

UW Farm Mini Wash Pack Design and Proposal

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Introduction:

The UW farm is a local and sustainable food source for many students, staff, the food pantry, and dining outlets around the Universities Seattle campus. The farm comprises three growing sites on the North, East, and West side of campus; Center for Urban Horticulture, McMahon Hall, and Mercer Court. Being an urban farm, the UW farm has to face the challenge of urban landscape and structures. Currently the UW farm is having to rely on using fossil fuels to transport freshly harvested produce across campus to their wash-pack site at The Center for Urban Horticulture, and then back across campus to their delivery sites. In order to decrease the use of fossil fuels at the farm and sustain their mission statement of being a source of sustainable urban agriculture, the UW farm is in need of a mini wash pack at the Mercer Court location.

The objective of this project will positively impact the farm's efficiency and environmental impact as well as working to decrease the UW farm's clients carbon footprint for local food sourcing. The scope of this proposal will highlight the following aspects of installing a mini wash pack at Mercer Court:

- sustainability goals
- budget and cost analysis
- environmental benefits
- labor-savings
- financial benefits

History of The UW Farm

The UW Farm is a 1.5 acre student-powered farm located on the University of Washington's Seattle campus. The farm was first established in 2006 by a group of students who were dedicated to creating a small urban farm on campus. At first the farm started with a couple of garden beds at the Botany Greenhouse, or what is now the Life Sciences building. Since 2011, the farm has expanded to its 3 different locations at; Center for Urban Horticulture, Mercer Court, and on the roof of McMahon Hall. Practicing and providing sustainably grown produce is at the forefront of the UW farms mission as they work hard to shorten the length of farm to table

through CSA shares and providing fresh and local produce for nearby dining halls and student food pantries.

UW Farm's Mission Statement:

Our mission is to be the campus center for the practice and study of urban agriculture and sustainability, and an educational, community-oriented resource for people who want to learn about building productive and sustainable urban landscapes.

Statement of Need

The UW Farm is an urban garden at the University of Washington that is used for education, volunteering, research, and food production. A challenge that arises with the use of urban farms, especially woven into universities, is how to maximize efficiency as much as possible. Since the UW farm has multiple, small gardens laid out across the campus there is an issue of time and use of a truck getting to each one. The carbon emissions from driving back and forth across campus to each section, and having to transport the produce back and forth to be washed then sent out from different sites. The daily back and forth of moving produce for the West and North sites to the East site to the one wash/pack facility is inefficient, pollutes the environment, and takes up too much time and labor. In addition, only one site has a proper hand-washing area to insure food safety requirements.

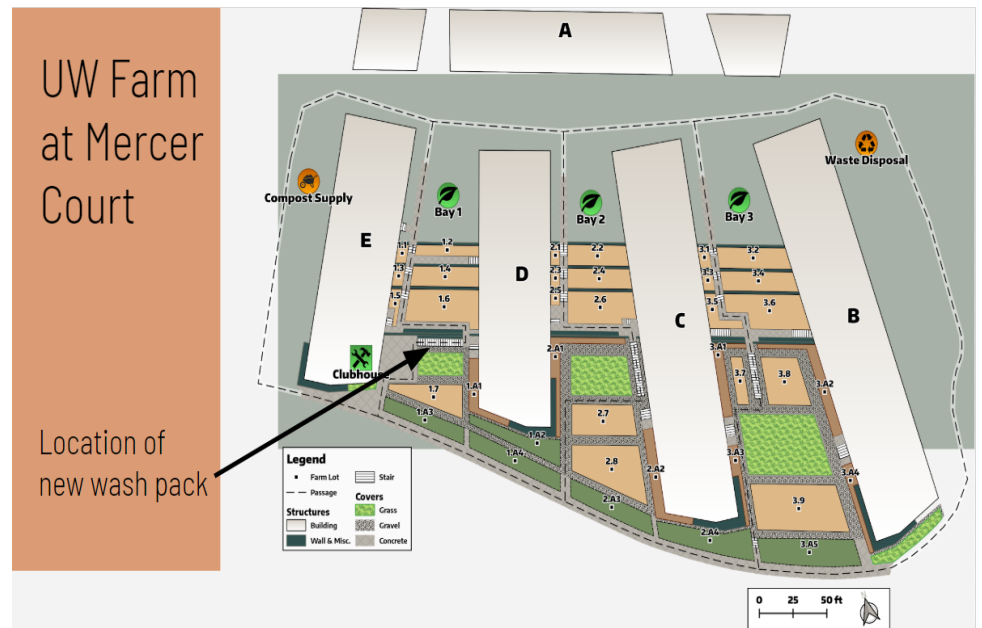
Therefore, the purpose of the wash pack and grant proposal project for the UW Farm is to be able to solve this complex campus community garden problem. The sustainable goals intended to be achieved are to:

- reduce dependence on fossil fuel by reducing/at times eliminating, the need for an automobile for delivering produce to the food pantry and campus dining outlets;
 - save valuable farm staff time by reducing time spent in the truck moving produce from one site to the other;
- improve food safety by having an accessible, adequate hand-wash sink;
- save drinking water by directing used wash/pack water for irrigating crops on-site to enable the cleaning of field tools and irrigation of planted beds reusing captured water versus drinking water.

In order to address this matter, there has been an urgency for implementing a “Mini Wash/Pack in an area by one of the garden sectors (Mercer Court) that is closest to where that produce is mainly sold to (The Husky Grind). In addition, it would help the UW Farm to fulfill their financial sustainability goals if there was funding to help. To solve this, this proposal has been created so it can be sent to many different contacts and potential sources for funding in order for the UW Farm to have the best chance in getting funding for their projects now and for future aspirations. By addressing these topics as the UW Farms top priorities, it will create an urgency in helping this urban campus farm become more sustainable and more supported.

Project Description

The UW farm is in need of a second Mini-Wash Pack facility. At Mercer Court, a fenced area is possible to create one. A Mini/Wash pack facility will allow the workers at the UW farm to save time and money by washing the produce harvested at the Mercer court farm instead of transporting it to the main UW farm location. This Mini/Wash pack will be located between



stairwell would be lockable drawers to hold tools. Encasing this mini wash pack system is fencing, with the front part on a track (as seen in figure 3) that would fold into the largest fencing panel to allow for easy access when the wash pack needs to be used. This fencing system will also have a locking mechanism to prevent outside tampering. We hope that this project can be completed by the summer of 2021 and further UW's goal of becoming a more sustainable campus.

