Recommendations for Solar Panel Initiatives at Geer Park In Salem, Oregon

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SALEM

PPPM445: GREEN CITIES | SCHOOL OF PLANNING, PUBLIC POLICY AND MANAGEMENT

UNIVERSITY OF OREGON
CITY OF Salem AT YOUR SERVICE
SCI Sustainable Cities Institute
SCYP Sustainable City Year Program

Acknowledgments

The Green Cities course at the University of Oregon was a collaborative effort among students, stakeholders, and other working professionals. The proposed initiatives presented in this report are a testament to the exchange between students and community collaborators. The students would like to acknowledge and extend their sincere appreciation to the following individuals, who were instrumental in the completion of this report, for their time and generosity throughout the term:

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About SCI

The Sustainable Cities Institute (SCI) is an applied think tank focusing on sustainability and cities through applied research, teaching, and community partnerships. We work across disciplines that match the complexity of cities to address sustainability challenges, from regional planning to building design and from enhancing engagement of diverse communities to understanding the impacts on municipal budgets from disruptive technologies and many issues in between.

SCI focuses on sustainability-based research and teaching opportunities through two primary efforts:

1. Our Sustainable City Year Program (SCYP), a massively scaled university-community partnership program that matches the resources of the University with one Oregon community each year to help advance that community's sustainability goals; and

2. Our Urbanism Next Center, which focuses on how autonomous vehicles, e-commerce, and the sharing economy will impact the form and function of cities.

In all cases, we share our expertise and experiences with scholars, policymakers, community leaders, and project partners. We further extend our impact via an annual Expert-in-Residence Program, SCI China visiting scholars program, study abroad course on redesigning cities for people on bicycle, and through our co-leadership of the Educational Partnerships for Innovation in Communities Network (EPIC-N), which is transferring SCYP to universities and communities across the globe. Our work connects student passion, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

About SCYP

The Sustainable City Year Program (SCYP) is a yearlong partnership between SCI and a partner in Oregon, in which students and faculty in courses from across the university collaborate with a public entity on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner agency through a variety of studio projects and service- learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations that result in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

About City of Salem

The City of Salem is Oregon's second largest city (179,605; 2022) and the State's capital. A diverse community, Salem has well-established neighborhoods, a family-friendly ambiance, and a small town feel, with easy access to the Willamette riverfront and nearby outdoor recreation, and a variety of cultural opportunities.

The City is known for having one of Oregon's healthiest historic downtowns, hosts an airport with passenger air service, and is centrally located in the heart of the Willamette Valley, 47 miles south of Portland and an hour from the Cascade Mountains to the east and the ocean beaches to the west.

State government is Salem's largest employer, followed by the Salem-Keizer School District and Salem Health. The City also serves as a hub for area farming communities and is a major agricultural food processing center. A plethora of higher education institutions are located in Salem, ranging from public Western Oregon University, private Willamette and Corban universities, and Chemeketa Community College.

Salem is in the midst of sustained, steady growth. As a "full-service" city, it provides residents with services such as police and fire protection, emergency services, sewage collection and treatment, and safe drinking water. Salem also provides planning and permitting to help manage

growth, as well as economic development to support job creation and downtown development. The City also provides 2,338 acres of parks, libraries and educational programs, housing and social services, public spaces, streetscaping, and public art.

Salem's vision is a safe, livable, and sustainable capital city, with a thriving economy and a vibrant community that is welcoming to all. The City's mission is to provide fiscally sustainable and quality services to enrich the lives of present and future residents, protect and enhance the quality of the environment and neighborhoods, and support the vitality of the economy. The City is in the midst of a variety of planning efforts that will shape its future, ranging from climate action planning and implementation, a transportation system plan update, as well as parks master planning.

This SCYP and City of Salem partnership is possible in part due to support from U.S. Senators Ron Wyden and Jeff Merkley, as well as former Congressman Peter DeFazio, who secured federal funding for SCYP through Congressionally Directed Spending. With additional funding from the city, the partnership will allow UO students and faculty to study and make recommendations on city-identified projects and issues.

Course Participants

UNDERGRADUATE

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Course Description

PPPM445: GREEN CITIES

This course explores the complex relationship between urban policy, politics, and climate change, examining how cities can transition toward a more sustainable future. Through a project-based learning approach, students collaborate with city representatives to investigate and address a pressing sustainability challenge. The course's goal is to create and foster professional planning and project skills while upholding the highest standards of ethical conduct and equity.

Executive Summary

The University of Oregon's Green Cities students focused on creating innovative and sustainable solar panel proposals for Salem's Geer Park, located near the Oregon State Penitentiary, which has been historically underfunded and undervalued. The class focused on addressing the city's questions concerning solar capacity, alignment with sustainable infrastructure objectives, and potential for replication in other locations. By organizing into three focus areas:

1. Solar Park Lighting
2. Community Solar Pavilion
3. Solar Awnings

Students conducted a robust exploration of design possibilities. Drawing on diverse academic backgrounds, students enriched their designs with insights from various fields. Through access to diverse resources, including case studies, guest lectures and academic journals, students tailored design ideas for Geer Park's unique context. The resulting proposals not only aim to enhance community engagement and reduce grid reliance but also offer potential synergies with broader sustainability initiatives. Through their efforts, students strived to transform Geer Park into a resilient and inclusive public space, increasing community engagement amidst the park's existing underutilization.

Introduction

This project represents a collaborative effort between the winter 2024 Green Cities class and the City of Salem to integrate solar facilities into Geer Park, one of Salem's 92 parks. As outlined by the City of Salem, the initiative aims to address the park's underutilization, promote sustainability, and enhance community engagement. By incorporating solar facilities, the city seeks to generate energy for Geer Park, reduce its grid reliance, and enhance energy resilience, particularly during peak demand periods such as the summer. Moreover, the proposed initiatives aim to attract more visitors to Geer Park, offering enhanced recreational activities to contribute to its revitalization and the community's overall well-being.

Student groups proposed solar recommendations that reflect their exploration into sustainable solutions aimed at answering the following questions:

- What is the solar capacity OR ability of the proposed recommendation?
- What added benefits from the recommendation can potentially connect with other sustainable infrastructure goals?
- How could a similar project be replicated at other sites?

Groups

SECTION 1: SOLAR PARK LIGHTING

Team: Nicole Alstrin, Alexis Demery, Yaire Solano Guevara, Avi Hille, Andy Lam, Grace Lee Maisie McCarley, Gabrielle Pearse, Maia Thomas, Cami Tommeraason, Emily Torres, and Chloe Wood

Proposal: This proposal imagines the enhancement of Geer Park's infrastructure through the integration of solar-powered lighting, considering the park's needs and the broader community context. Students decided to recommend solar lighting as it aligns with the City of Salem's commitment to sustainability, offering an energy-efficient alternative to traditional lighting systems that Geer Park currently utilizes.

By harnessing renewable energy sources, Geer Park can reduce its carbon footprint and contribute to Salem's transition towards a greener future. Moreover, the self-sufficiency of solar lighting systems ensures the park has sufficient lighting, even in the event of grid failures or brown outs. Solar lighting would enhance the safety and accessibility for Geer Park users.

FIG. 1

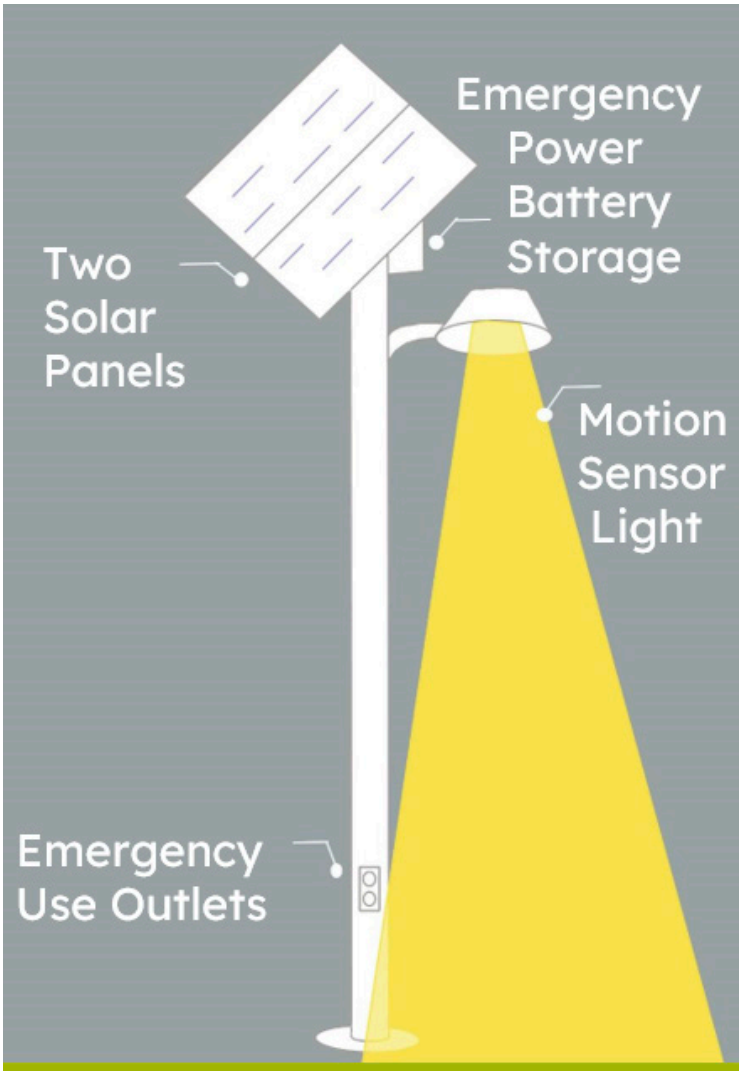
Emergency
Power
Battery
Storage
Two
Solar
Panels
Motion
Sensor
Light
Emergency
Use Outlets

FIG. 2

Solar Light Models

EverGen M by Sunna Design

- The EverGen M model can function independently of the grid, which ensures consistent lighting, even during power outages, enhancing safety and security for park users. The group considered this to be an important feature keeping in mind power outages in the area, especially during the summer months.
- The EverGen M model has a modular design and a simplified installation process that makes it an efficient and cost-effective solution for large-scale deployment, considering Geer Park would require 41 systems to cover both walking and bike trails.

