



Portfolio

Michelle Liu
2023

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01. Autonomous Housing Pods

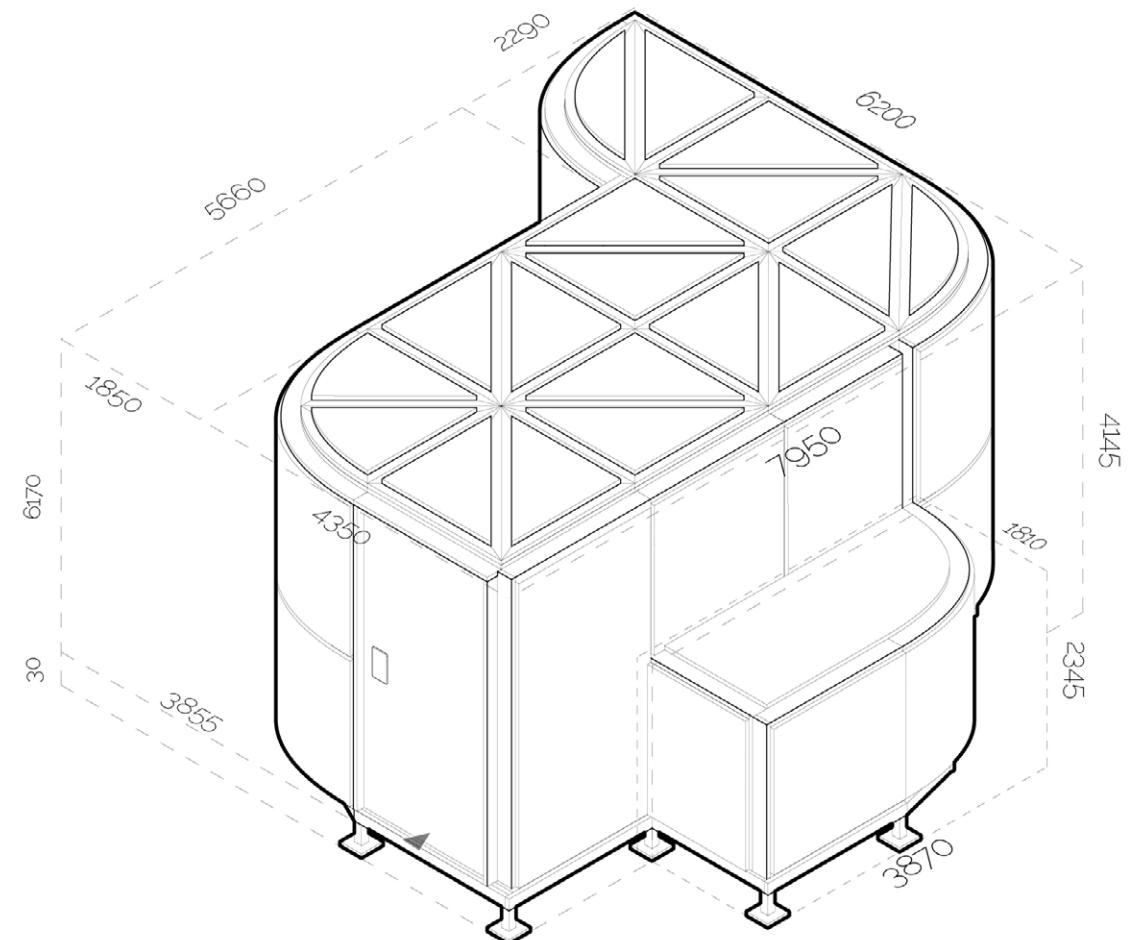
Course: ARC480 - Advanced Topics in the Technology of Architecture
 Instructor: Tom Bessai

Case Study: Car-Boat-Bike

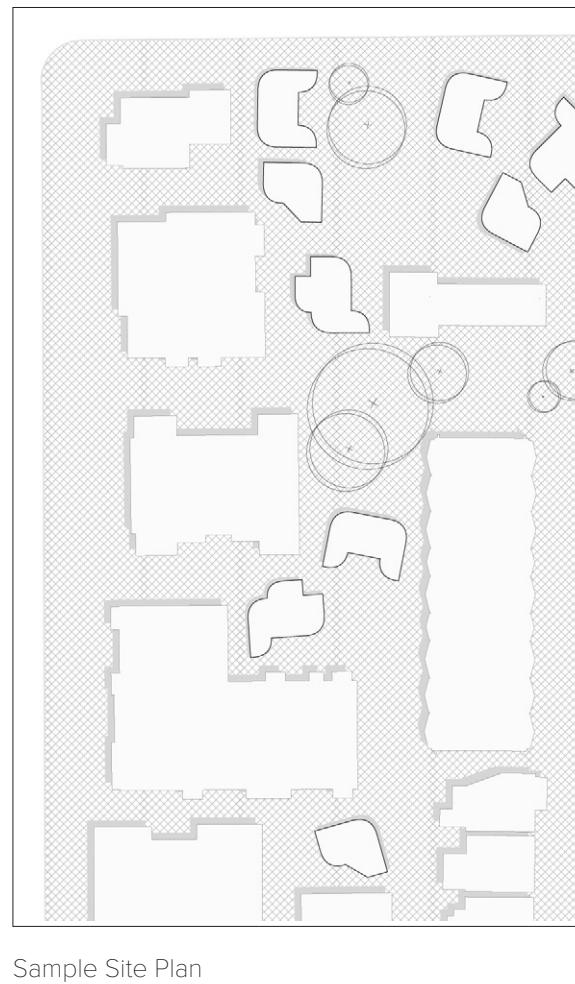
The pod is designed to be deployable, optimized, and autonomous – fundamental qualities chosen after intensive precedent research on automobiles, boats, and bicycles. The final pod design borrows fabrication methods from each precedent category whilst maintaining qualities of a deployable pod meant for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

