

THE FRAY HOUSE

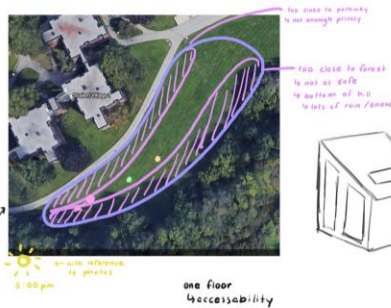
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01

SITE DOCUMENTATION

Located Outside of V1



Things We Noticed:

- very strong sunlight coming from east/west when in the center of the field
- shade is provided by nearby trees
- pathway very close with many students passing through
- **uneven ground**

Things to consider:

- how much privacy
- not too close to the pathway and residences
- a lot of noise
- students getting too close to the house
- not too close to the forest
- safety
- since it's at the bottom of the hill, water and snow will slide down there
- must have access to the path and V1 for food, water and hygiene

- climate

- cold and temperate

- natural disasters in Waterloo

- blizzards

- power outages

- heat waves

- smoke detector

- carbon monoxide detector

- fire extinguisher

- first aid kit

- accessibility

- old

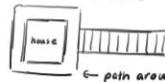
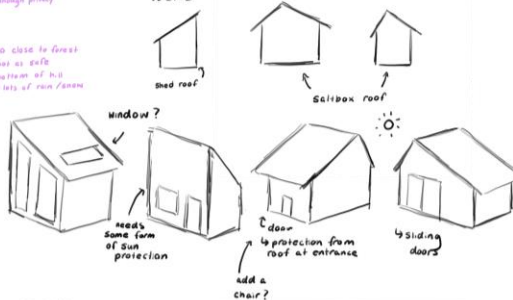
- physically disabled

- variety of heights

- sustainability

https://www150.statcan.gc.ca/n1/pub/85-002-x/2016001/article/14638/s3/s3_11-eng.htm

IDEAS



Include (maybe)

- large windows

- makes the space look bigger

- allows sunlight

- ventilation

- Overhangs

- for shade

- Sloped roofs

- for snow and rain

- insulation



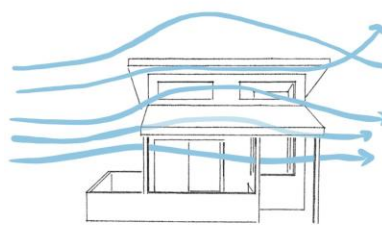
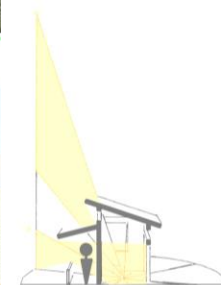
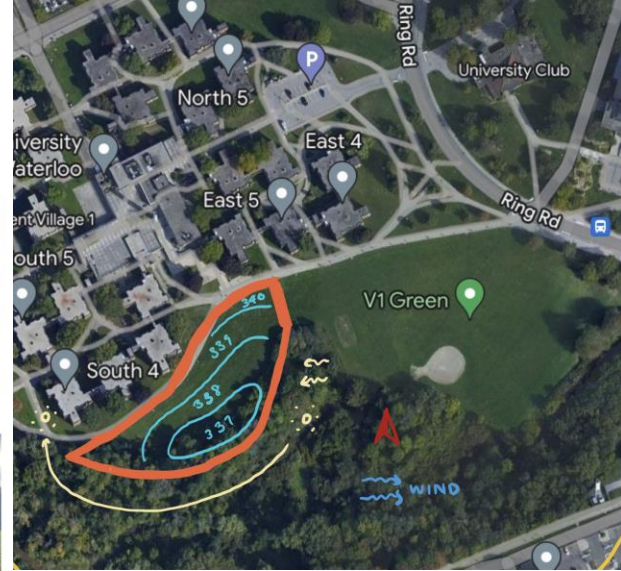
- the trees were blocking the sun from the west
- very close to the trees



- near the middle
- very sunny, barely any cover
- on a slope



- near the middle
- very sunny, barely any cover
- on seemingly flatter ground





01 THE SITE

Site Plan

02.

THE PROBLEMS



Rankings → In order of priority (greatest to least)
In regards to overnight rentals...

Problem 1: Ineffectual in creating a net zero carbon emission house whilst maintaining optimal comfort levels.

