



Portfolio

Michelle Liu
2022

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01. Autonomous Housing Pods

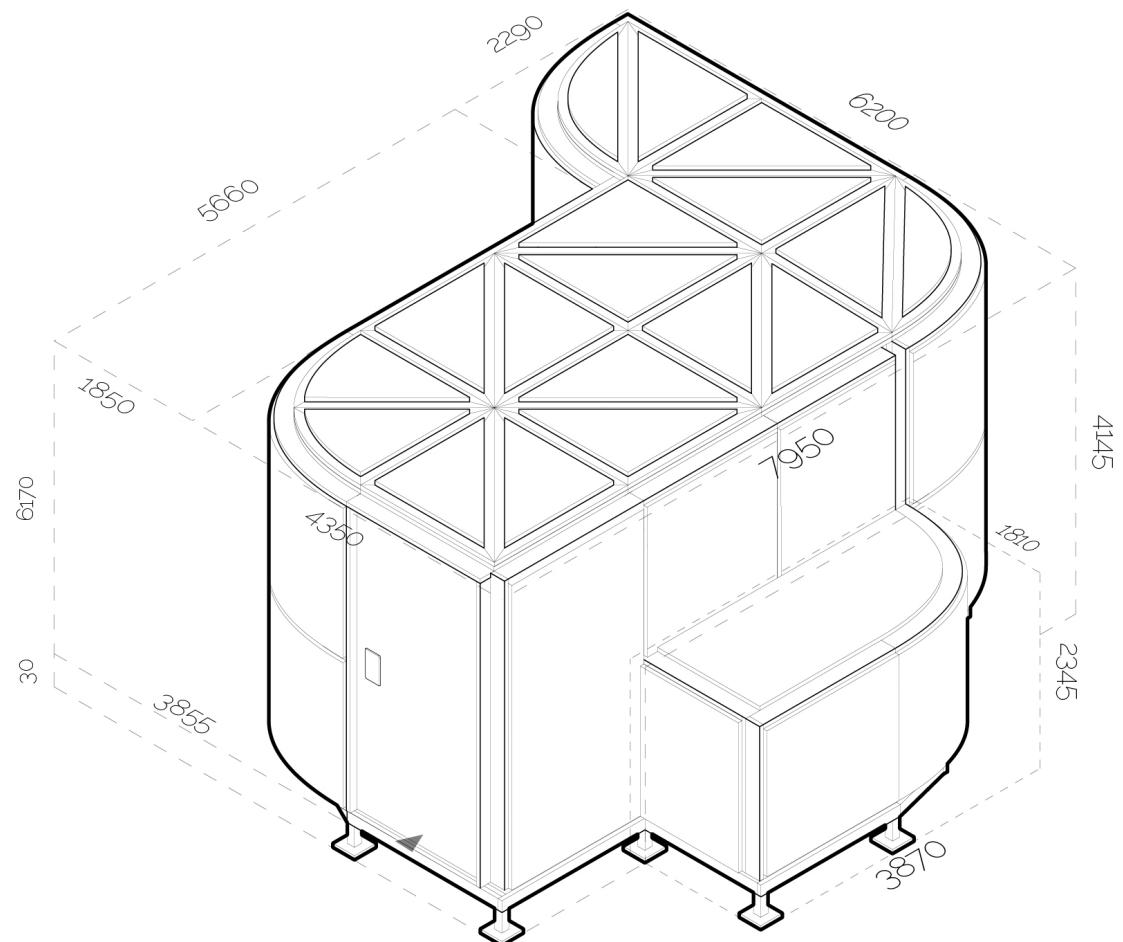
Course: ARC480 - Advanced Topics in the Technology of Architecture
 Instructor: Tom Bessai

Case Study: Car-Boat-Bike

The pod is designed to be deployable, optimized, and autonomous – fundamental qualities chosen after intensive precedent research on automobiles, boats, and bicycles. The final pod design borrows fabrication methods from each precedent category whilst maintaining qualities of a deployable pod meant for any flat terrain.

The pod geometry was initially created as a series of boxes that was then inputted to Galapagos, a Grasshopper plug-in that takes a geometry and optimizes the form by maximizing volume with the least surface area. The Galapagos output geometry rendered curvy throughout, lending the final form as a mediation of the input boxes and curvy output geometry. This structure is then explored using frames to actualize the geometry; the final form has potential to duplicate, expand, and aggregate.

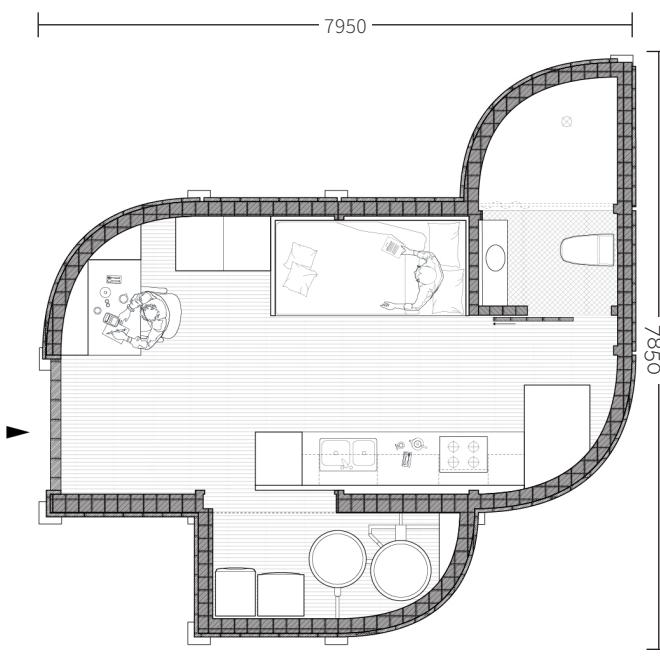
Collaborators: Christian Paez Diaz, Reem Khalifeh, Jo-Lynn Yen, Mina Yip, Pengfei Zhao



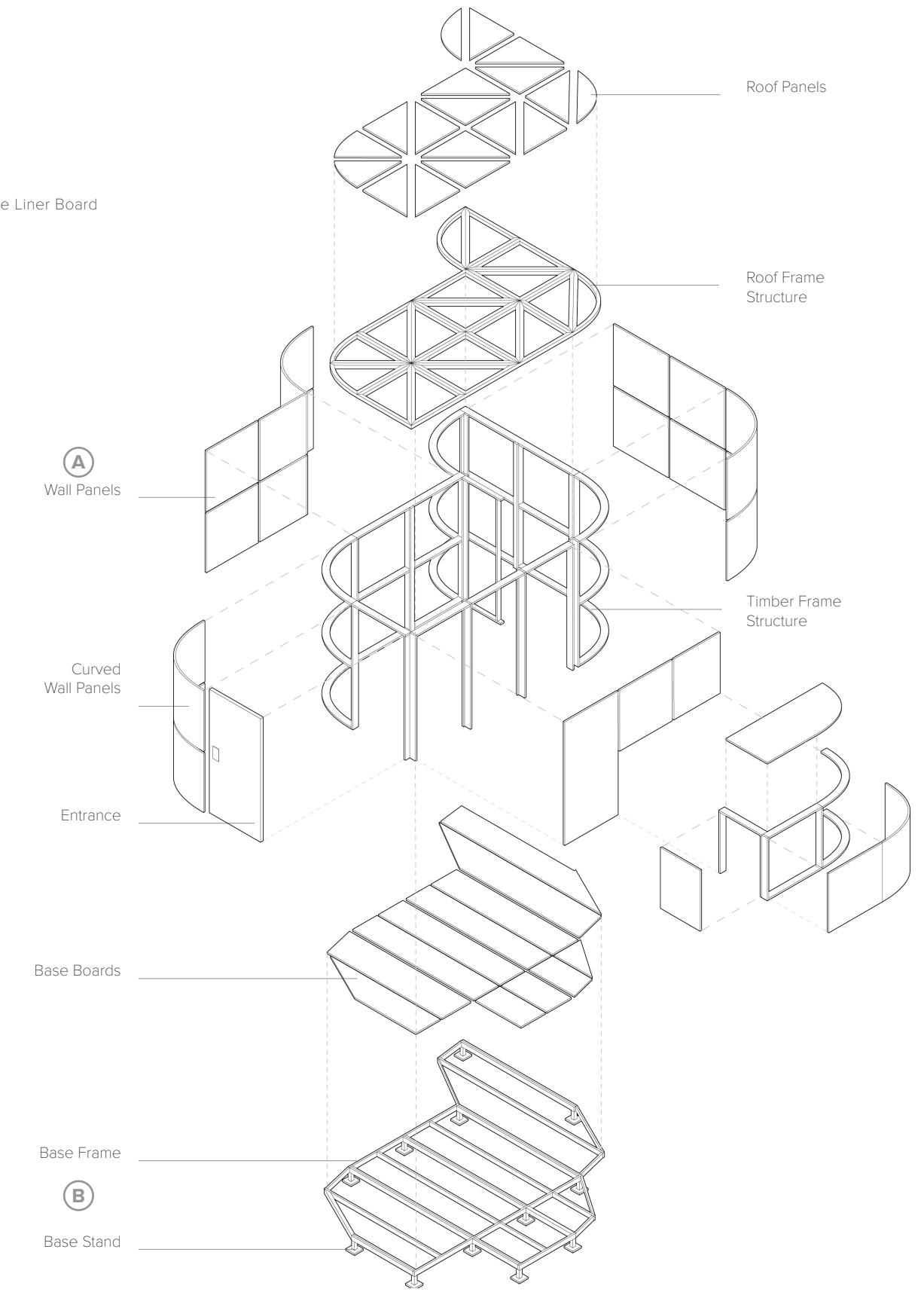
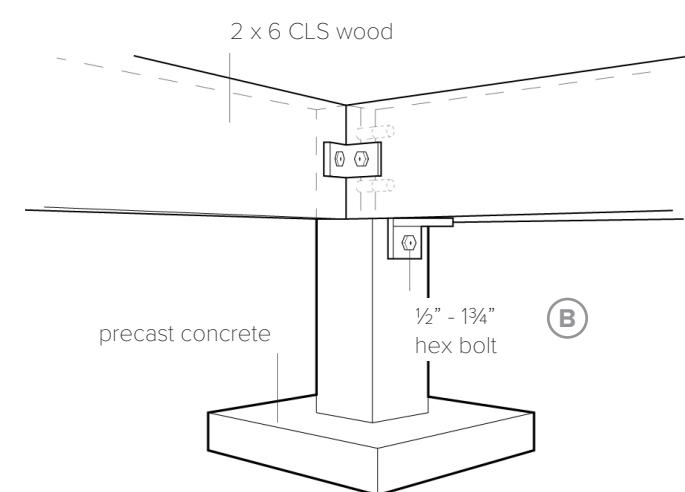
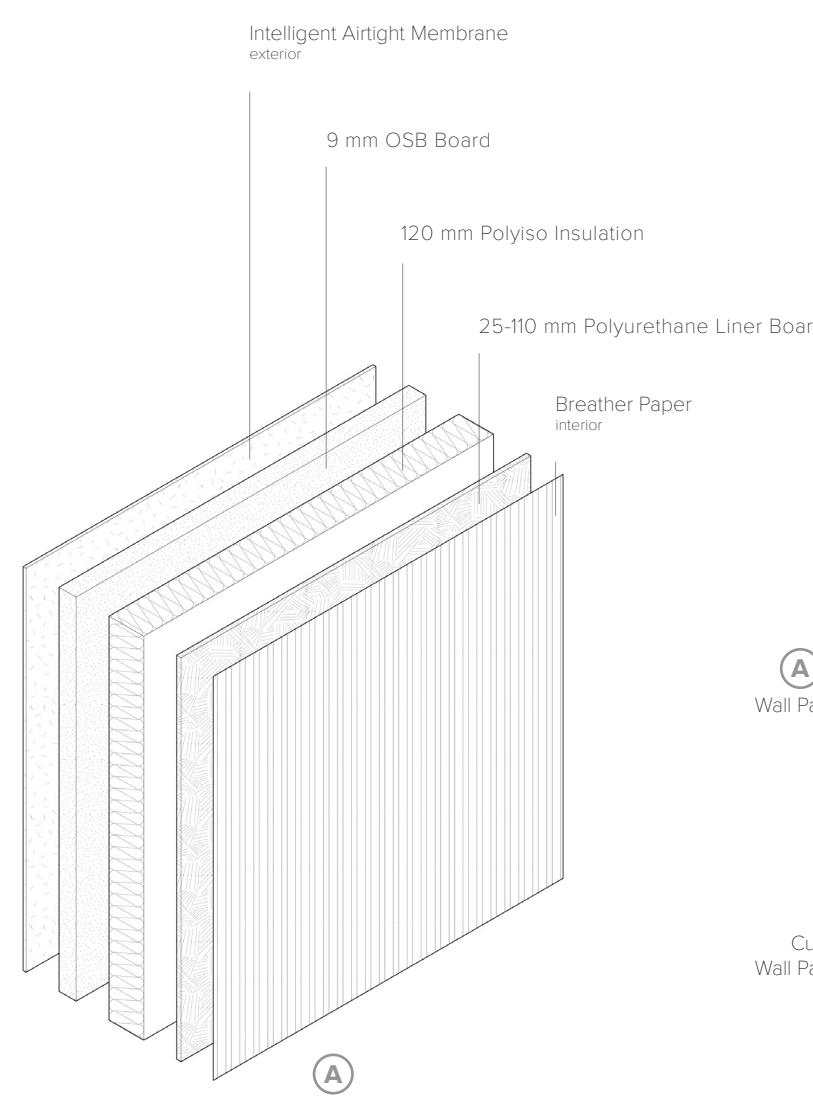
Final Pod Design