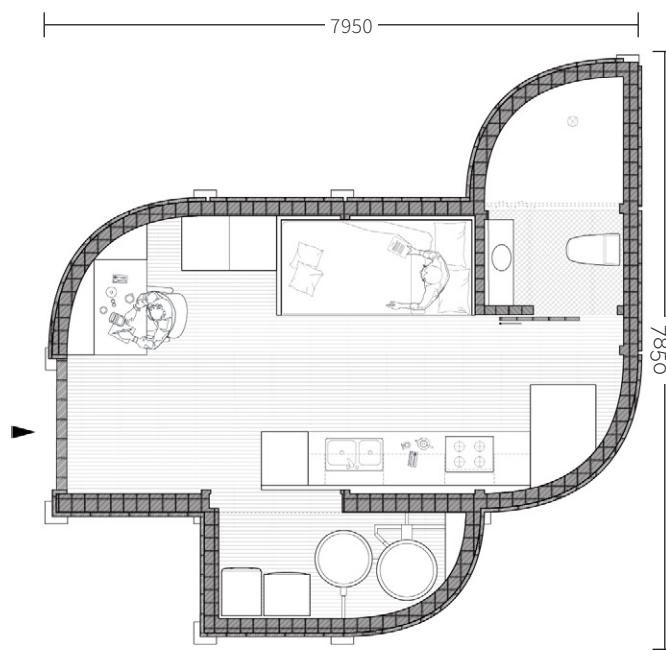
Collaborators: Christian Paez Diaz, Reem Khalifeh, Jo-Lynn Yen, Mina Yip, Pengfei Zhao