- Canadian Net-Zero Emissions Accountability Act enacted June 29, 2021
- Canada's legislative commitment towards achieving net zero carbon emissions by the year 2050
- Housing aimed to provide a solution that abides by the passed legislature
- Cost being at the occupant's comfort from temperature levels, daylighting and ventilation
- CONUNDRUM: Wanting to occupy sustainable spaces while also prioritizing their own levels comfort



[COMFORT]

Problem 2: Unable to provide **optimal accessibility** accommodations **for all** parties. |

- Most structures in Waterloo are pretty old
- In turn, many are archaic in their prioritization of accessibility
- Lack of prioritization for different body types / certain accommodations

EXAMPLES:

- Doors that fit wheelchairs, door handles that is accessible, furniture height, navigate able floor space, etc



Problem 3: Incapable of fostering a **private, secluded space** for influx of **net efficiency** |

- With Waterloo becoming more populated; vacant spaces narrow down
- Remaining occupancies are generally surrounded by bustling urban life
- Disturbances such as student parties/ nightlife bleed into these estates from the downtown core
- Affects: lack of privacy, sound pollution and light pollution
- Results in decreased productivity and overall efficiency



[PRODUCTIVITY]

Problem 4: Lack of suitable accommodation within walking vicinity of UWaterloo facilities

- Occupant: visiting scholar(s) on campus conducting research, attend conferences or guest speak
- Visitors from outside of Waterloo may not have access to a vehicle
- For max comfort, campus grounds /facilities must be within walking distance



[COMFORT]

Problem 5: Inadequate forms of **aesthetic beauty** that **alleviate** adverse/negative **emotions**

- Campus accredited as a form of meager aesthetic beauty
- Aesthetic beauty linked to an increase in overall wellness
- A campus that lacks beauty is insufficient in alleviating an individual's mental distresses / adverse emotions.



Problem 6: Influx of **distractions** because of a plethora of **automated devices** at disposal

- TVs, controllers, monitors, and other automated devices eat away at people's ability to concentrate
- Overnight rentals tend to have lots of automated devices.
- Causes an inability to reach daily objectives → act as distractions that hinder overall productivity



03. THE PRECEDENTS

Note: This is our inspiration board. Precedents are on the next slide.

APA Citations at the end.



(CountryStyle, 2019)



(Tiny Houses, 2021)



(Oldar, n.d.)



(Tiny Haus, 2020)



(HouseToDecor, 2020)



(Homestyle, 2022)



(Tiny House Talk, 2018)



(Whish, 2019)



(Slatalla, 2015)



(Lou Tiny House, n.d.)



(Upstater Magazine, 2015)

Writer's Shed: WSD Architecture London Borough of Hackney



(Contemporist, 2016)

Relevance:

This precedent was looked at as inspiration for the structure's atmospheric incorporation into surroundings as well as its snow removal roof, wood facade, and compact interior.

Solution: We were inspired by the interior of the house and what our tiny house could look like, with the integration of natural materials.

Whispering Hope Ranch: Studio Ma Payson, AZ, US



(Timmerman, n.d.)

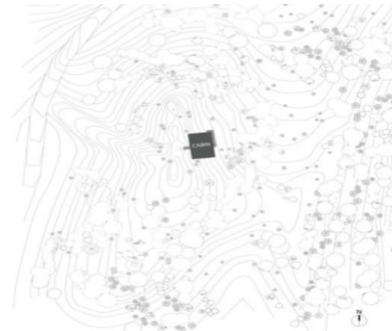
Relevance:

This precedent was looked at as inspiration for its elevated foundation, private porch, and roof shape.

Solution: We were inspired by the snow shedding roof design having the high peaks. Furthermore, having the south facing overhang allows for the block of excess summer light.

Cabin on Flathead Lake: Anderson Wise Architects

London Borough of Hackney



Relevance:

This precedent was looked at as inspiration for proper topographical utilization of landscape and its passive sustainable design strategies.

Solution: We were inspired by the hanging stilts incorporating that in our own project making traverse to the rough terrain.

Little A-frame Cabin in the Catskills

New York City, NY, USA



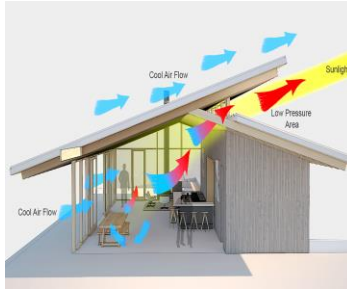
(Adrian, 2018)

Relevance:

This precedent was looked at as inspiration for incorporation of bioclimatic conditions and the materiality of the roof.

Solution: We were inspired by the dynamic whether patterns that span the snow to shine. This closely matches our cold climate (Region of Waterloo).

