UNIVERSITY of HAWAI'I at HILO
CENTER FOR MAUNAKEA STEWARDSHIP

# MEMORANDUM

- Date proposal rec'd: 8/15/2024
- Type A / B / C
- CMS project #: 346
- ED review: 8/27/2024
- EC final review: 9/12/2024
- KKM final review: 9/5/2024
- MKMB final review: 10/1/2024
- MKSOA review: 11/14/2024

November 14, 2024

TO: John DeFries, Executive Director, MKSOA

FROM: Greg Chun, Executive Director, CMS

SUBJECT: Upgrading Halepōhaku Fuel Storage System

## I. Project Description

CMS plans to remove its three, single-wall, underground fuel storage tanks from the Utilities area of Halepōhaku (HP) in accordance with the 2028 Regulatory Deadline pursuant to Hawaii Administrative Rules 11-280.1.-21, "Upgrading UST Systems." The tanks were originally approved under CDUP HA 1430, "Subdivision and Construction of the Hale Pōhaku Mid-Level Facilities." CMS proposes to replace these removed tanks with two, double-wall, aboveground fuel storage and dispensing tanks (AST). The total volume of the new tanks will be approximately one-third of the total volume of the original tanks, or 6,000 gallons vs 18,000 gallons.

Following a period of conceptual scoping and discussion with CMS's advisory committees and briefings to the MKSOA Board, the project underwent final, in-depth consultation with Kahu Kū Mauna on September 5, 2024; by the Environment Committee on September 12, 2024; and by the Maunakea Management Board on October 1, 2024, where MKMB recommended approval of the project to proceed to BLNR review. No objections were stated by any committee.

## II. Department of Land and Natural Resources Rules

The project presumes the following land uses:

- (Removal of existing tanks) HAR §13-5-22, P-8, Structures and Land Uses, Existing, (D-1) *Major alteration of existing structures, facilities, uses, and equipment, or topographical features which are different from the original use or different from what was allowed under the original permit.*
- (Installation of new tanks) HAR §13-5-22, P-9, Structures, Accessory, (B-1) *Construction or placement of structures accessory to existing facilities or uses.*

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## III. Identified Impacts

Natural Resources
Hale Pōhaku is located at an elevation of roughly 9,200 feet. The local ecosystem is considered subalpine and is designated critical habitat for the endangered palila (*Loxioides bailleui*). The palila, which is known to occur intermittently at HP, is one of nine native bird species that occur or could occur in the area. Vegetation is dominated by non-native grasses, native māmane (*Sophora chrysophylla*) and scrub plants. There are no federally listed threatened or endangered plant species within the HP parcel itself, though numerous planted silversword, *Argyroxiphium sandwicense* subsp. *sandwicense*, exist within the silversword enclosure adjacent to the HP parcel in the Mauna Kea Forest Reserve. Groundwater is assumed to be at significant depth, likely more than 3,000 feet below ground surface. Water quality analyses have not detected any levels of bacterial or other pollutants in Maunakea water resources.

Historic Properties
The Utilities area is located within the midlevel facilities, between 9,100-9,400 feet elevation. The nearest historic property to the project site is State Inventory of Historic Properties No. 50-10-23-10314[1], a lithic scatter interpreted as an adze and octopus lure sinker manufacturing workshop approximately 150 feet uphill/north of the project area.

Recreational Resources
Visitors traverse the HP area while on their way to other destinations within and outside the UH-managed lands, and some daytime public access may be briefly limited due to movement of heavy machinery or construction supplies. However, overall impacts to public activities and access are expected to be negligible.

No permanent, adverse impacts are anticipated to any biological or hydrological resources, identified historic properties, nor to recreational resources. In addition, CMS has determined the project will not extend or enlarge the UH's sublease of HP and will not change the permitted use of the facility; however, the proposed removal of the existing tanks may be considered to differ from the new construction activity allowed under the original permit, HA 1430.

## IV. Maunakea General Lease, Sublease, and Comprehensive Management Plan Compliance

The proposed use complies with UH's General Lease S-5529 for the HP parcel, the 2022 Master Plan, and the 2022 Comprehensive Management Plan (CMP) Supplement. Further, CMS' review of this proposal complies with the following CMP Actions, including, but not limited to, the following:

- NR-1: Limit threats to natural resources through management of permitted activities and uses. Habitat alteration and disturbance will be minimized via

[1] PCSI, 2010, Final Report Archaeological Inventory Survey Mauna Kea Access Road Management Corridor, Ka'ohe Ahupua'a, Hāmākua District, Island of Hawai'i, State of Hawai'i, TMK (3)4-4-015:01 (por.)

implementation of Construction Guidelines detailed in the CMP's six Permitting and Enforcement Actions, including:

- ●P-1: Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.
- ●P-2: Strengthen CMP implementation by recommending that compliance with the CMP be a condition of permits and agreements.
- ●P-4: Educate management staff and users of the mountain about applicable rules, CMP management actions, and permit requirements.

- AR-2: Prevent light pollution, radio frequency interference (RF) and dust.
  - Contractors and staff will be informed not to use cell phones, two-way radios, or other electromagnetic frequency emitting devices, and to keep within posted speed limits. All work will be done during daylight hours so as not to affect nighttime operations of other observatories.
- P-1: Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH management Areas.
- P-4: Educate management staff and users of the mountain about all applicable rules and permit requirements
  - All project workers will be required to attend cultural and environmental training prior to onsite arrival.
- IM-5: Develop and implement a Debris Removal, Monitoring and Prevention Plan.
  - Crating material shall be removed daily. All incidental rubbish and debris shall be kept in a windproof rubbish bin or inside the VIS behind closed doors. All perishable materials such as food and food wrappers shall be removed daily.
- C-9: Inspection of construction materials
  - Shipping containers and crates will be inspected by a DLNR-approved biologist or by Department of Agriculture personnel prior to arriving at Maunakea. Identified mitigation measures will be complied with.
- EO-2: Require orientation of users

## V. Center for Maunakea Stewardship (CMS) Recommendation

CMS recommends these conditions should this request receive OCCL Site Plan Approval:

- Best Management Practices will be employed.
- The work area will be clearly delineated to warn the public of any hazards.
- All project participants must attend a Maunakea Orientation prior to work.
- Allow Maunakea Rangers to visit and monitor activities.
- Ensure that loose tools or equipment are not left unattended and are properly stored at the end of each day.
- In preparation for high wind conditions protocols must include measures to ensure debris and equipment are not blown from the job site.
- All improvements shall be designed and installed to withstand the severe weather conditions on the mountain.
- Removal and proper disposal of all waste material. All perishable items including food, food wrappers and containers, etc. shall be removed from the site at the end of each day and properly disposed.

- Use of lighting from sunset to sunrise is prohibited unless otherwise stated in the project proposal and approved.
- Employ invasive species prevention best practices, including inspections of materials by a DLNR-approved biologist, as identified in the *Maunakea Invasive Species Management Plan* prior to entering UH managed lands. Inspections shall not occur on UH managed lands on Maunakea, at State or County parks, along public roadsides, or on Department of Hawaiian Home Lands.
- Motorized equipment, when stationary, must have a drain-pan in place suitable for catching fuel or fluid leaks.
- Nēnē (*Branta sandvicensis*) may be present. If a nēnē appears within 100 feet (30.5 meters) of ongoing work, all activity shall be temporarily suspended until the animal leaves the area of its own accord. Feeding of nēnē is prohibited.
- The project approval/permit may not be transferred or assigned without prior authorization. A copy of the approval/permit must be present on-site and available for review at all times while working on University-managed lands.
- No use of mechanized equipment is allowed unless authorized by this permit.
- Identify and comply with other permit requirements, such as County of Hawaii building permits or Department of Land & Natural Resources (see both any applicable DLNR permit and HAR §13-5-42 Standard conditions).
- Notify CMS in writing when field activity associated with the project is completed.
- The project must be completed within the time frame specified in the proposal and (when applicable) as provided for in DLNR approval.

If you have any questions, please do not hesitate to contact me via email, gchun711@hawaii.edu, or by calling 808-933-0734.

Sincerely,

Greg Chun
Executive Director, CMS

# Facility Project Proposal for the UH-Managed Lands

## Please mark all that apply to your project

_X_ Project was reviewed in a 5- or 3-Year Plan
_X_ Project is a CMP, lease, or sublease compliance measure (e.g., keeps the site in safe working order)
_X_ Project involves heavy machinery
_X_ Project requires ground disturbance such as digging or trenching
_X_ Project will result in a change to the facility footprint

## Facility Name

Center for Maunakea Stewardship (CMS).

## Brief Descriptive Title of Project

Halepōhaku Fuel Storage System Upgrades.

### Project Description

CMS requests to remove its three, single-wall, underground fuel storage tanks (UST) at Halepōhaku and to replace these with two, double-wall, aboveground fuel storage and dispensing tanks (AST). The USTs, all fiberglass, have the following volumes and content: (a) 12,000-gallon diesel tank, (b) 4,000-gallon gasoline tank, and (c) 2,000-gallon gasoline tank. Removal of the tanks is required to meet the 2028 Regulatory Deadline pursuant to Hawai'i Administrative Rules 11-280.1.-21 "Upgrading UST Systems ." The proposed ASTs each have a 3,000-gallon capacity and are constructed of steel. One AST will be dedicated to diesel and one to gasoline.

CMS will also prepare a site restoration plan to revegetate, on at least a one-to-one basis, native plants such as māmane that may need to be pruned or removed as part of project activity. Such work complies with the 2022 Master Plan and 2022 Comprehensive Management Plan (CMP) Supplement Natural Resources (NR) actions including:

- Master Plan directive that "UH continue its habitat restoration efforts within Halepōhaku ... to contribute to the State's pledge to conserve, restore, or grow 100 million trees" (CMS 2022 Master Plan: 3-5).
- CMP NR-9: Produce and outplant native species;
- CMP NR-10: Have mitigation measures for new development, ensuring that any habitat that will be permanently removed be replaced on at least a one-to-one basis. *Note: The USTs removal is not considered a "new development," but a decommissioning and removal of existing infrastructure. In addition, while the installation of the ASTs may be considered a new development, it does not require removal of any plants;*
- CMP NR-12: Conduct habitat rehabilitation or restoration.

The removal and installation work will involve the following general steps:

- Empty fuel from tanks prior to tank removal;
- Remove aboveground fuel dispensers;
- Trench or demolish limited areas of existing pavement at Utilities and subsequent re-paving of these areas;
- Drain, cap, and remove all associated underground fuel pipes and pumps;
- Remove associated electrical wiring and conduit;
- Backfill excavated locations;
- Soil sampling as part of due diligence efforts to analyze for any hydrocarbon;
- Contamination remediation, if needed. CMS notes that no evidence of fuel leaks has been documented in the Veeder Root inspections or any other facility records;
- Prepare fuel storage and dispensing site with installation of tertiary concrete containment berm;
- Install fuel storage and dispensing tanks with power lines;
- Outplanting of native seedlings.

CMS has been advised to prepare an Environmental Assessment covering the primary project components of tank removal and installation. Additional and separate permitting will be pursued for the primary project components as follows: (1) Board of Land and Natural Resources Conservation District Use Permit for tanks removal and (2) Office of Conservation and Coastal Lands Site Plan Approval for the installation of the twin fuel storage and dispensing tanks. CMS is responsible for obtaining any other applicable permits or approvals (e.g., County grading/grubbing/building permit for demolition).

## Identified Land Use (see HAR § 13-5-22 through 13-5-25)

Removal of existing tanks: HAR §13-5-22, P-8, Structures and Land Uses, Existing, (D-1) Major alteration of existing structures, facilities, uses, and equipment, or topographical features which are different from the original use or different from what was allowed under the original permit.

Installation of new tanks: HAR §13-5-22, P-9, Structures, Accessory, (B-1) Construction or placement of structures accessory to existing facilities or uses.

## Identify the existing CDUP this proposal alters or affects, if any

CDUP HA-1430, issued April 1982.

## Identify University of Hawai'i exemption per HAR § 11-200-8(a), if any

N/A

## Tax Map Key(s)

3-4-4-015:012 – Halepohaku Mid-Level Facilities (por.)