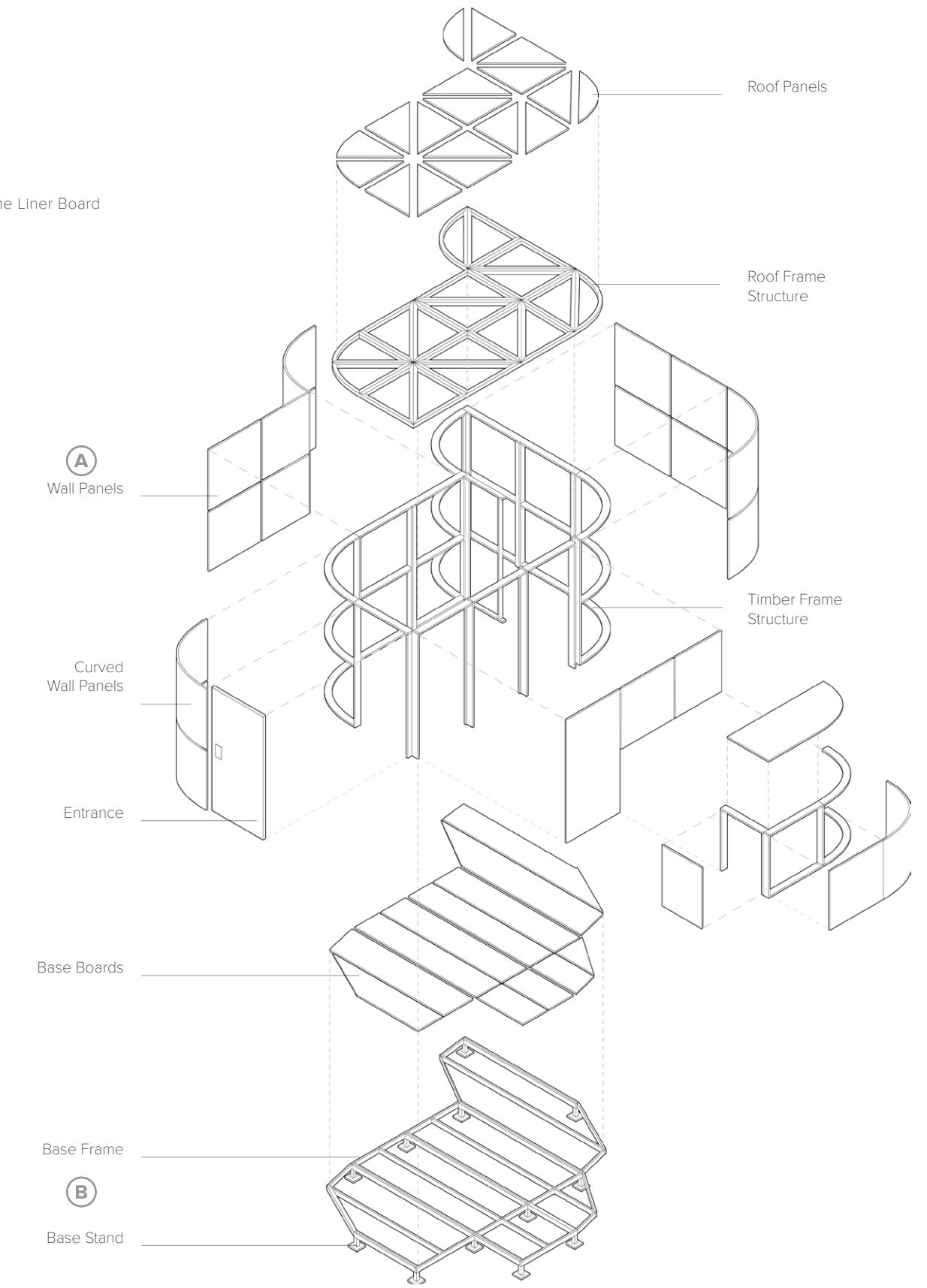
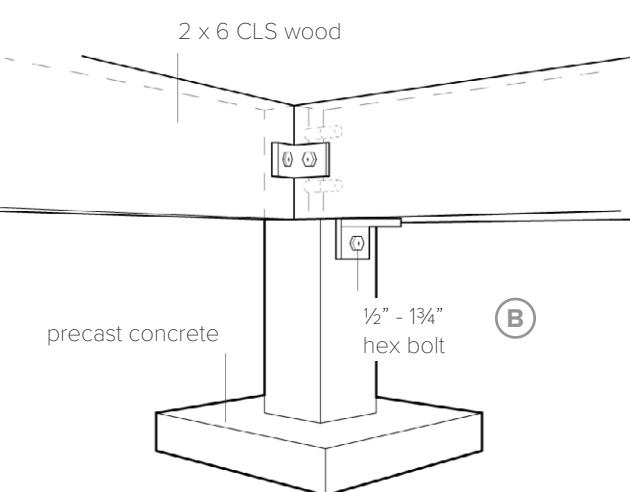
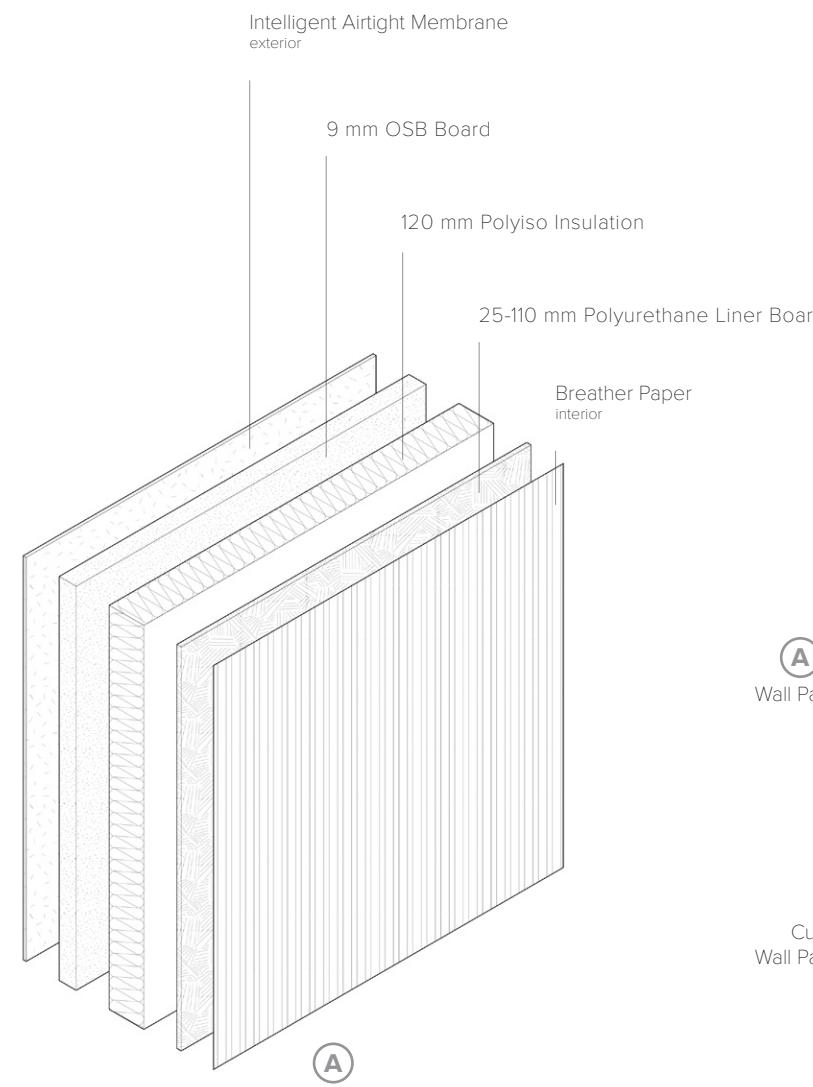
Final Pod Design



