

BASELINE INFORMATION

PROJECT NAME: Biodiversity Green Wall, Edible Green Screen and Water Harvesting Demonstration
Project
LOCATION: Gould Hall, University of Washington (NE 50th St and 15th Ave E, Seattle, WA 98105)
AWARD MADE: May 2011
PROJECT COMPLETED: Phase I - August 26th, 2011; Phase II - August 2012 (end date for entire project)
DURATION (MONTHS): Phase I - 3 months (June-August 2011); Phase II - 12 months (August 2011-August 2012); Total Duration - 15 months
AWARD TOTAL: \$101,985
AWARD SPENT TOTAL: \$101,985
% SPENT: 100%
PROJECT MANAGER(S): Nancy Rottle (nrottle@uw.edu), Leann Andrews (andrewsl@uw.edu) - both from the Green Futures Lab (gflab@uw.edu)
CONSULTANTS: SolTerra Systems (http://www.solterrasystems.com/home/)
SIZE (SQ FOOTAGE, ACREAGE): Biodiversity Green Wall- two 10x10 sq. ft. panels (200 sq ft. total); Edible Green Screen- three 13 ft. vine wires (39 ft. total); Water Harvesters- two 1000 gl. Cisterns (2000

gl.)

PROJECT PROFILE

SITE & CONTEXT: Varey Garden, Gould Hall, University of Washington. Situated aside academic office balconies and above a pocket park located just off a busy North-South arterial.

PROGRAM ELEMENTS: <u>Biodiversity Green Wall</u>- Populated with local and native herbaceous and evergreen plants, harvests rooftop water diverted into a "living wall", provides habitat for native fauna, reuses rainwater, reduces total stormwater runoff volume, and improves local water quality. <u>The Edible Green Screen</u>- Intercepts surface runoff to grow edible vines and creates an innovative, space-efficient way to produce local food.

**Both the Green Wall and Green Screen provide vertical habitat, assist with building insulation and summer cooling (reduce costs, energy use and carbon emissions), and provide educational and aesthetic opportunities for students, faculty and staff.

<u>Water Harvesting Demonstration Project</u>- address' several aspects of campus sustainability outlined in the UW Climate Action Plan including water recycling, sustainable land use planning, energy and carbon footprint reduction, and UW green marketing and branding efforts. Intended to excite students and staff about sustainability, perhaps leading to future installations.

MAINTENANCE / MANANGEMENT REGIEME: Maintenance is currently done by Solterra (the contractor and primary construction consultant). There is a two year maintenance contract in effect which expires in June 2015. At that point, the UW, more specifically UW Grounds Management, will take over. The



system is self-irrigating so the bulk of maintenance involves weeding biannually and ensuring the plants are free of weevils, parasites and other infections.

PHOTO(S):



Photo taken upon completion of Phase II.

PLAN(S):



Schematic drawing of front/side view of planned project.



Daytime rendering of planned Green Wall.



ANALYSIS

USER/USE ANALYSIS: "The whole team is extremely grateful to have the opportunity for such a rich hands-on learning experience while contributing to sustainability on campus. It was quite fascinating to navigate through the various channels on campus, and I feel much of the mystery of campus operations has been revealed- an educational experience all on its own. The encouragement and support from all of the faculty and staff that we worked with really speaks to the support of CSF and sustainability on campus. We are proud of the Green Wall and feel lucky to be able to look out our window to gaze at the wall and watch others sitting in the garden below enjoying the view."- Leann Andrews (member of Student Construction Team).

PEER REVIEWS: "potential that a closed ball-valve on rain leader diversion piping to the cistern caused water to back up into College of Built Environments and damage rooms/materials, and lack of clarity if it should be opened or not." "lack of clarity regarding completion of green wall and cistern by commissioned contractor (SolTerra)." - UW Facilities Services Irrigation Mechanic (9/20/12)

"water that leaked into College of Built Environments resulted from a recently installed downspout. Unclear if downspout is a component of the Green Wall, a by-product of its construction or independent of wall entirely." - UW Construction Project Manager (9/17/12)

"1/4" irrigation hose blew out during irrigation cycle and shot water onto terrain below. Perhaps a result of inline pressure regulating valves not having been installed prior to blow out (or at all) during construction." - UW Facilities Services Irrigation Mechanic (9/14-17/12)

CRITICISM: As a whole I think that the Biodiversity Green Wall, Edible Green Screen and Water Harvesting Demonstration Project is a success. Aesthetically, the project is an appealing addition to Gould Hall that helps further UWs goal of sustainability. That being said, I do have one big critique of the project. It is clear that the Green Wall is the focus of the project and while this installation is great, I think more could have been done towards making the other aspects of the project shine as well; in particular the Green Screen component. Compared to the rendering of the Edible Green Screen, the result seems lack luster. Its location and well as its simple construction appearance decrease its visibility, and because of this it seems that it doesn't receive the proper attention it should.

