Conservation District Use Application (CDUA)

for the

Polarized **L**ight from **A**tmospheres of **N**earby **E**xtra-**T**errestrial **S**ystems (PLANETS) Telescope

Haleakalā High Altitude Observatory Site
Haleakalā, Maui, HI

May 12, 2015

Prepared for:

University of Hawai‘i, Institute for Astronomy
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Prepared by:

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P.O. Box 1208
Makawao, HI 96768

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CONSERVATION DISTRICT USE APPLICATION (CDUA)

File No:	
Acceptance Date:	180-Day Expiration Date:
Assigned Planner:	
	for DLNR Use

PROJECT NAME: **PLANETS Telescope, Haleakalā High Altitude Observatory Site**

Conservation District Subzone: General Subzone (see figure 1)
Identified Land Use: The proposed use is an identified land use in the General Subzone, in accordance with HAR 13-5-22, P-8 Structures and Land Uses, Existing, (C-1) Moderate alteration of existing structures, facilities, uses, and equipment, and in accordance with HAR 13-5-25 (c) (3) Identified land uses in the general subzone.

(Identified Land Uses are found in Hawai`i Administrative Rules (HAR) §13-5-22 through §13-5-25)

Project Address: University of Hawai‘i Haleakalā High Altitude Observatory (HO) site

Tax Map Key(s): (2) 2-2-007-008

Ahupua`a:** Papa`anui **District: Waiakoa, Papa’anui, Makawao

County: Maui **Island:** Maui

Proposed Commencement Date: Upon approval of CDUA

Proposed Completion Date: Approximately 17 weeks from commencement date

Estimated Project Cost: $515,695

TYPE OF PERMIT SOUGHT: ☐ **Board Permit** ☐ **Departmental Permit**

☐ Boundary Determination *(ref §13-5-17)*
☐ Emergency Permit *(ref §13-5-35)*
☐ Temporary Variance *(ref §13-5-36)*
☐ Site Plan Approval *(ref §13-5-38)*

Note: The four items on the left do not require that a full CDUA be filled out; please complete the first three pages of this application, and refer to the relevant HAR sections for the required documentation.

ATTACHMENTS *(where applicable)*

$ _____ Application Fee *(ref §13-2-33 through 34)*
$ _____ Public Hearing Fee *($250 plus publication costs; ref §13-5-40)*
☒ 20 copies of CDUA for Board and Departmental Permits (*5 hard + 15 hard or digital copies)*
☐ Management Plan *or* Comprehensive Management Plan (*ref §13-5-39 and §13-5 Exhibit 3)*
☐ Draft / Final Environmental Assessment *or* Draft / Final Environmental Impact Statement
☐ Special Management Area Determination *(ref Hawai`i Revised Statutes (HRS) 205A)*
☐ Shoreline Certification (*ref §13-5-31(a)(8))* if land use is subject to coastal hazards.
☐ Kuleana documentation (*ref §13-5-31(f))* if applying for a non-conforming kuleana use.
☐ Boundary Determination *(ref §13-5-17)* if land use lies within 50 feet of a subzone boundary.

TABLE OF CONTENTS

SECTION **PAGE**

1.0 Applicant / Required Signatures…… 6

2.0 Proposed Use…… 7

3.0 Existing Conditions……. 18

4.0 Evaluation Criteria……..…… 28

4.1 Proposed Use Consistent With Purpose of Conservation District…… 28
4.2 Proposed Use Consistent With Subzone Objectives…… 28
4.3 Proposed Use Compliant With Coastal Zone Management …… 28
4.4 Proposed Use Not Impacting Existing Natural Resources …… 28
4.5 Proposed Use Compatibility With Locality and Surrounding Area …….. 39
4.6 Preservation of Existing Physical and Environmental Aspects of Land …… 41
4.7 Proposed Use Not to Increase Intensity of Land Uses……. 41
4.8 Proposed Use Not Detrimental to Public Health, Safety, and Welfare ……. 41

5.0 Cultural Impacts……..…… 44

5.1 Identity and Scope of Cultural, Historical, and Natural Resources …….. 44
5.2 Identify Affected Traditional and Customary Native Hawaiian Rights…… 48
5.3 No Action for BLNR to Protect Native Hawaiian Rights …….. 48

6.0 Other Impacts…….. 49

6.1 No Effect on Public Access to Shoreline or Public Trail…… 49
6.2 No Effect on Beach Access…… 49
6.3 No Increased Runoff or Sedimentation……. 49
6.4 Minimal Visual Impact on Individuals or Community…….. 49
6.5 Sustainable Design Elements……. 50
6.6 No Landscaping Involved …… 50
6.7 Best Management Practices……..……. 50
6.8 Mitigation Measures for Environmental and Cultural Impacts……... 55

7.0 Single Family Residential Standards Not Applicable…..…….. 56

8.0 Coastal Zone Requirements Not Applicable…….. 57

9.0 Management Plan Requirements…… 58

10.0 Certification…….. 59

11.0 References …….. 60

LIST OF FIGURES

FIGURE		PAGE
1	Haleakalā Observatories General Subzone……..……..	9
2	State of Hawai‘i TMK and General Location of Proposed Project……...….	10
3	Map Displaying HO and Adjacent Property Owners…….……	11
4	Topographic Map of Pu‘u Kolekole with Property Boundaries…….	12
5	Aerial View of HO, Existing Facilities and Proposed Location of PLANETS…..…	13
6	Existing structure of the former Neutron Monitor Station viewed from the South …	16
7	Exterior Appearance of Structure after Modification viewed from the South……	16
8	Existing structure of the former Neutron Monitor Station viewed from the West…..	17
9	Exterior Appearance of Structure after Modification viewed from the West……..	17
10	Schematic of proposed PLANETS modifications / Roll-off roof …….…….	18
11	Topography for Island of Maui, Hawai‘i…….……..…….…….	19
12	‘Ua‘u Population Distribution at Haleakalā …….	34
13	Petrel Burrows Close to or Within HO Boundaries……	35
14	Locations Hawaiian Hoary Bats detected near summit……	36
15	Archeological Resources Within HO…….	39
16	View From Pu‘u ‘Ula‘ula (Red Hill) Overlook……	40
17	Sign at Entrance to HO Complex Welcoming Native Hawaiians ……	45
18	East- and West-facing Ahu Locations at HO……	46
19	Set aside “Area A” Location at HO……..……	47

LIST OF ATTACHMENTS

Attachment 1. PLANETS / Chicago Building Structural Plans (not to scale)

On File at DLNR. University of Hawai‘i, Institute for Astronomy
Haleakalā High Altitude Observatory Site
Haleakalā, Maui, Hawai‘i
Management Plan, June 8, 2010

1.0 REQUIRED SIGNATURES

Applicant
Name / Agency: University of Hawai'i, Institute for Astronomy
Street Address: 2680 Woodlawn Drive
Honolulu, HI 96822-1839
Contact Person & Title: Mike Maberry, Assistant Director
Phone: 808-573-9528 **Fax:** 808-573-9557
Email: maberry@hawaii.edu
Interest in Property: Owner

Signature: _____ **Date:** 5/20/15
Dr. Günther Hasinger, IfA Director
Signed by an authorized officer if for a Corporation, Partnership, Agency or Organization

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Landowner (if different than the applicant)
Name:

Title; Agency:
Mailing Address:

Phone: Fax:
Email:

Signature: _____ **Date:**
For State and public lands, the State of Hawai`i or government entity with management control over the parcel shall sign as landowner.

Agent
Agency: KC Environmental, Inc.
Contact Person & Title: Dr. Charlie Fein, Vice President
Mailing Address: P.O. Box 1208
Makawao, HI 96768
Phone: 808-573-1903 **Fax:** 808-573-7837
Email: charlie@kcenv.com

Signature: _____ **Date:** 5/20/15

Chairperson, Board of Land and Natural Resources
For DLNR Managed Lands

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

Signature _____ **Date:**

2.0 PROPOSED USE

Please provide an executive summary of the proposed land use. Attach any site plans, landscaping plans, photographs, maps, and construction plans as needed.

Background

The proposed Polarized Light from Atmospheres of Nearby Extra-Terrestrial Systems (PLANETS) would be the world's highest contrast optical telescope designed for low-scattered light, high-contrast night-time observations, even though the telescope aperture would be only 1.8 meters in diameter.

This telescope represents the interests of many \institutions and research groups across the globe. In addition to the University of Hawaii Institute for Astronomy (IfA), partners from Asia, Europe and North America are involved, including Tohoku University in Japan, the Kiepenheuer Institute for Solar Physics (KIS), and the National Autonomous University of Mexico (UNAM). There is no Federal nexus associated with the proposed project.

Proposed Use

The proposed use is consistent with the 2010 BLNR approved Management Plan (MP) for the University of Hawaiʻi IfA Haleakalā High Altitude Observatory Site (HO), in accordance with Hawaiʻi Administrative Rules (HAR) Chapter 13: Department of Land and Natural Resources (DLNR), Subtitle 1:Administration, Chapter 5: Conservation District, where this document is implemented to regulate land use in the Conservation District for the purpose of conserving, protecting, and preserving the important natural resources of the State through appropriate management and use to promote their long term sustainability and the public health, safety, and welfare.

Haleakalā is one of the premier astronomy observatory sites in the world. The University of Hawaii and its partner institutions wish to re-use an existing structure that has been occupied by the University of Chicago Cosmic Ray Neutron Monitor Station, also referred to as the Chicago Building. The telescope and its partner instruments would have unrivaled scientific capabilities in the "high dynamic range" sciences of polarimetry and coronagraphy, aimed at studies as diverse as exoplanet detection to the understanding of the tenuous exo-atmospheres of planets within our solar system. By combining expertise from various fields - coronagraphy and high contrast imaging from solar physics, polishing, polarimetry, and adaptive optics from astronomical communities, and the experience of each institutional partner - this telescope would make significant advances in several fields. The scientific outcomes from the new telescope would be publicized through IfA outreach programs, as well through each international partner's outreach programs.

Originally part of the Baker-Nunn satellite tracking facility built in the mid 1950's, the University of Chicago Cosmic Ray Neutron Monitor Station began operating at HO in February of 1991 as part of the University of Chicago's establishment of a network of high-altitude neutron monitor stations covering a wide range of geomagnetic latitudes.

In accordance with definitions in HAR §13-5-2, the proposed facility modifications would be a moderate alteration to the existing structure, resulting in more than a ten per cent increase, but no more than a fifty per cent increase, in the size of the structure. The proposed alterations would include removal of a section of the existing flat portion of the roof, which would be replaced by a roll-off enclosure 6'5 ½" tall (3,966 cubic feet) to house the telescope. Other exterior work would include the installation of the roll-off steel frame requiring excavation of column footings on an existing concrete slab and installation of a rollup door on the south side of the structure. Removal of interior walls and construction of a telescope pedestal and foundation on the interior of the structure would also take place. Most modifications would take place primarily within the existing structure and foundation and the exterior appearance of the original wall structure would remain largely unchanged. Adding the roll-off enclosure would increase the total volume by 38% over the original structure size. Once modifications were completed, this facility would be operated remotely, requiring no operators on-site aside from periodic maintenance.

Construction of the Daniel K. Inouye Solar Telescope ((DKIST), previously the Advanced Technology Solar Telescope)) is currently underway at HO. The small scale changes to the original Chicago Building for the proposed PLANETS facility, with an anticipated duration of 120 days to complete, would add negligibly to the cumulative impacts from DKIST construction that would be underway at the same time and in the immediate area of this proposed project.

Location

In 1961, Executive Order (EO) 1987 by Hawaii's Governor Quinn to UH, set aside 18.166 acres of land on the summit of Haleakalā to establish the HO site, as amended by EO 4452 in 2014. EO 1987 has no expiration date. This area of the Conservation District was set aside for "…Haleakalā High Altitude Observatory Site purposes only" (EO 1987).

The proposed project is within the 18.166-acre HO site. Figure 2 is the tax map key (TMK) and general location of the proposed project. Figure 3 is a map showing HO and the adjacent properties. Figure 4 is a topographic map showing the property boundaries at Pu'u Kolekole, which includes Haleakalā High Altitude Observatories (HO) and the boundaries of the adjacent Department of Energy (DOE) and the Federal Aviation Administration (FAA) properties. Figure 5 shows an aerial view of the HO site, the existing facilities and proposed location of the PLANETS telescope. Figure 6 and 8 are recent photographs of the University of Chicago Cosmic Ray Neutron Monitor Station structure in which the PLANETS telescope would be installed. Figure 7 and 9 are rendered image comparisons to illustrate what the facility would like after the proposed modifications.

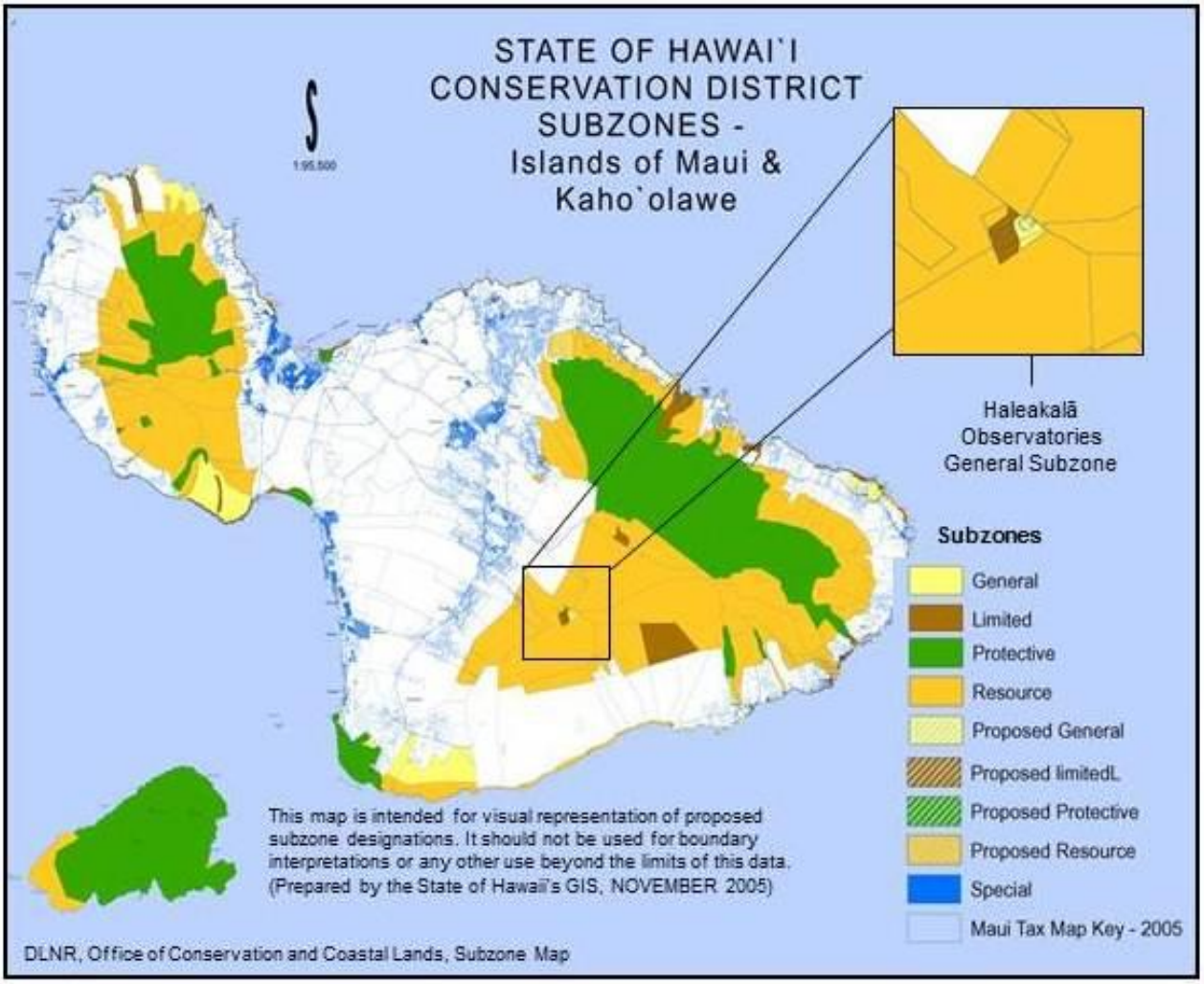


Figure 1. Haleakala Observatories General Subzone

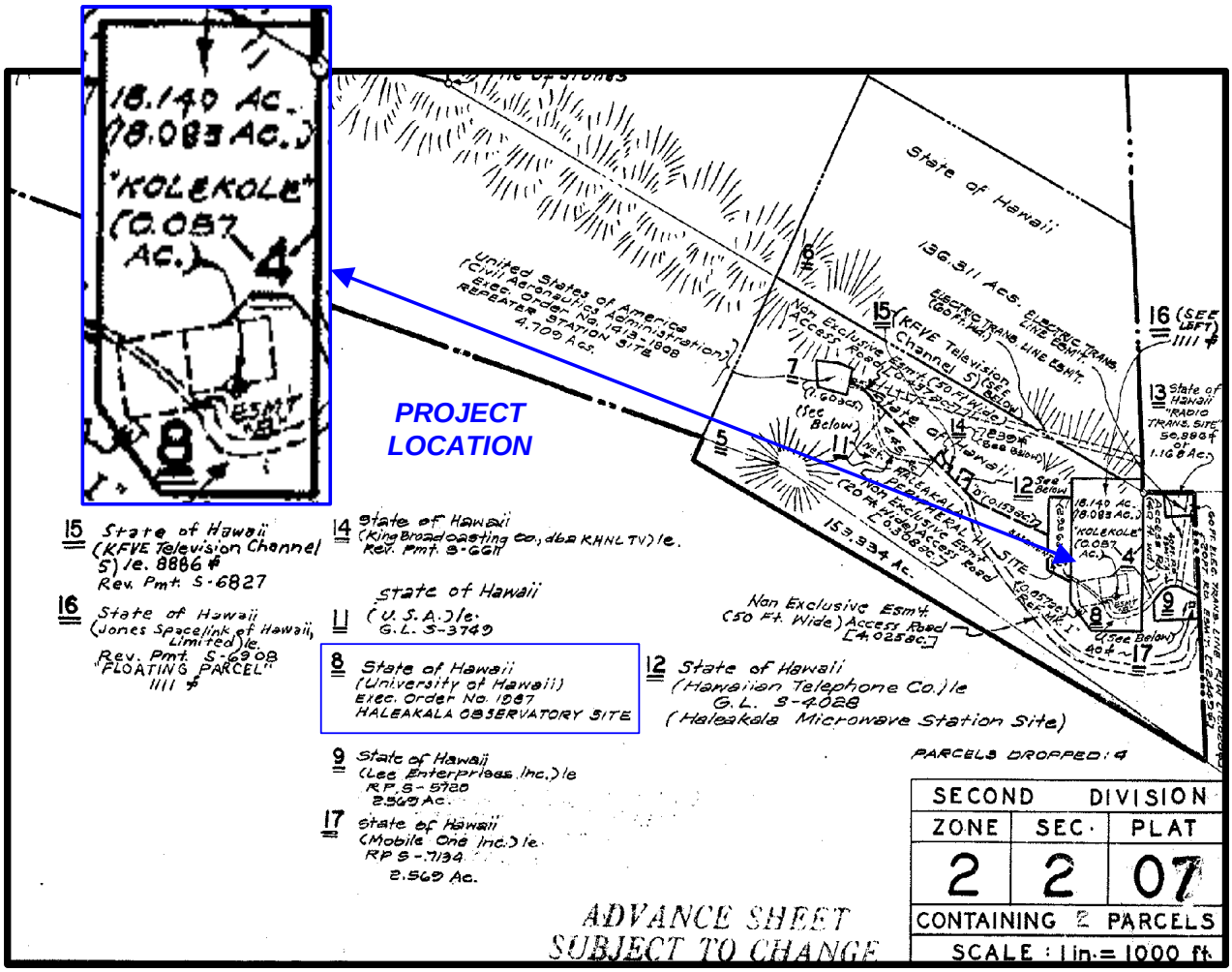
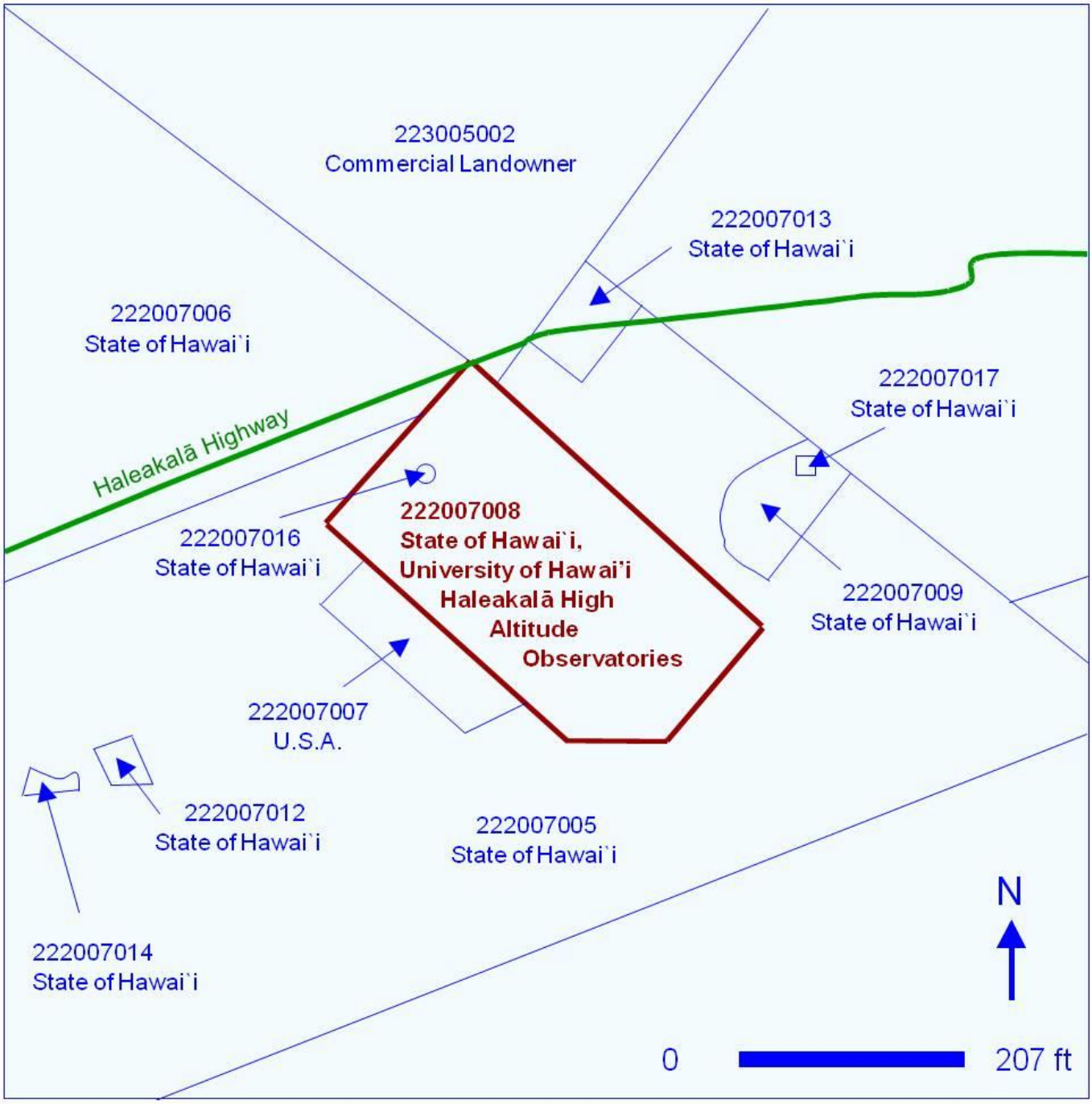


Figure 2. State of Hawai'i Tax Map Key and General Location of Proposed Project.



Internet website: http://kivanetext.co.maui.hi.us/kivanet/2/permit/index.cfm

Figure 3. Map Displaying HO and Adjacent Property Owners.