Wine Tasting Room: Lever Architecture Oregon, USA



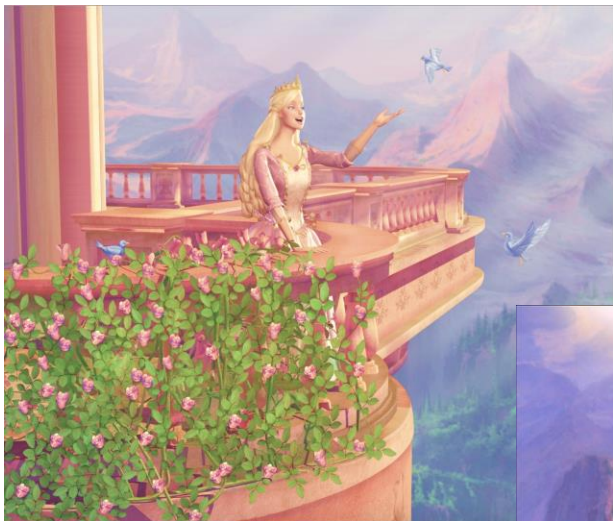
(Arch Daily, 2018)

Relevance:

This precedent was looked at as inspiration for the tiny retreat's window layout and its incorporation of a sound understanding of sun and window angles.

Solution: We were inspired by the idea of having the light and air flow diagram, trying to replicate our own for our project.

Princess Anneliese's Balcony: **The Princess and the Pauper** **Queen Genevieve's Kingdom**



(Mattel Animation Team, 2004)

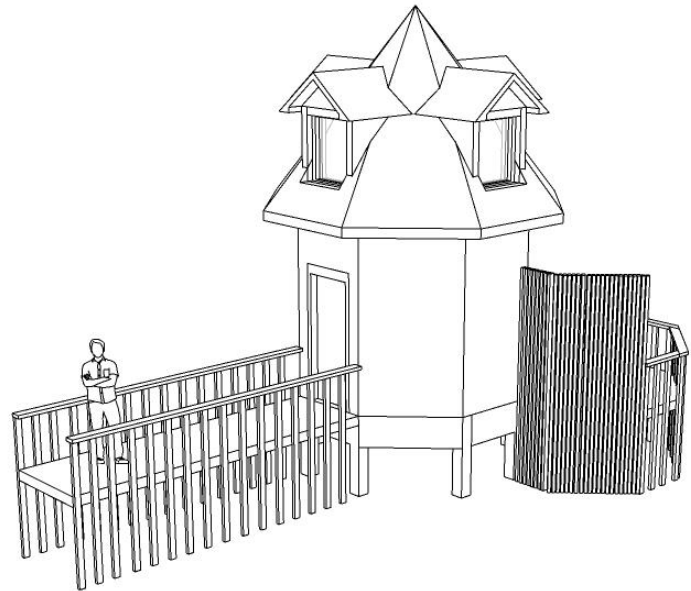
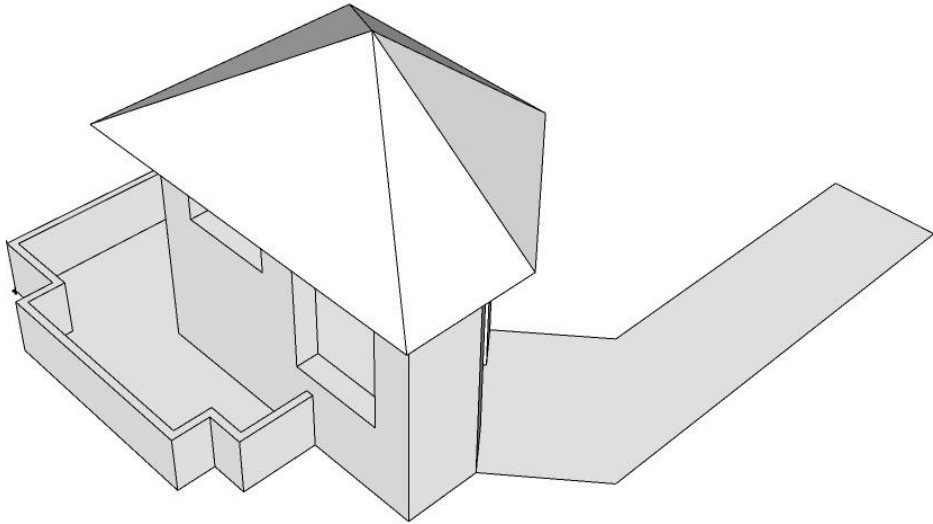
Relevance:

This precedent was looked at as inspiration for the L-shaped patio, seamless environmental incorporation and its expressive childhood representation.