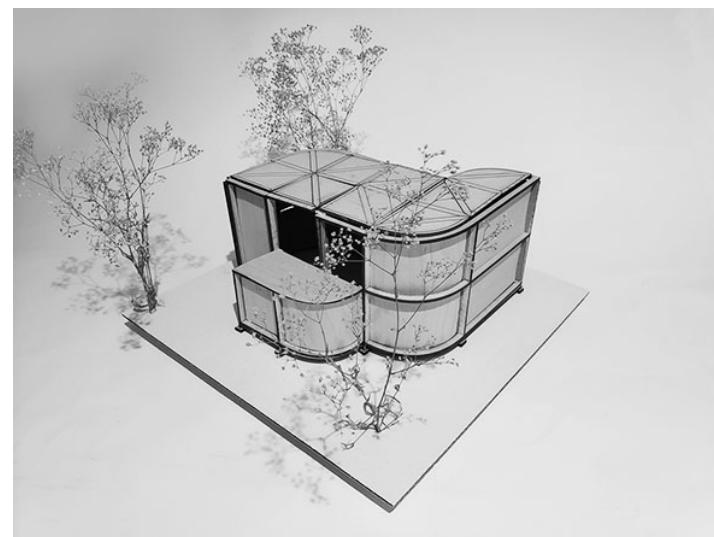
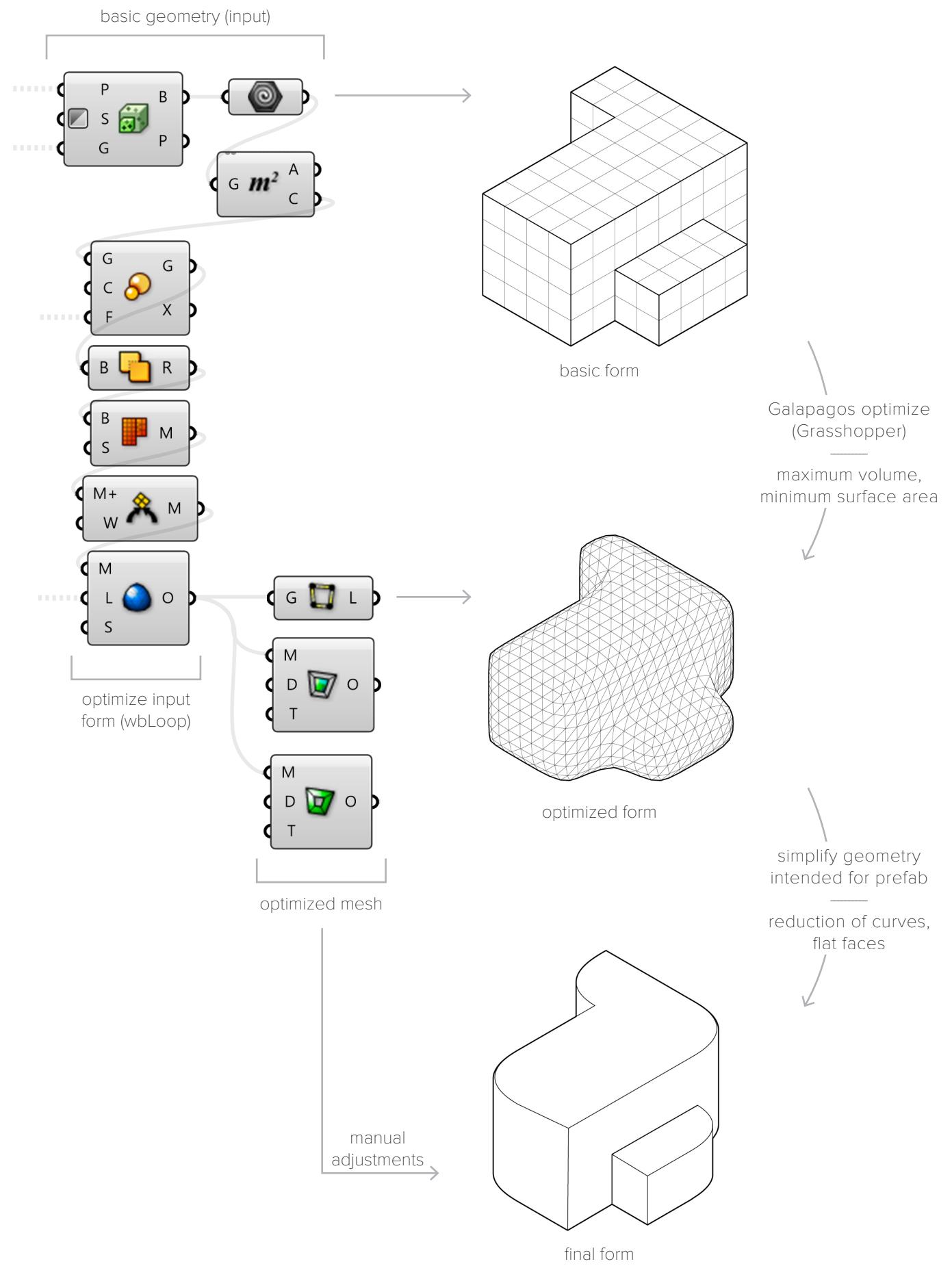
Sample Site Plan



Pod Plan



Exploded Construction Axonometric



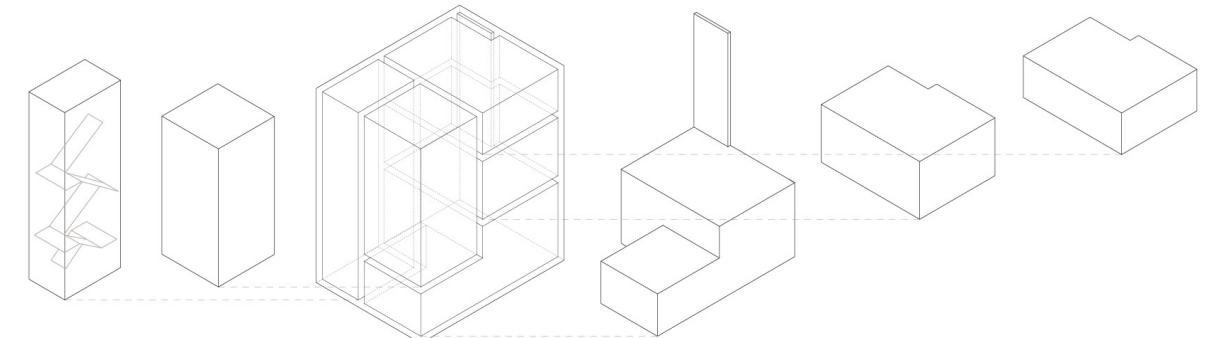
1:50 Model

02. Void and Volume

Course: ARC361 - Architecture Studio III
Instructor: Chloe Town

Precedent Study: Farnsworth House

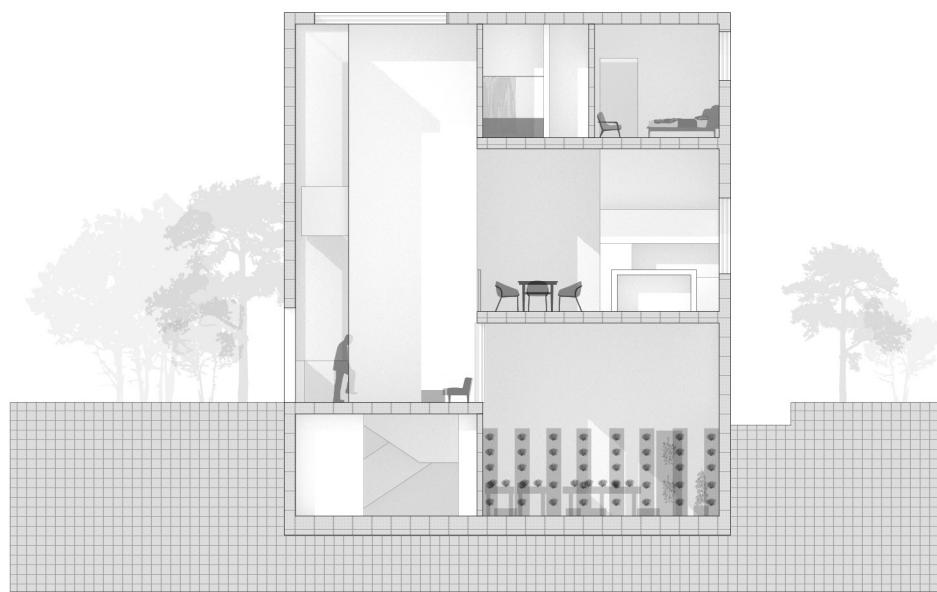
This studio critically analyzed the block structure of program allotment of the Farnsworth House and its disconnect from the overall surrounding context. The final design observes the main characteristics of the Farnsworth house - strict division of program, block geometry, and detachment from its site. Playing with various floor heights and volumes, each space is meant to evoke a different experience through void and volume. While the main floor is smallest in surface area, the openness of an atrium is replicated with the triple floor height and direct skylight. The residence is specifically designed for an urban farm entrepreneur and cook. The requirements include a 12 person dining table and designated plant area for experimental vegetation growth.



