MOVABLE TRELLIS
ARCH 459/559 Top Sustainable Energy Landscapes
Professor: Yekang Ko
Brooke Ridgway, Deanna Lynn, Mia Eikani

A FLEXIBLE STRUCTURE FOR COOLING AND FOOD PRODUCTION AT OVE
This project will benefit the community by cooling the houses with shade and evaporative cooling from plants, producing fresh produce to help alleviate food insecurity, providing privacy, and providing special event space. The systems will be portable on wheels, allowing residents to customize the configuration and transport them if the village needs to relocate. Four different suggested configurations demonstrate the usefulness and adaptability of our structure. The first configuration is the trellis alone to provide privacy and produce for the community. The second configuration connects the structure to individual units that need cooling in the warm summer months with canvas fabric. The third configuration uses canvas fabric to connect the structures to each other, shading and cooling circulation spaces for all OVE’s inhabitants. The fourth configuration connects the structures with wire for supporting edible vines for increased food production. The estimated cost for the project materials is $120/structure or $1270 total with two fabric awnings.

PRECEDENTS
Green wall for food production at Six-One-Six. restaurant
Arbor with vines divide and cool a space
Green screen cools building and outdoor space

PLANTS: EDIBLE OR NATIVE
‘Himrod’ Grapes
Fiveleaf Akebia
Hardy Kiwi
Orange Honey-suckle

GOALS:
COOLING
PRIVACY
FOOD PRODUCTION
CUSTOMIZATION

SITE ANALYSIS

SITE PROPOSAL
OVE during the winter solstice with our design
OVE during the summer solstice with our design

DESIGN CONCEPT

FOUR CONFIGURATIONS:

1) SINGLE TRELLIS: can support edible climbing plants and can fit in small spaces.

2) SUPPORTED AWNING: Trellises can support a simple canvas awning to cool the tiny houses and be quickly attached and detached.

3) TWO CONNECTED: with wires to give more space to grow edible plants like grapes or kiwi vines.

4) TENT: can support a shade structure for outdoor living or event space.

EXPECTED BENEFITS:
+ Shade from pop-up awning alleviates uncomfortable summer heat in the tiny houses
+ Plants on the trellis cool the air with evapotranspiration
+ Vines with edible fruit can grow on the trellis and help alleviate residents lack of access to fresh produce
+ Trellises are on wheels and can be easily moved to shade a different side of the house
+ Trellises can be arranged to support a tent/pavilion for events
+ Awning can be removed very quickly to let in sun when not needed
+ The whole system is portable if the village needs to relocate

OVE during the winter solstice with our design
OVE during the summer solstice with our design

FOUR CONFIGURATIONS:

1) SINGLE TRELLIS: can support edible climbing plants and can fit in small spaces.

2) SUPPORTED AWNING: Trellises can support a simple canvas awning to cool the tiny houses and be quickly attached and detached.

3) TWO CONNECTED: with wires to give more space to grow edible plants like grapes or kiwi vines.

4) TENT: can support a shade structure for outdoor living or event space.

EXPECTED BENEFITS:
+ Shade from pop-up awning alleviates uncomfortable summer heat in the tiny houses
+ Plants on the trellis cool the air with evapotranspiration
+ Vines with edible fruit can grow on the trellis and help alleviate residents lack of access to fresh produce
+ Trellises are on wheels and can be easily moved to shade a different side of the house
+ Trellises can be arranged to support a tent/pavilion for events
+ Awning can be removed very quickly to let in sun when not needed
+ The whole system is portable if the village needs to relocate

OVE during the winter solstice with our design
OVE during the summer solstice with our design

FOUR CONFIGURATIONS:

1) SINGLE TRELLIS: can support edible climbing plants and can fit in small spaces.

2) SUPPORTED AWNING: Trellises can support a simple canvas awning to cool the tiny houses and be quickly attached and detached.

3) TWO CONNECTED: with wires to give more space to grow edible plants like grapes or kiwi vines.

4) TENT: can support a shade structure for outdoor living or event space.