PROJECT SIGNIFICANCE / UNIQUENESS: This project functions as a beacon for sustainability, green design and ecological innovation on campus. It incorporates natural systems into man-made architecture and shows how the two can function together. The project capitalizes on the rising trend of green walls for both aesthetic and functional reasons, but is unique in that it is perhaps the first use of a green wall in a university context. Additionally the works as an education tool for the College of Built Environments, offering valuable lessons in ecocentric design. Finally it works to improve the overall mission of UWs Climate Action Plan by recycling and collecting water, providing food, increasing biodiversity and buffering energy loss from Gould Hall.



FUTURE PLANS: The Project is a work in progress. Recently bird perches were installed on the panels to encourage additional avian use. Courses in the College of Built Environments as well as other Departments (e.g. the College of the Environment) are looking at using the space as a mean for teaching sustainable practices and building design. Finally, a project to design, fabricate and install educational signage is in progress as a means to educate passerby that are not initially drawn into the Varey Garden to explore the project's features, and thus more widely educate the UW population and become even more of a demonstration site.

LESSONS LEARNED: (Taken from Leann Andrews' CSF Feedback Report, March 2013.)

- The *project timeline* for any project of this size will extend beyond the quarter system. Our project is still finishing up and is currently on month 22. We expedited our project as much as possible and worked rigorously. Suggestion: CSF projects should have at least 1 student and 1 faculty/staff willing to tough it out for the full length of the project to provide consistency, keeping in mind graduation timelines.
- **Construction has a set schedule/season.** Suggestion: help students be aware of the right time to plant, grade, etc. and that it aligns with their timeline. The bid approval and contract review process for our project took a lot longer than anticipated and we did not end up planting in the ideal time, and were not able to capture water for our cisterns, so had to use potable water for the first season of irrigation
- Our project was considered a *"purchase"* through UW FS Works, not a capital project. We were bounced around between capital projects, purchasing, small projects, and campus alterations for several weeks, causing much confusion and taking a lot of hours/time. No one seemed to know the appropriate place to put a student project. Suggestion: CSF could help students upfront to determine the most appropriate place for the contracting process if outside contractors are needed.
- Because the green wall was a "purchase", we did not have a strict, airtight *contract* with the contractor. Our contractor was inexperienced and young, and so we were able to negotiate with them naively, but there was nothing in our contract to protect the University in case a legal battle did happen (we came close to a couple of change orders). A contract is KEY to not being sued, and we got lucky, but it could be a legal nightmare if something did happen. Suggestion: projects this size should consider going through Small Capital Projects, which, while expensive, will craft an airtight contract.
- Because the green wall was a "purchase" we did not have a university appointed *Project Manager*. Students were in charge of directing the contractor, which is also a legal liability, and
 students did not always have the technical expertise to do so. The student lead had some
 construction experience prior to school so was able to navigate safely using volunteer advice by
 UW staff, but contractors can be underhanded, students have classes so can't always be on site,



and it is a lot of legal responsibility put on the student. Suggestion: projects this size should consider paying a University Construction Manager to be on site throughout the whole construction process to advise the student Project Manager. This is pricey but likely worth it.

- Students likely do not have the *technical knowledge* needed to construct a project this size (that is why they are in school), and need to rely heavily on the engineering services department and the knowledge of the contractor. Suggestion: CSF could make the engineering department aware that a project is coming and make sure they can handle advising for its scope.
- **Navigating through the UW channels** is time consuming and confusing. Every time we met with someone to review the project, we were pointed in the direction of several other people, racking the review list up to 50+ people (and 50+ meetings). At times we felt quite lost and alone through this process. Suggestion: CSF could share the list of UW staff that each project went through to help future projects navigate through the UW review process.
- Related, we had no idea how *complicated a UW construction project* could be, and so did not budget time appropriately. Suggestion: CSF share the hours, staff, and timeline of previously constructed projects to future students and projects so they understand the full scope of what they are proposing.
- We were (gratefully) trusted with \$101,985 from CSF, and I can honestly say we spent every cent of it on the project in the most efficient and cost effective way we could. However, what if we weren't *honest with our funds?* Suggestion: CSF devise a form of reporting to itemize how recipients spend their funds. Even if CSF doesn't have the staff resources to really inspect these reports, merely requiring them will make recipients feel accountable.
- The *Feasibility Phase* helped keep our project efficient and manageable. By breaking the project into Feasibility/Design and Construction Phases, CSF did not have to give the project team all the funds upfront- helpful if the project was not feasible, or students discovered it was going to be a lot more work than they had anticipated. Suggestion: Encourage feasibility studies for projects this size.
- *Maintenance* plans. This is a discussion that we know CSF is working on, but we'd like to encourage continued dialogue to assure that projects are maintained (and therefore sustainable). The Green Wall is being maintained by the contractor for 2 years, but after that, we fear Maintenance and Grounds won't have the funds to inspect the wall and cisterns to the extent it needs. Suggestion: As part of the feasibility study, have students do a projected maintenance plan to present in front of Grounds prior to being funded for construction funds. Continue searching for maintenance funds.
- **Research** tied to CSF projects. While CSF explicitly does not fund strictly research projects, research on the results of the built projects is helpful to measure the sustainable impact of CSF projects. We included a tiny bit of funds to have an ecology graduate student monitor our wall for biodiversity and incorporated flow monitors and soil sensors into the construction budget. We were able to get preliminary data, which, if we are able to supplement with other grant