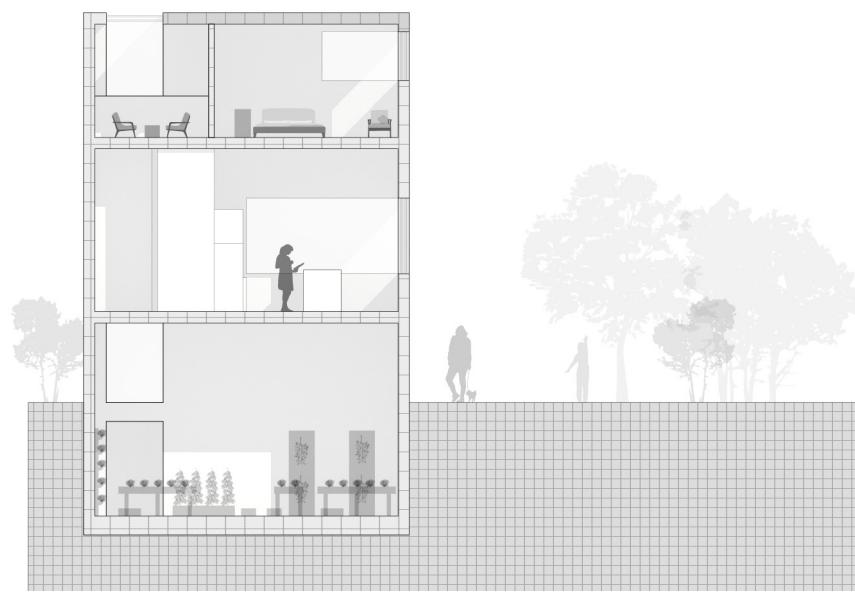
Program Diagram



Exterior Collage



Section A - A'



Section B - B'

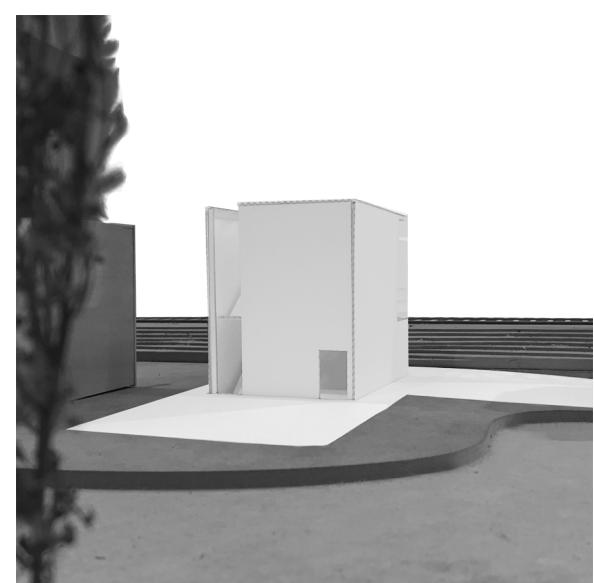
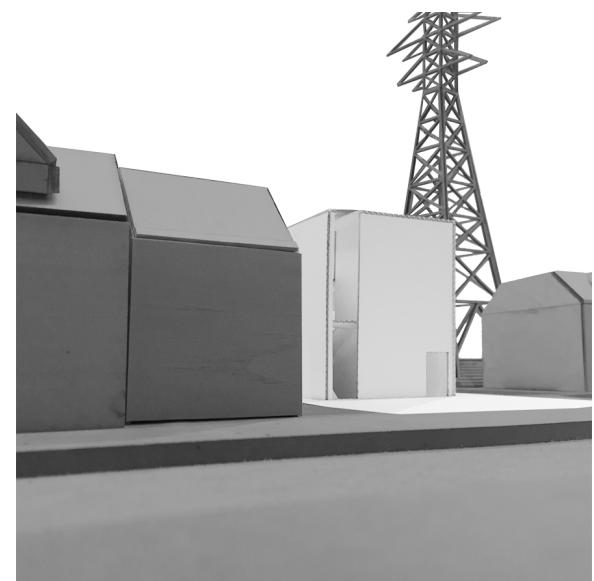


Site Plan



1 5 10 Meters

Location: Rathnelly Neighborhood in Toronto, Ontario



1:100 Site Model

03. Urban Interface: Particle Net

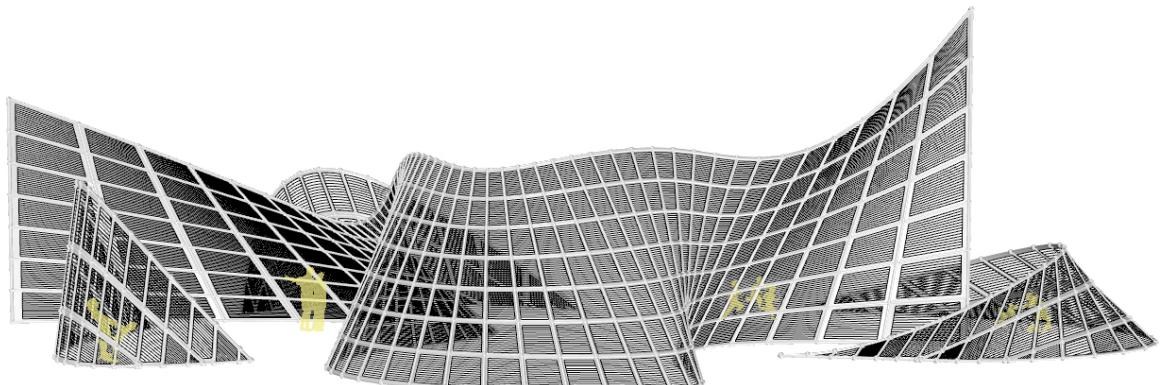
Course: ARC480 - Advanced Topics in the Technology of Architecture
 Instructor: Simon Rabyniuk

Research Topic: Wind of 120 Days

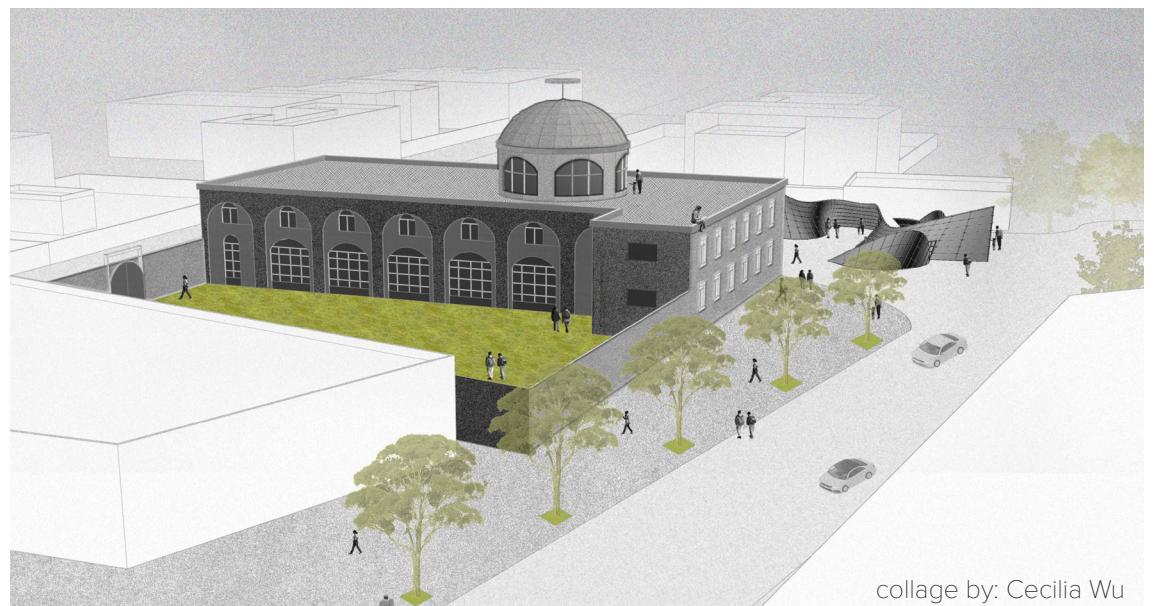
The natural phenomenon called 'Wind of 120 Days' takes place annually between May and September in East and Southeast regions of the Iranian Plateau, demonstrating winds that range between 30 - 110 km/h. The proposal was made in effort to encourage local interaction by use of a sand particle net installation.

Sand storms in the region are exacerbated by the phenomena's high speed winds, producing the most persistent strong near-surface winds on Earth, and inevitably causing hardship to the inhabitants of the Iranian Plateau. The particle net encourages residents to embrace the environment by creating a localized area of protection. The particle net in its scale is a modern solution to protect local inhabitants, meant for any site in the region.