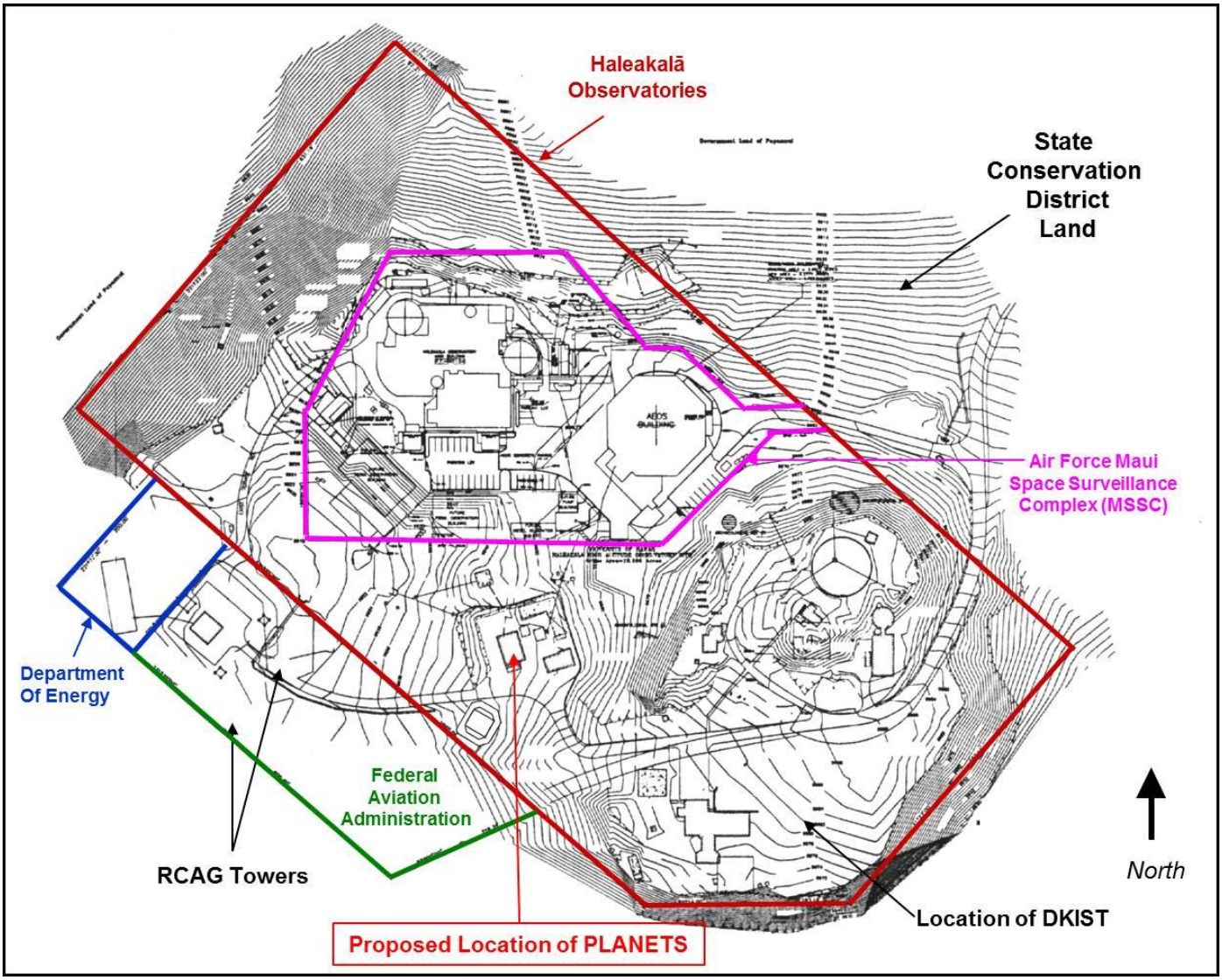


Figure 4. Topographic Map of Pu‘u Kolekole with Property Boundaries.

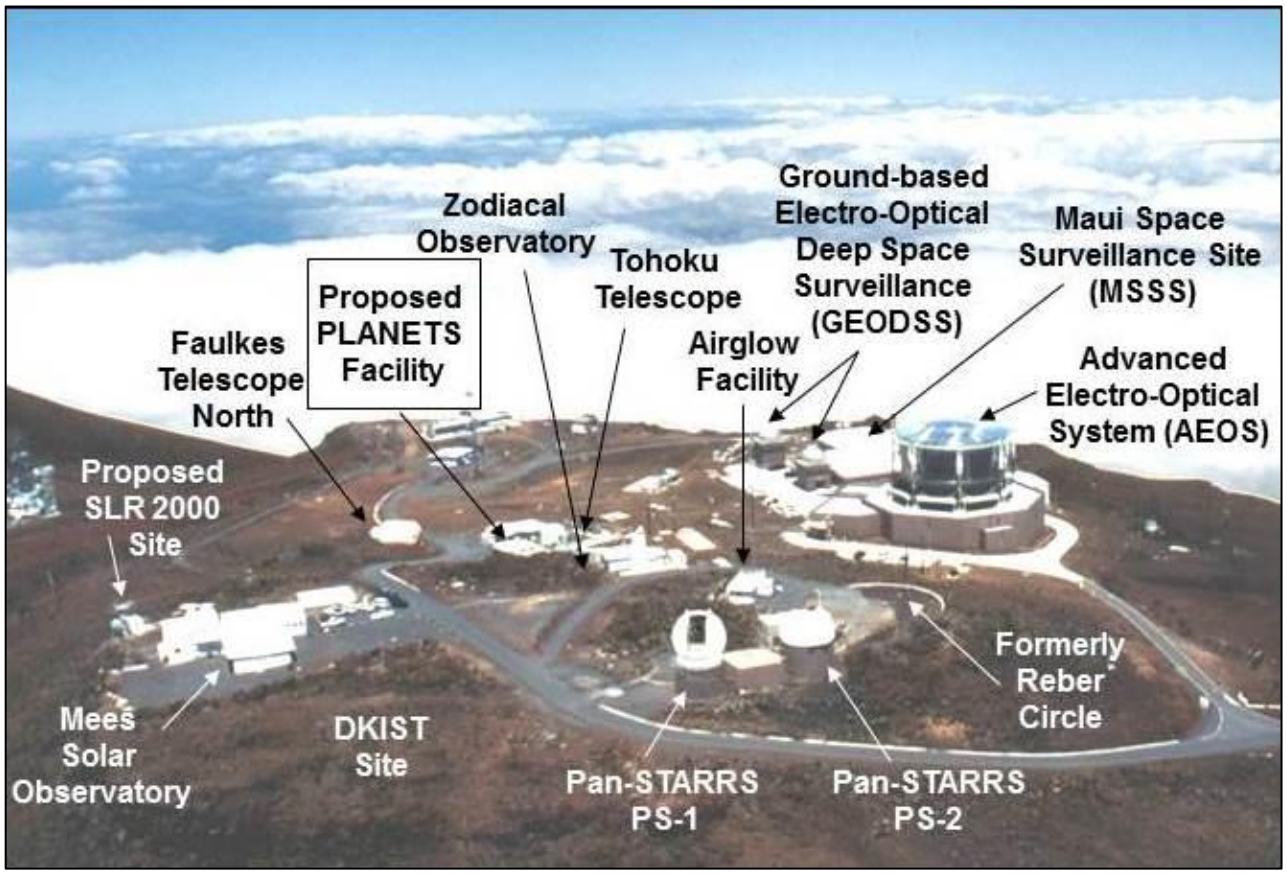


Figure 5. Aerial view of the HO site, the existing facilities and proposed location of the PLANETS Telescope in the existing Neutron Monitor Station.

Proposed Site Improvements

As previously mentioned, the proposed alterations would include removal of a section of the existing flat portion of the roof, which would be replaced by a roll-off enclosure 6'5 ½" tall (3,966 cubic feet) to house the telescope instrument. Other exterior work would include the installation of the roll-off steel frame requiring excavation of column footings on an existing concrete slab and installation of a rollup door on the south side of the structure. Removal of interior walls and construction of a telescope pedestal and foundation on the interior of the structure would also take place. Modifications would take place primarily within the existing structure and foundation and the exterior appearance of the original wall structure would remain largely unchanged. It is not anticipated that heavy construction equipment will be required for any of these modifications.

The proposed PLANETS telescope facility improvements would take approximately 120 days to complete based on the Construction Work Plan outlined below. Because the endangered ʻuaʻu (Hawaiian petrel, *Pterodroma phaeopygia sandwichensis*) is known to nest near the HO boundaries (addressed in more detail in section 4.4), and even though the nearest known Hawaiian petrel burrow is more than 300 feet from the proposed site, the schedule has been designed so work that may involve ground disturbance can be completed while the Hawaiian petrels are not present in the area, in order to avoid any potential vibration/noise impacts to birds

that will occupy burrows during the daytime. For example, Phase two of the proposed schedule below includes all the ground disturbing work and would be completed completely within the months that the petrels are not on site.

A. Phase 1 (approximately 21 days)

1. Commencement Preparation
2. External Building Preparation
3. Internal Building Preparation
4. Demolition and Removal of existing roof and interior walls

B. Phase 2 (approximately 64 days)

1. Slab Demolition
2. Excavation
3. Grading
4. Construction of Piers
5. Roll-off Roof Frame Foundation Construction
6. Forming North Slab-on-grade
7. Roll-off Roof Steel Frame Construction
8. Roll-off Roof Construction

C. Phase 3 (approximately 20 days)

1. General Exterior Work
2. General Interior Work
3. Equipment Installation
4. Demobilization

Small construction staging areas would be required for off -loading shipping containers and some hardware assembly of the roll-off enclosure. Existing concrete slabs adjacent to the Chicago Building would be used for this purpose.

Figures 6 and 8 show the structure as it currently exists, and figures 7 and 9 are renderings of what the proposed modification would look like when completed. Figure 10 is a schematic showing how the proposed roll-off roof and telescope would be incorporated into the existing structure.

Environmental Assessment Exemption

The proposed site improvements project is in an exempt class of action in accordance with HAR 343 and HAR 11-200-8, which state that classes of action that will probably have minimal or no significant effect on the environment may be declared exempt from the preparation of an Environmental Assessment. This proposed project is exempt under HAR 11-200-8, Exempt Classes of Action, Item a(3): Construction and location of single, new, small facilities or structures and the alteration and modification of the same and installation of new, small, equipment and facilities and the alteration and modification of same.

In addition, as discussed in CEQ 1508.7, regulations for implementing NEPA, Cumulative impact "is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

While cumulative impact can result from individual minor actions, as an accessory structure to the Chicago Neutron monitor station structure, the proposed PLANETS action does not meet the criteria for a minor action that requires additional assessment. It will use an existing footprint, and is similar to many other small scale actions that take place at HO each day in which vehicles arrive and leave, facilities receive maintenance, and power equipment is employed. None of these actions involve significant or even measurable risks to listed species. Work on the existing structure to add a small enclosure and frame on an existing concreate slab would not increase its footprint, the final configuration would not be higher than the natural surroundings just to the east of the facility or than other structures around it (it would not even be visible from most locations within HO and not visible anywhere outside of HO). Construction would involve the presence of no more than two or three vehicles at any time, and would not involve vibration or noise measureable outside the immediate area, although such noise and vibration would be confined to the time period when no listed species are present at the site.

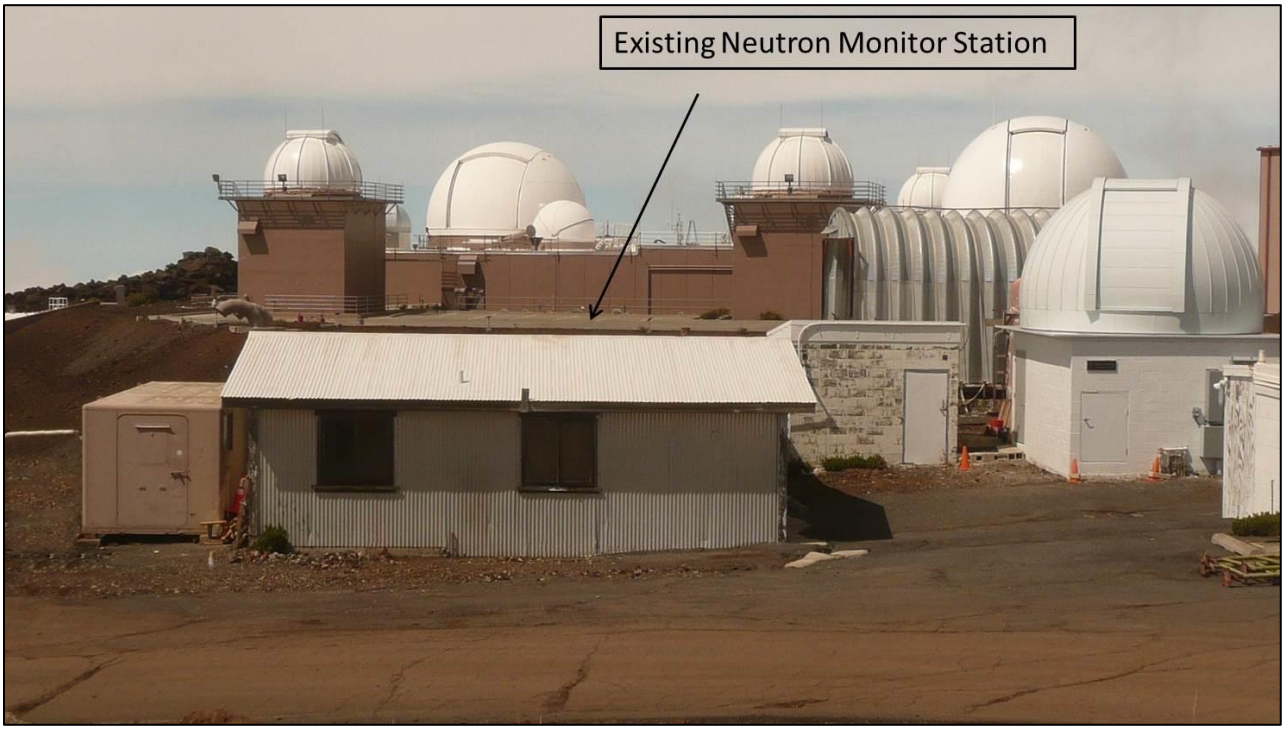


Figure 6. Appearance of the existing Neutron Monitor Station structure viewed from the South

Figure 7. Exterior appearance of proposed PLANETS Telescope Facility after modification viewed from the South in its closed position

Figure 8. Existing appearance of the former Neutron Monitor Station structure viewed from the West

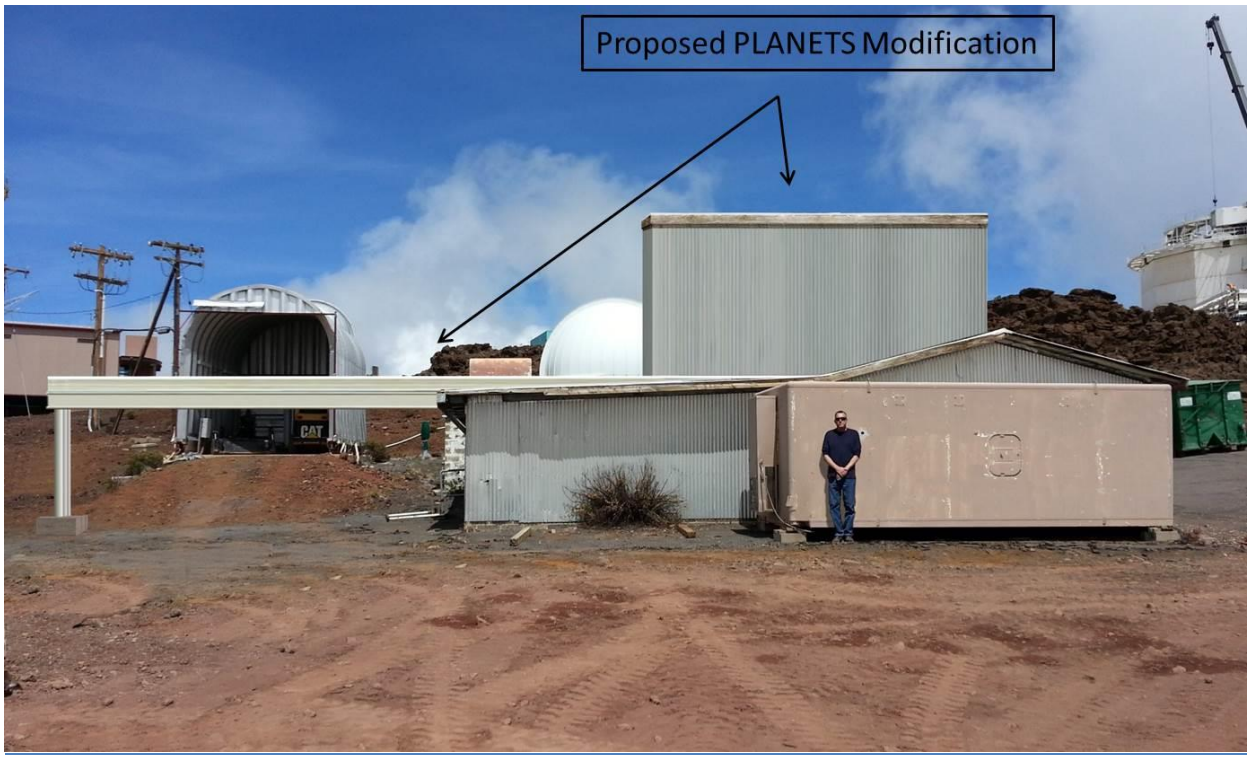


Figure 9. Exterior appearance of proposed PLANETS Telescope Facility after modification viewed from the West in its closed position

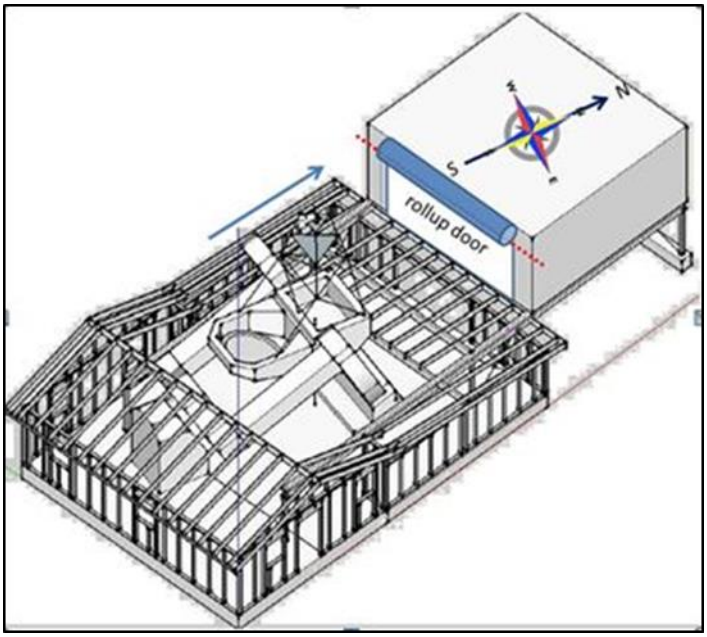


Figure 10. Schematic of proposed PLANETS modifications / Roll-off roof

3.0 EXISTING CONDITIONS

Please describe existing conditions on the parcel (geology, ecology, cultural and recreational resources, historic resources, structures, landscaping, etc). Attach maps, site plans, topo maps, biological or archaeological surveys as appropriate.

Topography Geology, and Soils

Haleakalā Observatories is wholly contained within Pu‘u Kolekole. The Kolekole volcanic center is located in East Maui on the southwest rift of Haleakalā, adjacent to the deeply eroded and spectacular summit depression. Alkalic lava flows in this area belong to both the post-shield stage Kula series as well as to the initial phase of the rejuvenated stage Hana series. The observatories are largely built on ankaramitic picro-basalts and some basanites (Bhattacharji 2002). Geological field studies describe the HO property as an asymmetric volcanic cone whose slopes are steeper at the western and northwestern sides, while the eastern and southern slopes are gentler. Much of the northern slope — most of which is occupied by the Air Force Maui Space Surveillance Complex (MSSC) — is flattened and had been disturbed. The central crater of Kolekole is described as a flattened bowl of ponded ankaramite lava, spatter and pyroclastic ejecta. More than one eruptive vent was present on Kolekole. The primary vent was likely in the approximate position of the present day Panoramic-Survey Telescope and Rapid Response System observatory (Pan-STARRS) telescope facility, and one prominent likely secondary event is within the wide depression near the western border of the property.

The significance of Pu‘u Kolekole appears to be a result of its geographical position near the apex of the southwest rift zone of Haleakalā, which resulted in a somewhat unusual volcanic history. Kolekole exhibits both post-shield (Kula) volcanism and the initial stage of rejuvenated (Hana)

alkaline volcanism in proximity to each other on or near the surface. Samples from different eruptive centers on the site that were collected and analyzed demonstrate that the transition between eruptive cycles was taking place at Pu‘u Kolekole. Age dating of lavas from the site and micro-chemical barometry confirm this unusual confluence of what are two distinct volcanic regimes elsewhere on Maui.

Topography

The Island of Maui, nicknamed “The Valley Isle” and the second largest of the Hawaiian Islands, is a volcanic doublet: an island formed from two volcanic mountains that abuts one another to form the isthmus between them (Figure 11). Mauna Kahalawai, also known as the West Maui Mountain, is the much older volcano and has been eroded considerably. Haleakalā, the larger volcano on the eastern side of Maui, rises above at 10,023 feet ASL. The last eruption occurred sometime between 1650 and 1790, and the lava flow can been seen between Āhihi Bay and La Perouse Bay on the southwest shore of East Maui. Both volcanoes are shield volcanoes and the low viscosity of the Hawaiian lava makes the likelihood of the large explosive eruptions negligible.

The summit area of Haleakalā is rugged and barren, consisting of lava and pyroclastic materials. Within a 4-mile radius of HO, the elevation drops to approximately 3,600 feet ASL, with an average slope greater than 30 percent.

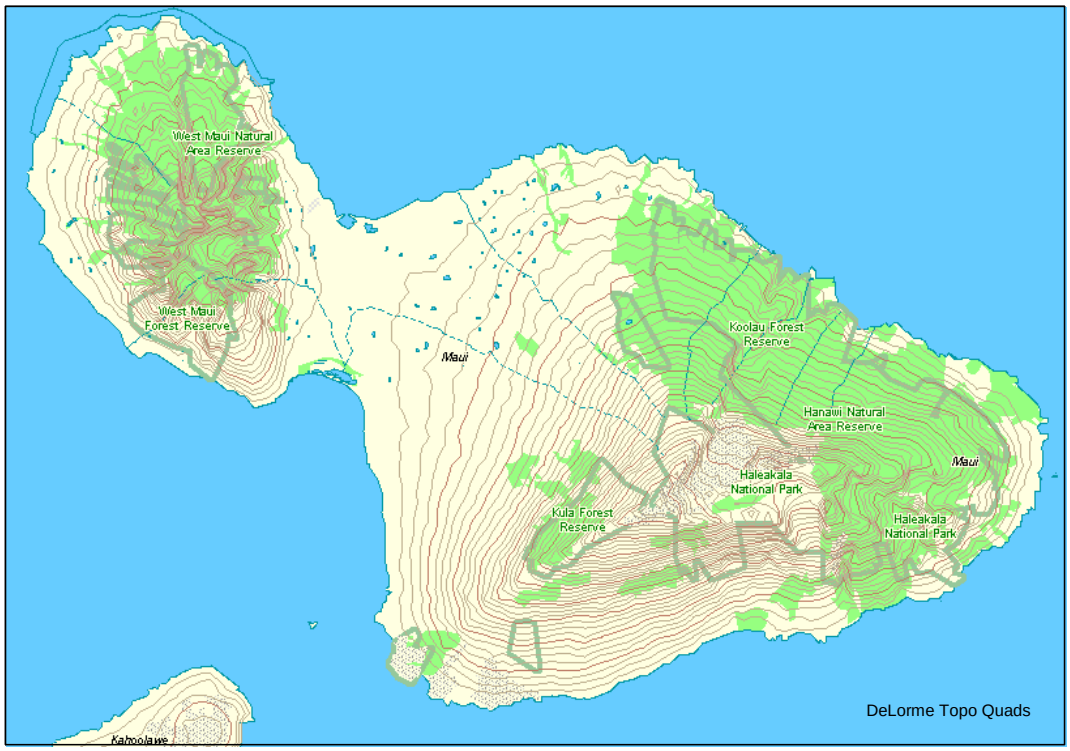


Figure 11. Topography for Island of Maui, Hawai‘i.

Geology

Over the course of Haleakalā’s formation, three distinct phases of eruption have taken place. The first, called the Honomanu Volcanic Series, is responsible for the formation of Haleakalā’s

primitive shield and most likely its three prominent rift zones. Honomanu lavas are exposed over less than 1 percent of Haleakalā, but are believed to form the foundation of the entire mountain to an unknown depth below sea level. The second series, or Kula Volcanic Series, overlaid the previous Honomanu Series with its lava flows. Eruptions of this series were considerably more explosive than its predecessor, leading to the formation of most of the cinder cones along the three rift zones.

A period of inactivity followed the Kula Series, during which time erosion began to predominate the formation of Haleakalā Crater by forming great valleys leading to the coast. After this long period of erosion, the final volcanic eruptions, called the Hana Volcanic Series, partially filled the deep valleys. Several cinder cones and ash deposits lined the East and Southwest Rift Zones ranging from a few feet high to large cones more than a mile across at the base and 600 feet high. Lava flows within the Haleakalā Southwest Rift Zone range from 200 to 20,000 years old. Six flows have erupted in this area within the last 1,000 years. During the latest eruption, sometime between 1650 and 1790, lava emerged from two vents and flowed into La Perouse Bay, where a small peninsula was constructed. Recent studies have indicated that Haleakalā volcano may still be active, in light of the numerous eruptions during the last 8,000 years (Bergmanis, et al, 2000).

