

EXTREME AFFORDABLE HOUSING SOLUTIONS



The TINY HOUSING COMMUNITY PROJECT

A Study of Infill Development Opportunities | Bellingham, WA | Spring 2017

TINY HOME MODEL 1

**Whatcom Creek
Tiny Home Community**

Whatcom Creek Tiny Home Community



Team 1

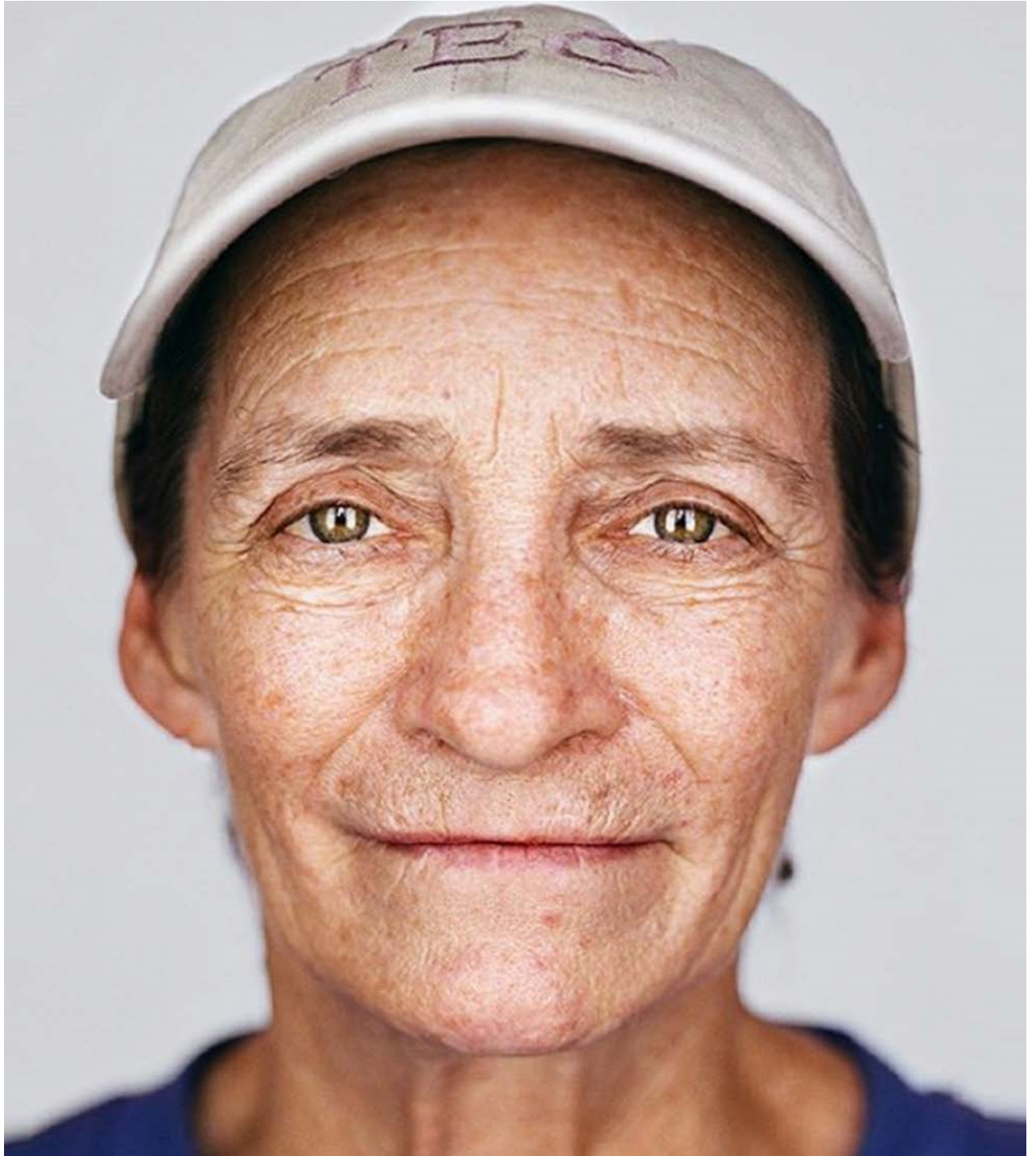
Alexa Harrington, Lindsey
Nordberg, Dylan Fischer

Sustainable and
Multi-Generational

SUSAN

Income: \$11,000 per year
Widowed, 60 years old
Lives in Bellingham, WA

“While I had tried to
save for retirement, I
never understood the
cost of aging.”



NEEDS

Susan needs a stable living situation in order to help organize her life.

She is in need of affordable housing in order to start tackling her medical debt.

WANTS

Susan has a desire to age in a home with a supportive community that is conducive to the physical ailments of old age.

It is important to Susan to maintain her independence into her old age.

She hopes to serve a purpose in her community and help benefit the whole.

Accessible transportation near home or resources that are within walking distance are important.

MOTIVATIONS

After recovering from her sickness, Susan's goal is to maintain her health through exercise and diet.

Susan finds it important to keep a sharp mind and healthy attitude by maintaining a strong social community. She wants to be a contributing member of her community.

HARDSHIPS

Susan lost her husband last year and has been battling with depression ever since.

Mounting debt has created excess stress on Susan which is severely affecting her health.

FRUSTRATIONS

Amounting medical bills have forced her to search for affordable housing.

Her current living situation leaves little room for social interaction. She feels isolated and trapped in her own home.

Susan has begun to feel depressed as she feels isolated from society and lacks a purpose.

She is extremely fearful of moving to a retirement home as it signifies a loss of independency.

Susan does not want to ask family for financial help because she would rather not be a burden.

DESIGN OBJECTIVES

1

Supports a healthy independent lifestyle

2

Affordable and Stable Rents

3

Green site and landscape design

4

Implements sustainable infrastructure

5

Encourages community interaction

6

Provide safe, secure, affordable, long-term housing for seniors

TINY HOUSE



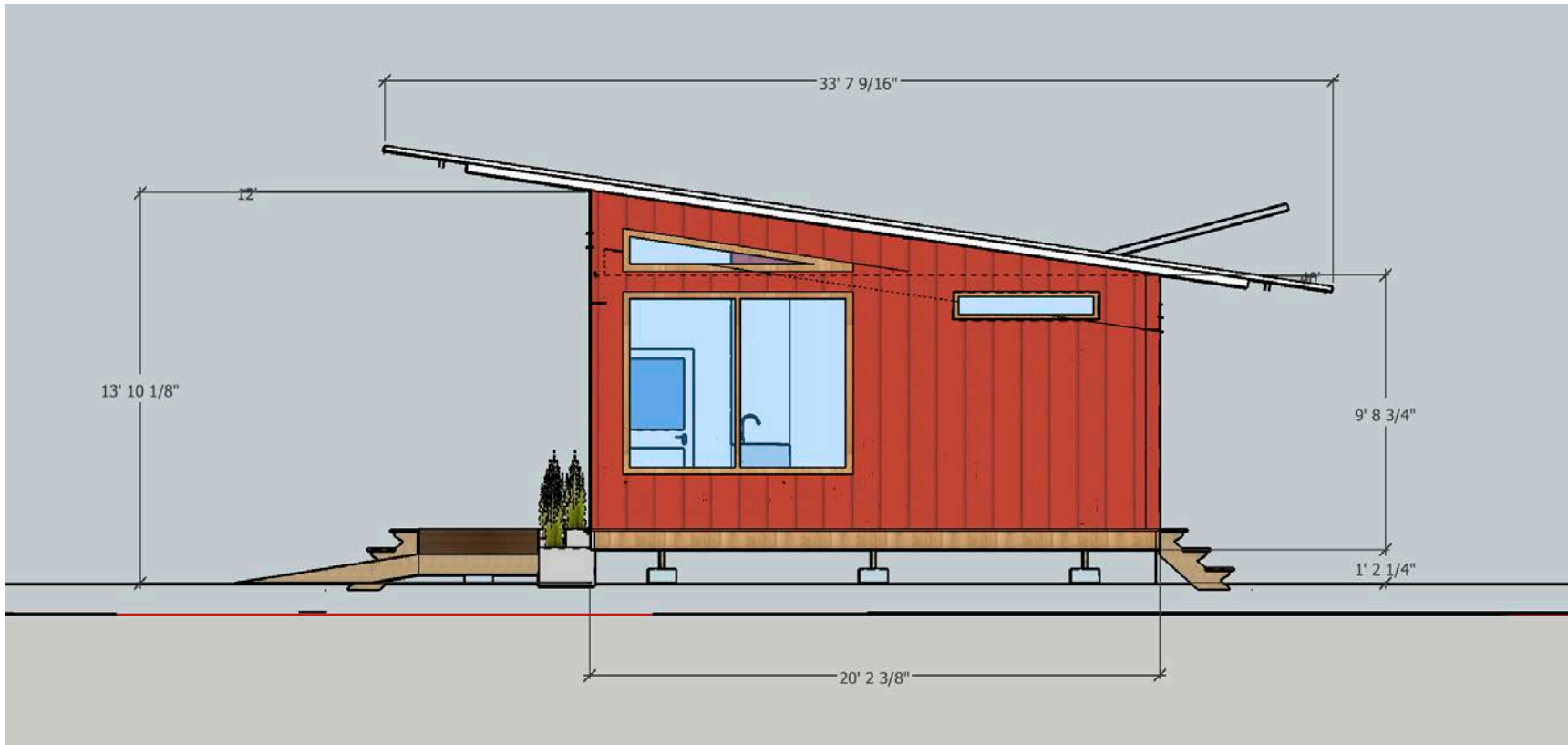
With a footprint of 20 x 20, this small home aims to efficiently use the space within. Inspired to encourage an individual's purpose and inspire community engagement, this home uses large windows and shared decks to aid in the development of community relationships.

The design incorporates modularity to the units, allowing for reduction in price per unit. The units are stackable, which reduces material use with shared walls, plumbing, and roofing.



TOP VIEW

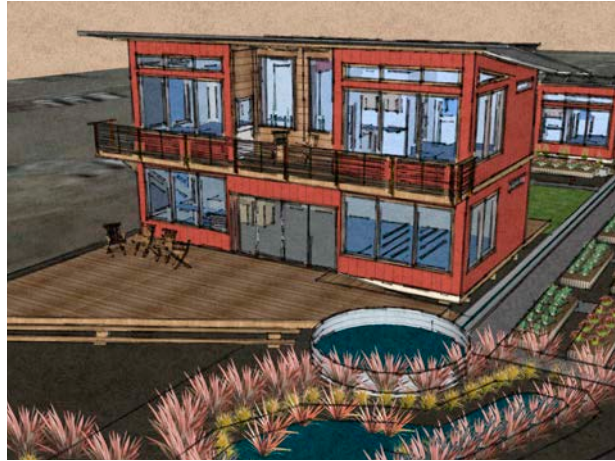




SITE LAYOUT



COMMUNITY ASPECTS



This design incorporates a community center where residents share amenities including laundry, Internet, computers, and a commercial kitchen in order to facilitate community interaction and as well as opportunity for income.

Independence and contribution to a larger community are important ways to increase quality of life among the elderly. This design incorporates a large community garden, which serves to provide a sense of purpose and increase community engagement.

A water collection system has been incorporated into this site design. Water is harvested from the roofs and directed into a series of troughs, which lead to a cistern. The collected water is then used to irrigate the community gardens.

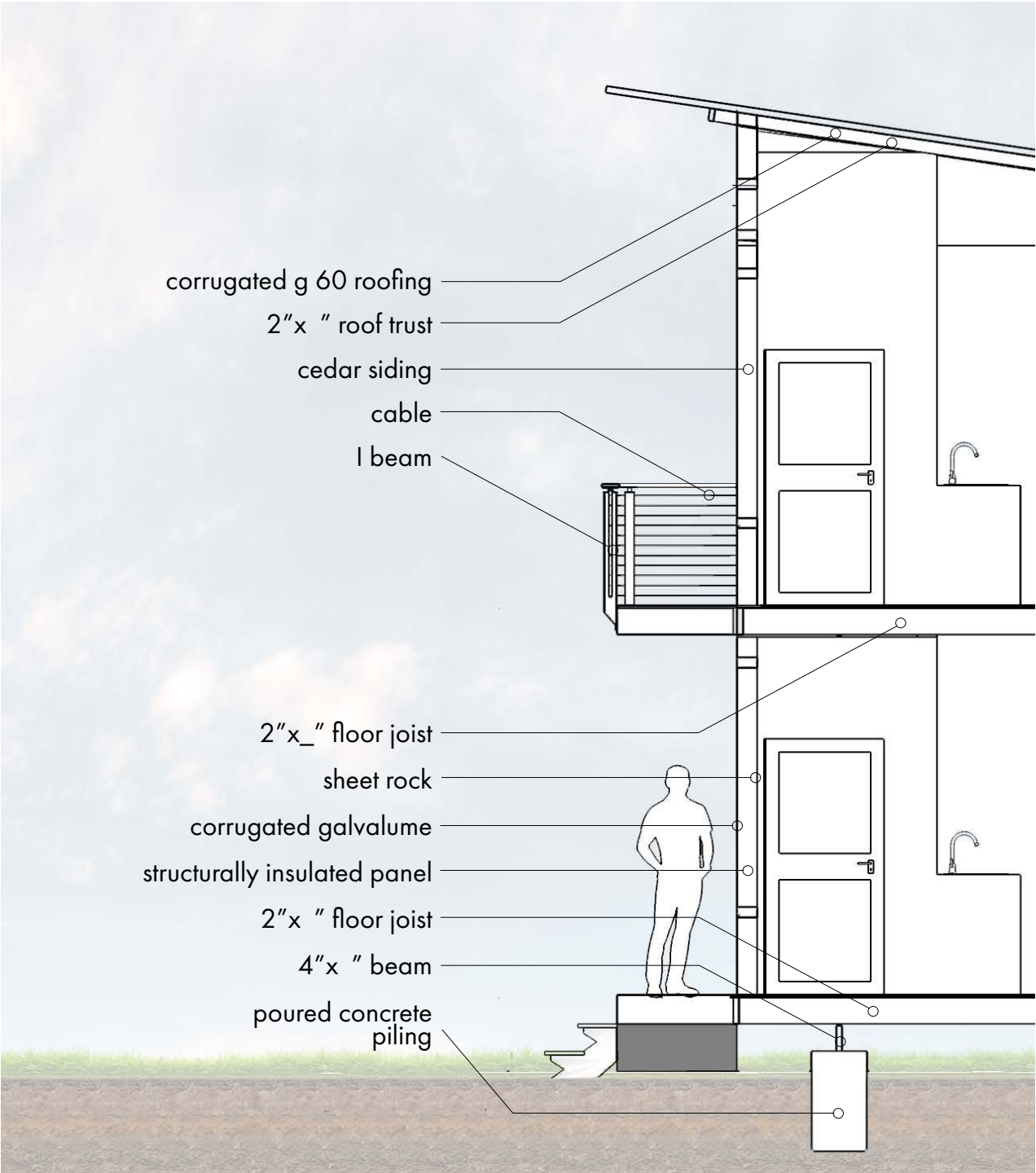
Excess water collected during the rainy season overflows into the rain garden system, which cleanses the water before it enters the storm drain or creek.



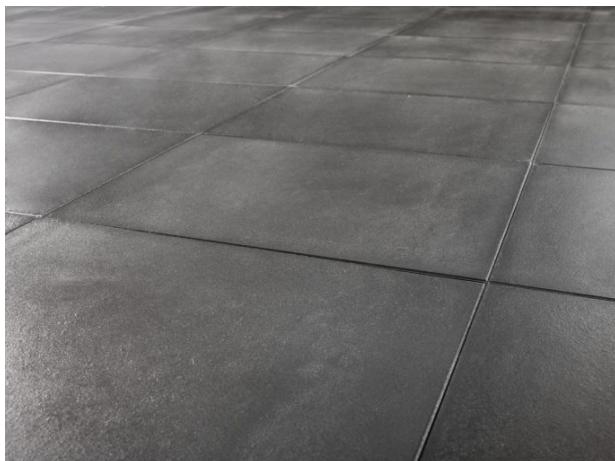
SITE LAYOUT



CONSTRUCTION TECHNIQUES



This design focused on affordable yet elegant materials while maintaining durability and ease of construction. The raised pillar foundation is easily constructible cutting the cost of labor and materials compared to a traditional foundation. Structurally Insulated Panels or SIPs are prefabricated to the specific modular design of this house. These SIPs are composed of an expanded polystyrene insulation sandwiched by oriented strand board and contains an R-value of 27. SIPs drastically reduce the labor time and reduce overall time of construction. Cedar planks were used for the foundation, roof trusses, and material accents due to its water resistant properties. Two types of corrugated steel were used for their affordable yet durable and low maintenance properties. Ceramic tile floors were installed in order to facilitate passive solar heating during the winter season.



COST ESTIMATE

Building permit costs

Building permit cost per unit	\$14,393
City building permit reduction 80%	-\$11,514.4
Total cost of building permits after reduction	\$2,878.6

Building costs

Cost of materials	\$33,202.6
Cost of labor	\$33,202.6
Total cost of unit	\$66,405.3

Land costs

Rental of land from City of Bellingham	\$1/year
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Site plan approval

Application, review, and permit fees	\$11,016
City reduction 80%	-\$8,812.8
Total cost of site plan approval	\$2,203.2
Total cost per unit	\$220.3

Site construction costs

Sewer, water, grading, landscaping	\$139,900
Total cost per unit	\$13,990

Planning and design

Design fees	\$120,593
Design fees per unit	\$12,059.3

Total cost per unit	\$98,432.17
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FINACIAL STRATEGIES

To fund each tiny home within our urban village each client will have different needs, ranging financial situations, and homeownership goals. We are encouraging clients to apply for the Infill Demonstration Toolkit, which promotes homeownership or rental housing that implements the Infill Demonstration Toolkit. We have proposed an addition to the city's Infill Toolkit, which includes tiny homes. Under the assumption the guidelines are approved and added to the Toolkit, clients could apply for the grant. The Housing Levy Homebuyer Funds provides up to \$90,000 and Federal Home Funds provides up to \$110,00, which totals at \$200,000 for funds available. If a client does not receive the grant, they can apply for a loan through WECU of \$50,000. If they do not qualify for a loan, they can apply for the grant. Over a 30-year mortgage it would be \$253 per month, which meets Susan's income goals.

SUSTAINIBILITY GOALS

Sustainable Building Design

- Fit context of neighborhood in scale, form and style.
- Attractive aesthetic inspired by surrounding area.
- Energy Efficient- Passive solar and south facing, radiant floor heating, water catchment and reuse for gardens, photovoltaic panels.
- Units are modular allowing them to be built as a single unit or as a group of units. Grouping units decreases cost of materials and labor.
- Natural light and ventilation are incorporated to encourage a stronger connection with the outdoors and greater community.
- Small units reduce heating of vacant space.

Affordable and Stable Rents

- Efficient use of land (density of 15 DU per acre), minimize required parking
- Durable, low cost, easy to maintain materials
- Small, well designed units that can be arranged different ways individualized
- Well constructed and insulated to avoid high utility bills
- Opportunity for ownership and building equity through payment programs

Financial Goals

- Construction cost of 100-125 dollars per square foot in result of land trust agreements, volunteer work, and rent support.

Encourage Community and aging in place

- Shared indoor and outdoor areas
- Shared activities and facilities, outdoor gathering spaces, Gardens, orchard
- Ideally Walkable and access to transit and not car dependent
- Opportunity to contribute skills- gardening, baking, repairs, elder or childcare
- Designed to encourage interaction year round
- Multigenerational

Inspirational/Education

- How can this model of living both set the standard and change our cultures understanding of the size of living?
- How will this model change our cultures procedures for elderly care?
- Create a solution that encourages change within Bellingham's housing code.
- Facilitate and inspire a discussion around the feasibility of tiny homes as affordable housing within the City of Bellingham.