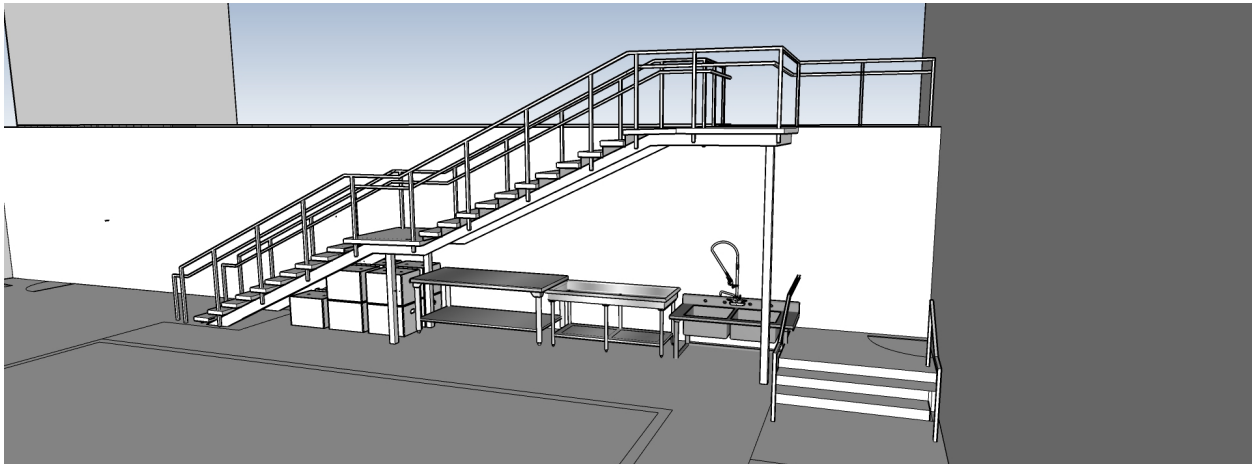


Figure 2

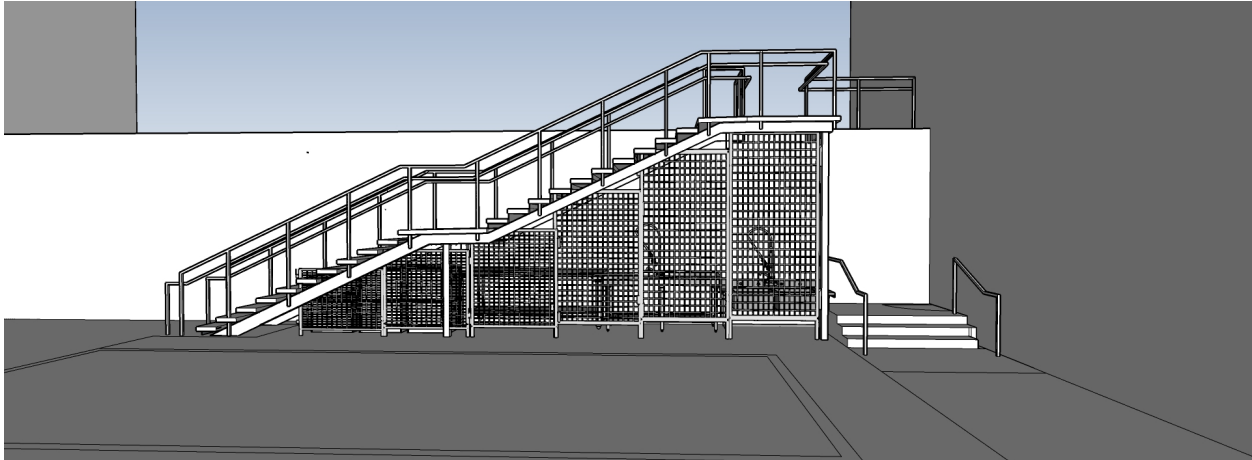


Figure 3

Methods:

To successfully complete our clients project needs we first conducted research to analyze how installing a wash pack at Mercer Court would positively impact the farms environmental footprint. In order to conduct this research we gathered information from the UW farm about

their weekly harvest and washing schedules, how often they drive between locations, and what transportation they are using. Gathering this information allowed us to calculate and estimate the environmental, time, and financial benefits of the mini wash pack. As a part of our environmental analysis we also compared a local food distributor, Charlie's Produce, to the UW farm in order to compare environmental footprints of food production. To conduct this analysis we contacted Charlie's Produce to ask about their transportation, time, and water use. Unfortunately, Charlie's Produce did not feel comfortable sharing this information with us at the time. Therefore, to complete the comparison, we instead used google maps to gather the distance from Charlie's to Mercer Court as well as Charlie's website for other main objectives about their water and time data.

After we conducted our environmental analysis we then prepared a materials cost analysis for the mini wash pack. We prepared and sourced a materials list using an excel sheet to estimate a total cost to instal the wash pack. To estimate a cost for each material required to build the wash pack, we conducted a google search and looked at local home improvement stores such as Lowes and Home Depot for price estimates. We scheduled and met with All City Fencing Company to provide us with an estimate for installment of the fencing surrounding the mini wash pack. To finalize this section we sent our cost analysis to our client to review and approve the materials.