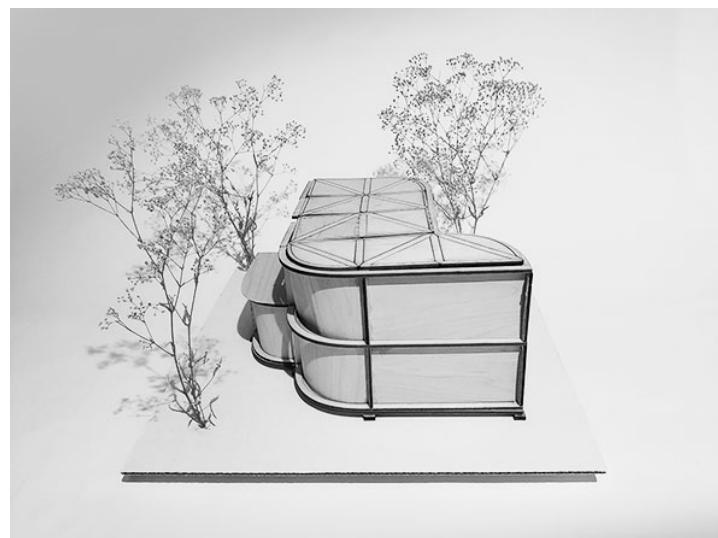
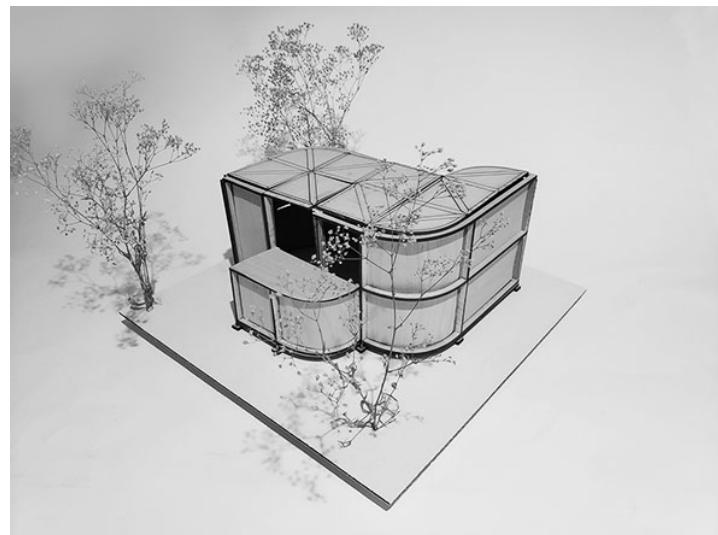
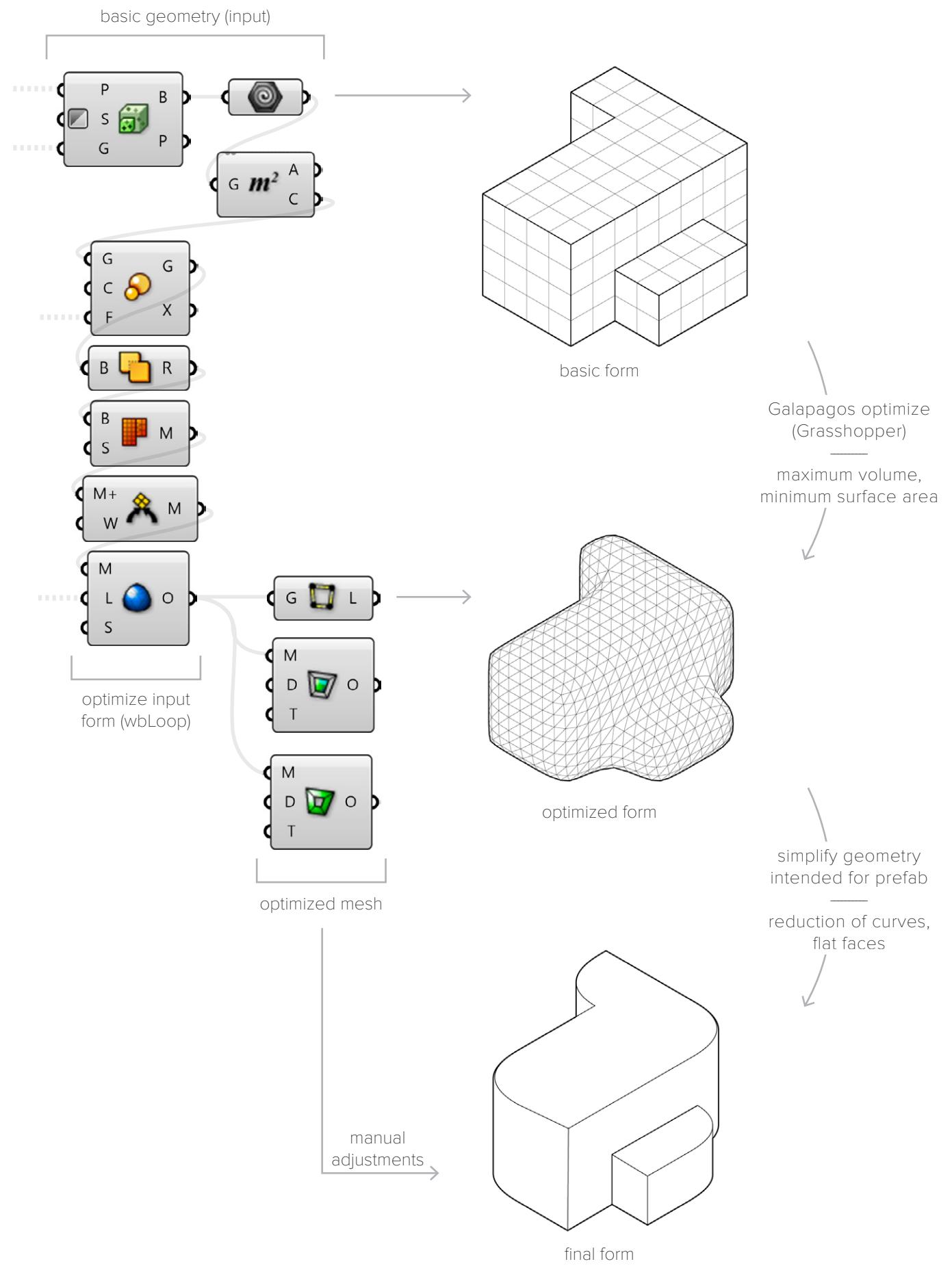
Sample Site Plan