Supports healthy independent lifestyle

- Accessible design supports aging in place. Detail like 3' doors, walk in showers, minimal or no steps or option for ramps
- Designs cater to Americans with Disabilities Act
- Access to food-nearby grocery store, a community garden, shared cooking and meals.
- Access to medical-nearby or accessible by bus
- Access to community places like library church, recreation or senior centers etc.
- Social/group and private spaces both indoor and outdoor
- Encourages community interaction and participation
- Provides a sense of purpose through on site therapeutic activities including gardening/farming, caring for animals, and other alternatives.

Sustainable site and landscape design

- Sustainable storm water design includes rainwater harvesting, reuse, and cleansing.
- Energy efficient- mechanical systems
- Minimal parking and driveways required
- Rain gardens and raised bed gardens encourage wildlife habitat

REGULATORY CODE

Tiny House

Description- A tiny house is a detached single family dwelling unit, on lots of 600 square feet to 1,000 square feet.

Site Requirements and Setbacks

Lot size: Minimum 600 square feet and maximum 1,000 square feet.

Required setbacks for tiny houses from property line is to be 5 feet.

Bulk and Massing

Maximum floor area ratio (FAR): 0.85. Attached garages are included in FAR. Detached garages up to 200 square feet are exempt from FAR.

No single floor may be larger than 500 square feet

Maximum height is 25 feet under definition #1 and 15 feet under definition #2.

Open Space

A minimum of 20% of the site area shall be in landscaping and pervious materials, which may include pervious paving or green roofs. Exceptions may be granted in erosion hazard zones or areas with shallow bedrock as determined by the planning director.

Parking

Dwelling units under 500 square feet are not required to provide on-site parking, if units reside within 0.25 miles of public transportation. Units larger than 500 square feet shall provide one parking stall. The Planning Director may change parking requirements based on applicant's demonstration of site specific factors that justify a different standard. Parking stalls shall be at least 9' X 18'.

Tandem parking is allowed (may be exterior or interior).

If an alley exists, parking shall be accessed via the alley except when the Planning Director determines that alley access is impractical or environmentally constrained.

If a lane exists, but no alley, parking shall be accessed via the lane. Parking accessed from the public street shall be limited to one driveway of 20' maximum width.

Adjacent properties may share a driveway upon approval of a shared access and maintenance agreement.

Detached garages may share a common wall along a property line if a shared maintenance agreement is in place.

Parking setbacks from property line:

Front: 10 feet

Side Flanking: 15 feet

All common shared driveway, common wall or any common facility shall be approved by the Planning Director. Final documents are required to be recorded.

Design Standards

Each dwelling unit must have a separate entrance. Units that front the public street shall have entrances facing the public right-of-way.

Units should utilize the benefits of outdoor spaces, like porches and decks.

No roof pitch shall be less than 2:12 (may be shed type) except for green roofs.

Fences in the front and side flanking setbacks are allowed a maximum height of 42 inches in height and may be no more than 60% opaque.

Chain link or cyclone fencing is not allowed in the front or side flanking setback.

Design Guidelines

Use context-sensitive site design and building details to help ensure that new infill development will enhance the neighborhood and respect the character of the existing houses on a street.

Building Design

Single story massing elements should be emphasized on the front facades, using porches and bays seen from the street. The elements should also vary in design and materials used to provide further articulation and additional variety and character.

A small stoop or covered step is encouraged to add character and distinction to the tiny house entrance.

Site Design

If including front yards in the design, then they should provide small extensions to the entry porch for semi-private activity. Front yard parking aprons are not allowed.

Fencing, especially when seen from the street, should be designed to integrate into the architecture of the building and add visual interest in its detail, materials or color.

Provide generous use of planting materials and landscape structures such as trellises, raised beds and fencing to unify the overall site design.

TINY HOME MODEL 2

**TINY HOMES FOR THE
FINELY AGED FOLK**



TINY HOMES FOR THE FINELY AGED FOLK

Madeline Hart

Josh Ludden

Thomas Tague₂₆

CLIENT PROFILE

Introduction

Too many people cannot afford housing. Many wind up becoming homeless. There are 650,0000 people experiencing homelessness on any given night in the United States. Homeless persons in Whatcom County were expected to exceed 750 people in 2016. Imagine if we could create housing that is truly affordable to all segments of the population? Would that reduce or even prevent the condition of homelessness?

The clients for this project include a broad segment of the community that simply cannot afford, nor need, standardized, market-based housing. Alternatives are needed to identify practical solutions for DIY housing construction, assisted, in part, by public agencies and non-profit organizations committed to support housing solutions for the poorest segment of the population. As a starting point, it will be assumed that the client group has an income that falls below federal poverty levels; desires home ownership, has an ability to provide in-kind labor in constructing their own home, desires to live in a like-community setting, and requires some degree of public / non-profit organizational support to defer some of the costs associated with housing development, which may include the provision of land that could be provided at below market value; exemptions from impact fees associated with new development and hookup toutilities, and/or regulatory relief measures to permit alternative forms of housing construction.

Too further identify this projects client, the Sustainable Design Studio conducted research and several interviews of people within the criteria identified for this project. Our target demographic is people in a more advanced stage of their lives in which they no longer need such large living spaces and need to continue to feel as though they are part of the community. The purpose of the interviews was to develop Design Objectives and Goals for the project. Through this process the studio was able to develop a Social profile of the client group to be served. Here we have the profile of Finely Aged Francis.



AGE 77
STATUS Widowed
LOCATION Artist
OCCUPATION Enumclaw, WA
TIER Marine Water Color
ARCHETYPE Wily Widowed Painter

Bio

Francis grew up in a steady household that taught her many skills and developed her into a strong, independent woman. More recently, she became a widow after a horrible fire claimed her husband when her extravagant log house went ablaze. She has now turned her focus to her artwork, mainly painting, and is seeking a much smaller, more affordable and more sustainable place to live.

Goals

- Not rely on others for help
- Maintain active social life
- Permanent living situation
- Walkable/Public Transit
- Access to open space
- Use resources and space efficiently
- Live in a small community

Personality

- Outdoor Oriented
- Social Butterfly
- Witty

Hobbies

- Artwork
- Gardening
- Home Maintenance Projects
- Reading
- Cooking
- Traveling

Fears

- Increased cost of living
- Being unable to care for yard and home
- Isolation
- Prematurely exhausting assets
- Getting hurt and not being able to receive help

Financial Example

Social Security	\$1,327
Rent	\$751
Others	\$836
Total Expenses	\$1,587

DESIGN OBJECTIVES

Introduction

The Sustainable Design Studio is taking an indepth look at homelessness to develop extreme affordable housing solutions with a focus on tiny housing community projects. Homelessness can affect a range of different people and this studio is focusing on growing aged population that is facing a number of challenges. The studio conducted a design survey to qualify design objectives for consideration. Each member interviewed persons within that were older than 55 and considered poor or nearly poor (Income within 125 percent of the poverty line. Each potential client has a different set of needs that the studio identifies and addresses. In this case, the studio is developing an affordable senior housing option. Some of those design objects are as follows:

Considerations

- How can we enable access to housing, for those that cannot afford conventional housing, that still respects dignity and promotes social inclusion?
- How practical are Do-It-Yourself Housing Options that build on human capital?
- Think Tiny Living – can tiny spaces result in housing accessibility?
- Is green building limited to only those that can afford it?
- Can truly alternative housing work both financially and legally?

Along with the above considerations, the sustainable design studio is committed to creating communities with the lowest impact possible. These designs are held to standards similar to that of LEED and other organizations.

Objectives

Below the studio has identified several important design objectives. Some of them apply to the construction and building itself and some apply to the related non-physical features such as price, location, and amenities. These considerations are based on a whole community and not and individual home. Specifics for the individual homes:

Specifics for the individual homes: are discussed in the Regulatory Code Section. Below are the combined objectives considered for the entire community and the individual homes

- **Provide affordable and efficient housing**
 - Under \$500 or 1/3 of average finely aged person's income. According to the Social Security Administration (SSA), the average SSA benefit distribution is \$1342 USD per month. This is dispersed to men on an average of \$1500 per month and women on an average of \$1182. There are several estimates that an individual should spend approximately 30% of their income on housing. That equates to \$402.60 per month for a person with this annual monthly income.
 - Efficient low cost utilities. According to Move.org, a person should anticipate approximately \$200 per month for utility bills and ApartmentRatings.com estimates that "An average electric bill may be as low as \$30 per month or as high as \$100. Gas may cost, on average, anywhere from \$40 to \$150 and can fluctuate depending on the season," "the average bill for each falls between \$10 and \$30 a month, although you may be billed at a flat rate for both that," and "you could expect to pay between \$10 and \$40 a month for trash pickup."
- **Design for a space that safely encourages independence and mobility**
 - Mobility (Outside Community, Food, Errands, etc...) The inability to drive due to visual difficulties or mental acuity can make even seemingly simple things, such as picking up some milk from the store, next to impossible.
 - Safety and support services. By providing readily available support, aged client will be able to live independently more safely for a longer period of time.

- **Provide accessible amenities**
 - Easily Accessible home features. This further promotes independence and cuts the cost of expensive services that do things for you.
 - Communal home with utilities. Provide an opportunity for interaction and implement a design that is more cost effective and efficient.
- **Create a walkable, tight-knit community, Entertainment**
 - Close proximity. As Merck reports, "many seniors who live alone report feelings of loneliness and isolation. Depending upon the support structure at the senior's disposal, she may go extended periods of time without visitors or with little contact to the outside world"
 - Access to recreation activities. Offering social outlets to promote interaction and prevent isolation.



PROTOTYPE

To avoid the monotony of uniformity this concept provides three different individual units. Prototype 1 and 3 are equipped with solar panels in an attempt to achieve a higher level of sustainability. All 3 units vary in total square footage, layout and materials. Prototype 1 and 2 are the ideal size for a person living on his or her own. The compact design allows enough space to live comfortable without excess. Features

have also been built in to accommodate family visitors or other guests.

The largest unit, prototype 3, was designed to fit the needs of a couple rather than an individual client. Together these 3 units all come together to create a tight knit community. The variety also creates a unique character that adds to the

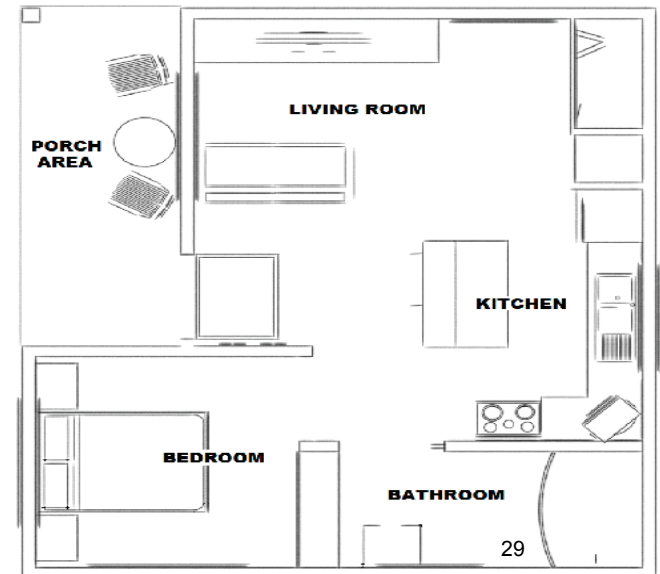
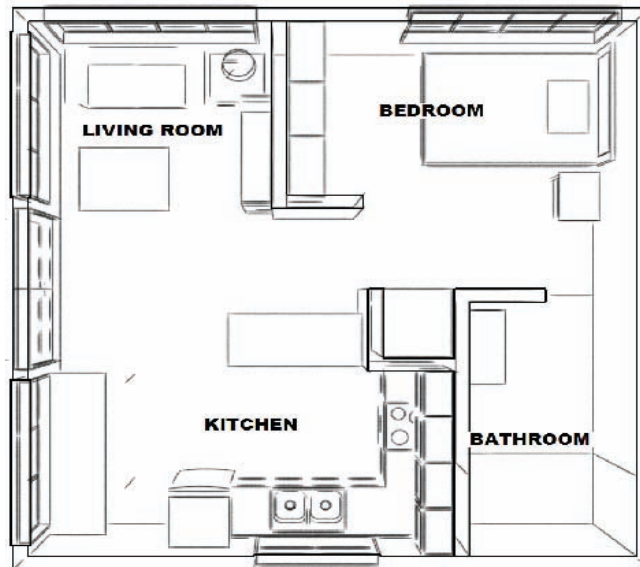
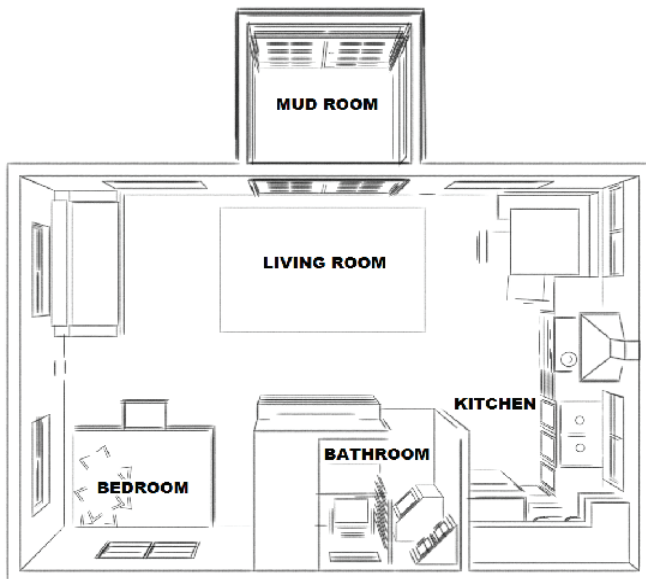
vibrance of everyday life. Additionally, each unit was designed with the environment in mind. Many factors such as water conservation, air quality, and utilizing the sun were incorporated. As densities increase, society has to be more and more sensitive to the impacts that it will have on the environment locally and collectively.



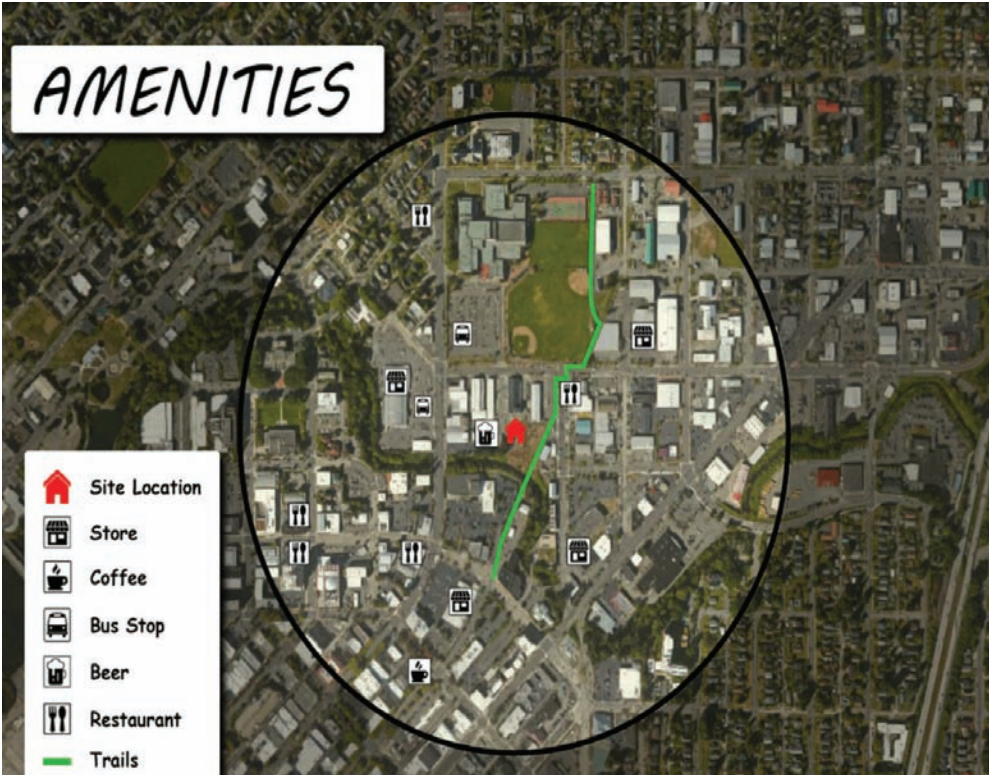
Prototype 1 - 467 Square Feet

Prototype 2 - 441 Square Feet

Prototype 3 - 648 Square Feet



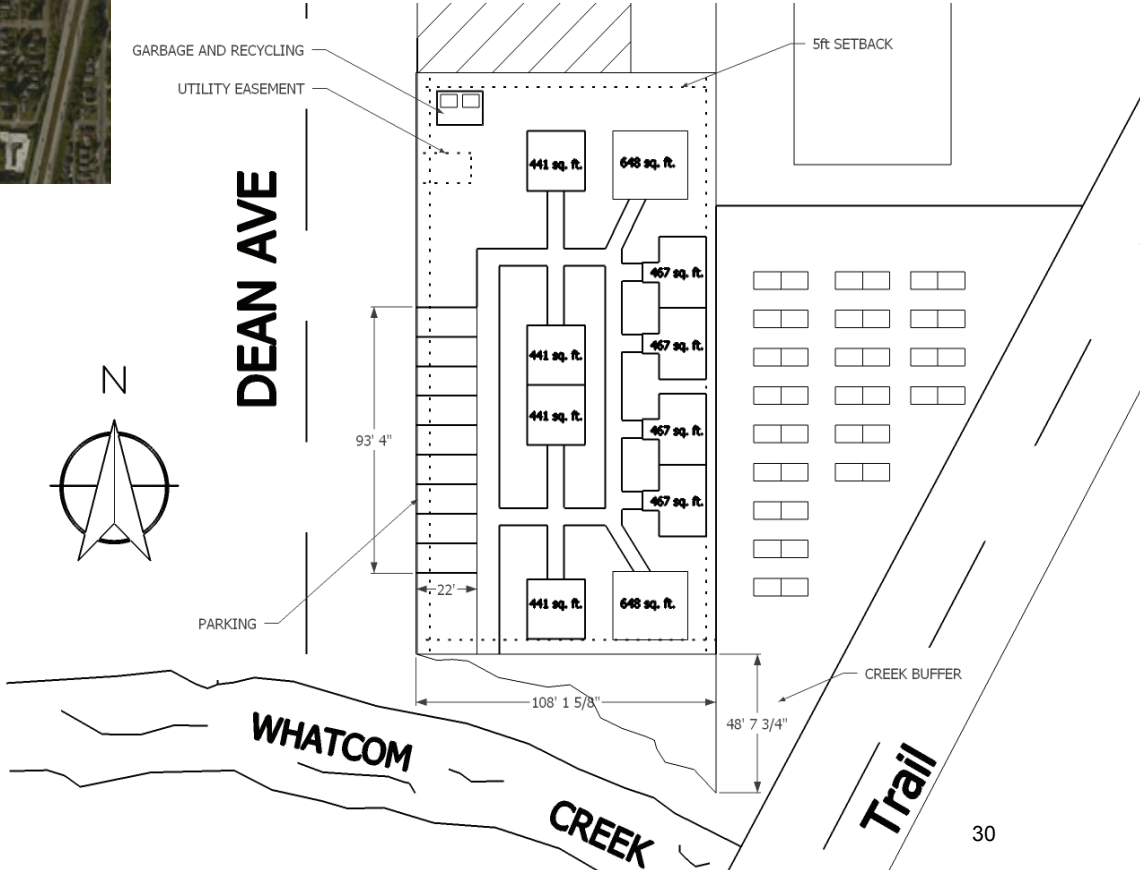
SITE PLAN



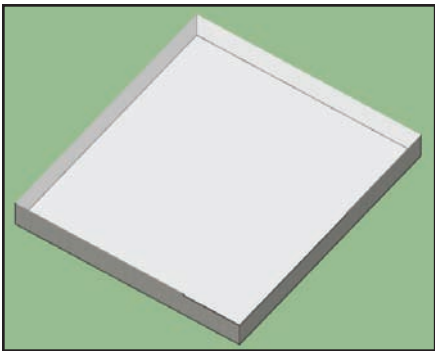
Introduction

The sustainable design studio chose the site location at 1810 Dean Avenue in Bellingham, WA. The lot is an empty gravel lot used as a storage yard and parking lot by the adjacent land owner, Overhead Door Company of Bellingham. It is composed of approximately 26,000 square feet of unimproved land. It is abutted on the North by the Overhead Door Company, Dean Avenue to the West, a community garden to the East, and Whatcom Creek to the South. Bellingham currently enforces a 5 foot setback from the property line and there is a 100 foot setback from Whatcom Creek. Even with the Whatcom Creek setback there is a substantial amount of land to develop on. Below is an image of the proposed site plan layout. To the left is a vicinity map that shows amenities within 1/2 mile of the site. The bottom left is a density table showing that we were able to fit 10 units on a 0.59 acre lot. This equates to approximately 17 units per acre. We could fit more units on the site if the city would grant a variance to lower the Whatcom Creek Buffer.