EXPECTED BENEFITS:
+ Shade from pop-up awning alleviates uncomfortable summer heat in the tiny houses
+ Plants on the trellis cool the air with evapotranspiration
+ Vines with edible fruit can grow on the trellis and help alleviate residents lack of access to fresh produce
+ Trellises are on wheels and can be easily moved to shade a different side of the house
+ Trellises can be arranged to support a tent/pavilion for events
+ Awning can be removed very quickly to let in sun when not needed
+ The whole system is portable if the village needs to relocate

OVE during the winter solstice with our design
OVE during the summer solstice with our design

FOUR CONFIGURATIONS:

1) SINGLE TRELLIS: can support edible climbing plants and can fit in small spaces.

2) SUPPORTED AWNING: Trellises can support a simple canvas awning to cool the tiny houses and be quickly attached and detached.

3) TWO CONNECTED: with wires to give more space to grow edible plants like grapes or kiwi vines.

4) TENT: can support a shade structure for outdoor living or event space.

EXPECTED BENEFITS:
+ Shade from pop-up awning alleviates uncomfortable summer heat in the tiny houses
+ Plants on the trellis cool the air with evapotranspiration
+ Vines with edible fruit can grow on the trellis and help alleviate residents lack of access to fresh produce
+ Trellises are on wheels and can be easily moved to shade a different side of the house
+ Trellises can be arranged to support a tent/pavilion for events
+ Awning can be removed very quickly to let in sun when not needed
+ The whole system is portable if the village needs to relocate
Knot Your Average Window

Bianca Malkoc, Alissa Brunkhorst, and Kellie Murtle

The residents at Opportunity Village mentioned that the winter time can be hard because heat is easily lost, especially when they open their doors. We also learned that a lot of heat can be lost through windows so we wanted to create things to help reduce the amount of heat lost through windows. We also wanted our designs to be universal for the winter and summer so our concepts can be used to help create shade in the summertime. Another goal is to use found or low cost materials. These designs can also be customizable and don’t require professionals to make or install.

The area where we are focused are mainly the tiny homes that have windows. Although, the knots and patterns can be used for the other places but maybe not as a window cover.

Knot Patterns

These are just a few knot patterns that can be used. They are simple patterns that aren’t too complicated that make nice looking knots. This could be a good summer option to create dappled lighting in the summertime.

Opportunity Village

Opportunity Village is a community that sits on city property that is rented to them for $1.00 a year. The homes on this site are intended to be “short term” so they are built on stilts so they can be quickly removed if needed. There is no water or electricity running through the homes but their community center has electricity and there is running water in the bath house. This community has about 35 people living there now but the community can have up to 39 residence. The average length residence stay are 1-3 years. The winters here in Eugen, Oregon can get cold so keeping these tiny homes warm can be difficult. There are also studies done showing that a lot of heat in homes are lost through windows.

Materials

Square Knot
Chinese Crown Knot
Josephine Knot

Cost: Can be free if you have any old ripped out jeans or can be found at Places like Goodwill for about $4.00 to $8.00.

Jeans are also a good material to have for the winter. These are also a good material to have. T-shirts are also a good material to have.

Cost: Can be free if you have any old ripped out t-shirts you can’t wear anymore but can be found at Goodwill for about $3.00 to $4.00.

T-shirts are also a good material to have. These are also a good material to have. T-shirts are also a good material to have.

Cost: $4.00 for 100 feet of 550 para-cord at Para-cord Wholesaler.

Para-cord can be used to have denser knots and can be un-knotted to be used for other thing if needed.

Cost: $24.00 for 5,000 feet of three ply twine from ULINE.

Twill isn’t as thick as the other options but makes nice looking knots. This could be a good summer option to create dappled lighting in the summertime.

Precedent Studies/ Concepts

Dream-Catcher

Dream-Catchers can come in many sizes and patterns. They can be densely woven or thinly woven. There can be many parts and the materials are low cost. Dream-Catchers are easy to create by anyone and can be work-shopped at Opportunity Village. It is aesthetically pleasing and can be unique to each person. Utilizing recycled materials, this project is inspired by the pattern of a dream-catcher. The material can be pulled tight in the center, creating less surface area and reducing the amount of air or light allowed through the space. Air can pass through when the sun goes down. The concept can be hung in front of a window inside of the home, similar to curtains. The design differs from curtains as it allows for thermal regulation by trapping air between the woven and the glass window, while still allowing in light. Additionally during hot summers, and the weave can be scaled back to allow greater air flow.