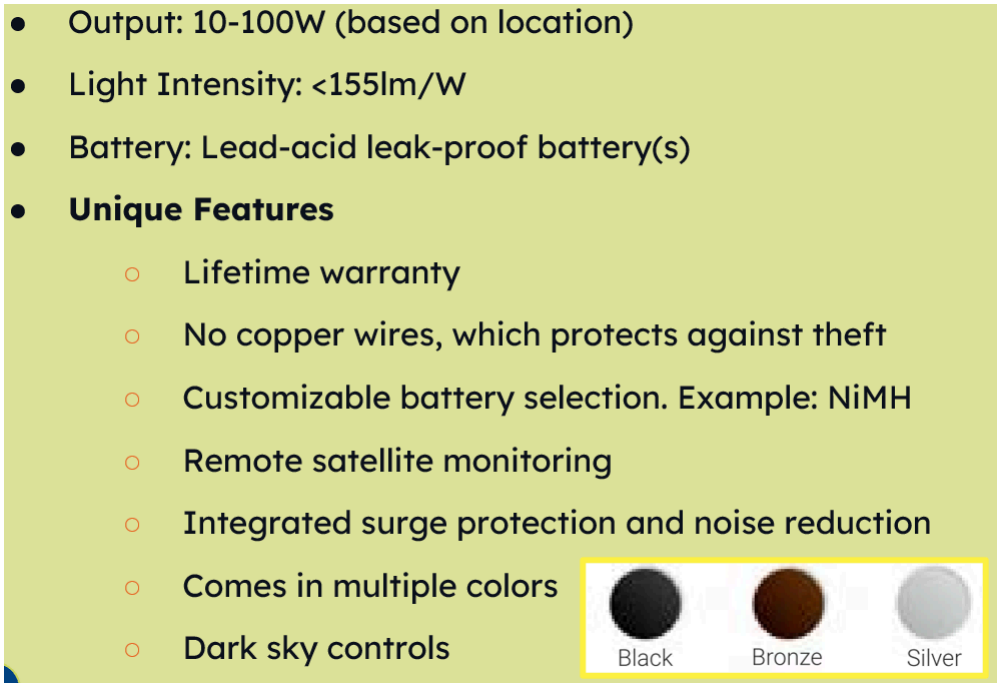

FIG. 3

EnGo Leaf by EnGoPlanet

- While the EnGo Leaf offers innovative features such as customizable LED lighting and integrated motion sensors, its lack of warranty and price transparency raised concerns for the group regarding long-term reliability and cost-effectiveness and prompted discussions regarding maintenance costs and system replacement.

FIG. 4

- **Price:** Unknown
- **Output:** 20-30W
- **Light Intensity:** 180 lm/W
- **Design:** Comes in 13 ft or 20 ft model and white or black
- **Battery:** Lithium battery within pole, can store over 100 hours of lighting power
- **Features**
  - LED light can be customized to preferred color and brightness remotely, allowing for less power use
  - Motion sensors for lights
  - Charging port for mobile devices
  - Security cameras

FIG. 5

	Engo Leaf	EverGen-M
Price per unit	Unknown	$5,241.00
Output per unit	3,600 lumens	2,924 lumens
Green Features	Motion Sensors	Dark-Sky Control
Warranty	None	10 year limited warranty
Additional Equipment	Charging Port, Security Camera	Extended battery warranty

Project Budget

The Solar in Geer Park project budget includes detailed estimates for the EverGen-M solar lighting systems but notes that the cost for the EnGo Leaf systems remains unknown. Specifically, for the walkway and bike path, 41 EverGen-M systems are estimated at $5,241 each, totaling $214,881. For the walkway only, 29 systems are projected to cost $151,989. The EnGo Leaf system's cost is not provided because it requires a call to the supplier for a custom quote. This adds an element of variability to the budget, as the final choice of lighting system could affect the overall project cost depending on the quote obtained for the EnGo Leaf.

Walkway + Bike Path	
Estimated # of Systems	41
Energy Generated*	16,400 W
Battery Storage	41,984 W
Total	58,384 W

Walkway Only	
Estimated # of Systems	29
Energy Generated*	11,600 W
Battery Storage	29,696 W
Total	41,296 W

FIG. 6

Community Engagement

This team suggested inviting local schools, clubs, and artists to decorate each solar light pole to foster community engagement and creativity. Creating opportunities for children to participate in painting the light posts not only encourages their creativity but also instills a sense of ownership and pride in their community. By involving children in such projects, they have an opportunity to learn the value of beautifying and maintaining public spaces from a young age, fostering a deeper connection to their surroundings. This collaborative approach beautifies public spaces and ideally mitigates potential vandalism through community involvement and the creation of public art, fostering a safer and more vibrant community environment.

Moreover, a well-lit park plays a crucial role in community engagement by providing a safe and inviting space for residents to gather, socialize, and participate in various activities. When parks are well-lit, they become more accessible, extending their usability into the evening hours and encouraging people of all ages to enjoy outdoor recreational activities. This contributes to a stronger sense of community cohesion, as neighbors come together to share experiences and build relationships in a welcoming and illuminated environment.

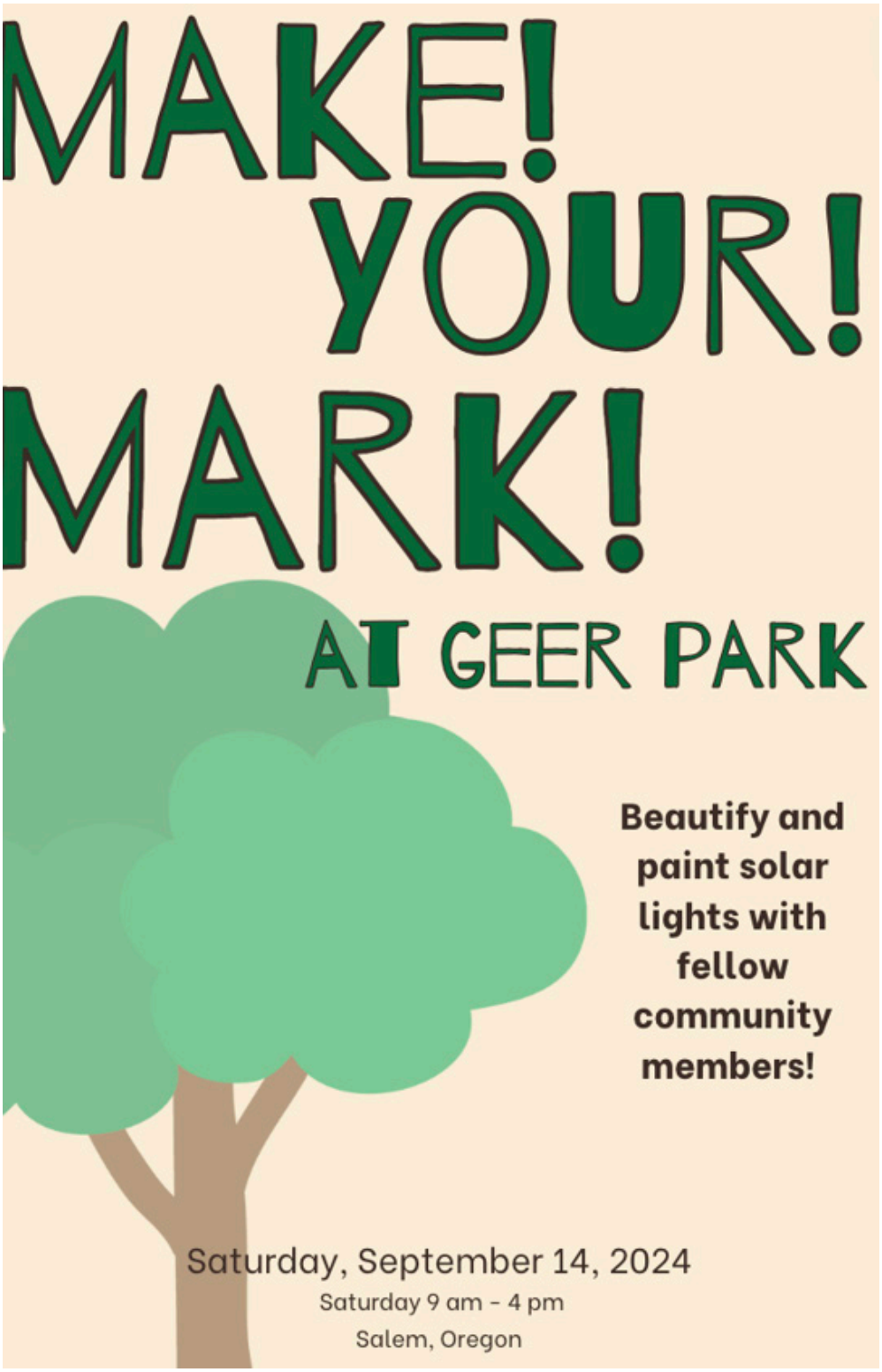

FIG. 7

Student mockup poster of community event

FIG. 8

Similar Projects

Students identified two locations that have implemented similar solar-powered lighting projects, emphasizing sustainability, safety, and cost efficiency.

Woodland Terrace Park in Tampa, Florida, installed solar-powered lighting along the walking trail. This initiative aims to enhance safety by providing better illumination, which also deters criminal activity, thus making the park safer for users. The use of solar power brings significant cost savings by reducing electricity bills and eliminating the need for extensive wiring, which lowers installation expenses. Additionally, the project incorporates timers to limit light pollution, aligning with environmental sustainability goals.

Similarly, **Wellen Park** in Sarasota County, Florida, introduced solar-powered lighting for its walkways and trails within a new residential area. This project is environmentally friendly, utilizing renewable energy to reduce the park's carbon footprint. The solar lighting system is designed to operate independently of the power grid, ensuring reliability even during power outages. Furthermore, the system's durability and low maintenance requirements contribute to long-term cost savings.