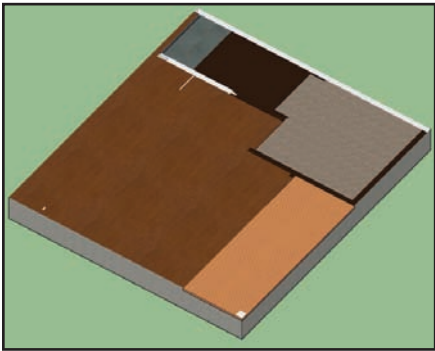
Lot Size	26,000 sq. ft. or 0.59 acres
Number of Units	10
Density	17 units per acre
Layout 1 (4)	441 sq. ft.
Layout 2 (4)	467 sq. ft.
Layout 3 (2)	648 sq. ft.



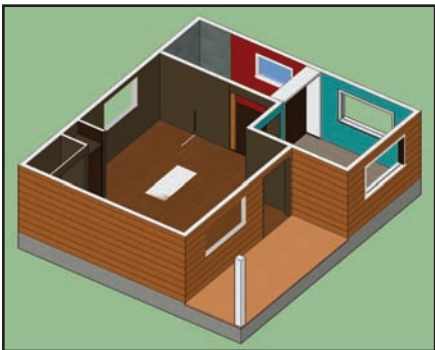
CONSTRUCTION



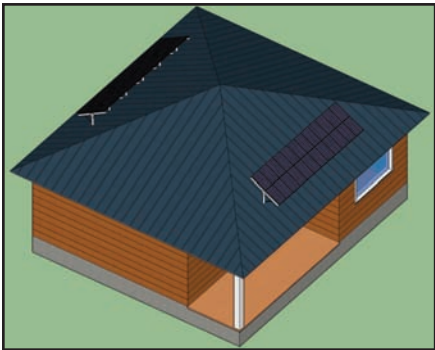
Step 1
Lay the
foundation



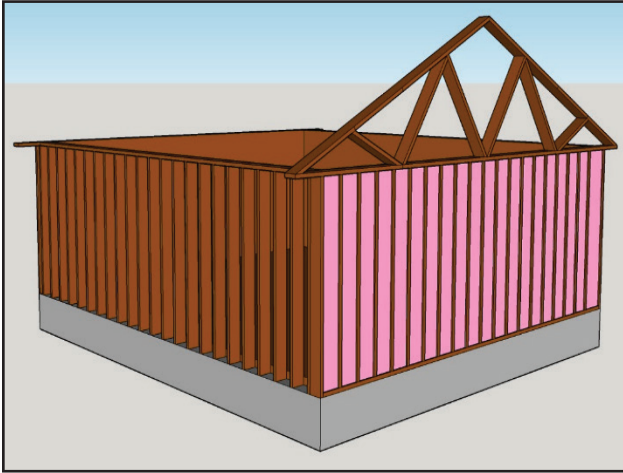
Step 2
Lay the sub-
flooring



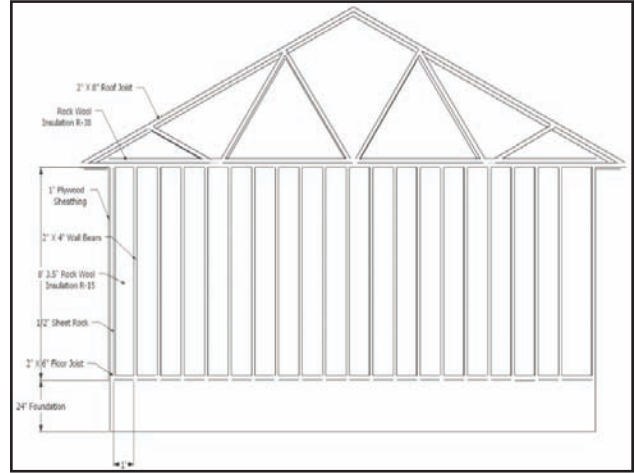
Step 3
Frame and
erect the
walls



Step 4
Frame and
construct the
roof



This image (above) shows the stick building construction along with the Rock Wool insulation



This image (above) gives a cross section view with measurements of the bare bones construction



Labor, Materials & Sourcing

Introduction

Labor and Materials are the greatest cost when building a home. Other expenses consist of the land price, utility connection, permit fees, and any environmental remediation that you are required to do. These all can cause home construction to become unaffordable. The Sustainable Design Studio has identified ways to reduce these costs in order to keep housing affordable.

To begin, the City of Bellingham offers incentives to reduce the price of fees and that can be seen in the table to the right. In addition to the savings, will be other financing options discussed in the financing section. Labor is one of the most expensive components and this project aims to eliminate this by utilizing volunteers and labor from other organizations. The people that will be living in the community will have the opportunity to help with construction, but we anticipate most of the labor coming from other volunteers and organizations.

Some of the organizations that will be involved are Habitat for Humanity, local businesses, the Restore, and volunteer organizations in the area.



Category	Costs
Land Value	\$248,640.00
Permit w/ 80% Reduction	\$28,571.99
Material (4928 sq ft)	\$284,592.00
Labor	\$284,592.00
Utility Connection estimate	\$2,000.00
Total	\$846,397.99



FINANCING & STRATEGY

Ordinance 2015-07-029, provides for fee exemptions via 80% reductions to park impact fees (BMC 19.04.130), transportation impact fees (BMC 19.06.030), school impact fees (BMC 19.08.080), water service system development charges (BMC 15.08.230), sewer system development charges (BMC 15.12.170), and storm and surface water utility system development charges (BMC 15.16.040). These exemptions can be granted based on the following criteria:

Permit Fee Estimation - \$142,859.95

With 80% affordable housing discount - **\$28,571.99**

No Savings

5.25% Mortgage for \$846,397.99

\$4,674 per month

\$467.40 per unit

Labor Cost savings \$284,592.00

5.25 % Mortgage for \$561,805.99

\$3,102 per month

\$310.20 per unit

Washington State Housing Finance Commission 501(c)(3)

Nonprofit Housing Bonds Savings

2.5 % Mortgage for \$561,805.99

\$2219.81 per month

\$222.10 per unit

Bellingham Median- \$43,536

80% - \$34,828.80

30% - \$10,448.64

Per month - \$870.72

Other Programs / Funding Opportunities

Rental Housing Predevelopment

Infill Housing Demonstration Program

Rental Multifamily()Production Program

501(c)(3) Nonprofit

Housing Bonds

Tax incentives

Donations

Organizations

Restore

Habitat for Humanity

Churches

Retirees

Crowd Funding

Kickstarter

Indie go go



KulshanCLT
a *community* land trust



KICKSTARTER



Opening doors to a better life

SUSTAINABILITY & MATERIALS

Introduction

The studio recognizes that sustainability encompasses several aspects of a building project. Through out the design process we identified building methods, materials, appliances and fixtures that would contribute to the sustainability of the project.

The homes will be built by community members and volunteers. This will cut costs and create a stronger tie to the project that will encourage a stronger sense of community. Below is a list of some of the features chosen:

Sustainability Features

- Natural wool insulation
- 6 10 Soms k - 10 gallon compact electric water heater
- Roofing: Recycled Shingles
- Flooring: Cork
- Rain Catchment
- Solar Panels and PSE Green Power
- Low flow shower heads and faucets
- Energy Star Rated Appliances
- Greywater toilet system
- Permeable Concrete



ReStore

REGULATORY CODE

A. Description

Tiny housing (village?) is a grouping of small, compact residential housing units that are approximately 500 square feet or less. This grouping of units has a common area and is developed with a shared plan in regards to design of structures and site, as well as access, amenities, and parking.

B. Site Requirements and Setbacks

1. Tiny houses may be located on a separate lot or several units may be located on a common parcel.
2. There are no minimum lot dimensions, lot sizes or minimum street frontage requirements unless otherwise specified
3. The required setbacks is 5 ft. from the property line and 100 ft. from Whatcom Creek

C. Bulk and Massing

1. 15 units per acre of land, shared garden court or duplexes may be subdivided if site as a whole complies with BMC title 18.
2. No structure greater than 650 sq ft and a floor area ratio of 0.75
3. The height limit is 25 ft

D. Open Space

1. 100 sq ft of usable open space. Decks may be included
2. A minimum of 15 percent of the site area shall be landscaping. Exeptions to this may be made in erosion hazard zones, near the creek, or regions with shallow bedrock (determined by the city)
3. Usable open space must be directly accessible from the dwelling unit whether it is private open space or a shared common space.

E. Parking

1. At least one on-site parking stall per unit (400 sq ft),
2. The project shall include at least one on-site parking stall per unit. The planning director for this site may reduce parking requirements based on applicant's demonstration of site-specific factors (such as older folks who cannot drive). Parking stalls shall be at least nine feet by 18 feet
3. Parking must be consolidated

F. Design Standards

1. If a porch is provided on a dwelling unit, it must be a minimum of 60 square feet, with no dimension less than 5 feet. This is in addition to private/shared open space requirements.
2. Dwelling units that front a public street or lane shall have a porch that faces the street or lane. Units with porches provided and/or mud rooms that face the shared open space shall have their porches or mud rooms face the open space.
3. If fences in the front and side street setbacks, or between the common areas and the dwelling units, are limited to 42 inches in height and may be no more than 60 percent opaque. Chain link or cyclone fencing is not allowed in the front or side street yard.

G. Design Guidelines

Tiny housing villages should architecturally blend into existing neighborhoods to the best of their capability through careful attention paid to the design of units, open space and landscaping, and parking designs. Proportionate tiny houses, with porches, small gardens, and varied roof lines within the village can fit comfortably into surrounding neighborhoods of more elderly, detached homes or businesses.

H. Building Design

1. Buildings should be various in orientation, design, and layout between cottages whilst still maintaining similar character to aid with differentiating units.
2. Tiny homes should echo typical neighborhood design features such as porches, and architectural detailing features.
3. Changes in materials, colors, or textures to add character to the village are encouraged, so as long as they do not clash or overpower adjacent features.
- 4.

I. Site Design

1. If possible, provide small private open spaces such as a porch, in conjunction with a shared open space. If there is no private open space provided, there must be direct access to common open space.
2. Tiny house villages must provide a considerable amount of landscape structures such as benches, gates, ecks/patios, pathways, and raised garden beds to provide adequate usable outdoor space. Planting materials and fencing is required to unify the overall site design.



TINY HOME MODEL 3

ELLIS CREEK HOMES

Ellis-Creek Homes

An architectural rendering of a modern residential development. The scene shows several multi-story houses with large windows and balconies, arranged around a central courtyard. The courtyard is landscaped with green grass, several tall yellow sunflowers, and clusters of spiky green plants. A person is visible on a balcony on the right, and another person is standing in the courtyard. The sky is a clear blue.

1815 ELLIS ST.
Bellingham, WA
Team 3

Gavin Alfus,
Michael Beck,
Naoki Tsuruta

Client Profile

Family Profile

Names David
Delores
Ana

Collective

Income \$21,000 annually

Languages Spanish & English



Family Motivations

- Place to raise Ana
- Affordable amenities
- Capability to move in a timely fashion because of seasonal work
- Little work to be done on the home due to David's laborous job and age of Deloras
- Devoted catholic family
- Close proximity to public transit
- Ability to walk to food sources
- Tight knit community
- Ability to accommodate guests
- Cooking is a passion for Deloras
- Place that celebrates the families unique cultural traditions



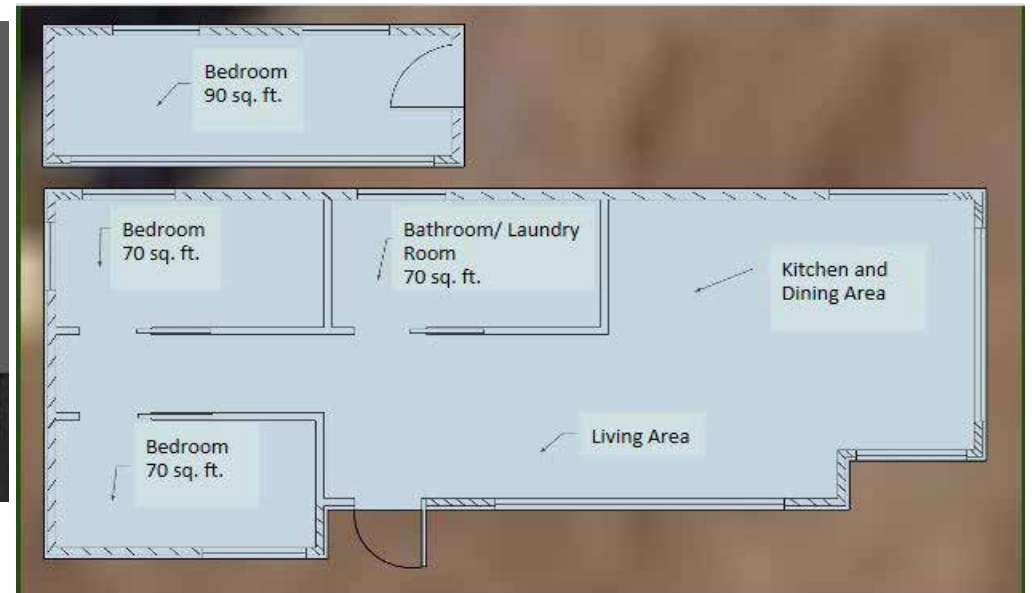
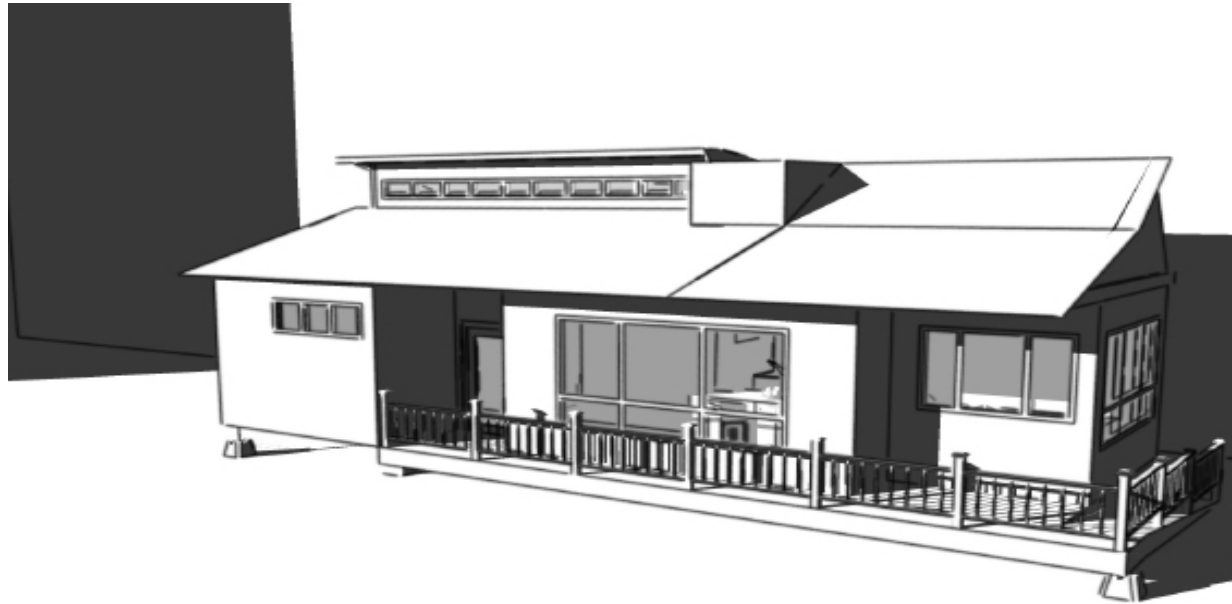
Single Working Father,
Retired Grandmother, and a
7-year-old girl

Migrant Family

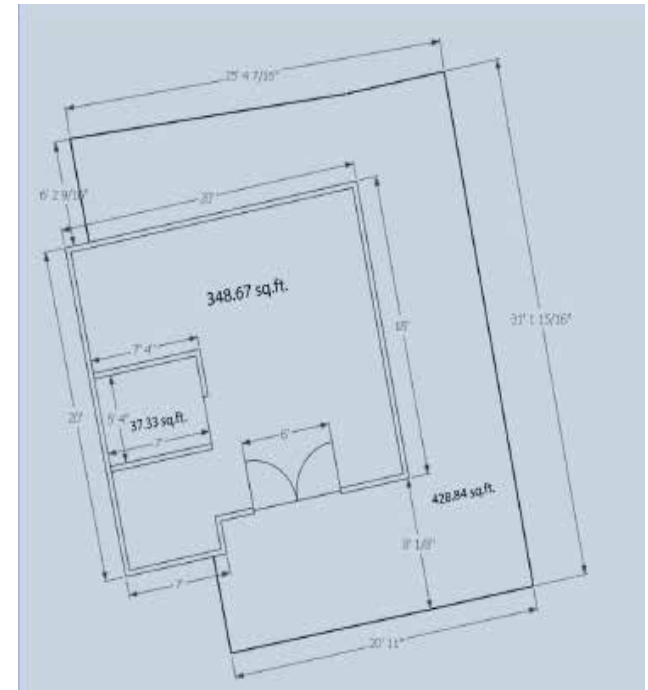
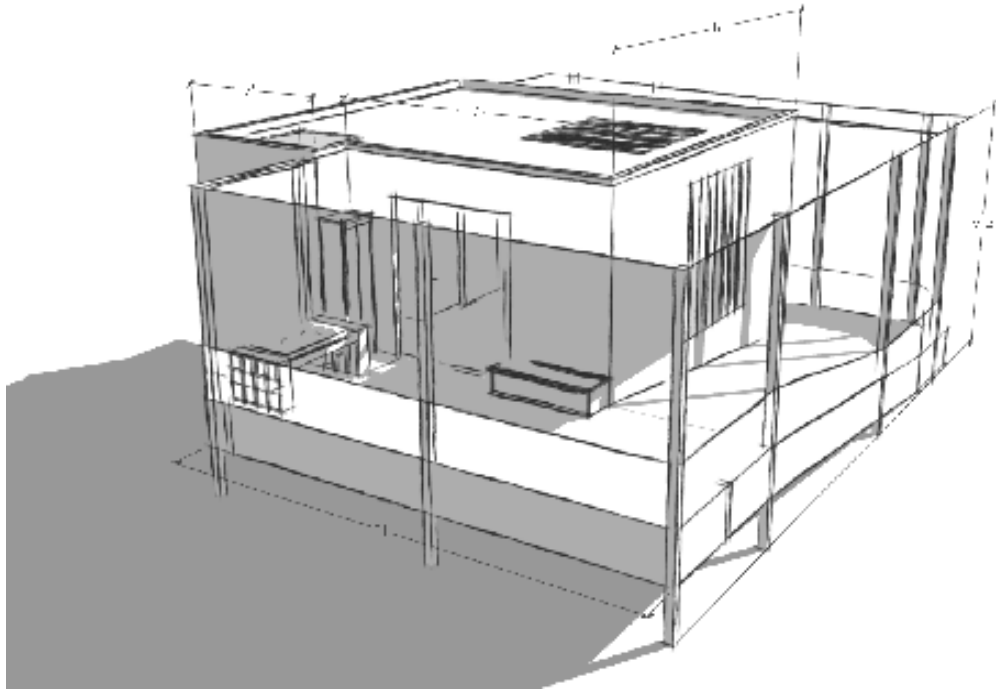
"Living paycheck to paycheck is not the way I want to raise Ana. I want to repay my mother for her years of hard work raising me to be the man I am today" - David