Utilizing Found Material

Using recycled materials can help reduce cost and still be functional. Using things like plastic bags can be used to knot and weave. You can use recycled, found, and inexpensive materials to create a unique macramé window insulation. The idea is to make strips of macramé so the individual can add or change their window insulation as needed. This can help reduce heat loss through windows and in the summer it can help altitude and keep the inside cool.

(POP)Culture Insulation by Garth Britzman

The goal of this installation would be noise reduction and it can also create shaded outdoor communal spaces for the warmer months through a constructed canopy. My design focuses on passive cooling inspired by Britzman’s (POP) culture insulation. It is designed to be attached outside to the window, existing shade onto the window and the ground underneath. This can also create another private space underneath the canopy, which will help residents to feel more at home while in transitional housing.

Building America climate zones, 2015, USL, DOE
Showers to Shade:
On-site resource recovery for nursery stock

LA-459/559 S.E.L. Yeakag
Yun-Han Huang, Corner Iverson, Adam DeHeer

Problems
Too Hot
No Trees
No Income
High EWEB Bill
Limited Training

Opportunities
Labor
Space
Waste liquids
Graywater
Urine

Precedent
Sanitary Greenspace is an on-site resource recovery system used to grow container plants. In 2018, the first prototypes were launched in the informal settlements of Lima Peru.

Concept Diagram
The concept diagram shows a closed-loop system, whereby existing on-site resources—graywater and urine—are used to grow trees and bamboo, providing passive cooling and active income. Potential partners include The City of Eugene and Hedge Between Bamboo Nursery.

System Diagram
The concept diagram shows the larger system consists of a four parts: (1) Photovoltaic Solar Panel; (2) Greywater and Urine from bathhouse; (3) Bio-filtration system; (4) Nursery stock.

Site Analysis
Using Google Maps, we identified the best locations for providing shade to the dwellings.

Site Plan
The water treatment tanks are located next to the bathhouse. The site plan also illustrates the irrigation layout. Three phases show the potential of the project.
Small, durable containers (such as milk crates and things of the like) will offer adaptive, mobile design of garden beds and new spaces which will allow residents to curate menu gardens in common areas and bring more personalization near their individual residences.

Shrubs, fruit trees, potted bamboo, vining plants and other lush greenery will offer shading and breeze to the hottest areas around the edges of the property. Not only will these elements offer relief from intense summer heat, but they will also bring privacy and aesthetic value to the space.

Trees and fruit trees will be placed throughout the village to provide fruit for consumption within the village and to sell to the community during the Summer and Fall. Placing more trees in the bungalow area to provide shade and privacy between homes.

Small, durable containers (such as milk crates and things of the like) will offer adaptive, mobile design of garden beds and new spaces which will allow residents to curate menu gardens in common areas and bring more personalization near their individual residences.

Shade tarps offer immediate shade and shelter with how easy they are to construct. This can provide additional communal spaces within the village that provide shade in the Summer. The posts of the Structure can vary from hydroponic pillars to regular wooden posts. Either way, these shade structures offer modularity and flexibility as the village grows and changes.

Menus offer an easy way to access and grow food. The different colored containers will indicate if it is a soup, salad, or herb garden. The herb and salad garden will be located where the current garden beds exists by the entrance for more communal gardening. The other containers will be placed around the bungalows for a more personalized experience.

**Presented by:** Isabela Ospina | Audrey Manahan | LA 410 Food Systems | Jacques Abelman

**OVE Food System Design**

**FOOD SOVEREIGNTY / A LIFESTYLE**

**WHAT IS FOOD SOVEREIGNTY?**

Food sovereignty is the right of peoples to define their own food and agriculture; to protect and regulate domestic agricultural production and trade in order to achieve sustainable development objectives; to determine the extent to which they want to be self reliant; to restrict the dumping of products in their markets; and to provide local fisheries-based communities the priority in managing the use of and the rights to aquatic resources. Food sovereignty does not negate trade, but rather, it promotes the formulation of trade policies and practices that serve the rights of peoples to safe, healthy and ecologically sustainable production.

