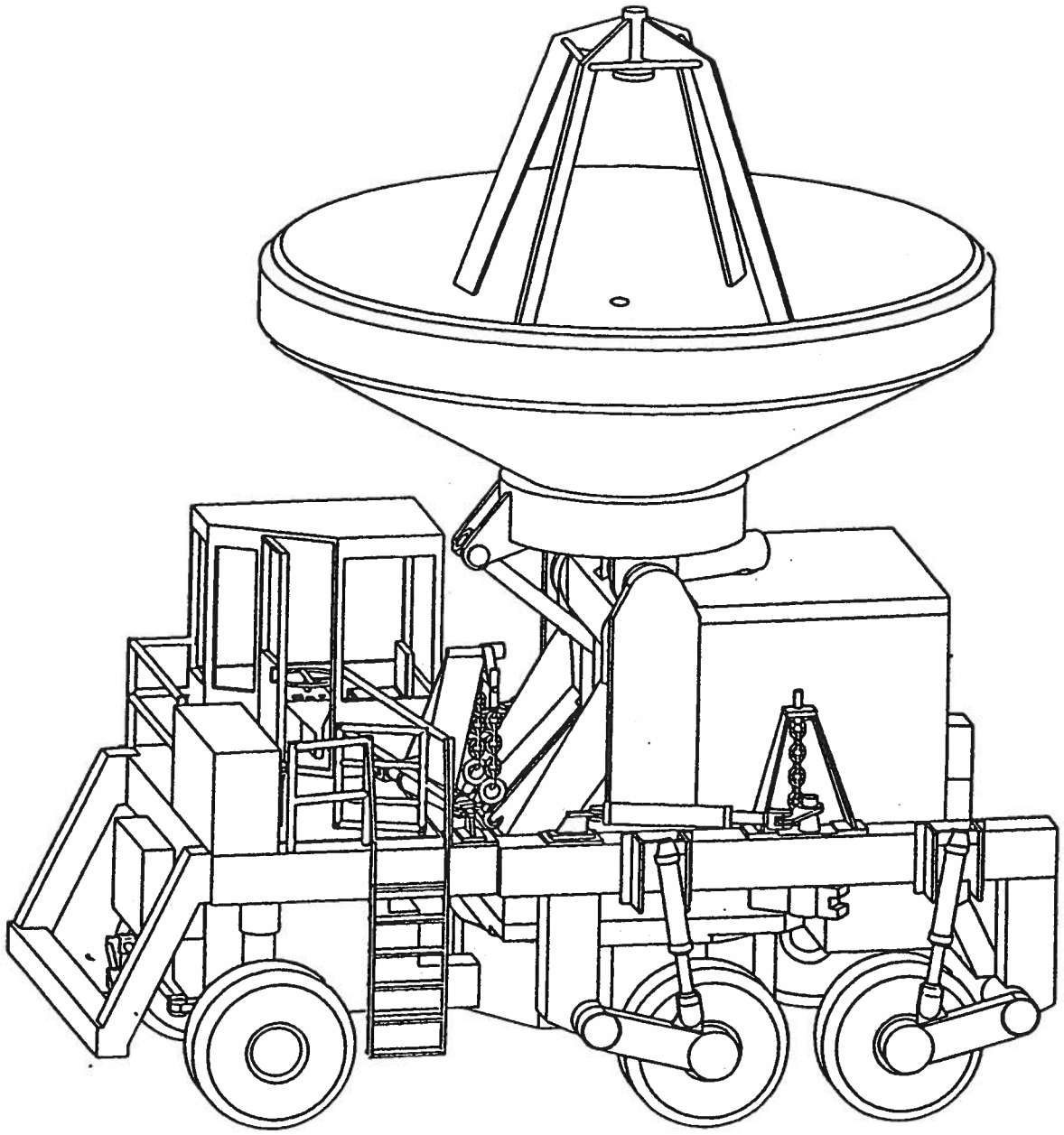
CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 12**



ANTENNA ORIENTED AT ZENITH

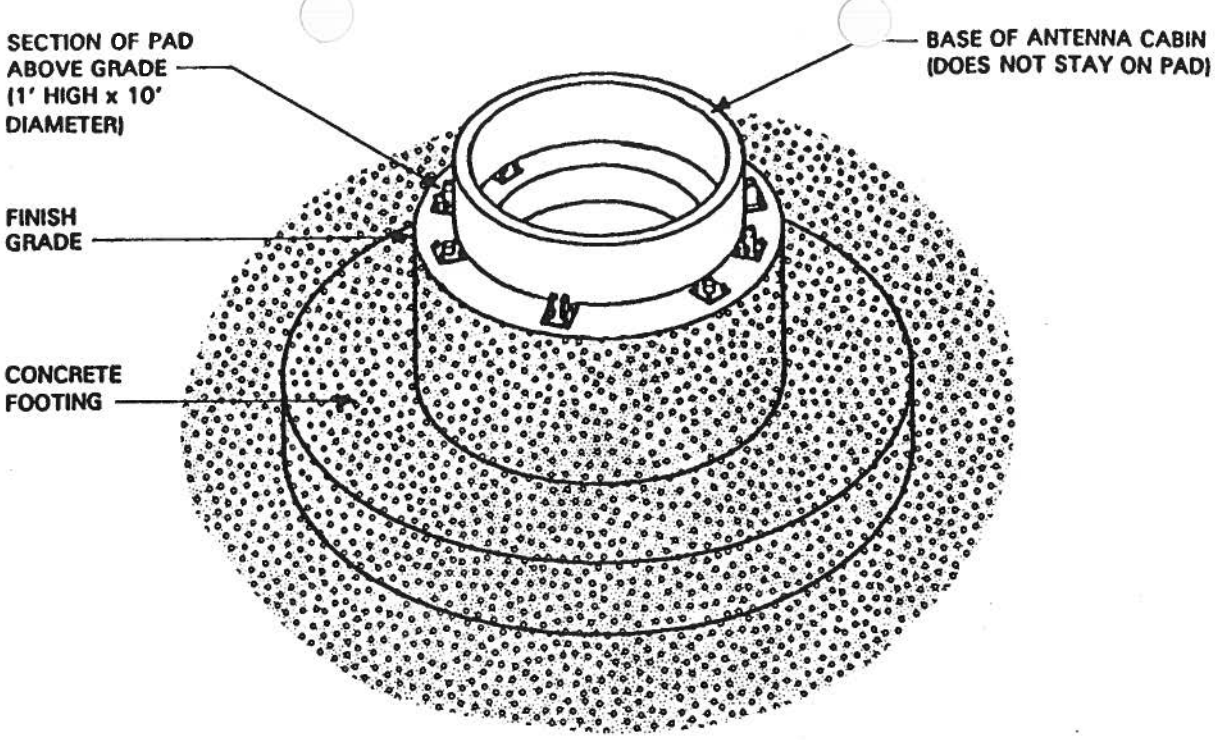
CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope
at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12