Prototype Housing Unit Design 1



Prototype Housing Unit Design 2



Site Plan

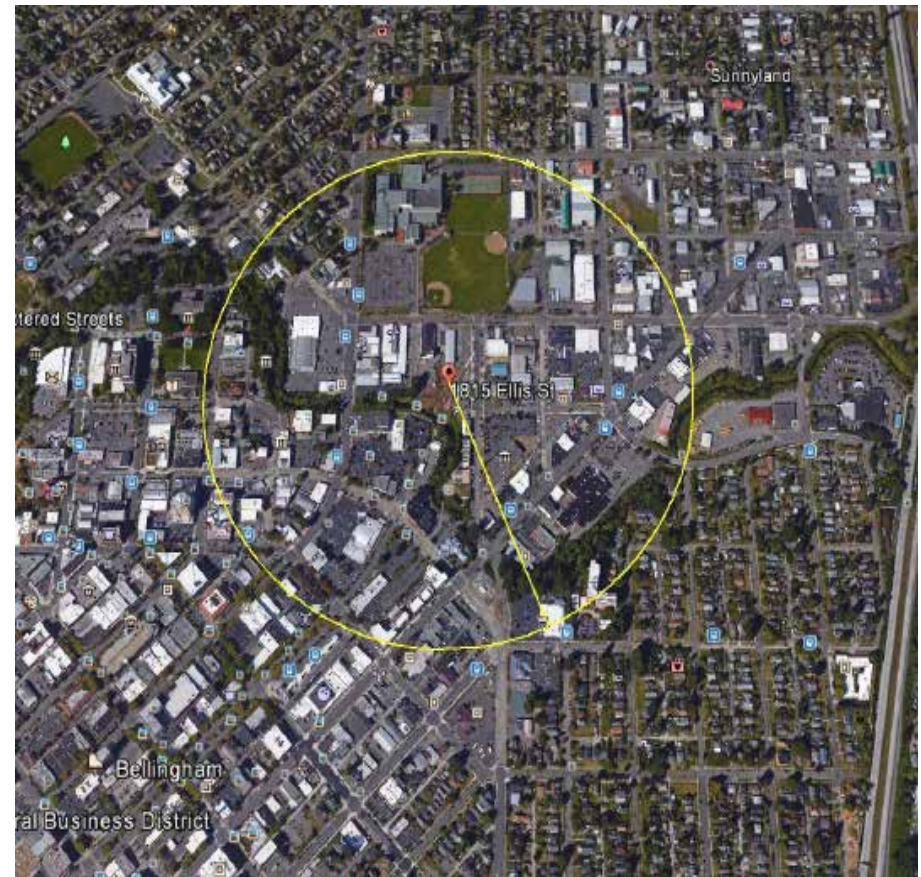
Dimensions

Total Area Size: 18,541 ~sq. ft.

Parking lot: 4,725 ~sq.ft.

Area of development: 11,516~ sq.ft.

Creek buffer: 2,300~ sq.ft.

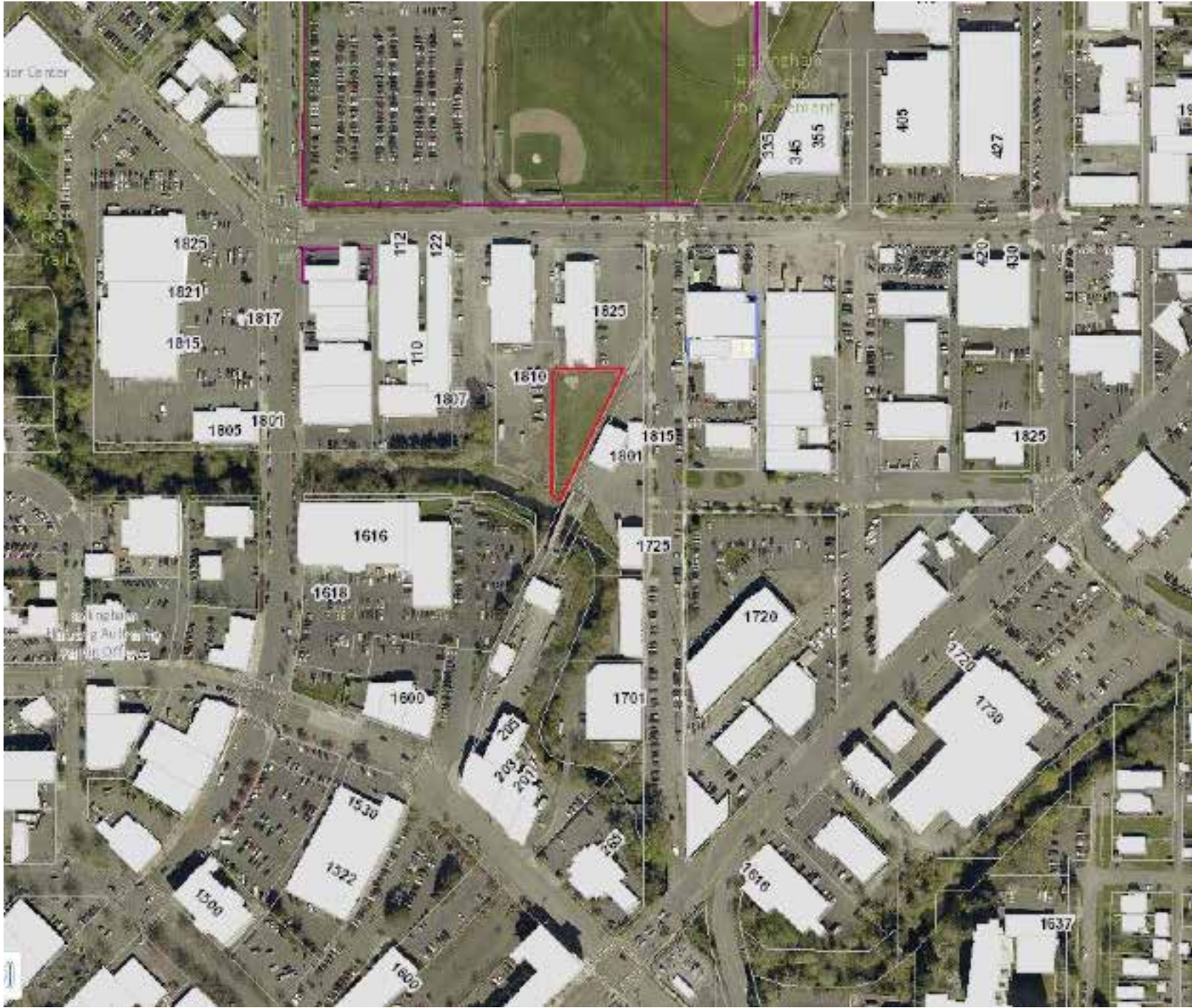


15 Minute Walking Radius

Right next to:

- 13 bus stops
- Close to Downtown
- The Bellingham Food Bank
- Wander Brewing
- Grocery Outlet
- Bellingham High School
- Assumption and Catholic Church





Construction

Home Design Two

Phase 1 (1 day)

Set up seismic piers for the foundation of both the house and the porch.

Phase 2 (4-5 days)

Construct porch made of re-used wooden pallets , 4"x4"x16' pillars, and wooden trellis material. The 428.84 sq.ft. porch is larger than the square footage of the house and may require as much or more time to construct by professionals than the housing design.

Phase 3 (4-5 days)

Construction of the Conceptos Plásticos block house. The first day will be spent establishing the pillars on the seismic piers and constructing the floor structure. Days two, three, and potentially four will be spent setting the blocks for wall structure and day. Day five will complete the structure with front foor and secure walls and no roofing or window material.

Phase 4 (1-2 days)

Situating glass door ceiling panels as roof structure and securing panels to interior walls. Placing glass in window openings.

Phase 5 (1-2 days)

Setting up water meter and connecting housing unit to city electricity

Phase 4 (1-2 days)

Placing furniture and appliances.



Labor

The Western Willing Workers is a non-profit organization that will help with the labor in constructing new affordable home projects. They are a local organization that will have student volunteers help with the initial construction phases. Similar to organizations like Habitat for Humanity, The Western Willing Workers is a nonprofit, interest group that have goals in devoting to building simple, decent, and affordable housing. The non-profit organization will also be donating construction material such as recycled wooden material that will essential for the constructing phases for the house.



Materials & Costs

Land Cost

1815 Ellis St. has a land value of \$167,000 with no land improvement value.

Materials

1. Walls and Framing

Both designs will consist of a balloon framework. The balloon framework design will require more connection between floorboards and the framework with multiple metal hangers for each side of the pillar. Model one requires 22 pillars. Design two requires six pillars. Each ground floor pillar will require a seismic pillar as a stable foundation; design one requires 12 piers and design two calls for five piers.

In addition to the building framework, each design will include porch space, which will be constructed from recycled wooden pallets and 4"x4" wooden pillars. Site plans intend for the recycled wooden pallets to be attained for free with the help of local donation, outlined below. The 4" by 4" pillars cost around \$30 per 16' height unit and one unit for design one is approximated to require nine pillars and design two calls for twelve pillars.

The exterior walls of design one will be made of Hardie V-Rustic siding for \$3 per sq.ft. of wall. Hardie V-Rustic siding is made up of a lock joint system that blocks out moisture and prevents moisture-related material issues such as rot, mold, shrinking and swelling (Artisan, 2014). This siding



Hardie V-Rustic Siding

looks similar to wood framing but has a more durable and low-maintenance exterior. Hardie V-Rustic siding for model one will cost around \$3,738 per house.

The frame and walls of design two will be constructed using recycled Lego-style block material from Conceptos Plásticos. Using the design of Conceptos Plásticos, the tiny home designs can be mobile, sustainable, and low-cost. The company's designs include beams, blocks, and pillars and make construction possible for homeowners with the blocks functioning as building material and building tools to hammer pieces together. Conceptos Plásticos was

established in Bogota, Columbia and makes it possible for a 40m² home to be built by four able-bodied people in four to five days at a price of \$5,200 (Winkless, 2016). The sourcing of this material from Columbia will not be a dramatic cost for the project's original clients, who have been based in Oaxaca, Mexico. The blocks can be shipped to the clients and stored in the back of a pick-up truck or larger trailer and will accompany the clients in their West-coast harvest migration. Conceptos Plásticos is resistant to moisture and the effects of mold and rot.

2. Roofing

The roofing materials of both designs consist of recycled materials for economic savings, sustainable use of materials, and unique design.

Corrugated Steel is used for roofing in design one for its durability to rain, low cost, and lightweight nature. Using this material for roofing has

benefits of better housing ventilation and structural safety by avoiding roof collapse. One potential challenge is the loss of heat through the roof and increased effort to keep the house warmer during months outside of winter. Housing design one requires 17 sheets of 12' by 4' corrugated steel.



Construction using Collectivos Plásticos

The use of Conceptos Plásticos in house design two leads to a limited heat containing capacity in the walls of the design. In order to generate more heat, the roof of the designs is planned to be constructed out of recycled sliding glass doors to create a greenhouse effect for each

unit. In warmer summer months the greenhouse effect can be limited by residents by extending an accordion shutter for the roof window during peak sun exposure hours. Humidity can be mitigated by opening windows or the front door, and Conceptos Plásticos is resistant to mold and rot. One challenge of this roofing material is the weight of the glass doors, which will require more extensive roof securing brackets. The reclaimed glass doors can be purchased at Bellingham's REstore or analogous reclamation stores along the West Coast of the U.S. or in Mexico. Home design two requires 15 panels of 6'8" by 4' glass doors.

The cost of recycled glass door panels and sheet metal can be avoided through a glass door and corrugated sheet metal collection drive for the site.

3. Insulation

The designs include insulation that is appropriate for the Bellingham climate and is affordable with a cost of \$1.00 per sq. ft. The insulation is Eco-Batt insulation with an R rating of 38 meaning that the insulation is effective for temperate climates. Eco-Batt insulation is a sand based insulation that could be installed quickly and easily.

4. Electrical

The site will be a grid-tied solar electrical system, which relies on both solar panels and the Bellingham electric grid for power. The initial cost of solar panel installation, electrical wiring, and connecting to city electricity will cost \$18,000. Depending on the amount of energy collected annually, the site could receive annual returns of \$3,500 in revenue from the state. This payoff is a result of contribution for lifting the service burden on Bellingham's electrical grid.

The solar panels are located on seven trellises scattered throughout the site. The seven trellises provide shade, bench seating, and a bike rack. To obtain optimal sunlight exposure, all solar trellises are north and south facing. In addition, to make the most out of the unique site four of the seven solar trellises are located in the buffer zone near Whatcom Creek where residential development is not allowed.

5. Water

Water will be connected to the site using the city water system. Figure 1 shows the closest water lines to the site. Metered water is billed bi-monthly with the rate inside the city being \$40.66 for a meter size of 3/4". The meter rate is based on single family residential units.

6. Sewer

The homes on the site will be attached to City of Bellingham Sewer. Rates for city sewer services are based on costs to treat wastewater. For a single family unit Class 1 inside the city the base rate is \$83.32.

7. Stormwater

Stormwater rates are based on the costs of service for prevention and cleanup of water pollution, flooding, and to meet state and federal water resource regulations. For properties with a surface area less than 1,000 sq. ft. the rate is \$12.84.

8. Lake Whatcom Watershed

The Lake Whatcom Watershed Land Acquisition and Preservation Program Charge funds land acquisition and other land preservation measures in the Lake Whatcom

Watershed to help preserve water quality. Inside the city for single family residential the base rate is \$26.26.

9. Foundation

The designs are elevated 2ft and rest on seismic piers with anchor piers for support. Bellingham is located in a seismic fault area which means many homes are at risk of seismic hazards. To mitigate damage of a potential seismic event, the seismic piers are included in the designs for each unit on the site. Elevating the units also provides ventilation to prevent molding.

10. Water Heating

Solar hot water heaters for each unit follows the design objectives of being environmentally friendly. Each solar hot water heater is \$1,500 and provides hot water in an energy efficient way for a family of three.



Figure 1. City map of the closest water lines to the site.



Construction	Material	Cost
Roof	Corrugated Steel	\$3000 (\$5.00/sq.ft.)
Insulation	Eco-Batt R-38	\$1,246 (\$1.00/sq.ft.)
Foundation	Seismic Pier and Anchor	\$2,000
Walls	Balloon Framing (Wood)	\$31,150 (\$25.00/sq.ft.)
Water	Metered Water	\$40.66
Water Heating	Solar Hot Water Heater	\$1,500
Heating	Passive Solar Heating	\$0
Siding	Hardie V-Rustic	\$3,738 (\$3.00/sq.ft.)
	Conceptos Plásticos	\$12/sq. ft.
Electricity	Grid-Tied Solar	\$18,000 (\$3,500 from the state after a year)
Sewer	City of Bellingham	\$83.32
Stormwater	City of Bellingham	\$12.84
Lake Whatcom Watershed	City of Bellingham	\$26.26
Doors	Sliding Doors	\$600
	Front Door	\$1,500
Windows	Chicago Style	\$4,000
Plumbing	Copper with PEX	\$4,000
	Total Cost	\$70,897
		\$133/sq.ft.



Financial Strategy

The contributor that will help David's family in financial funding the tiny house project will be Umpqua Bank. Umpqua Bank located in Bellingham Washington, is a commercial bank that will help fund and provide the initial down payment for the constructing the tiny house. The conventional loan with a fixed interest rate of 4% and 30 year mortgage plan will help with the construction and purchasing the material needed for construction. The 30 year mortgage plan will fit David's qualification and it will fit his financial plan to pay low monthly payments. By using the amortization schedule calculator (mortgage loan calculator), David's family will have a monthly payment of \$337 for household 1 and monthly payment of \$206 for household 2.



UMPQUA
B · A · N · K

Household #	Area of lot	Cost
Household 1	530 sq. ft. x (\$133 per sq. ft.)	\$70,490
Household 2	374 sq. ft. x (\$115.50 per sq. ft.)	\$43,197

	Square Footage	Population
Housing Design #1	530 sq. ft.	3 people (x2)
Housing Design #2	374 sq. ft.	2 people (x5)
Total Site	0.38 acres	16 people (7 houses)
		48 people per acre



Regulatory Code Table

Regulatory Code Table	
Acres	.3834
Area	16,735.651 sq. ft.
Minimum lot size	1,000 sq. ft.
Maximum lot	2,000 sq. ft.
FAR	0.4
Open Space Min	0.6
Setback	5 feet
Parking	7 Spaces
Parking Setback	Front 25ft & Side Flanking 20ft



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TINY HOME MODEL 4

The Tetris Homestead



The Tetris Homestead

iReno Booth
Brittany Vallene
Aaron Zilz

Client Profile



Gustavo and Sheri Segal

Personality Profile

- Outdoor Enthusiasts
- They would love to have a place that is warm, welcoming, and family oriented

Sheri

- Loves to garden
- Enjoys Bellingham because of its natural surroundings and enjoys hiking and taking photos of nature

Gustavo

- Loves to entertain and have friends over
- Loves music and dancing

Analysis of Need

- Sheri has a lot of student loans to pay off
- The family's only income is L&I payments and small projects that Sheri takes on

ABOUT

Young family with a baby on the way.

Ages: 26 and 27
Sheri is 4 months pregnant.

Income: \$20,000 annually

Occupation:
Sheri - Aspiring photographer who is trying to get her business off the ground

Gustavo - works for a construction company, but was recently injured on the job

Tetris Homestead Design



An exterior view of the Tetris Homestead. Note the vaulted ceiling for natural light and heating. Also a mud room next to the front door allows for additional storage. The green roof lets the family have their own green space and a private garden.

Design Goals

1. Modular

-The tiny home design breaks down into individual shipping containers for ease of construction, but also allows for the units to be connected together to create duplexes or townhomes.

2. Open Space

-Creating open space within the home is important to make the small space seem larger. Open space within the community is important as well so that residents can come together to enjoy the outdoors, an important value of this community.