## Proposed Commencement Date

January 2025, pending necessary approvals

## Proposed Completion Date

July 2026

## Estimated Project Cost

$1,200,000

## Total size / area of proposed use

UST Tank Removal Approximate Area
Estimated 240 linear feet of trenching over existing asphalt concrete (AC) (480 $ft^2$)
Estimated 225 linear feet of trenching over soil (450 $ft^2$)
Trenching width estimated at 2 ft
Estimated 350 $ft^2$ (35' x 11') for the diesel tank removal
Estimated 600 $ft^2$ (20' x 30') for the two gasoline tanks
Estimated 65 $ft^2$ (13' x 5') for the dispensing pumps concrete pad
Estimated total square footage (at various depths and locations) 1,945 $ft^2$

New Storage and Dispensing Fuel Tanks Approximate Area
The two new AST will be placed on top of a single concrete slab with approximate dimensions of 14' x 23' (322 $ft^2$). The slab will contain the two tanks with built-in and integrated dispensing pumps and hoses.

## Project Purpose and Need

CMS proposes this infrastructure improvement in continued fulfillment of Operating and Site Development Agreements between the University of Hawaii/Maunakea Support Services and individual observatories, which require UH to provide services or utilities including fuel to observatory facilities. In addition, onsite diesel and gasoline are needed in order for CMS staff to fulfill a variety of duties including Ranger patrol for public safety and resource protection, as well as road maintenance work and snow removal performed by the Utilities division. Further, the three existing underground storage tanks (UST), installed pursuant to OCCL Site Plan Approval HA 1430 in 1982, must be removed by July 2028 in accordance with State of Hawaii Department of Health requirements for single-wall UST. The USTs and the associated underground delivery system, aboveground dispensers, and electrical components will be completely removed. New fuel storage and dispensing units are proposed to continue provision of fuel.

## Has professional peer-review occurred

The project has been developed and reviewed by the engineering consultant, Engineering Partners, CMS staff, and the Maunakea observatory directorate. In addition, initial conceptual review of this project by community advisory boards and the Mauna Kea Stewardship and Oversight Authority occurred as follows:

- Maunakea Environment Committee - informational update June 13, 2024;
- Kahu Kū Mauna Council - informational updates March 7, 2024 and July 11, 2024;
- Maunakea Management Board - informational updates March 5, 2024, April 2, 2024 and July 2, 2024;
- Mauna Kea Stewardship and Oversight Authority – informational updates April 11, 2024, May 9, 2024, and July 11, 2024.

### Are there any related ongoing, pending, or planned projects associated with this submission?

No.

## Existing Conditions at Project Site(s)

### Geology, Climate, & Hazards

The Halepōhaku (HP) parcel is on the southern flank of Maunakea, between an elevation range of roughly 9,100 to 9,400 feet. The ground surface consists of volcanic ash, cinder, rock, and deep, well- to excessively-drained soils formed in volcanic ash and 'a'a lava. The parcel slope ranges between 0.5 to 15 percent and moderate soil erosion is observed to occur. Mean annual rainfall is about 25 inches and the climate is considered subalpine. HP is in USGS lava flow hazard map Zone 7, an area not anticipated to be impacted by lava flows in the near future. However, USGS also rates Hawaii Island as Seismic Zone 4 and HP may experience major earthquake damage. No flood hazards are identified for the HP area.

### Flora, Fauna, Ecology, Water Resources

The ecosystem encompassing HP is considered subalpine, with vegetation consisting of a mixture of abundant non-native grasses, native māmane *(Sophora chrysophylla*) and xeriphitic scrub. Of native plant species, the most abundant are māmane and native grasses. There are no federally listed threatened or endangered plant species within the HP parcel itself, although planted *Argyroxiphium sandwicense* subsp. sandwicense, ʻāhinahina, are found within the silversword enclosure in the Mauna Kea Forest adjacent to the HP parcel. No impact to any of the silverswords, silversword habitat, or visitors to the enclosure is anticipated.

Regular invasive and native species monitoring of the project areas is conducted by CMS pursuant to the 2022 Comprehensive Management Plan Supplement and the Maunakea Invasive Species Management Plan (see Invasive Species Management Plan (hawaii.edu)) Standard Operating Procedures “Cleaning of Vehicles and Personal Belongings v 1.3” (SOP 1) and “Inspection of Vehicles, Construction Materials, Scientific Equipment, and Supplies v 1.4” (SOP 2).

HP is located within the Onomea aquifer system. There are no water sources at the surface. Any precipitation received at this elevation is seen only during the occasional rain storm and snow melt, and either quickly percolates down through the ground-surface or becomes run-off. Groundwater levels are assumed to be at significant depth, likely more than 3,000 ft below ground surface. Water-quality analyses have not detected any levels of bacterial or other pollutants in Maunakea water resources. All water used onsite is delivered by truck.

### Historical and Cultural Resources

The proposed activity will occur within an already-developed area experiencing routine maintenance. No historical or cultural resources are identified within the project site. The nearest historic property is State Inventory of Historic Properties No. 50-10-23-10314[1], a lithic scatter interpreted as an adze and octopus lure sinker manufacturing workshop at least 100 feet uphill

[1] PCSI, 2010, Final Report Archaeological Inventory Survey Mauna Kea Access Road Management Corridor, Ka’ohe Ahupua‘a, Hāmākua District, Island of Hawai‘i, State of Hawai‘i, TMK (3)4-4-015:01 (por.)

and to the north of Utilities. The area is off-limits to the general public and no cultural practices occur in the area. The proposed activity is therefore not anticipated to cause any impacts to any cultural practices.

### Recreation

The project site is accessible only to authorized personnel and is off-limits to the general public, cultural practitioners, and commercial tour groups. As no recreation occurs in the project site, no impacts to public activities and access are expected. However, some recreational access in the general area may be briefly limited due to movement of heavy machinery or construction items entering and exiting the project site.

Project activities will be limited to daytime only and impacts are anticipated to be negligible or minimal to public activities. There may be some impact to observatory staff on nighttime schedules due to noise from heavy machinery, but this will be temporary and limited. Meanwhile, employee use of respective facilities is currently low or flexible, and staff will experience minimal, if any impacts.

### Built Infrastructure

Existing structures at Utilities include the Utilities' main office and shop building; generator building; underground fuel, electrical and telecommunication lines; vehicle accessways and parking areas; water and fuel tanks; fuel dispensing pumps; light posts; and outdoor chemical storage locker. Because the activity primarily involves underground infrastructure, there will be little or no surface changes visible after project completion. Casual observers are also not likely to notice the absence of the fuel dispensing pumps, which are located near the much-larger, aboveground water tanks.

### Landscaping & Visual Conditions

The landscape around Utilities is a cinder/rock/soil mix supporting subalpine mā mane and grass scrubland. Other than the active construction period, the project will have no long-term effect on the surrounding landscape nor on the visual conditions of the area.

## Description of the Project

### Location

Utilities is located at an elevation of roughly 9,400 feet, at the base of Maunakea's upper southern slope .

### Description of the process of completing the project

- Soil sampling to analyze for any hydrocarbon contamination and remediation, if needed. CMS will conduct soil sampling as part of its due diligence in removing the tanks. CMS notes that no evidence of fuel leaks has been documented in the Veeder Root inspections or any other facility records;

- Archaeological monitor will be present and monitor all work involving ground-disturbance, as specified in the 2022 CMP Supplement, section 10.4.6, C-6: Require an Archaeological Monitoring Plan;
- Independent construction monitor will be present to monitor all work as specified in the 2022 CMP Supplement, section 10.4.1, C-1: Require an Independent Construction Monitor;
- Invasive species monitor to assess deliveries requiring inspection and conduct site monitoring;
- Cultural monitor;
- Emptying fuel from tanks prior to their removal;
- Actual removal of tanks;
- Removal of fuel dispensers;
- Trenching or demolishing limited areas of existing pavement at Utilities and subsequent re-paving of these areas;
- Draining, capping and removing all associated underground fuel pipes and pumps;
- Removing associated electrical wirings and conduit;
- Backfilling excavated locations and restoring visual site condition.
- Creation of concrete slab with containment berm for fuel storage and dispensing tanks.
- Installation of fuel storage and dispensing tanks within berm.

### Who will do the work?

CMS will be seeking a contractor to perform the demolition, removal and site clean-up/restoration work. A separate contractor may be needed for soil sampling and analysis.

### Equipment & Transportation

TBD by contractor.

## Measures to protect the environment and/or mitigate impacts

### Impacts

All necessary measures will be taken to protect the environment. A Spill Prevention and Response Plan will be implemented and spill response kits will be onsite. All contractors will be required to successfully complete the Maunakea Users Orientation before start of work. Parties agree to comply with SOP 1 and SOP 2 of the Maunakea Invasive Species Management Plan (CMS, 2015), including any required inspections. CMS will require crating materials to be removed daily, and that all incidental rubbish be kept secured until appropriate removal. All perishable materials such as food and food wrappers shall be removed daily. Littering of any kind will not be permitted.

### Protective Measures

All site workers will complete the CMS Maunakea Users training online prior to their arrival. Workers will be responsible for cleaning their gear and vehicles prior to ascending and to carpool when possible. Persons onsite during active work shall include, among others, an archaeological monitor, construction monitor, and contractor s. In addition, a site

restoration plan will be developed and implemented to revegetate the area, in furtherance of Master Plan and CMP goals.

## Compliance with Lease, Sublease, or Comprehensive Management Plan (CMP)

The proposed use addresses covenant #6. Compliance with laws of UH's General Lease S-5529 for the HP parcel, which states, "The Lessee shall comply with all of the requirements of all municipal, state, and federal authorities and observe all municipal, state and federal laws applicable to the premises, now in force or which may be in force." As previously noted, the existing USTs must be removed to comply with the regulatory deadline of HAR 11-280.1.-21 "Upgrading UST Systems." In addition, pursuant to S-5529 covenant #8, Improvements, UH "shall not at any time during the term construct, place, maintain and install on the premises any building, structure or improvement of any kind… except with the prior written approval of the Board and upon those conditions the Board may impose, unless otherwise provided in this lease…" The proposed use is also consistent with the 2022 CMP Supplement. Further, CMS' review of this proposal addresses numerous CMP Actions, including, but not limited to, the following:

- NR-1: Limit threats to natural resources through management of permitted activities and uses. Habitat alteration and disturbance will be minimized via implementation of Construction Guidelines detailed in the CMP's six Permitting and Enforcement Actions, including:
    - P-1: Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.
    - P-2: Strengthen CMP implementation by recommending that compliance with the CMP be a condition of permits and agreements.
    - P-4: Educate management staff and users of the mountain about applicable rules, CMP management actions, and permit requirements.
- IM-5: Develop and implement a Debris Removal, Monitoring and Prevention Plan. Crating material shall be removed daily. All incidental rubbish and debris shall be secured in a windproof rubbish bin or kept indoors. All perishable materials such as food and food wrappers shall be removed daily.
- C-9: Inspection of construction materials. Shipping containers and crates will be inspected by a DLNR-approved biologist or by Department of Agriculture personnel prior to arriving at Maunakea. Identified mitigation measures will be complied with.
- EO-2: Require orientation of users. All project workers will be required to successfully complete the Maunakea Resource Orientation prior to working onsite.
- AR-2: Prevent light pollution, radio frequency interference (RF) and dust. Contractors and staff will be informed to keep within posted speed limits and implement construction Best Management Practices to minimize dust.

## Identify other required or associated permits

Required permits include, but may not be limited to, a County of Hawaii Fire Department (HFD) application to retire UST. The project contractor shall obtain the HFD tank permit and identify and obtain any other required permits, such as Department of Health National Pollutant Discharge Elimination System (NPDES) permit and County building (demolition), grading, and/or grubbing permits.

### Five Year Outlook

This activity was originally included in CMS' 2022-2026 Five-Year Outlook.

## Community Benefits

### Benefits to other Maunakea entities and/or global astronomy community

CMS will continue fuel service to the Maunakea observatories as required in OSDAs and at significantly lower cost than offsite retail fuel locations. The onsite fuel also enables CMS and MKO personnel efficiency and to reduce their carbon footprint by performing their tasks with minimal disruption and not having to travel 30+ miles for the nearest retail gas/diesel.

### Benefits to the Hawaii Island community

The benefit of removing the UST to the Hawai`i Island community is CMS maintaining regulatory compliance with current DOH regulations and minimizing potential environmental risk from petrochemical contamination.

### Will data, publications, or other products be free and available to the public?

N/A

DLNR Evaluation Criteria

### After approval by the Maunakea Management Board, the Department of Land & Natural Resources or Board of Land & Natural Resources will evaluate the merits and approve the project based on the following eight criteria (§13-5-30). See http://dlnr.hawaii.gov/occl/files/2013/08/13-5-2013.pdf

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?