Collaborators: Eunice Cheung, Terence Lo, Derrick Wong, Cecilia Wu

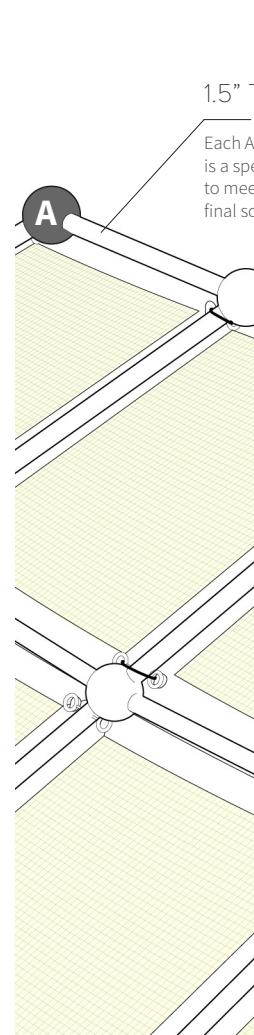
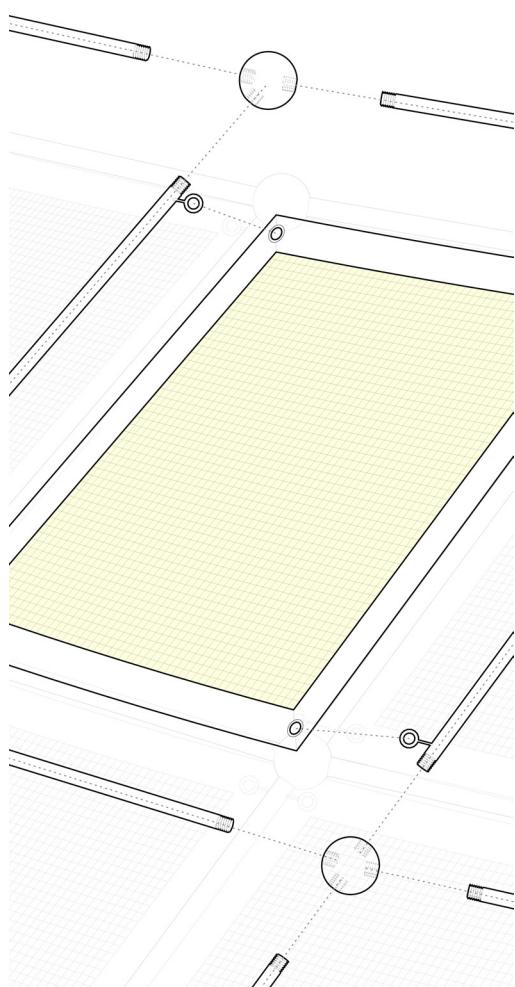
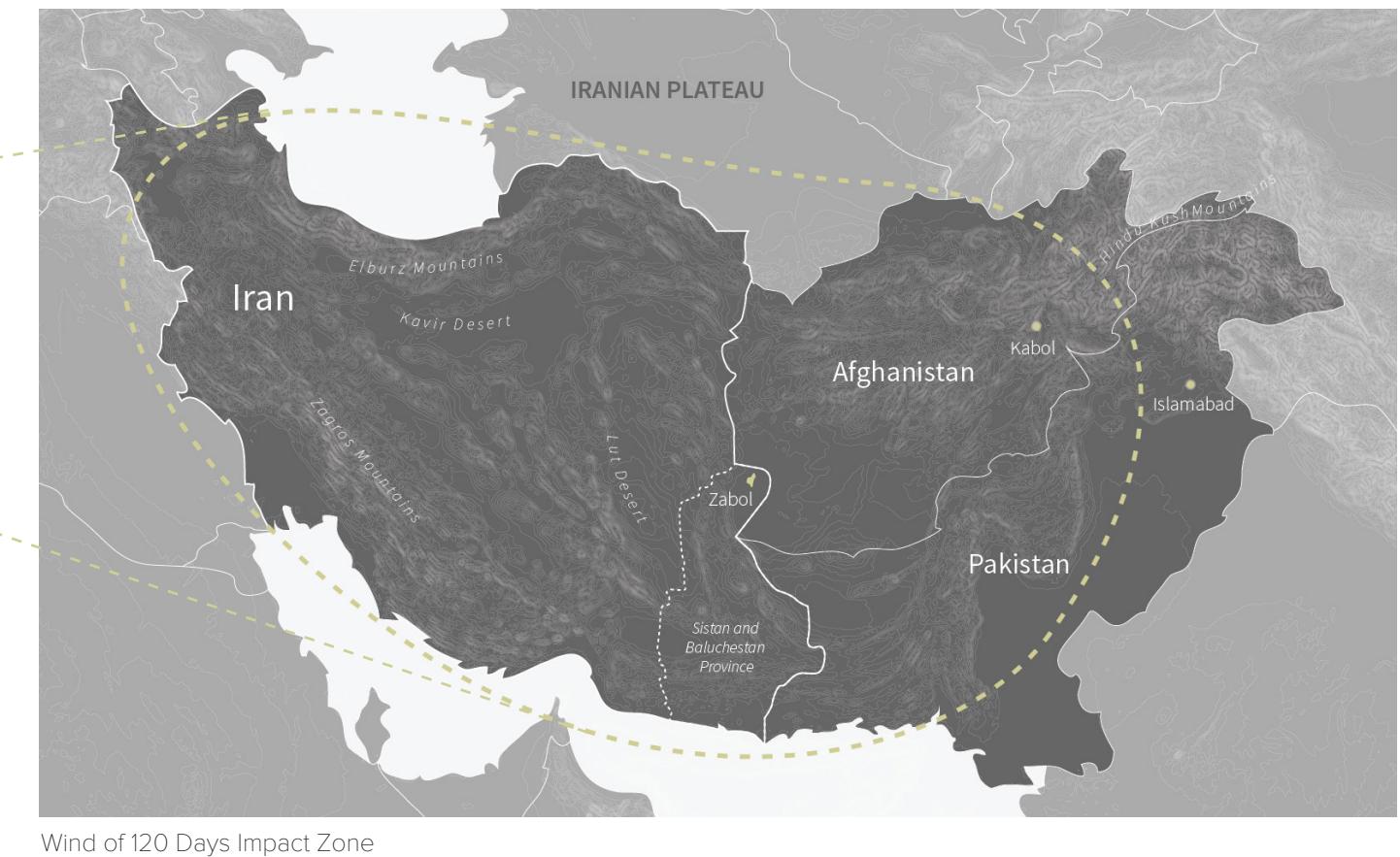
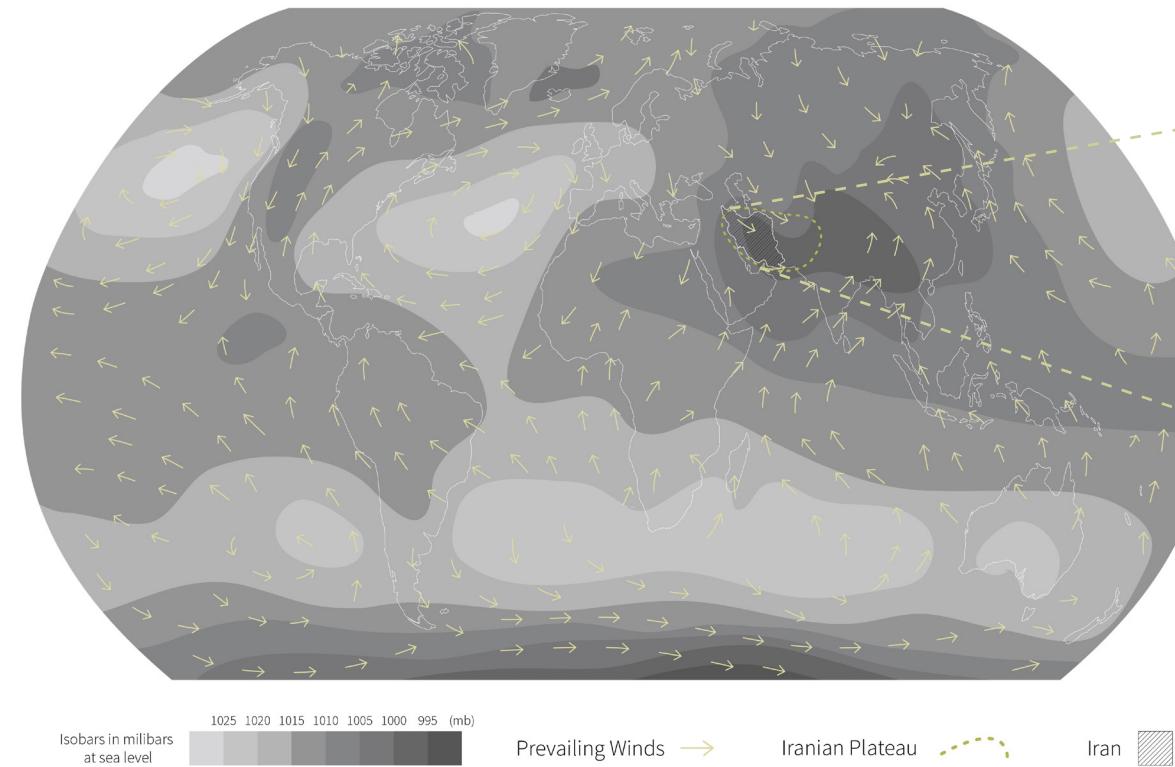


Particle Net



collage by: Cecilia Wu

Collage - Particle Net in Central Mosque Site



Reinforced Edges

1" HDPE reinforced edges provide more durability to windbreak while also allowing netting to be easily fixated to structure with included eyelets.

Stainless Steel Cable Ties

Uses teeth in the head that lock into notches on strap. Can withstand UV rays and are easy to use from a construction standpoint.

High Density Polyethylene Fabric

A lightweight, flexible netting that provides up to 55% wind reduction and 85% dust reduction with UV and flame resistance.

Galvanized Button Eyelets

Galvanized steel eyelets allow windbreak netting to fixate to stainless steel frame and other adjacent nettings.

3" Threaded Connection

Each steel threaded connection is custom made to properly house the vector of each threaded pipe.