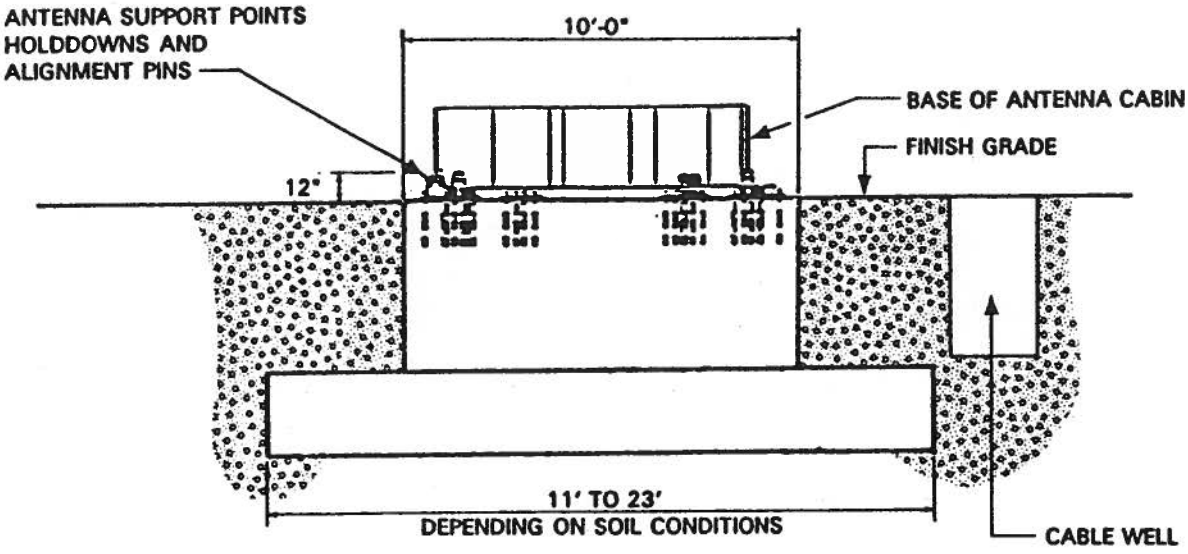
CARRIER WITH ANTENNA

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 14**

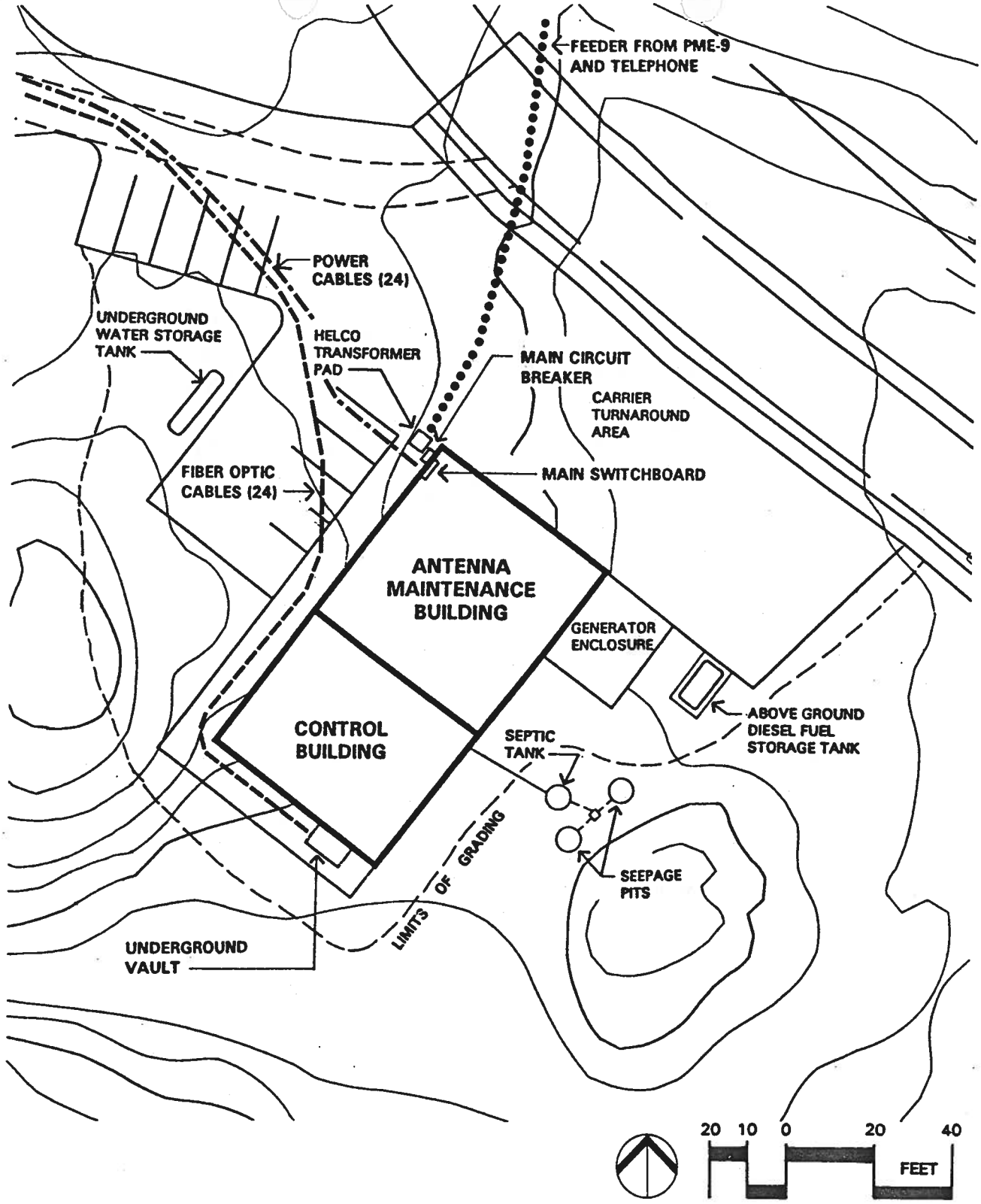


BIRD'S EYE VIEW



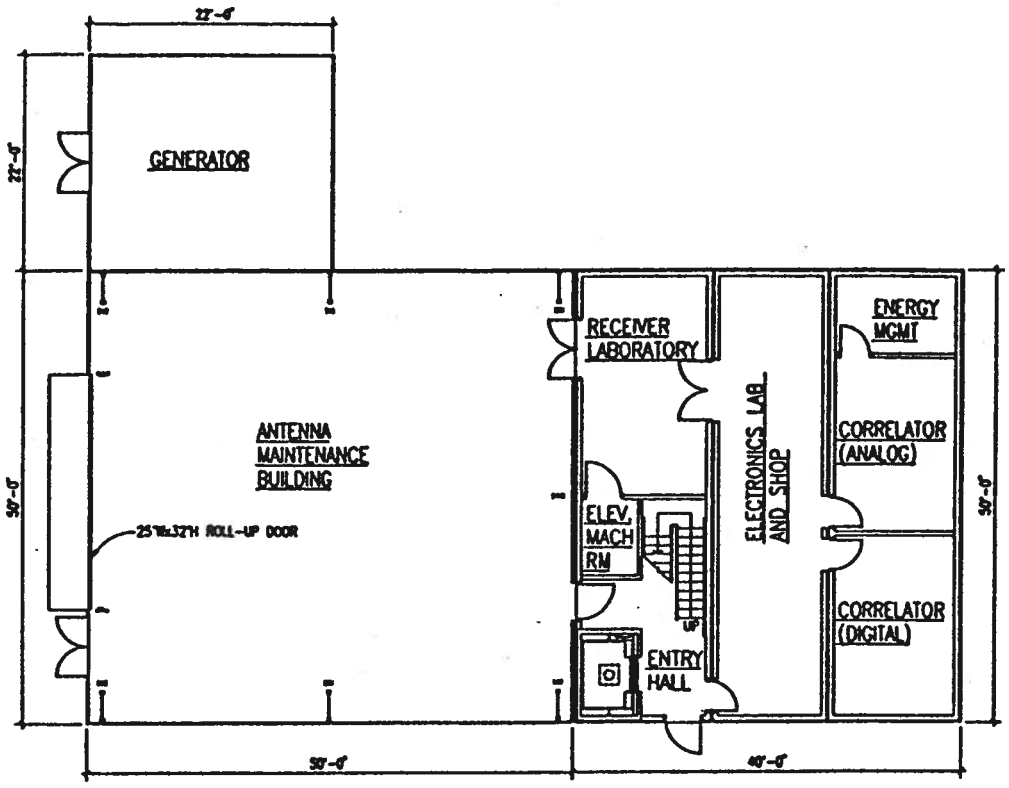
SECTION

TYPICAL OBSERVING PAD

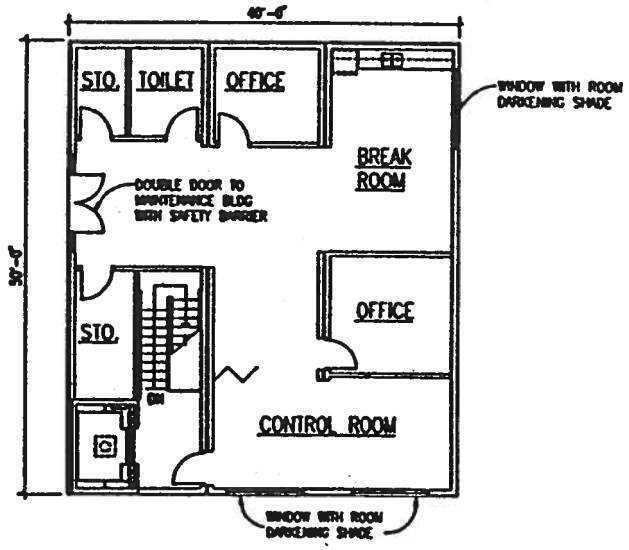


SITE PLAN: OPERATIONS/MAINTENANCE AREA

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12



GROUND FLOOR PLANS: O/M BUILDING

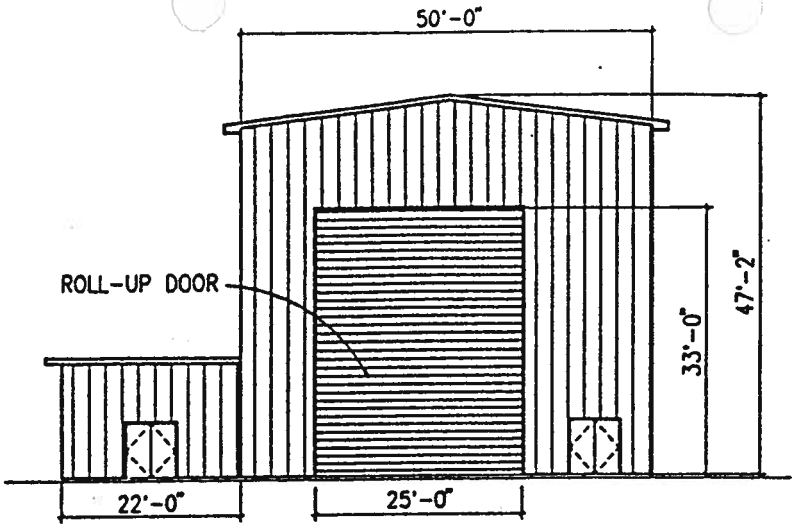


SECOND FLOOR
CONTROL BUILDING

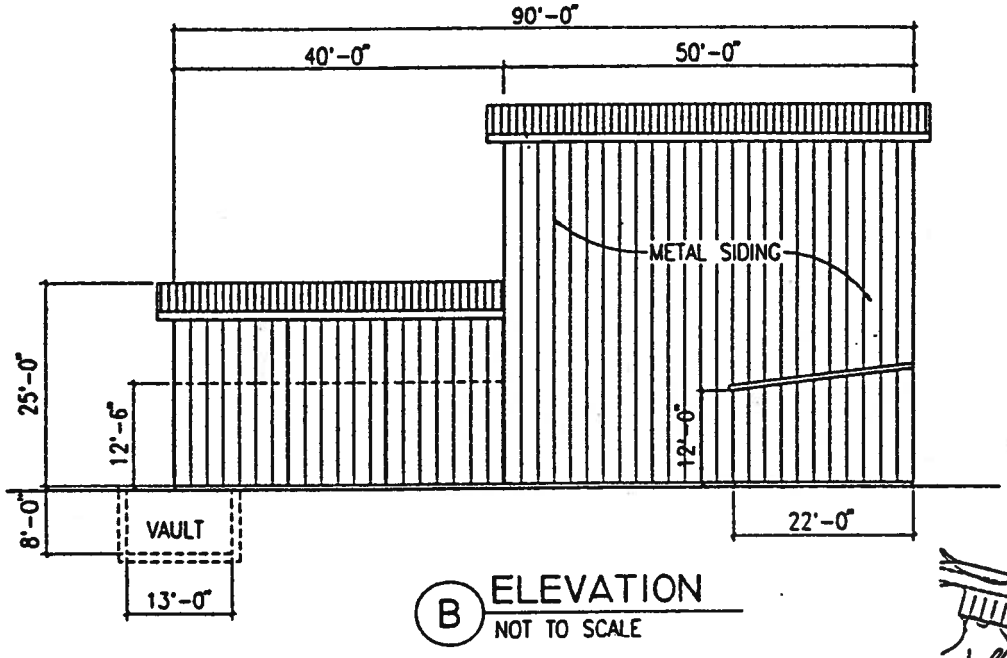