Soils

The summit area is covered with volcanic ejecta consisting of lava, cinder, and ash of the Kula and Hana Volcanic Series. There is no soil development in the immediate vicinity of HO. Soil development occurs with increased distance (greater than 1.5 miles) from the summit. Most of the area is situated on Cinder Land (rCl), which is thought to be of the Kula period of volcanism (U.S. Soil Conservation Service, 1972). A foundation investigation conducted in 1991, in the northern area of HO revealed that cinder in this area is underlain by 5 feet of volcanic clinker and 16 feet of volcanic cinder.

Cultural and Historic Resources

According to oʻmanaʻo (remembrances, recollections) of many Native Hawaiians interviewed for the recent cultural impact assessments, for the ancient Native Hawaiians, Haleakalā — which includes the Kolekole area on which HO resides — is considered a piko (the navel, or center of Maui Nui a Kama (Greater Maui). It is a Puʻu Honua (sacred refuge, or place of peace), which Hawaiian ancestors believed was a Wao Akua, or place where gods and spirits walk. The cultural resources of Kolekole date back more than a thousand years and are an integral part of the Hawaiian culture, both past and present. In ancient times, commoners could not even walk on the summit because it belonged to the gods. The sacred class of na poāo kāhuna (priest) used the summit area as a learning center. It was a place where the kāhuna could absorb the tones of ancient prayer and balance within the vortex of energy, for spiritual manifestations, the art of healing, and the study the heavens for navigation purposes. Kolekole itself was a very special religious place used by the kāhuna poʻo (head priest) as a training site in the arts. There are numerous gods and goddesses said to reside on the summit, in the crater, and all around the mountain. (CKM 2006).

A Cultural Resource Survey (CKM 2003), a Traditional Practices Assessment (CKM 2002), and an archeological inventory (Fredericksen 2003), were completed in 2003 to address historic and cultural issues for long-range development planning at HO. A subsequent cultural resources study, Cultural and Historical Compilation of Resources Evaluation and Traditional Practices

Assessment was conducted in 2006 (CKM 2006) as part of the environmental compliance process for the Daniel K. Inouye Solar Telescope ((DKIST) previously the Advanced Technology Solar Telescope) Project.

In 2007, Cultural Surveys Hawaiʻi, Inc. (CSH) was commissioned to conduct a Supplemental Cultural Impact Assessment (SCIA). Although the SCIA was conducted for a specific project, the preparers of the SCIA made an additional effort to gather supplementary information, community input, and knowledge of the summit area, and therefore, the information is relevant to the management of HO. The SCIA was performed in accordance with the guidelines for assessing cultural impacts, as set forth by the Office of Environmental Quality Control (OEQC 1997) and was intended to supplement the initial Cultural Resource Evaluation (CKM 2006) for the DKIST Project. The primary purposes of the SCIA were to widen community outreach and to gather additional information on the Traditional Cultural Property (TCP) of Haleakalā as an additional means to assess the potential effects of that particular proposed undertaking on Native Hawaiian traditional cultural practices and beliefs. The SCIA contains considerable additional historical perspective on Haleakalā. It discusses in great detail the symbology of the mountain, its role in the history of Maui as a living entity, as well as the archeological record. The information provided is intended to educate the reader about the spiritual sacredness and cultural relationship of Native Hawaiians to Haleakalā as a whole and to the summit area in particular.

This section briefly describes the results of those surveys and the numerous previous studies with respect to resources of cultural value and their significance, ancient traditional practices, and archeological sites in and around what is now HO.

Cultural Resources

Pele (goddess of fire), Poliʻahu (goddess of snow), Māui (the demi-god), and others inhabited the area. In Hawaiian lore, it is said that Māui stood with one foot on Kapalaoa and the other on Hanakauhi Peak when he lassoed the Sun.

Haleakalā Crater was used as a trans-Maui thoroughfare and source for basalt stones. There are specific teachings related by the kupuna (elder) that guided commoners who were permitted access for gathering stones and to bury the dead. Numerous archeological sites have been recorded on the crest and in the crater, including, in order of frequency, temporary shelters, cairns, platforms with presumed religious purposes, adze quarries and workshops, caves, and trails (Rosendahl 1978). These are all remnants of the very elaborate spiritual and cultural life that the Native Hawaiians focused around the summit area.

Within Kolekole, cultural resources of importance are: temporary habitation or wind shelters, two petroglyph images, one site interpreted as a possible burial, and two ceremonial sites (CKM 2003). The sites are important in that they have yielded information on prehistory. Native Hawaiians know that this area, as a remnant of a Native Hawaiian landscape, provides significant cultural value because of its ceremonial and traditional importance.

Traditional Cultural Practices

During preparation of the Traditional Practices Assessment (CMK 2002), it was understood that due to the construction of former and existing buildings over the past 70+ years, much of the physical evidence of ancient Hawaiian traditional and cultural practices in the area was destroyed. The SCIA also provides information about Haleakalā as an important place where traditional

cultural practices take place and several types of traditional cultural practices continue to take place, as listed and described below:

1. Gathering of plants
2. Traditional hunting practices
3. Collecting for basalt and tools
4. Pōhaku Pālaha – The Piko of East Maui
5. Traditional Birth and Burial Practices
6. Haleakalā as a Sacred Mountain
7. Ceremonial Practices, e.g., honoring the solstice or equinox
8. Astronomy
9. Travel

Gathering of Plants

Several plants have had and continue to have particular cultural importance. The SCIA reported that traditional gathering of plant resources continues to take place today within the upper elevations surrounding the summit (SCIA p. 102).

In the past, ʻōhelo berries (*Vaccinum sp.*) were traditionally offered to Pele by those who frequented the upper elevations of the mountainous regions (SCIA, p. 102). Today, upland hikers and those in transit often pick ʻōhelo berries as a food resource when found ripe. Another example of plant gathering is the collection of pūkiawe (*Syphelia tameiameiae*) and *lehua* blossoms used for lei making (SCIA, p. 102). The SCIA also reported that pūkiawe, lehua, māmane and other plants and flowers are used for this same purpose (SCIA, p. 102). The trunks and branches of the ʻaʻaliʻi (*Dodonaea viscosa*) and māmane (*Sophora chrysophylla*) were traditionally harvested and used for hale, or house, posts. Present day efforts have revived the construction of traditional structures, however, it is unknown at this time whether these plants are actively harvested (SCIA, p. 102). Māmane timber has also been traditionally used for weaponry, particularly spears; however, it is unknown whether modern craftsmen of traditional weaponry harvest this timber today (SCIA, p. 102). Pōpolo (*Solanum americanum*) leaves, which are also found along the upper elevations and summit of Haleakalā were traditionally used (and appear to continue to be used) in laʻau lapaʻau, or Hawaiian medicinal practices. Specifically, they have been used for alleviating sore tendons, muscles, and joints (SCIA, p. 102).

Hunting Practices

Traditional hunting of birds for food and feathers was documented at least 100 years ago (SCIA, p. 103). The ʻuaʻu (Hawaiian petrel, *Pterodroma phaeopygia sandwichensis*) was particularly sought after; they were considered to be very tasty, especially the nestlings, which were reserved for the exclusive enjoyment of the chief (SCIA, p. 103 and NPS 2008 Ethnographic Study, p. 36). In addition to the ʻuʻau and nēnē (*Nesochen sandvicensis*), the extinct flightless birds *Platochen pau* and *Branta hylobadisies* were hunted. Hunting practices today include the hunting and taking of "deer, goats, pigs, pheasant, chukar partridges, francolin and other game birds has become a culturally- supported subsistence practice" (SCIA, p. 104). Feathers from some of the game birds "are highly prized for their use in hatbands (SCIA, p. 104).

Basalt Collection

One of the reasons people came to the mountain was to collect basalt for use in tool-making. Physical evidence from several archeological sites on the mountain seems to indicate that there were areas used for collection, reduction, and transport of basalt to lower elevations (NPS 2008 Ethnographic Study, p. 36). Evidence exists of areas where basalt was quarried that were used for "lithic workshops", which "are surface scatters of basalt debitage, with very few finished tools. This suggests that the scatters are related to reduction activities rather than sites where tools were used" (NPS 2008 Ethnographic Study, p. 36). Many of the lithic workshops are associated with cave shelters, structures, or natural rock formations (such as cliff faces) that would have afforded protection from inclement weather (NPS 2008 Ethnographic Study, p. 36).

Pōhaku Pālaha – The Piko of East Maui

Traditionally, Maui Island was separated into 12 moku, or districts during the time of the Aliʻi Kakaalaneo and under the direction of the Kahuna Kalaihaʻohiʻa (SCIA ref. Beckwith 1940:383). The western portion Maui Island, dominated by Mauna Eke, the range commonly referred to as the West Maui Mountains, was subdivided into three moku: Lāhaina, Kaʻanapali, and Wailuku. The eastern portion of Maui Island, dominated by Mauna Haleakalā, was subdivided into the remaining nine moku: Hāmākua Poko, Hāmākua Loa, Koʻolau, Hāna, Kīpahulu, Kaupō, Kahikinui, Honuaʻula, and Kula. There is a naturally circular stone plateau, referred to as Pālaha (SCIA ref. Sterling 1998:3), along the summit of Haleakalā where one ahupuaʻa from each moku, with the exception of Hāmākua Poko, originate. Pōhaku Pālaha (SCIA Fig ref), as it is commonly known today, is located on the northeast edge of Haleakalā Crater, at Lauʻulu Paliku and is considered as the piko (navel or umbilical cord [Pukui and Elbert 1986]) of east Maui (Mr. Timothy Bailey, personal communication (References omitted).

The term, *Pōhaku Pāloha*, is used to describe a place in the northeast corner of the crater. The origin of the term is complex, perhaps interpreted as smooth and flat, or flat rock, but essentially referring to a convergence point where eight of the nine districts of Maui meet, which is a unique spatial organization of the islands (NPS 2008 Ethnographic Study, p. 24). There are more prominent points on the mountain, e.g., Haleakalā Peak, which is the high point on the south rim of the crater, but the cultural significance of this location originates with the concept of a piko, or mouth, which has been described as that of an octopus (SCIA, p. 106) from which eight tentacles spread out over a rock, making it difficult to pry loose, in essence, they are stuck flat to the rock. The symbolic significance of the piko to Native Hawaiians as the center, or source life, would apply to this locus of interlocking districts, or moku (SCIA, p. 107).

Birth and Burial Practices

Native Hawaiians frequently buried their dead in the crater. In addition, the umbilical cords of newborns, or piko, were left in the crater as well. Burial sites have been identified in the crater and one possible burial feature has been described at HO (Fredericksen 2003). Haleakalā is vital to the birth and death life cycle for Native Hawaiians who were and continue to be maʻa (familiar or accustomed) to this place (SCIA, p. 103).

Haleakalā as a Sacred Mountain

There is much historical research, testimonies, and other views that Haleakalā is a sacred place. As such, those who view Haleakalā as sacred consider development of the summit area to be

desecration. Different individuals explain this viewpoint in various terms, or as expressed by one Maui kupuna (elder), "[w]hen a culture depends on these natural wonders of their environment for survival and reverence communications to a higher power than themselves, all care must be given to this practice" (SCIA, p. 105).

The summit area is referred to as Wao Akua and is considered to be the realm of the gods, and, as such, is a place to be revered. It is an area that is described to have been kapu, or restricted to all but the highest ranking of Native Hawaiians, such as their kāhuna, or priests. Even today, visitors "…must go in a sense of humbleness and in a sense of asking and in a sense of not disturbing unduly…" (SCIA, p. 106)

There is a protective instinct among Hawaiian people to properly care for Haleakalā, not just for themselves but for future generations. That care is expressed as a strong feeling for responsibility to prevent development on Haleakalā, rather than propose or agree to mitigation for the adverse cultural effects that may result from construction at the summit (SCIA, p. 106). Planning and management for scientific development at HO must be conducted with an understanding of, and a respect for, the connection and delicate balance between the Native Hawaiians, the āina (land), and the ocean from which it was born.

Ceremonial Practices

Most of the cultural rituals and ceremonies that may be practiced on Haleakalā are not known to the general public because they are kept secret for personal reasons or to maintain the integrity of particular rituals from generation to generation (SCIA, p. 107). This is not uncommon in the Hawaiian culture, and during consultations with Native Hawaiians only a few specifics of these practices have been shared (SCIA, p. 107). The best-known ritual to non-Native Hawaiians is the calling of the Sun, or "e ala e", which is a chant used to greet ancestors, kupuna, and [also] greet the Sun as it rises (SCIA, p. 107). Some consulted parties have shared other rituals that include such practices as annual pilgrimages to honor certain trees, conducting solstice ceremonies, visiting special sites at certain times of the year for offerings, and going to the summit for chanting. Certain times of the day, month, or year are considered important because at these times the Sun is at zenith. The zenith has particular significance in that there would be the greatest amount of hā, or spiritual breath that comes from above. For example, ceremonies at Leleiwi, about two miles from HO, have been described that involve the time when one's shadow is completely absent. These are described as being a time of hālāwai, or meeting, where everything in the world meets (Leleiwi is famous for "Specter of the Brocken", an unusual effect in which one can see his/her own shadow in the clouds surrounded by a rainbow, if the clouds are low and the Sun is behind the viewer. The hālāwai can also provide an opportunity to simply sit, with a sense of being with one's ancestors, doing what they did for generations (SCIA, p. 109).

Another example of the importance of Haleakalā for ritual practices is the ability to honor the Sun during the solstices and equinoxes in ways that are not possible at sea level. With visibility to the horizon over long distances, it is possible to see, for example, the Sun track across the sky and touch particular points around the summit, e.g., Pu'ukukui. These practices essentially use Haleakalā as a calendar (SCIA, pp. 107-108).

Astronomy

As described in oli (chants) and the mo'olelo (stories) about the summit of Haleakalā, the area

around Kolekole was used for a training ground in the arts of reading the stars and being one with the celestial entities above and was considered sacred because of its height and closeness to the heavens. In her introduction to the translated *Kumulipo,* Queen Liliuokalani stated that, "the ancient Hawaiians were astronomers and the terms used appertained to the heavens, the stars, terrestrial science, and the gods." (Queen Lili‘uokalani. 1978 [1897])

Astronomy has a very large role in the cultural importance of Haleakalā:

> Astronomical matters, both practical and ceremonial, may have been the basis for the most important activities at Haleakalā. All of the possible traditional names for the mountain are associated with tales of the demi-god Māui and his efforts to catch and slow the Sun. These tales involve two aspects, one is the perception of Haleakalā reaching to the sky, and the other is Haleakalā as a place where the observation of solar movement (that is, the marking of seasons) took place.

The recognition of Haleakalā as a place to study the Sun, astronomy, astrology, and the constellations continues into modern times (NPS 2008 Ethnographic Study, p. 31).

<u>Travel</u>

Haleakalā has long been recognized as a traditional traveling route through East Maui. Travel from one side of Maui Island to the other side often resulted in experiencing Haleakalā. The Kaupō and Ko'olau Gaps provided an excellent route to connect these two districts, and it traversed through the crater (NPS 2008 Ethnographic Study, p. 33). A trail once led from Nu'u (in Kaupō) directly up the steep southern flank of the mountain to the south rim of the summit of Haleakalā (NPS 2008 Ethnographic Study, p. 33).

In 2005, in recognition of the cultural importance of Haleakalā and in the spirit of ho‘oponopono (to "make right"), UH contracted Native Hawaiian stonemasons to erect a west-facing ahu (altar or shrine) (Figure 17) within the HO set aside "Area A" for the sole reverent use of Native Hawaiians for religious and cultural purposes with the understanding that such use will not interfere with other uses and activities within HO (Figure 18). A ho‘omahanahana (dedication or "warming" offering) was held, at which time the ahu was named Hinala‘anui.

In 2006, in the spirit of makana aloha (gift of friendship) for a proposed project, UH contracted the same Native Hawaiian stonemasons to erect an east-facing ahu near the UH Mees Solar Observatory (MSO) site (Figure 17), not within the HO set aside "Area A". Upon its completion, a ho‘omahanahana was held and the ahu was named Pā‘ele Kū Ai I Ka Moku. Native Hawaiians are welcome to utilize these sites for reverent, religious and cultural purposes, on a non-interference basis with site activities.

As shown in oli (chants) and the mo‘olelo (stories) about the summit of Haleakalā, the area around Kolekole was used for a training ground in the arts of reading the stars and being one with the celestial entities above, by the Kahuna Po‘o (High Priest). This site was sacred to them because of its height and closeness to the heavens.

Evidence of sacred use found within HO includes ko‘a (ceremonial rock formations) and temporary habitation shelters. These may have been used for ceremonies by the priesthood during

Makahiki festivals. In ancient times, the moʻolelo tells of kāhuna and their haumāna (students) living at Haleakalā and conducting initiation rites and practices. Traditional accounts also exist of the use of Haleakalā in rites of passage such as birth and death. Haleakalā's

connection to a symbolic rebirth is reflected in the traditional Hawaiian practice of piko storing. A pit at Haleakalā named Na Piko Haua was still being used by Kaupo residents in the 1920s to store their offspring's umbilical cords (Krauss 1988).

Haleakalā has long been recognized as a traditional traveling route thru East Maui. In the sixteenth century, Kihapiʻilani, Aliʻi nui (high chief) of a united Maui constructed a trail around the island and over Haleakalā, uniting the politically important districts of Hana and Kaupo with West Maui. Peoples of Honuaʻlua buried their dead in Haleakalā Crater (Handy and Handy 1972). Several references specify burials of both chiefs and commoners in Haleakalā Crater (SCIA ref. Kaʻaiʻe, Kamakau; in Sterling, 1998:264-265), and one possible burial is recorded on the northwest boundary of HO property (Fredericksen 2003).

Early post-contact travel to Haleakalā by haole (foreigner) was mostly limited to expeditions and sightseeing until the late 1800s. There is evidence that the Hawaiians continued to ascend Haleakalā throughout the 1800s not only for its popularity as a traveling route, but also for its ceremonial significance. Cattle ranching occurred on the slopes in the late 1800s, and in 1916 the U.S. Congress allotted 21,000 acres at the summit of Haleakalā as part of the Hawaiʻi National Park. The Park opened in 1921 and operated peacefully for 20 years until the U.S. Army began seeking sites for "unspecified defense installations" (Jackson 1972:130). By 1945, the Army had installations on both Red Hill and Kolekole Peak, just outside National Park boundaries. These installations were utilized until the end of World War II and intermittently thereafter, including during the Korean War. Grote Reber built a radio telescope on Kolekole in 1952, and between 1955 and 1958, the UH and the U.S. Air Force shared use of the Red Hill facilities. By 1960 to 1961, the UH was operating its observatory at the Kolekole location (Jackson 1972:131).

Today, spiritual practices continue in and around Kolekole. Flora and fauna are still collected for hula adornment by Kumu Hula, and native Hawaiians frequent the site for sunrise or sunset practices. The mana (spirit) of the area is wholly dependent on the vistas that can be viewed and the connection with earth and sky. For example, Native Hawaiians know that the spiritual essence is not something tangible at the summit area, but that one can feel the presence of the gods (CKM 2003, oral history).

Haleakalā Summit

The summit of Haleakalā is considered a significant cultural resource in and of itself. It is eligible for listing on the National Register of Historic Places (NRHP) as a TCP through consultation with the State Historic Preservation Division (SHPD) under Criterion "A" for its association with the cultural landscape of Maui and this is reflected in the number of known uses, oral history, mele (song) and legends surrounding Haleakalā. The term "Traditional Cultural Property" is used in the NRHP to identify a property "that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that, (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (DOI 1994). The summit is also eligible under NRHP Criterion "C" because it is an example of a resource type, a natural summit, and a source for both traditional materials and sacred uses. The

value ascribed to Haleakalā as a TCP can be expressed in five distinct attributes, solidifying the role of the summit as a place of value.

1. Haleakalā summit is considered by Native Hawaiians, as well as more recent arrivals to Hawai‘i, as a place exhibiting spiritual power.
2. The summit of Haleakalā is significant as a traditional cultural place because of traditional cultural practices conducted there. For both Hawaiians and non-Hawaiians who live and visit here, the summit is a place of reflection and rejuvenation.
3. The mo‘olelo and oli surrounding the summit present a collection of stories suggesting the significance of Haleakalā as a TCP.
4. Some believe that the summit possesses therapeutic qualities.
5. The summit provides an “experience of place” that is remarkable.

Historic Resources

There are no historic sites at HO. There was one historic site until December 2012, the Reber Circle site, which was a remnant of early 1950s astronomy construction at the peak of Pu‘u Kolekole. It was designated by the State Inventory of Historic Places (SIHP) as Site 5443 (UH IfA 2005) and was eligible for listing on the NRHP under Criterion “A” because of its association with mid-20th century scientific studies at Haleakalā, and under Criterion “D” for its information content. This site remnant consisted of a concrete and rock foundation that was part of the former radio telescope facility that was constructed in 1952 by Grote Reber, an early pioneer of radio astronomy. The bulk of this structure was dismantled about 18 months after the facility was completed. This site was composed of a concrete and rock foundation that was approximately 25 meters (82 feet) in diameter, the outer rim of which was up to 1 meter (3.28 feet) in width and approximately 80 centimeters (2.62 feet) in height. It was removed in accordance with an SHPD approved data recovery plan, and associated preservation plan, and was fully documented as a Historic American Engineering Record (HAER) report for archival purposes.

Botanical, biological, invertebrate and archeological resources are covered in detail in Section 4.4.

4.0 EVALUATION CRITERIA

The Department or Board will evaluate the merits of a proposed land use based upon the following eight criteria *(ref §13-5-30 (c))*:

4.1. The purpose of the Conservation District is to conserve, protect, and preserve the important natural and cultural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety, and welfare. *(ref §13-5-1)* How is the proposed land use consistent with the purpose of the conservation district?

IfA proposes that the PLANETS telescope project is consistent with the intention that conveyed the HO area to the University of Hawai‘i by Governor’s Executive Order 1987. This area of the Conservation District has been set aside for astronomical research, and facilities conducting astronomy and advanced space surveillance already exist in the HO area. The proposed telescope would utilize an existing facility in a location with previously disturbed ground. It is also consistent with the IfA Long Range Development Plan for the HO site, which was accepted by the DLNR in 2005 for managing future development at the site.

4.2. How is the proposed use consistent with the objectives of the subzone of the land on which the land use will occur? *(ref §13-5-11 through §13-5-15)*

The objectives of the General Subzone are to designate open space where specific conservation uses may not be defined, but where urban uses would be premature. HO consists of lands with topography and soils that are not normally adaptable or presently needed for urban, rural, or agricultural use. Identified applicable land uses in the General Subzone include R-3 Astronomy Facilities, and (D-1) Astronomy facilities under an approved management plan (HAR 13-5-25). The proposed PLANETS telescope project is an identified use in the General Subzone in accordance with Chapter 13-5, Section 22, P-8 Structures and Land Use, Existing, (C-1) Moderate alteration of existing structures, facilities, uses, and equipment, and HAR 13-5-25 (c) (3) Identified land uses in the general subzone.

4.3. Describe how the proposed land use complies with the provisions and guidelines contained in chapter 205A, HRS, entitled “Coastal Zone Management” *(see 205A objectives on p. 8)*.

The current structure and proposed modifications are not located in a Coastal Zone Management area pursuant to the Office of Planning map entitled *Special Management Areas Maui County*. This map is provided by the County of Maui GIS Program *hawaii.gov/dbedt/gis/maps/sma.pdf*, dated February 25, 2011. The map clearly indicates that the existing Neutron Monitor Station and proposed PLANETS telescope is not located within a Coastal Zone Management area.

4.4. Describe how the proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region.

The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community, or region.

Numerous environmental and cultural resource surveys and studies were completed as part of the development of the initial UH IfA Long Range Development Plan (LRDP). The LRDP was augmented in 2010 by a separate plan to manage HO. The UH IfA Management Plan (MP was approved by the Board of Land and Natural Resources in December, 2010 and is on file with the DLNR. The MP can also be found on the Internet at: http://www.ifa.hawaii.edu/haleakalanew/LRDP/index.htm. These studies were, in part, designed to evaluate the potential impacts from proposed new projects. The studies, inventories, and surveys indicate that the PLANETS project will not have significant impact on the resources at the site, as described below. PLANETS would occupy a current facility and utilize a roll-off roof system for its modifications designed to minimally impact existing natural resources within the surrounding area. Modifications would take place primarily within the existing structure and foundation, and the exterior appearance of the original wall structure would remain largely unchanged. In addition, minor ground disturbing modifications would take place during the non-nesting season of the Hawaiian petrel in order to avoid any potential impact to this seabird. After completion, the PLANETS facility would continue to be one of the lowest structures within HO and would not be visible from outside HO.