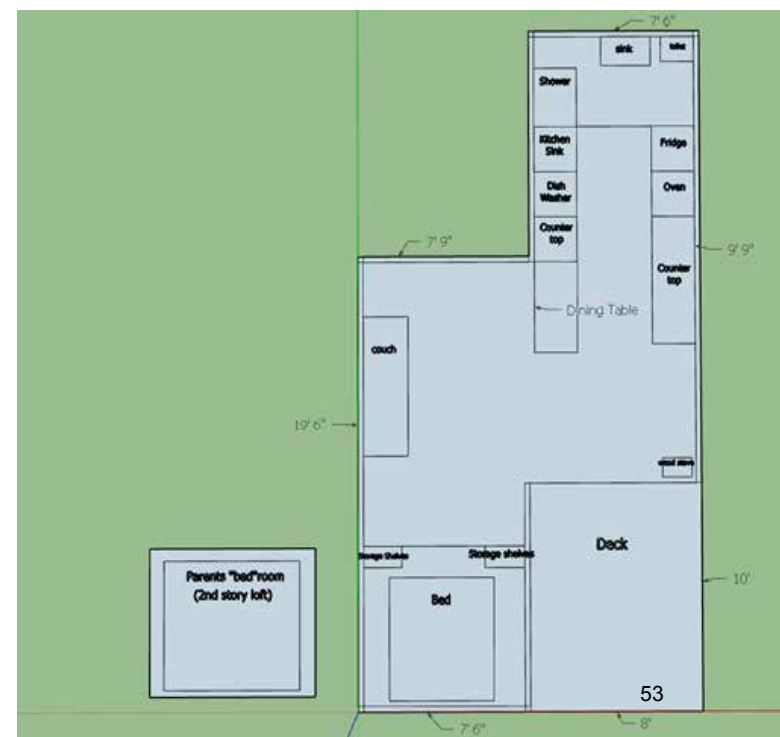
3. Strong Sense of Community

-This encourages family oriented activities within the community. A strong sense of trust between neighbors is essential to building a community.

4. Natural Aesthetics

-Bellingham is known for its natural features. Saving open space as well as bringing in native species of plants into the area adds to aesthetics.

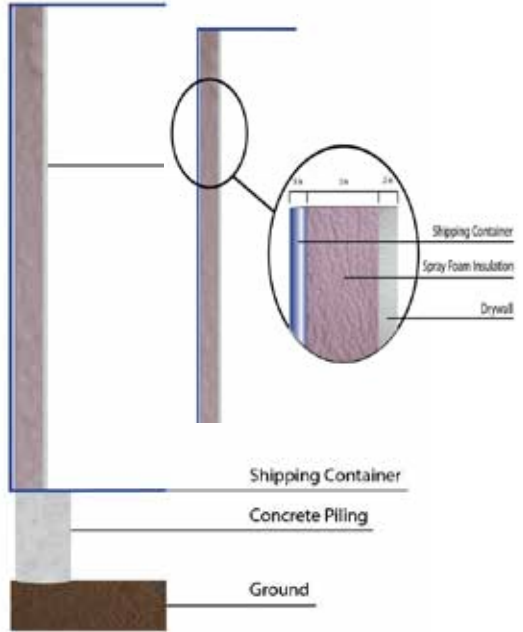
This site plan features two shipping containers that are offset to create open space in the center of the home which was a key design goal. The lofted bed lets the family have two separate rooms allowing for privacy in such a small space. All the features utilizing water are placed towards the back of the shipping container, thus lowering the cost of piping. The tiny home has all of the features of a full sized home with the exception of laundry machines. This feature was allocated to a community center, further driving the costs down for the tiny home.



Step by Step Building Procedure



An interior shot featuring the kitchen area. At the end of the hallway, there is a bathroom with a low flow shower and toilet. The kitchen itself is narrow, but has all the features of a modern kitchen. The dining table folds out from the counter-top allowing for additional open space in the center of the home.



In order to maintain the legality of our home, it is mandated that the structure is not permanent and may easily be moved to a new location. The fact that the home consists of two shipping containers immensely helps it to qualify as transportable, however it is also essential that our home is not situated atop of a legitimate slab foundation. Instead the home will sit atop 12 concrete pilings (6 per container) after the ground has been leveled by a grade rod and excavator. Once the containers have been placed on top of these pilings, 2x2's will be mounted to the interior walls every 16 inches on center for the purpose of filling the gaps with environmentally friendly spray foam insulation. Following the isolation process, a series of 4x8 sheets of drywall will be mounted over the 2x2 studs, taped, and bonded with joint compound and then painted over to provide an appropriate home atmosphere, as opposed to cold steel walls.

Another interior shot showing the bedroom and living room. A small hutch creates a private room for the design. Above the hutch is a lofted bed with a beautiful view from the vaulted ceiling and large window panes.



Site Plan



This image shows the entirety of the lot. The tiny homes surround a community center with a basketball court. In the northeastern section, on site parking is available to those with a vehicle.



Table of Denisty

	Total
Number of Units	25 (7 Stand Alone, 9 duplexes)
Population	50-100
Site Size	40,000 Square Feet
Tetris Footprint	320 Square Feet
Townhome Footprint	340 Square feet
Community Center	480 Square feet



Costs

Building	
DIY	\$8,187
Contractor	\$33,004
Land Cost	
Entire Vacant D street Lot	\$743,560 (cityIQ)
Each residential lot	\$29,742 (25 units)
Permit Fees	
Before 80% affordable housing deduction	\$10,045 (per unit)
After 80% affordable housing deduction	\$2009 (per unit)

Financial Strategies and Partnerships

Kulshan Land Trust will be our primary partner in financing the properties along D street. Kulshan essentially provides the initial overhead required in order to purchase the property therefore becoming the new landlords through which the tenants rent to own.

Kulshan also finances the building through grants from city and state. This year, Kulshan is partnering with local Bellingham breweries such as Kulshan Brewing Co. and Stones Throw Brewing Co. in order to acquire the funds necessary to contribute to an expanding community that everyone can afford to live in. This is yet another great way that Kulshan propagates community involvement throughout the entire city in order to make affordable housing possible in Bellingham.

Through Kulshan Land Trust’s financial plan, the tenants are provided with an affordable mortgage of \$182 a month which comes to a total of \$2,184 a year. By partnering with Kulshan we are able to introduce a new financial standard of affordable housing. And if that wasn’t good enough, there are even more discounts available through Habitat For Humanity. Before approaching Kulshan to finance the building, we will partner with Habitat For Humanity in order to cover all the labor costs of the homes construction. Assuming Habitat For Humanity covers the labor cost, tenants are provided with a 30 year fixed interest loan of \$94 a month, which is likely the most inexpensive mortgage you will ever pay in America in your life.

Regulatory Code

Tiny Housing

- A. Description
 - Tiny homes are small houses that are less than 1000 square feet. Tiny homes can be stand-alone structures or share walls with other tiny homes similar to duplexes.
- B. Site Requirements and Setbacks
 - 1. If the building is fronting the street, there must be a setback of at least 5 feet. If the unit is part of a duplex then there is no setback.
 - 2. Maximum lot size: 2,000 square feet.
- C. Bulk and Massing
 - 1. Maximum Floor Area Ratio (FAR): 0.75.
 - 2. Maximum height is 25 feet.
- D. Open Space
 - 1. There must be at least 25% of open space per unit. If the unit is part of a larger community development, the shared open space can count towards the open space of the unit.
 - 2. Open space can be incorporated on top of the building with green roofs.
- E. Parking
 - 1. The maximum amount of parking per unit is one stall. Each parking stall must be at least 9’ X 18’.
 - 2. Parking can be individual to the home or shared if it is part of a larger tiny home development.
- F. Design Guidelines:
 - 1. Homes should tie into the existing area through design elements and building materials.
 - 2. Buildings are encouraged to incorporate sustainable practices into the building design such as green roofs, south facing windows, and tankless water heating.
 - 3. Buildings are encouraged to be south facing to maximize sun exposure.
- G. Site Design
 - 1. Fencing is permitted as long as it fits with the aesthetic of the neighborhood. Chain link fences are not allowed.

Attainment of Sustainability Goals

Sustainability is at the core of this design and is clearly demonstrated through the green roof, tankless water heating, and the reclaimed shipping container. The home comes equipped with two beds, a mudroom off the front porch, a large open space in the center of the home, and plenty of storage throughout the kitchen. Safety was very important to the design because the new baby so there is a railing around the entire perimeter of the rooftop garden as well as a first floor bedroom for the child. The parents will have their quiet space with the loft bedroom and rooftop garden, while the child is also guaranteed its own private space as it grows thanks to the accommodation of its very own bedroom. The community itself is walkable with a series of elegant bridges and well lit pathways. Downtown Bellingham is within the 15 minute walking radius with access to shopping, dining, entertainment, a library, and an interpretive social scene. The woodfire stove is placed near the front door within the open living area of the home, guaranteeing a warm and cozy space to cuddle up with the family.

Special Thanks
 Western Washington Universtiy
 Nicholas Zaferatos
 Arunas Oslapas

TINY HOME MODEL 5

Dean Street Tiny Village



Dean Street Tiny Village
Team 5
Patrick Grennan, Stirling Scott, Hunter Philip

1. Client Profile



Maribel Rodriguez

Age: 34
Single Mother
Two Children:
Joaquin-5, Daisy-11
English is second language

Income: ~\$13,000

"I am hoping for a sense of community in my new home and a space where my children feel safe. I would like my kids to be able to connect with their house while they grow up here."

Hobbies

- Gardening
- Cooking
- Watch TV

Bio

Maribel and her two children moved to Bellingham three years ago to be closer to her aging mother who will likely need assistance in the coming years. She found a steady job but still finds herself on the poverty line. Maribel loves her children and will do whatever she can to help them thrive in a community that will benefit their future even with her low income. Her mother occasionally takes care of the children, but Maribel is unable to depend on her mother's variable availability and doesn't want to burden her. Maribel describes herself as family-oriented, and would like to save up to pursue a college degree so she can get a better job to support her children and mother.

Needs

- Safe and healthy environment
- Area for family gathering/activities
- Storage space
- Affordability

2. Design Objectives/Goals

Create efficient design to facilitate saving/stretching resources

- i.e. blocked amenities, energy efficient appliances, general store/social network

Promote a healthy and safe environment

- i.e. community garden, natural hazard consideration, child-proofing, fire-proofing, energy efficient design

Foster strong social atmosphere

- i.e. community center/shared space, garden, blocked amenities

Design Needs

- Space for toys and sleepovers
- Storage for mom's cleaning supplies
- Personal bathroom including shower
- Area for family gathering
- Enough space for mom to be comfortable

Community Needs

- Convenient access to affordable resources and healthy food
- Convenient access to information regarding larger community; integration with the rest of Bellingham
- Social capital



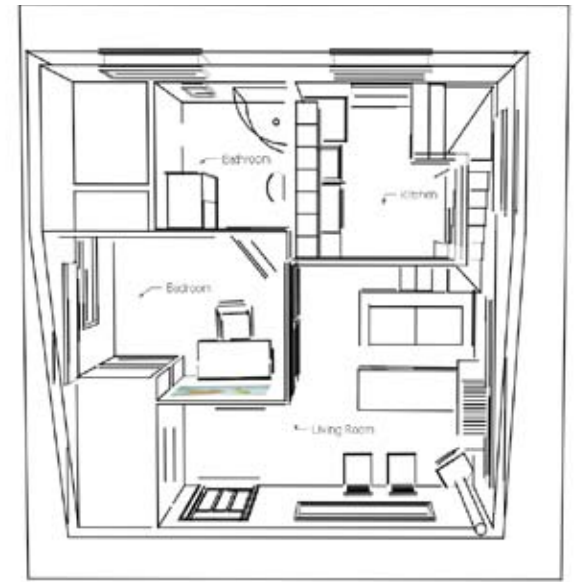
3. Prototype Housing Unit Design

Concept

The design concept for the housing unit uses natural wood products to give the house a cozy cabin vibe. The unit utilizes a square foundation to allow for maximum square footage which is 500 sq ft. The interior of the home is spacious with a loft providing an upstairs bedroom and a pod-style bunk bed on the ground floor. The kitchen is located directly below the loft and the stairs leading up the loft dually function as storage cabinets. The living room doubles as the dining room and is the largest room in the house. Windows on all sides of the house allow for natural lighting to enter the unit. Increased sun helps reduce energy use by passively heating the house due to sun exposure and requiring less lights to be used.



Above: Showing the front of the house arranged as a duplex.



Above: The floorplan illustrates each room on the first floor of the house.

Below: A cutaway image of the interior of the house showing the bunk beds in the bottom and living room in the center-right.

Below: An aerial shot of interior of the tiny house.



4. Site Plan

Concept

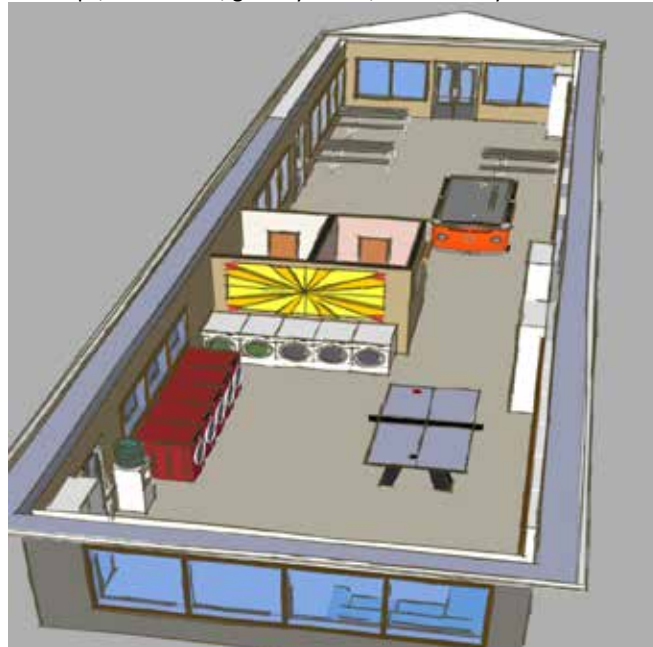
The site of the tiny house development is located at 1810 Dean Avenue and is approximately 26,000 square feet of undeveloped land. The site can allow for 10 housing units, one community center, and multiple spaces for families to gather indoors or outdoors. Due to the close proximity of Whatcom Creek, there is a 105' setback for development. This reduces the amount of units that were able to fit onto the site. However, the space is now used for gardens, outdoor activities, and a gazebo



The surrounding development is primarily industrial and commercial. As shown in the vicinity map, there are multiple bus routes within a fifteen-minute walking distance. Bellingham High school is a block north of the site, making someone with kids the perfect client. The Bellingham Food Bank is located only two blocks away which reduces the amount of car trips that residents would have to take.



The vicinity map shows the site, the yellow shape, as well as the fifteen minute walking radius outlined in red. Within the red boundary multiple amenities are available to residents including bus stops, restaurants, grocery stores, and a trail system.



The picture above is showing the community center which is a functional social space. There are five washer and dryer units, game tables, storage, two bathrooms, and meeting areas for residents. This space can be utilized to host classes, parties, and community game nights.



Above: Perspective photo taken from the large industrial building looking into the core of the community.

Below: Photograph showing the outdoor recreation area.

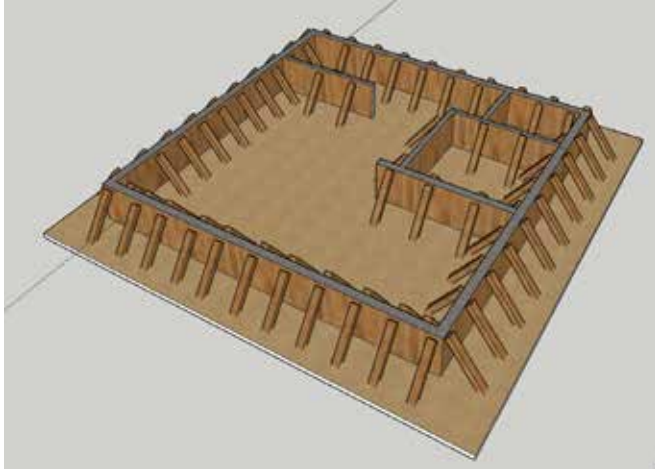


Below: Perspective photograph showing the inner core from a porch.

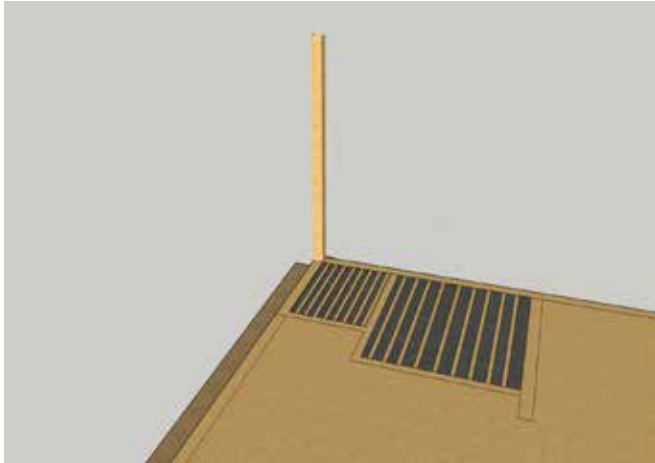


5. Construction

1. Pour foundation



2. Lay the flooring



3. Create exterior and interior walls



4. Install insulation into walls



5. Construct the roof



6. Bring in appliances



7. Apply flooring and interior walls



8. Move in furniture



6. Materials

Interior Walls	Drywall	999 sq ft	\$1,498 (labor inc)
Framing/ Insulation	SIPs	1,041 sq ft	\$7,807
Siding	Reclaimed barn wood	1,041 sq ft	~\$910.88
Flooring	Cork	456 sq ft	\$1,363
Foundation	Concrete	400 sq ft	\$1,600
Plumbing	PEX	Two coils per house	\$700
Roofing	Composite recycled	456 sq ft	\$1864

7. Financing Strategies/ Partnerships

Financing

By taking advantage of Washington State’s affordable housing programs, we can partially fund the project with grants and special low-interest loans. Using the Washington State Bond/Tax Credit Program, we can offer a mortgage interest rate of 2.5%, with monthly payments at \$325 for thirty years.

Alternatively, we could propose to rent the land from the city at a low price.

Labor

We will be partnering with local non-profit organizations to help build and finance the home. Organizations such as Kulshan Community Land Trust (KulshanCLT), Habitat for Humanity and Thrivent Builds are among the top choices we have made to collaborate in this process.

Partnering with KulshanCLT could be one way that we could utilize an existing community framework to invest in the longevity of our plans. KulshanCLT has been assisting low- to moderate-income households purchase homes in Bellingham since 2001, and keeps those homes affordable. Partnering with this organization will give us much-needed legitimacy when we apply for public funding, in addition to invaluable insights towards the successful provision of

affordable housing. In addition to helping people buy homes KulshanCLT also provides homeowners with post-purchase support, and we think our residents could benefit from these services as well. KulshanCLT has already done what we hope to do with this project for nearly two decades, not only are our values aligned, but they already have an inventory of local resources to tap into and experience with this process.



Another group we would like to work with is Thrivent Builds. This group can come in and help construct the home for very cheap compared to normal construction costs. Thrivent Builds is the name for the partnership between Thrivent Financial and Habitat for Humanity, so we plan on joining this partnership and working with both of those organizations.

For Thrivent Builds projects, Thrivent Financial contributes 50% of the funding for construction, and volunteers who sign up through Thrivent or Habitat for Humanity raise the rest of the money to cover the remaining costs and build the house. In addition, like KulshanCLT, Thrivent Builds has a network of partnerships with like-minded organizations. We also admire Habitat for Humanity’s model for allowing the future residents to assist in building their home to help lower the cost of construction, and selling it to them through an affordable mortgage that is used to fund similar projects. We believe our project will be an intriguing proposal to Thrivent Financial and Habitat for Humanity and that this partnership will be satisfying for all involved.