FIG. 9

Woodland Terrace Park solar powered lighting

FIG. 10

Wellen Park solar powered lighting

SECTION 2: COMMUNITY SOLAR PAVILION

Team: Haley Alferez, Gavin Burgess, Jess Chapin, Fisher Cherney, Alexandra Cox, Himali Glor, Kayla Helligso, AJ Iboa Garcia, Georgia Karam, Stephenie Kerr, Asher Krauel, Josh Marion, Coop Naumann, Wyatt Piurkowsky, Alice Puk, Mackenzie Ross, Jacob Roth, Amelia Styan, Jill Taylor, Blaire West, David Wilcox

Proposal: The "Community-Solar Pavilion Project" aims to integrate solar power into Geer Park to promote renewable energy and civic engagement. The project features a solar panel-covered pavilion designed to provide shelter and a venue for various community activities. The pavilion will incorporate a metal roof with solar panels positioned at a 45-degree angle for optimal energy absorption, and the design encourages flexible uses for concerts, meetings, and vendor spaces. The proposed location for the pavilion is adjacent to a parking lot and connected to surrounding trails, making it accessible and reducing construction costs due to the pre-existing flat and paved site.

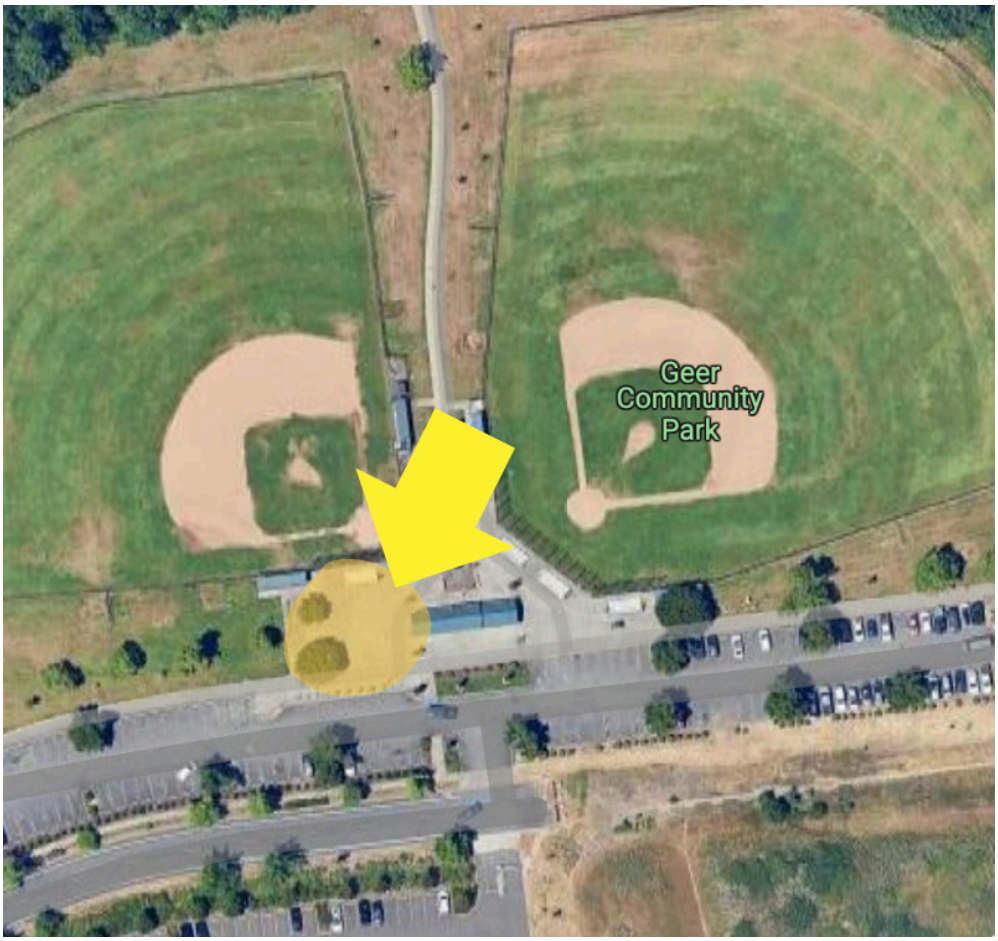

FIG. 11

Aerial view of proposed site location in Geer Park

Design Takeaways

Location of the roof

- Faces south
- Solar panels on the roof are positioned at a 45-degree angle for optimal energy absorption

Elevated platform

- Divides space to create opportunity area for concerts, community meetings, and vendors

Flexible uses

- Maximize space
- Encourage community interactions
- Create potential for communities to add variety

FIG. 12

Produced by Mackenzie and Amelia
Images rendered by Micah Gamlen

Project Budget

The Community-Solar Pavilion Project budget outlines the financial requirements for two different solar capacity scenarios: a minimum of 15 kW and a maximum of 27 kW. The budget includes costs for labor, solar panels, and the structure itself.

15 kW System Budget

- Labor Cost: $14,000
- Solar Panel Cost: $9,720 for 27 panels
- tructure Cost: $225,000

Total Cost: $251,288

27 kW System Budget

- Labor Cost: $30,000
- Solar Panel Cost: $18,000 for 50 panels
- Structure Cost: $225,000

Total Cost: $292,704

Breakdown of Costs

Labor Cost

- For the 15 kW system, labor costs are estimated at $14,000.
- For the 27 kW system, labor costs increase to $30,000 due to the larger number of panels and additional work required.

Solar Panel Cost

- The 15 kW system requires 27 solar panels, costing $9,720.
- The 27 kW system requires 50 solar panels, costing $18,000.

Structure Cost

The structure cost remains constant at $225,000 for both systems. This cost covers the construction of the pavilion itself, which includes a mass timber frame sourced from Oregon.

Total Budget

- For the 15 kW system, the total estimated cost is $251,288.
- For the 27 kW system, the total estimated cost is $292,704.

This budget ensures that the pavilion will be adequately equipped to generate renewable energy while providing a functional and versatile community space. The detailed allocation of funds highlights the financial planning needed to achieve the project's energy and community engagement goals.

Energy Output And Solar Capacity

The solar panels installed on the pavilion are designed to optimize energy absorption and significantly contribute to the city's renewable energy goals. The pavilion will feature a roof with solar panels positioned at a 45-degree angle, facing south to maximize sunlight capture. Two solar capacity options are considered: a 15 kW system with 27 panels and a 27 kW system with 50 panels. The 15 kW system will generate enough energy to power various pavilion activities, while the 27 kW system will provide

even greater energy output, contributing more substantially to the park's energy needs. These solar installations reduce greenhouse gas emissions and help Salem move towards its goal of cutting emissions by 50% by 2035 and achieving carbon neutrality by 2050. The energy generated by the pavilion's solar panels will also be available for charging stations, making it a practical and sustainable addition to the community infrastructure.

Community Engagement

The Community-Solar Pavilion Project is designed to significantly boost community involvement by creating a versatile, multifunctional space in Geer Park. The pavilion will serve as a hub for various activities such as concerts, community meetings, farmers' markets, and food truck gatherings. This space is intended to foster social interaction, providing a venue where residents can gather, share experiences, and participate in local events. Moreover, the project includes initiatives to engage the community from start to finish. This involves conducting surveys to gauge public opinion, informing residents about environmental consciousness, and involving local non-governmental organizations (NGOs) and community organizations for additional support and funding. Post-implementation, the pavilion will continue to be a focal point for community engagement through events like cookouts, which will utilize the space and educate the public about the benefits of renewable energy and sustainable practices. Students team members highlighted potential multi-use strategies and community uses, including;

Multi-use strategy

- Provide economic opportunities for local businesses and consumers
- Reduce car trips through the injection of commercial markets within recreational land
- Encourage safe, convenient, walkable, and bikeable trips for residents and workers

Possible community uses

- Civic engagement
- Volunteer opportunities
- Cultural events
- Sustainable energy
- Shelter and shade
- Picnic areas
- Community connectivity
- Environmental education
- Emergency/disaster resilience
- Local businesses
- Community projects

FIG. 13

Produced by Mackenzie and Amelia
Images rendered by Micah Gamlen

FIG. 14

Produced by Mackenzie and Amelia
Images rendered by Micah Gamlen

Similar Projects

Students identified The Pioneer Solar Pavilion at Hess Park in Lee Vining, California, as an exemplary project that highlights sustainable energy practices and fosters community engagement. This pavilion, utilizing solar panels, harnesses the abundant sunlight of the region to provide a renewable source of energy, thereby reducing the community's reliance on non-renewable power sources and lowering its carbon footprint. Serving as an educational tool, the pavilion demonstrates the practical applications of solar energy. Visitors and locals alike can learn about solar technology and sustainability through educational signage and interactive displays, making renewable energy more accessible and understandable.

The pavilion is equipped with charging stations and a real-time solar generation monitor, enhancing its role as a model for sustainable energy practices. The inclusion of charging stations is a practical feature that underscores the pavilion's commitment to promoting renewable energy usage. These stations allow visitors to charge their electric vehicles, bicycles, and other electronic devices using clean, solar-generated power. This supports the adoption of electric vehicles by providing essential infrastructure and also demonstrates the direct benefits of solar energy in everyday life.

FIG. 15

Community event at The Pioneer Solar Pavilion

FIG. 16

Electric charging station at The Pioneer Solar Pavilion

SECTION 3: SOLAR AWNINGS

Team: Dahlin Allen, Ezra Bergson-Michelson, Trent Garzoli, Aaron Gathrid, Natalie Hartley, Owen Kaufman, Franki Phelan, Lulu Robb-Upham, Miranda Stone

Proposal: This proposal concentrates on enhancing comfort, convenience, and accessibility at Geer Park by proposed installing various solar-powered awnings within the park, particularly restroom facilities and seating arrangements. By installing solar awnings in Geer Park, students aim to strike a balance between energy efficiency and practical use. Students believe panels will provide energy to the grid and shade for the park visitors, enticing neighbors and Salem residents to enjoy their time in Geer Park on sunny and cloudy days.