Botanical Resources

General Description of Vegetation

The natural resources on Pu‘u Kolekole and within the area surrounding HO include an *Argyroxiphium* / *Dubautia* alpine dry shrubland. Dry alpine shrublands are typically open communities, occurring at 3,000-3,400 m (9,842-11,155 ft) elevation, predominantly on barren cinders, with very sparse vegetation cover (Wagner *et al.*, 1999). HO is located near the summit of Haleakala, at 2,999-3,052 m (9,840-10,012 ft) elevation. Average annual rainfall is 112 cm (44 in), occurring primarily during the winter months (County of Maui, 1998). Temperatures occasionally dip below freezing, with average annual temperature at the summit of Haleakala ranging from 42.6 - 50 degrees F (5.9 - 10 degrees C) (County of Maui 1998), and once every few years it will snow. The substrate is a mixture of ash, cinders, pumice, and lava (RTS 2002). The vegetation is sparse, from a near barren <1% cover to about 10% cover. The vegetation is low, no more than one meter (3 ft) tall anywhere on the site. There are many native plants at HO, including the threatened Haleakalā silversword (*Argyroxiphium sandwicense* subsp. *macrocephalum*). HO also has many non-native plants, some of which do not appear to be found in nearby undeveloped areas (Starr, 2014). During the 2014 programmatic botanical survey of HO by Starr Environmental that included a detailed mapping of all plant species within HO aside from the very common *Deschampsia* and *Dubautia*, a total of 31 plant species were observed. Of these species, 15 (48%) were native and 16 (52%) were non-native.

According to Starr, the number of native species at HO rose [in 2014] by two over the 2013 survey. One was the discovery of what appeared to be a silverswords hybrid (*Argyroxiphium sandwicense* subsp. *Macrocephalum* x *Dubautia menziesii*). The other is ena ena (*Pseudognaphalium sandwicensium* var. *sandwicensium*), a short-lived silvery herb that had

never been observed before at HO, but was found in two different places during the 2014 spring programmatic survey.

Detailed botanical mapping and/or descriptions in Starr 2014, shows the predominant vegetation around the proposed PLANETS facility, and for HO as a whole, is primarily the native Hairgrass *Deschampsia nubigena (Poaceae)*, the native shrub *Dubautia menziesii (Asteraceae), and Tetramolopium humile subsp. Haleakalae*, a common native herb.

Several *Trisetum glomeratum* (Poaceae), a native perennial grass were mapped near the proposed PLANETS facility, as was the non-native *Taraxacum officinale* (Asteraceae) a common dandelion. One plant each of the following plants was also observed near the proposed PLANETS facility: Non-native Poa pratensis (Poaceae), non-native *Lepidium virginicum* (Brassicaceae), and native *Pseudognaphalium sandwicensium* var. *sandwicensium* (Asteraceae)

Listed or Endangered Species

'ahinahina, Haleakalā silverswords

Haleakalā silverswords (*Argyroxiphium sandwicense* subsp. *macrocephalum*) are the only plant with federal status at HO, they are federally listed as "threatened" species, meaning they may become endangered throughout all or a significant portion of their range if no protection measures are taken. During the 2014 programmatic survey, 131 live silverswords were located within the HO property, which is a huge increase from 2002 when only 9 live silverswords were known from HO. All live plants were located on or near the MSSC site on land that has undergone heavy construction activities in the past. (Starr, 2014).

Currently the HO property is programmatically surveyed semi-annually for botanical inventory, and weed control is conducted annually, as part of the programmatic monitoring effort. During the most recent visual inspection in 2014, no endangered, threatened, listed, or proposed plant species were found at or near the proposed PLANETS facility.

With respect to the Haleakalā silversword (*Argyroxiphium sandwicense macrocephalumi*), there is no evidence that the PLANETS project would poses a risk of cumulative impact to this threatened species, because there are no silversword at or near the proposed project site.

With respect to introduction of non-native species that may pose a threat to the silversword, the HO Management Plan Best Management Practices specifies that any equipment, supplies, and containers with construction materials that originate from elsewhere, i.e., the other islands or the mainland, must be checked for infestation by unwanted species by a qualified biologist or agricultural inspector prior to being transported to the summit. Specimens of non-native species found in these inspections are to be offered to the state for curation, and those not wanted are to be destroyed. All construction vehicles that will be used off paved surfaces must be steam cleaned/pressure washed before they travel or are transported through Haleakalā National Park (HALE). All HO Best Management Practices would apply to PLANETS.

The protective measures required of all entities at HO have been very successful. Annual botanical surveys that have been conducted to monitor the number, distribution and condition of silverswords on HO property reveal the success of long-term efforts by the University of Hawai‘i Institute for Astronomy to carefully protect native plant species, remove invasive weeds, and promote healthy propagation of silverswords elsewhere on the property under the requirements of the HO Management Plan.

Biological Resources

‘U‘au, Hawaiian Petrels *(Pterodoma sandwichensis*)

Near the HO boundaries and on surrounding land are burrows of the ‘Ua‘u, or Hawaiian petrel, the only seabird that is federally listed as an endangered species. Most of the population is within Haleakalā National Park (HALE) boundaries (Figure 12). About 55 burrows are within ¼-mile of HO, a few of which are inside HO boundaries. The burrows immediately surrounding HO are shown in Figure 13 (indicated by red dots). Burrow locations were derived from data obtained by GPS mapping by HALE and DKIST personnel, who regularly monitor burrows that are occupied and which nests successfully fledge young birds.

‘Ua‘u are at the Haleakalā colony from February through November each year. The birds make their nests in burrows and use the same burrow year after year, although not all burrows are occupied. ‘Ua‘u fly at night; and they fly from the ocean to the Haleakalā colony just before sunset and leave the colony for the ocean just before sunrise. These birds fly up the slopes of Haleakalā, some passing within the HO.

Through extensive coordination with the U.S. Fish and Wildlife Service and the Division of Forestry and Wildlife on other projects within the same general location at HO, the risks to the petrel during nesting season have been determined to be a collision risk with construction equipment, cranes, and newly built structures, burrow collapse due to vibration, disturbance or harassment of the burrow habitat due to vibration and noise, and artificial lighting that can disorient birds. The PLANETS Telescope project will pose none of these risks to petrels because:

1) the very short duration of ground disturbing construction can be completed during the non-nesting season, thereby eliminating risk of collision with any construction equipment or disturbance to the burrow habitat.

2) the final configuration of the PLANETS Telescope will result in adding little more than the height of a human and low framework for the roll-off roof to the existing structure, which will pose no collision risk with the facility when birds are present, because the completed structure will still be considerably lower than the natural terrain within a few feet of the site, and lower than most existing structures within a 360 degree radius. More importantly, ornithological radar studies conducted at the site (Day et al. 2005) clearly indicate that the PLANETS site is not located in the flight path of petrels entering or exiting the area;

3) the nearest petrel burrows are approximately 300-feet from the PLANETS project site (Figure 13), therefore no construction activity would be anywhere near a burrow;

4) the project requires only minimal ground disturbance that would not impact any existing burrow; and,

5) the project would not involve the installation of any outdoor lighting.

Nēnē, Hawaiian Goose (*Branta sandvicensis or Nesochen sandvicensis)*
Nēnē, currently on the Federal List of Endangered Species, are found only in the Hawaiian Islands and are the only extant species of goose not occurring naturally in continental areas. Preferred nest sites include sparsely to densely vegetated beach strands, shrublands, grasslands, and woodlands on well-drained soil, volcanic ash, cinder, and lava rock substrates. Nēnē typically feed on both native and introduced plants in the grasslands and slopes where it lives, but has been known to fly over Haleakalā Observatories, although the entire summit area is outside the known range of the bird.

To date, there have been no nēnē sightings reported on the ground at HO, including at the proposed PLANETS facility site.

Opeʻapeʻa, Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)
The ʻopeʻapeʻa, was listed as an endangered species on October 13, 1970. The nocturnal ʻopeʻapeʻais the only existing native terrestrial mammal known to occur in the Hawaiian archipelago, although other bat species have been found in sub-fossil remains. According to the U. S. Fish and Wildlife Service, relatively little research has been conducted on this endemic Hawaiian bat and data regarding its habitat and population status are very limited. Most of the available documentation suggests that this elusive bat roosts among trees in areas near forests. On Maui, the bat resides in the lowlands of the Haleakalā slopes.

Even though several sightings have been reported near HO, it is considered unlikely that the bat is a resident of the area, due to the relatively cold summit temperatures and the very low abundance of flying insects, the primary prey of the bat. The largest concentrations of bats are considered to occur on Hawaiʻi and Kauaʻi.

The most recent faunal survey conducted at HO in November of 2014 by Starr Environmental reported no detection of bats in the immediate area (Figure 14). The survey states that there have been numerous reports of bats from the summit area prior to the November survey; the most recent of which was from an Air Force security guard who reported he saw what appeared to be a bat fly over the driveway area by the front gate around dusk on September 29, 2014. According to Starr:

> Recent surveys are showing that bats are flying around the subalpine area of Haleakala virtually every night. The number of bats is low and they are mostly transiting through the area rather than foraging. The areas with the most number of bats are near forested areas, such as Hosmer's Grove and the 8500 ft. Eucalyptus

grove. Below is a map showing bat detections in the summit region of Haleakala since the Spring [204] survey. The only location bats were not detected this round of surveys was HO. This does not mean there are never bats at HO, but it does suggest the likelihood of bats occurring at HO on a given night are lower than other areas further down the mountain.

Future surveys will help further bring to light the currently unknown distribution, abundance, and habits of this elusive native mammal in the summit region of Haleakala.

Newell's Shearwater (*Puffinus auricularis newelli*)

It is noted here that the Newell's Shearwater is a threatened species that has been known to occur within the proposed action area. In the Service's Formal Biological Opinion (BO) for the DKIST project under construction within HO, the Newell's Shearwater was declared not likely to be adversely affected by the project, "…Although the project site is within the natural range of the Newell's shearwater, their vocalizations have not been heard in the project area and we believe these birds are unlikely to traverse the higher elevation portions of the Haleakalā crater rim to access the lower elevation valleys….the proposed construction and use of the [DKIST] and the upgrade and ongoing use of the FAA towers is not likely to adversely affect the Newell's shearwater." (USFWS 2011). Since the proposed PLANETS telescope is situated in between the two structures mentioned in the BO, we believe its construction is not likely to affect the Newell's shearwater either.

Consultation Not Required for Endangered Species

Because there is no Federal agency involved with the proposed facility, there is no requirement for consultation in accordance with section 7(a) (2) of the Endangered Species Act (ESA). Based on the information provided above there is no need for an Incidental Take Permit or State Incidental Take License, since the proposed project would not result in take of the Hawaiian petrel or Haleakalā silversword.

In addition, cumulative effects upon endangered species were not considered because there will be no adverse effects which can be added to other actions at HO on either the Hawaiian petrel or the Haleakalā silversword. As considered in Chap 11-200-8 B, all exemptions under the classes in this section are inapplicable when the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.

Other Introduced Fauna

Other introduced fauna that could be observed within the summit area include the chukar (*Alectoris chukar*), the feral goat (*Capra hircus*), the Polynesian rat (*Rattus exulans)*, and the roof rat (*Rattus rattus*). Feral cats *(Felis catus*) and the Indian mongoose (*Herpestes auropunctatus*) are also occasionally observed on the summit.

These species are not included on Federal or State threatened or endangered lists.

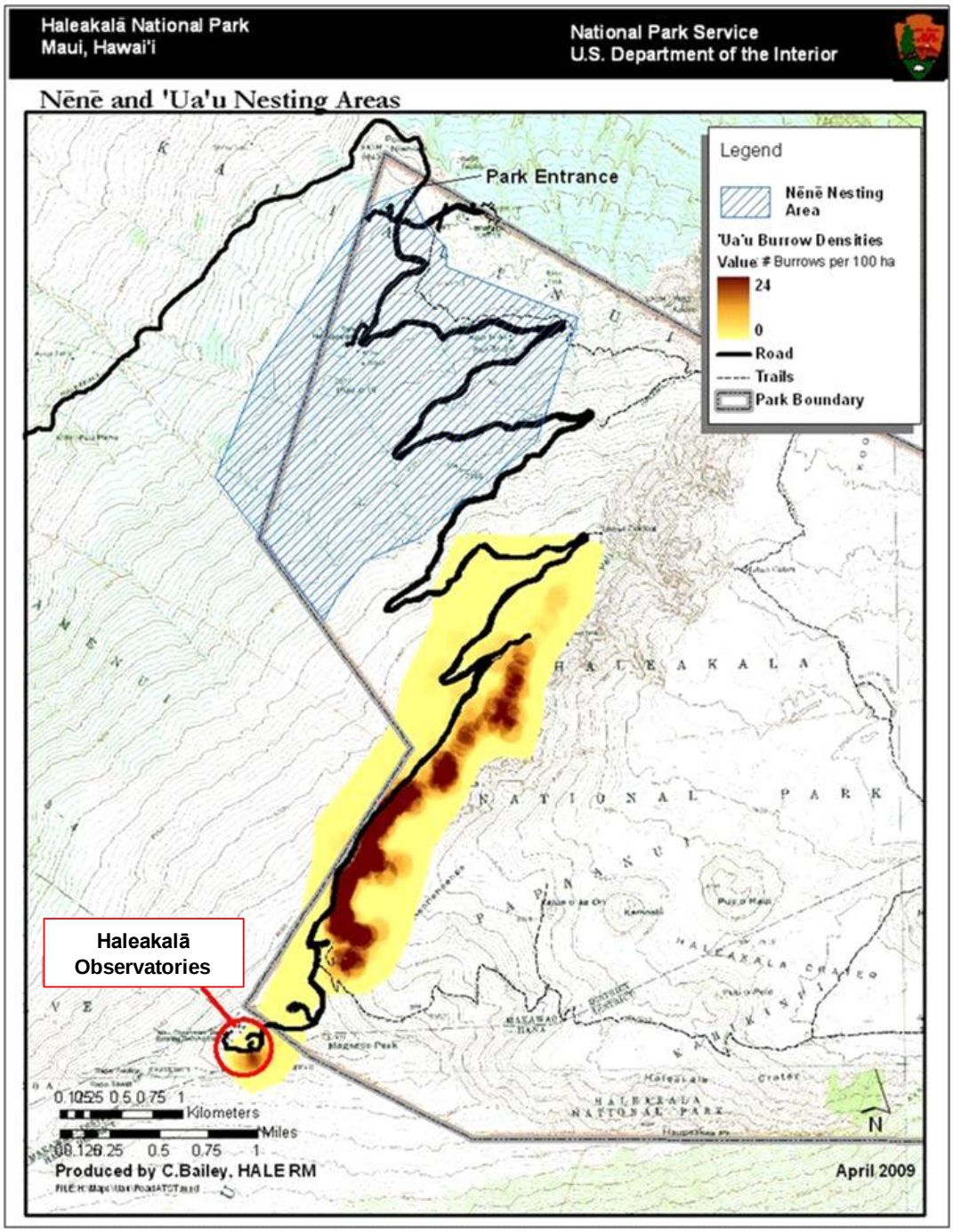


Figure 12. ‘Ua‘u Population Distribution at Haleakalā

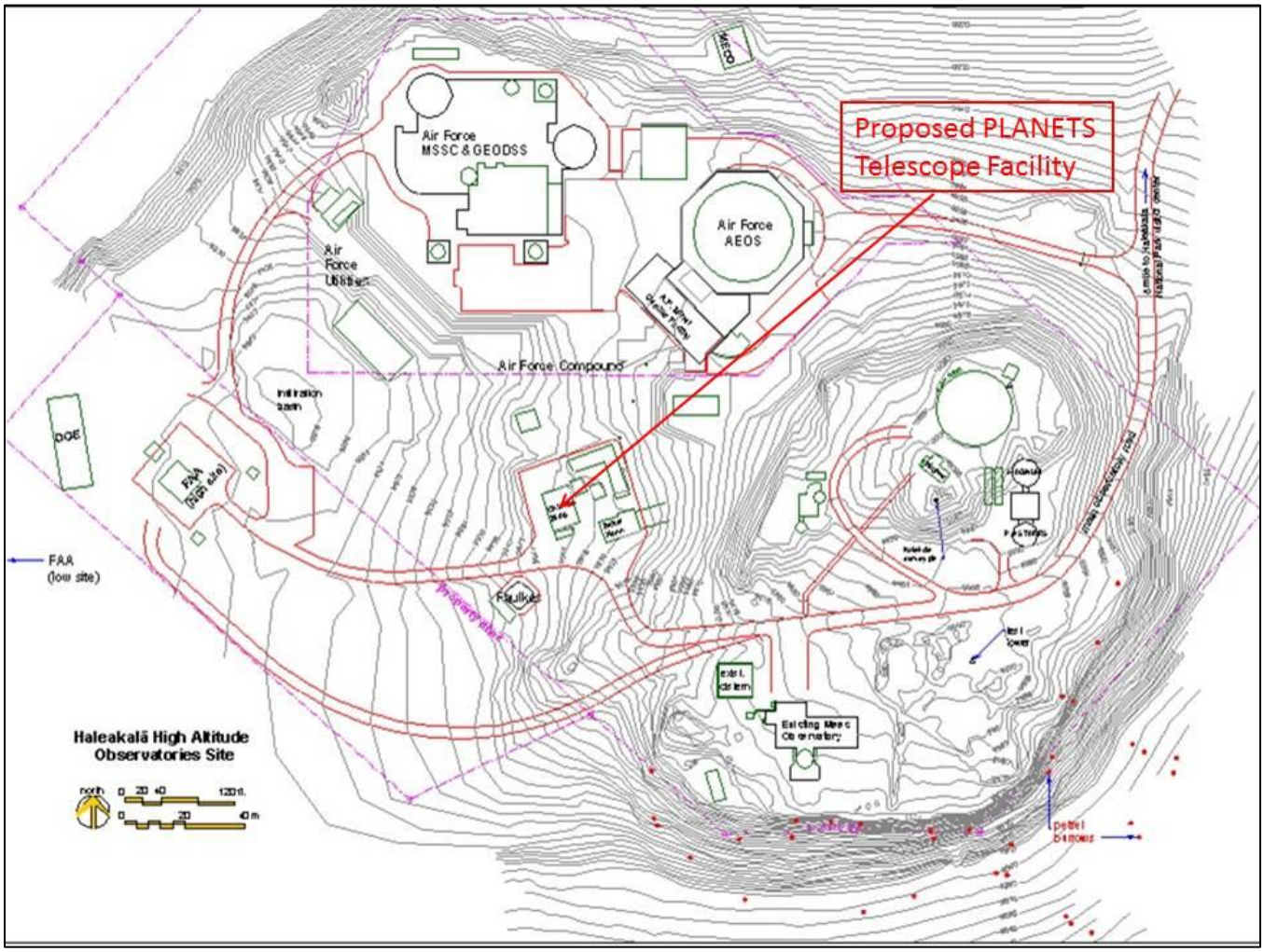


Figure 13. Petrel Burrows Close to or Within HO Boundaries (Indicated by Red Dots).

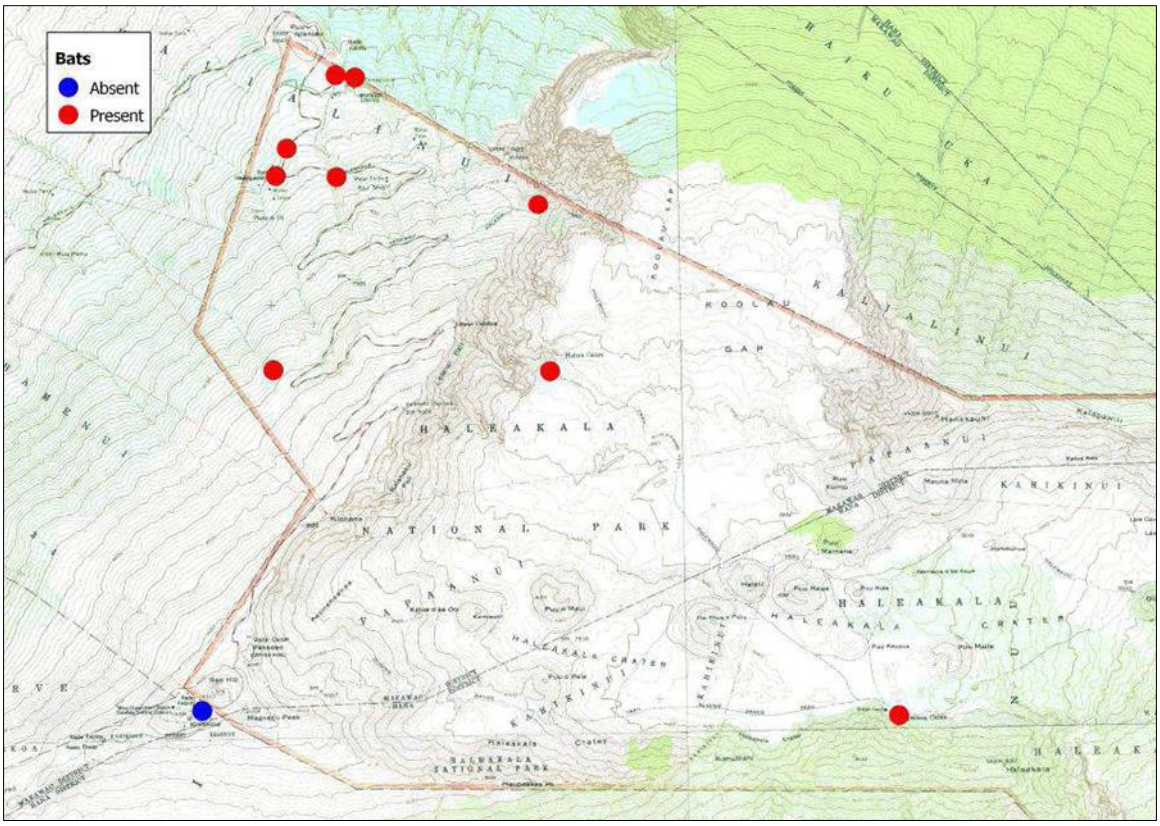


Figure 14. Locations Hawaiian Hoary Bats detected (red) and not detected (blue). Starr 2014.

Invertebrate Resources

The highest elevations of Haleakalā were once considered lifeless, but biologists have discovered a diverse fauna of resident insects and spiders. These arthropods inhabit unique natural habitats on the bare lava flows and cinder cones. Because they feed primarily on windblown organic materials, they form an aeolian ecosystem.

In Hawai‘i, aeolian ecosystems are used to describe those that exist on non-weathered lava substrates mostly, but not exclusively, found at high elevations (Medeiros and Loope 1994). On Haleakalā an aeolian ecosystem extends up the summit from about the 7,550 feet elevation. It is characterized by relatively low precipitation, porous lava substrates that retain relatively little moisture, little plant cover, and high solar radiation. The dark, heat-absorbing cinder provides only slight protection from the extreme temperatures, and thermal regulation and moisture conservation are critical adaptations of arthropods occurring in this unusual habitat.

Due to the harsh environment, fewer insects are present at upper elevations on Haleakalā than are found in the warm, moist lowlands. However, an exceptional assemblage of insects and spiders make their home on the mountain's upper slopes. A survey and inventory of arthropod fauna was conducted for the 18.166 acres of HO in 2003 for the LRDP (Pacific Analytics

2003). In the 2003 study, several species were added to the previous inventory site records.

An additional survey including arthropod collection and analysis was conducted in 2005 at the Mees and previous Reber Circle sites for the ATST Project (Pacific Analytics 2005). The arthropod species that were collected in this study were typical of what had been found during previous studies. Although the study was conducted during the winter months, no species were found that are locally unique to the site, nor were there any species found whose habitat is threatened by normal observatory operations.

In March 2007, another arthropod inventory was conducted for arthropod sampling at the sites considered in the ATST Project (Pacific Analytics 2007). The goal was to detect additional species that may have been missed during previous samplings. This additional survey, including night sampling, covers a seasonal component not included in the two previous studies. This survey was conducted during the winter months. The results of the 2007 arthropod survey indicate there are no species of concern or legal constraints related to invertebrate resources in that project area. No invertebrate species listed as endangered, threatened, or that are currently proposed for listing under either Federal or State of Hawai'i endangered species statutes were found.

A June 2009 arthropod survey was conducted and extended to larger portions of the HO property (Pacific Analytics 2009). There were a number of additional species collected, including one endemic carabid beetle (*Mecyclothorax*), and two species of long horn beetles of the genus *Plagithmysus*. Carabid beetle populations appear to be impacted when alien predators are introduced to their habitats and their conservation is considered important. The two species of long-horn beetles are considered rare and are infrequently collected.

Since 2012 HO property has been semi-annually surveyed for invertebrate resources as part of the HO programmatic monitoring of environmental resources at HO. During the most recent survey in February of 2015, the arthropods that were found during this sampling were characteristic of the fauna at both sites. No new invasive arthropods were detected at any of the sites (Pacific Analytics 2015)

As is the case with respect to the introduction of non-native botanical and faunal species, the HO Management Plan section on Best Management Practices addresses the risk and prevention of the introduction of non-native invertebrate resources, by specifying that any equipment, supplies, and containers with construction materials that originate from elsewhere, i.e., the other islands or the mainland, must be checked for infestation by unwanted species by a qualified biologist or agricultural inspector prior to being transported to the summit. Specimens of non-native species found in these inspections are to be offered to the state for curation, and those not wanted are to be destroyed. All construction vehicles that will be used off paved surfaces must be steam cleaned/pressure washed before they travel or are transported through Haleakalā National Park (HALE).