O/M BUILDINGS: FLOOR PLANS

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

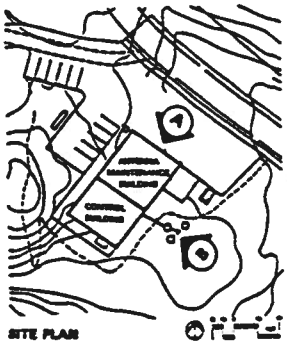
CDUA: HA-2728 **EXHIBIT 17**



A ELEVATION
NOT TO SCALE



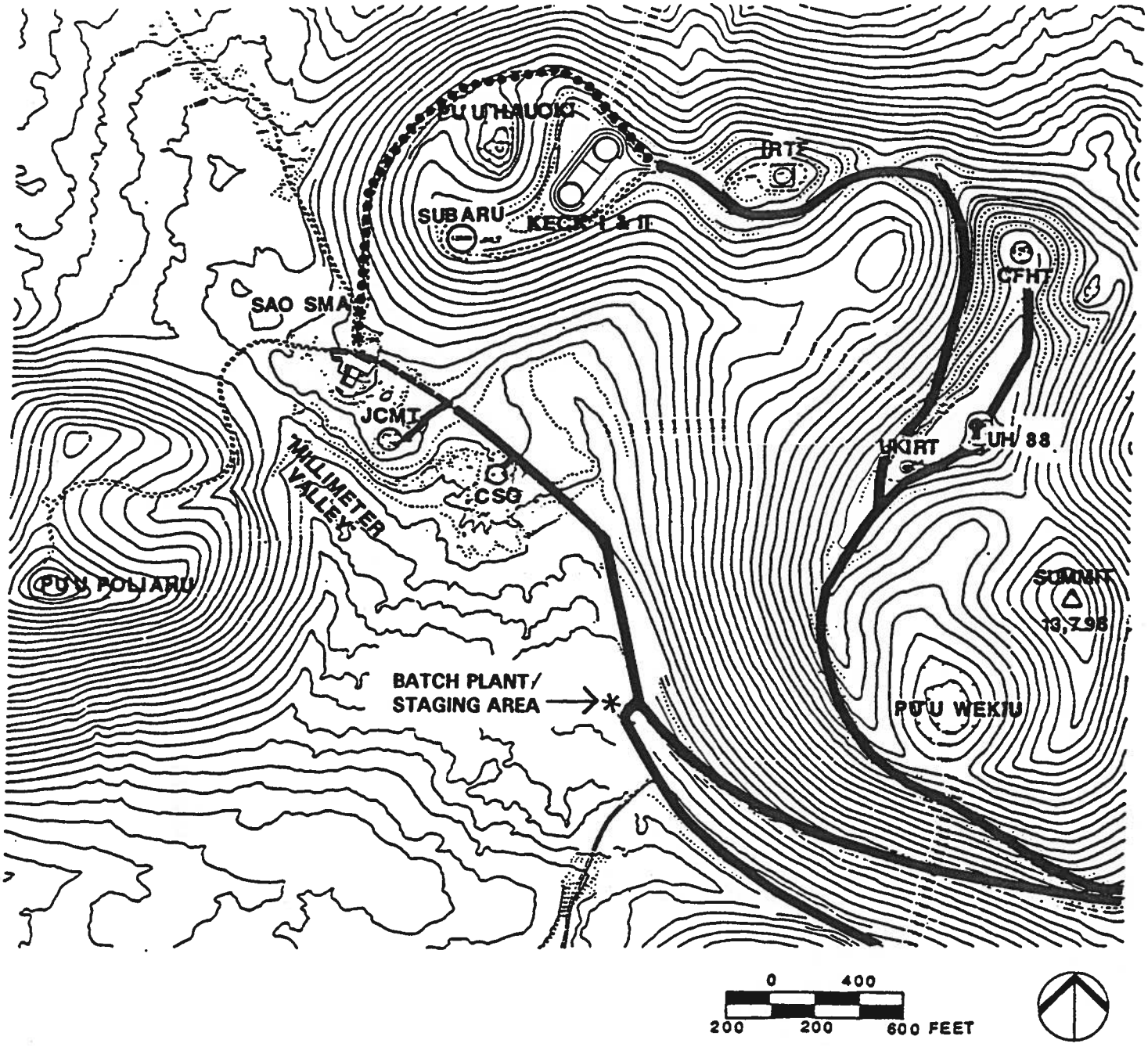
B ELEVATION
NOT TO SCALE



O/M BUILDINGS: ELEVATIONS A AND B

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 18**



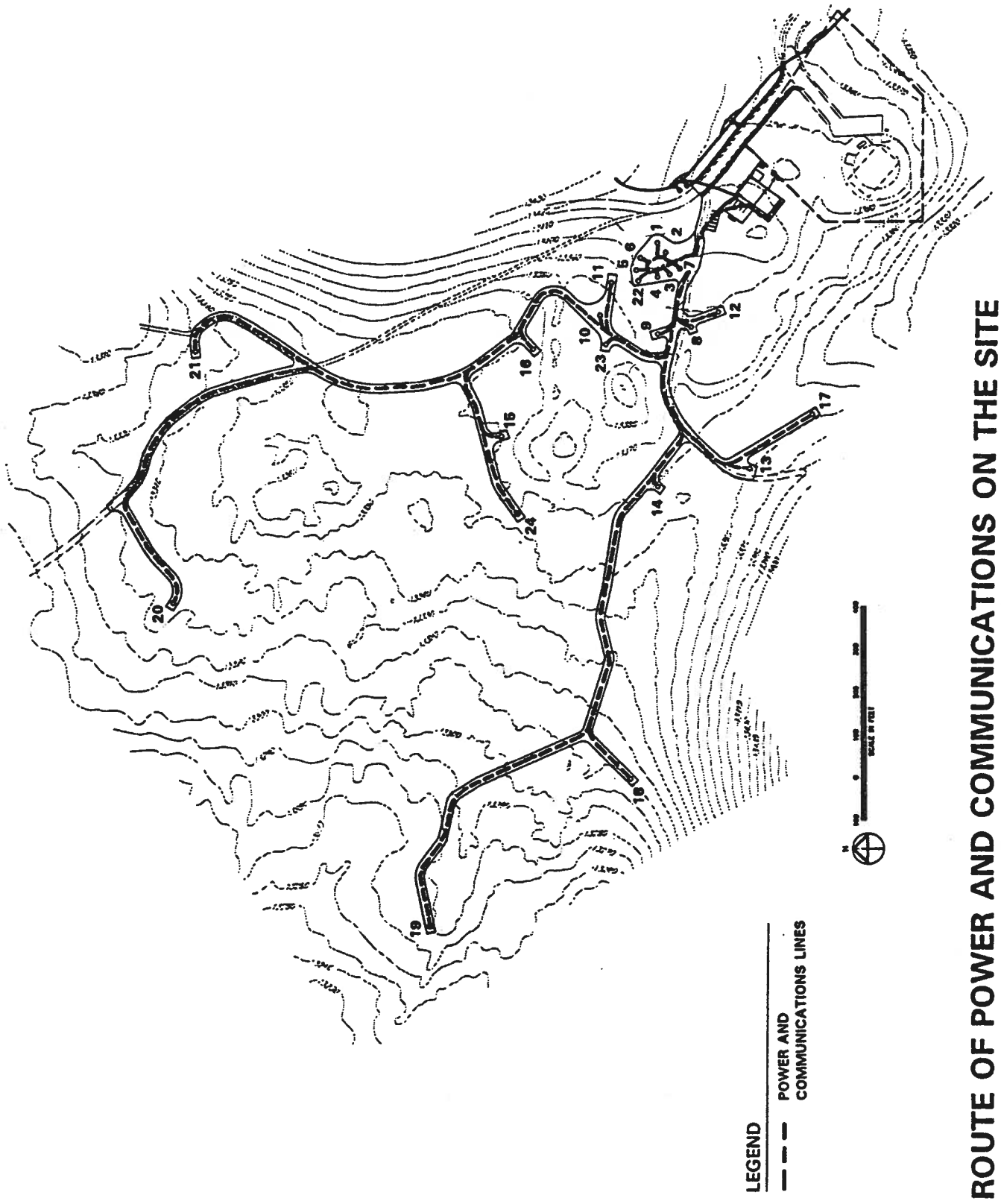
LEGEND

- EXISTING PAVED ROADS
- TO BE PAVED BY SAO
- GRAVEL ROADS

SITE ACCESS

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

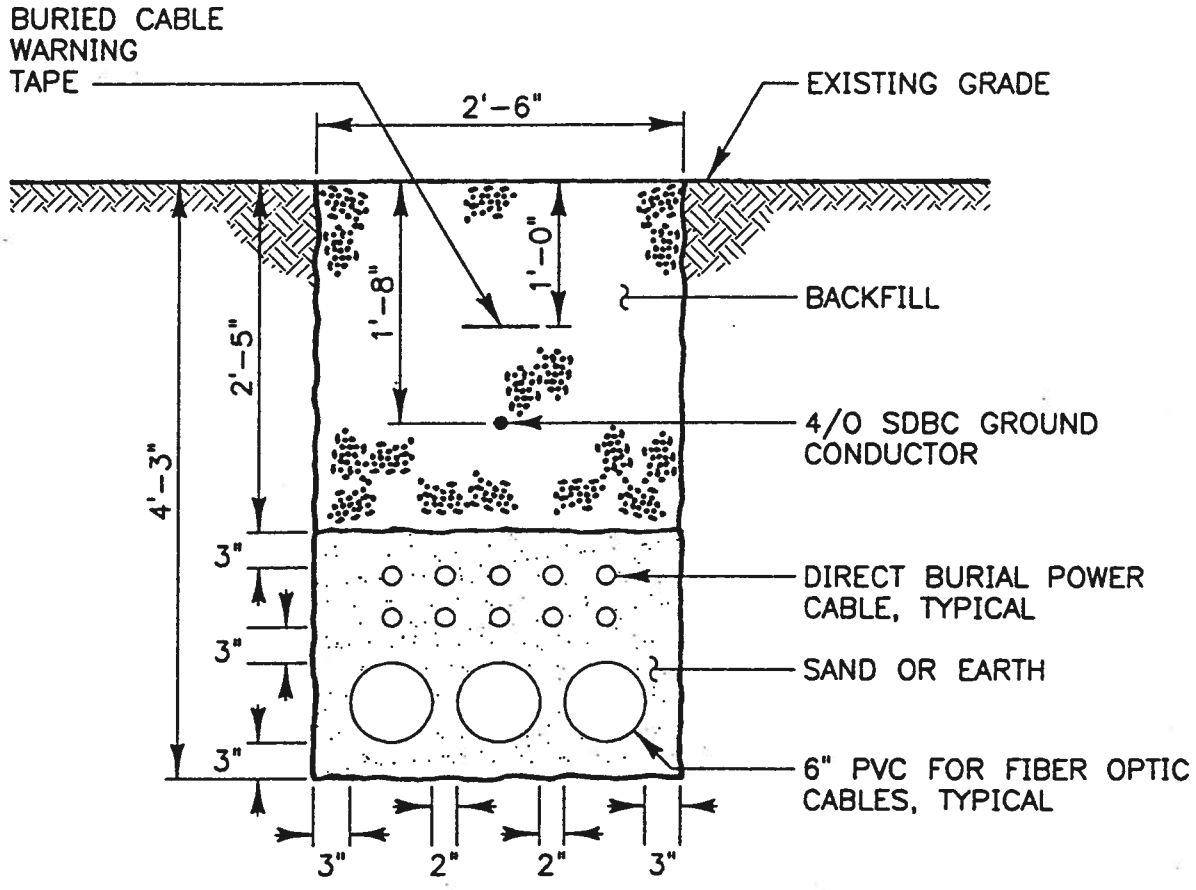