Solar Capacity

The solar capacity of the park includes various installations: a bathroom with a maximum capacity of 1.1 kW, large covers with a total capacity of 34.8 kW, and a small cover with 6.56 kW, amounting to a total of 40.46 kWh at maximum capacity. However, this is adjusted to 36.02 kWh to account for Oregon's temperatures. The annual maximum capacity is estimated at 315,584 kWh. These solar installations aim to generate renewable energy and serve

dual purposes, such as providing shaded picnic areas and bike racks, contributing to both energy generation and user comfort.

The project is budgeted at $74,980, with $60,000 allocated for structures, $3,000 for shipping the structures, and an additional $1,000 to $3,000 for shipping the solar panels. Installation and maintenance costs are included, resulting in an effective rate of $0.24 per kWh in the first year of generation. These costs reflect a significant investment in sustainable infrastructure aimed at long-term benefits for the community.

Project Budget

Item	Amount
Total Budget	$74,980
Structures	$60,000
Shipping (Structures)	$3,000
Shipping (Solar Panels)	$1,000 - $3,000
Effective Rate (First Year)	$0.24 per kWh
Installation and Maintenance	Included

Resident Feedback

The group conducted a survey among residents of Salem to gain insight into their preferences regarding expansion of the park. Survey responses indicated strong support for the enhancements proposed in the Geer Park Solar Project. Community feedback highlighted a desire for a multi-use park that caters to various needs beyond just sports facilities. Many residents emphasized the importance of having diverse amenities, such as picnic areas, playgrounds, a dog park, community gardens, and skateboard parks. Direct quotes from Salem residents include:

"The city should create a multi-use park serving multiple users, not just those using the ball fields. I support picnic and playground areas, dog park, community garden, and skateboard park."

"This should be a multi-use park, not just for soccer and baseball and bikes… Provide a pathway…Build a dog park and community garden area…Reduce park lot size"

"The park should be a diverse area with something for everybody; a dog park, community garden, open space…"

"Top three desired features: expanded trails, more shade trees/tree planting, and natural areas/pollinator gardens."

"I would love to see… a covered area for hot or rainy days."

"I'd like to see the following changes/ additions to the plans for Geer Park… add covered community area (s). Make this a neighbor park, and not just a city wide sports venue."

Design Takeaways

One two-stall bathroom

- Add two 0.55 kW (STC maximum) solar panels (89.68” x 44.64” x 1.38”) on top of the bathroom
- Add a path extension to include paved paths to both the bathroom and the bike rack-covered area
- Include covered area (north of skatepark on northwest zone of skate plaza) that shelters a bike rack, water fountain, and two (rather than four) benches
- Addition of bathrooms near the skatepark for easier access to bathrooms

Covered area for three picnic tables

- Covered area is constituted by a solar mount (67’W X 13’D X 8-12’ H, four load bearing support columns) and solar panels (40 of the 76.68” x 40.32” x 1.57”, 0.41 kW STC max. panels)
- Covered area (on western tip of planting area) that shelters a picnic table
- Covered area is constituted by a solar mount (26’W X 13’D X 8-12’H, three load bearing support columns) and solar panels (16 of the 76.68” x 40.32” x 1.57”, 0.41 kW STC max. panels)

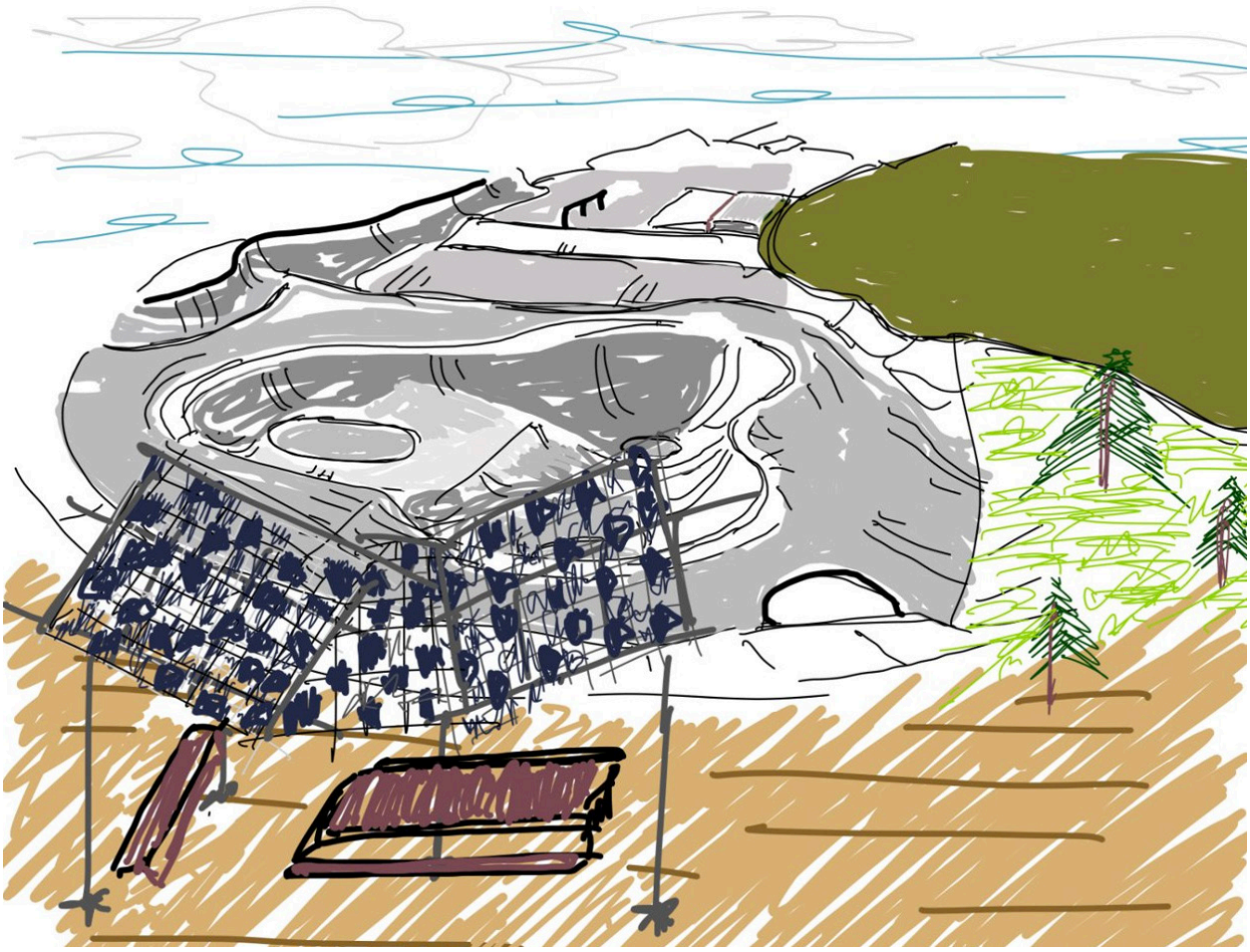

FIG. 17

Student drawing of proposed picnic area covered by solar panels

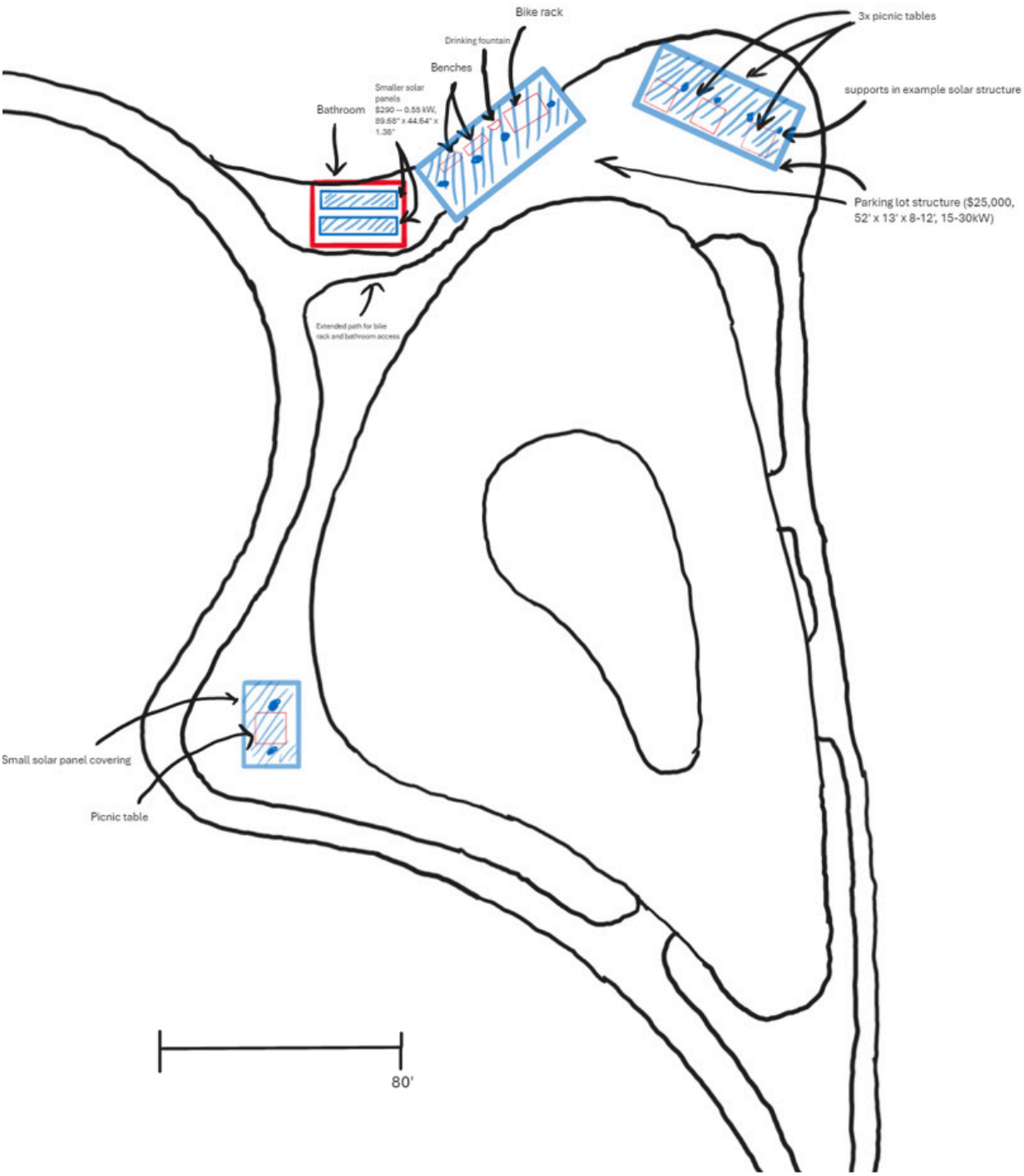

FIG. 18

Student drawing of layout of the proposed project

FIG. 19

Changes to Geer Park Master Plan site plan graphic

Site Exploration

Riverfront Park, Salem

The team also explores the potential for replication at other city sites, such as Riverfront Park. By focusing on sustainability and community use, similar initiatives could be implemented in other parks. Riverfront Park is a key recreational area in Salem, offering a variety of amenities and activities for residents and visitors. Located along the Willamette River, the park provides scenic views and a natural setting that enhances its appeal. It serves as a central hub for community events, outdoor activities, and leisure.