Pod Plan



Exploded Construction Axonometric



02. Urban Interface: Particle Net

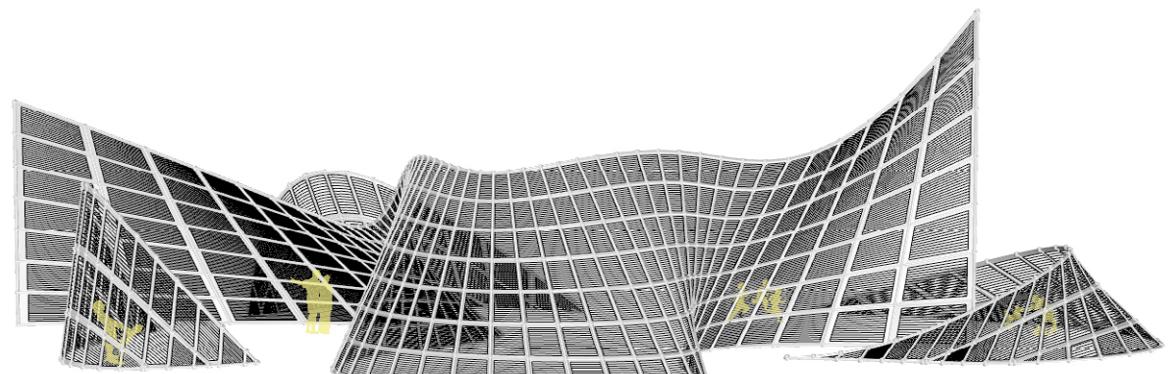
Course: ARC480 - Advanced Topics in the Technology of Architecture
Instructor: Simon Rabyniuk

Research Topic: Wind of 120 Days

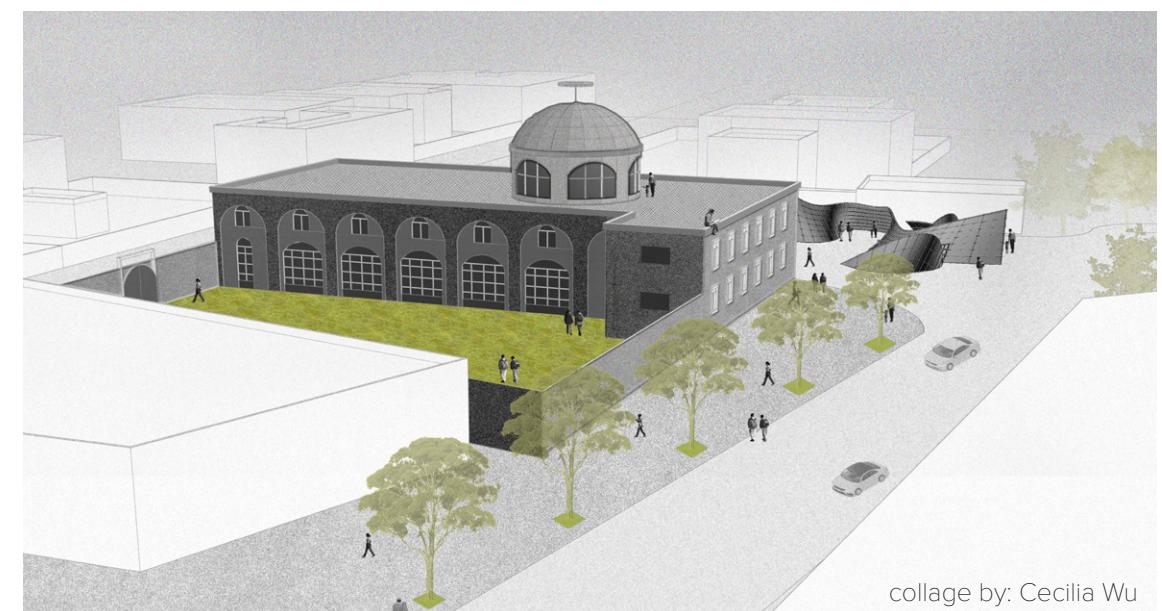
The natural phenomenon called 'Wind of 120 Days' takes place annually between May and September in East and Southeast regions of the Iranian Plateau, demonstrating winds that range between 30 - 110 km/h. The proposal was made in effort to encourage local interaction by use of a sand particle net installation.