CDUA: HA-2728 **EXHIBIT 19**



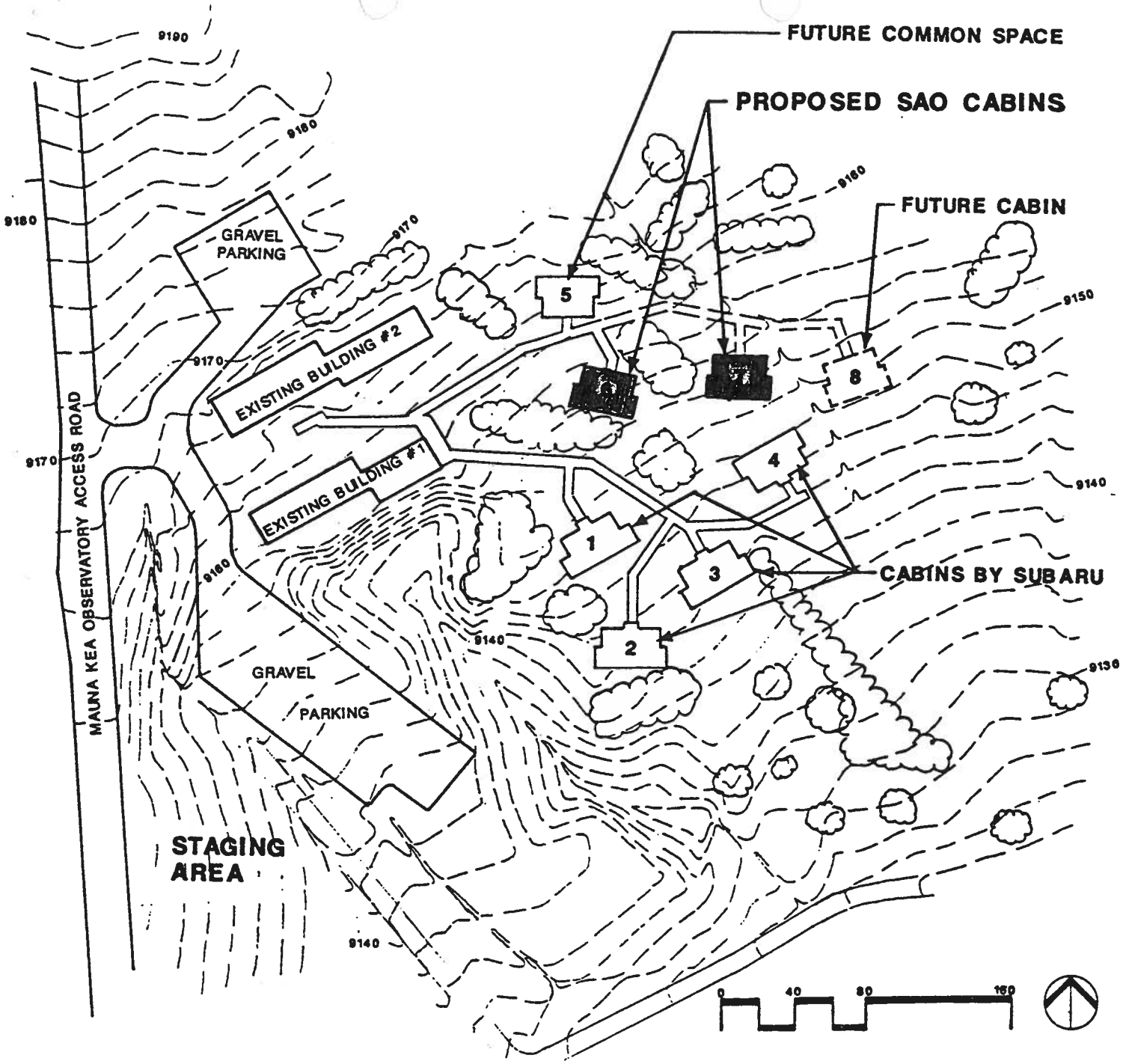
ROUTE OF POWER AND COMMUNICATIONS ON THE SITE

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 20**



CROSS-SECTION OF TYPICAL TRENCH



HALE POHAKU: CONSTRUCTION CAMP AND STAGING AREA

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 22**

RECEIVED

MAY 2 5 1994

DIRECTOR
INSTITUTE FOR ASTRONOMY

JOHN WAIHEE
GOVERNOR

BRUCE S. ANDERSON, Ph.D.
INTERIM DIRECTOR

STATE OF HAWAII
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May 24, 1994