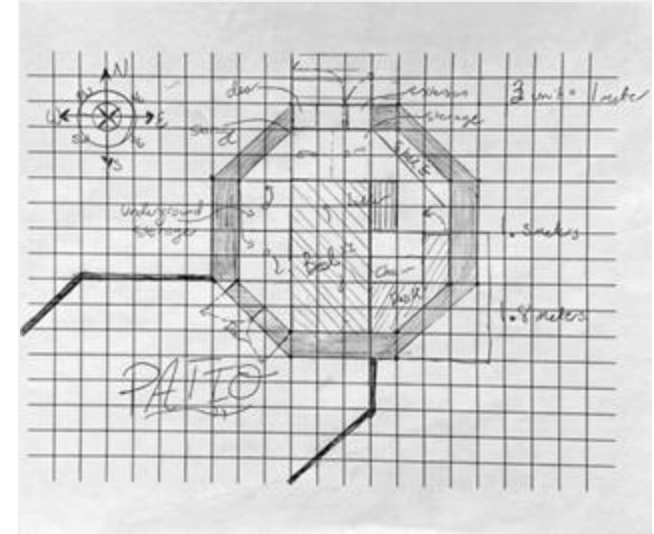
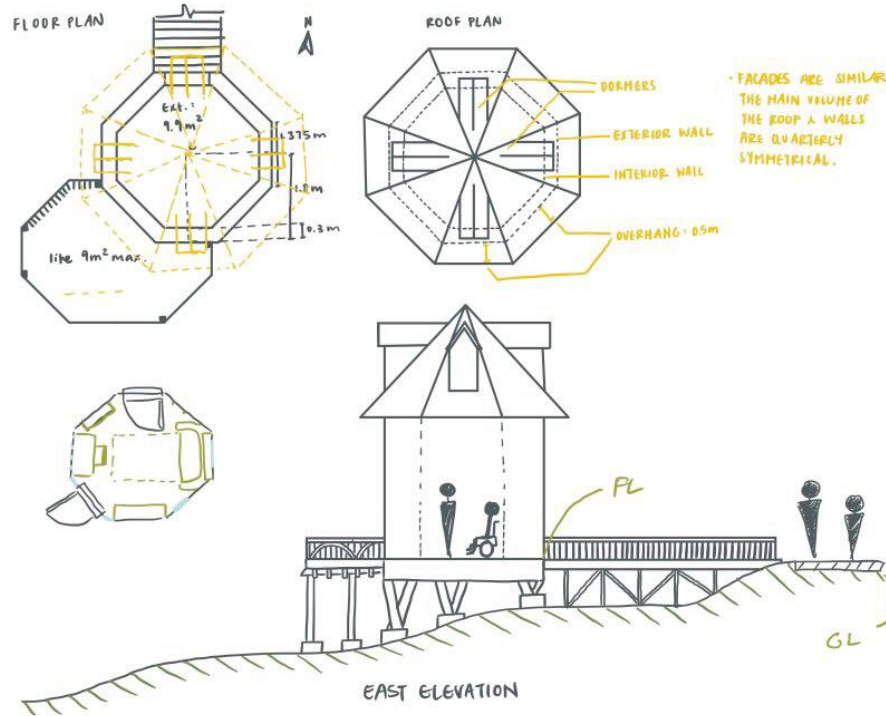
Solution: We were inspired by the various shapes and stylistic choices that we can push a balcony, getting a wrap around style.