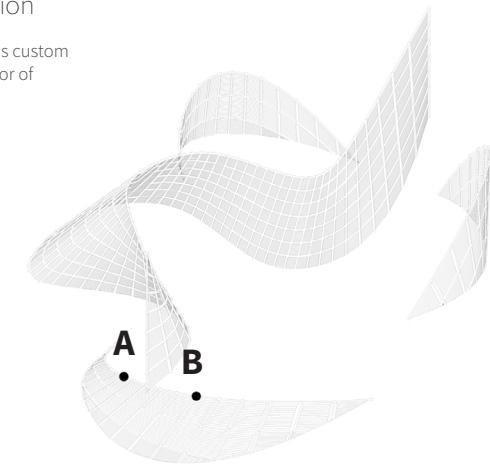


diagram by: Terence Lo

Particle Net - Exploded Connections

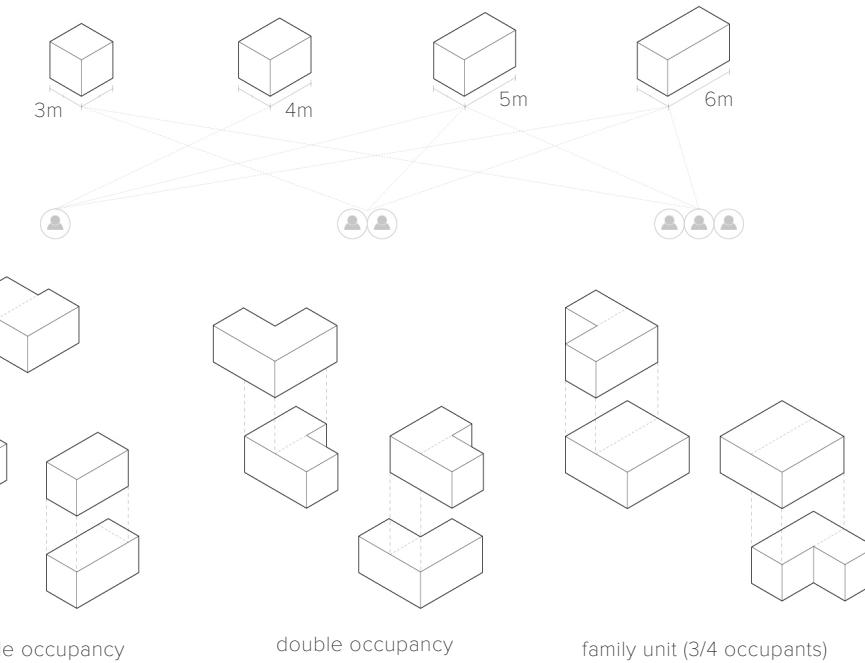
Particle Net - Material Diagram

Particle Net Axonometric

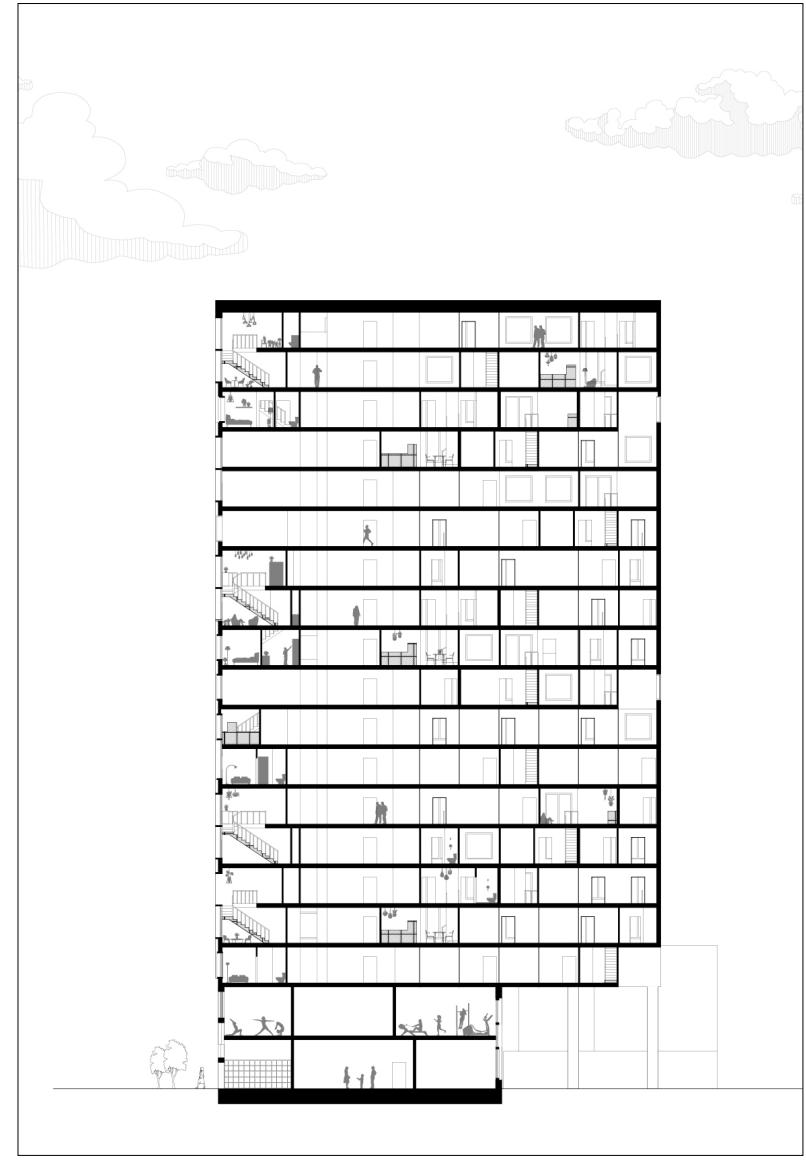
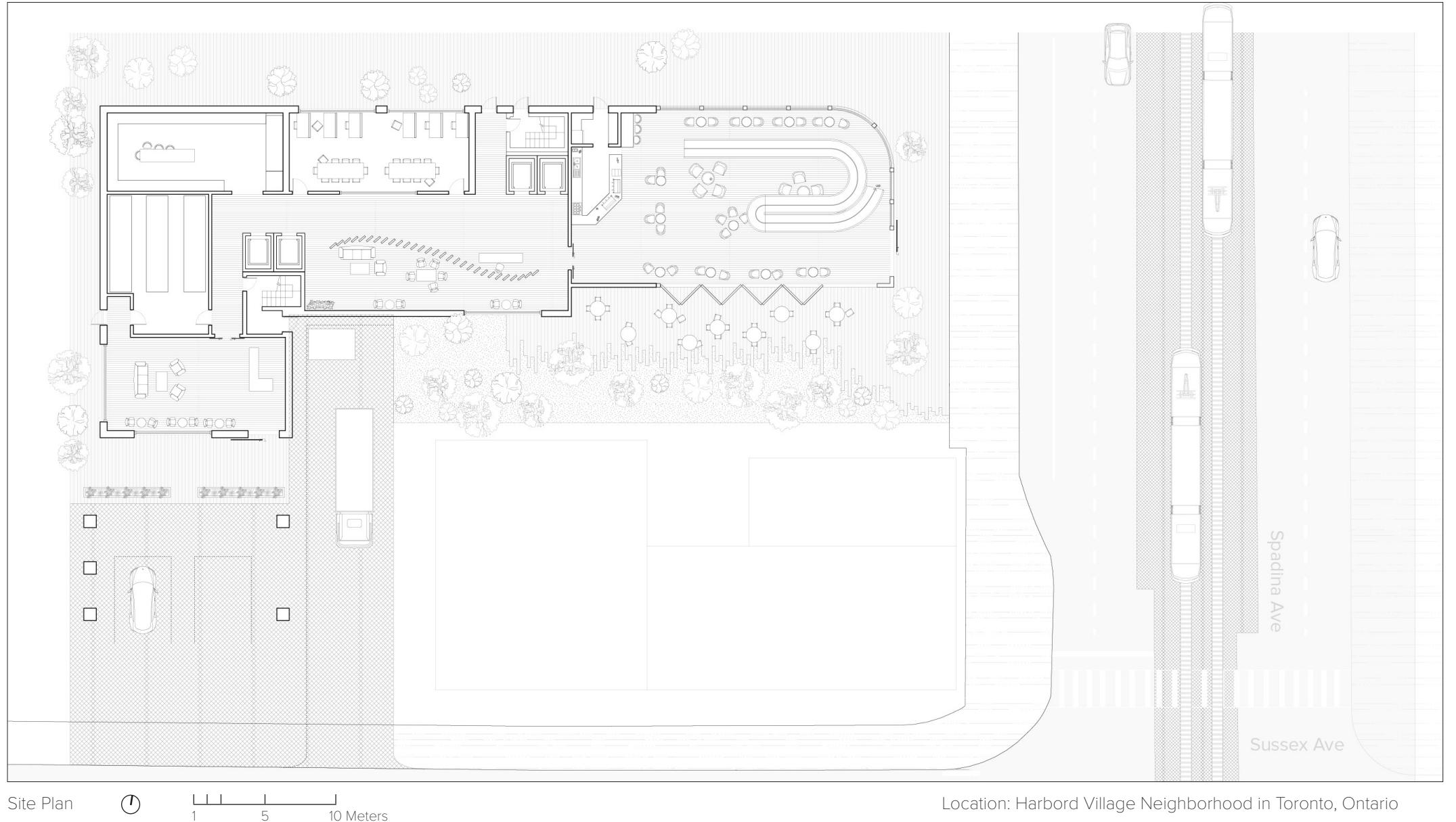
04. BlockA

Course: ARC362 - Architecture Studio IV
 Instructor: Victor Perez-Amado

Block A is a residential tower catered to students and students with families. The units are organized as compact blocks, where every floor is a different layout because of the various stacking techniques of the block units. The various units stack and aggregate to create unique corridor conditions – this excess space is then converted to storage and communal areas. Each residential floor has several of these spaces that range from study rooms to play zones for children - these common spaces are meant to embrace the diverse needs of the residents.



BlockA Axonometric



15th Floor Plan

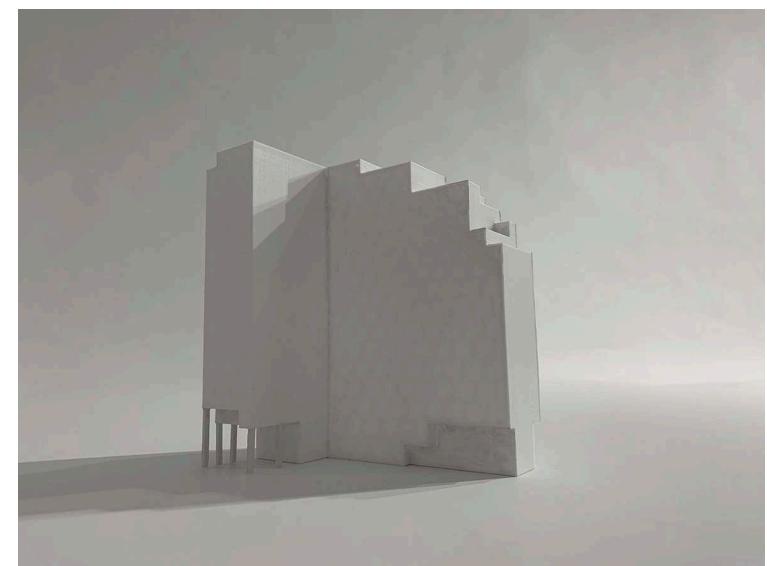
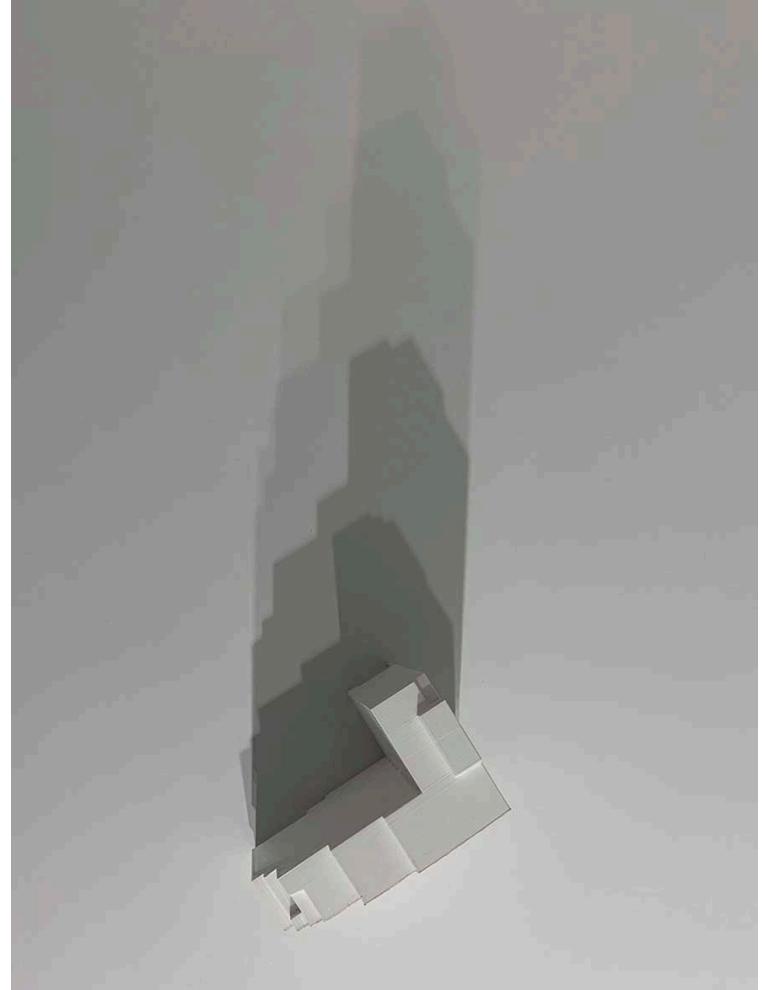
Unit Floor Plan



