

UH Managed lands – Project Proposal

for projects anticipated to be classified as having “Minimal Impact”

Observatory Name

Gemini North Observatory

Brief Descriptive Title of Project

Installation of a Solar Calibration Unit on the roof of the Gemini Support building to characterize the variations in radial velocity measurement due to stellar activity on the surface of the Sun.

Project Description

The project would mount a solar monitor constructed by the University of Chicago on the Gemini Support Facility roof. The monitor consists of an Alt-Az mount collecting solar light onto an integrating sphere and connecting it to the MAROON-X spectrograph via fiber. The size of the monitor would fit within a 30”x30”x30” volume.

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

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

Under existing CDUP HA-2691 for Gemini North Observatory.

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

Exemption Class #1.w. Operation, repair or maintenance of existing structures, facilities, equipment or topographical features, involving negligible or no expansion or change of use beyond that previously existing. Scientific equipment used for research, instructional, and experimental functions, including but not limited to, lasers, x-rays. Spectroscopes, oscilloscopes, analyzers, distillers, computers, electron microscopes and diathermic apparatus.

Tax Map Key(s)

4-4-015:009 – Mauna Kea Science Reserve (por.)

Proposed Commencement Date

02 August 2021

Proposed Completion Date

31 December 2021

Estimated Project Cost

\$10,000

Total size / area of proposed use

The proposed work is entirely within the existing exterior footprint of the facility.

Project Purpose and Need

This project addresses an important functional requirement as a calibrator for the MAROON-X Radial Velocity spectrograph.

Has professional peer-review occurred

The Solar calibrator system is being designed and built at the University of Chicago by personnel very experienced in this kind of work.

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

No.

Existing Conditions at Project Site(s)

Geology, Climate, & Hazards

Maunakea is considered an active, post-shield phase volcano (USGS) rising to nearly 13,800 ft. Climate conditions at altitudes of 12,500ft and above are often below freezing and when combined with humidity above 100% or precipitation, on the surfaces resulting in natural cinder movement from geophysical processes.

Flora, Fauna, Ecology, Water Resources

None. The site has no recorded natural resources and is routinely monitored for invasive species by the Office of Mauna Kea Management (OMKM).

Cultural Resources

The nearest historic cultural site is located near the geographic (USGS) summit survey marker located approximately 1300ft away and will not be disturbed in any way by this proposal.

Recreation

None at the proposed site.

Built Infrastructure

The solar calibration unit will include an aluminum mounting plate fastened to the roof similar to the existing environmental monitoring stations and solar array, with ducts running from the side of the building to the solar calibration unit enclosure.

Landscaping & Visual Conditions

None. Only cinder soil present.

Description of the Project

Location

The project location is on the existing Gemini North Observatory located on the Summit Ridge of Maunakea. Please see Figure 1 through Figure 4 for installation locations of the existing equipment and proposed location of the solar calibrator on the roof of the support facility.