   The Board of Land and Natural Resources adopted the 2022 Maunakea Comprehensive Management Plan (CMP) Supplement as the approved management document for land use and activities in the UH Management Areas on Maunakea, aka "Maunakea lands." UH is committed to fulfilling the CMP, which provides management strategies designed to preserve and protect the resources within the Maunakea lands. This proposal addresses logistical needs, policy regulations, and reduces perceived impacts to natural and cultural resources through implementation of a reduced-volume, double-walled, aboveground fuel storage and delivery system. The proposed land use is projected to be completed within 18 months.

2. How is the proposed use consistent with the objectives of the Resource subzone of the land on which the land use will occur?

   The objective of the Resource subzone "…is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas." This proposed land use is requested as accessory to an approved use within the Conservation District Resource subzone. ; Pursuant to HAR §13-5-24, R-3 Astronomy Facilities, (D-1) "Astronomy facilities under a management plan approved simultaneously with the permit," HP is an identified,

approved use in the Resource subzone which this project is accessory to. The project eliminates the existing, single-walled fuel tanks at HP and will facilitate sustained management of Maunakea. No significant, permanent adverse impacts or significant, permanent adverse changes to the footprint, extent, or intensity of uses will occur as a result of this use.

3. Describe how the proposed land use complies with the provisions and guidelines contained in chapter 205A, HRS, entitled "Coastal Zone Management".
The site of the proposed use is over 20 miles from the coast and is not connected to shoreline resources. The project will have no effect on any of the coastal resources identified in 205A, including, but not limited to, recreational opportunities, historic resources, scenic and open space, ecosystems, economic uses, beach and coastal dune protection, and/or marine and coastal resources. The project is also not a coastal development. Consequently, the project complies with the objectives of HRS 205A.

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 USTs are located within the HP parcel, an area disturbed when HP was originally permitted. The area is currently used for vehicle movement, vehicle parking, and routine maintenance, including with heavy machinery. CMS will ensure the project will comply with the 2022 CMP Supplement; all applicable Standard Operating Procedures of the Maunakea Invasive Species Management Plan to ensure that the natural resources are not harmed or negatively impacted by this activity and no invasive species are introduced; conditions recommended by the Environment Committee, Kahu Kū Mauna Council, Maunakea Management Board, and Mauna Kea Stewardship and Oversight Authority; and approval mitigation measures provided by the forthcoming CDUP and EA.

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 use at HP is compatible with the locality and surrounding areas as the parcel has already been developed with infrastructure. The project is an accessory use to HP and is appropriate to the physical conditions and capabilities of the specific parcel. The tank upgrade will not affect any scientific, natural, cultural, or historic resources. No long-term changes to the physical conditions and capabilities of the parcel will occur. The activity is wholly within and consistent with the terms and conditions as identified in the 2022 CMP Supplement.

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.

   The removal of the USTs will be a positive activity for the existing environment. Once tanks are emptied and removed, and the new fuel storage tanks placed into use, the risk of a leak into the ground is significantly reduced.

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 use does not involve subdivision of land and intensity of uses in the Conservation District will not occur.

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

The proposed use will maintain amenities for UH and RCUH employees whose work responsibilities center on fulfilling the CMP, thereby improving public health, safety and welfare while visiting the Maunakea lands.

# UST Removal & New Storage & Dispensing Tanks Project @ Hale Pohaku

Rodrigo Romo
MKSS General Manager

# UST Removal
# Project to Comply with DOH Regulations.

Deadline July 15, 2028

PLAN ACCORDINGLY!

## 2028 REGULATORY DEADLINE

Pursuant to Hawaii Administrative Rules 11-280.1-21. Upgrading UST Systems.

*"UST systems..: Not later than July 15, 2028, tanks and piping installed before August 9, 2013 must be provided with secondary containment that meets the requirements of section 11-280.1-24."*

**292 TANKS FROM 112 FACILITIES ARE SINGLE WALL TANKS THAT WILL NEED TO BE UPGRADED**

## IMPORTANT CONSIDERATIONS!

1) Hire a contractor. There are limited companies that are able to complete this in Hawaii and you will be competing with the other 112 facilities that need to upgrade.
2) Schedule so that all work will be completed by July 15, 2028, including shipping of new tanks to Hawaii and getting your Modification Permit approved prior to work. Given the 10 year lead time, no extension will be granted.
3) Submit Modification Permit at least 60 days in advance of any work. You will not be able to proceed with the upgrade until the Modification Permit has been approved.
4) Anticipate possible site assessments and possible release response activities depending on the upgrade method selected and whether the fuel is present when old tanks are removed. This may include over excavation, confirmation sampling and active remediation.
5) **START EARLY!** Tanks not upgraded by the deadline will be required to permanently close pursuant to: HAR 11-280.1-40(c).

**Hawaii Department of Health, Solid & Hazardous Waste Branch, Underground Storage Tank Program (808) 586-4226 http://health.hawaii.gov/shwb/underground-storage-tanks/**

Section Supervisor: Roxanne Kwan, Environmental Health Specialists: Roy Ilaga, Richard Takaba and Thu Perry.

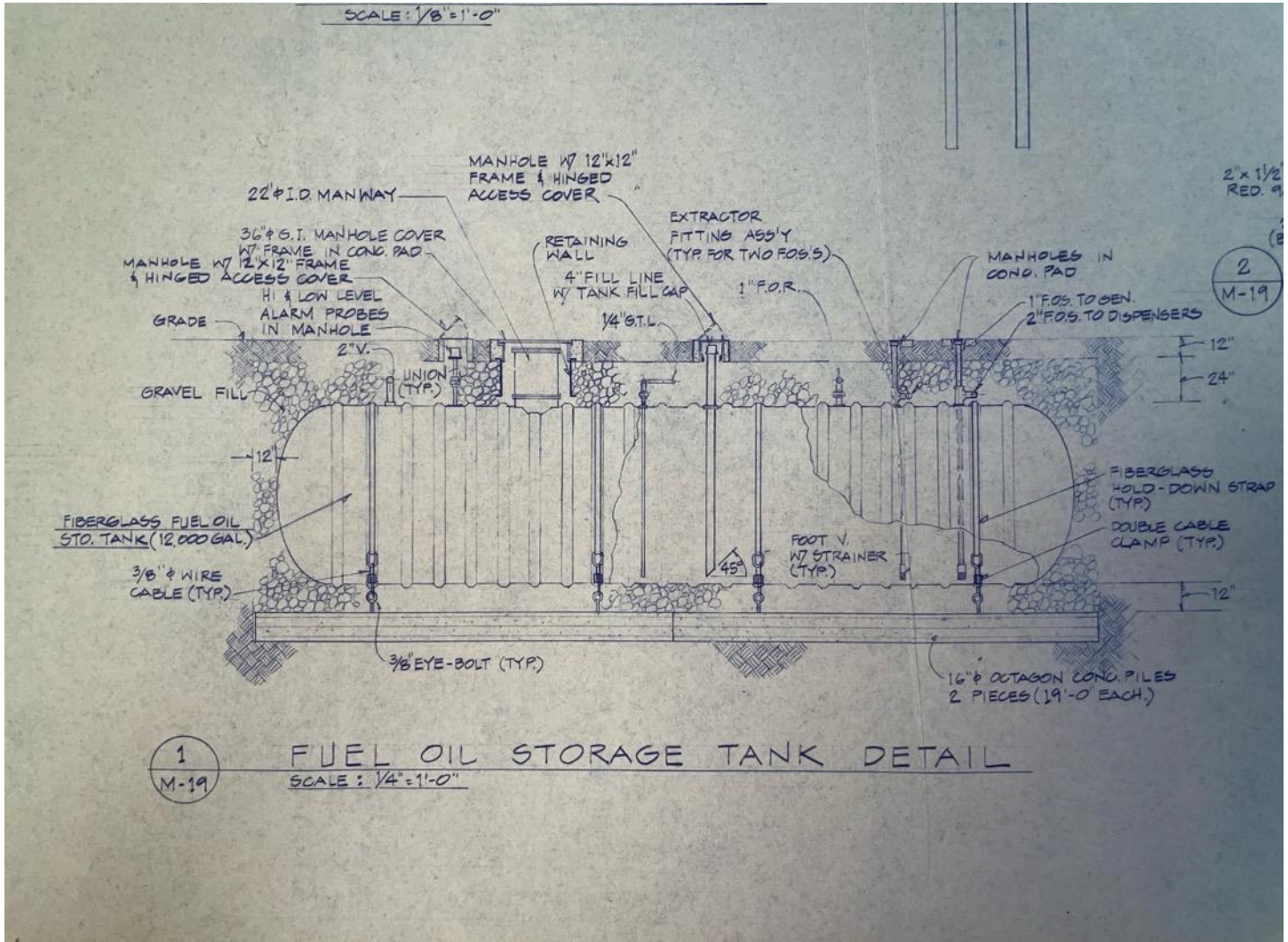

Gasoline USTs
Fuel Dispensing Pumps
Diesel UST

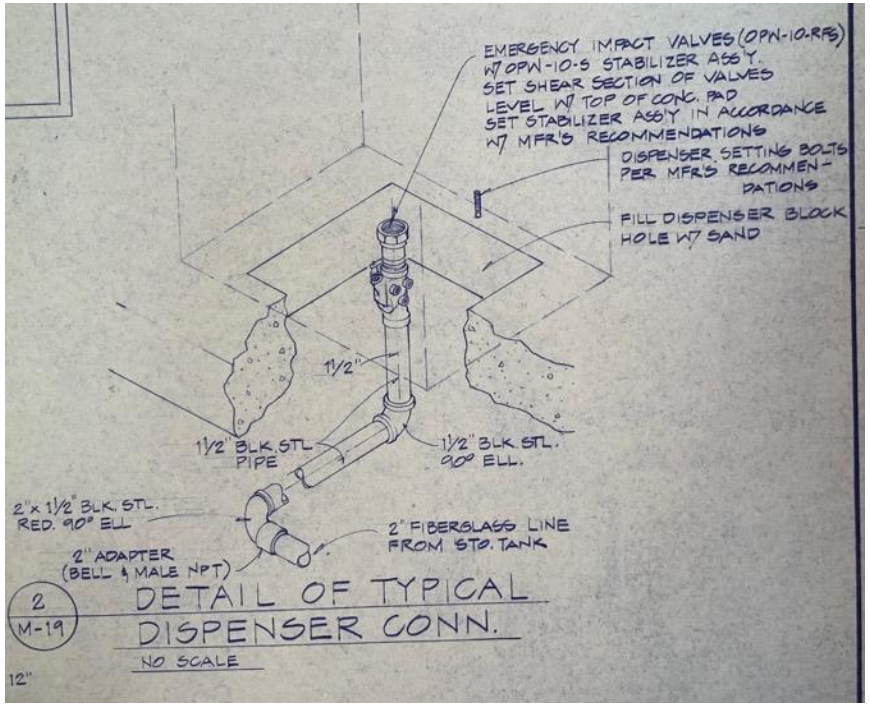
# Existing UST & Dispensing Station

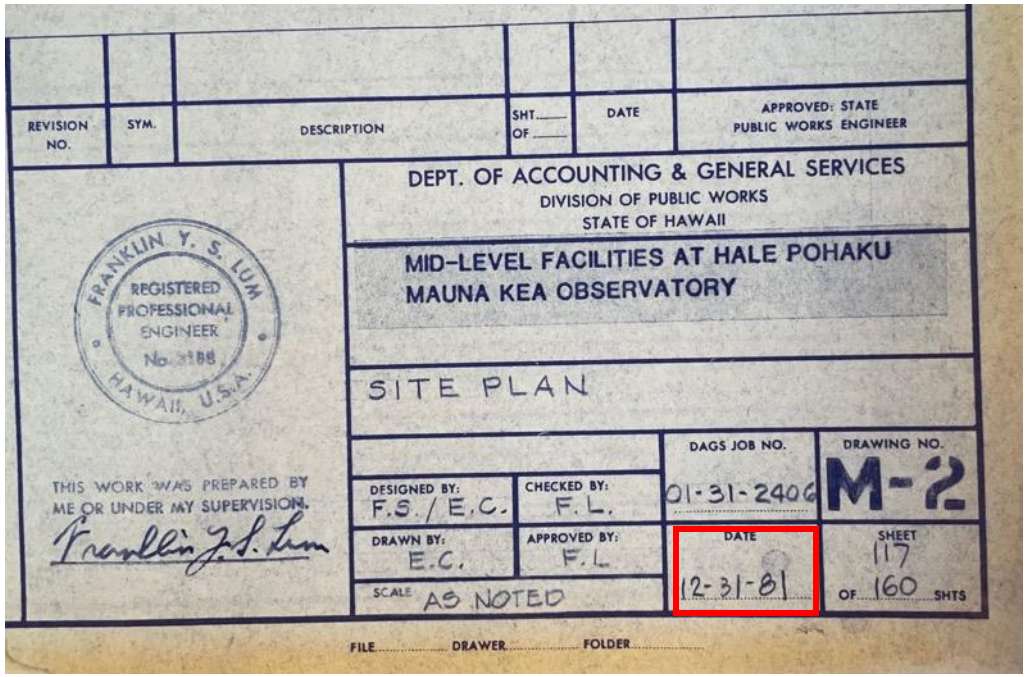


CURRENT INFRASTRUCTURE

- Installed under CDUP 1430 during construction of HP facilities 1982-1983
- Veeder-Root TLS-350 Leak Detection System installed in 1998 (annual testing & certification). No leaks since its installation .