**FOOD SOVEREIGNTY @ OVE**

The goal of Flux Gardens is to bring food sovereignty to Opportunity Village through the use of adaptive, mobile container planters that can be tailored to the changing needs of the residents. The addition of shade screens, fruit trees and potted bamboo will help regulate heat and provide shade that will allow residents the opportunity to grow, cook and enjoy their food in a way that has not yet been possible at this site. The ability to grow fresh produce will give the community the chance to take control of their food intake as well as learn a set of new, valuable skills. We hope that this format will evoke a sense of independence, self reliance and an appreciation for the stability and upward mobility that Opportunity Village provides.

**Site Specs:**
- 30 tiny home units (50 square feet)
- Industrial Zone
- 70% of site have impermeable surfaces
- Village house up to 35 people at a time
- It had helped about 300 houseless people transition
- One communal space (Yurt)

**Current Food System:**
- A few garden beds in use
- Food Stamps
- Communal pantry
- Communal kitchen
- Diverse food and cooking experience

**Obstacles:**
- Constant influx of people
- Trust
- Limited water sources
- Very hot and dry in Summer
- Only one communal space
- Planting in soil is not allowed

**Possible Vegetables and fruit:**

**Salad:** lettuce, arugula, chard, mustard greens, broccoli, leeks, koh, peas

**Soup:** squash, tomato, carrots, potatoes, onion

**Herbs:** mint, rosemary, thyme, chives, oregano, cilantro, basil, parsley

**Fruit:** apples, pears, plums, fig, strawberries, grapes

**Menus**

- Fruit: cilantro, basil, parsley
- Soup: broccoli, leeks, kale, peas
- Salad: P and O, possibly:

<table>
<thead>
<tr>
<th>PRIMETREES</th>
<th>CONTAINERS</th>
<th>SHADE TARPS</th>
<th>MEAL+</th>
<th>PERIMETER</th>
<th>TRES</th>
</tr>
</thead>
</table>

**Food Stamps**

- Diverse food and cooking experience
- Communal kitchen
- Food Stamps
- A few garden beds in use
- Food Stamps
- Communal pantry
- Communal kitchen
- Diverse food and cooking experience

**Stakes**

- Planting in soil is not allowed
- Only one communal space
- Very hot and dry in Summer
THE CONCEPT OF "UNITY" IS EXPRESSED AS AN IMPORTANT QUALITY IN OPPORTUNITY VILLAGE. USING A SYMBOL OF UNITY, THE NORTHERN KNOT, I CREATED A CENTRAL ZONE FOR GARDENING WITH THE HOMES SITUATED AROUND THE GARDEN. WITH VEGETATION BEING THE CENTRAL ASPECT, THIS WILL ALLOW FOR ALL COMMUNITY MEMBERS TO INTERACT WITH THE GARDEN AND BE INVOLVED IN SELF-SUSTAINABLE LIVING. THE GARDEN COMMUNITY CENTER WILL HELP MEMBERS GROW AND WASH FOOD AND WILL HAVE A LARGE TABLE FOR GATHERING. AROUND THE GARDEN CENTER WILL BE RAISED GARDEN BEDS, AND THE LOOPS AROUND THE HOMES WILL CONTAIN MILK CARTON PLANTERS THAT CAN BE REARRANGED BY OVE MEMBERS.