Lastly to finish our project, We collaborated to write a grant proposal to help source funding for the wash pack. Before writing the grant proposal we researched the proper format of a grant proposal by looking at academic examples of previously submitted proposals. Each member of our team worked together to create a title page, table of contents, project abstract, statement of need, environmental and cost analysis, and final pictures of the design. The grant proposal was sent to our client for review and editorial recommendations.

Results:

Environmental, Time, and Financial Benefits

Besides the benefit of added convenience with the new wash pack at Mercer Court, there are also environmental, time, and financial benefits. Trips are made from Mercer Court to CUH three times a week in order to wash produce in the CUH wash pack. The washed produce is then returned to Mercer Court. A one way trip takes approximately 10 minutes, so after the road trip it

becomes 20 minutes¹. Multiplying by three then gives the weekly time of 60 minutes, or one hour. Two people are in the truck each time it makes its trip however, so the effective lost work hours per week would be two hours.

The distance by car from Mercer Court to CUH is 2.3 miles², which would then be a 4.6 miles round trip. Multiplying 4.6 by three gives the weekly distance traveled of 13.8 miles. The truck used by the UW farm to transport is a 2004 Chevrolet Colorado, and the reported city fuel efficiency is 16 miles per gallon³. The gallons of fuel used per week is then determined:

$$\frac{13.8 \text{ miles}}{1 \text{ week}} \times \frac{1 \text{ gallon}}{16 \text{ miles}} = 0.8625 \frac{\text{gallons}}{\text{week}}$$

One gallon of gasoline produces 19.60 pounds of CO₂⁴, so multiplying the truck's weekly fuel use by the emissions per gallon yields 16.905 pounds of CO₂ produced per week. With the new wash pack, these emissions would be eliminated. The UW farm transports produce from Mercer Court to CUH for about 8 months of the year or about 34 weeks, so this would lead to CO₂ mitigations of approximately 574.77 pounds per year. The weekly fuel use also allows an estimation of financial savings. The average price for a gallon of gasoline in northern Seattle is \$2.89⁵. The weekly fuel usage of 0.8625 gallons would thus translate to approximately \$2.49 per week in direct savings. As with emissions, multiplying the weekly savings by 34 would yield annual savings of approximately \$84.66.

¹Google Maps. *Building E, 3927 Adams Ln NE, Seattle, WA 98015 to UW Farm at the Center for Urban Horticulture*. Retrieved May 21, 2020 from <https://www.google.com/maps/dir/47.6543943,-122.3184849/UW+Farm+at+the+Center+for+Urban+Horticulture/@47.6566028,-122.3101805,15.78z/data=!4m9!4m8!1m0!1m5!1m1!1s0x549015316d604559:0x12943684f6fd0dd4!2m2!1d-122.292343!2d47.6583975!5i2>

²Google Maps. *Building E, 3927 Adams Ln NE, Seattle, WA 98015 to UW Farm at the Center for Urban Horticulture*. Retrieved May 21, 2020 from <https://www.google.com/maps/dir/47.6543943,-122.3184849/UW+Farm+at+the+Center+for+Urban+Horticulture/@47.6566028,-122.3101805,15.78z/data=!4m9!4m8!1m0!1m5!1m1!1s0x549015316d604559:0x12943684f6fd0dd4!2m2!1d-122.292343!2d47.6583975!5i2>

³Fueleconomy.gov. *2004 Chevrolet Colorado Crew Cab 4WD*. Retrieved May 21, 2020 from <https://www.fueleconomy.gov/feg/noframes/20031.shtml>

⁴U.S. Energy Information Administration. (2016, February 2). *Carbon Dioxide Emissions Coefficients*. Retrieved May 21, 2020 from https://www.eia.gov/environment/emissions/co2_vol_mass.php

⁵King5.com. *Gas Prices: Lowest Gas Prices in Seattle - N*. Retrieved May 21, 2020 from <https://www.king5.com/gas-prices>

⁶ These prices reflect the time of researching; they are subject to and likely to change.