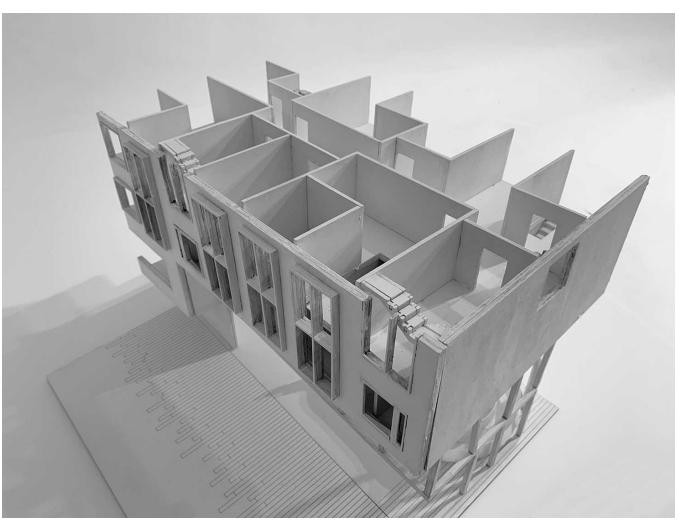
Exterior Collage - Main Entrance



Interior Collage - Common Area



1:100 Massing Model



1:50 Sectional Model - Main Entrance

05. Church of Community

Course: ARC1041 - Building Science I
Instructor: Ted Kesik

Historically, churches have been used as common spaces to practice religion and bring communities together into a single shared space. However, physical church attendance has declined over the years, leaving existing church buildings to become highly underutilized and sometimes even abandoned. The chosen site, Headford United Church, is an abandoned church located in Richmond Hill, Ontario, an affluent suburb within the GTA. Considering its locale, the church is repurposed and reintroduced as a place of gathering that is catered towards the surrounding community. This project introduces an urban garden, a sanitation facility, a workshop/tool share centre, and a communal kitchen that will bridge the gap between the different demographics that exist. Individuals of all age cohorts, from children to the elderly, will be able to make use of the various communal programs within the building. These programs are necessary to create affordable community-based initiatives for the public to have access to shared spaces, tools, and food. Most importantly, they aim to promote inclusivity by attracting people from different socio-economic backgrounds. The communal spaces allow for all generations to work and learn together, forming a partnership and support system within the community. The proposed new typologies within this project can be replicated and adapted to other underutilized or abandoned buildings and serve as a precedent for future projects of similar size.

Collaborators: Jessica Babe, Amelia Chung, Larissa Ho, Rachel Sau

1.0 Urban Garden

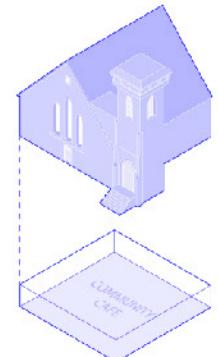


Accessible raised garden beds

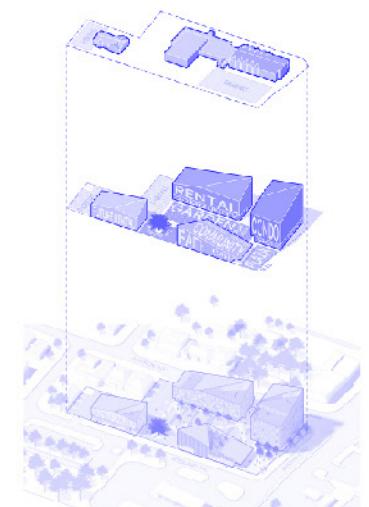
In the suburban context, churches have plenty of green space and open land around the building. This space has the potential to transform into a garden that can increase community food access. Surplus crops can be sold for profit, therefore enabling a sustainable food system. This concept has been done by the Church of Our Saviour in Toronto and Christian Food Movement in the United States.

How Have Other Churches Adapted?

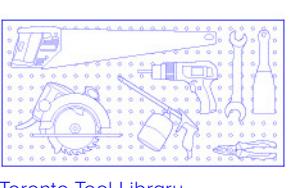
1.0 St. John's Anglican Church
Chapleau, ON



2.0 St. Julian of Norwich Church
Ottawa, ON



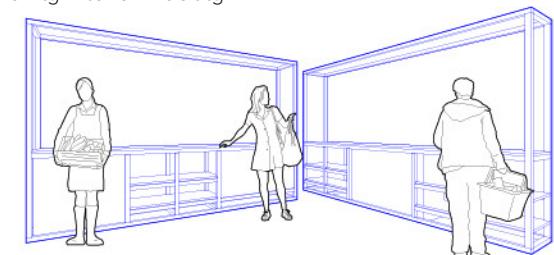
2.0 Tool Sharing & Workshop



Toronto Tool Library

Tool share and workshop is a space that encourages the exchange of knowledge, workshop facilities, and tool lending services. The Toronto Tool Library is a membership-based business for tool lending and workshop space meant for hobbyists. Commercial enterprises such as The Home Depot provide similar services, for larger tools geared towards professionals and businesses.

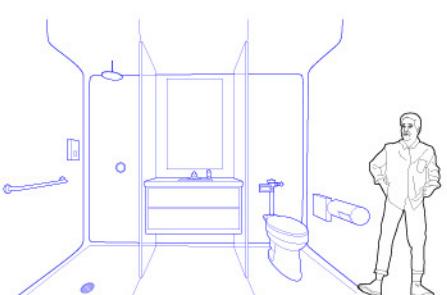
3.0 Community Kitchen Facility



Community kitchen design by mani Harikrishna Ravuri

The kitchen is oftentimes referred to as the heart of a home, a place for gathering, a place for people to feel comforted, nurtured, and healed. Community kitchens is a concept that has been done in cities across North America, although catered to entrepreneurs and experimental food enthusiasts; these kitchens are usually for rent or membership based. Kitchen24 in Toronto is catered towards businesses who are looking to grow, so the space also acts as a development space with other like minded groups. The kitchen is sometimes used to cook meals for the vulnerable populations, proving its ability to adapt to various needs.

4.0 Sanitation Station



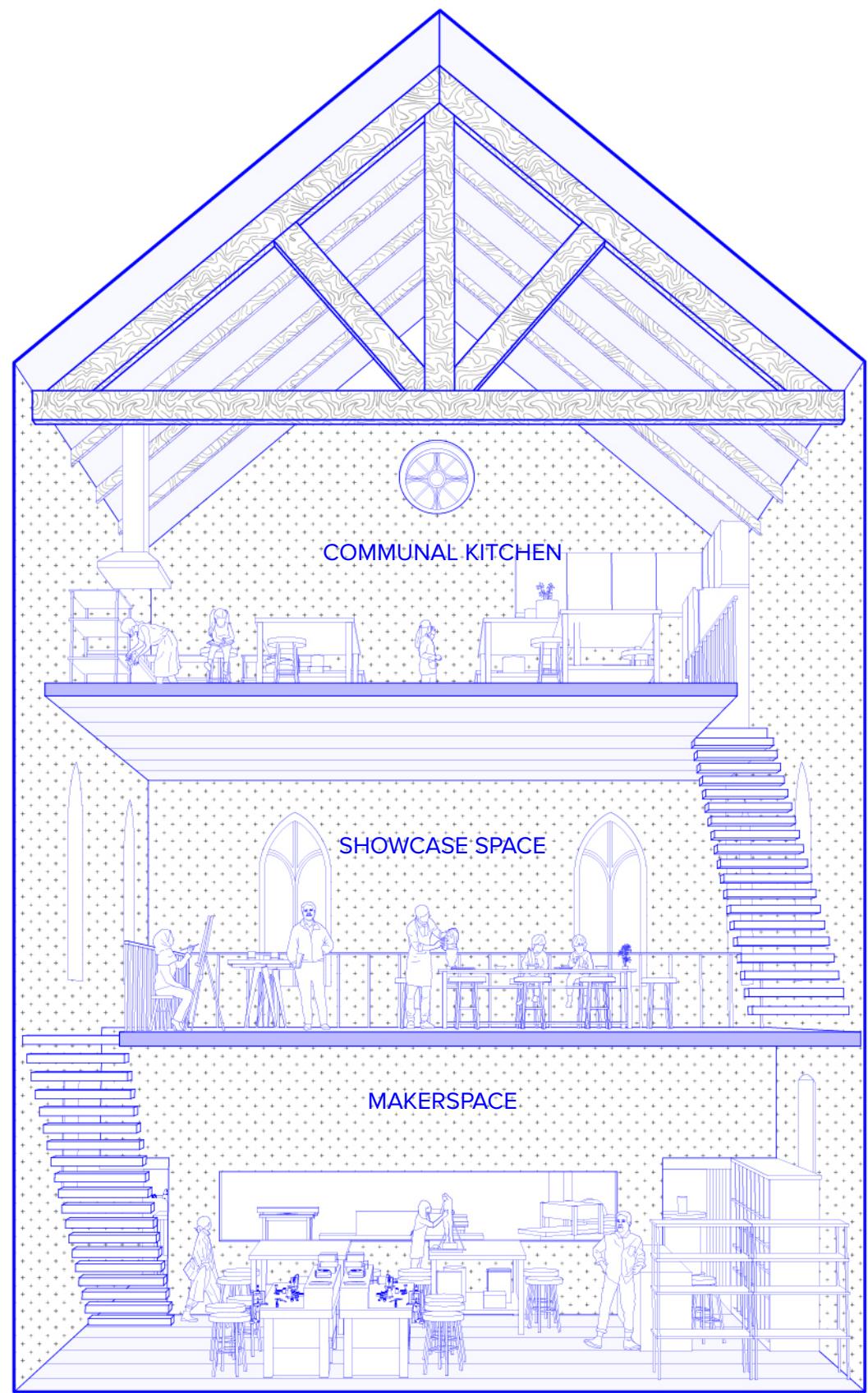
StudioAC mobile shower facility design

Proper sanitation is integral to one's health and dignity. Having access to adequate facilities is necessary to promote proper sanitation. The WASH Project led by the Catholic Church provides sanitation facilities in underdeveloped regions across the globe. StudioAC proposed a mobile sanitation station to address the lack of proper facilities in Toronto, where the design of the facilities is rooted in safety in its choice of material.

