

# Conservation and Sustainability at Manastash Ridge Observatory: Additional Funding Request

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## Summary of Continuation Request

The CSF funded project, Conservation and Sustainability at Manastash Ridge Observatory: Planning for the Next Forty Years<sup>1</sup>, was funded in 2015 for \$59,559. These funds were used for multiple energy efficiency upgrades to MRO, including water efficient plumbing fixtures, rainwater catchment, and energy efficient appliances and lighting. The project has been very successful so far; for example, the observatory water tanks are now self-sustaining, no longer requiring expensive water deliveries.

The only major component we have yet to install is the solar power collection and battery backup system. Unfortunately we lost our engineering support one and a half years ago, before the solar system was constructed. This meant our original plan, wiring most of the system ourselves, is no longer feasible. In addition, we have realized that welding presents a significant fire risk during most of the season the observatory is open.

We have spent this off-season developing a plan that we believe will allow us to complete the solar installation and finish the MRO sustainability project. This includes redesigning the solar mounting system that does not require welding, and contracting with an electrician to complete the wiring.

### 1. What is(are) the next / new step(s) in completing this project?

1. Install a shed to house the solar equipment and batteries. MRO will fund these upgrades, which addresses the safety concern of co-locating power systems and students.
2. Book a licensed electrician capable of installing our equipment.
3. Purchase supplies and install solar framing and panels.
4. Complete the installation with the help of a licensed electrician.

### 2. How much will the(se) additional step(s) cost?

- The observatory will purchase the new shed for \$2500-\$3500. The Astronomy Undergraduate Engineering Group (AUEG) will provide the labor for solar mounting assembly. The Astronomy department will cover transportation costs. The remaining costs are;
- Solar Panel Mounting System: \$8,000, mostly in material costs. We would like to purchase the supplies as soon as possible, to improve our chances of completing the install before summer. The framing system will be installed by students and will require significantly less training than a welded frame.
- Electrician: A local company estimated the install at \$5700. Due to the specifics of the site, and splitting the installation into student-led and professional work, we anticipate cost overruns and ask for 40% over this estimate, or \$8000.

Together, the additional funds come to \$16,000

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<sup>1</sup> <https://csf.uw.edu/project/fp/743>

3. What options have you explored for completing the new steps? (be thorough in your search)

Due to the safety concerns of this project, we must have an electrician do most of the wiring and connections. We called over two dozen solar electricians around the state; only one was willing to drive up the mountain and give us an estimate. We continue seek a second quote.

We have chosen Unistrut, a product that our students can assemble without welding, addressing the fire risk. This is an industry standard mounting system<sup>2</sup> that is also easy to repair and maintain. Section 4 contains a brief description of other standard methods for solar panel mounting, and a cost comparison.

4. What did the other options cost, and how were the options different?

- Pressure Treated Lumber – \$6,000-8,000
  - Outdoor rated wooden frame is strong and not lightning prone, but it is bulky, heavy and hard to get to the top of a mountain. Second choice over our choice; main reason we decided against is the difficulty of bringing the supplies up to MRO.
- Aluminum PV Framing – \$10,000-15,000
  - Light and designed for solar panels. Expensive and require special hardware, hard to repair or replace. We would need to custom order it, especially if we wanted to use our concrete pillars.
- Welded Steel Framing – N/A
  - This is what we tried the first time, but due to the fire risk, assembly is not practical for our site.
- Tube Steel Mount – \$8,000-10,000
  - More flexible than rectangular, no welding required. Need to use long pipe sections, hard to get up the hill and hard to adapt to our concrete pillars. Expensive

5. Why is your choice the best route to completing your project relative to the available options and their respective costs?

There are two main issues that remain in our project; solar panel mounting and electrical connections. We need to have a licensed electrician complete the connections between the panels and the building, this is a safety and legal issue. We intend on completing as much of the project as we can before the electrician arrives, thereby saving as much money as possible.

The solar panels must be mounted before the electrician arrives to complete the connections. The design of the panel mounting system follows industry standards, gives us the ability to work into fire season, and improves safety for students working on these frames. This is also the fastest and cheapest method to mount the panels, as well as the easiest to maintain and repair. By mounting the panels ourselves, we can save a great deal of money on labor and material costs compared to a professional install.

We believe that with help from CSF, we can complete the final phase of our sustainability project. We are requesting \$16,000 to build solar panel mounts and have a professional electrician install our solar power equipment and connect it to the building. We would also like to request an answer as soon as possible, so we can take advantage of our limited window of work time available this spring.

Thank you very much for considering our funding request.

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<sup>2</sup> [www.strutandsupply.com/index.php/download\\_file/view/255](http://www.strutandsupply.com/index.php/download_file/view/255)