4 concept designs
1 final design

04. THE CONCEPT DESIGNS



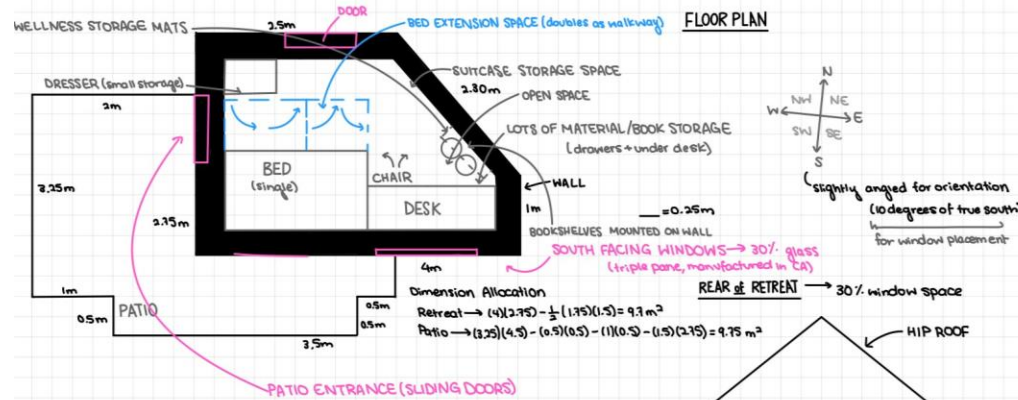
THE LIGHTHOUSE



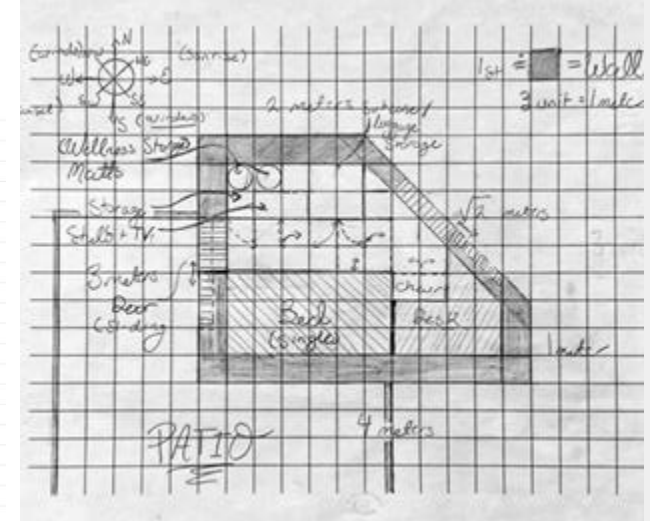
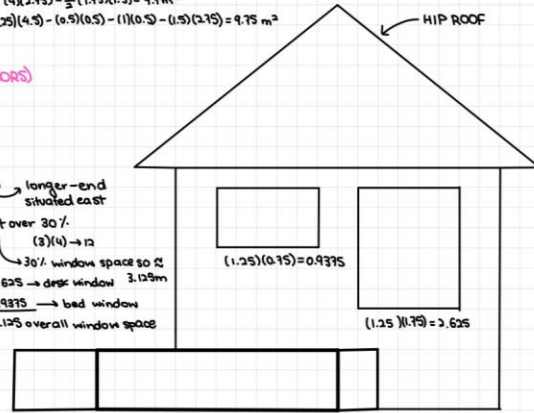
Proposed Solutions:

- Wrap around patio provides panoramic views of sunset.
- Orientation on site harnesses sun and wind; fulfills passive sustainable strategies.
- Flat pathway leads to door (accessibility).
- Lack of electricity provides decreased outlet for distractions.

THE SLANT



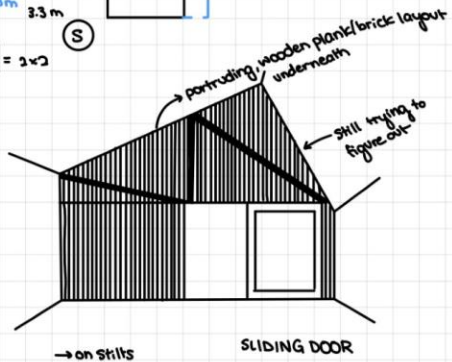
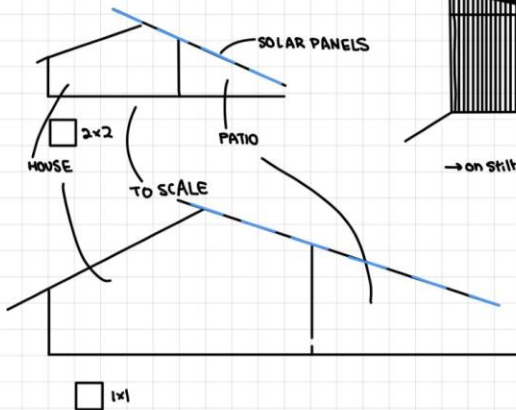
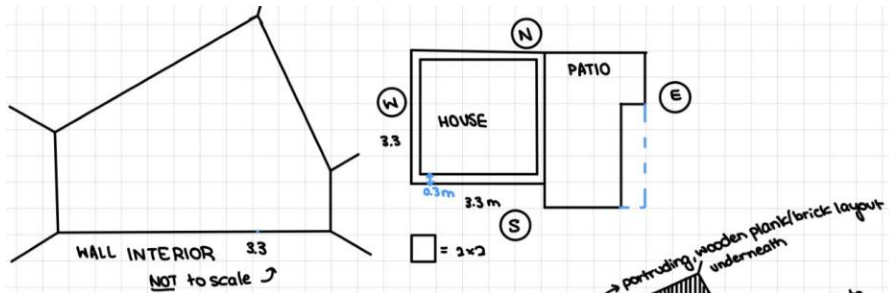
→ on 3rd elevation
→ south-facing windows
→ east-west orientation
→ slendershape
→ longer-end situated east
a bit over 30%
→ 30% window space so 12
2.625 → desk window 3.125m
0.9375 → bed window
2.125 overall window space



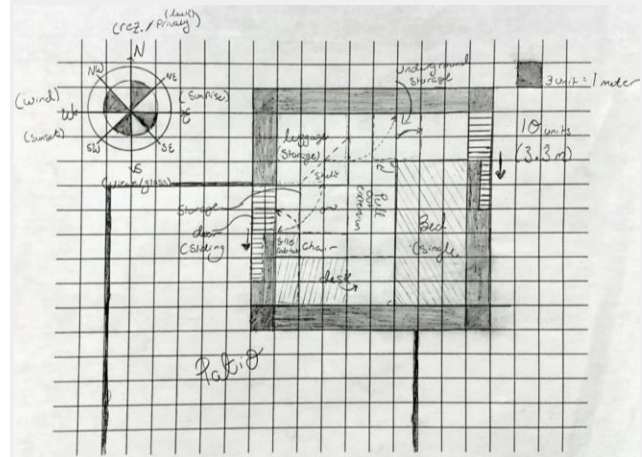
Proposed Solutions:

- Allows for a private, expansive experience of scenery from inner confines.
- Orientation on site harnesses sun and wind; fulfills passive sustainable strategies.
- Encompassing scenery boosts wellness.