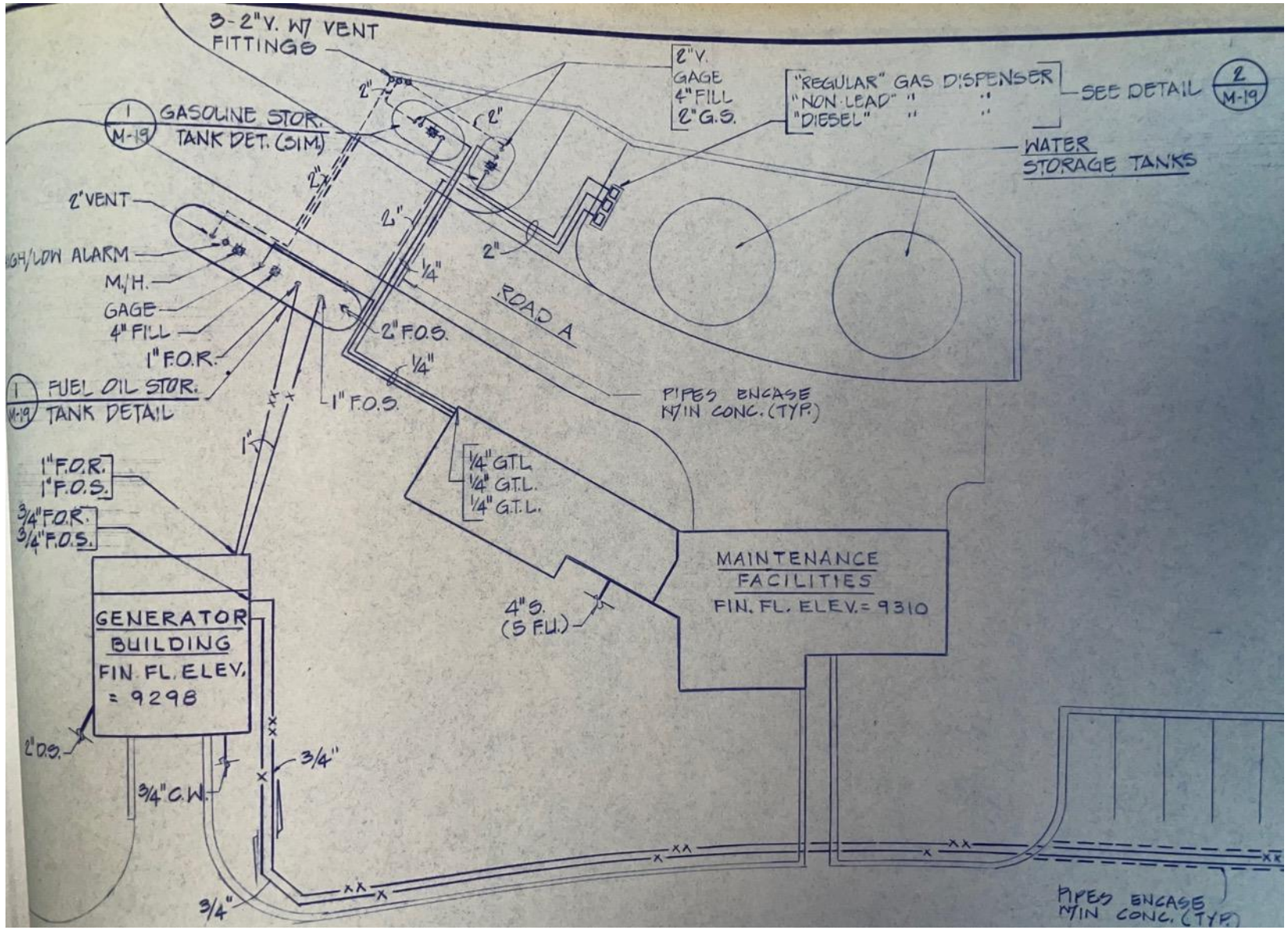



Current infrastructure consists of:

- 12,000 gal single wall, fiberglass diesel tank
- 4,000 gal single wall, fiberglass gasoline tank
- 2,000 gal single wall, fiberglass gasoline tank
- 3 dispensing pumps
- Underground fuel lines connecting tanks to pumps and diesel tank to boiler room in HP
- Electrical lines

Current Use
Diesel (250-500 gal/month)
Heavy Equipment (Road/Snow)
Back up boiler

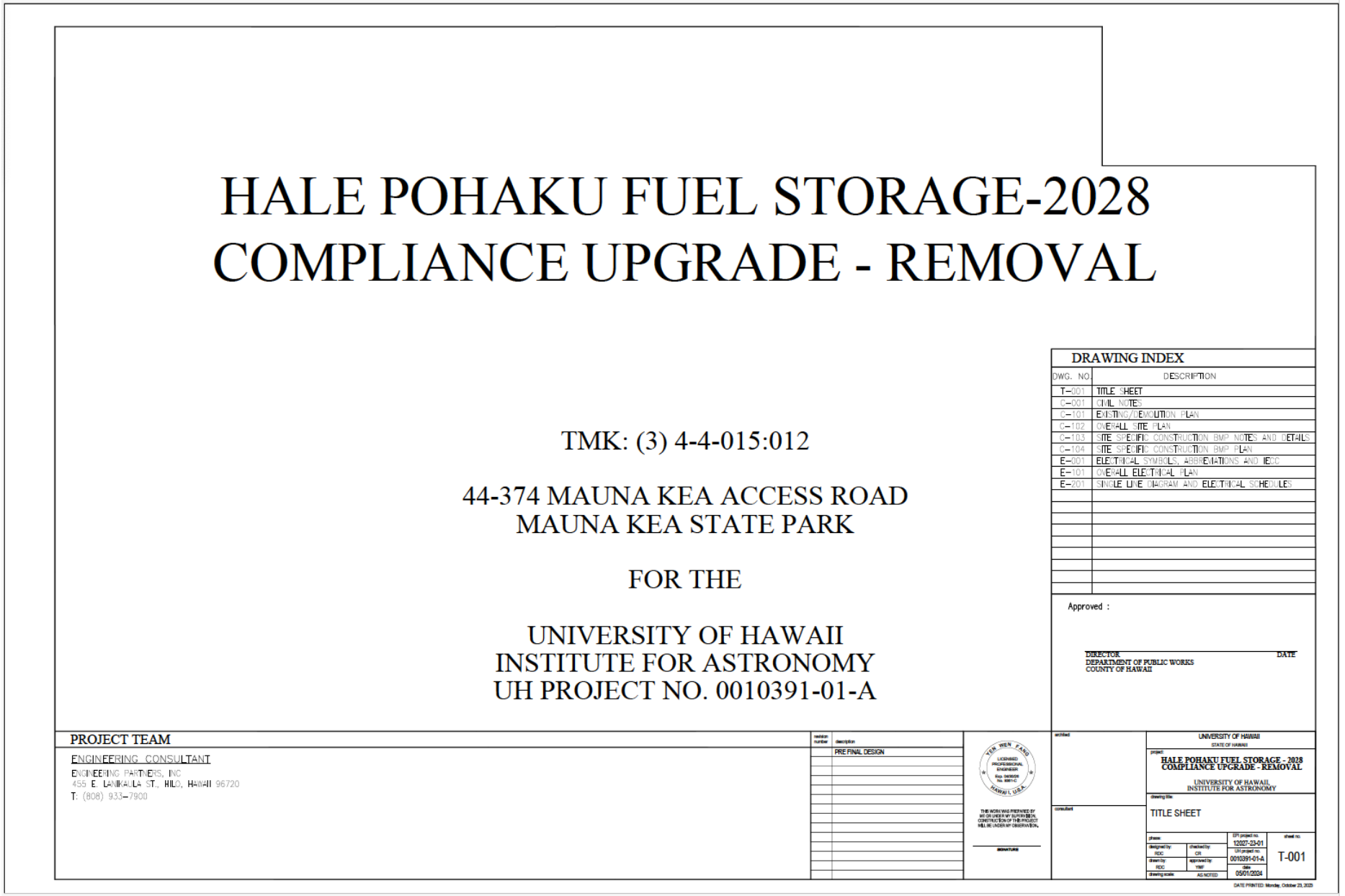
Gas (2,000 – 2,500 gal /month)
CMS Fleets, MKO Fleets, other CMS/MKSS vehicles



# UST Project Design and Cost Estimate by Engineering Partners

Scope of Work

- Remove all 3 tanks
- Soil test for leaks
- Remove all buried fuel lines
- Test soil for leaks
- Remove Dispensing Pumps
- Remove Electrical Lines
- Remove fuel transfer pumps.
- Provide remediation if needed.
- Estimated Cost $800k



HALE POHAKU FUEL STORAGE-2028
COMPLIANCE UPGRADE - REMOVAL

TMK: (3) 4-4-015:012

44-374 MAUNA KEA ACCESS ROAD
MAUNA KEA STATE PARK

FOR THE

UNIVERSITY OF HAWAII
INSTITUTE FOR ASTRONOMY
UH PROJECT NO. 0010391-01-A

DRAWING INDEX

| DWG. NO. | DESCRIPTION |
|---|---|
| T-001 | TITLE SHEET |
| C-001 | CIVIL NOTES |
| C-101 | EXISTING/DEMOLITION PLAN |
| C-102 | OVERALL SITE PLAN |
| C-103 | SITE SPECIFIC CONSTRUCTION BMP NOTES AND DETAILS |
| C-104 | SITE SPECIFIC CONSTRUCTION BMP PLAN |
| E-001 | ELECTRICAL SYMBOLS, ABBREVIATIONS AND IECC |
| E-101 | OVERALL ELECTRICAL PLAN |
| E-201 | SINGLE LINE DIAGRAM AND ELECTRICAL SCHEDULES |

Approved :

DIRECTOR DATE
DEPARTMENT OF PUBLIC WORKS
COUNTY OF HAWAII

PROJECT TEAM

ENGINEERING CONSULTANT
ENGINEERING PARTNERS, INC
455 E. LANIKAULA ST., HILO, HAWAII 96720
T: (808) 933-7900

| revision number | description |
|---|---|
| | PRE FINAL DESIGN |

YEE WEN FANG
LICENSED PROFESSIONAL ENGINEER
HAWAII, U.S.A.

THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION. CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

SIGNATURE

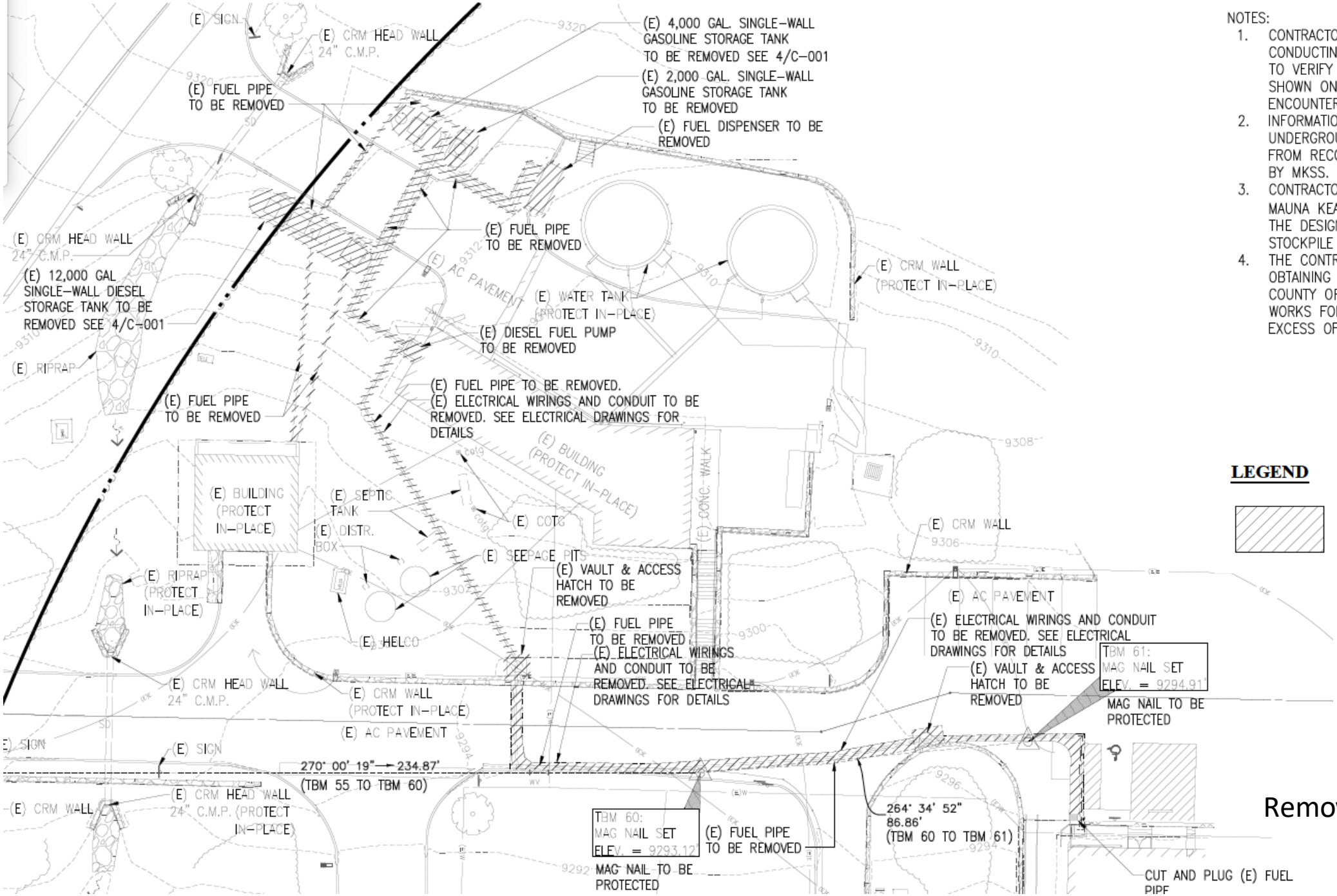
UNIVERSITY OF HAWAII
STATE OF HAWAII

HALE POHAKU FUEL STORAGE - 2028
COMPLIANCE UPGRADE - REMOVAL
UNIVERSITY OF HAWAII
INSTITUTE FOR ASTRONOMY

TITLE SHEET

| | | | |
|---|---|---|---|
| designed by: RDC | checked by: CR | EPI project no: 12027-23-01 | sheet no: T-001 |
| drawn by: RDC | approved by: YWF | UH project no: 0010391-01-A | |
| drawing scale: AS NOTED | | date: 05/01/2024 | |

DATE PRINTED: Monday, October 23, 2023




NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE IN CONDUCTING UNDERGROUND UTILITY TONING TO VERIFY UNDERGROUND UTILITIES NOT SHOWN ON PLAN THAT MAY BE ENCOUNTERED DURING CONSTRUCTION.
2. INFORMATION ON TANK SIZES AND UNDERGROUND UTILITY PIPE LOCATIONS ARE FROM RECORD DRAWINGS ON FILE PROVIDED BY MKSS.
3. CONTRACTOR SHALL COORDINATE WITH THE MAUNA KEA SUPPORT SERVICES (MKSS) ON THE DESIGNATED LOCATION TO TEMPORARILY STOCKPILE EXCAVATED MATERIAL.
4. THE CONTRACTOR SHALL BE RESPONSIBLE IN OBTAINING STOCKPILING PERMIT FROM THE COUNTY OF HAWAII, DEPARTMENT OF PUBLIC WORKS FOR ANY STOCKPILED MATERIALS IN EXCESS OF 500 CUBIC YARDS.

**LEGEND**

TO BE REMOVED OR DEMOLISHED

# Removal & Demolition Plan

# Tank Removal

## UNDERGROUND STORAGE TANK CLOSURE NOTES

1. Contractor to conduct utility clearance at planned excavation areas. Contractor responsible to protect all aboveground and below ground utilities within the work area and is responsible for repair of any damaged aboveground or below ground utilities on the project property.

2. Contractor to coordinate work with and Environmental Professional (EP) hired by MKSS to conduct site assessment activities required by the HDOH SHWB UST Section for the closure of UST system. Unless otherwise directed by the EP, Contractor will only conduct work on this project when EP is present on the project site.

3. Contractor will conduct work in a manner that allows the EP to perform the required site assessment activities. This includes but is not limited to providing access to excavated material and providing access to all excavations. No material associated with this project may leave the property until authorized by the EP.

4. Unless otherwise directed by the EP, Contractor should be prepared to remove all bedding material from all project excavations to reach intact native material where site assessment activities will be conducted by the EP.

5. Contractor is responsible to disconnect and cap product lines at building terminations. Contractor will coordinate with MKSS maintenance personnel on the desired termination method and location. Concrete demolition and patching will not be required for product line termination at buildings.

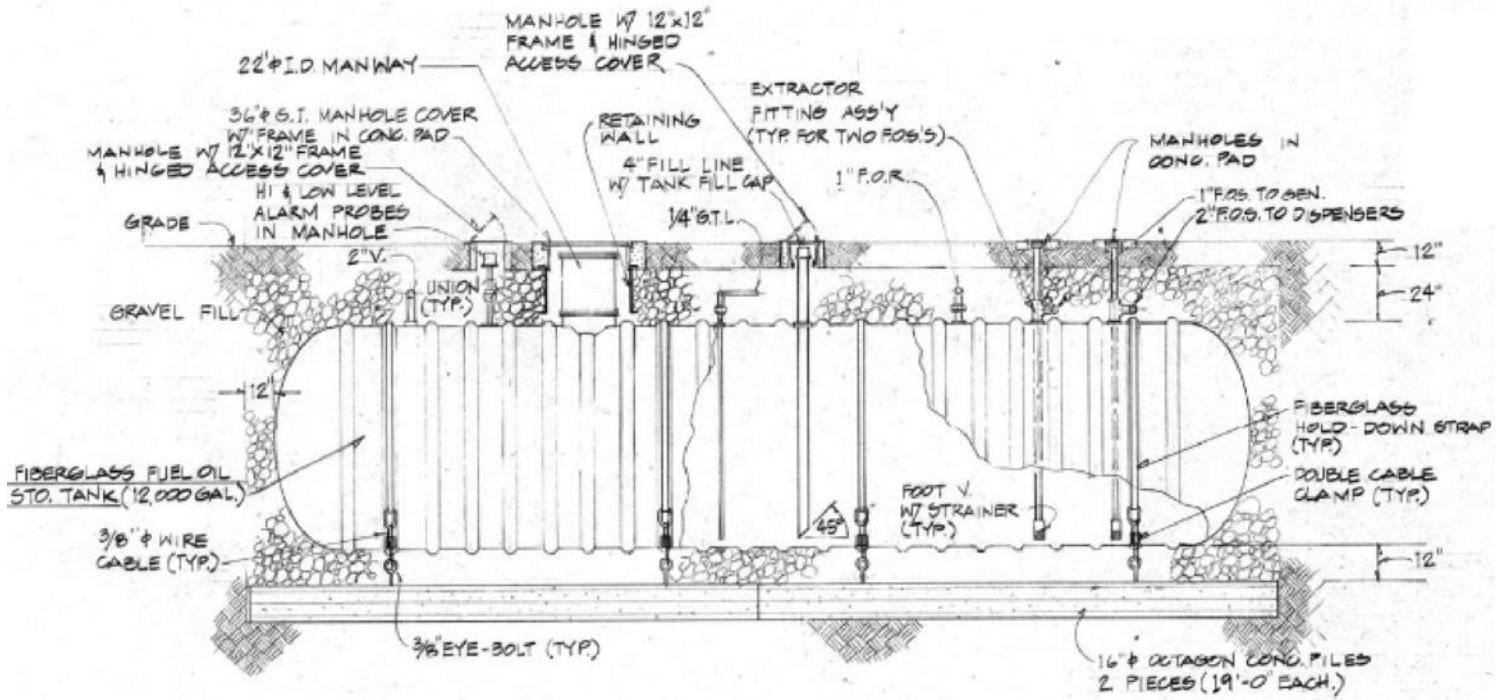
## BACKFILLING AFTER TANKS REMOVAL NOTES

1. 2–1/2" minus drain rock to within 3–feet of ground surface. Place material in lifts not to exceed 18". Place geotextile fabric on top 2–1/2" minus drain rock.

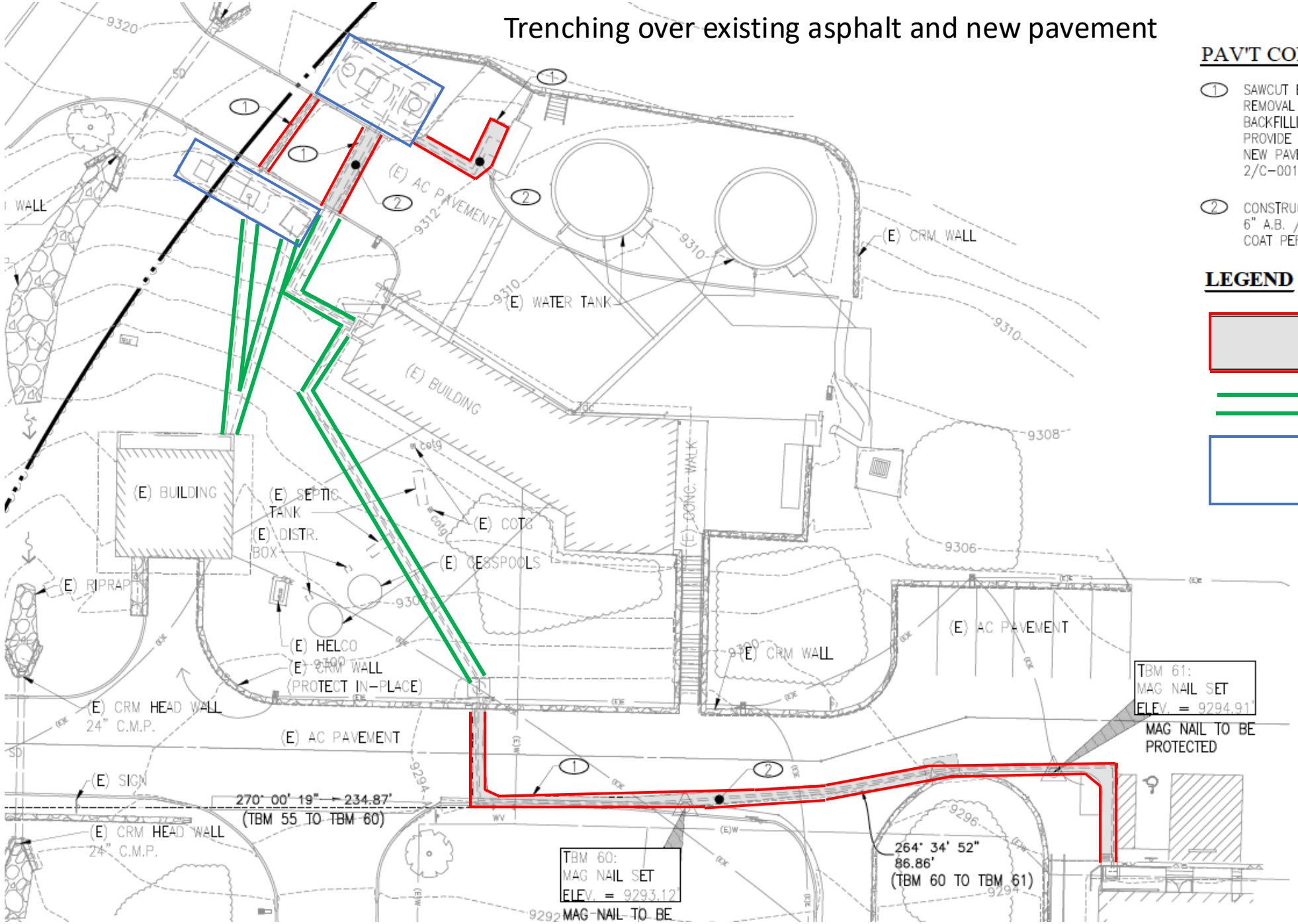
2. 1–1/2" minus base course to within 1–feet of ground surface. Backfill in minimum 2 lifts of 12" maximum and compacted to 90% maximum density.