Mr. Robert A. McLaren
Associate Director, Mauna Kea Division
University of Hawaii at Manoa
Institute for Astronomy
2680 Woodlawn Drive
Honolulu, Hawaii 96822

Dear Mr. McLaren,

Subject: Proposed Smithsonian Astrophysical Observatory Submillimeter Array Telescope at the Mauna Kea Science Reserve

We have reviewed the May 1994 revisions to the proposed Smithsonian Submillimeter-wavelength Telescope within the summit area of the Mauna Kea Science Reserve. Although the exact configuration of the proposed telescope has changed since the Final Environmental Impact Statement for the Mauna Kea Science Reserve: Complex Development Plan was submitted, the location and type of proposed telescope are within the scope of activities described in the FEIS.

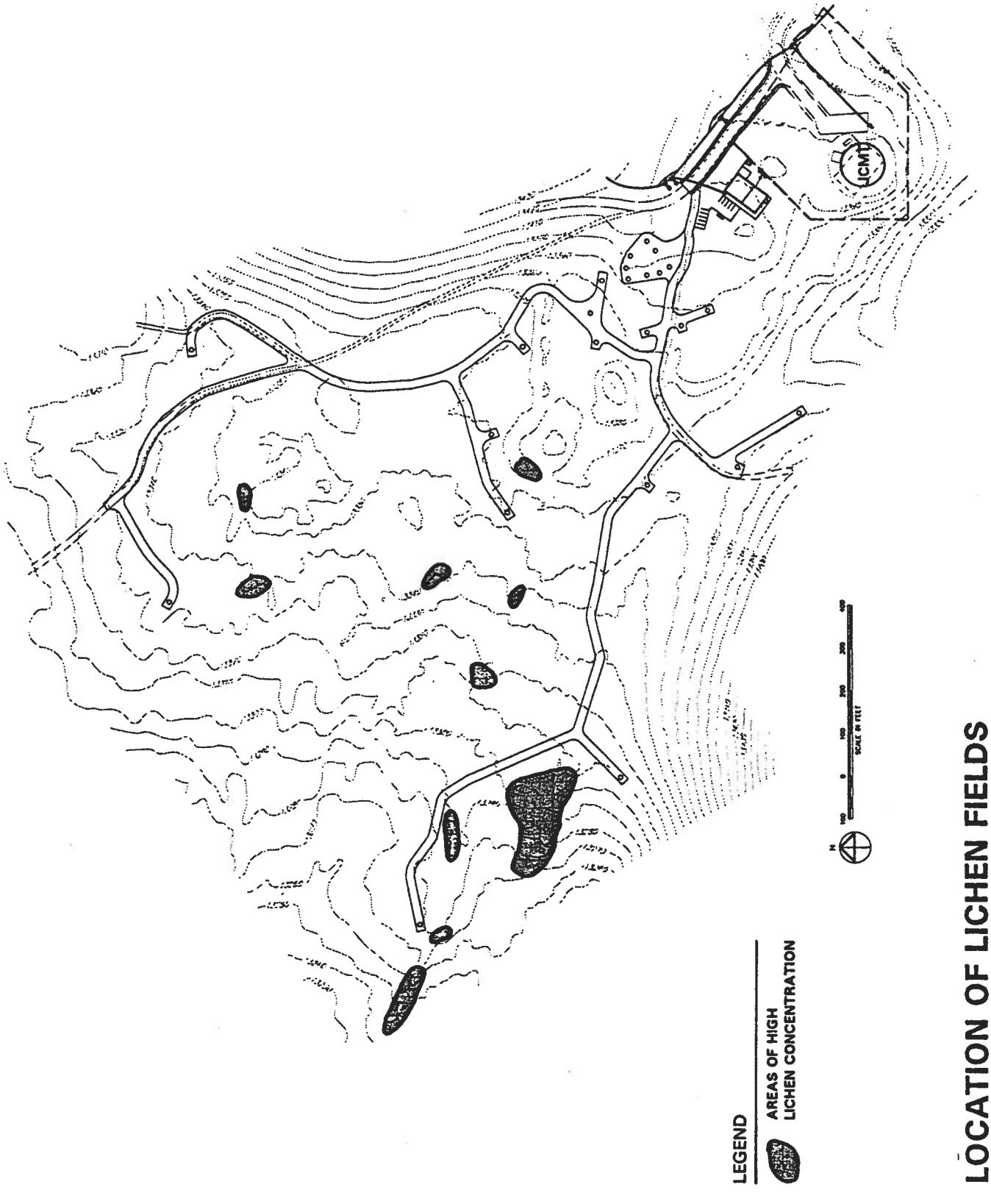
We find that all pertinent environmental concerns have been addressed in the FEIS. Accordingly, we find that you have fulfilled the requirements of the Hawaii Revised Statute, Chapter 343, Environmental Impact Statement, with the previous EIS and no further documentation is required for this project.