The new wash pack could also be used to lower the water usage of the UW farm. Each time the wash pack is used to clean produce from the farm, each of the three sink basins will be filled up twice. Each 24" by 24" by 14" sink holds 8,064 in³ of water. Adding the two other equally sized sinks, and then multiplying by two because each sink is filled up twice, yields a total water use of 48,384 in³ or around 209 gallons. The total weekly water use would thus be around 627 gallons per week due to three weekly washings. Assuming the 34 weeks of harvest using the wash pack, and with all used water being recycled, this project could see water savings as high as 21,318 gallons per year. Water from the sinks will drain through PVC pipes that connect to another PVC pipe, consolidating the used water from all the sinks to a single flow. This final pipe will lead out the side of the wash pack, where a larger diameter flexible black pipe can be attached to it. This pipe will be used to divert the water to a nearby garden run by the Dirty Dozen's Club to be used as irrigation. The flexible pipe can also easily be removed to allow for five gallon buckets to be placed underneath the PVC pipe to collect the water. The buckets of water would then be used to clean farms tools and equipment.

Environmental Benefits in comparison to Charlie's Produce:

Charlie's Produce is a distribution center that collects produce from farms all over Washington, Idaho, and California and is a major vendor that supplies a significant amount of produce to UW housing. In saying this, since Charlie's Produce does not grow food their environmental impact is much greater than the UW Farm's. Charlie's Produce is located about 7.6 miles from Mercer Court, so the carbon emissions are more from car usage. Whereas, CUH is 2.3 miles from Mercer Court and still involves quite a bit of gas emissions to travel back and forth from each site. With the implementation of a washpack at Mercer Court it will make the distance even shorter since the dining hall that can be supplied from the UW farm is within 100ft walking distance. Charlie's Produce doesn't use a Wash/Pack either because they have a larger washing and packaging system, which uses more water than the UW Farm. Therefore, based on the water saving in the section above, a Wash/Pack station saves gallons of water. The last environmental comparison between Charlie's and the UW Farm is the amount of time saved from a Wash/Pack on the UW Farm. Since the UW Farm is local it saves tons of time to harvest, wash, and package produce versus waiting the delivery from farms to Charlie's, then package it up, and then deliver it to Mercer. Overall, when comparing environmental benefits of another

vendor UW HFS has it is clear to see the impacts of a Wash/Pack in the Mercer Court location include:

- Environmental: less carbon emissions
- Economic: more money savings on less gas
- Social: washing and packaging food in a local campus spot is more accessible to the UW Farm staff and UW dining halls

Cost Analysis

The materials needed to instal a Mini Wash/Pack at Mercer Court includes; a 3-basin sink, hand-washing sink, a foldable workbench table, a flexible pipe for directing flow to garden beds, PVC pipe for sink drainage, pipe fittings, a bordering fence around the stairs with a lockable component, and an attachable whiteboard. The above stated materials will be gathered from used or recycled materials wherever possible. These materials will enable the UW farm student staff to efficiently wash harvested produce in close proximity to the delivery outlets near Mercer Court and have an easily accessible, external hand-wash sink for increased food safety.