EASY-TO-GROW PLANTS

- TOMATOES
- CARROTS
- BELL PEPPERS
- SPINACH
- RADISH
- LETTUCE
- GREEN BEANS
- ONIONS
- CUCUMBER
- PEAS
- BEANS
- POTATOES
- GARLIC
- BEETS
- ZUCCHINI
- BASIL

THE CURRENT STATE OPPORTUNITY VILLAGE HAS A LARGE LANE SEPARATING THE HOMES FOUND AT THE NORTH AND SOUTH ENDS. THE COMMUNITY MEMBERS HAVE EXPRESSED THEIR INTEREST IN AN EXPANDED GARDENING SYSTEM. I BELIEVE HAVING THE GARDEN AS A CENTRAL ASPECT WILL CONNECT THE SITE MORE AND ALLOW FOR ALL MEMBERS TO HAVE ACCESS TO HEALTHY AND ORGANIC FOOD.

PRECEDE NT

PRINZES S IN NG ARTEN UND NOMADISCH GRÜN
BERLIN, GERMANY

This site is situated in the center of the busy city of Berlin, Germany. Everything aspect found here is transportable as most crops are grown in milk crates, raised beds, and burlap sacks to emphasize temporary location. All vegetation is grown above ground in raised crates or beds as the condition of the soil found here is not suitable for growth.
Self-Sustaining Agriculture
Camille Hench and Kellie Murtle

The idea of our project is a combination of the pyramid gardens and the sky farms. The residents need shadier environments and would like the access to freshly grown herbs and vegetables. The residents are interested in “menu” gardens which are gardens that one could use all the ingredients grown in it to make soups, salads, and herbs. There would be multiple structures that grew different produce to accommodate these menu gardens. With pergola structures, potentially over the kitchen area, would have each side a different produce menu planted in pots. There could also be smaller structures that grow things like herbs and vines. There can also be PVC pipe added to these structures to help irrigate the plants.

Opportunity Village

Opportunity Village is a community that sits on city property that is rented to them for $1.00 a year. The homes on this site are intended to be “short term” so they can be quickly removed if needed. There is no water or electricity running through the homes but their community center has electricity and there is running water in the bath house. This community has 35 people living there now but the community can have up to 39 residence. The average length residence stay are 1-3 years. The residence are interested in having herb gardens or “menu” gardens around the community. They are also interested in the potential of shade structures along with these gardens.

Material and Costs

2 x 4
2 x 4’s are fairly inexpensive and can come in many sizes.
Cost: $2.75 at Lowe’s for 2 x 4 x 92

Seed Packets
Cost: On Amazon seeds cos anywhere from $3.00 to $4.00 but once the first year of growing is done you can harvest the seeds from plants for the following years

Pots
Potting plants could be recycled pop bottles but actual pots can be used.
Cost: On Amazon 100 plastic pots cost $12.99

Precedents

Sky Farm: This project collects rainwater and is intended to grow vines. When the vines grow it produces shade. Sky Farms can be made fairly cheap and the are easily movable.

Pyramid Garden: This project is self sustaining and doesn’t require any soil. Pyramid Gardens also don’t require lots of water which could be good for Opportunity Village.

Pergola: Pergola’s are good at providing shade. Pergola’s can also support vining plants which also helps create more shade.

Phaseolus vulgaris
Proprius
Rubus
Cucumis sativus
Lactuca sativa
Cucumis metulorus
Solanum lycoperisicum
Beta vulgaris
Asparagus officinalis
Brassica oleracea X italica
Brassica oleracea X botrytis
Pimpinella anisum
Ocimum basilicum
Nepeta cataria
Matricaria chamomilla
Allium schoenoprasum
Foeniculum vulgare
Lavandula
Mentha
Thymus vulgaris
Spinacia oleracea
Solanum tuberosum
Cucurbita
Lactuca sativa
Fall Winter Spring Summer
The Opportunity Village in Eugene provides the house-less with a safe space and the essentials to help with their transition. My proposal seeks to add to this effort and looks at the act of growing food as a strong avenue in doing so. ‘It takes a village to eat’ first proposes interventions at the systems level. Here, urban agriculture is adopted as a lens at the act of growing food as a strong avenue in doing so.

These interventions are then realized through site-appropriate spatial expressions - Mobile fruit trees, community garden, vertical planters, etc.