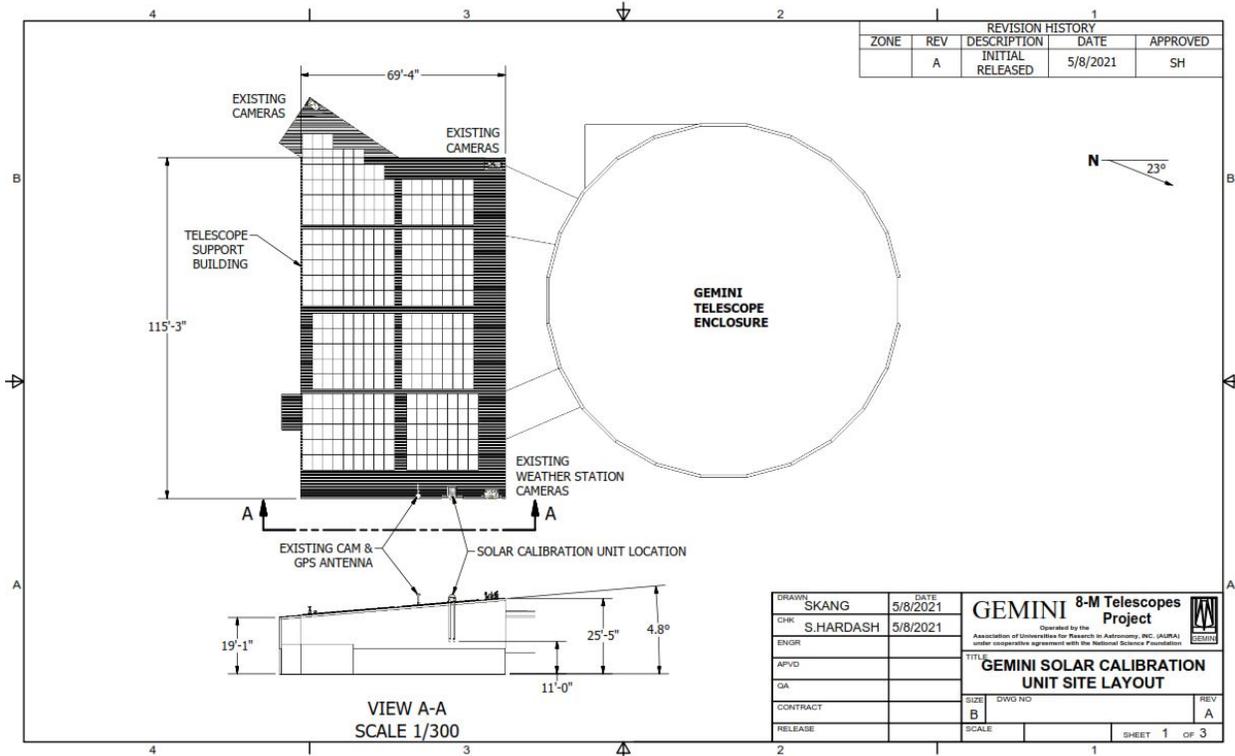


Figure 1. Gemini North facility showing the Telescope Enclosure to the right and the Support Facility in the left portion of this figure.

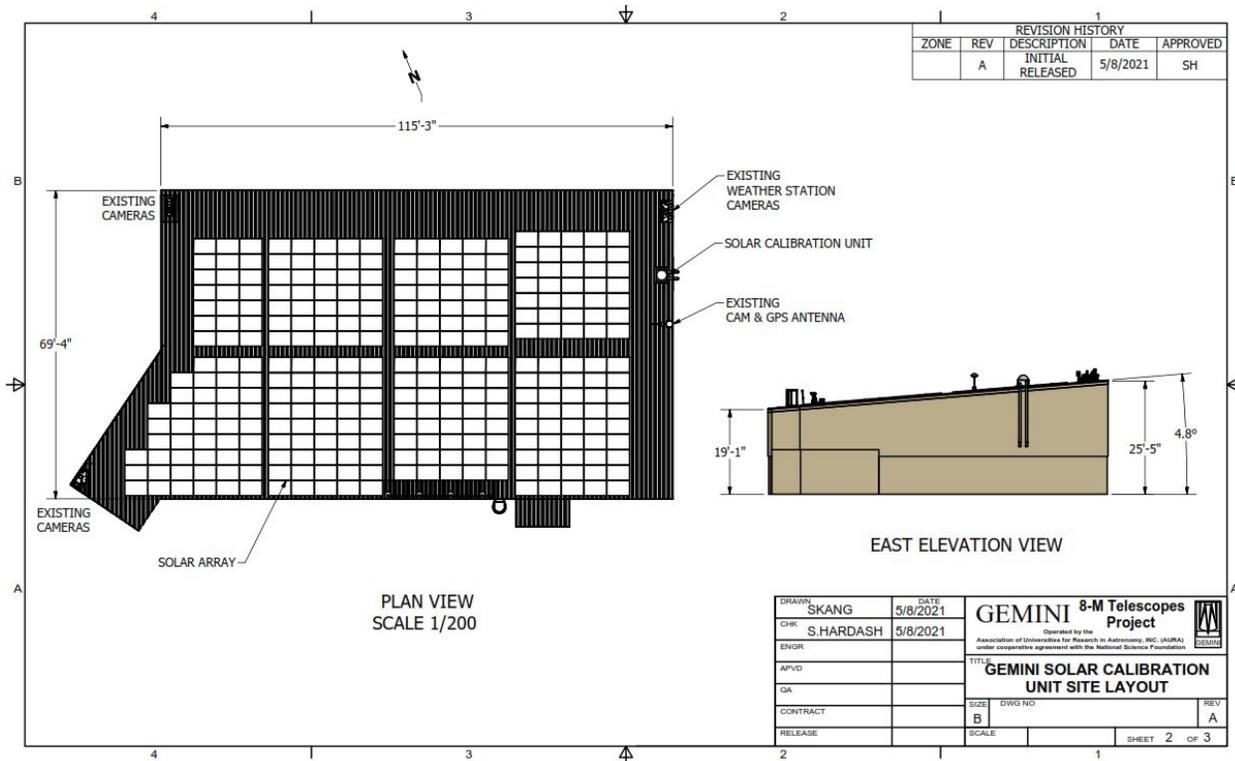


Figure 2. Plan view and elevation view of the Gemini Support Facility showing location of the proposed solar calibration unit.