The park features expansive green spaces ideal for picnics, sports, and casual gatherings. It includes playgrounds for children, walking and biking paths, and open fields suitable for various recreational activities. The proximity to the river also allows for water-related activities such as kayaking and fishing, adding to the park's versatility.

FIG. 20

Layout of Riverfront Park

Given its central location and existing infrastructure, Riverfront Park is an ideal candidate for projects like the Geer Park Solar Project. Implementing solar panels and other sustainable features would enhance the park's environmental footprint while providing additional shaded areas and renewable energy. These improvements could further support the park's role as a community gathering spot by making it more comfortable and eco-friendly.

The integration of solar panels could also serve educational purposes, similar to initiatives proposed for Geer Park. Local schools and community groups could use the park as a living classroom to learn about renewable energy and sustainability practices. This would benefit the park's visitors and promote broader environmental awareness within the community.

Moreover, enhancements at Riverfront Park would complement its existing amenities, attracting more visitors and increasing its utility for a wide range of activities. By adopting sustainable technologies and creating more versatile spaces, the park can continue to serve as a cornerstone of community life in Salem, fostering a sense of community and environmental stewardship.

Ed Benedict Skatepark, Portland

Students identified Portland's Ed Benedict Skatepark as a location where this kind of project could be replicated. Ed Benedict Skatepark, located on Powell Boulevard, spans 18,000 square feet and is recognized for its sustainable design using recycled materials. This existing focus on sustainability makes it an ideal candidate for adopting additional environmentally friendly measures, such as the proposed solar project.

Ed Benedict Skatepark shares a similar shape to Geer Park, making it an ideal candidate for implementing a similar solar project. Both parks feature expansive, open spaces that accommodate a variety of activities and structures, which can be leveraged for solar installations. This similarity in layout provides a straightforward template for adapting the proposed modifications from Geer Park to Ed Benedict Skatepark.

At Geer Park, the solar project includes installing solar panels on new and existing structures such as bathrooms, covered picnic areas, and bike racks. Given the similar shape and design of Ed Benedict Skatepark, these modifications could be seamlessly integrated. For instance, constructing covered areas with solar mounts to shelter picnic tables and bike racks would fit well within the existing layout of Ed Benedict. These structures not only provide practical benefits, such as shade and rain protection, but also generate renewable energy, enhancing the park's sustainability.

Moreover, the spacious and open design of Ed Benedict Skatepark allows for the installation of large solar panel arrays without disrupting the park's primary functions. The solar capacity estimation for Geer Park, which includes a maximum capacity of 40.46 kWh, can serve as a benchmark for Ed Benedict. Given the similar spatial arrangement, Ed Benedict can potentially achieve comparable solar energy outputs, contributing significantly to the local grid and promoting sustainable energy use.

FIG. 21

Potential Community Benefits

Community integration is a key component of the project. The addition of bathrooms and solar panels serve practical purposes as well as foster community engagement. Plans for a community garden include recruiting local volunteers, forming partnerships with climate coalitions, and hosting educational field trips and workshops. Feedback from the Salem community indicates strong support for a multi-use park that includes picnic areas, a dog park, a community garden, and a skatepark. The proposed solar awnings are particularly favored as they provide shade and eliminate the need for temporary tents during events. Students highlighted several additional ways in which this project promoted community engagement, including:

- Adds general use space (sheltered)
- Could be used as an event/gathering sites
- Creates a more modern and inviting feel
- Adds renewable capacity
- Offers user-friendly open sites for skaters, ball players, parents, neighbors, or any type of visitor
- Promotes community engagement by recruiting local volunteers and creating partnerships with local climate coalitions
- Local elementary and high schools could benefit from educational field trips
- Could host guided planting days or other sustainable farming and gardening workshops

Conclusion

Students presented comprehensive proposals for the integration of innovative and sustainable solar solutions at Geer Park in Salem. Through research and design, three distinct initiatives—Solar Park Lighting, Community Solar Pavilion, and Solar Awnings— were outlined to address the park's underutilization, promote sustainability, and enhance community engagement.

The Solar Park Lighting proposal focuses on harnessing renewable energy to illuminate Geer Park, providing safety and accessibility for visitors while reducing its carbon footprint. By selecting efficient solar lighting systems and incorporating community engagement initiatives such as artistic pole decorations, this proposal enhances park functionality while fostering a sense of ownership and pride among residents.

These Geer Park solar initiatives envisions a multifunctional space powered by solar energy, catering to recreational activities and fostering economic opportunities for local businesses. By prioritizing community engagement throughout the project lifecycle, from design to post-implementation events, this proposal aims to create a vibrant and inclusive public space that meets the diverse needs of the Salem community.

The Solar Awnings proposal seeks to enhance comfort and accessibility at Geer Park by integrating solar-powered awnings into park infrastructure. These awnings not only generate renewable energy but also provide shaded areas for visitors, promoting outdoor enjoyment in all weather conditions. Through resident feedback and site exploration, this proposal demonstrates the potential for replication at other city sites, further advancing sustainability efforts across Salem.

Ideally, these sustainable solutions align with the City of Salem's goals for Geer Park. By integrating solar technology, fostering community engagement, and prioritizing environmental stewardship, these proposals lay the foundation for a resilient and inclusive public space that enhances the well-being of Salem residents now and in the future.

Recommendations

SOLAR PARK LIGHTING (SECTION 1)

- Implement solar-powered lighting infrastructure in Geer Park.
- Use EverGen M solar lighting systems for consistent lighting, even during power outages.
- Explore the potential for community engagement through artistic pole decorations.
- Ensure sufficient lighting for safety and accessibility during both day and night.
- Consider the budgetary implications of different solar lighting systems.
- Encourage local schools, clubs, and artists to participate in decorating solar light poles.

COMMUNITY SOLAR PAVILION (SECTION 2)

- Construct a community solar-powered pavilion in Geer Park.
- Design the pavilion to accommodate various recreational activities and community events.
- Optimize the location and angle of solar panels for maximum energy absorption.
- Foster economic opportunities for local businesses through the pavilion.
- Engage residents and community organizations in the design, funding, and implementation phases.
- Provide amenities such as picnic areas, shelters, and charging stations.

SOLAR AWNINGS (SECTION 3)

- Install solar-powered awnings in Geer Park to enhance comfort and accessibility.
- Use solar awnings to provide shaded areas for park visitors.
- Consider the solar capacity of various installations, including restroom facilities and seating areas.
- Allocate budget for the construction, shipping, and installation of solar awnings.
- Solicit resident feedback and engage community organizations in the project.
- Explore the potential for replication at other city sites, such as Riverfront Park.

These recommendations collectively aim to transform Geer Park into a sustainable and inclusive public space that benefits the Salem community and promotes environmental stewardship.

References

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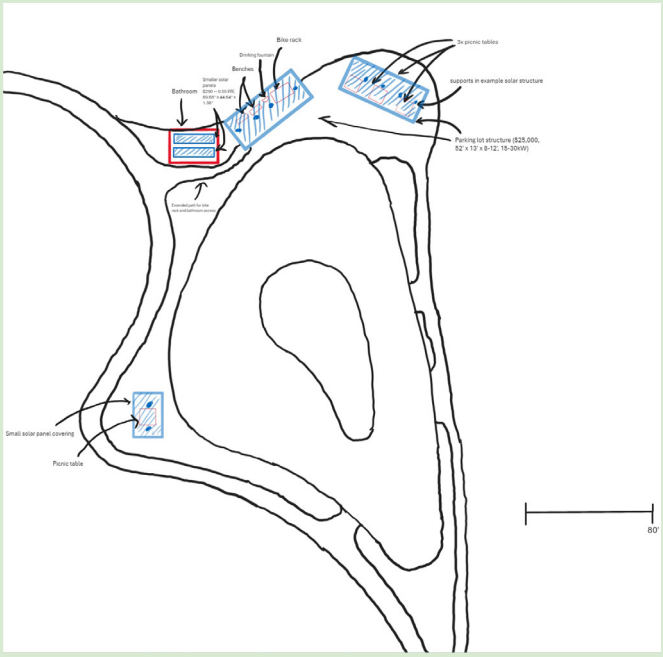
Appendix A: Student Presentation #1

This appendix includes the first student presentation, which explores the feasibility and implementation strategies for incorporating solar power in Geer Park. It covers site selection, design considerations, potential challenges, and benefits of solar initiatives, with a focus on replicating successful models from other locations.