8. Attainment of sustainability goals

Create efficient design to facilitate saving/stretching of resources

Potential strategies: blocked amenities, energy efficient appliances, general store/social network

This goal was attained through the inclusion of inexpensive, state-of-the-art, green building materials and appliances during and after construction. The community center contains washer and dryer units where residents can create a social network while spending less on utilities per month, as well as a bulletin board to be updated with local opportunities. In and outside of the community center, there are also spaces with games and picnic tables, where residents and their visitors can spend leisure time together.

Promote a healthy and safe environment

Potential strategies: community garden, natural hazard consideration, childproofing, fire-proofing, energy efficient design

The design of the tiny home allows for the residents to be safe inside their home. Certain modifications were made to the house design to protect from earthquakes and high winds such as extra floor and ceiling joists. Units will be built following the current code for earthquake safety, and the cabinets that come installed will be latched, and any tall and heavy furniture within a house will be bolted in place. A street also loops through the middle of the site for easy access by emergency vehicles, and community emergency response training opportunities will be made available to the residents. To address other health-related and environmental concerns, the site layout allows for residents to use multiple vegetable box planters where they can grow some of their own produce. A greywater system will be installed so that water from the laundromat in the community center can be used for the gardens. All houses face the interior of the site--enhancing safety by directing more eyes towards the street, and fostering a sense of connectedness within the community.

Foster a healthy social atmosphere and network within the community

Potential strategies: community center/shared space, garden, blocked amenities

The design concept included constructing a community center where residents can do laundry, play games, and hold community meetings. The theme of “community permeates throughout the site design, which is full of functional spaces where people can interact every day, such as the community center, the picnic area and playground, and multiple garden spaces.

9. Regulatory Code

A. Description

Tiny housing is a grouping of small compact, duplex family dwelling units clustered around a common area and developed with a shared plan for access and parking, and a coordinated design for the buildings and site.

B. Site Requirements and Setbacks

1. Tiny Homes could be located on a separate (fee simple) lot or several units may be located on a common parcel of land.
2. The height limit is 15 feet.

C. Bulk and Massing

1. The minimum is 2 dwelling units and the maximum is 10 dwelling units in a single development. This will vary on the parcel of land.
2. No structure shall be larger than 520 square feet and no single floor area shall be larger than 400 square feet.
3. Maximum Floor Area Ratio (FAR) is 0.4.
4. Common shared structures are allowed, they can be of varied size compared to tiny homes, as they offer amenities for the entire community.

D. Open Space

1. Each dwelling unit shall have at least 100 square feet of private usable open space with no dimension less than 5 feet. Decks may be included.
2. Private usable open space must be directly accessible from the dwelling unit, and be screened from shared spaces or paths and other units.

3. Common usable open space equivalent to 500 square feet per dwelling unit shall be provided. No single dimension shall be less than 20 feet, exclusive of parking or lanes except for emergency access. All units shall have direct access to shared open space.
4. A minimum of 60% of the site area shall be in landscaping or pervious materials (may include pervious paving and green roofs). Exceptions may be made in erosion hazard zones or areas with shallow bedrock as determined by the City.

E. Parking

1. Each dwelling unit shall provide at least one on-site parking stall. The Planning Director may reduce parking requirements based on applicant’s demonstration of site-specific factors that justify a lower standard. Parking stalls shall be at least 9’ X 18’.
2. Parking may not be located between structures or front directly upon a street.
3. If an alley exists, parking shall be accessed via the alley except when the Planning Director determines that alley access is impractical or environmentally constrained.
4. Parking shall be consolidated in areas not less than 4 spaces.
5. Parking accessed from the public street shall be limited to one driveway of 20’ maximum Width.
6. Parking shall be screened from the public street by landscape feature or green fence.

H. Design Standards

1. A front porch with a minimum of 60 square feet and no dimension less than 5 feet is required for each dwelling unit (in addition to private open space requirements).
2. Dwelling units that front a public street or lane shall have a porch that faces the street or lane. Units that face the shared open space shall have a porch that faces the open space. In some cases, units will require two front porches to satisfy this criteria.
3. All fences in the front and side flanking setbacks, or between the common areas and the dwelling units, are limited to 72 inches in height and may be no more than 60% opaque. Chain link or cyclone fencing is not allowed in the front or side flanking yard.

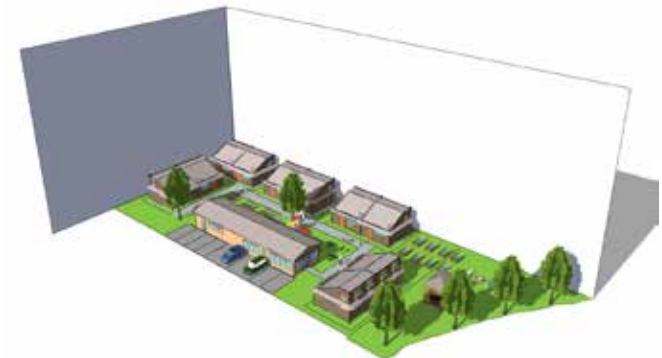
I. Design Guidelines

Tiny housing developments should architecturally blend into existing neighborhoods through careful attention to the design of the units, open spaces, parking and landscaping. Well proportioned tiny houses, with porches, small gardens, varied roof lines and dormers can fit comfortably into surrounding neighborhoods of older, detached homes. **Building Design**

- a. Buildings should be identical in design but ploy a variety in color, this design will maintain a certain character to help distinguish units apart but all have a similar neighborhood feel.
- b. Tiny homes can reflect common neighborhood design features such as porches and architectural detailing.
- c. Changes in materials and colors to add visual interest and character to the development are encouraged.

Site Design

- a. Provide small private open spaces in conjunction with a large shared open space.
- b. Provide generous use of landscape structures such as a community center, play area, decks, patios, and garden beds to provide plenty of usable outdoor space with a variety of environments. Use planting materials and elements such as green fencing to unify the overall site design.
- c. One shared parking lot is preferred behind the community center.
- d. Walkways should connect all dwelling units to the shared open space and consolidated parking and should utilize pervious materials.



TINY HOME MODEL 6

Cottage Court Housing

Cottage Court Housing

Dario Castellon & Adrienne Chambers

Group: 6





Joe Smith

- 24 years old
- Single father, widow
- Service Industry
- ~ \$1,200 Monthly
 - \$550 Rent
- H.S. Diploma

Joey Smith

- 6 years old
- Attends Elementary School
- Grandmother takes him to school
- No long-time neighbor friends
- Lives with Grandparents

- Sometimes practices tattoo art on the side.
- Non-permanent housing, considered unable to retain custody of son full time.
- Aging Grandparents have trouble caring for an energetic child.
 - Joe wants to be a full time parent for his school aged son.

Joe is receiving conditional custody until he has a place where his child can live. Working as a local tattoo artist, he makes just enough to pay the low rent for his basement.

“ Working as a tattoo artist allows me to show my talent, but I would like to eventually own a shop.”

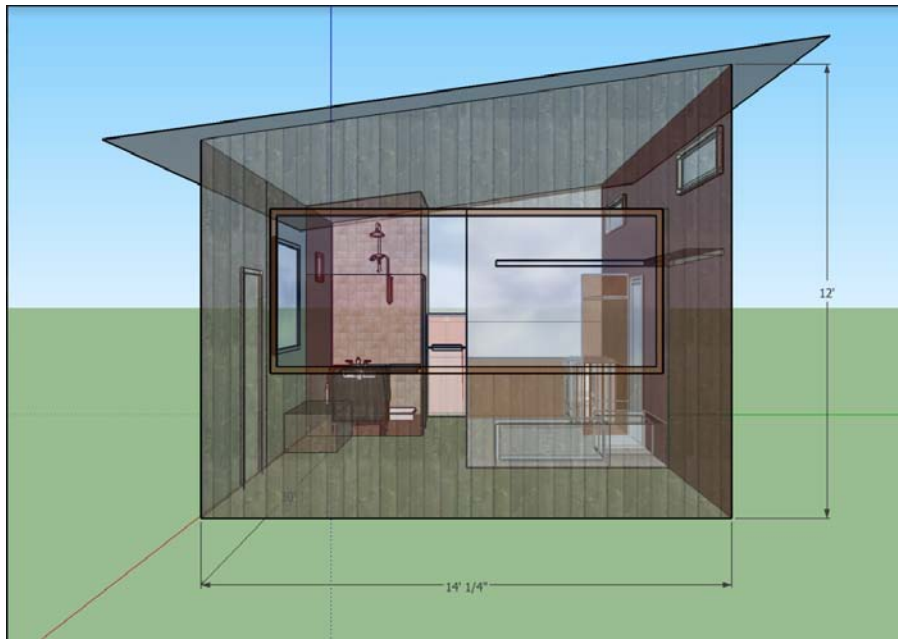
“I want to be there for my kid especially now that he’s going to school.”

Design Objectives:

- Beds for 1 adult + 1-2 children.
- Child Safety:
 - Electric heating and natural lighting.
 - Fenced in community space.
 - Playground inside common space.
- Permanent dwellings - public water, electric, sewage - similar to a regular home.
- 30% of homes for those who are elderly or disabled.
- 70% of residents are single parents.
- We desire to have a tiny house on location for administration and day care for busy parents.
 - Laundry, Day Care, Library, Community Kitchen
- Community open space
 - Playground, Gazebo, Raised Beds

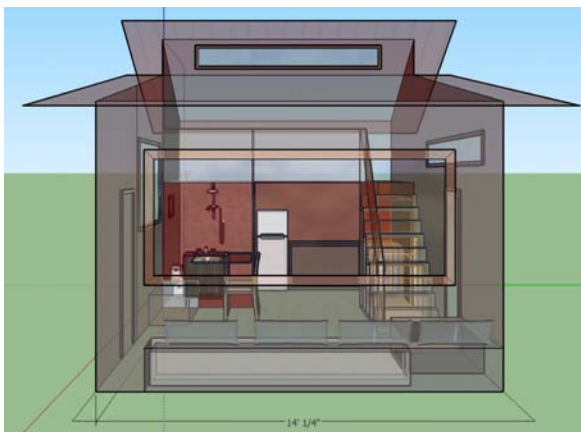


Cottage Court infill : Studio Tiny House



This home is was designed for disabled individuals or elderly people. The home dimensions are 15' x 30' x 12'. The home has a spacious floor layout with a small wall separating the living area of the home from the bedroom. The kitchen and bathroom are spacious enough to accommodate for easy mobility. This home will be great for any person that has accessibility needs, was injured at work, or just wants a small space with an open enough feel.

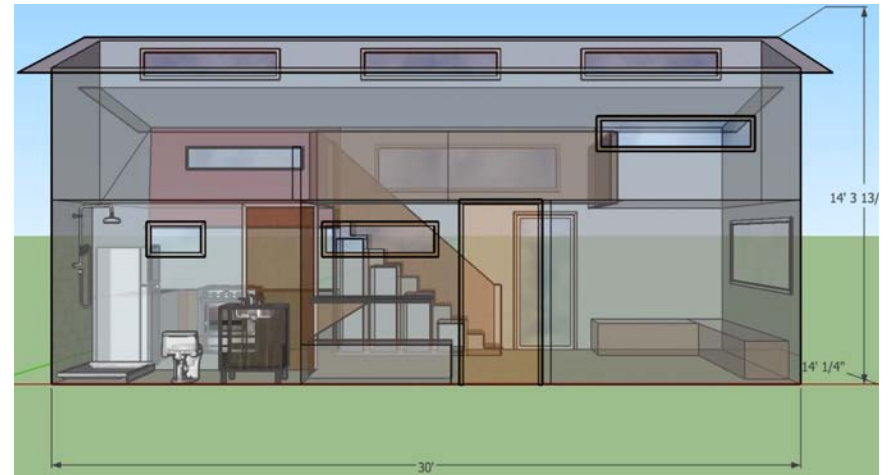
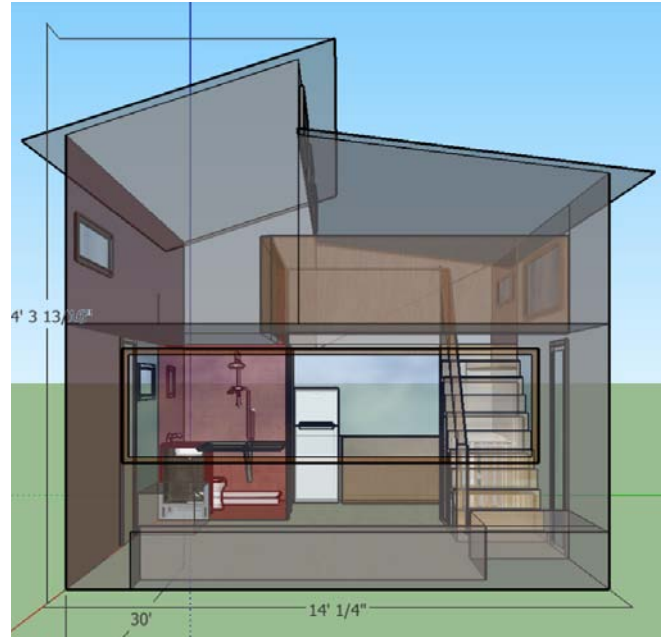
Cottage Court infill : 1 Loft Tiny House



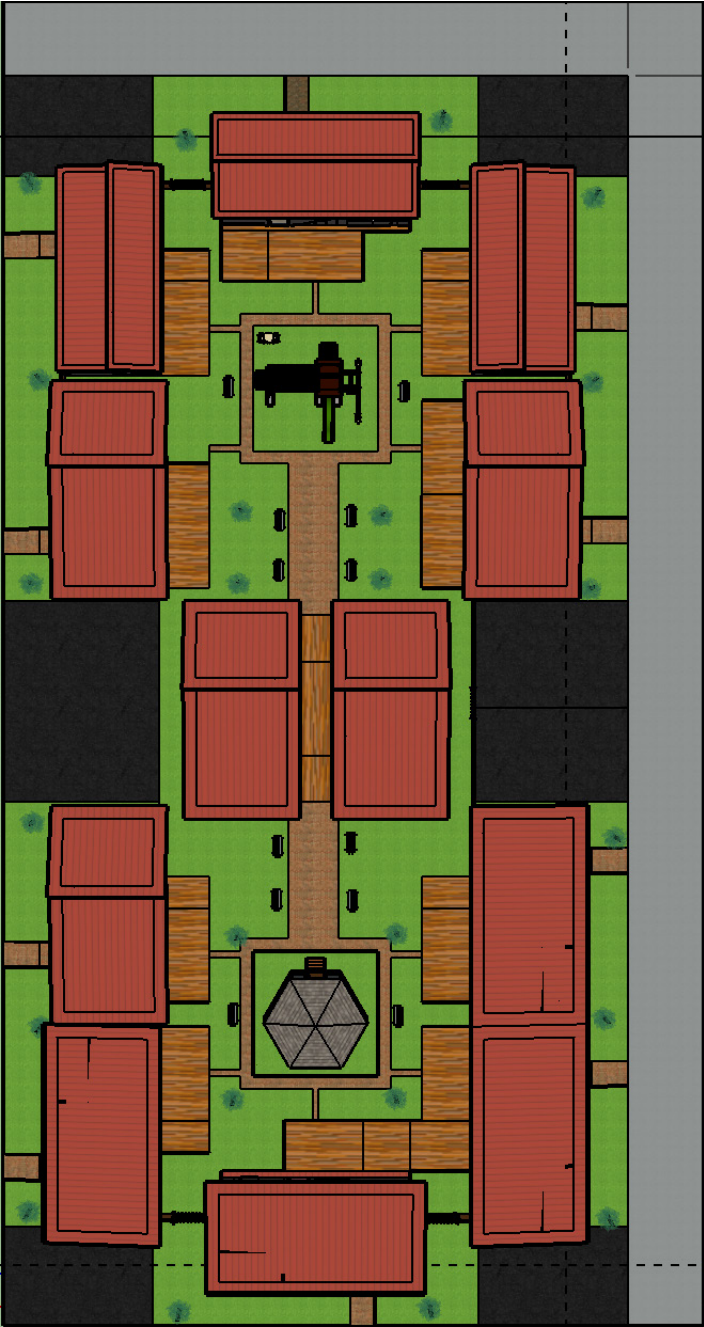
This one lofted home was designed for the single parent that has one child. The bottom floor layout is similar to the Studio Homes, with the addition to a larger living space and a 10' x 15' loft that would accommodate a queen size or two single beds. The larger living area includes built in bench/sofas that with a folding mattress can become a single bed. This larger area also accommodates for the child to have a play area when the Bellingham weather does not allow for outside play.

Cottage Court infill : 2 Loft Tiny House

The two lofted home was designed to accommodate for single parents with two children or a single parent with an older child that may require their own bedroom space. The first loft is the 10' x 15', and the second loft is 8' x 15' that would easily accommodate a single bed and a small nightstand. To access the smaller loft, there is a small bridge connecting both lofts with high-enough railing to provide safety when they are upstairs. This home is similar to the one lofted home in the sense that the living room has a built-in bench that can be converted into a bed.



Site Plan Supporting clustered housing



Density / Occupancy / Size

	Occupancy	Square Footage	Units in our Site
Studio	1 Person House	450	4
1 Loft	2 Person House	600	5
2 Loft	3 Person House	750	3
	Density per Acre = 26-78 People		Possible Units per Acre = 26 Houses

Appliances / random materials costs

Appliance/Household Item	Price	Quantity	Total
Stove	\$450	11	\$4,950
Fridge	\$500	11	\$5,500
Wall Tankless Water Heater	\$600+	11	\$6,600
Toilet	\$250	11	\$2,750
Sink	\$250	11	\$2,750
Kitchen sink	\$120	11	\$1,320
Laundry Center	\$1,200	5	\$6,000
Shower base w/ seat	\$900	11	\$9,900
Total			\$39,770

Financial Plan

- **Costs:**
 - **Materials & Labor** = \$115.50 / sq.ft.
 - **Permit Fee** = \$2,000
 - **Land Cost** = \$18 / sq.ft.
 - **Appliances** = \$4,270 / home

- **Reductions:**
 - **Labor Fee** = 50% Habitat for Humanity
 - **Permit cost** = 80% COB public funding
 - **Land Cost** = 100% Land Trust
 - **Appliances** = Discretionary

Common Costs	STUDIO	1 LOFT	2 LOFT
	- 450 sq.ft. house	- 600 sq.ft. house	- 750 sq.ft. house
Building cost/labor	\$38,981.5	\$69,300	\$87,469.3
Permit	\$400	\$400	\$400
Appliances	\$4,270	\$4,270	\$4,270
Utilities Per Month	\$150	\$150	\$150
RENT			
Land	\$0	\$0	\$0
Primary Cost	\$43,651.5	\$73,970	\$92,139.3
Cost/month	\$208	\$331	\$440
Total Cost	\$358	\$481	\$590
OWN			
Land	\$10,050 - \$20,190	\$13,460 - \$26,920	\$16,870 - \$33,202
Primary Cost	\$15,120 +/- 5,070	\$20,190 +/- \$6,730	\$25,036 +/- \$8,166
Cost/month	\$72	\$96	\$120
Total Cost	\$222	\$246	\$270

Table of Costs

TO OWN:

	Single House Infill	STUDIO - 450 sq.ft. house	1 LOFT - 600 sq.ft. house	2 LOFT - 750 sq.ft. house
Habitat for Humanity	Building cost/labor	\$38,981.5	\$69,300	\$87,469.3
Purchasing Land	Land FAR 0.8 - 0.4	\$10,050 - \$20,190	\$13,460 - \$26,920	\$16,870 - \$33,202
Public Funding	Permit	\$400	\$400	\$400
	Appliances	\$4,270	\$4,270	\$4,270
	Total Cost:	\$15,120 +/- 5,070	\$20,190 +/- \$6,730	\$25,036 +/- \$8,166
Amortization Table	Cost per month / 30 years @ 4% interest	\$72	\$96	\$120
Public Utilities	Utilities Per Month	\$150	\$150	\$150
	TOTAL COST: Month	\$222	\$246	\$270
	Income if 30% on rent:	\$740	\$820	\$900

Regulatory Code TABLE

TO OWN:

Single House Infill	Studio (450 sq.ft.)	1 Loft (600 sq.ft.)	2 Loft (750 sq.ft.)
Lot Size (min-max)	560 - 1,125 sq.ft.	750 - 1,500 sq.ft.	940 - 1,850 sq.ft.
Max Height	15 ft.	25 ft.	25 ft.
Setback minimum	4 ft.	4 ft.	4 ft.
FAR	0.4 - 0.8	0.4 - 0.8	0.4 - 0.8
Max Sq. Ft.	450	600	750
Parking	9 x 18'	9 x 18'	9 x 18'
Front Porch	8 x 10'	8 x 10'	8 x 10'
Back Deck	8 x 15'	8 x 15'	8 x 15'

TINY HOME MODEL 7

Maritime Terraces



Maritime Terraces

Team Seven: Mettie Brasel - Brittney Dover - Cassandra McGrath



“Trying to stretch out a seasonal income through the slow season is terrifying because we are on the verge of being on the streets”

Age: 32

Married: 3 Years

Income: \$12,499 annually

1. Client Profile

Joshua & Mary Applebottom

Motivations

Joshua and Mary want to find a stable home where they can raise their future child. They want to be able to move easily so that Joshua can follow farm work during the season and bring his family with him in a safe environment. They both attend church regularly and believe faith, family, and friends are the cornerstones to happiness. Mary is an artist who enjoys painting natural landscapes and likes to sell some of her paintings to her friends family she also enjoys cooking with her husband when she can. They don't know where they are going to settle down but want a place to call their own while they are transient.