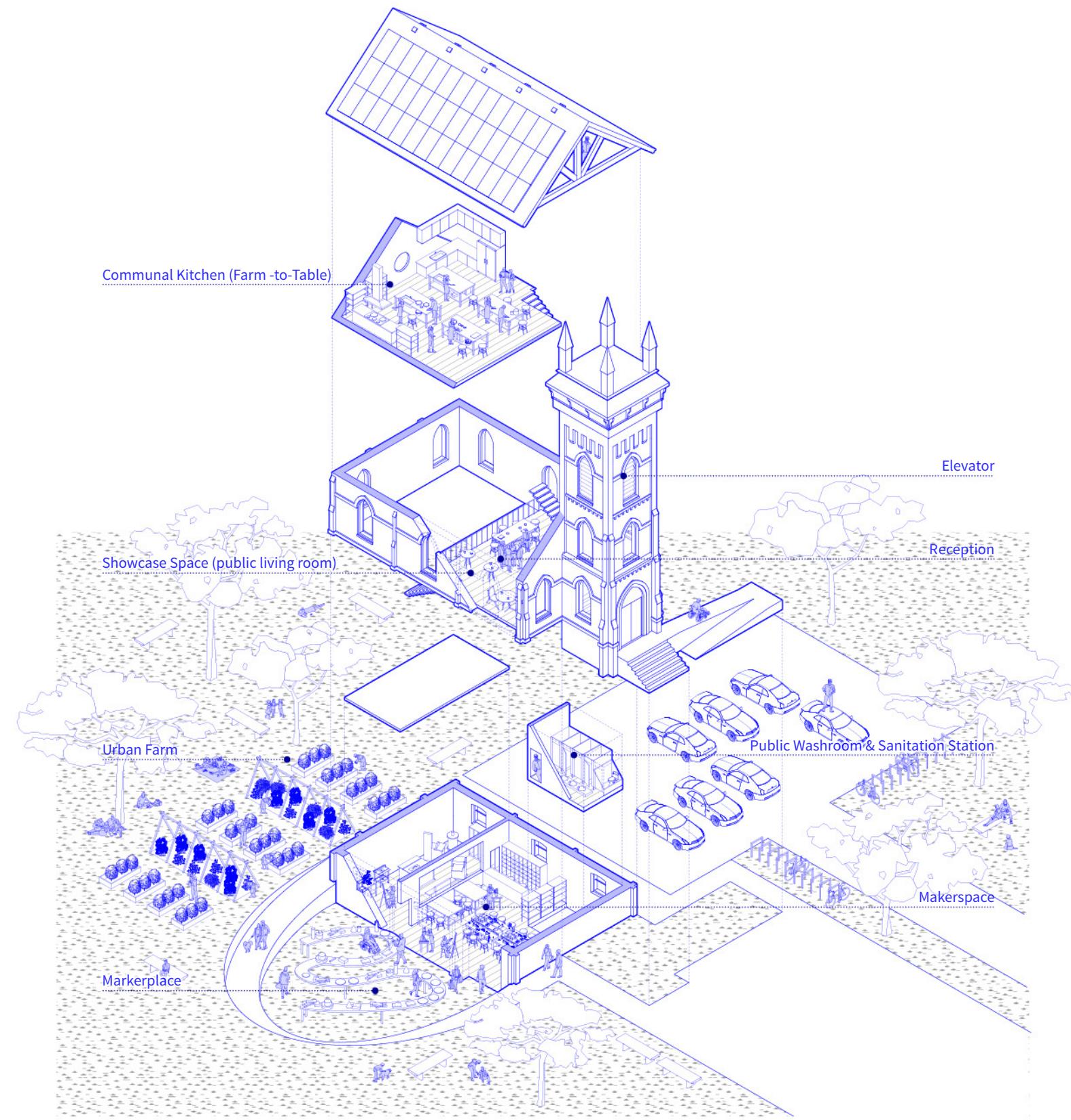


3.0 Cecil Community Centre
Toronto, ON





Interior Perspective

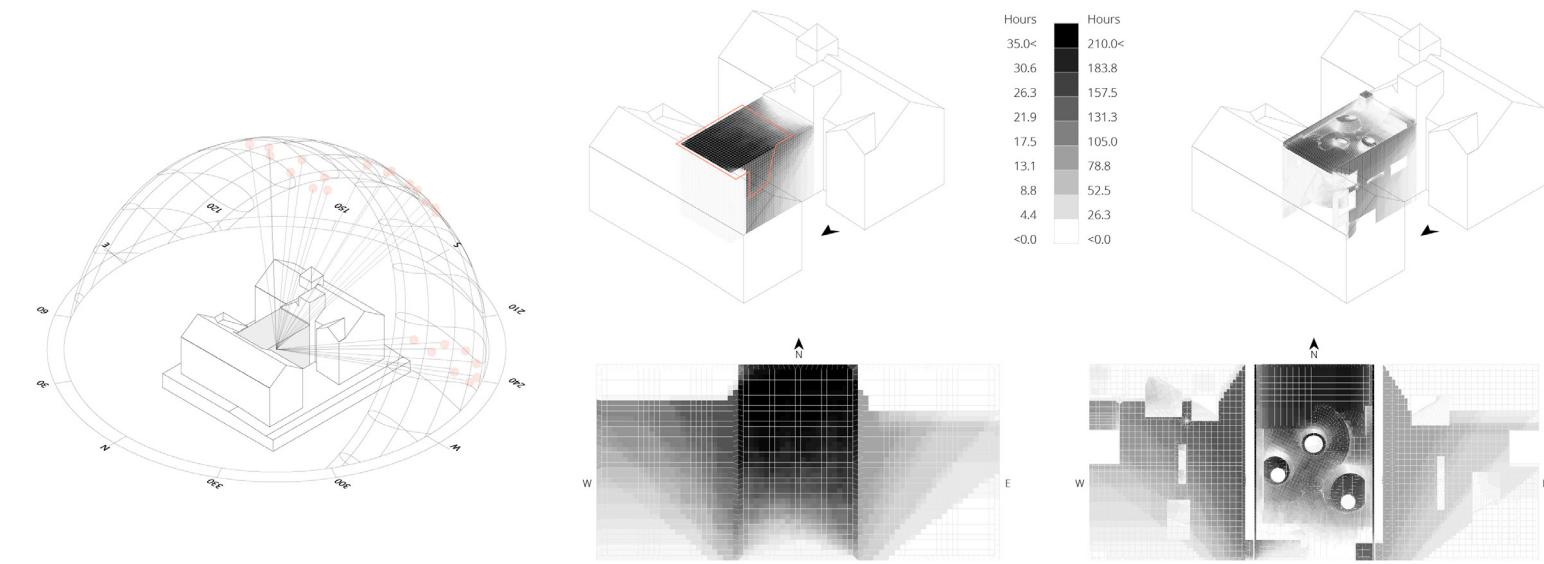


Exploded Program Diagram

06. Sun

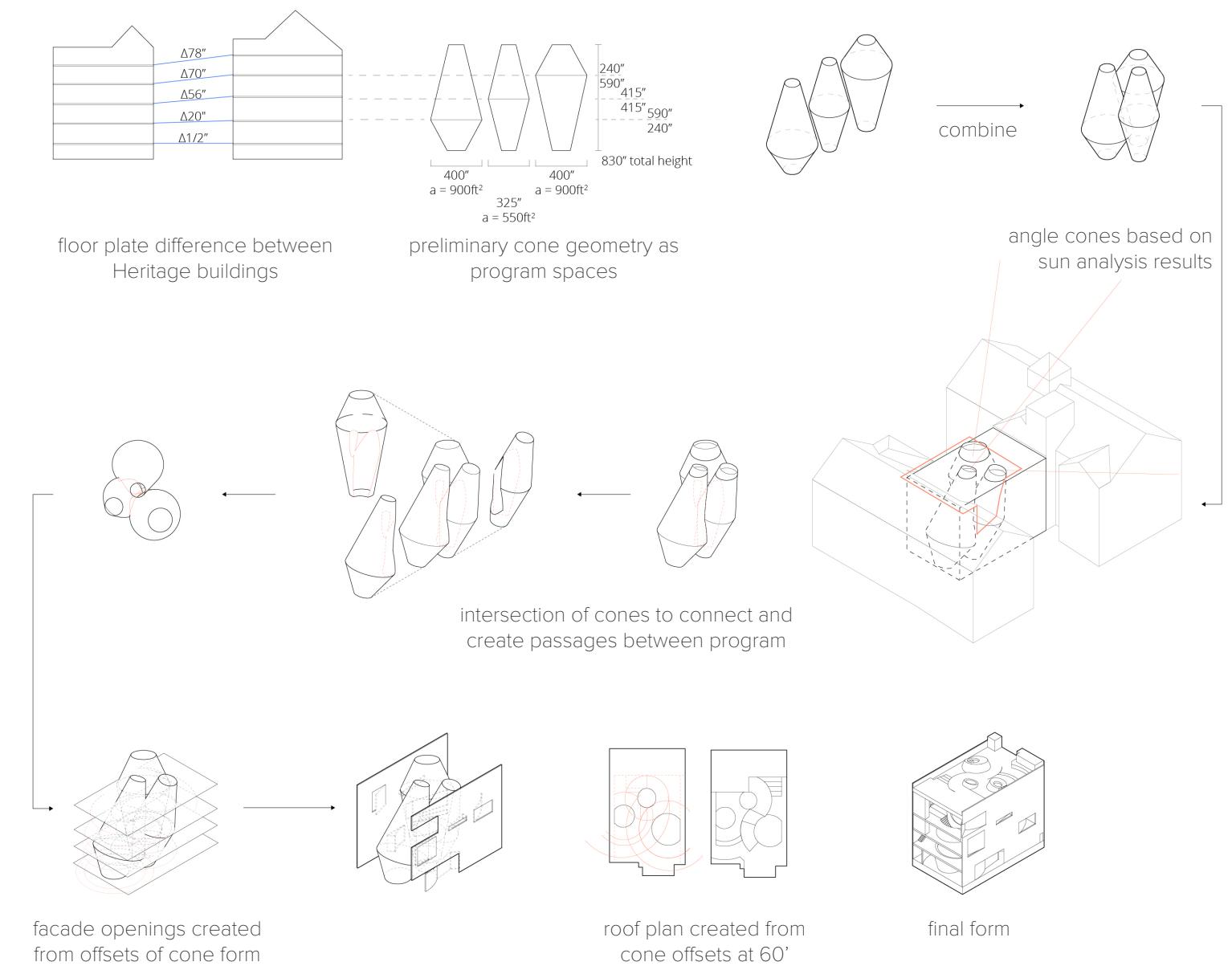
Course: ARC1011 - Design Studio I
Instructor: Sam Ghantous