THE BLOCK



CONCEPT DESIGN #3



Proposed Solutions:

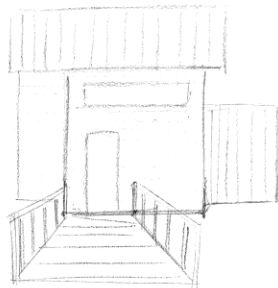
- Door accommodates wheelchair and handle is operable by differing body sizes.
- Books, mats and space present for wellness area.
- Cross ventilation and air flow promote sustainability without hindering comfort.

05.

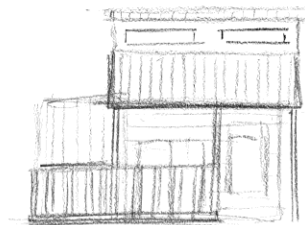
THE FINAL DESIGN

And drawing set run through.

FRONT

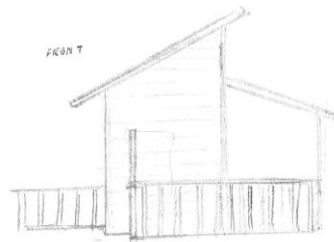


BACK



SIDE ELEVATIONS

FRONT



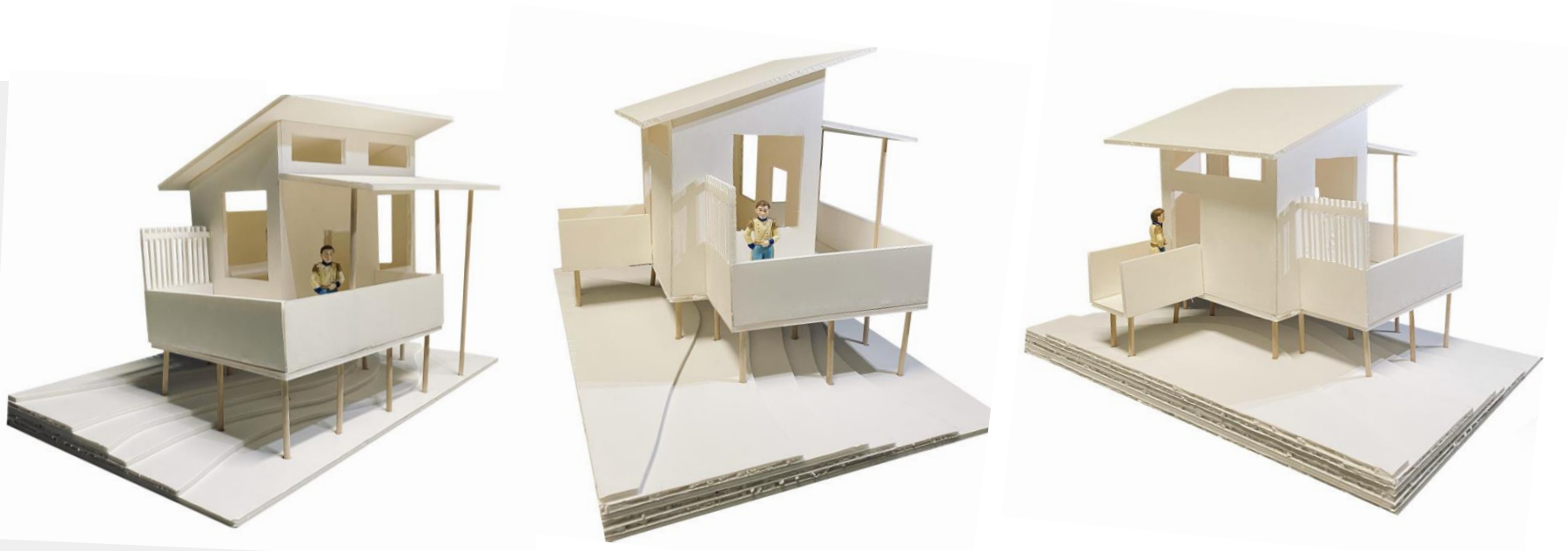
BACK

BACK



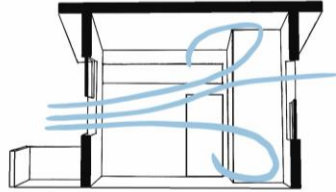
FRONT

06. THE MASSING MODEL



07 RESEARCH REPORT CONCLUSIONS

The main factors taken into consideration were that of durability, sustainability, climate retention and cost in relation to lifespan.