Geer Park Solar Project

By: Dahlin Allen, Ezra Bergson-Michelson, Trent Garzoli, Aaron Gathrid, Natalie Hartley, Owen Kaufman, Franki Phelan, Lulu Robb-Upham, and Miranda Stone

Introduction to our Project



Agenda

I. Introduction to our project
II. Our solar vision
III. Solar Capacity of the Park
IV. Budgeting and costs
V. Sustainable Infrastructure Goals
VI. Community Comments
VII. Implementation in Other City Sites
VIII. Additional resources

Miranda Stone

Introduction to our Project

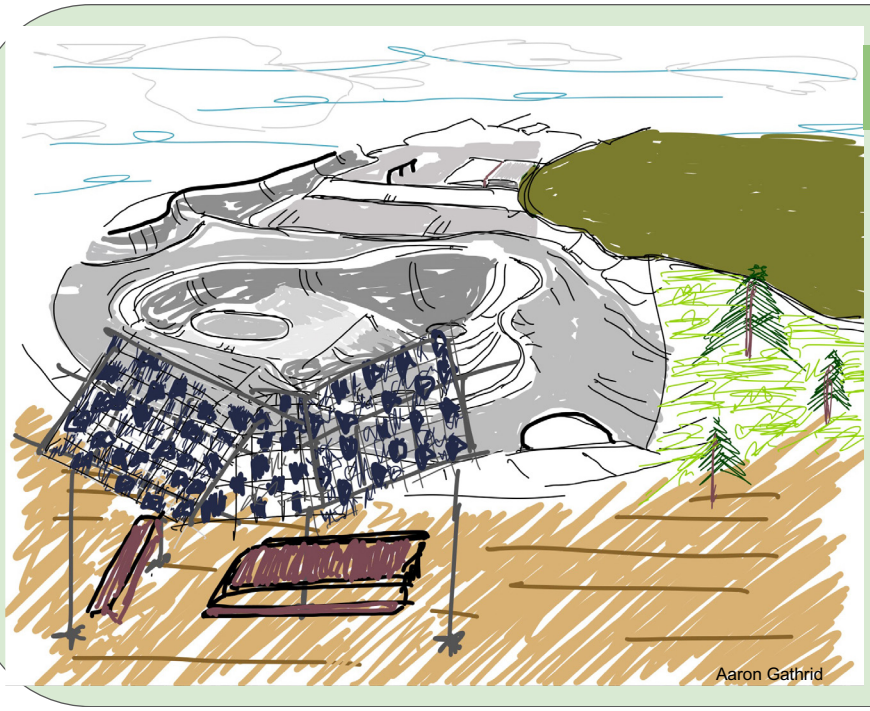
Modifications (bold is completely new, italics is modified)

- **Added one two-stall bathroom**
- **Added two .55 kW (STC maximum) solar panels (89.68” x 44.64” x 1.38”) on top of the bathroom**
- *Added path extension to include paved paths to both the bathroom and the bike rack-covered area*
- **Covered area (North of skatepark on Northwest zone of skate plaza) that shelters** a bike rack, water fountain, and *two (rather than four) benches*
  - **Covered area is constituted by a solar mount (67’W X 13’D X 8-12’ H, four load bearing support columns) and solar panels (40 of the 76.68” x 40.32” x 1.57”, 0.41 kW STC max. panels)**

Introduction to our Project

Modifications

- **Covered area (North of skatepark on Northeast zone of skate plaza) that shelters** *three (rather than four) picnic tables*
  - **Covered area is constituted by a solar mount (67'W X 13'D X 8-12' H, four load bearing support columns) and solar panels (40 of the 76.68" x 40.32" x 1.57", 0.41 kW STC max. panels)**
- **Covered area (on Western tip of planting area) that shelters a picnic table**
  - **Covered area is constituted by a solar mount (26'W X 13'D X 8-12'H, three load bearing support columns) and solar panels (16 of the 76.68" x 40.32" x 1.57", 0.41 kW STC max. panels)**



Aaron Gathrid

Our Solar Vision

Our Geer park solar awnings aim to strike a balance between energy efficiency and practical use. Panels provide energy to the grid and shade for the visitors - enticing neighbors and Salem residents to enjoy their time in Geer in the glaring sun and the pouring rain.

Blending Function and Design

What we're adding to Geer Park:
- general use space (sheltered)
- event/gathering sites
- a more modern and inviting feel
- renewable capacity

General use space
Balancing specific-use space
With user-friendly open sites
- skaters, ball players, parents
  Neighbors, or any type of visitor

Aaron Gathrid

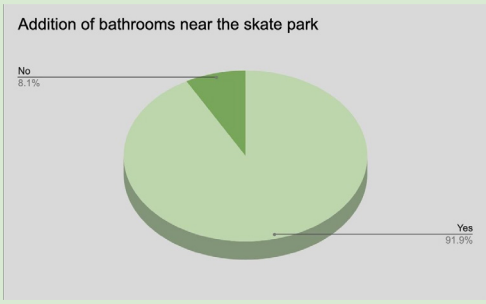
What is the Solar Capacity of the Skatepark?

- **Bathroom:** Max. 1.1 kilowatts
- **Large covers:** Max. 16.4 kilowatts each 34.8 kW total
- **Small cover:** Max. 6.56 kW
- **Total:** 40.46 kWh max., 36.02 kWh max. when adjusted to Oregon temperatures
- **Annual Maximum:** 354,429 kWh max., 315,584 kWh max. when adjusted to Oregon temperatures
- **Seasonal averages:** fall 36.14 kW max., winter 34.14 kW max., spring 35.76 kW max., summer 38.02 kW max.
- 25° celsius was used as the maximum temperature calculator (STC), but adjusted to actual outputs

Budgeting and costs

- **Total cost:** $74,980
- **Structures:** $60,000
  - $25,000 for each of the (2) large overhanging structures
  - $10,000 for small overhanging structure
- **Shipping:**
  - $3,000 for structures
  - ~$1,000-3,000 for solar panels
- **Installation and maintenance**
- **Rate cost:**
  - Equates to $0.24 per kWh in only first year of generation

Sustainable Infrastructure Goals



- Addition of bathrooms near the skatepark
  - for easier access to bathrooms
  - another option for solar panels
- Use of electricity for neighboring houses
  - solar energy generated at the skatepark to be used for the nearby neighborhoods

Natalie Hartley

Sustainable Infrastructure Goals

- Addition of solar panels near the skatepark
  - on top of potential new bathrooms
  - on top of structures built as coverings for picnic tables, bike rack and water fountain
    - structures used to hold solar panels are also a great use of shade from the sun and a covering for rain so people can enjoy sitting at the picnic benches

Natalie Hartley

Sustainable Infrastructure Goals: Integrating a Community Oriented Garden

- Promote community involvement by
  - Recruiting local volunteers and creating partnerships with local climate coalitions
  - Local elementary and high schools could benefit from educational field trips
  - Hosting guided planting days or other sustainable farming and gardening workshops
    - Salem Environmental Education (SEE)
    - Straub Outdoors
    - Salem Hardy Plant Society
    - Legacy Garden Supply

SALEM ENVIRONMENTAL EDUCATION

Franki Phelan

Capitalize on Undeveloped Potential

LEGEND

1. Baseball/Softball Field (300')
2. Soccer Field (250' x 180')
3. Skate Park (~20,000 SF)
4. Playground (~10,000 SF)
5. Splash Pad (~1,800 SF)
6. Single Track Bike Trails
7. Flexible Open Space (300' x 180')
8. Soft-Surface Pedestrian Trail (~1/2mi)
9. Large Dog Park (~1 acre)
10. Small Dog Park (~1/4 acre)
11. Picnic Shelter (20' x 30')
12. Restroom (4 stalls)
13. Parking Lot (40 stalls)
14. Viewing Area

A. Possible Location for Art - and - Interpretive Signage

Franki Phelan

Legend

- Sewer main
- Water main
- Subdrainage field
- Stormwater drainpipe

Franki Phelan

Salem Community Comments on a Garden

"The city should create a multi-use park serving multiple users, not just those using the ball fields. *I support* picnic and playground areas, dog park, **community garden**, and skateboard park."

"The *park should be a diverse area with something for everybody*; a dog park, **community garden**, open space…"

"*This should be a multi-use park*, not just for soccer and baseball and bikes…Provide a pathway…**Build a dog park and community garden** area…Reduce park lot size"

Top three desired features: expanded trails, more shade trees/tree planting, and natural areas/**pollinator gardens**.

Franki Phelan

Salem Community Comments on a Covered Area

"Picnics and celebrations. Groups picnic at the shelter area between the restrooms. Families bring 10x10 pop up tents and tables to have birthday parties by the pump track."

- Groups would no longer need to bring 10x10 tents, and could instead take advantage of the new solar awning

Owen Kaufman

Salem Community Comments on a Covered Area

"I would love to see… a covered area for hot or rainy days."

"I'd like to see the following changes/additions to the plans for Geer Park… add covered community area (s). Make this a neighbor park, and not just a city wide sports venue."

Owen Kaufman

How Could a Similar Project be Replicated at Other City Sites in Salem? Riverfront Community Park (1 of 3)

Why look at Riverfront Community Park?

- Salem's Premier Public Park
- 26 acres of park land.
- Seems to have a focus on the Amphitheater and dock.

There's no mention of solar panels or a skatepark. Also, there's no other park in Salem with a skatepark

Dahlin Allen

How Could a Similar Project be Replicated at Other City Sites in Salem? Riverfront Community Park (2 of 3)

What does Riverfront Park have to offer?