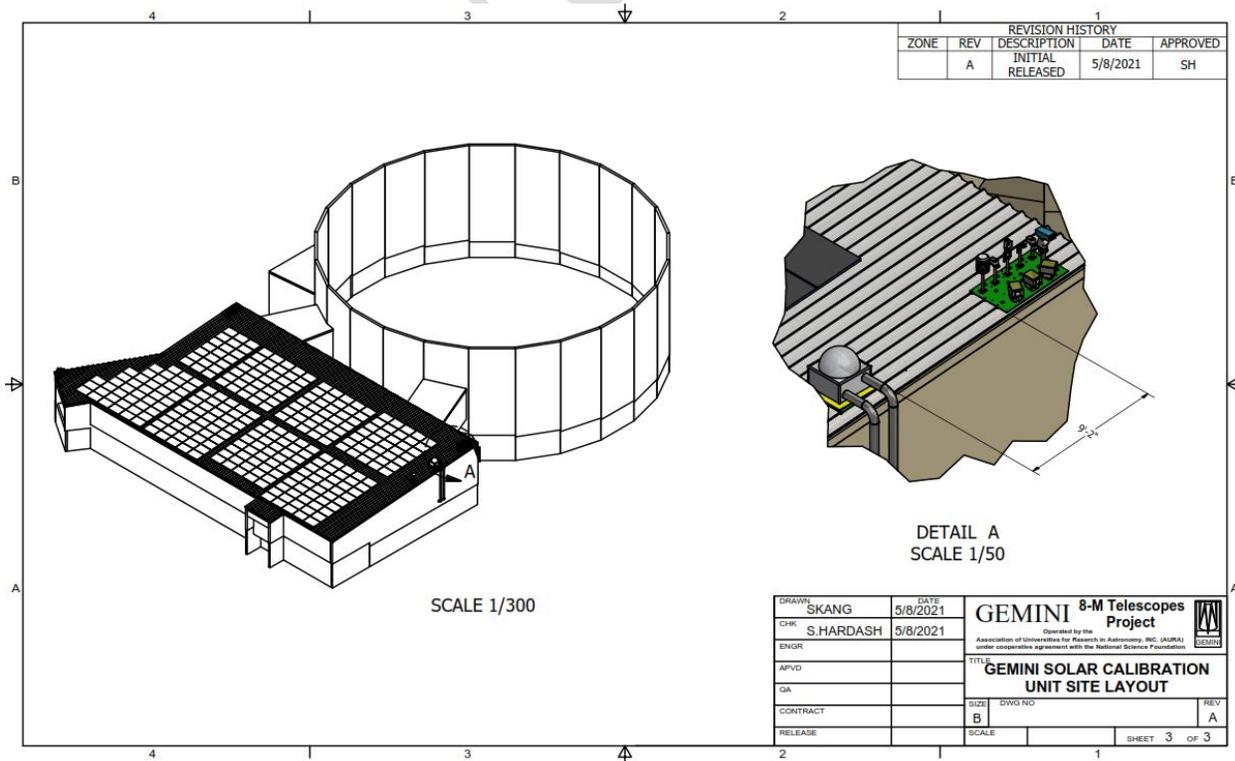


Figure 3. Detail location view of the proposed solar calibration unit on the Gemini Support Facility roof.