Archeological Resources

A comprehensive archeological inventory survey of HO was completed in the fall of 2002 (UH IfA 2005) and the inventory survey report was approved by SHPD. An archeological preservation plan for "Science City" (Xamanek Researches, 2006) was prepared in 2006 and approved by SHPD in a July 10, 2006, review letter (DLNR 2006). Whereas surveys had previously been conducted for specific construction projects within HO and a number of archeological features had been identified, the 2002 survey of the entire 18.166 acres for the LRDP (UH IfA 2005) was exhaustive and included location and description of six previously unidentified sites. These sites were assigned State of Hawai'i designations, and further documentation was obtained for four previously identified sites that were listed with the SHPD. In total, 29 new features were identified and five excavation units were used to sample selected features that were located in some of the previously undocumented sites. These sites consist of wind shelters, two petroglyph images, a possible burial feature, and an historic foundation known as Reber Circle (which was removed in December of 2012 under the Programmatic Agreement for the Advanced Technology Solar Telescope).

Supplemental information was obtained from Sites 50-50-11-2805 to 50-50-11-2808 per discussions with Dr. Melissa Kirkendall of the SHPD Maui office. In addition, a trail segment was recorded at Site 50-50-11-4836. Several isolated pieces of coral were noted in the southeastern portion of the 18.166-acre study area, but not assigned a formal site number because the coral pieces were not weathered. A possible site consisting of several pieces of coral in a boulder was plotted on the project map, but was determined to lie off the project area. The results of the inventory survey were submitted to SHPD for preservation review, although there was no triggering action requiring submittal of the survey, as described in HRS Section §6E-8. The significance assessments were accepted (DLNR 2003).

Most of the newly identified features are temporary habitation areas or wind shelters. Two features at one site are petroglyph images and, as indicated above, one new site is interpreted as a possible burial. Two small platforms thought to have ceremonial functions were also identified, as was a possible trail segment. All of the newly identified sites and previously designated ones retain their significance rating under at least Criterion "D" for their information content under NRHP and State historic preservation guidelines. All of the previously identified sites mentioned in this report qualify for significance because of their information content under Criterion "D" of State and NRHP historic preservation guidelines.

In addition, the possible burial and the 2 petroglyph images of Site 50-50-11-5440, as well as Site 50-50-11-5441 and the Site 50-50-11-4836 trail segment also qualify for their cultural significance under state Criterion "E". Finally, it is important to note that the various sites located in HO are a remnant of a Native Hawaiian cultural landscape. Because Haleakalā is noted for its ceremonial and traditional importance to the Native Hawaiians, the entire HO complex of sites may well qualify for importance under significance NRHP Criterion "A" and state criterion "E".

The general lack of material culture remains suggests that the HO area was used for short-term shelter purposes, rather than extended periods of temporary habitation. While there was no charcoal located during testing in the project area, the newly identified sites are nevertheless tentatively interpreted as indigenous cultural resources, some of which may have been modified or used in modern times.

A map of the archeological features at HO is presented in Figure 14. There are no archeological features on or near the proposed PLANETS telescope facility site that would be impacted by the proposed site improvements.

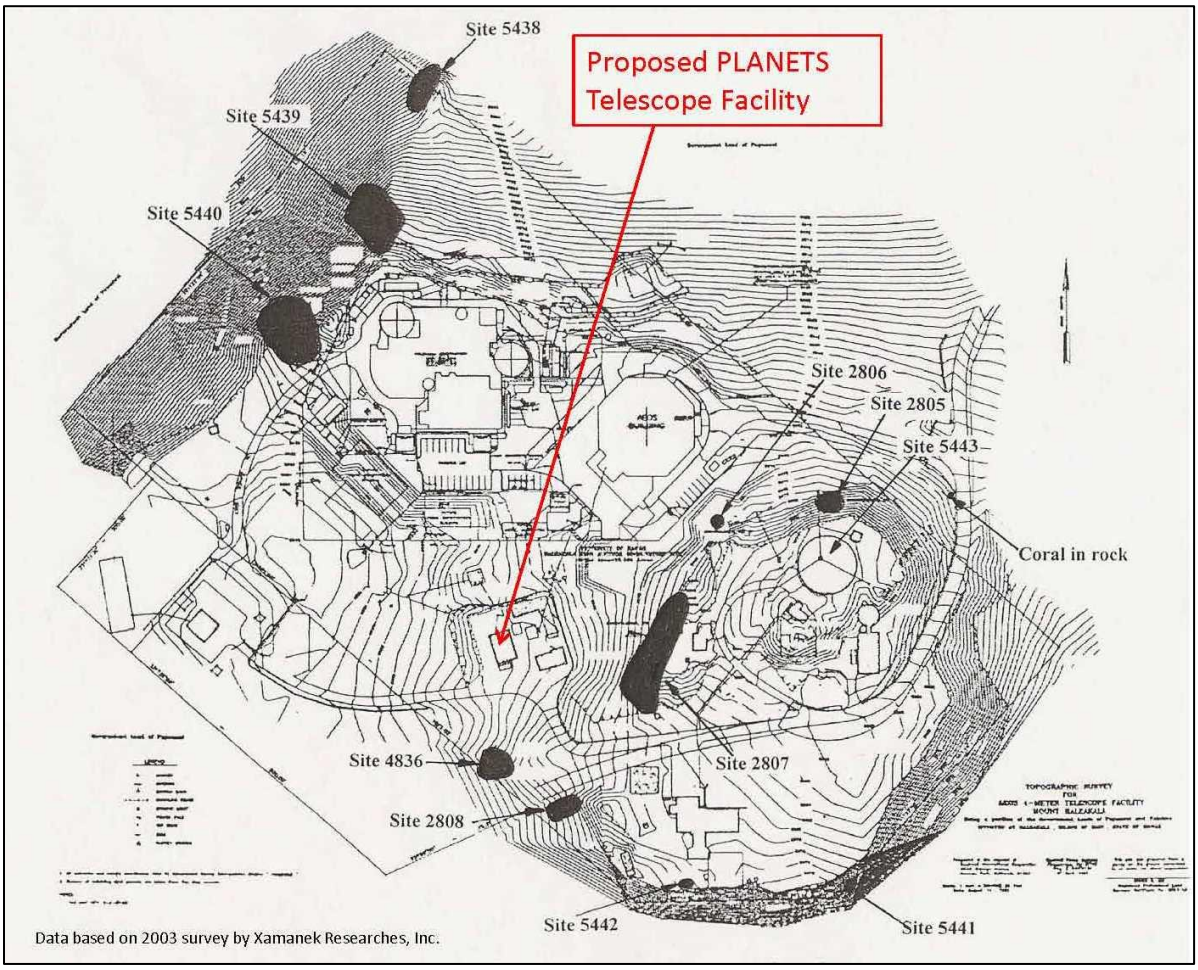


Figure 14. Archeological Resources Within HO

4.5. Describe how the proposed land use, including buildings, structures and facilities, is compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels.

The proposed PLANETS telescope site improvements project is within HO, in close proximity to the other previously developed facilities for astronomy and advanced space surveillance. The HO facilities are closed to the general public; therefore, only HO personnel would see the facility at close range. Native Hawaiians traversing HO for cultural practices in the area set-aside by IfA on the west side of HO (the set-aside area is discussed in detail in Section 5.1 below) would see the PLANETS facility, but it would not be markedly different from its current appearance, and its original exterior materials would not stand out among the other original Baker-Nunn buildings with which it is located. In relation to the nearest public viewing point, the HALE Pu‘u’ Ula‘ula (Red Hill) Overlook, the PLANETS telescope would not be visible, since it would be blocked by terrain on the far side of HO (Figure 15).

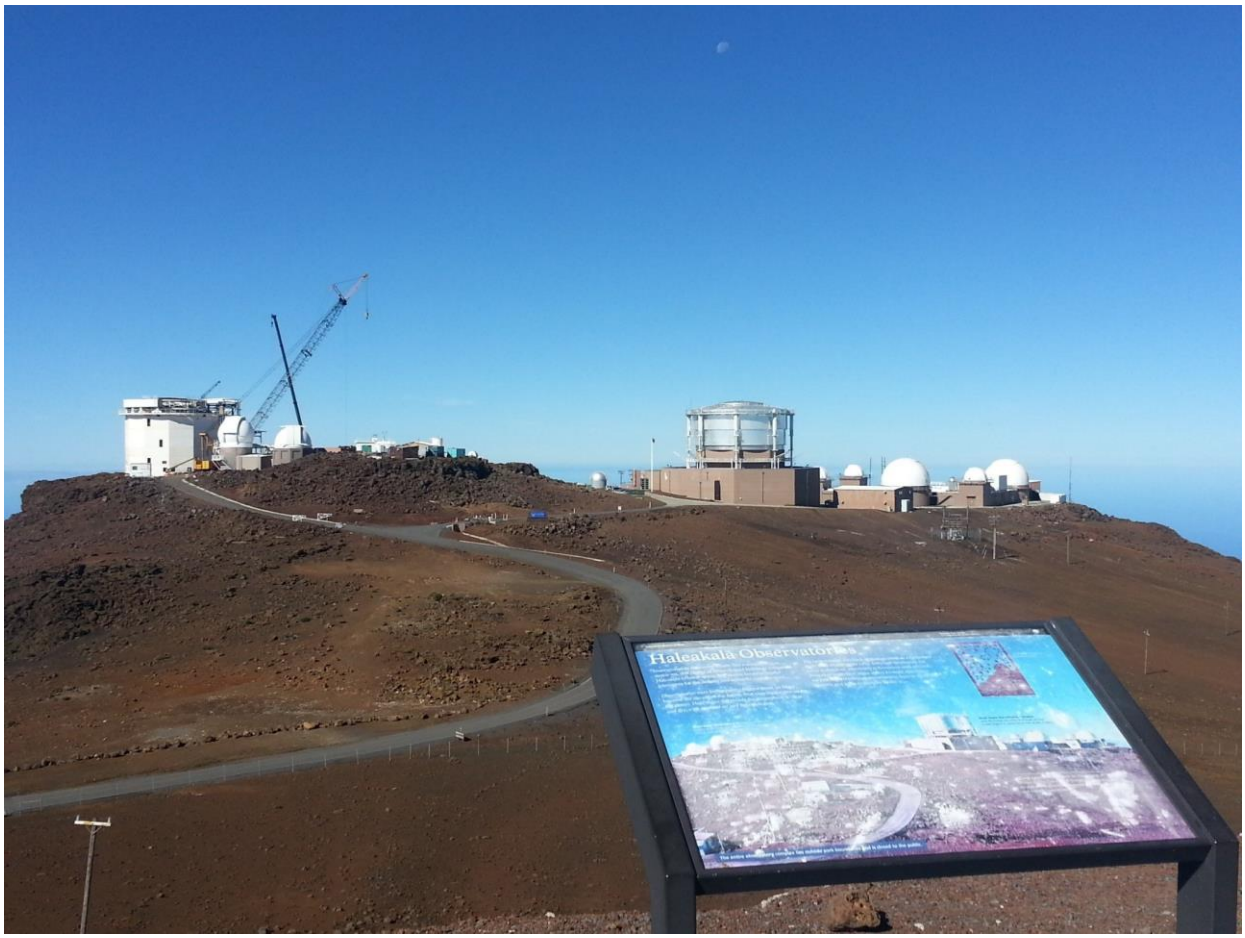


Figure 15. View from Pu‘u Ula‘ula (Red Hill) Overlook (PLANETS will not be visible from this overlook).

4.6. Describe how the existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon.

No changes to the landform within the action area will occur. Only minor changes to open spaces within the action area will occur to complete the proposed project. The topography will not be changed as viewed from either inside or outside HO. The viewplane from within HO would only be slightly altered with the addition of a small roll-off roof structure that is consistent with the current structure and surrounding astronomy facilities. Measures were taken during the design process to ensure the structure would remain as low as possible, the exterior of the original structure would be largely preserved, and the foundation would remain largely within the existing footprint.

4.7. If applicable, describe how subdivision of land will not be utilized to increase the intensity of land uses in the Conservation District.

The proposed project does not involve subdivision of Conservation District Land.

4.8. Describe how the proposed land use will not be materially detrimental to the public health, safety and welfare.

The proposed land use will not be materially detrimental to the public health, safety, and welfare.

In the MP for HO, there are documented procedures and policies to ensure that no future construction project would be materially detrimental to public health, safety, and welfare. To prevent introduction of alien species, the IfA will have all construction materials brought to the site inspected by a qualified biologist before entering The National Park.

The control and operation of the proposed PLANETS telescope before and after site improvements will be remote and there will not be a significant increase in the volume or type of vehicular traffic to or from HO. Only periodic maintenance will be required, therefore there will be no effect on air quality or noise level from vehicular sources.

The proposed PLANETS telescope site improvements will not produce significant air emissions, as described in the Air Quality section below, or generate significant levels of noise. The facility will not be accessible to the general public and it will be locked to prevent unauthorized entry.

<u>Noise</u>

Hawai‘i has adopted statewide noise standards that apply to fixed stationary noise sources and equipment related to agricultural, construction, and industrial activities. This project will introduce a stationary source, and thus Title 11 of Chapter 46 of the Hawai‘i Administrative Rules (HAR) applies to the project. The project area is zoned as a Class A district under these statewide community noise regulations (HAR 11-46-4). Class A zoning districts include “all areas equivalent to lands zoned residential, conservation, preservation, public spaces, open space or similar type,” and are the most restrictive of maximum allowable ambient noise levels.

The “A-weighted” decibel scale (dBA) is used in statewide standards because it best approximates the way the human ear responds to noise levels. Maximum permissible daytime sound levels in Class A zones under HAR 11-46-4 are 55 dBA for non-impulsive noise and 65 dBA for impulsive noise. These noise limits are defined as levels that can be exceeded no more than ten percent of the time in any 20-minute period, or L_{10}.

Background noise conditions at the summit of Haleakalā vary somewhat, depending on location, wind conditions, and the nature of nearby noise sources. Truck traffic and atmospheric conditions are the primary mobile noise sources, while air conditioning units and exhaust fans are the loudest stationary noise sources. Moderate wind speeds at the summit had instantaneous noise levels measured in the range of 45 to 50 dBA.

There are no noise-sensitive human receptors at HO, such as residences, schools, hospitals, or other similar land uses where people generally expect and need a quiet environment. In addition, HO is not open to the public. On the rare occasion observatory personnel would be on site, their outdoor occupational tasks would be negligible. The public areas closest to the project area are the Puʻu ʻUlaʻula (Red Hill) Overlook in Haleakalā National Park, which is approximately one-third of a mile away, and the Pa Kaʻoao (White Hill) Visitor Center, which is approximately two-thirds of a mile away.

The remote telescope controlling system and spectrographs to be installed in the structure are anticipated to operate well below defined noise limits.

Air Quality

All areas in Hawaiʻi are considered to comply with federal and state ambient air quality standards; no areas of Hawaiʻi are classified as non-attainment or maintenance areas. Therefore, all of Maui, including Haleakalā, is currently an attainment area for EPA “criteria” pollutants, which include sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, lead, and certain particulate matter. Furthermore, Haleakalā is categorized as a “Class 1” area under the Clean Air Act’s Prevention of Significant Deterioration Program, a category the EPA reserves for the most pristine areas of the country in order to maintain the excellent level of air quality already attained.

Relatively limited commercial or industrial development in Haleakalā results in few local anthropogenic (human-made) emission sources with the potential to affect air quality at HO. However, since the natural substrate at the project site is a mixture of fine volcanic sand and cinders, a small amount of naturally occurring fugitive dust from the finer material is released when the substrate is disturbed by wind. The prevailing trade winds from the northeast are frequently gusty at HO, which accelerates the dilution of any locally generated air emissions. Ambient winds of 20 to 50 mph are commonly reported at the summit, creating turbulence and accelerating the atmospheric dispersion.

The PLANETS project would not result in significant amounts of fugitive dust, since there will be only minor ground disturbance during the renovation process, and remote operations of the telescope and its sensors would not result in emissions of any air pollutants.

Hazardous Waste and Spill Containment

The PLANETS telescope would not normally maintain hazardous materials on site and would comply with IfA requirements of special care to maintain an unpolluted environment, where, accidental spills of any hazardous material during the execution of a contractor's project at the site will be reported immediately to the on-site IfA supervisor. In the unlikely event that a spill does occur, spill containment will be supervised by UH personnel at the site. Spill remediation methods must be approved by the University of Hawai'i's Environmental Health and Safety Office (EHSO) prior to clean up, and all costs incurred for clean-up will be assigned to the contractor. In the event of a reportable release, the construction contractor will be liable for any federal or state imposed non-compliance penalties.

5.0 CULTURAL IMPACTS

Articles IX and XII of the State Constitution, other state laws, and the courts of the State require government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups.

5.1 Please provide the identity and scope of cultural, historical and natural resources in which traditional and customary native Hawaiian rights are exercised in the area.

Traditional and Customary Native Cultural Rights Practiced at HO

Cultural Assessment and Traditional Practices assessments for the HO area were completed in March 2003 (LRDP), January 2006 (CKM Cultural Resources), and May 2007 (Cultural Surveys Hawai‘i).

The valued cultural and historic resources in which traditional and customary Native Hawaiian rights are exercised in the area are as follows: Haleakalā Crater was used as a trans-Maui thoroughfare and source for basalt stones. There are specific teachings related by the *kūpuna* (Elders) that guided commoners who were permitted access for gathering stones and to bury the dead. Numerous archeological sites have been recorded on the crest and in the crater, including, in order of frequency, temporary shelters, cairns, platforms with presumed religious purposes, adze quarries and workshops, caves, and trails. These are all remnants of the very elaborate spiritual and cultural life that the *kanaka maoli* (indigenous Hawaiian people) focused on around the summit area.

Within Kolekole, cultural resources of importance are: temporary habitation or wind shelters, two petroglyph images, one area interpreted as a possible burial site, and two ceremonial sites. The sites are important in that they have yielded information on prehistory. Native Hawaiians know this area provides significant cultural value as a remnant of a Native Hawaiian landscape because of its ceremonial and traditional importance.

The IfA has ensured that Native Hawaiians are welcome to enter HO for cultural practices, with the understanding that such use will not interfere with other uses and activities within HO and will not pose a safety risk to practitioners or HO personnel. A sign has been provided by IfA with instructions meant only for Native Hawaiians. It is posted at the entrance to the HO complex (Figure 17).

In 2005, in recognition of the cultural importance of Haleakalā and in the spirit of ho‘oponopono (to “make right”), UH contracted Native Hawaiian stonemasons to erect a west-facing ahu (altar or shrine) (Figure 18) within the HO set aside “Area A” for the sole reverent use of Native Hawaiians for religious and cultural purposes (Figure 19). A ho‘omahanahana (dedication or “warming” offering) was held, at which time the ahu was named Hinala‘anui.

In 2006, in the spirit of makana aloha (gift of friendship) for a proposed project, UH contracted the same Native Hawaiian stonemasons to erect an east-facing ahu near the Mees site (Figure 18), not within the HO set aside “Area A”. Upon its completion, a ho‘omahanahana was held

and the ahu was named Pāʻele Kū Ai I Ka Moku. Native Hawaiians are welcome to utilize these sites for reverent, religious and cultural purposes.

Figure 16. Sign at Entrance to HO Complex Welcoming Native Hawaiians (Hawaiian Language).

As mentioned previously, whereas archeological surveys had previously been conducted for specific construction projects within HO, and a number of archeological features had been identified, the 2002 survey of the entire 18+ acres was exhaustive and included the location and description of six previously unidentified sites on the property. These sites were assigned State designations and, in addition, further documentation was obtained for four previously identified sites that were listed with the Maui Office of the SHPD. In total, twenty-nine new features were identified and five excavation units were utilized to sample selected features that were located in some of the previously undocumented sites.

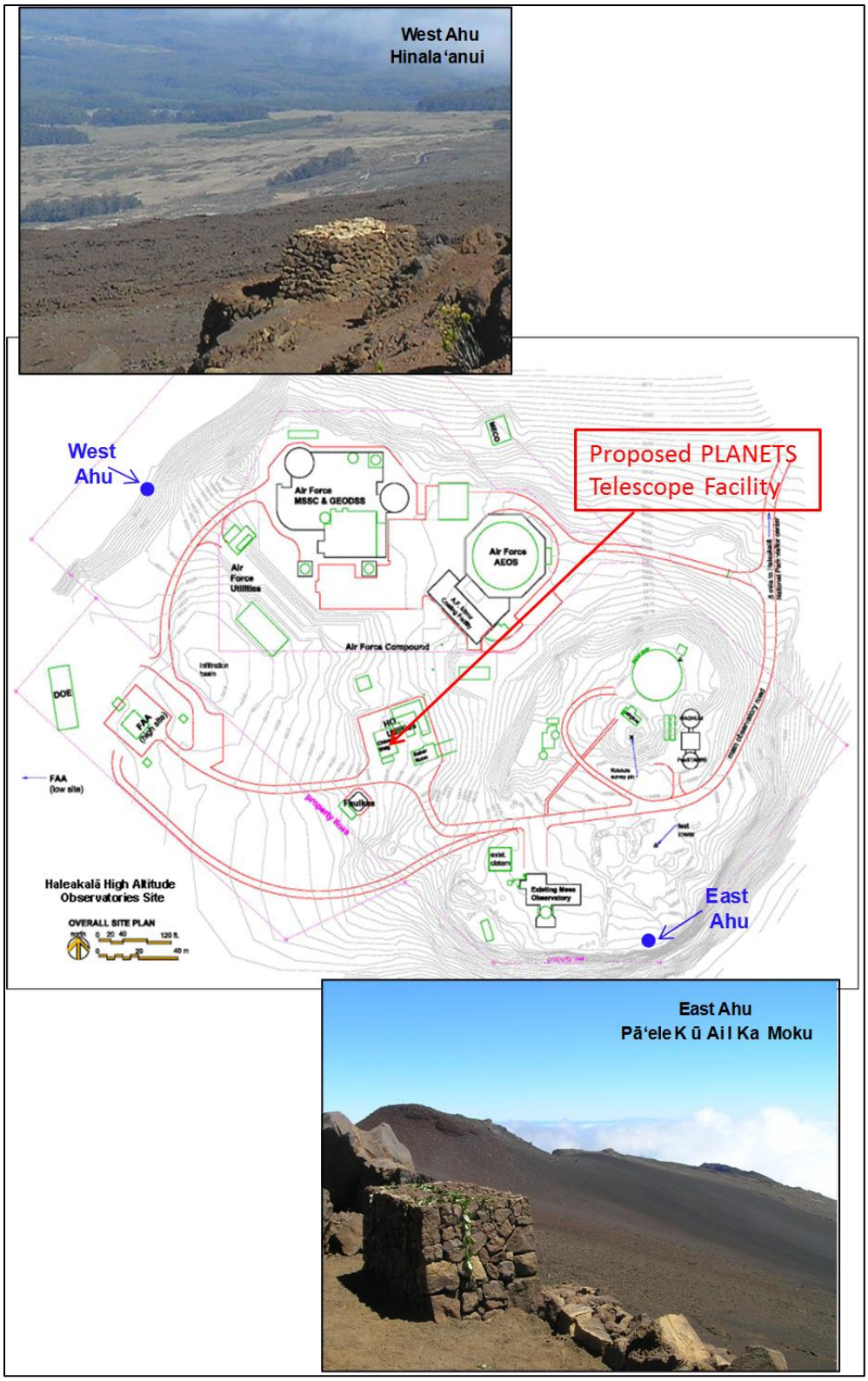


Figure 17. East- and West-facing Ahu Locations at HO

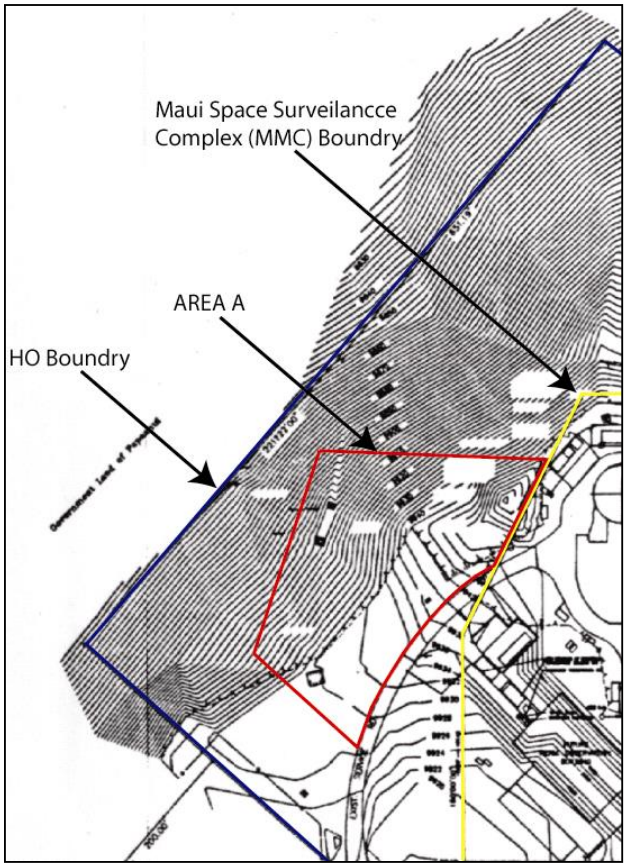


Figure 18. Set aside "Area A" Location at HO

5.2 Identify the extent to which those resources, including traditional and customary Native Hawaiian rights, will be affected or impaired by the proposed action.