Frustrations

The Applebottoms are unhappy with not being able to spend time together during working seasons. The poor living conditions and hostile environment in migrant worker “camps” are unsuitable for their family. Additionally, they cannot afford to break and resign leases multiple times in the year, increasing their need for full ownership of a living structure.

Aspirations

Financial freedom that allows their family to attain their goals and to eventually be able to afford a permanent house to raise their child and live as a family. They are excited to find a supportive and inclusive community that they can feel at home in.

2. Design Objectives

Affordability

Design must utilize cheap and reused materials, non-profit assistance and must be achievable without the assistance of a contractor. This will ensure that persons of very low-income and poverty status will be able to afford units.

Community

The site design is intended to foster a sense of security, create a sense of community and foster social capital among all citizens.

Mobility

The unit designs are intended to be easily movable to accommodate the lifestyle and aspirations of the Applebottom family. The goal is to allow mobility without forcing the family to give up their home.

3. Tiny House Models

20 Foot Model



Above: Perspective view of the small kitchen, bathroom and storage area.
Left: Elevation drawing of the 20' shipping container design.



Above: Perspective view of the small kitchen, sleeping and loft area.
Left: Floor plan of the 20' shipping container design.

40 Foot Model



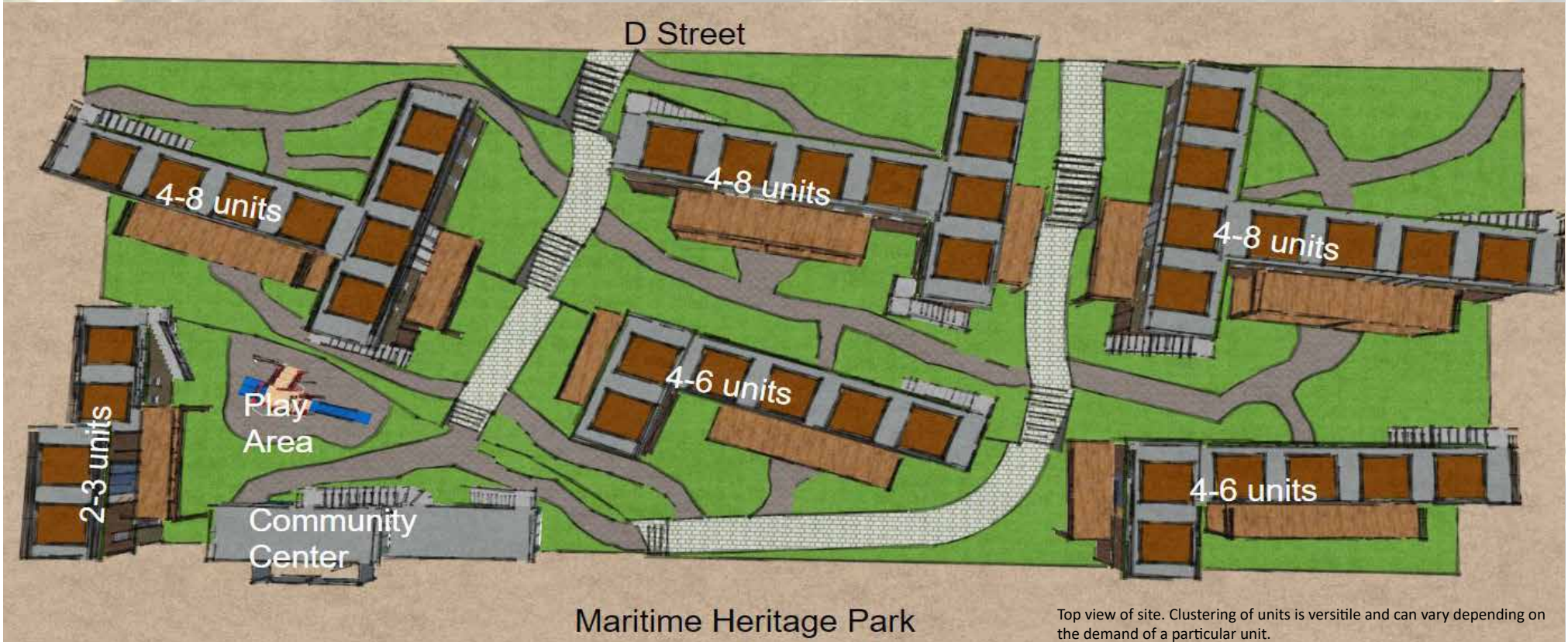
Above: Elevation drawing of the 40' shipping container design.
Below: Floor plan of the 40' shipping container design.



Above: Perspective view of the full sized kitchen and living area.
Below: Perspective view of the large bedroom and the small bedroom.



4. Site Plan



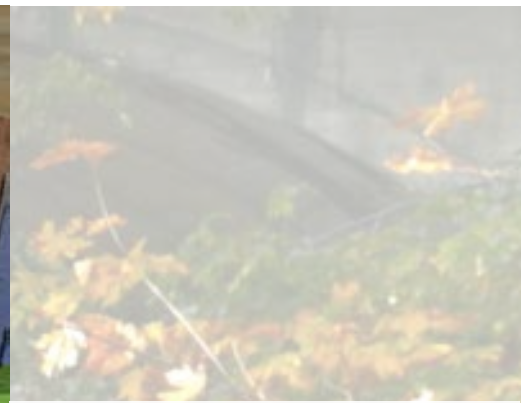


Description of Site Design

The site has an elevation change of 25 feet from the top of D street to the bottom within Maritime Heritage Park. The site was fashioned into terraces to accommodate the rigidity of the shipping containers. The bottom units are placed within the hillside to maximize community areas and green space. The site houses a community center and play area to emphasize community togetherness.

Above: Perspective view of daily life within the community.
Right: Perspective view emphasizing the community center and play area.





Left: Perspective view of a sunny day within the community.
Below: Perspective view of life within a terraced community.



Table of Density

Building type	Square Footage	Units	Population	Projection
Small 20'	2,880	18		43.2
Large 40'	2,880	9		21.6
Total	5,760	27		64.8

* 72 units per acre

The table of density illustrates the number of units and projected population within the current site plan. These numbers are variable depending on the demand of units.



5. Construction Techniques

1. Lay concrete slab foundation



2. Place shipping container and anchor down to foundation



3. Cut out openings and insulate using spray-in foam



4. Add windows and doors



5. Build green roof



6. Frame the inside and add plumbing and electric systems



7. Add in plumbing fixture and cabinets



8. Add flooring, and appliances



9. Add decks or porches, then landscape!



6. Material and Land Costs

Need	Solution	20' Cube	40' Cube
Structure	Shipping Container	Used \$2,200	Used \$2,950
Roof	Rooftop Garden	Included in base price	Included in base price
Insulation	Spray in Foam	\$620	\$920
Foundation	Concrete Pier	\$275	\$550
Interior walls	Drywall	\$150	\$230
Exterior Walls	Reclaimed wood	\$3-\$10 per sq. ft.	\$3-\$10 per sq. ft.
& Flooring			
Plumbing/Water	Grey Water/ City *\$200 installation	\$30-60 Per month	\$30-60 Per month
Electric	Passive Solar/Propane	\$30-\$60 per month	\$30-60 Per month

Above: A breakdown of costs for the tiny house structure, supporting materials, and required utility equipment.

Cost of Structure

With a base cost of \$55.00 per square foot for the construction of the tiny home. For the forty-foot home, which is 320 sq. ft., the total cost for the owner would be \$17,400. If the owner had a 15-year loan, the monthly payments would be \$98. After the cost of the home, the utilities, land, and permitting fees, the cost to the user \$198. For the twenty-foot home, which is 160 sq. ft., the total cost for the owner would be \$8,800. If the owner had a 15-year loan, the monthly payments would be \$49. After the cost of the home, the utilities, land, and permitting fees, the cost to the user \$149.

Cost of Land

The site of the tiny house community is owned by the City of Bellingham. This public land has a value of \$196,000. If the community collaborated with the city to use the land, the estimated cost would be one dollar a year. This would translate to no cost for the occupants of the community. If the community collaborated with a company, it would cost that price of the land.

At a fifteen-year mortgage, this would translate to roughly twenty dollars a month for the occupants of the community.

Cost	40-foot Unit (\$17,500)	20-foot Unit (\$8,800)
Monthly, 15-year mortgage loan	\$98	\$49
Cost of utilities (per month)	~\$80	~\$80
Cost of Land (per month)	~\$20	~\$20
Permitting Fees with 80% affordable housing incentive	\$363	\$214.50
Total Cost to User	\$198	\$149
Percent of User Income (per month)	19.8% of monthly income	14.9% of monthly income

Above: Breakdown of permitting fees and monthly costs with a 15 year mortgage.

7. Financing Strategies & Partnerships

There are a multitude of generous non-profit organizations within Whatcom County who seek to aid those in need of housing. Many of these organizations build affordable housing or provide financial assistance by way of purchase and rebates. The Kulshan Community Land Trust is the first and most important partnership for land purchasing as they strive for permanent affordability. The Kulshan Land Trust works by providing ownership of the land on which a private party lease and owns the structure. Another generous organization is the Habitat for Humanity, which works to provide housing for families in need. They provide a large portion of the financing while the future home owner provides 500 hours of sweat equity to their structure, as tiny houses typically take less time to build the party benefiting may opt to volunteer on other housing projects which the Habitat for Humanity supports, or work on structures that will be used within the tiny house village. Additionally, to benefit from Habitat for Humanity the recipient must make under 60%-30% of the median household income and be able to afford \$350-\$500/month in mortgage payments. Lastly, both Mercy Housing and Catholic Community Services and Catholic Housing Services are known to construct and provide housing to those below the poverty line, proposing the concept of a tiny house village to these organizations may provide them with the idea for future affordable housing projects.



8. Attainment of Sustainability Goals

Affordability:

The most important goal, affordability was met through intentional housing design and anticipated construction and land costs. The proposed site would be placed on public land, and through potential partnerships with the city, land costs are lower than they might otherwise be. Additionally, reuse of materials is encouraged through utilizing organizations like Resources and Habitat for Humanity.

- For example, monthly costs to owner are below the federal affordable housing percentage, materials are largely reused, non-profit organizations are utilized through partnerships to bring costs down, location walkability and access to public transportation decreases the need for vehicle ownership.

Mobility:

The structure is a shipping container which is easily moved as it was created to do so. At any point when the family needs to move, this living structure could be put on a semi-truck and transported to a new site. Additionally, the excellent walkability of this site allows residents to access amenities without having to own a vehicle.

- For example, the living structures are 20 foot and 40 foot shipping containers are traditionally used to transport goods, the fifteen minute walk-radius contains multiple bus stops, the food bank and Bellingham High School.

Community:

The sense of community was achieved through the shared areas within Maritime Terraces which can be utilized by all residents. There are multiple areas where neighbors can come together and get to know one another, creating a sense of community. The close proximity that people are living together and the connected pathways throughout, which were achieved through site design and regulatory code further help to achieve this goal.

- For example, the site design includes rooftop gardens on the clustering of the units, bringing together neighbors to work towards a common goal that, the community center and the play area, the intentional regulatory code.

9. Regulatory Code

The Tiny House Village regulations listed below are in the style of the City of Bellingham's Infill Toolkit. This toolkit is intended to provide rules on building to encourage the construction of housing in densely populated areas or areas with infill development potential. Tiny House Villages are an efficient and creative way to create increased options for dense and affordable housing.

Description

A Tiny House Village is a multi-family development comprised of housing units with square footage at or under 700 square feet. Units may be attached or individually placed dependent on the infill property being used. Tiny House Villages share community space and high density living to promote social capital.

Site Requirements and Setbacks

1. Tiny House units are required to have a setback from the main street of 5 feet.
2. There is a minimum 5 foot and a maximum 10-foot setback between houses. Tiny House units may be attached to maximize space and foster social capital, these multi-unit structures would share lots creating a zero-lot line, requiring no setbacks between each other.
3. There is a building height maximum of 25 feet. Personal lot fencing is not encouraged, but if necessary must be under 36 feet.

Bulk and Massing

1. A minimum of five units and a maximum of 35 units.
2. No single unit shall be more than 700 square feet in area.
3. Maximum Floor to Area Ratio, FAR= 0.8.

Open Space

1. 50 Square Feet of communal space is required per individual housing unit.
2. Communal space may include open space, play structures, barbeque areas or community structure.

Parking

1. These communities are encouraged to be largely carless, personal garages are not allowed. Community parking spaces are allowed.
2. Communities must be within one half mile of public transit.
3. Should a development choose to provide parking, a maximum of 33% of the number of units will be required to have parking spaces in the communal parking. (Example: three parking spaces will be required in a tiny house community that has nine units).
4. Driveways are not allowed on individual units.

Design Standards

1. If fencing is needed, vegetative fencing is encouraged.
2. Chain-link and cyclone fencing is not allowed. Opacity of fencing must be at least 50%.
3. Garbage and recycling shall be consolidated to one area for pick up, and screened from the public view.

Design Guidelines

The design of the tiny house village is intended to foster a sense of community and provide homeownership opportunities for those of little means or those seeking to live a minimalistic lifestyle. Designs that are community oriented and require daily interaction with neighbors is critical to achieving the vision of the tiny house village.

Building

1. Building designs must be intentional with consideration for social capital, this includes, inviting doorways and windows with street and path views whenever possible.
2. Obtrusive signage and structures are not allowed.

Site Design

1. Pathways to house entrances within the community are required and must be a minimum of 36 inches in width.
2. These pathways must connect for ease of access to community spaces, parking lot and street front.
3. Building designs may not be obtrusive and must blend with the character of the neighborhood while remaining unique and aesthetically pleasing (for example, tent-like "tiny house" structures are not allowed within a neighborhood that consists of traditional single family houses).

TINY HOME MODEL 8

Tiny Aspen

Tiny Aspen

Team 8
Kalli Light,
Erin Metcalfe,
Sean Murray





1. Client Profile

Facts

- Name: Chad “The Cool” Dad
- Age: 25
- Occupation: Server
- Salary: \$18,000 per year
- Location: Bellingham, WA
- Education: Huxley Graduate

Bio

Chad is a recent graduate from Huxley working part-time as a server to support him and his five year-old son, who he cares for full-time. He is starting an environmental consulting firm and needs a home office where he can meet with clients and work while watching his son.

Personality

- Community-oriented
- Outdoorsy
- Active/ healthy lifestyle
- Prioritizes relationship with son
- Dedicated to his new business

Likes

- Canoeing
- Hiking
- Public transit/ bus
- Spending time with son
- Working for himself

Dislikes

- Fear of not having enough
- Cheap, unhealthy food
- No time for son
- Strangers looking after son
- Relying on other people

Housing Needs

- Adequate play room for son
- Safety precautions for son
- Garden
- Storage space
- Separate beds
- Community feel
- Private outdoor space
- Mobile
- Space for home office

2. Design Objectives

Objective One:

Ensure the dignity of the residents by providing:

- Access to private indoor and outdoor space
- Opportunity to own their own home
- Ability to make changes to their home
- Mobility of homes

Objective Two:

Make environmentally sustainable choices when building and providing services when financially feasible.

Objective Three:

Minimum of fifteen tiny home per acre.

Objective Four:

Keep community affordable to people making \$10,000 per year.

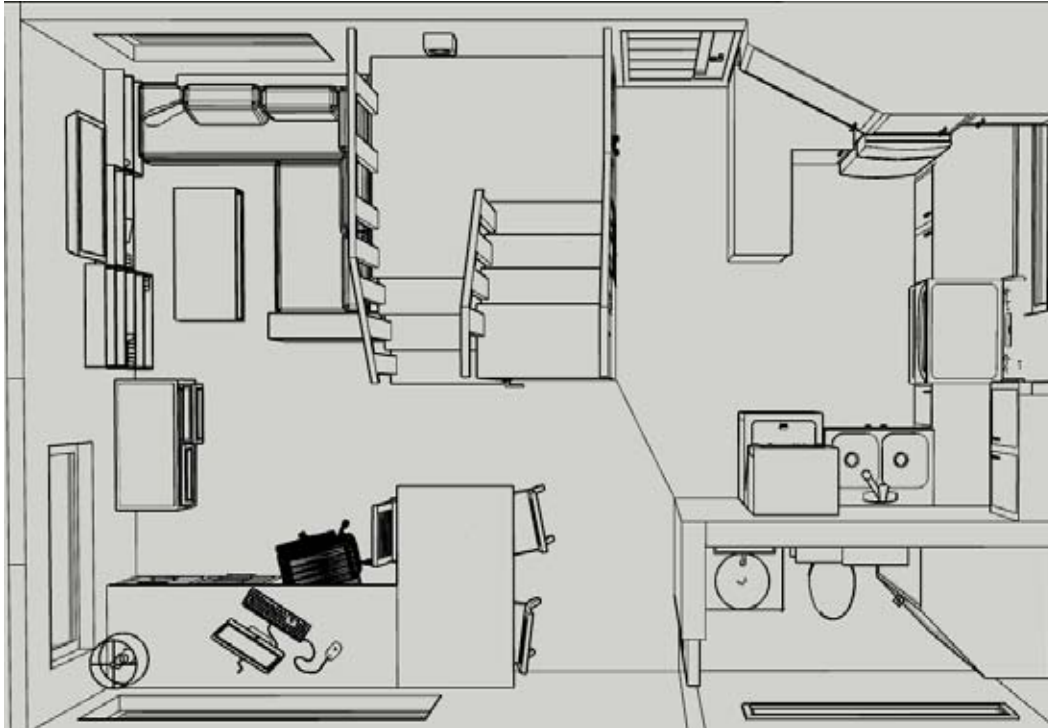


3. Prototype Housing Unit Design

The "Tiny Aspen" House



Floor One



Floor plan of floor one (above)

Office space with folding dining table (below)

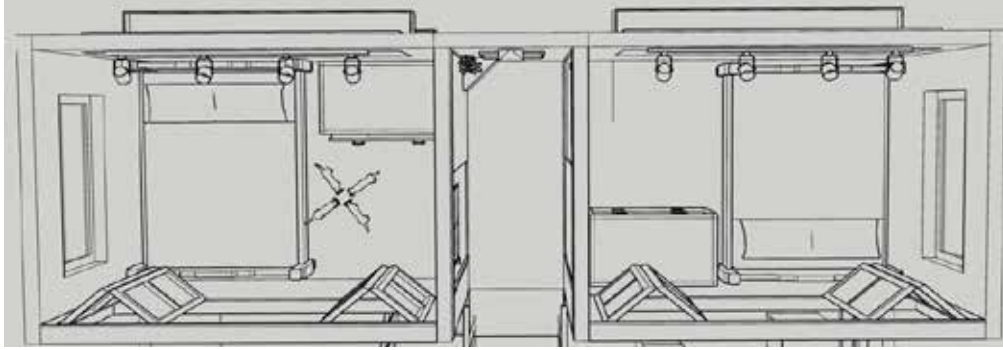


Kitchen with storage area underneath the stairs (above)

Living room with staircase (below)



Floor Two



Floor plan of floor two (above)

Bedroom with view of the first floor (below)



Dimensions

The house is designed to be semi-permanent, meaning it can be deconstructed and moved on a truck with relative ease. The house is a modular design that can be taken apart and reassembled. Each modular piece is sized to fit on a semi-truck for easy mobility.