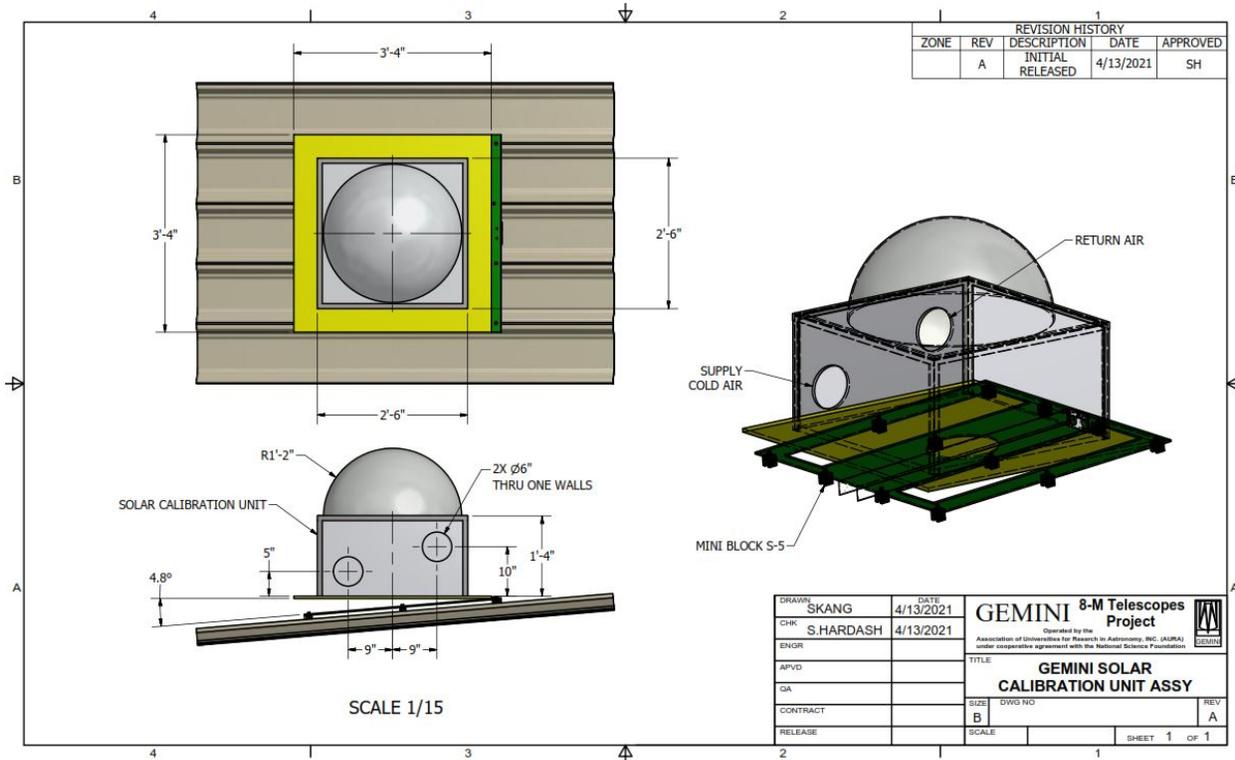


Figure 4. Detail of the solar calibration unit enclosure as it will mount to the Support Facility roof.

Description of the process of completing the project

All attachments will be made using bolted clamps installed on the roof standing seams. The solar calibration unit requires a reliable source of cool air, which is supplied by the two each 6" ducts that run up the east wall of the Support Facility to the enclosure. The enclosure of the monitor and the two ducts will be colored white to match the existing wall and roof.

Who will do the work?

The installation will be performed by Gemini and University of Chicago staff. The installation work will be accommodated by the regular staff size already working on Maunakea and one other person from the University of Chicago.

Equipment & Transportation

All the necessary components for this project can be brought up using the vehicles already in use to transport staff.

Measures to protect the environment and/or mitigate impacts

Protective Measures

- Gemini will ensure that loose tools or equipment are not left unattended and are properly stored at the end of each day.
- All improvements shall be designed and installed to withstand the severe weather conditions on Maunakea.
- All waste material will be removed and properly disposed of.
- Work will take place during regular daytime working hours.
- Gemini will comply with the invasive species prevention best practices.
- No motorized equipment, other than regular SUV's and flatbed truck, will be used in support of this work.
- No large, heavy, non-4-wheel drive, or oversized loads will be required for this project.
- No disturbance to the existing cinder is required for this project.

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

This solar calibration unit installation is a routine activity.

Identify other required or associated permits

None

Five Year Outlook

This solar calibration unit installation was included in the Five-year Outlook in Section 1: Environmental Monitoring. No further consultation was requested by Kahu Kū Mauna.

Community Benefits

Benefits to other Maunakea entities and/or global astronomy community

The benefits are for the MAROON-X spectrograph at the Gemini North Observatory and for the general Precision Radial Velocity astronomy community in the search for terrestrial exoplanets.

Benefits to the Hawaii Island community

The benefits are specific to Gemini and the Radial Velocity astronomy community.

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

All data and scientific publications will be made available according to existing Gemini policies regarding data and proprietary period rights. These state that after a proprietary period, all data is publicly available.

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?

No land will be disturbed during the installation of the solar calibration unit.

2. How is the proposed use consistent with the objectives of the Resource subzone of the land on which the land use will occur? (§13-5-13 The objective of this subzone is to ensure, with proper management, the sustainable use of the natural resources of those areas. This subzone shall encompass: lands necessary for providing future parkland and lands presently used for national, state, county, or private parks. Land suitable for outdoor recreational uses such as hunting, fishing, hiking, camping, and picnicking. [And other lands not applicable to Maunakea.]

The proposed use of this Solar monitoring project is for the continued science discovery of the Gemini North Observatory, and therefore is consistent with the objectives of the Resource subzone of the land on which the land use will occur.

3. Describe how the proposed land use complies with the provisions and guidelines contained in chapter 205A, HRS, entitled “Coastal Zone Management”.

Not applicable.

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 solar calibration unit will be attached to the existing building structure and will not affect the existing natural resources. Associated equipment will be housed within the Gemini Support Facility.

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 solar calibration unit and associated equipment will be attached to the existing structure or contained within the Support Facility and will not affect surrounding areas.

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 visual impact of this solar calibration unit will be minimal, given the small size of the installed solar monitor and associated components, and paint color will match surrounding construction.

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

Not applicable.

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

There will not be any impact on land use by the installation of this proposed solar calibration unit.

For Board Consideration