No resources, including traditional and customary Native Hawaiian rights, would be affected or impaired by the proposed action. The PLANETS telescope project is not located near any of the cultural resources described above, and its remote operations would not be seen from the ahus or heard from any of the archeological resources at HO.

5.3 What feasible action, if any, could be taken by the BLNR in regards to your application to reasonably protect native Hawaiian rights?

No action needs to be taken by the Board of Land and Natural Resource, as the IfA has already taken action to provide an informational sign, which is posted at the entrance to the HO complex (Figure 17).

6.0 OTHER IMPACTS

6.1 Does the proposed land use have an effect (positive/negative) on public access to and along the shoreline or along any public trail?

Shoreline Access

The site is located within HO at approximately 9,960 feet above sea level and, therefore, will have no effect on public access to and along the shoreline pursuant to the Office of Planning map entitled *Special Management Areas Maui County*. This map is provided by the County of Maui GIS Program at *hawaii.gov/dbedt/gis/maps/sma.pdf*, dated February 25, 2011. The map clearly indicates that the PLANETS telescope site is not located within a shoreline access area.

Public Trails

There are no public trails within the confines of the proposed site. The entire HO complex is off limits to the general public as shown on the sign in Figure 17.

6.2 Does the proposed use have an effect (positive/negative) on beach processes?

The site is located within HO at approximately 9,960 feet above sea level and will have no effect on beach processes as indicated in Section 6.1 above.

6.3 Will the proposed use cause increased runoff or sedimentation?

The proposed use will not cause increased runoff or sedimentation. There will be only minor ground disturbance and the structure will remain within the existing foundation footprint.

6.4 Will the proposed use cause any visual impact on any individual or community?

The proposed facility will not be visible from outside the observatory site. The current structure has a maximum height at the existing roof ridge of 11’ 9” from ground (datum) level. With the addition of the roll-off roof structure, the total structure height would be 18’ 2 ¼”, or 6” 5 ½” taller than the present structure. Because of its position within HO, low height, and similar appearance to the existing Neutron Monitor Station and other HO facilities, the proposed PLANETS telescope will not change the view from the nearest public vantage point in HALE at Puʻu Ulaʻula (Red Hill) Overlook, which is approximately 0.5 miles away (Figure 16).

The current structure is not visible from anywhere outside of HO. The proposed upgrade will not increase visibility of the structure anywhere in the summit area such that any individual or community would be visually impacted. Only HO personnel would see the facility at close range within the context of the other observatory facilities.

6.5 Please describe any sustainable design elements that will be incorporated into the proposed land use *(such as the use of efficient ventilation and cooling systems; renewable energy generation; sustainable building materials; permeable paving materials; efficient energy and water systems; efficient waste management systems; et al.).*

The proposed facility would utilize the existing structure that was part of the original Baker-Nunn satellite tracking station, and later the Neutron monitoring station, to minimize use of new materials on site. PLANETS would occupy a current facility and utilize a roll-off roof system for its modifications designed to minimally impact existing natural resources within the surrounding area. Modifications would take place primarily within the existing structure and foundation, and the exterior appearance of the original outer wall structure would remain largely unchanged. After completion, the PLANETS facility would continue to be one of the lowest structures within HO and would not be visible from outside HO.

6.6 If the project involves landscaping, please describe how the landscaping is appropriate to Conservation District *(e.g. use of indigenous and endemic species; xeriscaping in dry areas; minimizing ground disturbance; maintenance or restoration of the canopy; removal of invasive species; habitat preservation and restoration; et al.).*

The proposed project does not involve any landscaping and construction will not involve any ground disturbance.

6.7 Please describe the Best Management Practices that will be used during construction and implementation of the proposed land use.

Best Management Practices that will be used during construction and implementation of the proposed land use are outlined in the University of Hawai‘i Institute for Astronomy Haleakalā High Altitude Observatory Site Haleakalā, Maui, Hawai‘i Management Plan, Section 3.5.3.2, as follows:

All subcontractor personnel working at HO must receive IfA-approved environmental training, prior to beginning work. This training program explains and amplifies the requirements imposed on all construction projects within HO boundaries. For environmental protection, the IfA requires the following to protect vital environmental resources:

1. HALE has experienced the introduction of destructive non-native species that compete with and have in some cases displaced native plants and insects. These introductions threaten the ecological balance at the summit area, and in cooperation with HALE, IfA requires any contractor to take the following measures at HO to prevent construction or repair activities from introducing new species:

    a. Any equipment, supplies, and containers with construction materials that originate from elsewhere, i.e., the other islands or the mainland, must be checked for infestation by unwanted species by a qualified biologist or agricultural inspector prior to being transported to the summit. Specimens of non-native species found in these inspections

are to be offered to the state for curation, and those not wanted are to be destroyed. All construction vehicles that will be used off paved surfaces must be steam cleaned/pressure washed before they travel or are transported through HALE. It shall be the sole responsibility of the contractor to coordinate inspections with the HALE Business and Revenue Program Specialist.

b. Importation of fill material to the site is prohibited, unless such fill (e.g., sand) is sterilized to remove seeds, larvae, insects, and other biota that could survive at HO and propagate. All material obtained from excavation is to remain on Haleakalā. Surplus excavated cinders, soil, etc., is to be offered to other agencies located at the summit or HALE.

c. Contractors are required to participate in IfA-approved pre-construction briefings to inform workers of the damage that can be done by unwanted introductions. Satisfactory fulfillment of this requirement can be evidenced by a signed certification from the contractor.

d. Parking of heavy equipment and storage of construction materials outside the immediate confines of HO property is prohibited.

e. Contractors are required to remove construction trash frequently, particularly materials that could serve as a food source that would increase the population of mice and rats that prey on native species.

2. The endangered ʻuaʻu, or Hawaiian Petrel, occupies burrows on the upper slopes of Haleakalā from February to October. The burrows are located in cinder and are active year after year, since the birds return to the site of their birth. Petrels are night flying birds, leaving their burrows to search for food during nesting and fledgling seasons. The burrows are located on the south slopes below the MSO facility and on the north slopes below the MSSC. The following requirements are in place to ensure that the ʻuaʻu habitat will be protected during any construction activities.

   a. During the months when ʻuaʻu are present on Haleakalā, care must be exercised to ensure that ʻuaʻu will not be disturbed. Therefore, vibration and noise from heavy construction equipment or activities must not impact the normal life-cycle of resident birds. If heavy construction equipment will be necessary at the HO site, consultation with the USFWS, the Division of Forestry and Wildlife (DOFAW), and avifaunal experts will be required to determine feasibility and any applicable mitigation requirements.

      Furthermore, it would be necessary to determine whether human receptors in areas outside of the HO would be affected by construction noise. There are areas within HO close enough to HALE visitors, such that they would be able to detect noise from construction of and traffic at the proposed facilities. These sounds could affect Native Hawaiian cultural practitioners and those engaged in recreation at nearby locations. The analyses provided by the contractor would be used to help develop methods to avoid,

minimize, or mitigate such noise where it would or may affect endangered species, sensitive cultural practices, or the experience of visitors to the summit area outside of HO.

Such methods could include:

i. Workers at the site must be informed of vibration, noise, and lighting hazards to endangered species, that their activities are to be confined to the construction site to minimize risk to birds in adjacent areas, and that noise sources should be shielded where possible.

ii. Conducting all noise-emitting activities within strict day and time constraints, with work prohibited during sensitive nighttime periods.

iii. Reducing or substituting power operations/processes through use of proportionally sized and powered equipment necessary only for tasks at hand.

iv. Maintaining all powered mechanical equipment and machinery in good operating condition with proper intake and exhaust mufflers.

v. Turning off or shutting down equipment and machinery between active operations.

b. Contractors will be given current maps of locations of ‘ua‘u burrows to assist with ‘ua‘u conservation. HALE biologists are continuously finding and mapping new ‘ua‘u burrows and these maps are made available to IfA for planning purposes.

c. HO personnel will notify USFWS of any ‘ua‘u mortalities. Contractor personnel will report mortalities to IfA immediately.

d. Construction of fences will be avoided, to prevent ‘ua‘u mortality from collisions.

e. Lighting for construction hazards or night work must be approved by IfA prior to installation. All lighting must be shielded from above, so that night flying birds will not be disoriented by upward projecting lights that are mistaken for natural sources of navigable lighting.

f. To avoid attracting ‘ua‘u, contractors will make every effort not to use safety/security lighting the same color as stars. Other colors, such as red, blue, or orange or similar colors, should be considered.

In addition to the language in the BMP’s, and as further clarification, lighting at HO is carefully controlled to avoid degradation and invalidation of data from the various astronomical sensors used during dark hours. There are no outdoor lights permitted at the site at night, except for momentary illumination by personnel with red-filtered flashlights,

which may be used to navigate obstacles, illuminate controls on outdoor equipment, etc..

3. HO is located in a cinder cone in a State Conservation District. Construction at the site requires special care to maintain the unpolluted environment.

   a. No hazardous materials are to be released at the site. Substances such as surplus or used paint, oil, solvents, cleaning chemicals, etc., must be removed from the area and disposed of properly.

   b. Accidental spills of any hazardous material during the execution of a contractor's project at the site must be reported immediately to the IfA. Spill containment will be supervised by UH personnel at the site.

   c. Spill remediation methods must be approved by the University of Hawaii's Environmental Health and Safety Office (EHSO) prior to clean-up, and all costs incurred for clean-up will be paid by the contractor. In the event of a release, the contractor will be liable for any Federal- or State-imposed response action, costs, or penalties.

   In addition to the language in the BMP's, and as further clarification, the HO Management Plan requires that accidental spills of any hazardous material during the execution of a contractor‘s project at the site must be reported immediately to the IfA. Spill containment will be supervised by UH personnel at the site and spill remediation methods must be approved by the University of Hawaii‘s Environmental Health and Safety Office (EHSO) prior to clean-up. Containment methods include absorption of spilled petroleum products to prevent further spreading and contact with the environment, including unlikely contact with petrels at such time when they may be in the summit area of Haleakalā.)

   d. Washing and curing water used for aggregate processing, concrete curing, clean up, etc., cannot be released into the soil at the site. A recovery process is required by the contractor to capture wastewaters.

4. It is of particular importance to maintain a dust-free environment at HO. Telescope mirrors, lenses, and sensors can be quickly damaged by wind born dust. HO is located at 10,000 feet, and is often exposed to winds in excess of 30 miles per hour (mph). Before, during, and after winter storms, winds can exceed 50 mph. The natural substrate at the site is a mixture of fine volcanic sand and cinders. Fugitive dust from the finer material can be released when the substrate is disturbed. Therefore:

   a. Contractors must establish a written dust control plan that must be observed by all contractor personnel during the project. Contractors will adhere strictly to the requirement that dust be controlled at all times, including non-working hours, weekends, and holidays.

   b. Dust control must be accomplished by equipment that the Contractor keeps on site and sprinkling or similar methods will be required to keep disturbed finer material from

becoming airborne and must result in less than 10 pounds of fugitive dust released into the atmosphere per 24-hour period, as measured by standard collection methods.

c. No oil or chemical treating shall ever be used at the site for dust control.

d. Dust resulting from surface preparation of surfaces to be painted by sanding, power tools, or scraping and brushing shall be controlled by the Contractor by use of catchments and filtering systems/devices to prevent damage to the telescope mirrors, lenses and sensors.

e. Where practical, erect a designated on-site facility with wash racks to clean equipment and machinery before they are removed from construction zones.

f. Reduce vehicle emissions from construction projects and operations at HO by establishing worker carpools and shuttles to and from the job site, and mitigate construction equipment/machinery emissions by using proper emission-control technologies and standard exhaust filtration devices.

5. Construction or refurbishing of existing facilities will result in quantities of solid waste, and remnants of food and packaging that construction crews may bring for consumption at the site. Therefore:

a. Only materials that are not hazardous wastes can be managed as solid waste at the site.

b. Solid waste cannot be stockpiled or dumped at the site or on the slope below the HO facilities. Construction contractors must remove construction trash frequently, particularly food sources that could increase the population of mice and rats that prey on native species. Most construction waste should be removed in roll-off trash receptacles that are covered before transport.

c. Construction and demolition solid waste and debris must be secured such that strong winds cannot disperse materials. This is particularly important during weekends, holidays, and other non-working hours.

d. Construction and demolition solid waste and debris should be transported to the Maui Demolition and Construction Landfill in Ma‘alaea.

e. No food is to be left on the ground or in HO solid waste storage areas. This is to prevent attraction of rats and other pests.

f. Non-hazardous trash and solid waste will be transported in covered refuse containers and disposed of off-site at Maui’s licensed landfill.

6.8 Please describe the measures that will be taken to mitigate the proposed land use's environmental and cultural impacts.

The proposed land use was designed to result in very minimal environmental and cultural impacts. The PLANETS telescope will occupy an existing facility with only moderate alterations required to be implemented. In accordance with the MP, contractors performing the alterations for the PLANETS telescope project will receive training in protection of both environmental and cultural resources at HO. To generate minimal ground disturbance the project is designed to reuse as much existing material in the structure as possible. All materials to be imported will be inspected prior to transport to the site to prevent introduction of alien species. All construction will take place only in daylight hours to avoid impacts to night-flying Hawaiian petrels and disturbance to other operations at HO, and any ground-disturbing activity will take place during non-petrel season when petrels are not present at HO.

As mentioned in Section 5.1, The IfA has ensured that Native Hawaiians are welcome to enter HO for cultural practices, with the understanding that such use will not interfere with other uses and activities within HO. A sign has been provided by IfA with instructions meant only for Native Hawaiians. It is posted at the entrance to the HO complex (Figure 17).

In 2005, in recognition of the cultural importance of Haleakalā and in the spirit of hoʻoponopono (to "make right"), UH contracted Native Hawaiian stonemasons to erect a west-facing ahu (altar or shrine) (Figure 18) within the HO set aside "Area A" for the sole reverent use of Native Hawaiians for religious and cultural purposes (Figure 19). A hoʻomahanahana (dedication or "warming" offering) was held, at which time the ahu was named Hinalaʻanui.

In 2006, in the spirit of makana aloha (gift of friendship) for a proposed project, UH contracted the same Native Hawaiian stonemasons to erect an east-facing ahu near the Mees site (Figure 18), not within the HO set aside "Area A". Upon its completion, a hoʻomahanahana was held and the ahu was named Pāʻele Kū Ai I Ka Moku. Native Hawaiians are welcome to utilize these sites for reverent, religious and cultural purposes.

7.0 SINGLE FAMILY RESIDENTIAL STANDARDS

Single Family Residences must comply with the standards outlined in §13-5 Exhibit 4.

Size of Lot:

	Existing	Proposed	Total
Proposed building footprint			
Paved areas / impermeable surfaces			
Landscaped areas			
Unimproved areas			

Setbacks Front: Sides: Back:

Shoreline Properties

Average Lot Depth (ALD): Average annual coastal erosion rate:

Minimum shoreline setback based on Exhibit 4:

Actual shoreline setback of proposed structure:

Maximum Developable Area

The maximum developable area computation shall include all floor areas under roof, including first, second, and third story areas, decks, pools, saunas, garage or carport, and other above ground structures.

Maximum Developable Area based on Exhibit 4:

Actual Developed Area of proposed residence:

Actual height of the proposed building envelope as defined in Exhibit 4:

Compatibility

Provide justification for any proposed deviation from the established residential standards.

How is the design of the residence compatible with the surrounding area?

If grading is proposed include a grading plan which provides the amount of cut and fill. Has grading or contouring been kept to a minimum?

The proposed project is not a single family residence.

8.0 CHAPTER 205A, COASTAL ZONE REQUIREMENTS

Land uses are required to comply with the provisions and guidelines contained in Chapter 205A, Hawaii Revised Statutes (HRS), entitled "Coastal Zone Management," as described below:

- **Recreational resources:** Provide coastal recreational opportunities accessible to the public.
- **Historic resources:** Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.
- **Scenic and open space resources:** Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.
- **Coastal ecosystems:** Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.
- **Economic uses:** Provide public or private facilities and improvements important to the State's economy in suitable locations.
- **Coastal hazards:** Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.
- **Managing development:** Improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- **Public participation:** Stimulate public awareness, education, and participation in coastal management.
- **Beach protection:** Protect beaches for public use and recreation.
- **Marine resources:** Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

The proposed project site is not located in a Coastal Zone Management area.

9.0 MANAGEMENT PLAN REQUIREMENTS

Certain land uses require that a Management Plan be approved by the Board of Land and Natural Resources. The Management Plan can be processed concurrently with the Conservation District Use Application, and must be consistent with the Hawaii Administrative Rules Chapter 13-5, Exhibit 3.

Pursuant to the above, Management Plans should include:

- Project location (e.g., island map, location map, site plan (drawn to scale))
- Natural resource assessment including descriptive information about the natural resources in the project vicinity such as biological, archaeological, cultural, geological, coastal, recreational, and scenic resources, where applicable. The presence of any threatened or endangered species shall be disclosed.
- Natural hazard assessment including descriptive information of erosion, flooding, slope, tsunami, and volcanic hazards, where applicable.
- A description of best management practices used during project construction and implementation (e.g., mitigation measures).
- A description of the best management practices to be used during the lifetime of the project (e.g., mitigation measures).
- A description of the conservation methods and applications to be used in the short term and long term (e.g., mitigation measures).
- Description of existing uses and facilities, if any.
- Description of proposed facilities and uses, including phases, if applicable.
- Project schedule including description of project sequencing from project construction to project completion and on-going maintenance plans, including a description and timing of natural resource monitoring and maintenance plans.
- A description of the annual reporting requirements.
- Any other information or data, as required by the department.

Please attach the proposed Management Plan as a separate document.

The University of Hawai‘i Institute for Astronomy Haleakalā High Altitude Observatory Site Haleakalā, Maui, Hawai‘i Management Plan dated June 8, 2010, was approved by BLNR December 1, 2010. This document is on file at DLNR.

10.0 CERTIFICATION

I hereby certify that I have read this completed application and that, to the best of my knowledge, the information in this application and all attachments and exhibits is complete and correct. I understand that the failure to provide any requested information or misstatements submitted in support of the application shall be grounds for either refusing to accept this application, for denying the permit, or for suspending or revoking a permit issued on the basis of such misrepresentations, or for seeking of such further relief as may seem proper to the Land Board.

I hereby authorize representatives of the Department of Land and Natural Resources to conduct site inspections on my property. Unless arranged otherwise, these site inspections shall take place between the hours of 8:00 a.m. and 4:30 p.m.

_____

Signature of authorized agent(s) or if no agent, signature of applicant

AUTHORIZATION OF AGENT

I hereby authorize_____to act as my representative and to bind me in all matters concerning this application.

_____

_____

Signature of applicant(s)

11.0 REFERENCES

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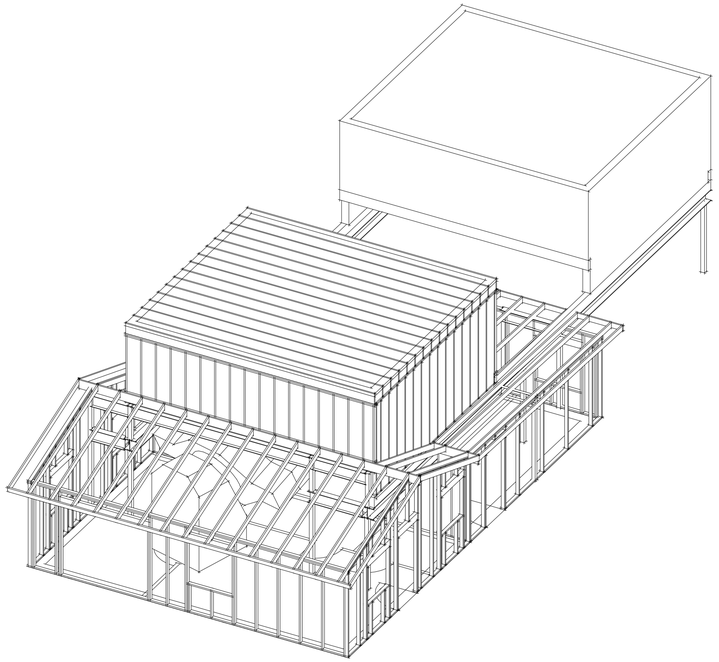
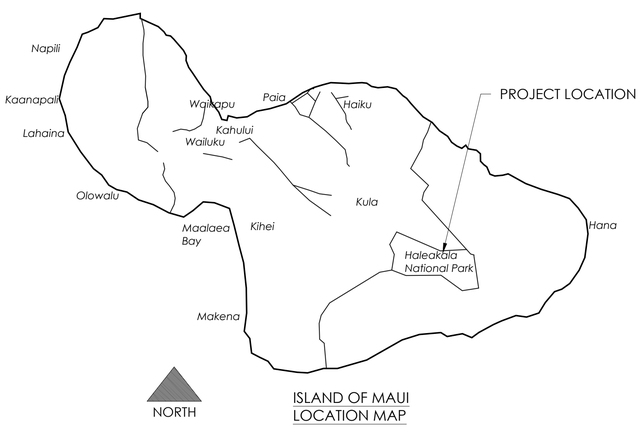
ATTACHMENT 1

PLANETS / CHICAGO BUILDING
STRUCTURAL DRAWINGS



CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI



ISLAND OF MAUI
LOCATION MAP

Volume Calculations:

EXIST Building Volume:	10,359 cu ft
New Dome Enclosure/Roof Off Roof Above Roof:	3,966 cu ft
Increase in Volume with Enclosure:	38%

Sheet Index:

Title	Title, Legend, Site Map, Sheet Index
S11	EXIST Building Foundation Plan
S12	EXIST Building Roof Plan
S13	EXIST Building Elevations
S21	Floor Demolition Plan
S22	Roof Demolition Plan
S31	New Construction Foundation Plan
S32	New Construction Roof Plan
S33	New Construction Elevations
S41	New Construction Sections
S51	Details/Sections

ABBREVIATIONS:

(NOT ALL ABBREVIATIONS SHOWN BELOW ARE USED IN THIS SET OF DRAWINGS)

A	&	And
	AB	Anchor Bolt/Rod
	AFF	Above Finished Floor
	ALT	Alternate
	ARCH	Architect
	ASTM	American Society For Testing Materials
	AV	Architect Verify
B	BLK/(G)	Block/(ing)
	BM	Beam
	BN	Boundary Nail
	BO	Bottom Of
	BOTT	Bottom
	BP	Base Plate
	BRNG	Bearing
C	CFCI	Contractor Furnished/ Contractor Installed
	CIP	Cast-In-Place
	CIVIL	Civil Engineer
	CJ	Control Joint
	CL	Center Line
	CLG	Ceiling
	CLR	Clear (ance)
	CMU	Concrete Masonry Unit
	CNTRD	Centered
	COL	Column
	CONC	Concrete
	CONN	Connection
	CONT	Continuous
D	d	Penny (Nail Size)
	DBL	Double
	DEMO	Demolish, Demolition
	DF	Douglas' Fir
	DIAG	Diagonal
	DIM	Dimension
	DO	Ditto
	DR	Door
	DWG/(S)	Drawing(S)
E	EA	Each
	EF	Each Face
	ELEC	Electrical
	ELEV	Elevation
	EMBED	Embedment
	EN	Edge Nail
	EOR	Engineer of Record
	EQ	Equal
	EQUIP	Equipment
	EW	Each Way
	EXIST/(E)	EXIST
	EXTER	Exterior
F	FND	Foundation
	FF	Finish Floor
	FFE	Finish Floor Elevation
	FG	Finished Grade
	FIN	Finish(Ed)
	FLR	Floor
	FN	Field Nail
	FOS	Face Of Stud
	FRMG	Framing
	FT	Foot, Feet
	FS	Full Sawn
	FSNR	Fastener
	FTG	Footing
	FV	Field Verify
G	GYP BD	Gypsum Board
	GALV	Galvanized
	GEOM	Geometry
	GLB	Glulam Beam
	GSN	General Structural Notes
H	HDR	Header
	HK	Hook
	HORIZ/(H)	Horizontal
	HS	Headed Stud
	HSS	Hollow Structural Section
	HT	Height
	HVAC	Heating/Ventilating/ Air Conditioning
I	IBC	International Building Code
	INFO	Information
	INTER	Interior
J	JT	Joint
L	L	Angle (Structural)
	LPS	Lap per Schedule
M	MAINT	Maintenance
	MAS	Masonry
	MAX	Maximum
	MB	Machine Bolts
	MECH	Mechanical
	MEP	Mechanical Electrical Plumbing
	MFR	Manufacturer
	MIN	Minimum
	MISC	Miscellaneous
	MTL	Metal
N	#	Number
	(N)	New
	NIC	Not In Contract
	NON	Nominal
	NTS	Not To Scale
O	OC	On Center
	OH	Overhang
	OPNG	Opening
P	PL	Plate
	PLYWD	Plywood
R	RE:	Reference/Refer To
	REINF	Reinforcement
	REQD	Required
S	S	Stucco
	(S)	Simpson Strong Tie
	SCHD	Schedule
	SECT	Section
	SHTG	Sheathing
	SIM	Similar
	SOG	Slab on Grade
	SP	Spacing/Spaces
	SPECS	Specifications
	STA	Station
	STD	Standard
	STL	Steel
	STRUC	Structural
	SYM	Symmetry (ical)
	SW	Shearwall
T	TB	Top And Bottom
	TBD	To Be Determined
	TO	Top Of
	TOBM	Top Of Beam
	TOC	Top Of Concrete
	TOFTG	Top Of Footing
	TOM	Top Of Masonry
	TOS	Top Of Steel
	TOW	Top Of Wall
	TYP	Typical
V	VAR	Varies
	VER	Verify
	VER(V)	Vertical
W	W/	With
	WF	Wide Flange
	WD	Wood
	WWF	Welded Wire Fabric

COUNTY OF MAUI
MAUI COUNTY CODE, CHAPTER 16.16A ENERGY CODE

To the best of my knowledge, this projects design substantially conforms to the Energy Code for:

X Building Component Systems
____ Electrical Component Systems
____ Mechanical Component Systems

Signature: _____ Date: 12-20-2016
Name: John K. Ritchey
Title: Structural Engineer
License No: PE - 13256

LEGEND

(NOT ALL SYMBOLS ARE USED IN THIS SET)

- # — NOTE
- COL — POST ID, SIZE PER SCHD
- FTG — FOOTING ID, SIZE PER SCHD
- X/SX.X — DETAIL NUMBER / SHEET NUMBER — DETAIL/PARTIAL SECTION
- X / SX.X — ELEV NUMBER / SHEET NUMBER — ELEVATION
- X / SX.X — SECTION NUMBER / SHEET NUMBER — BUILDING SECTION
- X — GRIDLINE
- 12 / 4 — ROOF SLOPE
- BREAKLINE
- CENTER LINE
- REFERENCE ELEV=0'-0" — DATUM ELEVATION
- SLOPE DIRECTION
- SLOPE DIRECTION / ORIGIN

MATERIAL SYMBOLS

(NOT ALL SYMBOLS ARE USED IN THIS SET OF DRAWINGS)

- POURED CONCRETE
- EARTH
- GRAVEL
- WOOD (ROUGH)
- PLYWOOD
- METAL (LARGE SCALE)
- MASONRY WALL
- CONCRETE WALL
- WOOD WALL

JR STRUCTURAL

JOHN RITCHEY, STRUCTURAL ENGINEER LLC.
EXP: 04-30-2016

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION (OBSERVATION AS DEFINED IN CHAPTER 16-115-2 OF THE HAWAII ADMINISTRATIVE RULES, DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS ENTITLED PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS).