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

Sincerely,

for Bruce S. Anderson
Interim Director

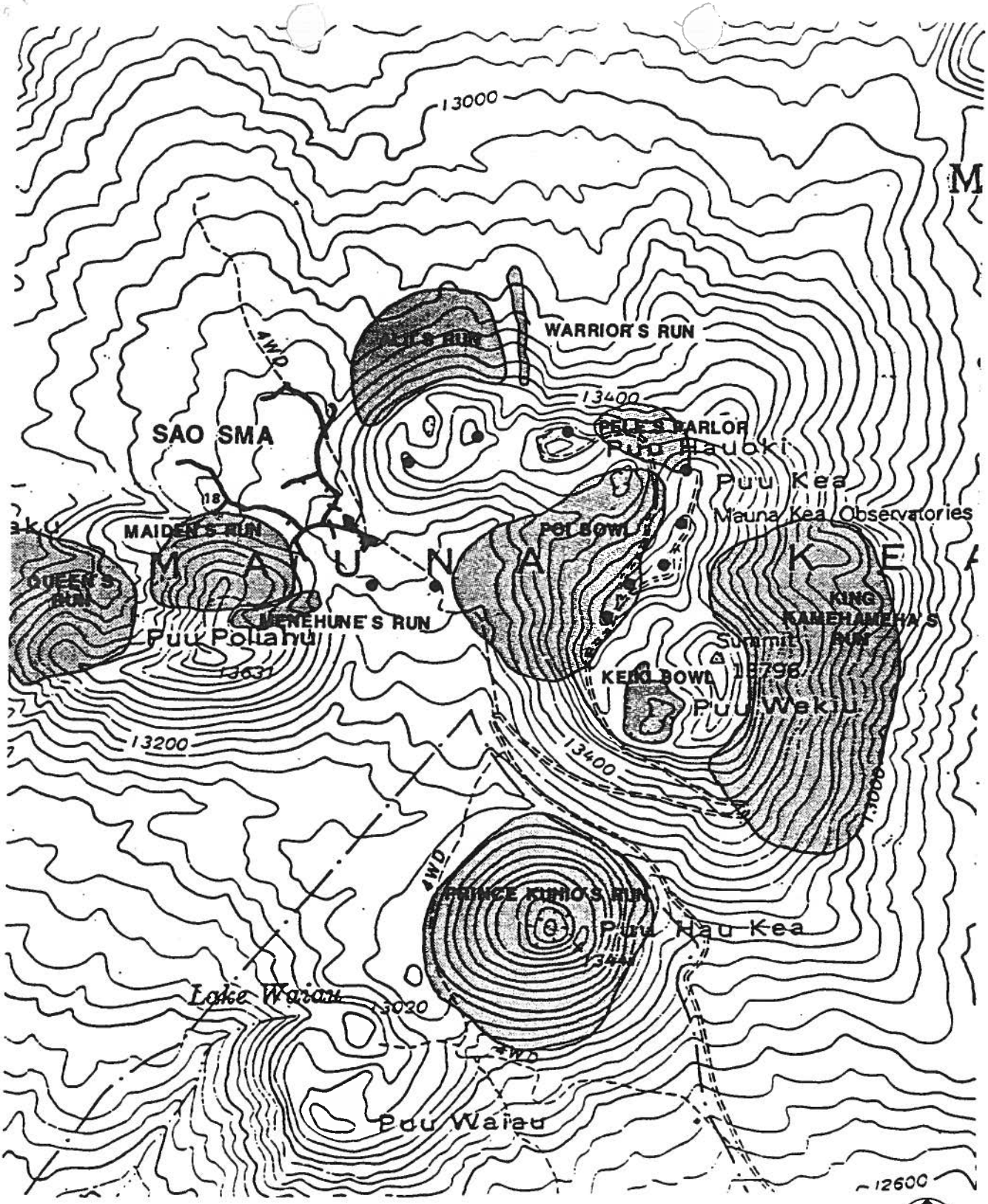
BSA/bjw



LOCATION OF LICHEN FIELDS

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

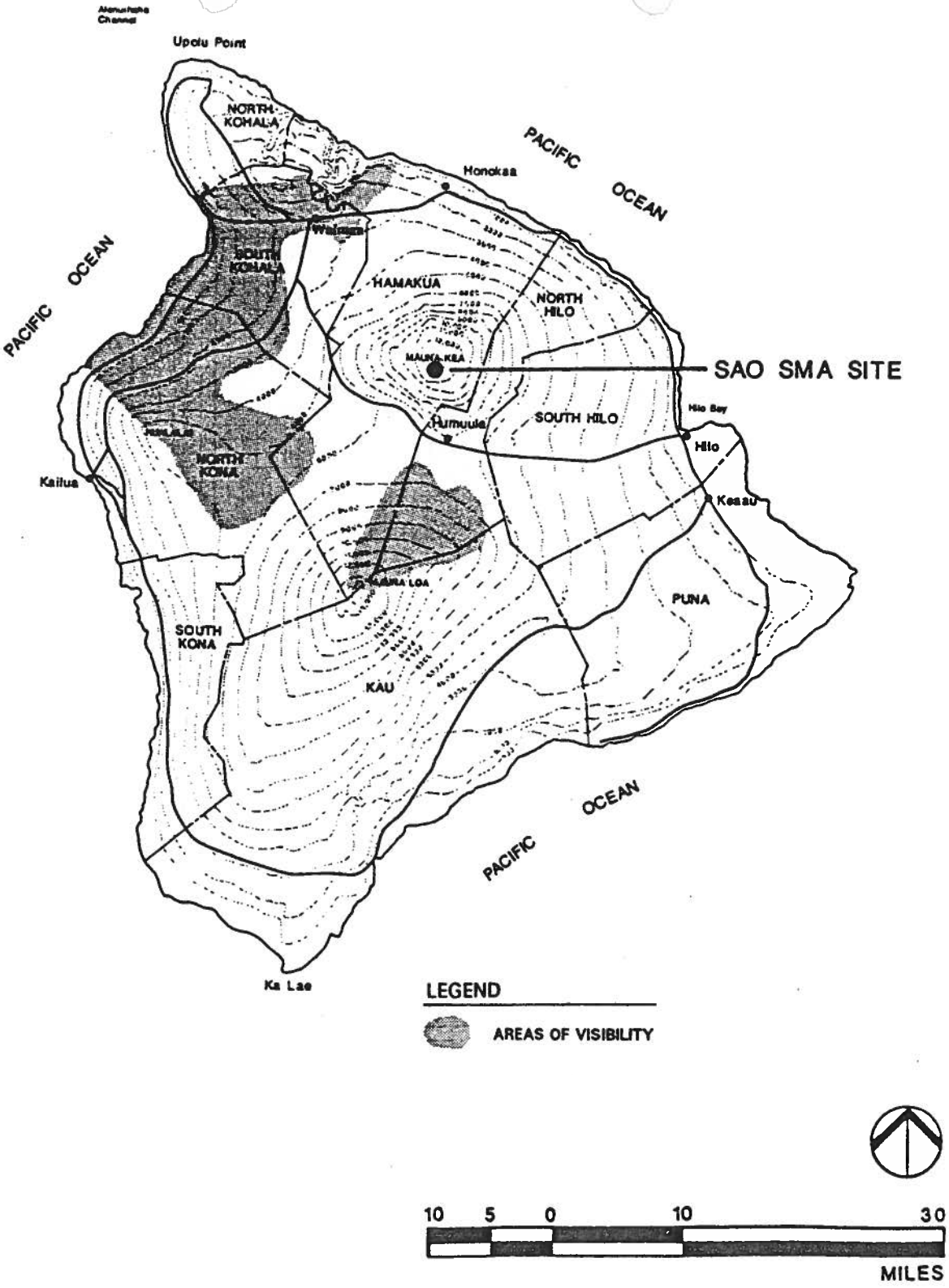
CDUA: HA-2728 **EXHIBIT 24**



MAUNA KEA SCIENCE RESERVE SKI RUNS

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

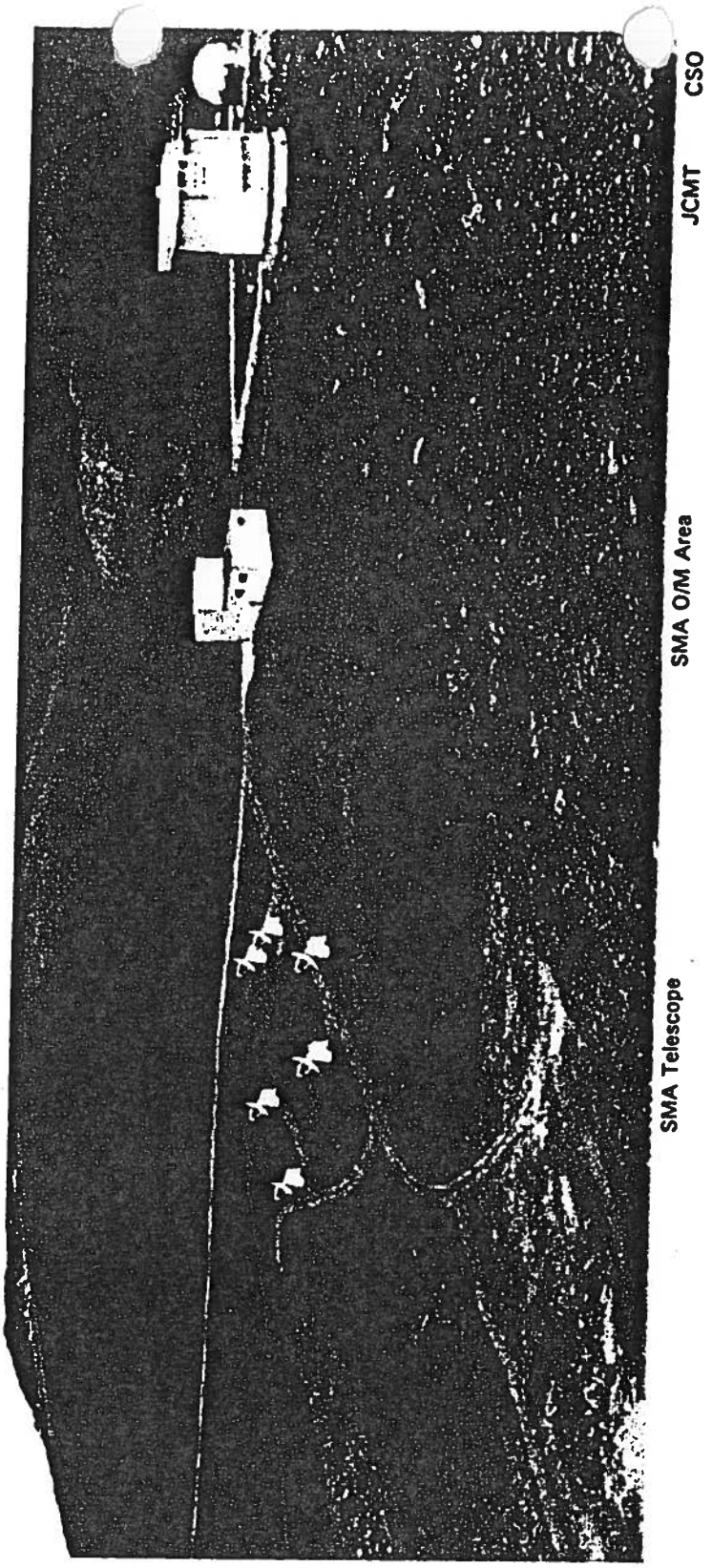
CDUA: HA-2728 **EXHIBIT 25**



LONG-RANGE VISUAL IMPACT

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728 **EXHIBIT 26**



SAO SMA: TYPICAL ANTENNA CONFIGURATION

SHORT_RANGE VISUAL PERSPECTIVE (ENHANCED)

CDUA to Construct a Smithsonian Astrophysical Observatory Submillimeter Array Telescope at Mauna Kea, Hamakua, Hawaii; Resource Subzone; TMK: 4-4-15: 9 & 4-4-15: 12

CDUA: HA-2728

EXHIBIT 27