funding, we can then take to conferences, publish in journals, and provide credible science to back up our sustainable claims (as well as promote CSF + student-led impactful projects). Having the infrastructure for research will be important to apply for funding for more robust research. Suggestion: Encourage projects to include applied research, or install research equipment for future research, to quantify the impact of CSF projects.

- University Staff were *excited* to work with students. Many of the staff we talked with found our project refreshing and a fun break from their everyday duties. While we may have extended our "stay" with a few staff, overall, we feel this is an important part of sustainability education on campus. Surprisingly, everyone was quite encouraging of our project! Suggestion: encourage students to share their project, or get advice from UW staff, however consider dispersing advisory roles amongst staff to avoid *"burnout"* from the quantity of student projects on campus, and to disperse education.
- **Celebrate** completion and thank everyone involved. The Ribbon Cutting Ceremony we held for the green wall was surprisingly successful. Suggestion: Encourage students to incorporate funds for a celebration into their budget. This is an important way to show appreciation for all involved and show off the project!
- Documentation is key to sharing the sustainability and CSF story. We rented photography equipment from the library and documented our construction in a time-lapse video. The compiled You Tube video made it all the way to the National Resource Defense Council blog! Suggestion: encourage students to photograph, videotape, or keep records of their drawings to share with the community

FOLLOW UP

CONTACT INFORMATION: Nancy Rottle (<u>nrottle@uw.edu</u>), Leann Andrews (<u>andrewsl@uw.edu</u>) - both from the Green Futures Lab (<u>gflab@uw.edu</u>) WER SITE: CSE webpage: http://f2 washington_edu/csf/project/408 : Green Futures Lab Website:

WEB SITE: CSF webpage: <u>http://f2.washington.edu/csf/project/408</u>; Green Futures Lab Website: <u>http://greenfutures.washington.edu/research.php</u>



PERFORMANCE

Please fill in all fields applicable to your project and for which you have data

NUMBER OF...

- ACRES
- Birds and insects primarily
- ATTENDANTS
- BIODIESEL PRODUCED (GAL.)
- COMPOST PRODUCED
- Projected food growth will be in the form of barley and kiwis.
- HOTSPOTS IDENTIFIED
- Students contributed a total of 2,542 documented hours to the project, 1,008 of which were funded by CSF
- PAGES
- PEER OR PROFESSIONAL REVIEWERS
- Various local and NW introduced species, the process is ongoing and plants are still changing. (Barley and Kiwi vines on Edible Vine installment)
- RIDES DIVERTED
- SERVICE LEARNING OPPORTUNITIEES CREATED
- See "size" under "Baseline Information"

- STORMWATER DIVERTED
- Graduate students who were a part of the Feasibility and Design Student Team are Leann Andrews (MLA), Katie Hunt (MA), Matt Chism (MA), Laura Poulin (MA), Chris Ewing (MCEE), and David Tomlinson (MLA). Graduate students who were a part of the Construction Student Team are Leann Andrews (MLA), Harley Pan (MLA), and Evan Henrich (MFR)
- TOTAL kWh GENERATED
- Two Green Wall Panels, three Vine Growth Wires, 2 Water Collection Cisterns
- Mainly UW students in the College of Built Environments, used as a learning tool to exemplify sustainable building practices.
- VIDEOS PRODUCED
- WASTEWATER CAPTURED & TREATED
- WATER SAVED (GAL.)
- WEB HITS

BEFORE & AFTERS...

• Testing still taking place but preliminary results indicate the Green Wall is retaining heat as well as energy fro the building.