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

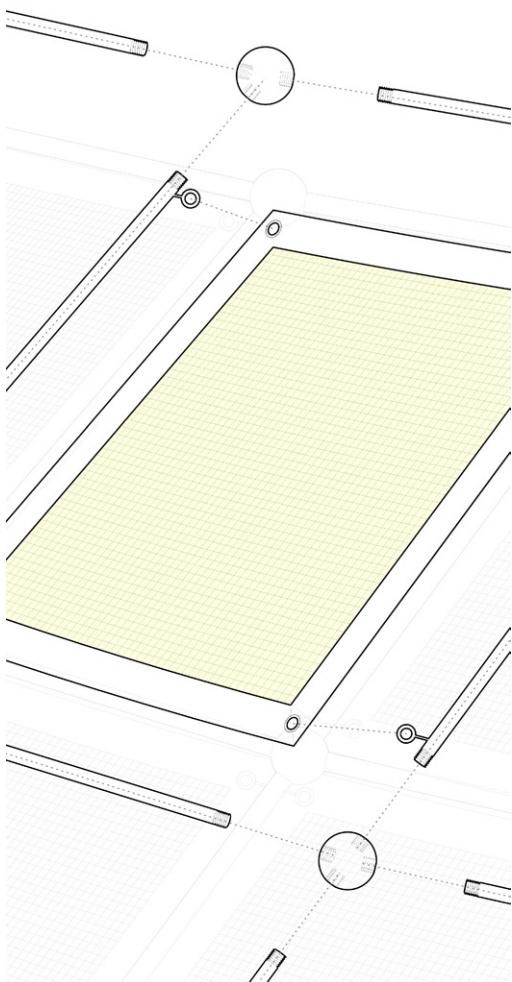
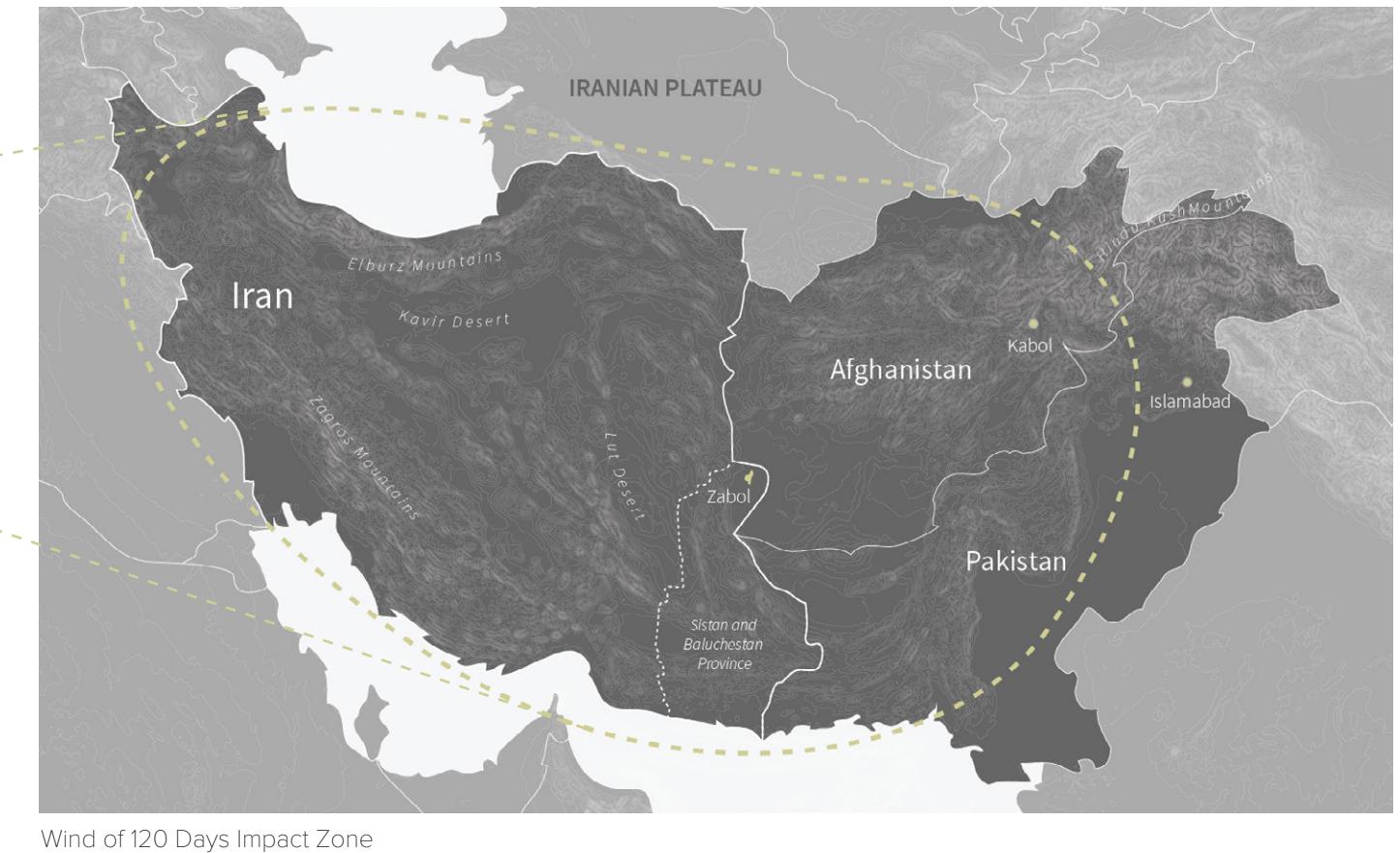
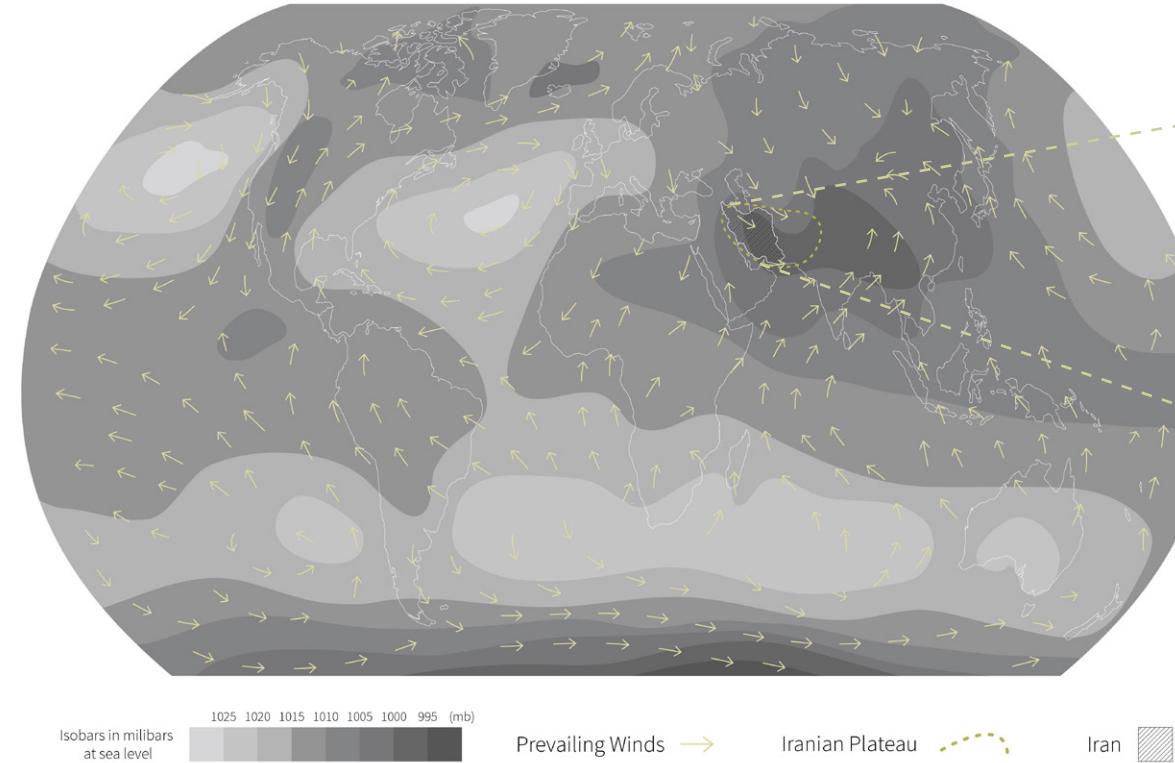