3. Backfill remaining 1–foot with cinder.

4. Equipments to be brought in and used during construction shall be thoroughly cleaned to avoid the introduction on invasive species. All imported materials to be brought in by the contractor shall comply with the requirements of the Mauna Kea Invasive Species Management Plan. Obtain copy of the management plan from the Mauna Kea Support Services.



# Trenching over existing asphalt and new pavement




## PAV'T CONST. NOTES

1. SAWCUT EXISTING PAVEMENT TO ALLOW FOR THE REMOVAL OF UNDERGROUND UTILITIES. BACKFILLING AND TRENCH RESTORATION SHALL PROVIDE SMOOTH TRANSITION WHEN JOINING NEW PAVEMENT TO EXISTING PER DETAIL 2/C-001 (2 / C-001)

2. CONSTRUCT 3" COUNTY MIX 4 A.C. PAV'T / 6" A.B. / 12" SUB-BASE WITH TYPE 1 SEAL COAT PER DETAIL (1 / C-001)

## LEGEND

- Trench on AC ~480 ft²
- Trench on soil ~450 ft²
- Tank Excavation ~ 950 ft²

# BMP Plan


## BMP CONSTRUCTION NOTES

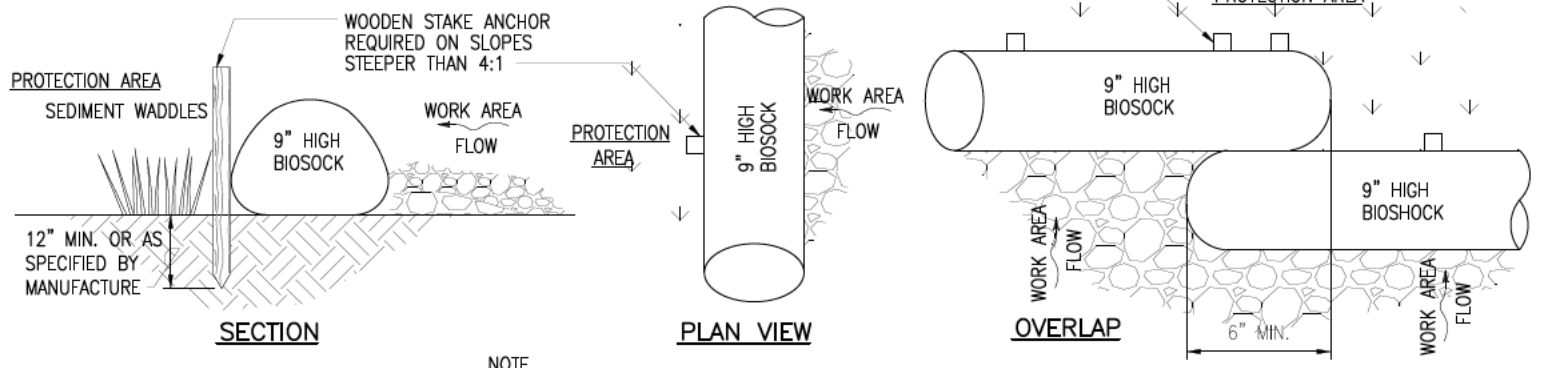
(ORDER OF PRECEDENCE FOR INSTALLATION)

1. CONSTRUCT SILT FENCE OR BIOSOCK PER DET. (1/C-103) (2/C-103)
2. BIOSOCK AROUND DRAINAGE SUMP PER DETAIL (2/C-103)
3. CONSTRUCT GRAVEL BAG FILTERS AROUND STOCK PILE/ DEBRIS/VEHICLE/EQUIPMENT STORAGE AREA. COORDINATE FINAL LOCATION WITH DIRECTOR (3/C-105)

## LEGEND

- PAVED AREAS
- SILT FENCE/BIOSOCK
- RUNOFF FLOW DIRECTION
- PROTECTED STOCKPILE, DEBRIS, AND VEHICLE/EQUIPMENT STORAGE AREA

# Site Specific BMP Control Measures



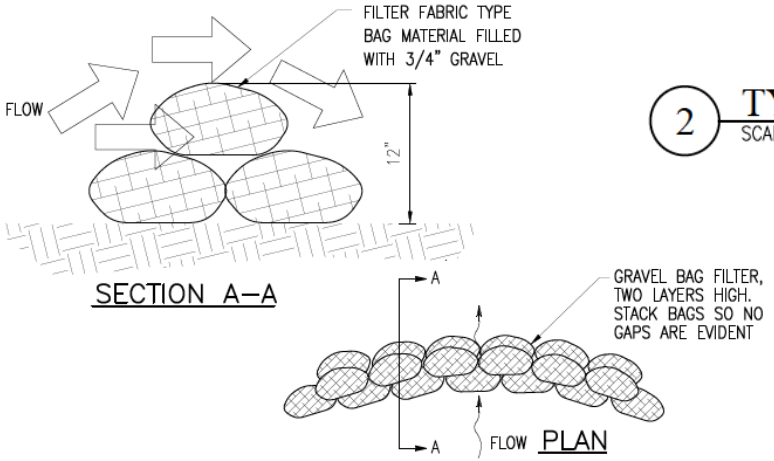

*WOOD ANCHOR STAKES SHALL HAVE A NOMINAL CLASSIFICATION OF 3/4" BY 3/4" AND MINIMUM LENGTH OR 24 INCHES. DO NOT USE REBAR OR OTHER METAL RODS

NOTE
PRODUCT SHOWN IS A PRODUCT OF HAWAII BIOSOCKS. PRODUCT MAY BE A PRODUCT OF HAWAII BIOSOCKS OR APPROVED EQUAL

WOODEN STAKE ANCHOR SPACING

| SLOPE GRADIENT | ANCHOR SPACING |
|---|---|
| <4:1 | NOT REQUIRED |
| 4:1 TO 3:1 | 10' ON CENTER |
| >3:1 TO 2:1 | 5' TO 10' ON CENTER |
| >2:1 | 5' ON CENTER |

2 TYPICAL BIOSOCK INSTALLATION
SCALE: NOT TO SCALE




3 GRAVEL BAG FILTER
SCALE: NOT TO SCALE

2

# Post UST Removal Fuel Storage & Dispensing Plan

Fuel will still be required at the mid level facilities after the UST's have been removed.

**Diesel**

is the most critical of the two fuels stored and it is used to fuel the heavy equipment used in road maintenance and snow removal as well as one of the boilers that provide heating to Hale Pohaku (there is one propane boiler and one diesel boiler). Once the UST's are removed, the plan is to replace the diesel boiler with a propane boiler.

Current Diesel use is between 200 and 500 gal per month.

Diesel consumption increases during months with heavy snow storms or during propane shortages.

Minimum delivery load for diesel is 2,500 gal.

**Gasoline**

Used by CMS, MKSS and MKO vehicle fleets. Gasoline is less critical than Diesel, however, it provides fueling capability for fleets that remain on the mountain like ranger vehicles, snow removal vehicles, and some observatory mountain fleets.

Current gasoline consumption is approximately 2,500 gal per month.

Minimum delivery load for gasoline is 2,500 gal.

# Proposed Solution

Assumptions

- Avg Diesel use/mo: 200 gal
- Avg Gas use /mo: 2,500 gal
- Min Delivery volume 2,500 gal

The Transtank Pro P12 is a static, economic, double-walled fuel tank. These bulk fuel tanks are for fleet refueling or the sale of fuel, and can be fitted to become complete fuel dispensing and management systems.

**SECURABLE**
Strong, durable and secure structure with added protection from bumps, scratches and dings.

**STACKABLE**
Tanks can be stacked, reducing storage space requirements (while empty).

**DOUBLE-WALLED**
Built-in, weather proof secondary containment, eliminates the need for berms or basins.

**UNDER TANK VISIBILITY**
Containers can be easily inspected without the hassle of lifting the tank.

**MAINTAINABLE**
Access manyway, allows access to inner tank for easy routine maintenance and inspection.

Proposed Design

Diesel & Gas

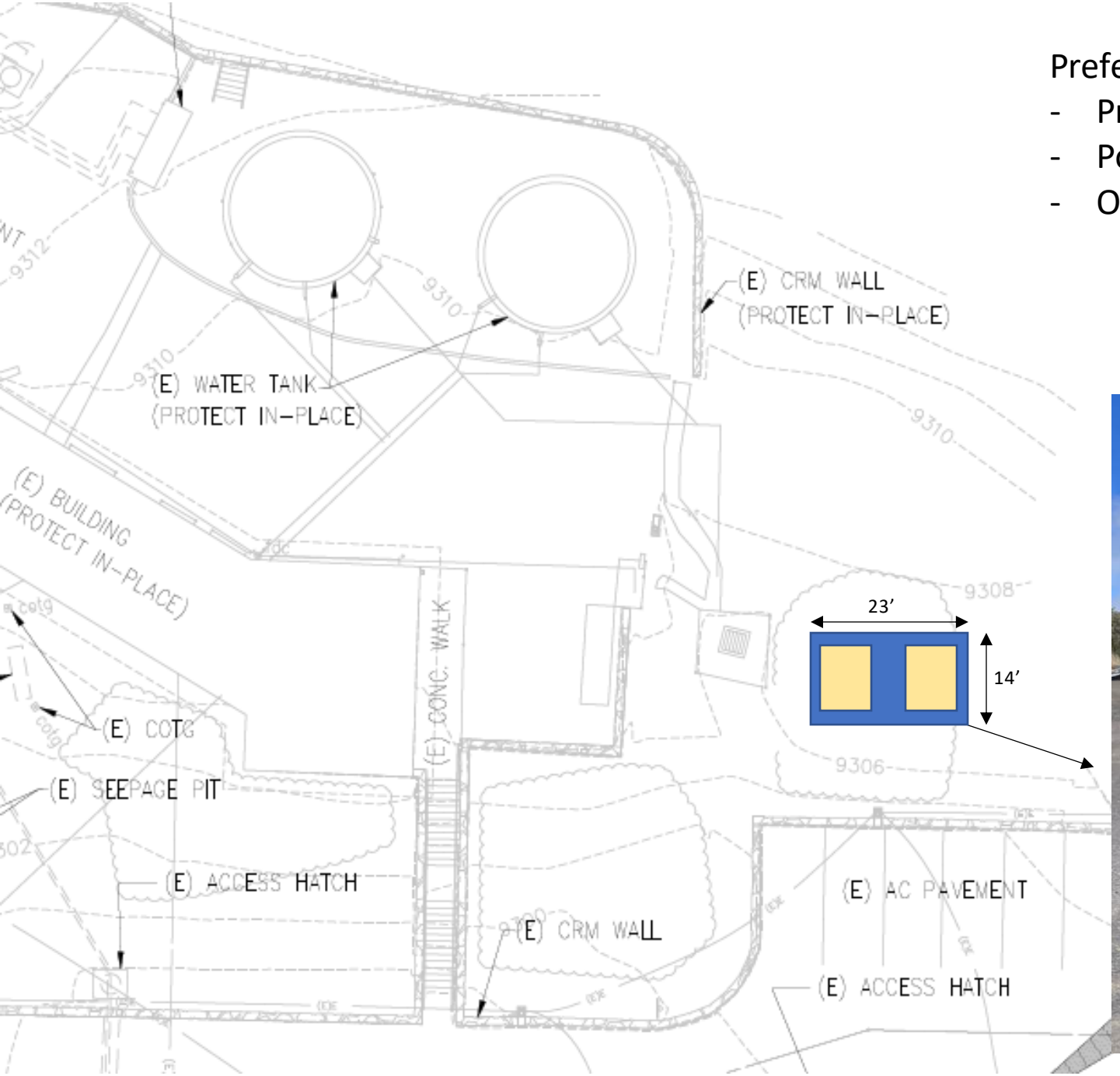
- 3,000 Diesel tank
- 3,000 Gas tank
- Diesel refill once or twice per year
- Gas refill once per month