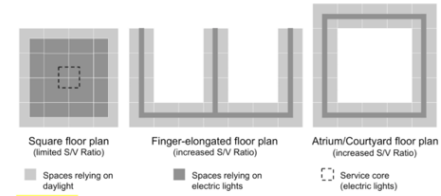
ORIENTATION & BUILDING MASSING

- **Prioritizes:** Natural cross ventilation, daylighting and passive heating/cooling.
- **Orientation:** Located in east-west direction. Longer axis situated in south-most axis. Windows 5-15 degrees of true south.
- **Building Massing:** Slender structure and elongated floor plan.

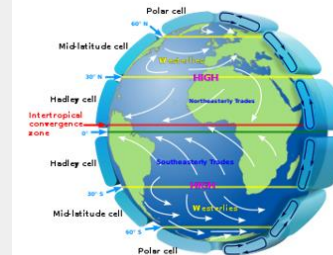
Meets criteria by selecting the axis that corresponds to our two highest priorities (natural cross ventilation and daylighting) and altering the massing to correspond to our tertiary priority (passive heating/cooling).



South-facing Windows and the Sun (Lea, 2017)



Comparison Between Alterations in Surface-Volume Design Configurations (Al-Sallal, 2020)



NASA's Depiction of Earth's Global Atmospheric Circulation (NASA, 2005)

07 RESEARCH REPORT CONCLUSIONS

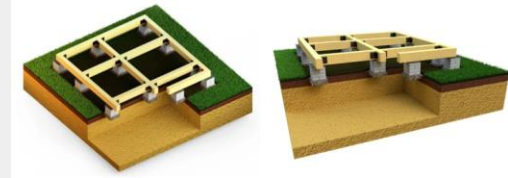


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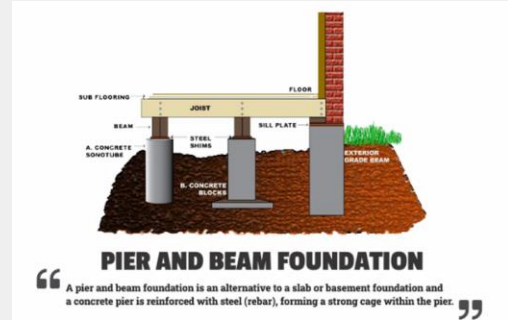
FOUNDATION

- **Considerations:** Topographical landscape, slope, and lightweight structure.
- **Method Selected:** Pier and beam foundation (as opposed to slab-on-grade).
- **Materials:** Reinforced concrete, timber poles, drainage pipe, and anchor strap cast.

Meets criteria by effective material use to prevent overproduction, problem-solve for its challenging topography, all while still prioritizing the structure's load-bearing needs and the goals for sustainability.



3D Diagram of Pier and Beam Foundations (Werner, 2021)



Section drawing of Pier and beam foundation (Patil, 2021)

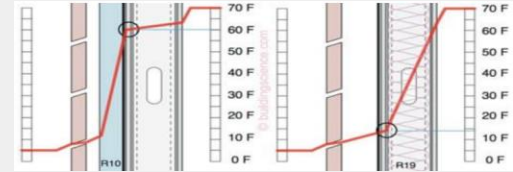
07 RESEARCH REPORT CONCLUSIONS

The main factors taken into consideration were that of durability, sustainability, climate retention and cost in relation to lifespan.

WALL

- **Considerations:** Bioclimatic conditions, affordability, and sustainability.
- **Method Selected:** Standard wood veneer wall (cold climate adherent).
- **Materials:** Triple pane glass, oak veneer (locally sourced), house wrap, close-cell spray foam, vacuum insulated panels (R value of 25), drywall, vinyl paint, and aluminum flashing.

Meets criteria by selectively choosing suitable materials that is locally produced matching the theme of sustainability; while having an aesthetic appeal, that can help with the overall wellness of occupants on campus.



Insulation Detail Work (Straube, 2011)

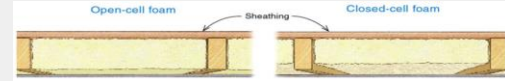
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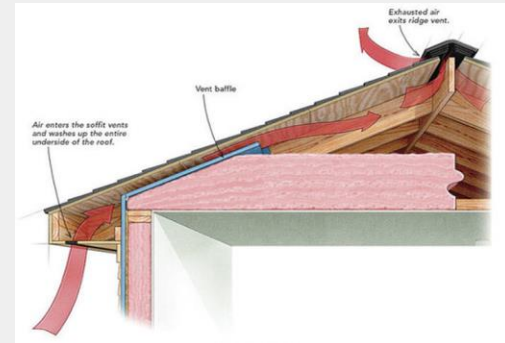
ROOF

- **Considerations:** Bioclimatic conditions, aesthetics, and sustainability.
- **Method Selected:** 22 gauge steel roofing (R value of 65).
- **Materials:** Metal roofing, engineering wood, XPS rigid insulation, and closed-cell spray foam.