**Concept**

**IT TAKES A VILLAGE TO EAT**

Empowerment through food systems intervention at Opportunity Village Eugene

The Opportunity Village in Eugene provides the house-less with a safe space and the essentials to help with their transition. My proposal seeks to add to this effort and looks at the act of growing food as a strong avenue in doing so. ‘It takes a village to eat’ first proposes interventions at the systems level. Here, urban agriculture is adopted as a lens.

These interventions are then realized through site-appropriate spatial expressions - Mobile fruit trees, community garden, vertical planters, etc.

**The OVE food narrative**

Food systems intervention

**OVE food hub**

The community kitchen is reimagined as a learning space. Culinary training requires hands-on table cooking using the produce from the garden. The garden helps residents gain knowledge about how to cook their own food. This promotes positive connections with food, provides nutrition, and can serve as a creative outlet for the community.

**OVE food network**

Framework for agriculture

**Opportunity garden**

A new food space

**Plants**

Beans
Carrots
Lettuce
Rhubarb
Spinach
Cabbage

**Herbs**

Huckleberries
Rosemary
Sage
Thyme
Parsley
Strawberries

**Additional Income**

• Fruit tree planters
• Vocational training
• Gardening workshops

**VOCATIONAL SKILLS**

• Healthy living workshops
• Therapy garden
• Recreation and community gathering

**Food systems intervention**

• Zoning for impermanent structures
• Transitional stay for 35 people max
• 30 tiny houses - 80 Sq. Ft. each
• Average stay of 5 to 9 months
• Low cost micro housing for the house-less
• Transitional stay for 35 people max
• 30 tiny houses - 80 Sq. Ft. each
• Average stay of 5 to 9 months
• Zoning for impermanent structures

**Key**

Stages of food system

Input

Processing + Storage

Consumption

Output

**New element**

Addition

**Food banking**

**PERSONAL EXPENDITURE**

```markdown
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Bank</td>
<td></td>
</tr>
<tr>
<td>Personal Expenditure</td>
<td></td>
</tr>
<tr>
<td>Farming</td>
<td></td>
</tr>
</tbody>
</table>
```

**PIPPING BEDS + POTS**

Case Study

Grow Good

A non-profit organization working with The Salvation Army’s Navajo Shelter.

**Intervention Strategy**

Areas of intervention:

1. Food hub
2. Food system
3. Food system intervention

**Plan view of garden**

Legend

1. Community plaza
2. Mobile fruit trees
3. Hanging planters
4. Low to ground planters

**Perspective view**

**Stages of food system**

1. Input
2. Processing + Storage
3. Consumption
4. Output

**Possible inputs in system loop**

**Aerial View of OVE**

**Orchard avenue**

Small fruit tree planters are placed along the ground road, providing fruits as well as shade and cooling. Here compact and simple form opportunities through sale. Here, the mobile gardens provide impermanent containers with the necessary soil volume and quality.
Opportunity Village Farm

Ayden Riley and Daniel Ramirez

Based off of a popular design, Public Farm One, located in Queens New York, we chose to take the idea of shaded hexagon shaped planters and apply it to Opportunity Village. After receiving personal insight from the residents of OVE it could be seen that the idea of menu organized gardens would make it easier for residents to know what to farm. We designed a hexagon shaped, multi-crop planter which can be fitted to grow bushy crops like potatoes as well as vine based crops like tomatoes. Our design has seven raised planters organized in a hexagon shape with the central planter containing a trellis which extends outward from it. This trellis structure will expand outward once it reaches seven feet high giving a feeling of an “artificial tree” or “hanging garden” above their heads. This trellis can provide both shade and a less labor intensive way of picking crops such as tomatoes. There will also be an easy access easy to use irrigation system, on the outside there will be a hose connection to a drip system. This design will be easily moveable as well as built from cheap and reused material. Each unit has an estimated cost of around sixty dollars.

Meal Garden

Planter Design

Food Desert: An area with a lack of easy access to healthy food options

Opportunity Village sits in an area without easy access to food. This project serves to reduce the spread of the food deserts in Eugene, allowing residents of Opportunity Village to have easy and close access to healthy organic food options. This will also develop a new unique food culture in Eugene, allowing for more diverse forms of farming and food access to be available.