House Dimensions

Height: 18.5'
Width: 24'
Depth: 16'

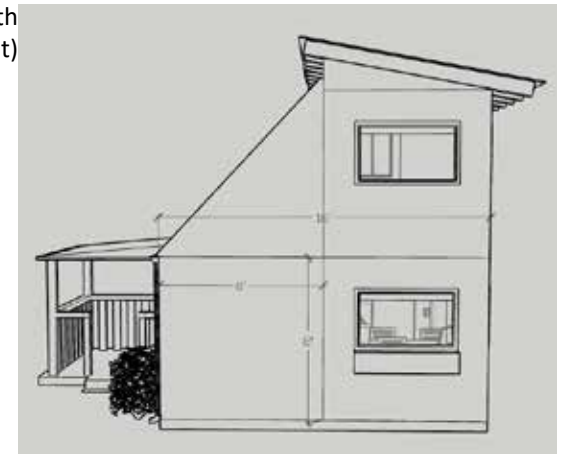
Section Dimensions

Height: 8'
Width: 24'
Depth: 8'



Front view of the Aspen House with dimensions (left)

Side view of the Aspen House with dimensions (right)



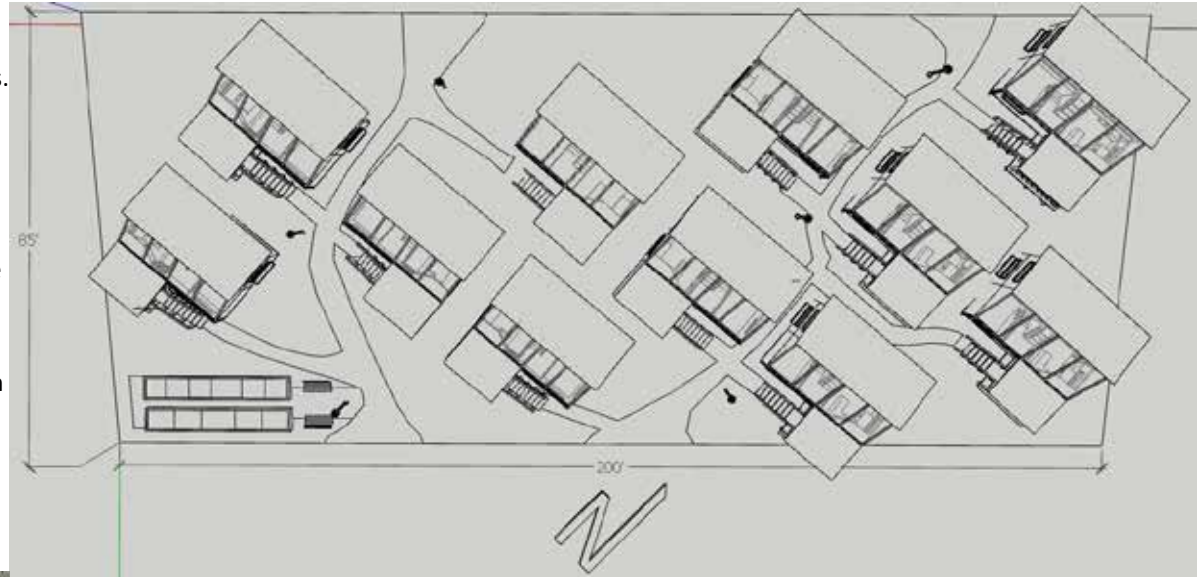
Truck carrying a section of the Aspen House (left)

4. Site Plan

Located on D Street, the Tiny Aspen village consists of 11 units all facing south. The site has a 25 foot elevation gain allowing for the houses to all receive beautiful views and lighting without being blocked out by nearby units. By facing the houses south, they receive the maximum passive solar gain to help heat and light the houses. Deciduous trees will be planted to reduce the amount of light and heat entering the home in the summer months. The entire village is built on a human scale with a focus on walking. A small trail system connects all of the homes and street lamps are installed to help light the village at night. Nearby bus stops will help residents get around the city with ease. Street parking will also be available to residents within the community.

The image below shows amenities within a 15 minute walking distance from the site. Some amenities include:

1. Battersby Park
2. Downtown Bellingham
3. WTA Bus Stop
4. Whatcom Creek

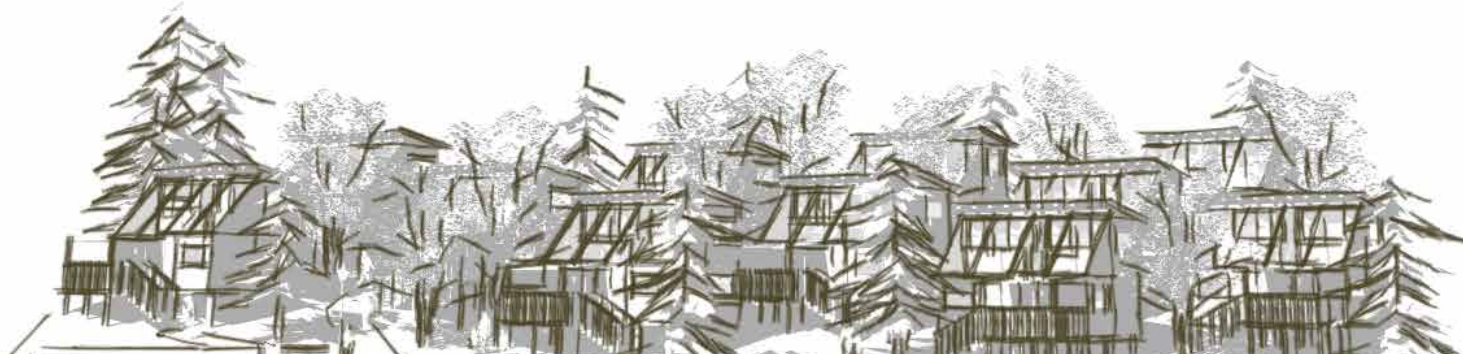


The image above shows the site with houses placed on it. This image has the trees removed to show the spacing of the houses and the trail system within the village.

The image on the right shows a perspective view of walking through the village.

The table below shows the size, density, and population of the site if fully built out.

Number of Homes	11
Estimated Population	26
Area of Site	0.4 acres
Density	28 units per acre





5. Construction



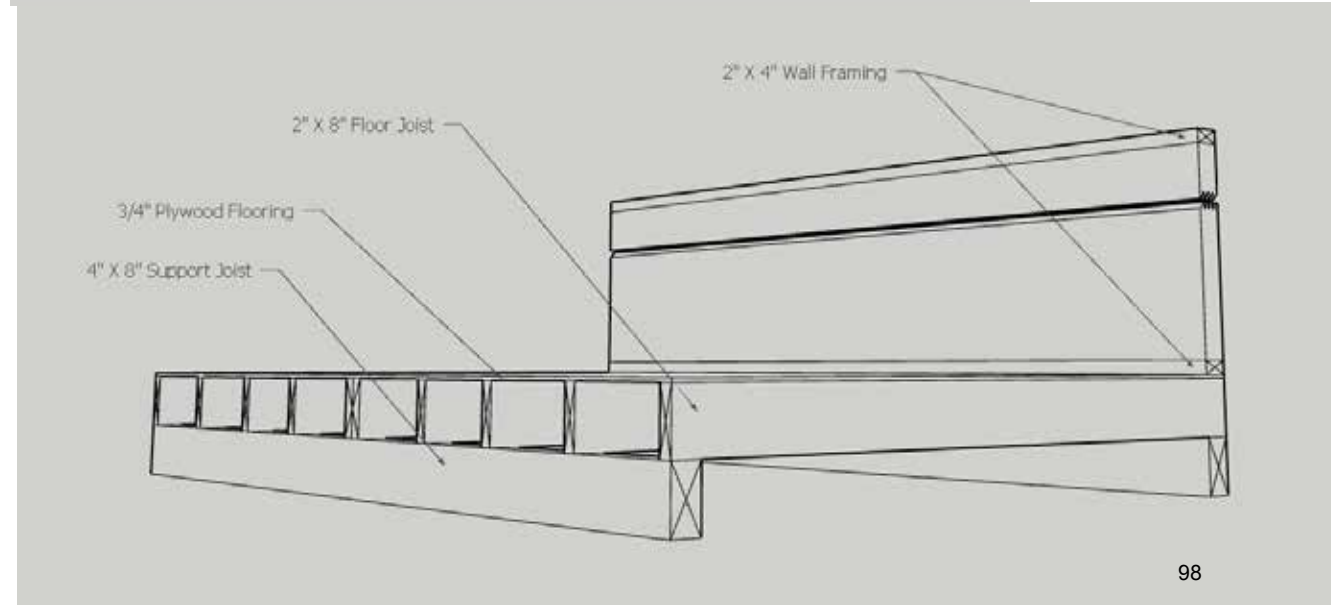
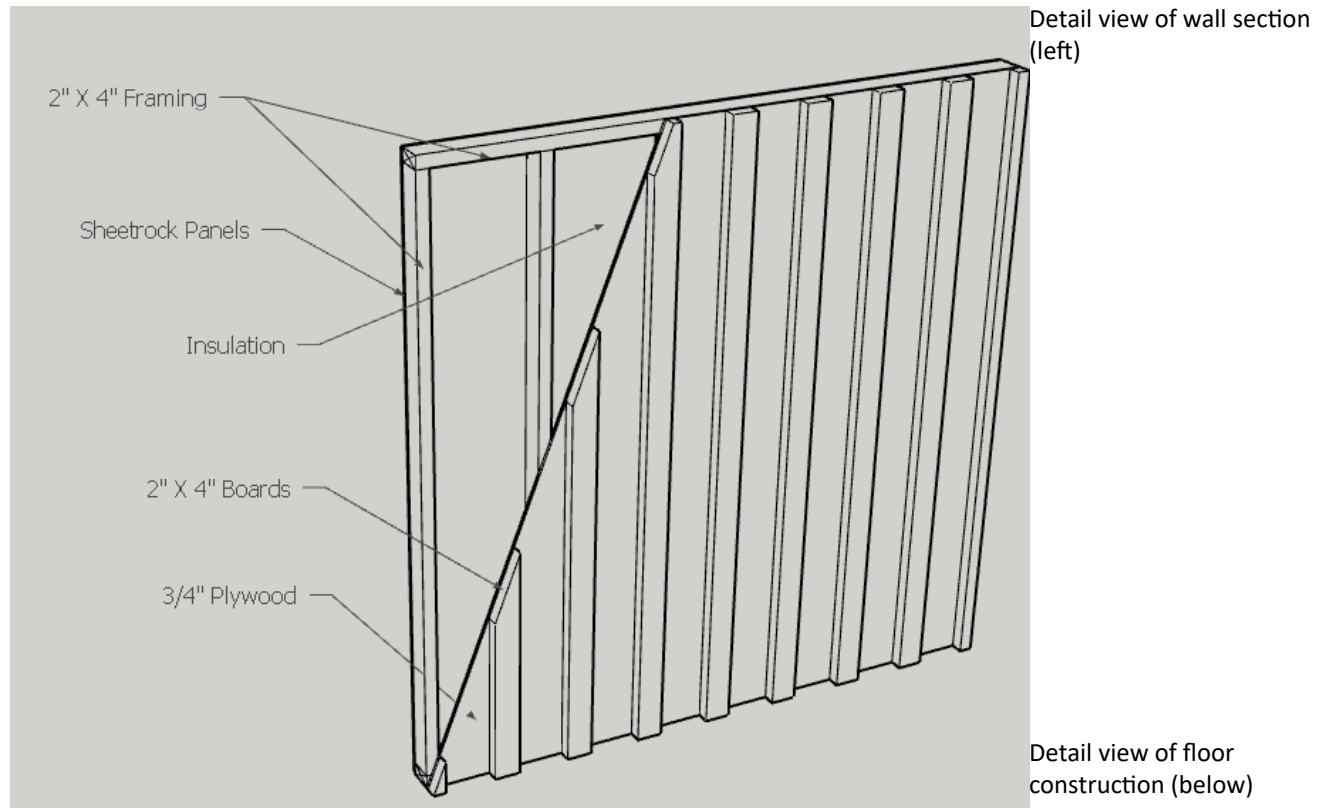
Step one: Set bottom two sections of home on foundation.



Step two: Place second story of home on first story.



Step three: Place roof and glass windows.



6. Labor, Materials, and Cost Estimates

Table one (right) shows the cost of labor, materials, and permits with assistance from the City of Bellingham Affordable Housing Reduction and an agreement with the City of Bellingham to lease the land for \$1 per year for 30 years. The cost for a 30 year mortgage totals to about \$327 per month.

Item	Cost	Client Contribution over 30	
		years (4)	Other Source of Funding
Materials and Labor (1)	\$66,528	\$66,528	-
Permit Fees (2)	\$10,000	\$2,000	City of Bellingham Affordable Housing Reduction
Appraised Value of Land (3)	\$17,847	\$2.72	City of Bellingham Lease
Total	\$94,375	\$68,530.72 (\$327/ month)	-

Notes:

1. Cost of labor and materials estimated at \$115.50 per square foot. This cost is adjusted from the City of Bellingham's estimated cost for single-family homes. The adjustment takes into account the lower size of the tiny house. The total square footage of the tiny house for this table is 576 square foot.
2. Cost of permitting comes from Nicholas Zaferatos.
3. Appraised value of land comes from CityIQ from the City of Bellingham website. The total appraised value totals \$196,320. This amount is divided by the number of homes (11) to get a cost of \$17,847 per home.
4. Monthly client contributions calculated using an amortization table for Bellingham over 30 years. Clients making \$11,772 or more per year can afford to build the tiny house without help from Habitat for Humanity. Clients making under \$11,772 per year will need to use an additional source of funding, such as Habitat for Humanity.

Item	Cost	Client Contribution over 30	
		years (4)	Other Source of Funding
Materials and Labor (1)	\$66,528	\$33,264	Habitat for Humanity (by need)
Permit Fees (2)	\$10,000	\$2,000	City of Bellingham Affordable Housing Reduction
Appraised Value of Land (3)	\$17,847	\$2.72	City of Bellingham Lease
Total	\$94,375	\$35,266.72 (\$168/ month)	-

Notes:

1. Cost of labor and materials estimated at \$115.50 per square foot. This cost is adjusted from the City of Bellingham's estimated cost for single-family homes. The adjustment takes into account the lower size of the tiny house. The total square footage of the tiny house for this table is 576 square foot.
2. Cost of permitting comes from Nicholas Zaferatos.
3. Appraised value of land comes from CityIQ from the City of Bellingham website. The total appraised value totals \$196,320. This amount is divided by the number of homes (11) to get a cost of \$17,847 per home.
4. Monthly client contributions calculated using an amortization table for Bellingham over 30 years.

Table two (left) shows the cost of labor, materials, and permits with the same assistance in table one, but with additional assistance from organizations such as Habitat for Humanity, which pays for the cost of labor. The cost for a 30 year mortgage totals to about \$168 per month.

7. Financing Strategies & Partnerships

The example client for this project, Chad, has a salary of \$18,000 per year. Based on the general recommendation of spending one third of one's monthly salary on housing, Chad can afford \$500 per month on a mortgage. The monthly payments for this tiny home will be \$327, which allows for Chad to easily afford to live in this community (refer to table one on the previous page).

To keep this community affordable to people of varying incomes, there is also the option to receive assistance from Habitat for Humanity. Habitat for Humanity provides free professional labor while the homeowner typically provides 500 hours of work towards building their house. In the case of tiny homes, the number of hours that the homeowner is required to provide will be cut down to 100 hours. With a 30 year mortgage, the monthly payments to pay for materials will be about \$168 for the homeowners. This allows for people making about \$6,000 per year to afford to live in this community.

8. Attainment of Sustainability Goals

Goal One:

Ensure the dignity of residents by providing:

- Private Space
- Opportunity to own their home
- Opportunity to make changes on their home
- Mobility

Actualization

- Each home has it's own private indoor space & outdoor deck
- Every resident will own their own home & will be able to make changes
- Homes are designed to be mobile by disconnecting each section of the house and loading them onto trailers.

Goal Two:

Whenever fiscally possible, make environmentally sustainable choices when building and providing services.

Actualization

Use of passive solar, solar air heater, and the Puget Sound Energy Green Power Program.

Goal Three:

15 units per acre minimum density

Actualization

Achieved about 28 units per acre.

Goal Four:

Make community affordable to low income residents

Actualization

The minimum resident salary needed is \$5,508.



9. Regulatory Code

Purpose

The regulatory code for tiny houses follows the formatting of the City of Bellingham Infill Toolkit document so that the proposed code could be added to the Toolkit. The purpose of defining the regulations for tiny homes is to encourage infill and increase the affordable housing options in the city in compliance with the city's comprehensive plan.

Tiny House Standards

A. Description

A tiny house is a dwelling unit on a lot at least 200 square feet and no larger than 1,000 square feet. Tiny houses may comprise of a single dwelling unit, or connect with other tiny house units to form a duplex or triplex structure. Connected units may share walls or be on different floors within a single structure.

B. Site Requirements and Setbacks

1. Lot Size: Minimum of 200 square feet and maximum of 1,000 square feet for single dwelling units. Maximum of 3,000 square feet for lots with connected units.
2. Setbacks: The dwelling unit should be at least 3 feet but no more than 10 feet from the property line. In cases where units share walls, no setback is required.

C. Bulk and Massing

1. Maximum Floor Area Ratio (FAR) is 0.8.
2. Maximum size of a single floor is 400 square feet.
3. Maximum height is 25 feet.

D. Parking

1. A maximum of one parking spot per unit.
2. If the parcel abuts an alley, parking spots should be accessible by the alley unless otherwise decided by the Planning Director.
3. Parking requiring a lane should consist of only one driveway of no more than 20 feet.
4. Parking should be consolidated and not located on the front side of the houses.

E. Design Standards

1. Windows of tiny homes should stagger to avoid looking into the windows of adjacent buildings.
2. In communities with other homes, tiny houses should match the design features such as character, building details, and massing to the adjacent buildings. However, tiny home designs are encouraged to be unique and quirky to match the tradition of tiny home architecture.