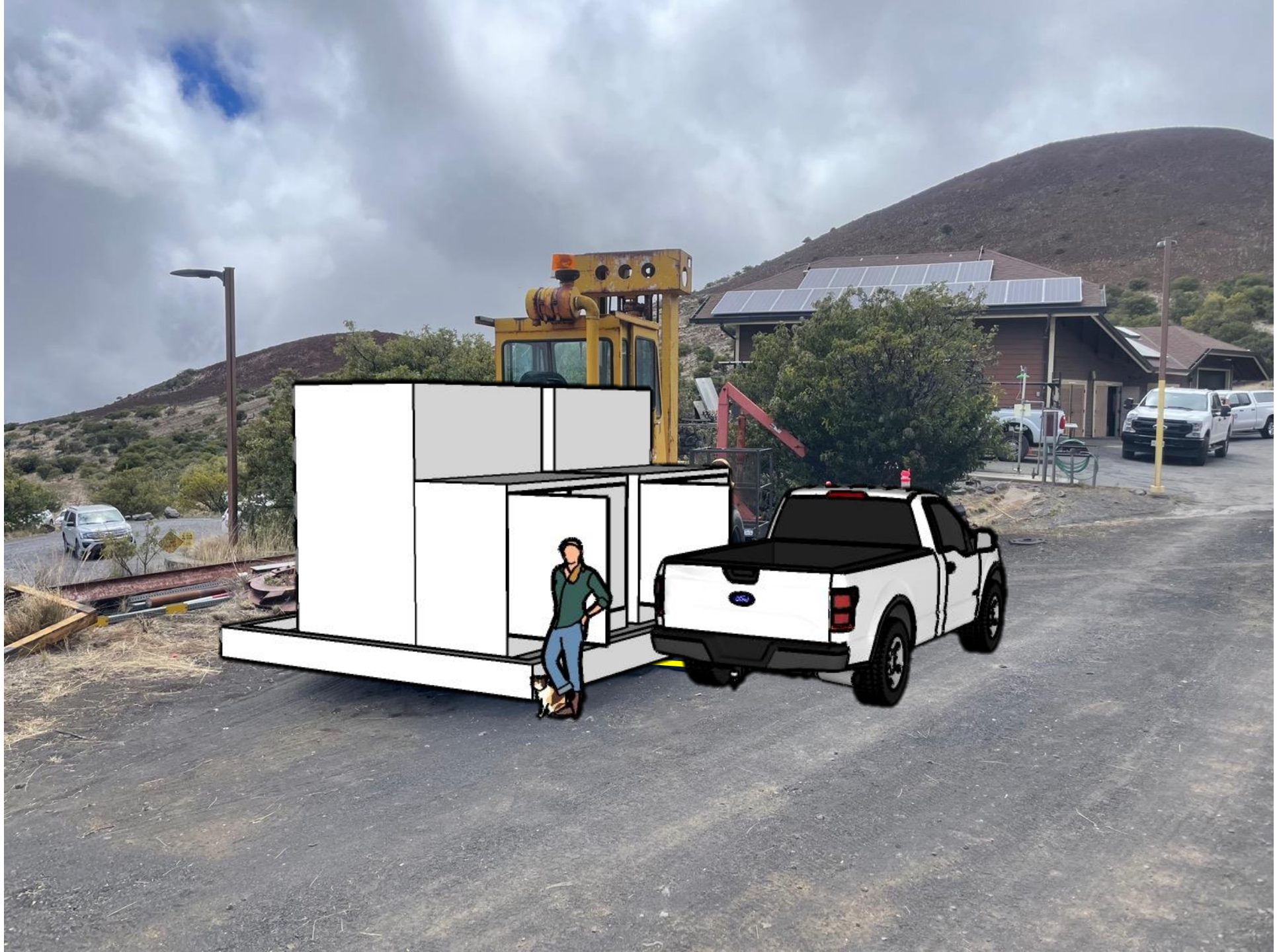
- Tank sizes selected based on minimum volume of fuel that can be delivered per load.
- Potential Location: Area east of the Utilities Base Yard just past the end of the paved driveway.


Preferred Proposed Location for AST Tanks
23'
14'

Preferred location for both AST's pending:

- Pre disturbed ground on existing gravel road.
- Power available near by
- Out of sight from summit access road.




Original Locations Considered
3
2
1
Cons:
High visibility from road
High Probability of complaints or objections

UNIVERSITY of HAWAI'I at HILO
CENTER FOR MAUNAKEA STEWARDSHIP

November 2, 2024

To: John DeFries, Executive Director MKSOA

From: Greg Chun, Executive Director CMS

Re: Canada France Hawaii Telescope UST Retirement
For Informational Purposes

Aloha John.

This memo is provided for informational purposes to update MKSOA on Canada-France-Hawaii Telescope's (CFHT) plan to decommission their underground fuel storage tank (UST). Under United States Environmental Protection Agency (EPA) regulations they are required to comply with this action by July 2028. This is the same requirement that the University must meet for its UST's located at Hale Pōhaku which MKSOA has been briefed on.

Background
The UST is constructed of ¼" thick solid steel and measures 25 ft long by 6 ft diameter. Volume is approximately 5,000 gallons. Top of the tank is 2.5 ft below grade, on the west side of the CFHT observatory. The UST was used to store diesel fuel for emergency power generation. CFHT made the decision in 2021 to retire the tank, and it was taken out of service in 2022. The tank is being retired in place until such time as the observatory facility is deconstructed; the tank will be removed as part of the final facility decommissioning. Details are provided below.

Project
Phase 1 of the project was approved by DLNR in November 2022 (SPA HA 23-30). Phase 1 was to conduct soil sample testing to ensure there was no petrochemical contamination from the tank. Upon completion of that testing and a finding no detection of a release, Phase II is planned to complete the final retirement of the UST. Due to structural concerns described below, CFHT had proposed retiring the UST in-place until such time that the CFHT facility itself was fully decommissioned. This project is classified as Type A under our CMS project classification system which means it is presented for informational purposes to our advisory groups and executive management.

CFHT has conducted due diligence verifying no detection of petrochemical spill/leak, including a thorough review of fuel delivery and storage logs, soil sampling, and Soil Vapor (SV) assessment. The SV assessment was conducted in accordance with Department of Health (DOH) requirements. On August 26, 2024, DOH issued its acceptance of the SV assessment results and approval to close the tank, pending receipt of documentation that the tank was emptied to less than one inch of product prior to the soil vapor testing, physical closure procedures, and provision of the final closure report. CFHT staff and contractors will conduct the closure.

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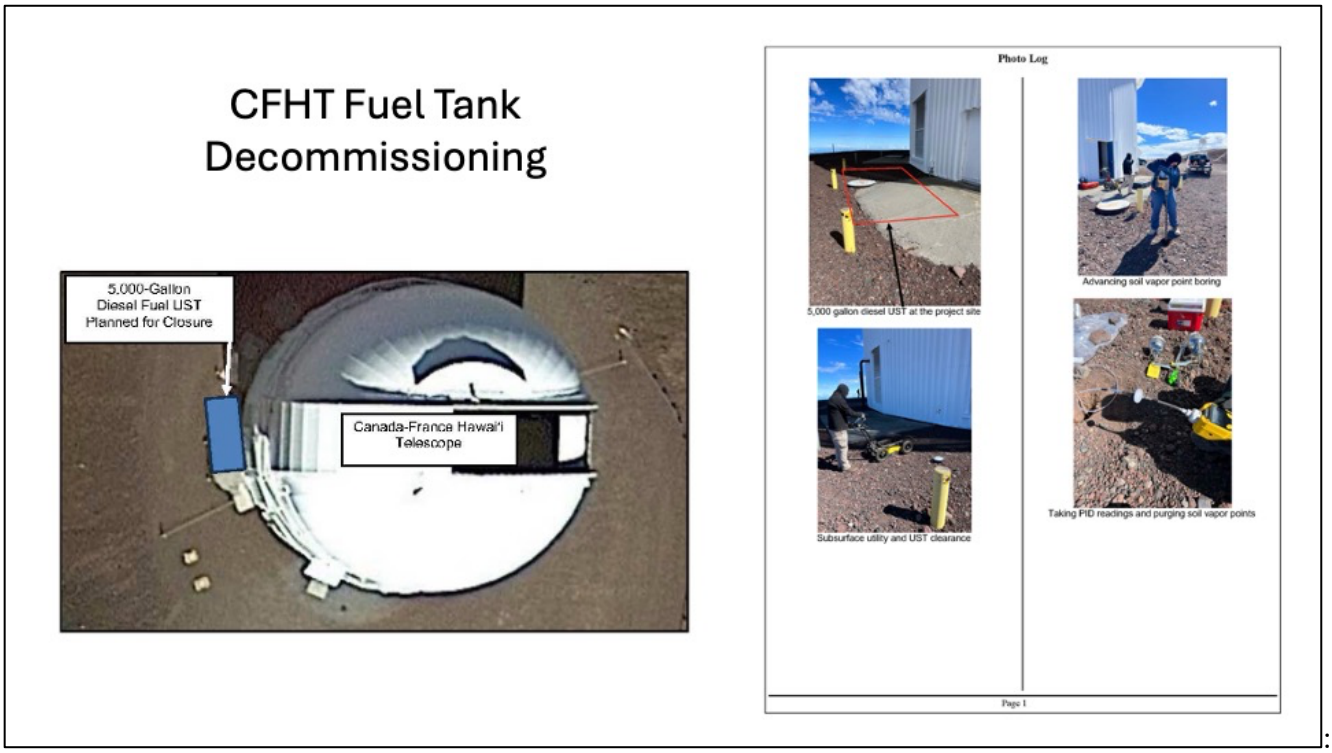
University of Hawai'i at Hilo
Center for Maunakea Stewardship

The alternative to retire-in-place for now is due to structural concerns because of the proximity of the tank to foundation of the facility as well as to the nearby slope. The UST, located exterior and adjacent to the CFHT dome, was installed during CFHT's construction in 1976 and approved under Conservation District Use Permit HA 527, issued in 1974. CFHT has upgraded its fuel storage to an indoor, aboveground tank and dispersal system. The new tank, at 300 gallons, is of significantly less volume than the UST, and has double-wall construction with tertiary containment. CFHT has determined the UST cannot be removed without risk to the facility's structural stability and, subsequently, impairing scientific operations. Specifically, the tank cannot be removed at this time due to risk of impact on the facilities existing infrastructure (observatory peer and electrical grounding grid) as well as to minimize the impact of significant ground disturbance. CFHT will remove the UST and all associated infrastructure upon decommissioning of its summit facility. The photos below depict the location of the tank.




:

Status

1. CFHT is currently discussing options on fill material to be used for the UST with DOH.
2. CFHT has also obtained from the Hawaii Fire Department permit # HFD 20-90 to close the tank.
3. CMS is waiting for concurrence from DLNR (OCCL) for the project to proceed.
4. CMS will be updating the status of the project with our community advisory groups and will do so with MKSOA when outstanding approvals have been received.

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UNIVERSITY of HAWAIʻI at HILO
CENTER FOR MAUNAKEA STEWARDSHIP

September 17, 2024

To: John De Fries
Executive Director, Maunakea Stewardship Oversight Authority (MKSOA)

From: Gregory Chun, Ph.D.
Executive Director, Center for Maunakea Stewardship (CMS)

Copy: CMS/MKSOA Joint Management Committee (JMC)

Re: Caltech Sublease Termination

Aloha e John. As discussed with the JMC, UH (CMS) is working with Caltech University on a sublease termination agreement now that they have completed decommissioning of the Caltech Submillimeter Observatory (CSO). Attached is an outline of the terms and conditions of the agreement (Exhibit A). Of relevance to MKSOA is the contribution negotiated with Caltech towards a fund for future summit wide decommissioning of shared electrical, communication, and data infrastructure on the summit. Also attached is the PowerPoint presentation we reviewed with the JMC explaining the assumptions and methodology used to develop Caltech's contribution (Exhibit B). Please let me know if you have any questions or information needs to review this with the MKSOA Board.

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UNIVERSITY of HAWAI'I at HILO
CENTER FOR MAUNAKEA STEWARDSHIP

EXHIBIT A

CANCELLATION OF SUBLEASE AGREEMENT AND
OPERATING AND SITE DEVELOPMENT AGREEMENT
between
University of Hawai'i and California Institute of Technology
for
Caltech Submillimeter Telescope Facility
Tax Map Key (3) 4-4-015-009 (por.)