TITLE

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

REV	BY	DATE	DESCRIPTION

PERMIT SET
Not for Construction

DESIGN BY: J.R. DATE: 03-20-15
DRAWN BY: J.R. JOB NO: M14009
CHECKED BY: J.R.

SHEET

TITLE

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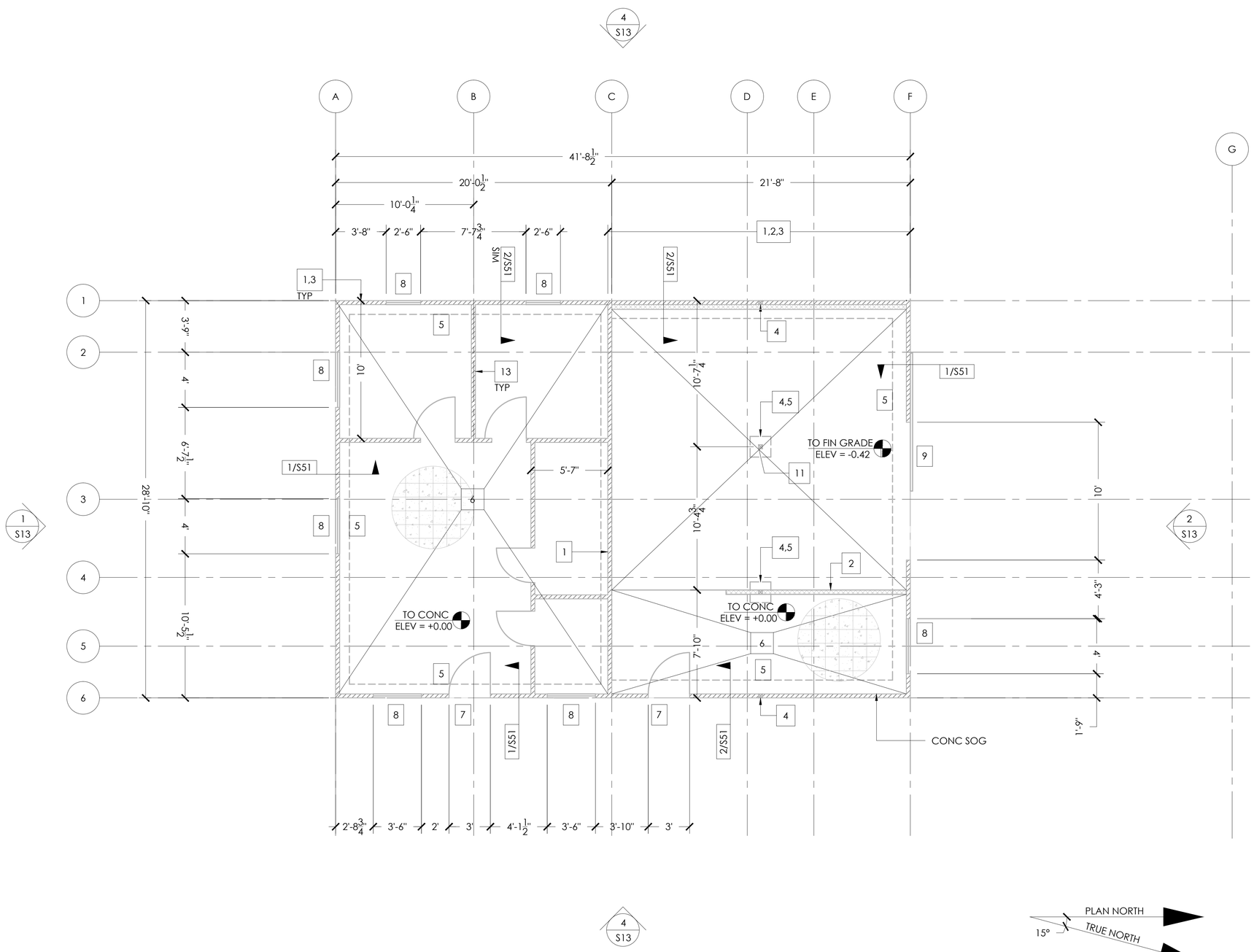

1 Existing Chicago Building Foundation Plan

1/4"=1'-0"

EXIST Foundation Plan Notes:

1. EXIST 2X4 @ 24" OC Stud Wall Framing, FV
2. EXIST 8x4x16 CMU Stem Wall, FV
3. EXIST Corrugated metal siding TYP
4. EXIST 4x4 Post
5. EXIST CONT CONC Wall FTG.
6. EXIST Concrete SOG
7. EXIST Man-Door
8. EXIST Window
9. EXIST Sliding Door
10. EXIST 2x4 @ 24" OC Stud Partition Wall Framing.
11. Finish Floor is Exposed to Grade
12. Dimensions shown were field measured by JRSE and should not be relied upon for construction purposes. Dimension shall be verified prior to the commencement of construction.

JR STRUCTURAL

JOHN RITCHEY, STRUCTURAL ENGINEER LLC.
EXP: 04-30-2016

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EXISTING BUILDING FOUNDATION PLAN

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

REV	BY	DATE	DESCRIPTION

PERMIT SET
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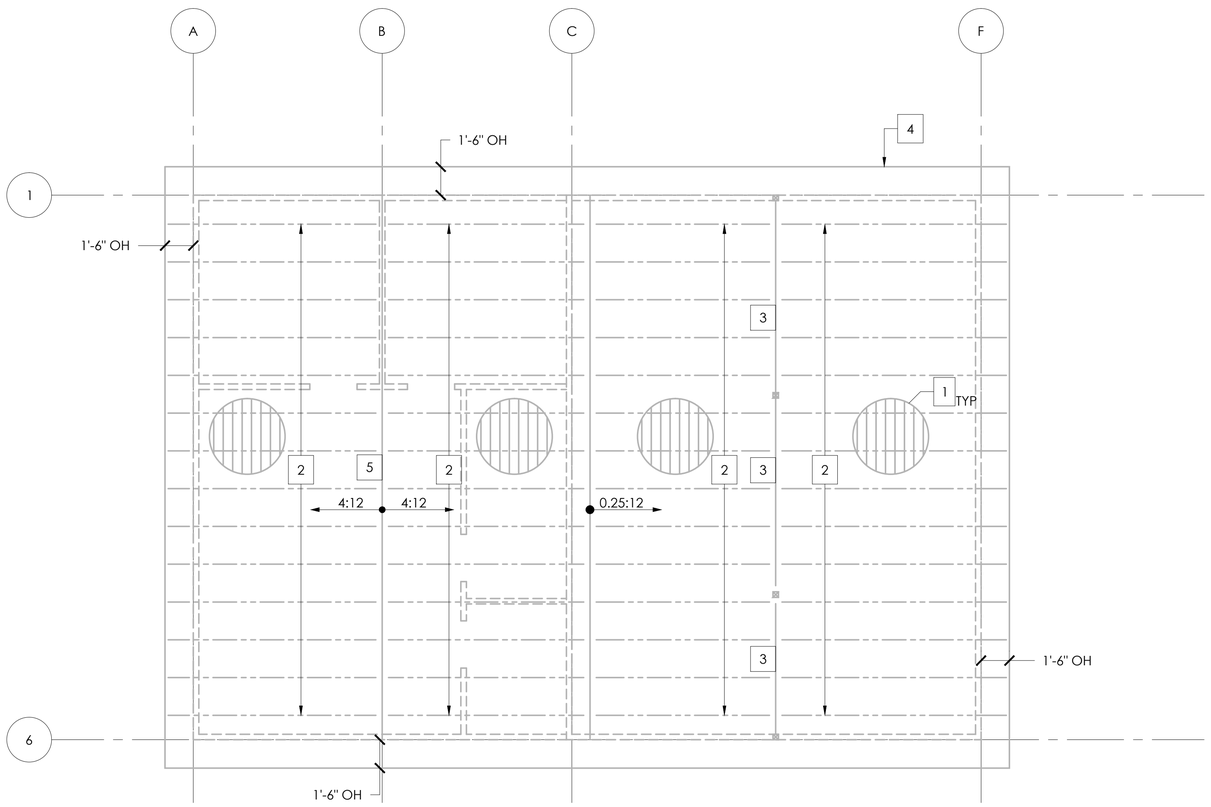

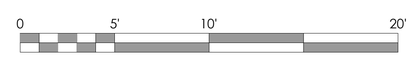

1 Existing Chicago Building Roof Plan

1/4"=1'-0"

EXIST Roof Plan Notes:

1. EXIST 1 1/2" Corrugated Metal Roof over 1x4 Flat
2. @ 24' OC . Typical.
3. 2x6 Rafters @ 24" OC
4. EXIST 4x10 BM
5. Edge of EXIST Roof
6. EXIST Ridge Beam. FV

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EXISTING BUILDING ROOF PLAN

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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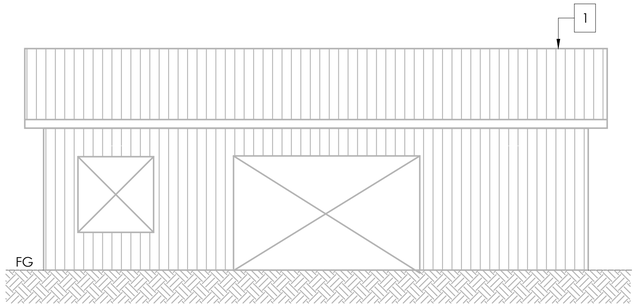
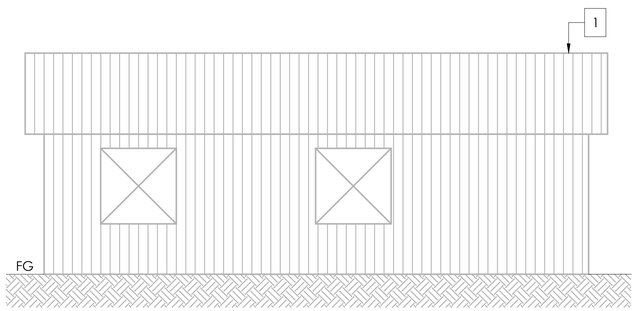


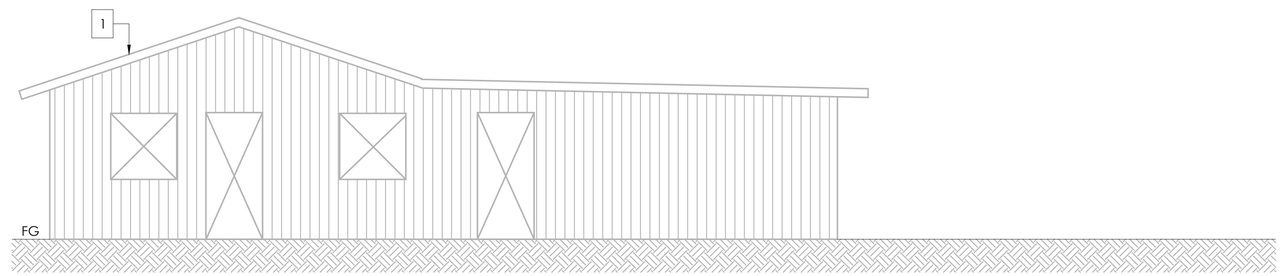
1 Existing Chicago Building North Elevation
1/4"=1'-0"

EXIST Elevation Notes:

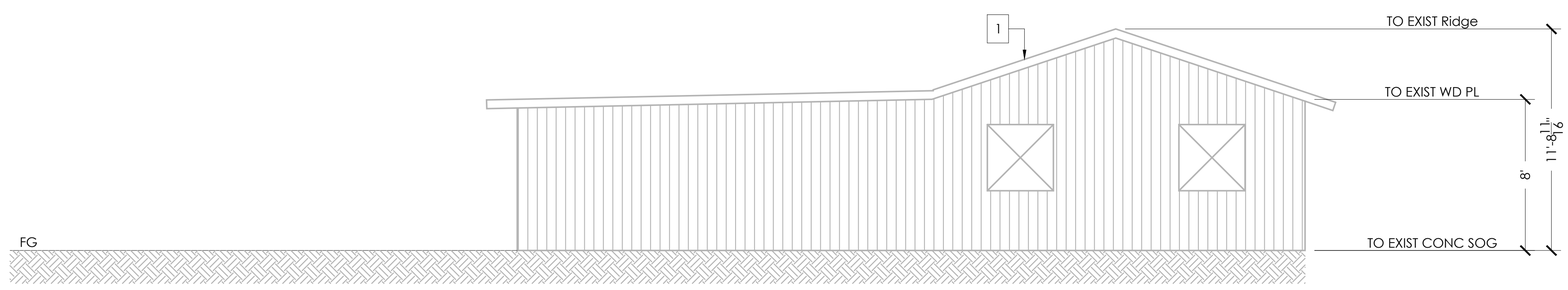
1. EXIST Chicago Building.



3 Existing Chicago Building South Elevation
1/4"=1'-0"



4 Existing Building East Elevation
1/4"=1'-0"



5 Existing West Elevation
1/4"=1'-0"

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EXISTING BUILDING ELEVATIONS

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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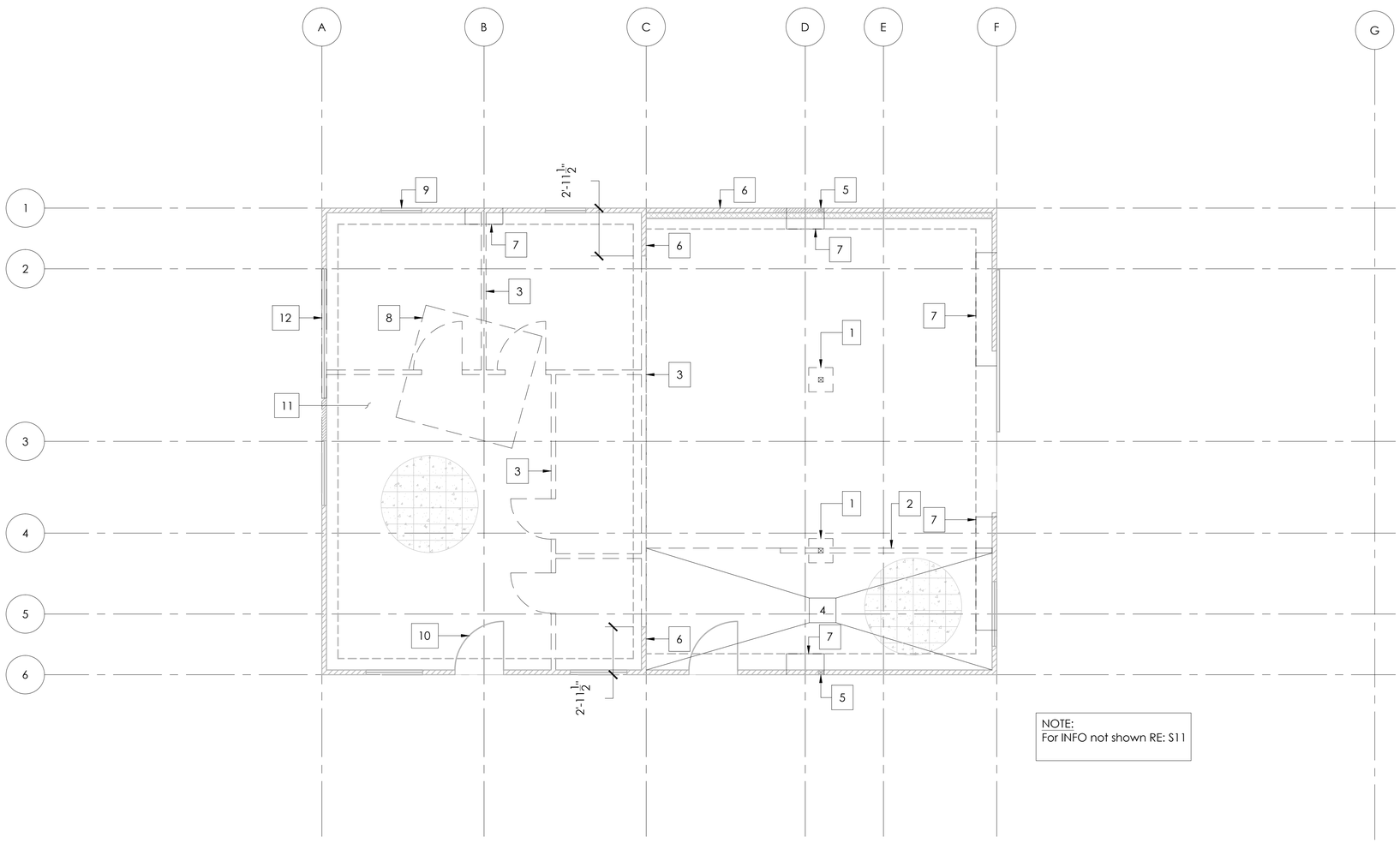

1 Floor Demolition Plan
1/4"=1'-0"

Demolition Notes:

1. Demo EXIST WD Post & FTG.
2. Demo EXIST CMU Wall.
3. Demo EXIST WD Partition Wall per Plan.
4. Demo EXIST COC SOG.
5. EXIST WD Post to Remain.
6. EXIST Stud Wall to Remain.
7. DEMO EXIST FTG at New FTG.
8. DEMO EXIST Floor Slab at New FTG.
9. EXIST Window to Remain. TYP
10. EXIST Door to Remain. TYP
11. EXIST CONC SOG to Remain.
12. DEMO EXIST Wall to Permit Installation of a new Door.

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FLOOR DEMOLITION PLAN

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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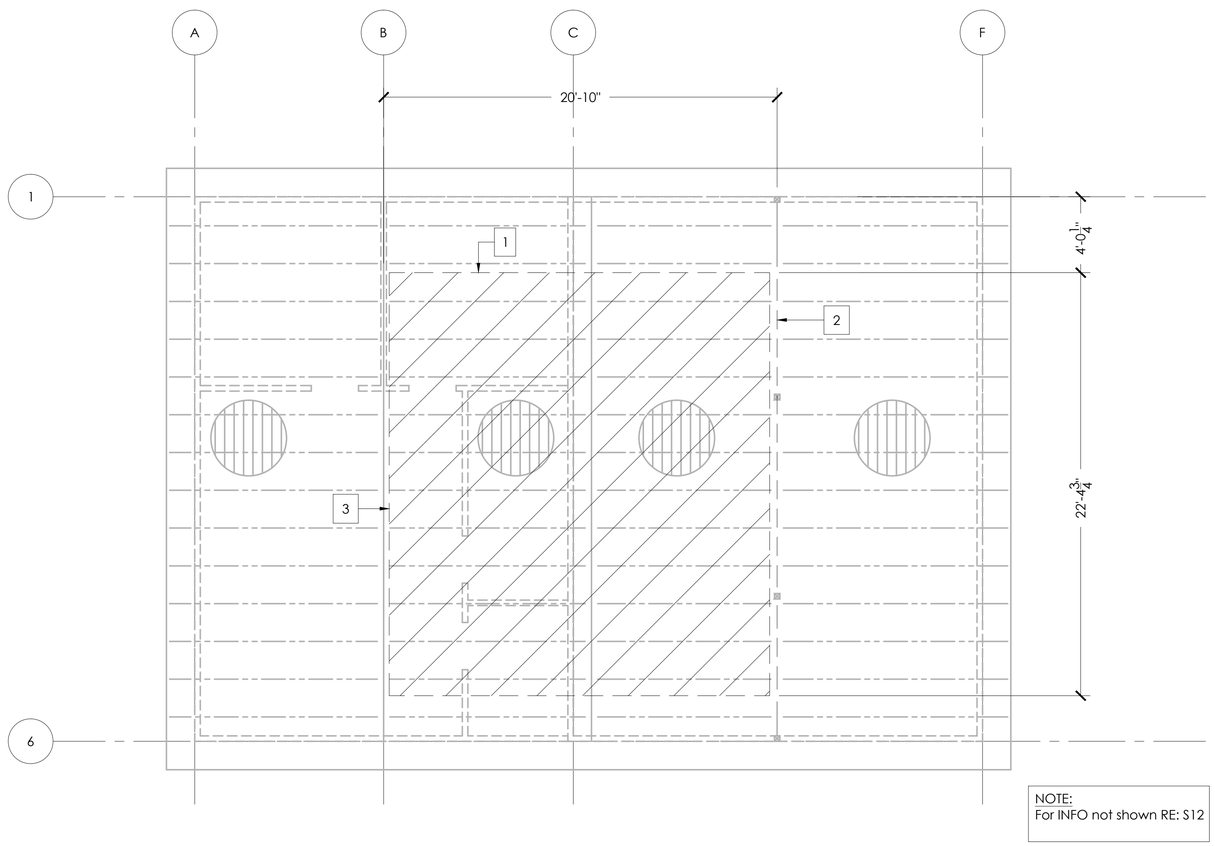

1 Roof Demolition Plan
1/4"=1'-0"

Roof Demolition Plan Notes:

1. Demo EXIST Metal Roof Purlins & Joists within Region Indicated per Plan.
2. Demo EXIST Roof Beam.
3. Perimeter of New Telescope Enclosure.