Description	Notes	Amount
3-Basin Wash Sink	Regency 124" 16-Gauge Stainless Steel Three Compa	\$773.00
Hand Washing Sink	<u>12" x 16" Wall Mounted Hand Sink with Gooseneck I</u>	\$55.00
Flexible Pipe for Directing Water	HydroMaxx 3 in. x 50 ft. Black PVC Schedule 40 Flexible Pipe	\$228.50
PVC Pipe for Sink Drainage	2 in. x 10 ft. 280-PSI Schedule 40 PVC DWV Plain E HydroMaxx 2 in. Schedule 40 PVC Pipe Tee Fitting X HydroMaxx 2 in. Schedule 40 PVC Pipe 90-Degree E	\$34.37
Pipe Fittings	Needs a direct size for pipe fittings	\$25.00
Faucet for 3-Basin Wash Sink	Regency Wall Mount Faucet with 14" Swing Spout, 2 GPM Aerator, 8" Centers, and Lever Handles	\$41.59
Foldable Table	Sparrow Peak 48-in W x 20-in H Hardwood Work Bench	\$105.00
Foldable Fence	Estimae from All City Fence	\$7,081.96
Garden Hose	FLEXON 5/8-in x 50-ft Light-Duty Vinyl Green Hose	\$10.00
Attachable White board	MagFlex Lite MFLA4(GWD)-1 Flexible A4 Magnetically Attachable Whiteboard Sheet (297 x 210 x 0.76mm) (Pack of 1)	\$22.00
Miscellaneous/Plumber	Extra funds	\$1,000.00
		\$9,376.42

Discussion:

We were able to achieve our objectives because through the many tasks we were given within this project we accomplished them all in order for the Wash/Pack at the UW Farm to be ready and fully implemented when the time comes. In addition, we included some recommendations that could continue to help the UW Farm, if they would like to take any into consideration for future times. Our recommendations includes;

1. Implementing a cistern

We included this as a recommendation because we didn't have the time, the planning, or the funding to add one during this quarter. A cistern is a waterproof tank that is meant for catching and storing rainwater. Perry and us believe that this would be a good future investment for the farm in order to catch all the rain that Seattle gives, so the farm can use it in a more sustainable way by storing it and irrigating all the crops. Another benefit a cistern brings is it allows for a small tool washing station, so that there is a smaller gap of wasted water used from just a hand sink being turned on and off.

2. Use the environmental benefits of the wash pack for promotional material.

The new environmental benefits provided by the new wash pack can be used by the UW farm or Housing and Food Services (who buys produce from the uw farm) to promote the farm. Promotional material can also include the new benefit caused by having the new wash pack so close to the Husky Grind at Mercer Court. The Husky Grind buys produce from the UW farm, including the kale for its kale salad. That kale is grown and harvested at the Mercer Court location of the UW farm, but currently must make the trip to CUH in order to be washed and packed. The new wash pack would allow the whole life cycle of the kale, farm to fork, stay in a radius of a few hundred yards. This new fact could easily be used to promote how local UW food services are.

3. Expand fencing to all the stairwells.

This last recommendation was included because Perry informed us during this project that the sun is bad for produce shelf life. Therefore, by implementing fencing under each stairwell within the farm it grants more secure storage for harvested produce, tools, and it would be a better shaded area so the produce doesn't get bad as easily.

Overall, the cistern provides a great environmental impact, economically by implementing these recommendations it can save money from buying less storage space and gas money for travel between CUH and Mercer, and socially it makes the farm's staff life way more accessible to their needed tools and harvests.

Next Steps:

The UW farm can use the finished grant proposal to essentially soft submit it to their 10 potential funders. What this means is that the proposal will be sent to the organization as is (maybe with a few minor changes), and the organization will review the proposal and provide feedback. With this feedback, the UW farm could then adjust the proposal to more accurately meet the needs/demands of the funding organization. It may also be the case that the number of potential funders will be narrowed down, as after seeing the proposal some organizations might decide it is not for them. After the necessary adjustments are made for each of the organizations, the proposal will be resubmitted. This time it will be more official, and will ask if the organizations would like to fund the project or not.

Conclusion:

In conclusion, the addition of a Mini wash pack at the Mercer court location would be a great benefit to the UW farm. Not only will it be simply more convenient for the farm by saving time and hassle, it will also have a beneficial impact on the environment. Hopefully our proposal will be successful in obtaining funding for the project, and with little extra effort on the part of the UW farm. The proposal may need some changes to tailor it to the needs of specific potential funders.