SUMMARY OF TERMINATION CONDITIONS

I. Decommissioning
   a. Caltech has completed the decommissioning process and related removal and restoration work subject to the terms and conditions approved by BLNR in Conservation District Use Permit No. HA-3880 (Decommissioning Permit) and Conservation District Use Permit No. HA-1492 (Operating Permit).
   b. Caltech agrees to provide the Center for Maunakea Stewardship (CMS) with documentation from BLNR or DLNR acknowledging compliance with the conditions set forth in their Decommissioning CDUP.
   c. Caltech has completed the decommissioning process and related removal and restoration work consistent with the Comprehensive Management Plan approved by BLNR and their decommissioning plan approved by the CMS.
   d. Caltech has completed the decommissioning consistent with the terms of their sublease agreement entered into on Dec 20, 1983 XXX and with UH General Lease (GL S-4191).

II. Delivery
   a. Caltech agrees to deliver the premises in accordance the "Condition of Premises" section of the termination agreement, e.g., that Caltech has removed its personalty, equipment, and trade fixtures from the subleased premises and has performed all of its other obligations under the sublease and the termination agreement.

III. Pro Rata Removal Cost of Shared Infrastructure
   a. Caltech agrees to pay UH $628,698.05, which amount represents the agreed upon amount owed for decommissioning of shared infrastructure costs. This payment satisfies in full Caltech's pro rata share of the removal of shared astronomy facility infrastructure in the future based on a methodology agreed to by Maunakea

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observatories. (Note: These funds will be held in a separate account by UHH for transfer to MKSOA at the conclusion of the transition period).

b. UH releases Caltech from any further contributions related to these future decommissioning costs.

IV. Sublessor's Release

a. UH acknowledges and agrees that all obligations of Caltech under the sublease and the OSDA have been satisfied in full, and UH releases Caltech from all claims or causes of action of any kind that UH may have against Caltech.

V. Sublessee's Release

a. Caltech acknowledges and agrees that all obligations of UH under the sublease and the OSDA have been satisfied in full, and Caltech hereby releases UH from all claims or causes of action of any kind that Caltech may have against UH.

VI. No Assignment or Transfer

a. Caltech represents and warrants to UH that it has not assigned or transferred and shall not assign or transfer any of its respective rights under the Sublease to any other party.

VII. Agreement Binding on Parties

a. Parties represent that each has full power and authority to enter into this Agreement. This Agreement constitutes the valid and binding agreement of the Parties.

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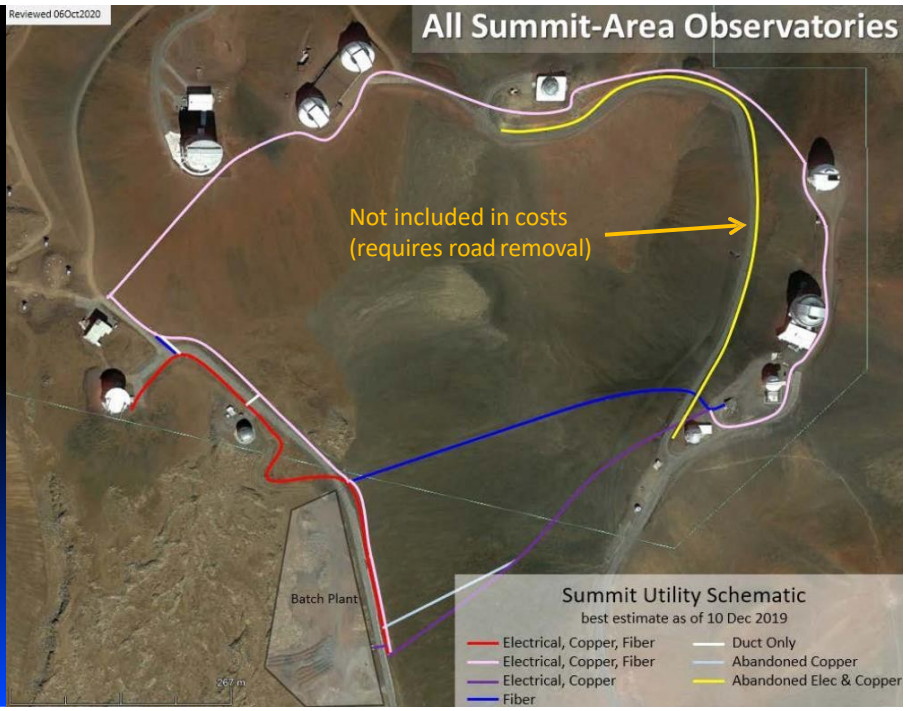
EXHIBIT B

## *Assumptions/Methodology*

- Costs included are for shared utilities in the Astronomy Precinct only: data, communication, and electrical power (VLBA not included)
- Includes removal of utilities and restoration of trenched areas
- Decommissioning of roads not included
- Costs are assigned to benefitting observatories, adjusted by each observatory's pre-negotiated multiplication factors
- Observatory site decommissioning plans cover removal and site restoration of all observatory-specific infrastructure including water and waste systems, roads, electrical power, and communication utilities
- Single planning and permitting effort; estimated as a % of total costs
- Costs were prepared in 2020 dollars

## *Underground Utilities Overview*

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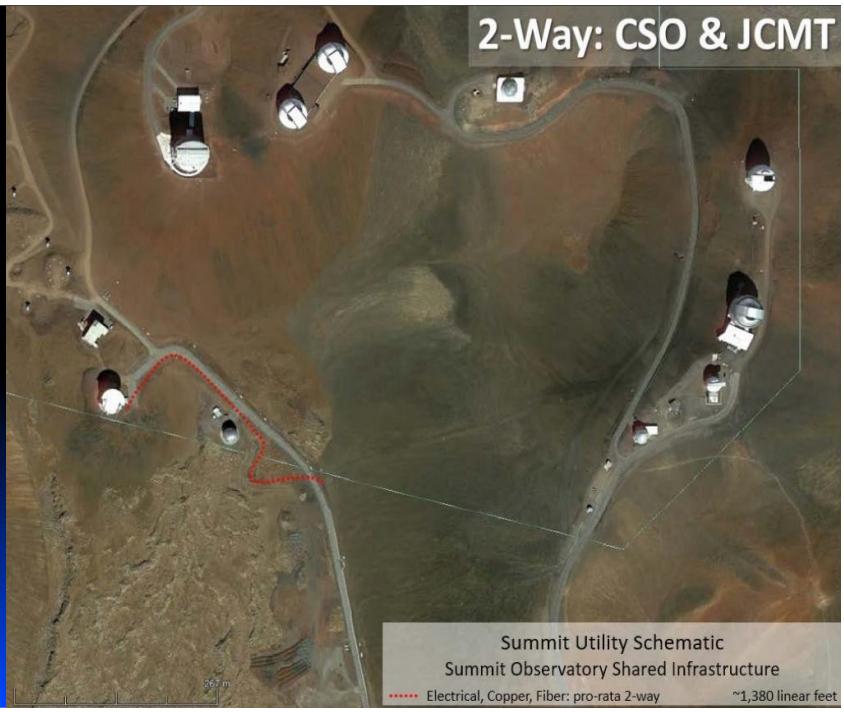
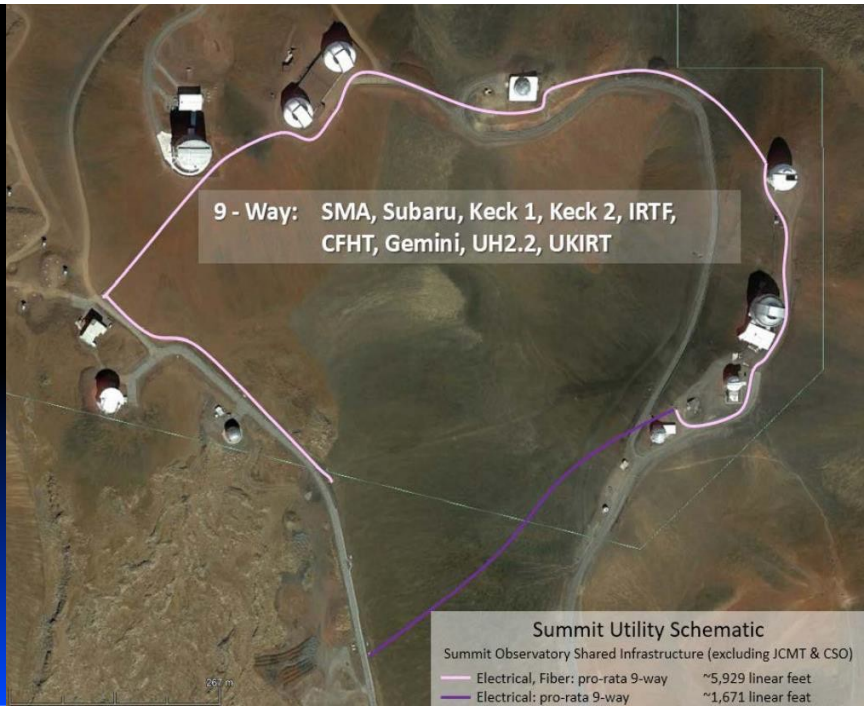
## *CSO + JCMT Shared Copper/Fiber*




## *9-way Shared Copper/Fiber*

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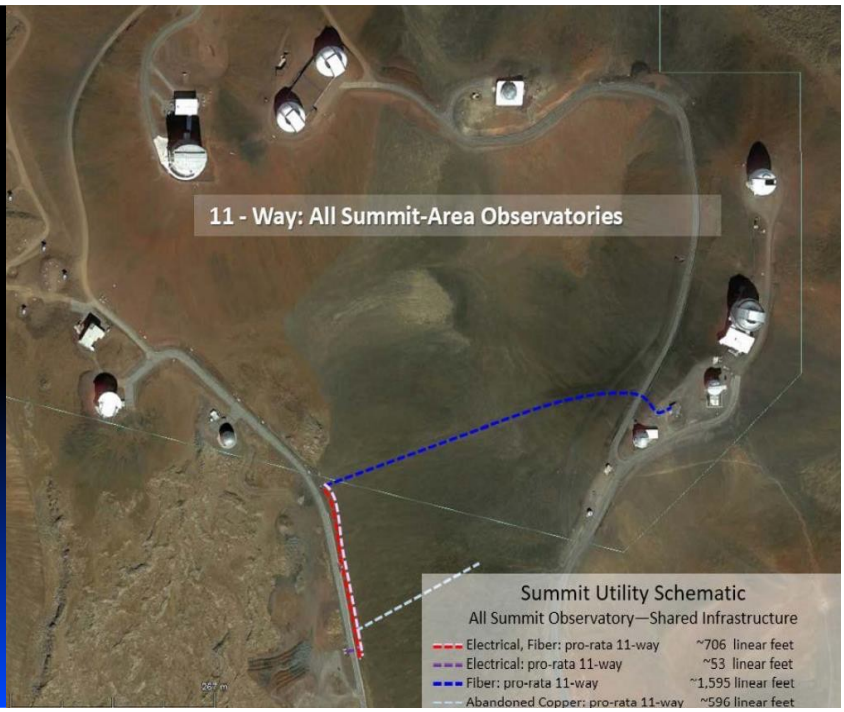
## *11 Way Shared Copper/Fiber*




## *Cost Allocations to Decom Summit Utilities*

**All Astronomy Precinct Infrastructure**
**Pro-Rata Share**

| Telescope | Weight | 11-way | 9-way | 2-way | Total |
|---|---|---|---|---|---|
| UH2.2m | 0.8 | $120,529.62 | $576,346.75 | NA | **$696,876.37** |
| UKIRT | 0.8 | $120,529.62 | $576,346.75 | NA | **$696,876.37** |
| IRTF | 0.8 | $120,529.62 | $576,346.75 | NA | **$696,876.37** |
| CSO | 0.8 | $120,529.62 | NA | $404,847.78 | **$525,377.40** |
| CFHT | 1 | $150,662.02 | $720,433.44 | NA | **$871,095.46** |
| JCMT | 1 | $150,662.02 | NA | $404,847.78 | **$555,509.80** |
| Keck 2 | 1 | $150,662.02 | $720,433.44 | NA | **$871,095.46** |
| SMA | 1 | $150,662.02 | $720,433.44 | NA | **$871,095.46** |
| Keck 1 | 1.2 | $180,794.43 | $864,520.13 | NA | **$1,045,314.55** |
| Subaru | 1.2 | $180,794.43 | $864,520.13 | NA | **$1,045,314.55** |
| Gemini | 1.2 | $180,794.43 | $864,520.13 | NA | **$1,045,314.55** |
| **Total** | | **$1,627,149.83** | **$6,483,900.95** | **$809,695.56** | **$8,920,746.35** |

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