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ROOF DEMOLITION PLAN

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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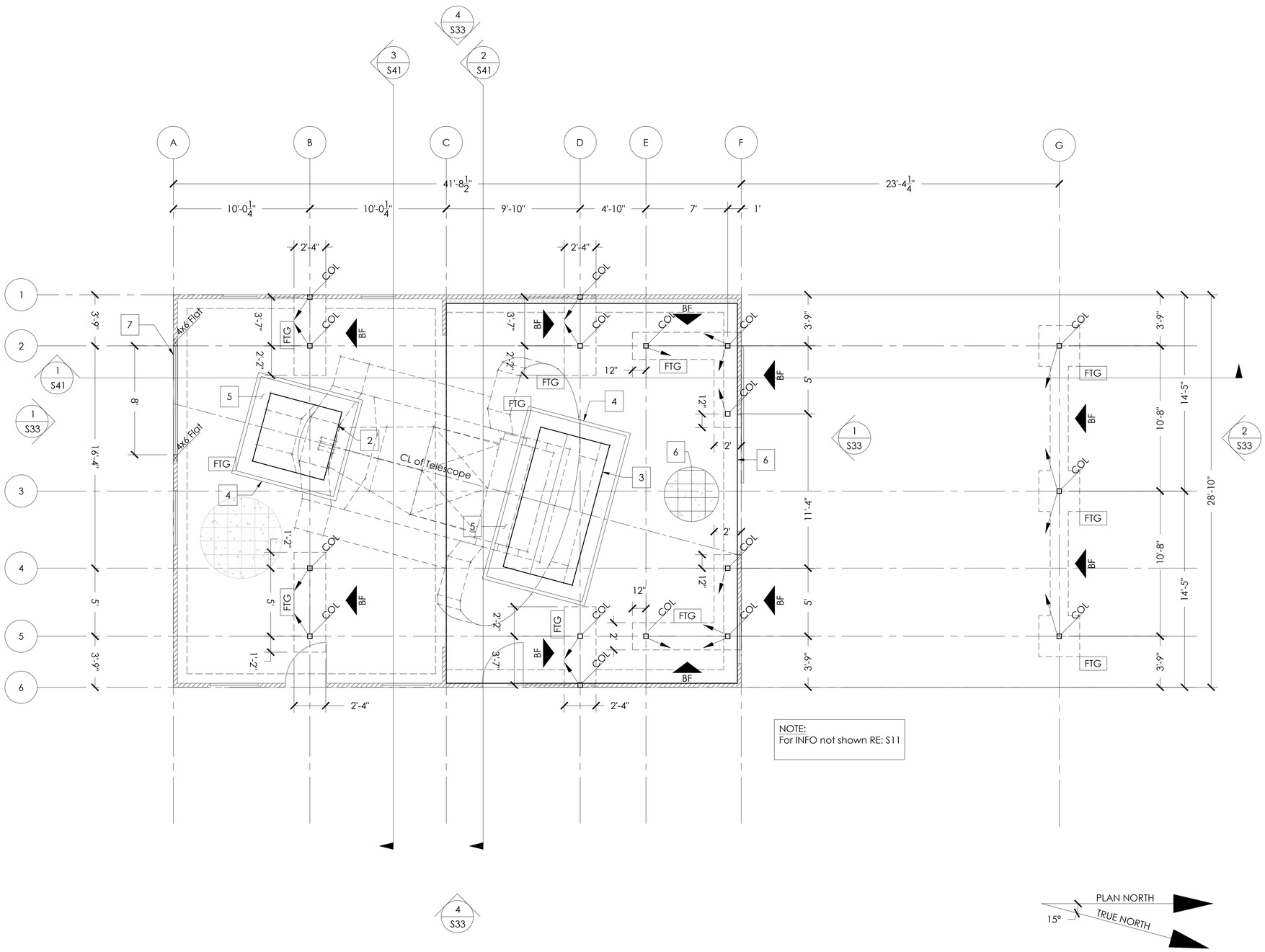

1 Foundation Plan - New Construction

1/4"=1'-0"

Foundation Plan Notes:

1. For INFO not Shown RE: EXIST Foundation Plan. RE: S11.
2. Coude Concrete Pier.
3. Telescope Pier.
4. Provide 3" Styrofoam separation between Pier Foundation & Adjoining Slab & Footings. Typical on all below grade Pier Vertical Surfaces.
5. 6" CONC SOG W/#4 @ 16" OC EW Centered in Slab over 3" Styrofoam. Highload 60 over 4" Aggregate Base Course.
6. 6" CONC SOG W/#4 @ 16" OC EW Centered in Slab over Vapor Barrier.
7. Roll-Up door. 8' Wide x Full Ht exterior surface. Contractor to select color to match EXIST BLDG Paint.

Column Schedule:

Mark	Size
COL	TBD

Footing Schedule:

Mark	Size	REINF
FTG	TBD	TBD

Legend:

BF — Mark

Chevron Braced Frame Elevation

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FOUNDATION PLAN
NEW CONSTRUCTION

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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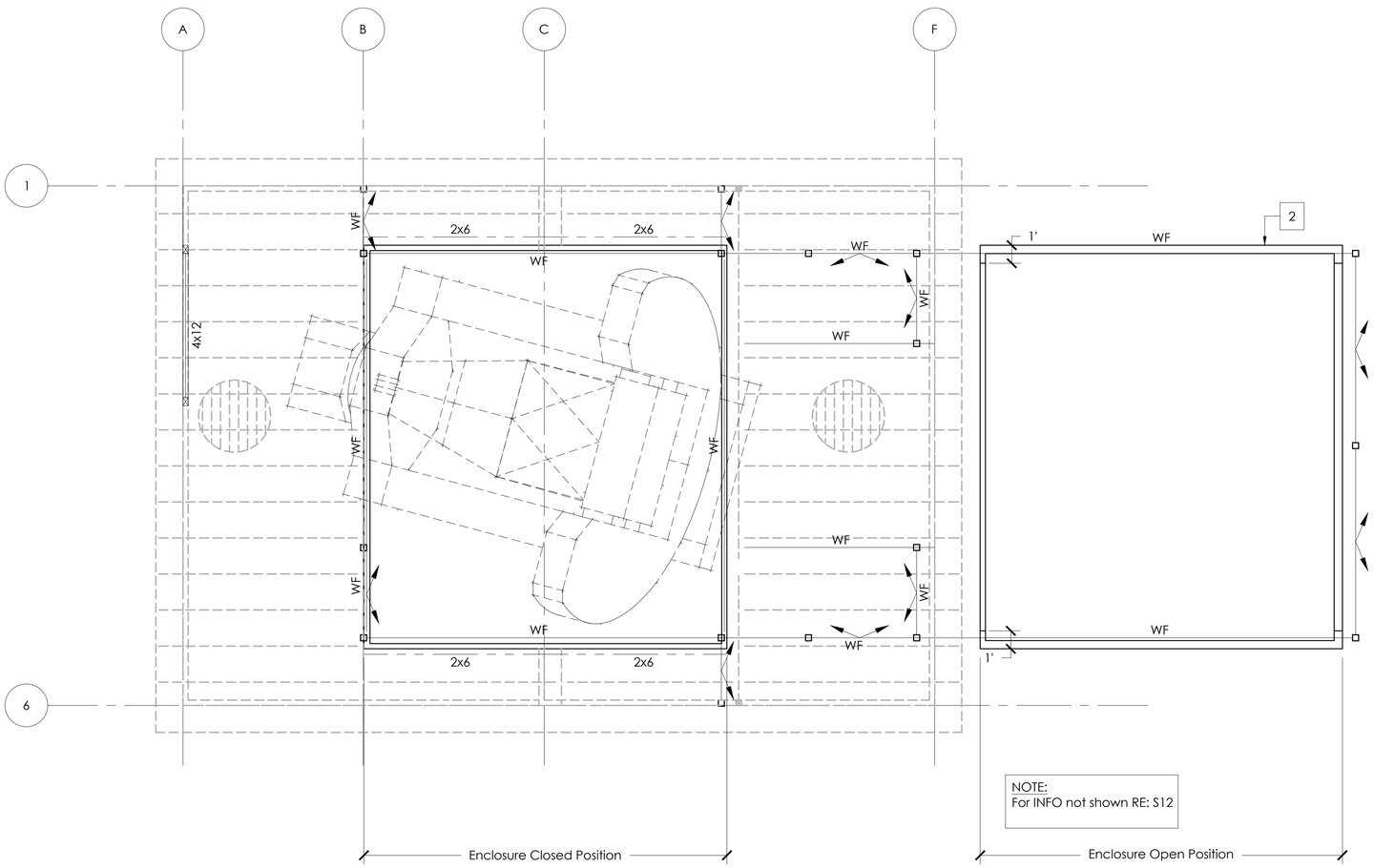


Roof Plan Notes:

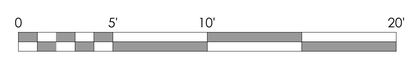
1. For INFO not Shown RE: S22
2. Roll-Off Telescope Enclosure.

Beam Schedule:

Mark	Size
WF	TBD

Legend:

Chevron Braced Frame RE: S31



1 Roof Plan - New Construction
1/4"=1'-0"

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ROOF PLAN
NEW CONSTRUCTION

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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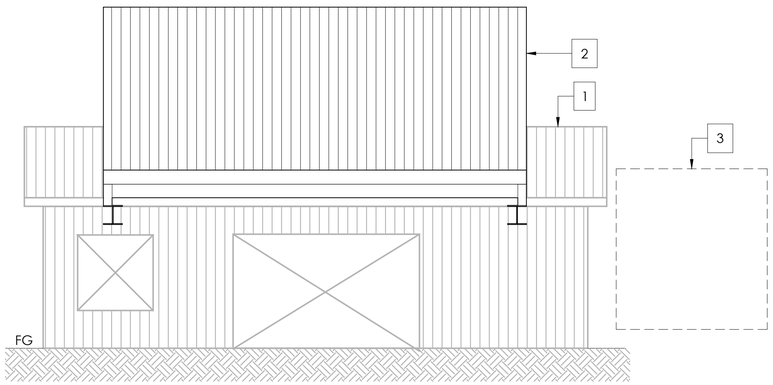
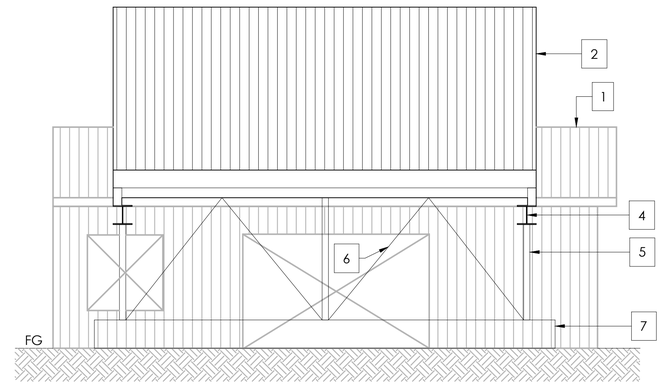


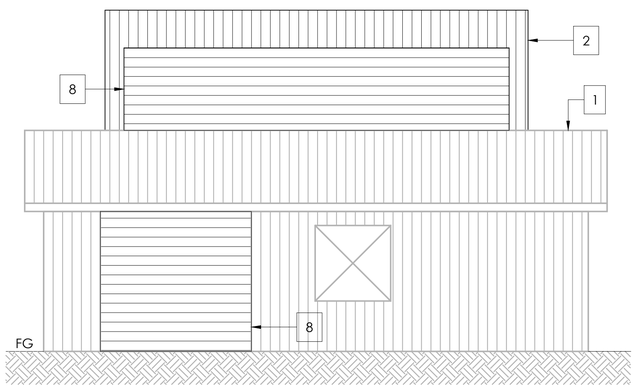
1 North Elevation (Closed Position)
1/4"=1'-0"



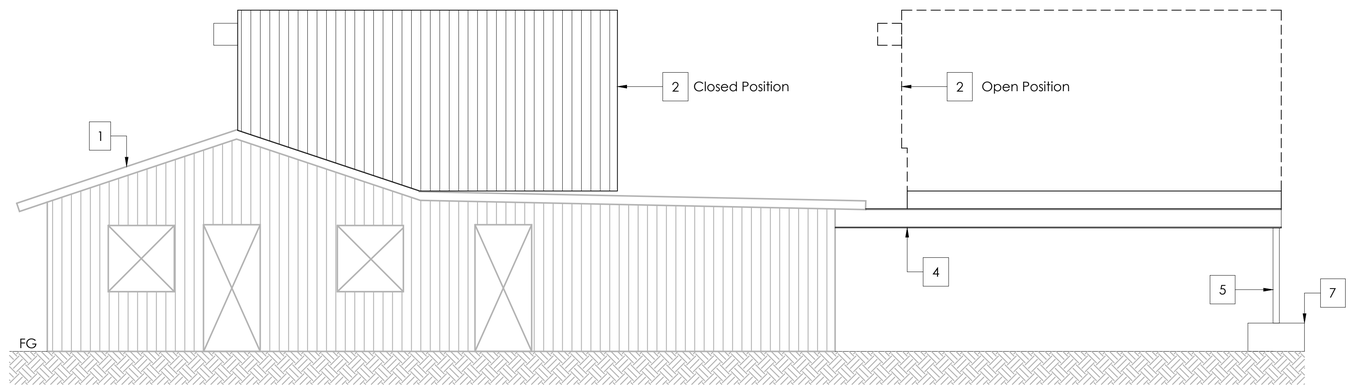
2 North Elevation (Open Position)
1/4"=1'-0"

Elevation Notes:

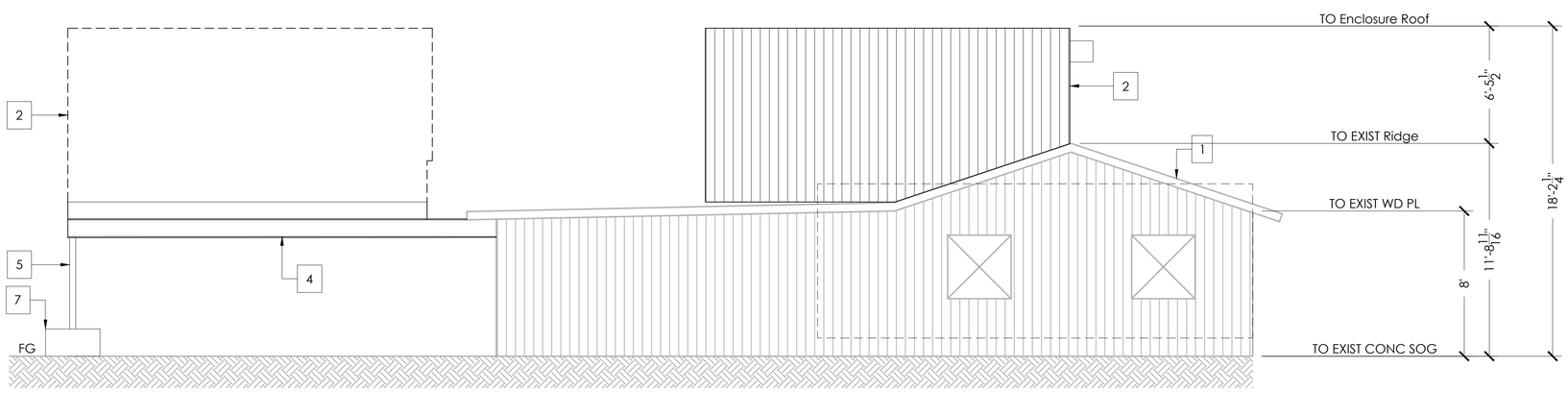
1. EXIST Chicago Building.
2. New Roll-Off Telescope Enclosure.
3. New Storage Container.
4. New WF Steel Beam.
5. New Steel Column.
6. New Steel Frame.
7. Footing per Plan.
8. New Roll-Up Door.



3 South Elevation
1/4"=1'-0"



4 East Elevation
1/4"=1'-0"



5 West Elevation
1/4"=1'-0"

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NEW CONSTRUCTION ELEVATIONS

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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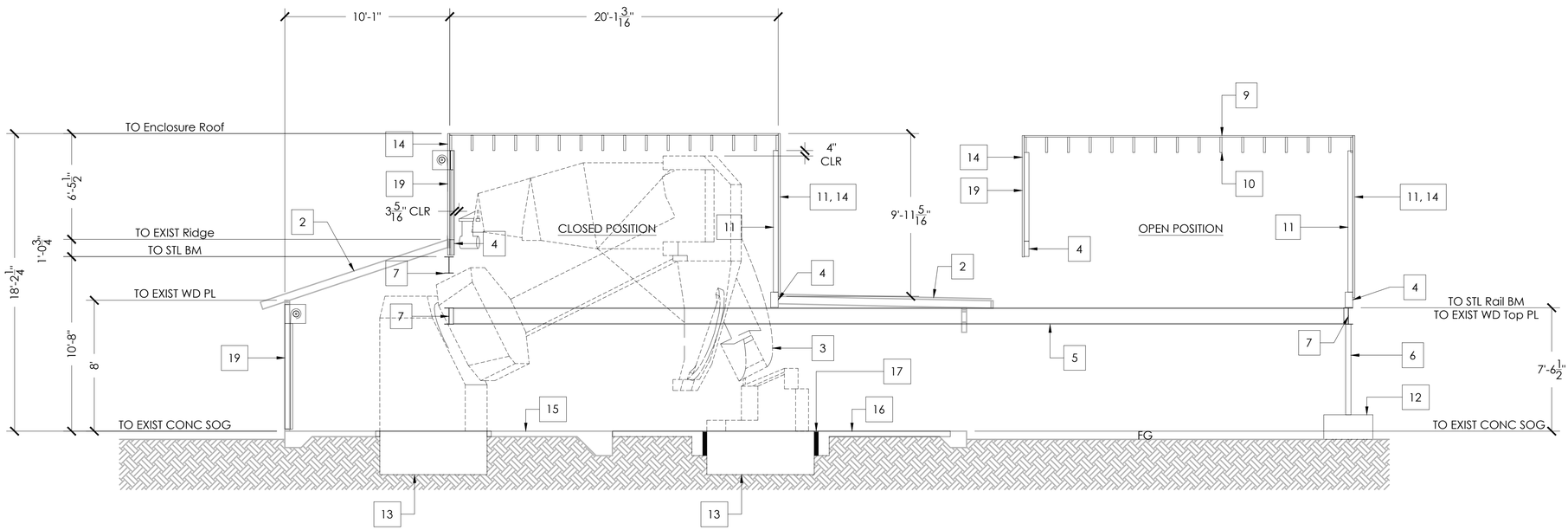
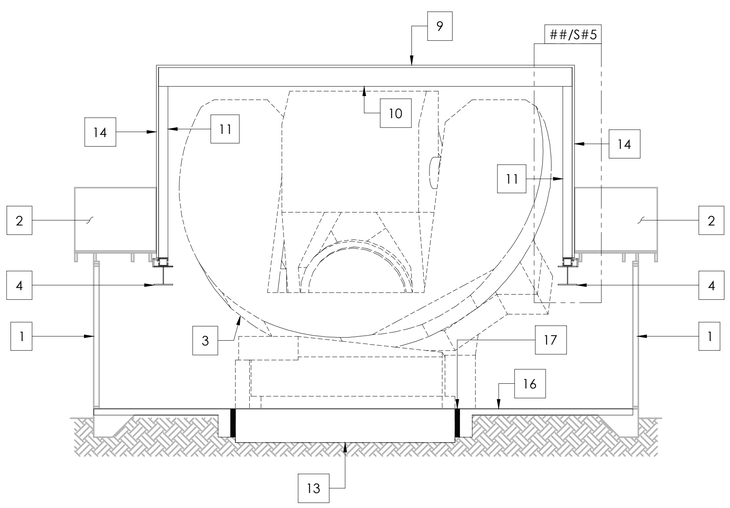


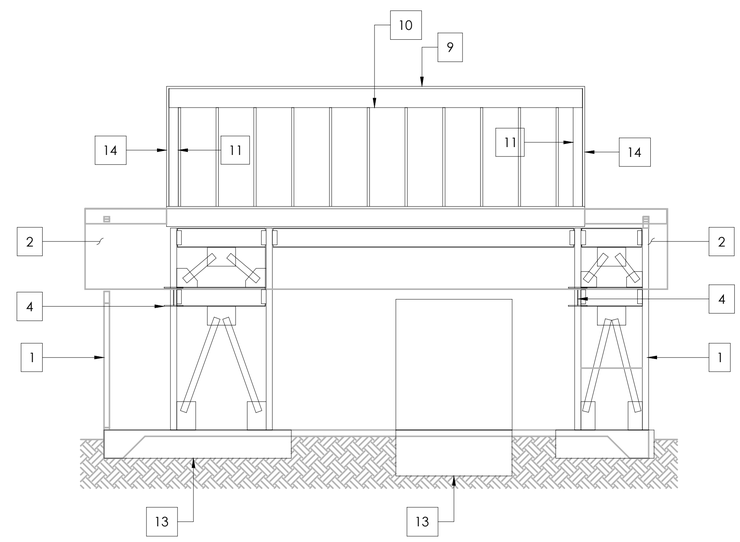
1 Longitudinal Section
1/4"=1'-0"

Section Notes:

1. EXIST Wall Framing
2. EXIST Roof Framing
3. New PLANETS Telescope (Close Position)
4. New WF Steel Enclosure Beam
5. New WF Steel Rail Beam
6. New Steel Column
7. New Steel Beam
8. EXIST Concrete Footing per Plan
9. New Metal Roof
10. New Enclosure Roof Framing
11. New Enclosure Wall Framing
12. New CONC Footing
13. New Telescope CONC Pedestal
14. New Metal Siding
15. EXIST CONC SOG
16. New CONC SOG
17. New Isolation Joint
18. New Steel Chevron Braced Frame
19. Roll-Up Door per Plan.



2 Transverse Section
1/4"=1'-0"



3 Transverse Section
1/4"=1'-0"

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SECTIONS

CHICAGO BUILDING IMPROVEMENTS
PLANETS Telescope
Haleakala, Maui, HI

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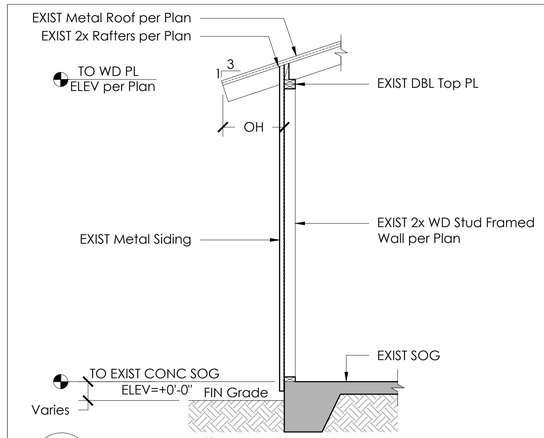
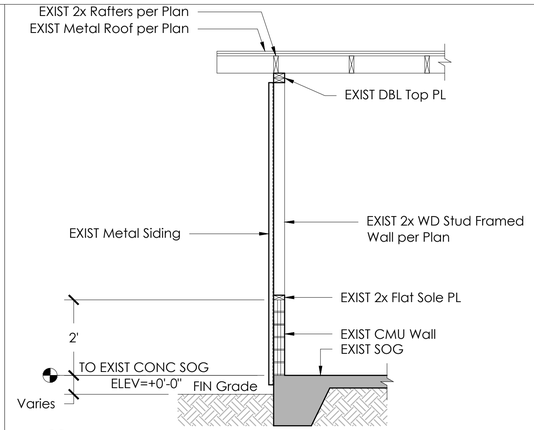
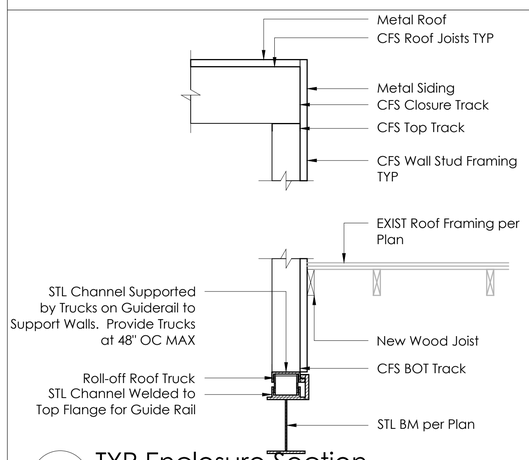


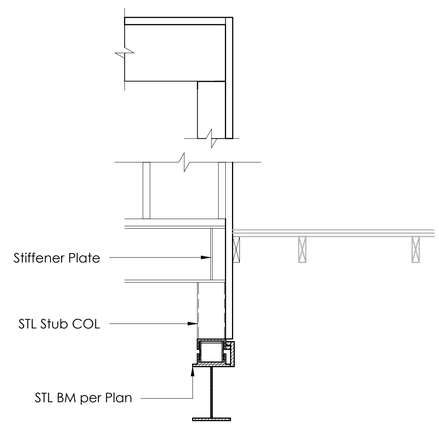
1 EXIST Wall Section
1/2"=1'-0"



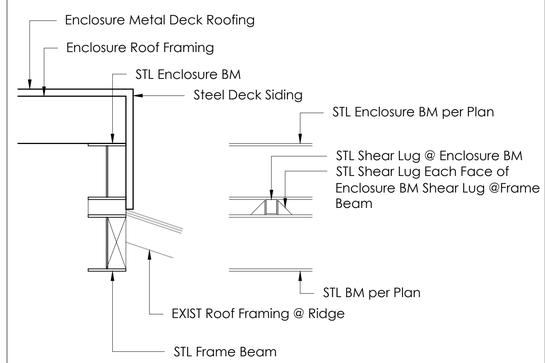
2 EXIST Wall Section
1/2"=1'-0"



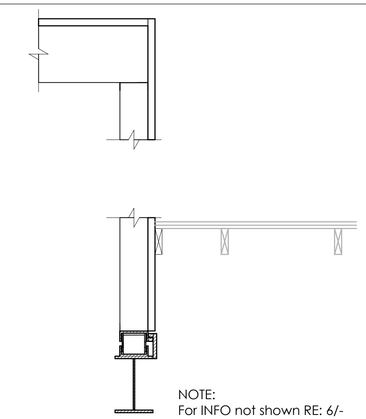
5 TYP Enclosure Section
3/4"=1'-0"



6 TYP Enclosure Section
3/4"=1'-0"



7 TYP Enclosure Section/Detail
3/4"=1'-0"



8 TYP Enclosure Section
3/4"=1'-0"

JR
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SECTIONS

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PLANETS Telescope
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