Meets criteria by choosing options of materials and design that are most suitable for our preferences and the requirements of the site.



Open Cell vs Closed Cell Insulation Area Differences (Holladay, 2017)



Ventilation of Attic (Lstiburek, PA-1101: A Crash Course in Roof Venting, 2011)

08 REFERENCES I

Adrian, S. (2018, July 4). *Charming Off Grid A-Frame Cabin In The Catskills*. Off Grid World. Retrieved from <https://offgridworld.com/charming-off-grid-a-frame-cabin-in-the-catskills/>

Airbnb: Vacation Rentals, Cabins, Beach Houses, Unique Homes & Experiences. (n.d.). Airbnb. Retrieved from https://www.airbnb.ca/rooms/23634262?source_impression_id=p3_1669342245_FSC8xiUxcGZqbukV

Al-SallaL. (2020, June 18). LinkedIn. Retrieved from Daylighting in the Architectural Design Process. Retrieved from <https://www.linkedin.com/pulse/daylighting-architectural-design-process-part-2-khaled-a-al-salla/>

Brian Clark Howard. (2011, January 7). *18 Incredible Small Green Homes That Live Large*. Popular Mechanics; Popular Mechanics. Retrieved from <https://www.popularmechanics.com/home/how-to/g460/small-green-homes/>

Cabin on Flathead Lake / Andersson Wise Architects. (2011, October 21). ArchDaily. Retrieved from <https://www.archdaily.com/177523/cabin-on-flathead-lake-andersson-wise-architects>

CAD blocks free download. CAD Blocks free download. (n.d.). Retrieved from <https://cad-block.com/>

Erin. (2016, March 24). *This writer's shed was designed to be a quiet haven in the big city*. CONTEMPORIST. Retrieved from <https://www.contemporist.com/writers-shed/>

REFERENCES |

“Free CAD Blocks in DWG File Format.” Free CAD Blocks in DWG File Format, 8 Sept. 2022,
<https://blocks.draftsperson.net/download-category/trees/>.

Holladay, M. (2017, August). *Closed Cell Foam between Studs is a Waste*. Retrieved from Fine Homebuilding:
<https://www.finehomebuilding.com/project-guides/insulation/closed-cell-foam-studs-waste>

L'Angolo Estate / LEVER Architecture. (2018, February 19). ArchDaily. Retrieved from
<https://www.archdaily.com/889038/langolo-estate-lever-architecture>

Lea, K. (2017). South Facing Windows. Retrieved from Green Passive Solar Magazine:
<https://greenpassivesolar.com/passive-solar/building-characteristics/orientation-south-facing-windows/>

Little A-frame Cabin in the Catskills. (n.d.). Tinyhousetalk.com. Retrieved from
<https://tinyhousetalk.com/little-a-frame-cabin-in-the-catskills/>

Lstiburek, J. (2011, August 1). PA-1101: A Crash Course in Roof Venting. Retrieved from Building Science Corporation. Retrieved from
<https://www.buildingscience.com/documents/published-articles/pa-crash-course-in-roof-venting/view>

NASA (2005, June 7). Understanding Climate. Retrieved from Jet Propulsion Laboratory:
<https://sealevel.jpl.nasa.gov/ocean-observation/understanding-climate/the-earth/>

REFERENCES |

Patil, R. (2021). Pier and Beam Foundation: Advantages and Disadvantages. Retrieved from Construction OR:
<https://constructionor.com/pier-and-beam-foundation/>

Straube, J. (2011, November 15). BSD-163: Controlling Cold-Weather Condensation Using Insulation. Retrieved from Building Science Corporation:
<https://www.buildingscience.com/documents/digests/bsd-controlling-cold-weather-condensation-using-insulation>

"Princess Anneliese on Her Balcony from Barbie as the Princess and the Pauper: Barbie Cartoon, Princess and the Pauper, Barbie Movies." Pinterest, 12 Dec. 2016,
<https://www.pinterest.ca/pin/220465344239142273/>.

Projects - Surman Weston. (n.d.). Surmanweston.com. Retrieved from
<http://surmanweston.com/>

Werner, A. (2021, October 27). Pros & Cons Of A Pier Foundation. Retrieved from The Real Seal LLC:
<https://www.therealseallc.com/blog/pros-and-cons-of-a-pier-foundation/>

Whispering Hope Ranch / Studio Ma. (n.d.). Archinect. Retrieved from
<https://archinect.com/firms/project/64834032/whispering-hope-ranch/150062476>