Particle Net



collage by: Cecilia Wu

Collage - Particle Net in Central Mosque Site

**A****1.5" Threaded Pipes**

Each Aluminum steel pipe is a specific length created to meet the form of the final screen.

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.

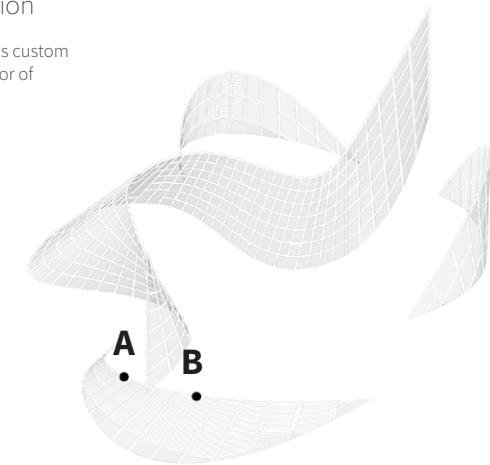


diagram by: Terence Lo

Particle Net - Exploded Connections

Particle Net - Material Diagram

Particle Net Axonometric

03. 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

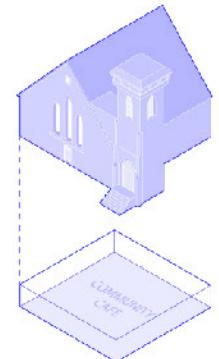


Accessible raised garden beds

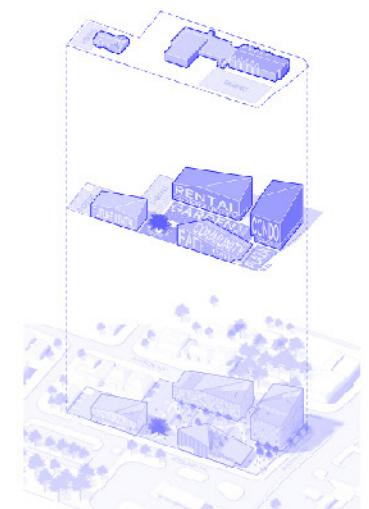
In the suburban context, churches have plenty of green space and open land around the building. This space has the potential to transform into a garden that can increase community food access. Surplus crops can be sold for profit, therefore enabling a sustainable food system. This concept has been done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

How Have Other Churches Adapted?