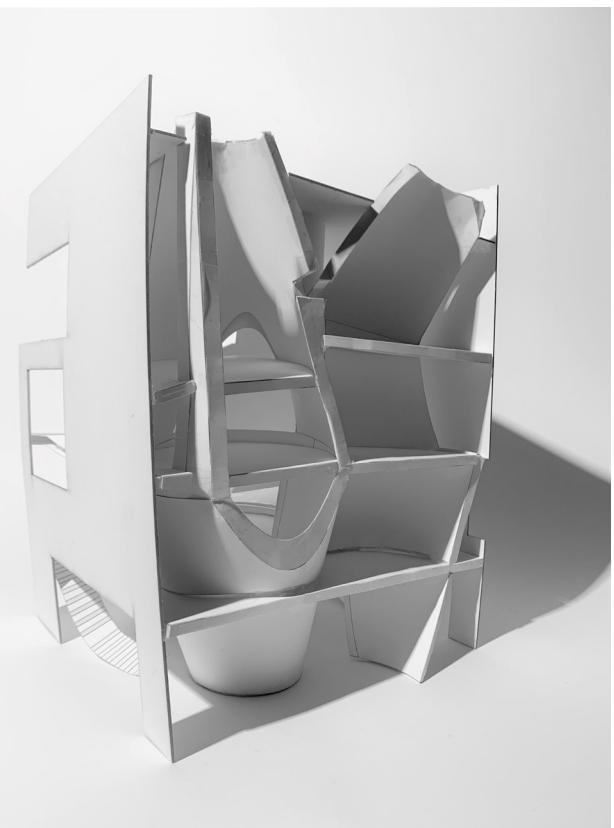
The project is influenced by the sunlight and radiation conditions of the site in Brooklyn, New York. Nestled between the existing art and architecture heritage buildings on the North and South, the proposed design seeks to bridge the two facilities whilst incorporating a gallery, amphitheater, cafe, and studio spaces. The main geometry is three cones that were formed based on sunlight analysis results, and are angled to allow maximum sun exposure during regular operational hours. The different angles of the cones intersect and allow for openings and moments of connection between the studio spaces and amphitheater. Secondary and public spaces are created by offsets of the cones, including windows, entrances and the roof garden.



Sun Path Analysis
analysis hours: 9AM, 12PM & 4PM

Sunlight Hour Analysis (September - April)
analysis hours: 9AM, 12PM & 4PM





1:48 Sectional Model

07. Daniels x Lululemon

Course: ARC399 - Research Opportunity: Daniels x Lululemon

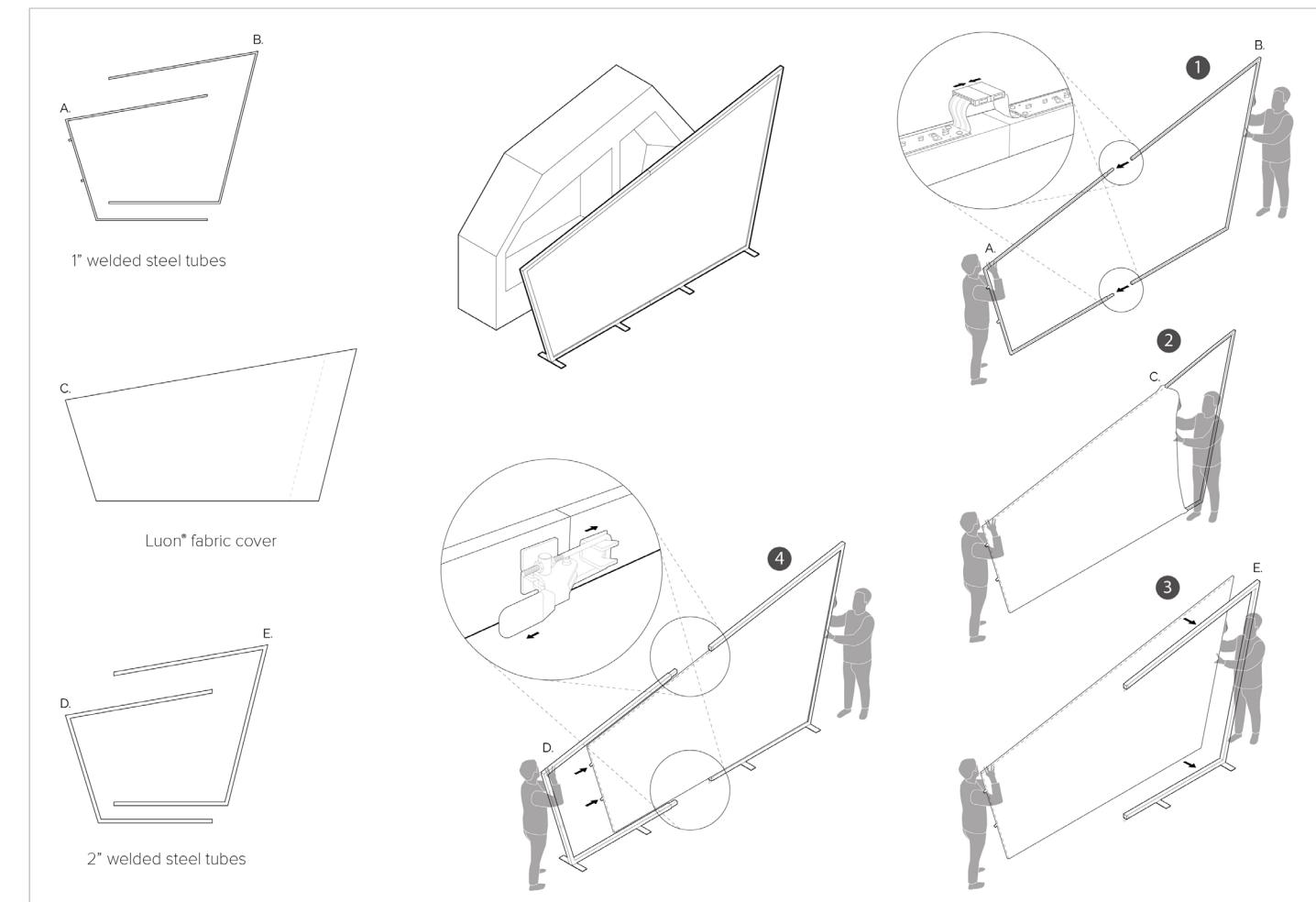
Instructor: Jay Pooley

A two week collaborative project between a small group of students and Lululemon to build a meditation pavilion. The pavilion is meant for a range of environments from busy streets to local parks allowing passerby to interact with it. The screen addition to the pavilion is meant to isolate users temporarily from their surrounding environment.

Collaborators: Ghalia Alchibani Alnahlawi, Filipe Costa, Sara Ghorban Pour, Gianlorenzo Giannone, Evan Guan, John Juodis, Chloe Lauder, Susel Naranjo Vega, Yalda Safar Ali, Sumaiya Sheikh, Maria Angela Viaje, Derrick Wong, Jue Wu



Model Photos

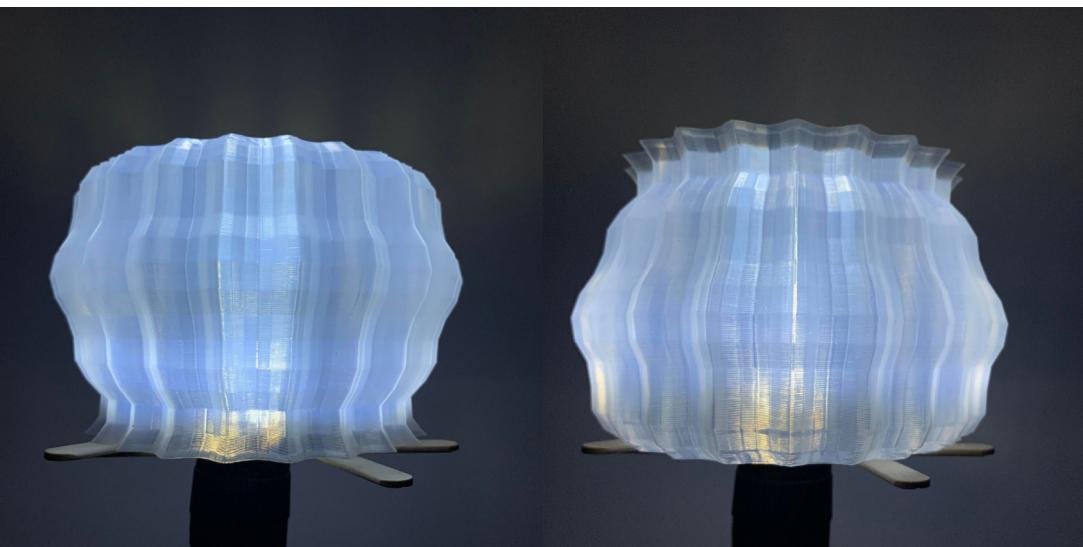
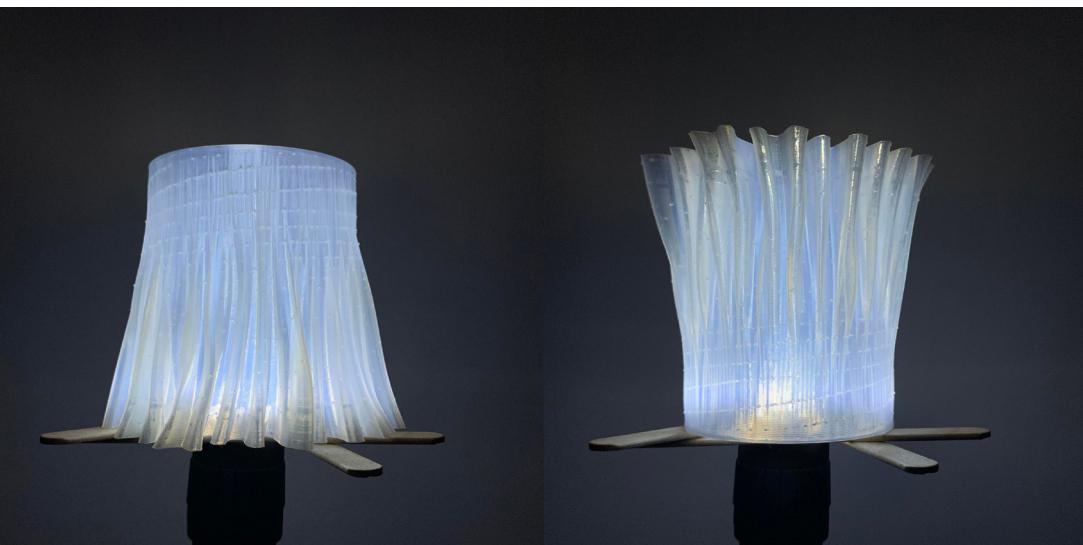


Frame Assembly Instructions

08. Glowing Parametrics

A series of 3D printed experimental parametric forms inspired by traditional lampshades and differential growth simulations. Generated entirely with grasshopper.

Creality Ender-3 using Natural Translucent PLA



thank you ☺