- Pulled from the city website directly (https://www.cityofsalem.net/Home/Components/FacilityDirectory/FacilityDirectory/110/599)

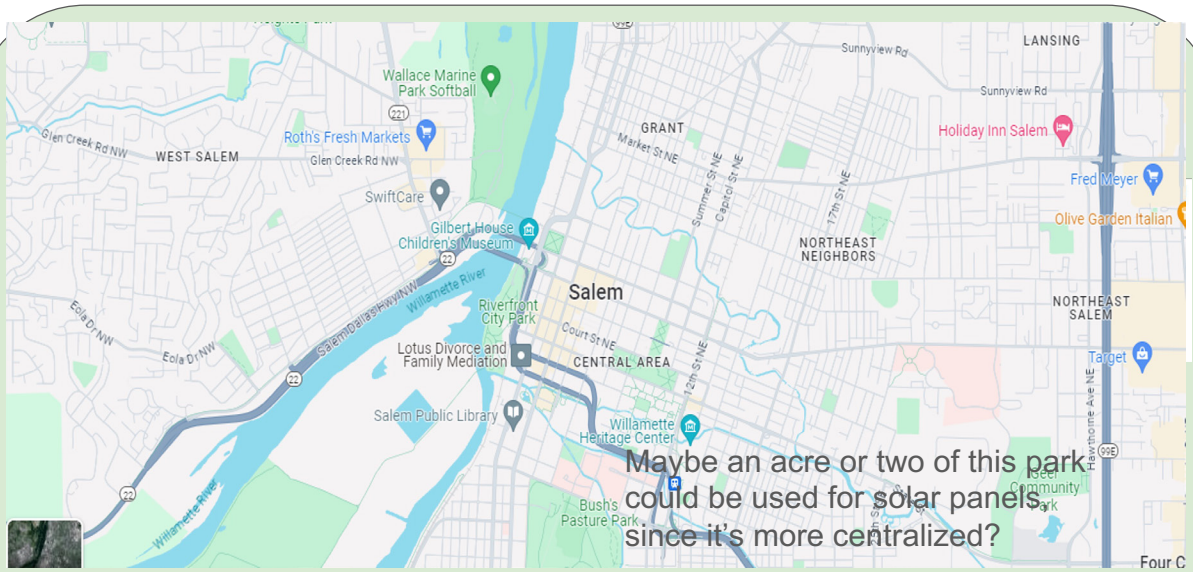
There's no mention of solar panels or a skatepark

ADDRESS:
200 Water St NE
Salem, OR 97301

AMENITIES:
- Boat Dock
- Grass Field
- Picnic Shelter
- Picnic Tables
- Play Equipment
- Restrooms
- Splash Pad
- Stage
- Walking

CATEGORIES:
- Parks in Central Salem
- Reservable Spaces

Dahlin Allen

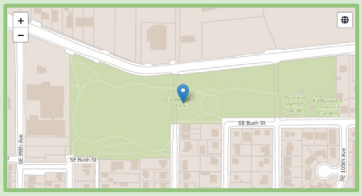


Dahlin Allen

How Could a Similar Project be Replicated at Other City Sites?
Portland, OR

Ed Benedict Skatepark

- Located on Powell Blvd
- 18,000 sq ft of skatepark
- The skatepark is a very similar shape to that of Geer Park
- Ed Benedict is considered to be one of the most sustainable skateparks, using recycled materials in its construction
    - A focus on sustainability will make them more inclined to adopt additional environmentally-friendly measures



Miranda Stone

What was learned

Planning Process

- Identify the problem
- Research
- Brainstorm solutions
- Evaluate
- Revise solutions
- Final

City Council Process

- How meetings are run
- People who are involved
- Idea proposal and critique process

Importance of collaboration on the brainstorming process

Additional resources

- Links to solar products used for modeling:
  - Large structure: https://sunwatts.com/solar-carport-mount-for-40-panels/?gad_source=1&gclid=CjwKCAiA_tuuBhAUEiwAvxkgTm-pNLo1ii29lcRkruPH9KMBr4zD8rOW2jHnBH9IjXS7gQC187mKfBoCnWkQAvD_BwE
  - Small structure: https://sunwatts.com/solar-carport-mount-for-16-panels/
  - Panels: https://www.solarelectricsupply.com/solar-panels/lg/lg-lg410nzw-a5-72-solar-panel

Thank you!

Appendix B: Student Presentation #2

The second student presentation outlines detailed proposals for solar installations, including solar lighting, solar awnings, and a community solar pavilion. The presentation provides technical specifications, cost estimates, and community engagement strategies, aiming to enhance the park's sustainability and usability.

Solar In Geer Park Proposal

By: Nicole Alstrin, Alexis Demery, Yaire Solano Guevara, Avi Hille, Andy Lam, Grace Lee Maisie McCarley, Gabrielle Pearse, Maia Thomas, Cami Tommeraason, Emily Torres, and Chloe Wood

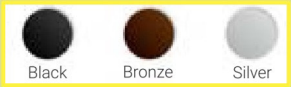
Overview:

- ★ Solar Capacity
- ★ Other Sustainability Benefits
- ★ Similar Projects
- ★ Conclusion

Question 1:
What is the solar capacity of the park?

EverGen-M by Sunna Design

- Output: 10-100W (based on location)
- Light Intensity: <155lm/W
- Battery: Lead-acid leak-proof battery(s)
- **Unique Features**
  - Lifetime warranty
  - No copper wires, which protects against theft
  - Customizable battery selection. Example: NiMH
  - Remote satellite monitoring
  - Integrated surge protection and noise reduction
  - Comes in multiple colors
  - Dark sky controls



EverGen-M Features:

Works even when the grid is down	Upgrades community infrastructure
Zero carbon emissions	No trenching

EverGen-M Installation:

- Modular design
- Delivered in kit form
- Less than 30 minutes per kit.
- Totaling around 1,230 minutes for the installation of 41 light systems
- Totaling around 870 minutes for the installation of 29 light systems.

*Image showcases 1 solar panel, however proposed model contains 2.

Project Cost Estimate:

Walkway + Bike Path	
Project Size	5622.70341 x 12 ft (3.66 m)
Estimated # of Systems	41
Estimated Cost (Per System)	$5,241.00*
Estimated Project Cost	$214,881.00*

Walkway Only	
Project Size	3960 x 12 ft (3.66 m)
Estimated # of Systems	29
Estimated Cost (Per System)	$5,241.00*
Estimated Project Cost	$151,989.000*

These prices are just estimates. Prices and overall cost are subject to change.

Energy Produced:

- Total Energy Wanted: ⅓ Mega Watt

Walkway + Bike Path	
Estimated # of Systems	41
Energy Generated*	16,400 W
Battery Storage	41,984 W
Total	58,384 W

Walkway Only	
Estimated # of Systems	29
Energy Generated*	11,600 W
Battery Storage	29,696 W
Total	41,296 W

This is the amount of power generated by the panels per day. However, this does not exclude the energy needed to power the light itself.

EnGo Leaf by EnGoPlanet

- **Price:** Unknown
- **Output:** 20-30W
- **Light Intensity:** 180 lm/W
- **Design:** Comes in 13 ft or 20 ft model and white or black
- **Battery:** Lithium battery within pole, can store over 100 hours of lighting power
- **Features**
  - LED light can be customized to preferred color and brightness remotely, allowing for less power use
  - Motion sensors for lights
  - Charging port for mobile devices
  - Security cameras

Comparison:

	Engo Leaf	EverGen-M
Price per unit	Unknown	$5,241.00
Output per unit	3,600 lumens	2,924 lumens
Green Features	Motion Sensors	Dark-Sky Control
Warranty	None	10 year limited warranty
Additional Equipment	Charging Port, Security Camera	Extended battery warranty

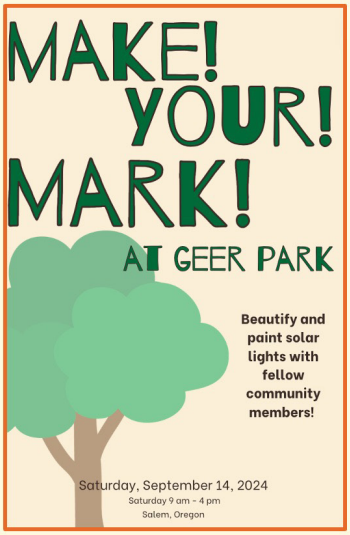
Question 2:

What added benefits could potentially connect with other sustainable infrastructure goals?

Why did we pick solar lighting?

- Energy efficient
- Cost saving strategies over time
- Enhances safety which increases park usage, especially during the warmer months when crime increases
- Self sufficient from the electric grid and can provide light even during blackouts
- Renewable energy
- Durable infrastructure

Community Engagement:



- Invite local schools, clubs, community groups, and artists to paint and decorate each solar light pole
  - Apply for permit
  - Collect materials
  - Maintenance
  - Promotional placements

Geer Park Community Art Day

"Public art can engage civic dialogue and community, attract attention and economic benefit, connect artists with communities, and enhance public appreciation of art"

Source: https://www.nrpa.org/parks-recreation-magazine/2015/september/using-art-to-define-our-parks/

Question 3:

How could a similar project be replicated at other sites?

Ruth J. Fleming Trail at Woodland Terrace Park:

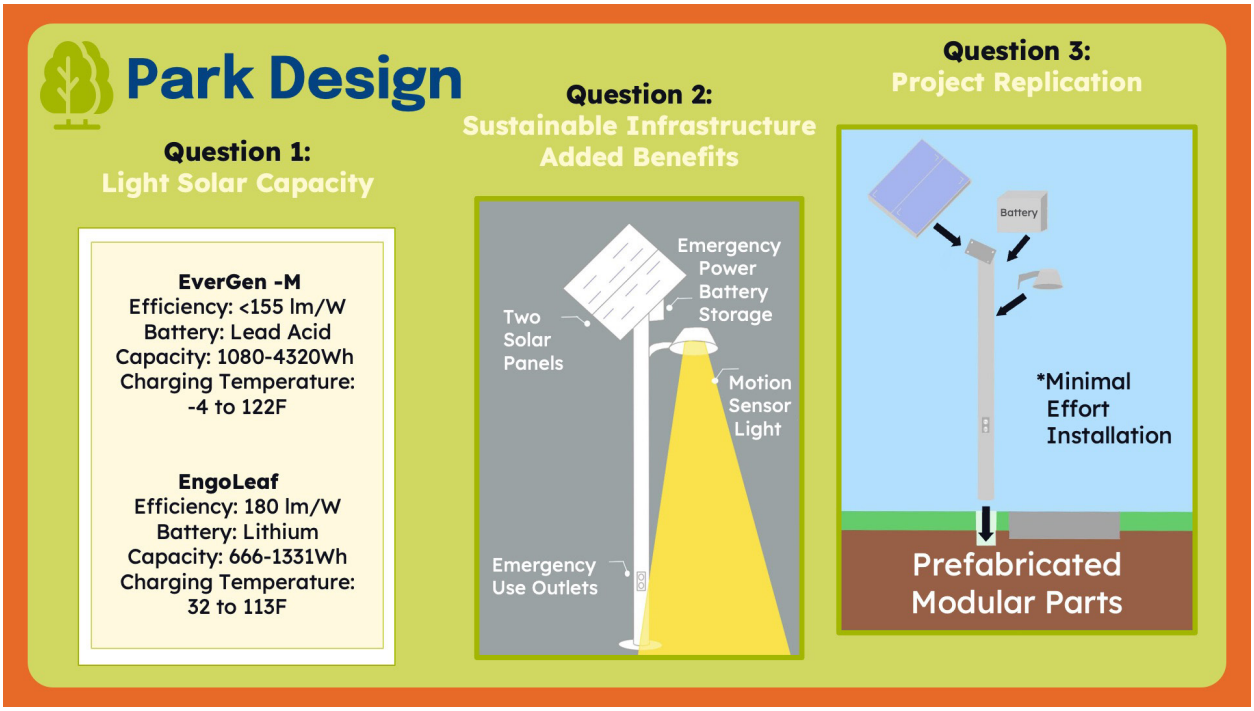
- Located in Tampa, Florida
- Solar powered lighting for walking trail
- Improved lighting for safety, saving money on installation, timers to limit light pollution

Wellen Park in Sarasota County, Florida:

- Environmentally friendly lighting for the walkway and trail in new residential walkway
- Grid-independent option
- Durable and low-maintenance

Park Design

This is only a mock-up of what the park could potentially look like. Light design and placement is subject to change.


Park Design
Question 1:
Light Solar Capacity
EverGen -M
Efficiency: <155 lm/W
Battery: Lead Acid
Capacity: 1080-4320Wh
Charging Temperature:
-4 to 122F
EngoLeaf
Efficiency: 180 lm/W
Battery: Lithium
Capacity: 666-1331Wh
Charging Temperature:
32 to 113F
Question 2:
Sustainable Infrastructure
Added Benefits
Two Solar Panels
Emergency Power Battery Storage
Motion Sensor Light
Emergency Use Outlets
Question 3:
Project Replication
Battery
*Minimal Effort Installation
Prefabricated Modular Parts


Thanks!
Any questions?

Sources

- Eco-Friendly Solar Pathway Lighting | Sol by Sunna Design
- Solar Lights Illuminate Florida Lake Trail: Eco-Friendly & Resilient Sol by Sunna Design (solarlighting.com)
- Using Art to Define Our Parks | National Recreation and Park Association
- Select Outdoor Yard Lights for Security and Energy Savings

Appendix C: Student Presentation #3

This appendix features the third student presentation, which delves into advanced solar design and infrastructure integration. It discusses the solar capacity of the park, multi-use strategies to connect solar projects with other sustainable infrastructure goals, and the potential for community involvement and replication of the project at other sites.

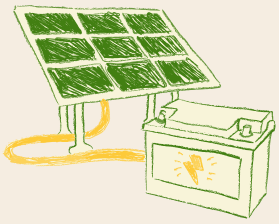
Community-Solar Pavilion Project

City of Salem x UO Green Cities
Presented by Gavin B., Amelia S., Himali G., Alexandra C.
20 March, 2024

1

INTRODUCTION

Our task: Incoporate ***solar power*** in Geer Park to ***increase renewable energy awareness*** and ***boost civic engagement.***



2

AGENDA

1. What is the solar capacity of the park? (pg. 4-11)
- a. Solar Design
- b. Proposed Location
- c. Budget

2. What added benefits connect with other sustainable infrastructure goals? (pg. 12-18)
- a. GHG Reduction
- b. Multi-use Strategy
- c. Rendered Designs

3. How can this project be replicated? (pg. 19-22)
- a. Hess Park
- b. Community Use
- c. Community Engagement

4. Conclusion & The Team

3

What is the park's solar capacity?

4

SOLAR DESIGN

One 30'x50' Structure
mass timber sourced in Oregon

Solar Panel Roof
metal roof which solar panels are installed

Estimated Cost
$250,000 - $300,000

Reference: Shawn Helligso Construction - Bend, Or

5

DESIGN TAKEAWAYS

1 Location of shed roof

- faces South
- solar panels on the roof are positioned at 45 degree angle for optimal energy absorbtion

2 Elevated Platform

- Divides space to create opportunity area for concerts, community meetings, and vendors.

3 Flexible Uses

- To maximize space
- encourage community interactions
- leave potential for communities to add variety

6

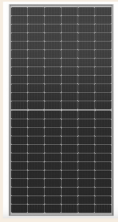
PROPOSED LOCATION

Accessible
The site is right next to a parking lot, sidewalk, and connects to the surrounding trails.

Already flat & paved
The fact the proposed site area is already paved is huge -- it potentially saves the money needed to put concrete down.

7

SOLAR PANEL



Panel:
545 Watt
7.5 ft. x 3.75 ft.
Weather Proof

Tax Eligibilities:
Investment Tax Credit (30% Deduction)

(Smart Solar Energy, 2022)
(SunWatts, 2024)

BUDGET

STRUCTURE BREAKDOWN

Excavation: $10,000
Concrete: $20,000
Framing Material: $40/ft (1,500sq ft)
Labor: $50/ft (1,500sq ft)
Eletrical/Solar: $35,000
Basic Utilties: $10,000

8

BUDGET- 15KW - 50 AMP

- $ Structure Cost: $225,000
- $ Labor Cost: $14,000
- $ Solar Panel Cost: $9,720 (27 Panels)

10

BUDGET- 27KW- 225 AMP

- $ Structure Cost: $225,000
- $ Labor Cost: $30,000
- $ Solar Panel Cost: $18,000 (50 Panels)

9

GRAND TOTAL

$ **Minimum Solar Capacity 15 KW:**
$251,288

$ **Maximum Solar Capacity 27 KW:**
$292,704

11

What added benefits could potentially connect with other sustainable infrastructure goals?

12

Sustainable Infrastructure Goals of Salem:

Green House Gas Emissions Reduced to 50% by 2035

Carbon Neutral by 2050

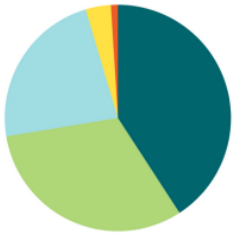
13

EMISSIONS AT A GLANCE

1 **Transportation** 41%

2 **Commercial & Industrial Energy** 32%

3 **Residential Energy** 23%



- Transportation & Mobile Sources (41%)
- Commercial & Industrial Energy (32%)
- Residential Energy (23%)
- Solid Waste (4%)
- Water & Wastewater + Process & Fugitive (<1%)

Figure 1: Community-Wide Emissions by Sector

Source: 2021 Inventory of Community Greenhouse Gas Emissions

14

Multi-Use Strategy

Provide Economic Opportunities for Local Businesses and consumers

Reduce car trips through the injection of commercial markets within recreational land

Encourage safe, convenient, walk-able, and bike-able trips for residents and workers

15

Produced by Mackenzie & Amelia
Images rendered by Micah Gamlen

16

Produced by Mackenzie & Amelia
Images rendered by Micah Gamlen

17

Produced by Mackenzie & Amelia
Images rendered by Micah Gamlen

18

How could a similar project be replicated at other city sites?

19

PIONEER SOLAR PAVILION

Hess Park in Lee Vining

- Showcases the possibility of clean energy incorporation into cities
- Provides shady place for community to gather & hold events
- Charging stations and monitor that depicts solar generation at real-time

20

POSSIBLE COMMUNITY USES

Civic **Engagement**

Volunteer **Opporunities**

Cultural **Events**

Sustainable **Energy**

Shelter & **Shade**

Picnic **Areas**

Community **Connectivity**

Environmental **Education**

Emergency/Disaster **Resilience**

Local **Businesses**

Community **Projects**

21

Community Inolvement

- **Community Engagement Programs**
  - This project affects them, their input should be heard and considered
  - Utilize surveys to gauge community opinions
  - Inform community about environmental consciousness and sustainable development alongside this project
- **Local NGO'S and Community Organizations**
  - Help with funding and gaining endorsements for more workers and quality materials for the project
  - Social media is a great starting point to reach organizations
- **Local Solar Engineers and Workers**
  - From start to finish, the community should be fully engaged, including those chosen to physically build and create this pavilion
- **Post-Implementation Engagement**
  - Cookouts and other events that use the pavilion to share purpose and benefits

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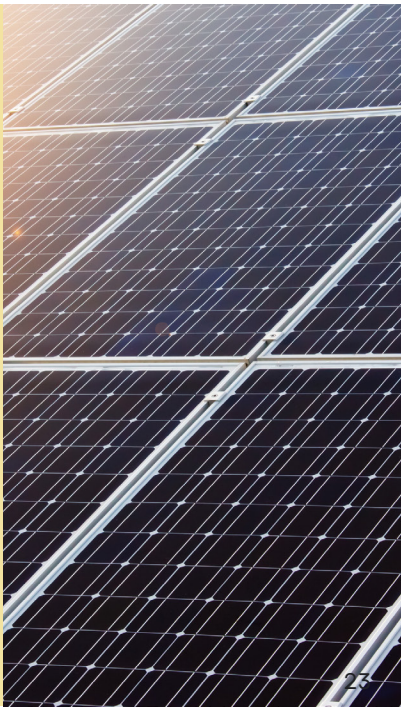
CONCLUSION

- Our solar panel-covered structure design would:
  - **provide shelter from weather during sporting events**
  - *create an event space that could be rented out*
  - **host farmers' markets, food trucks, community meetings, etc.**
  - *meet the City of Salem's preferred kilowatt per panel*
  - **Provide outlets for charging**



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Thank You

for listening!

City of Salem x UO Green Cities
20 March, 2024

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