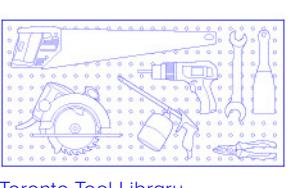
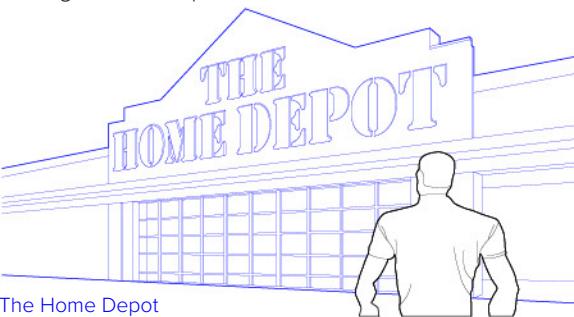
1.0 St. John's Anglican Church
Chapleau, ON



2.0 St. Julian of Norwich Church
Ottawa, ON



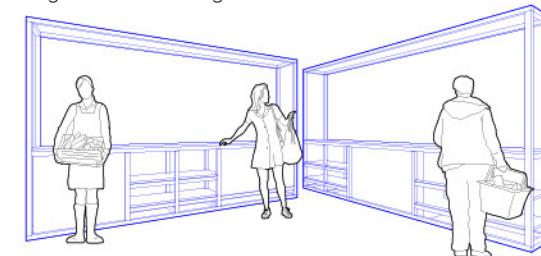
2.0 Tool Sharing & Workshop



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.

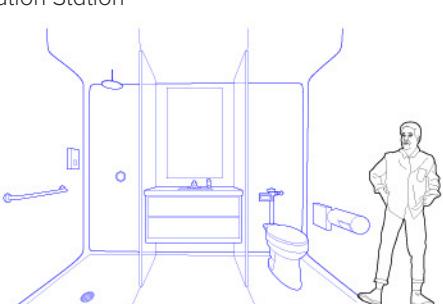
3.0 Community Kitchen Facility



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



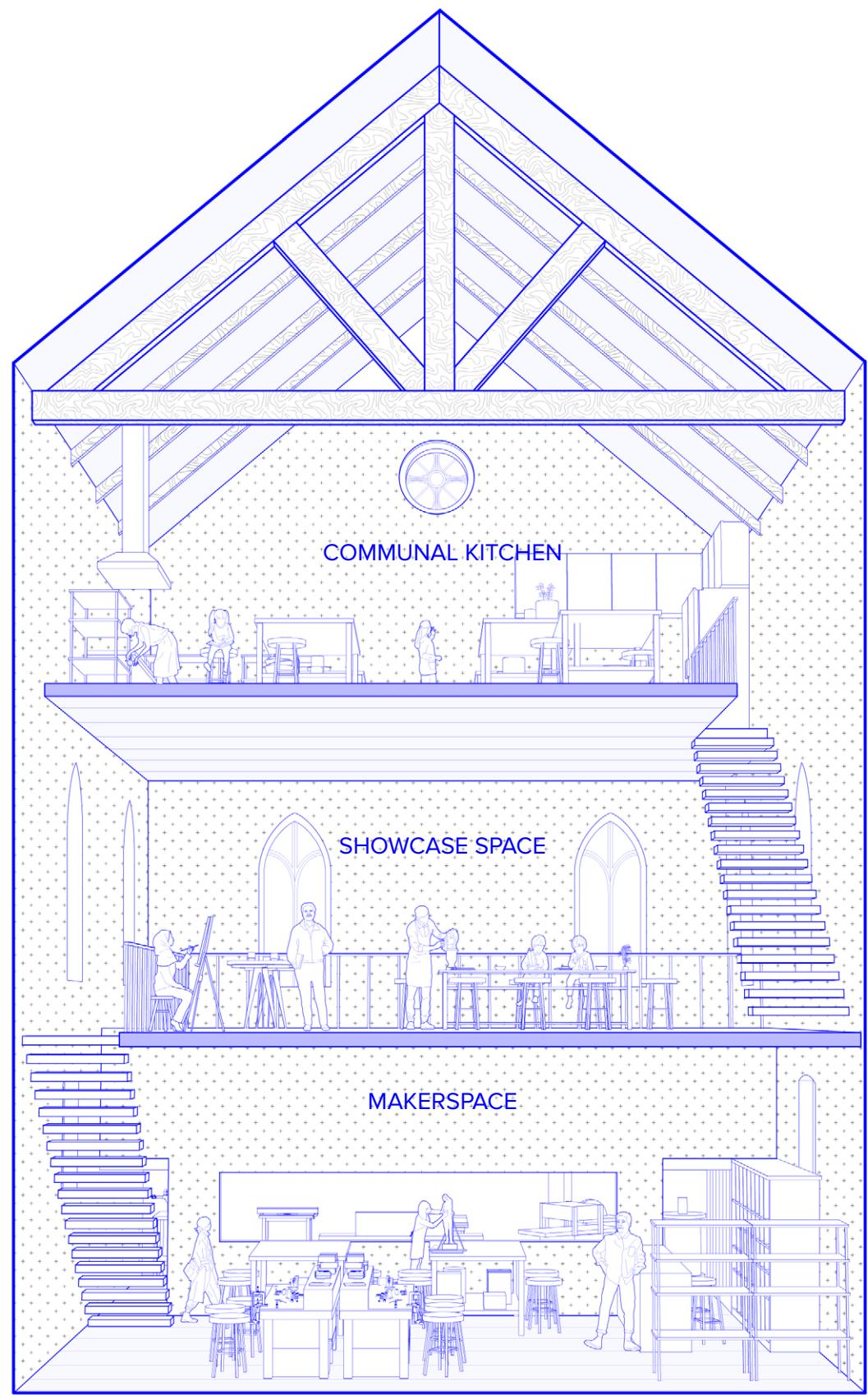
StudioAC mobile shower facility design

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.

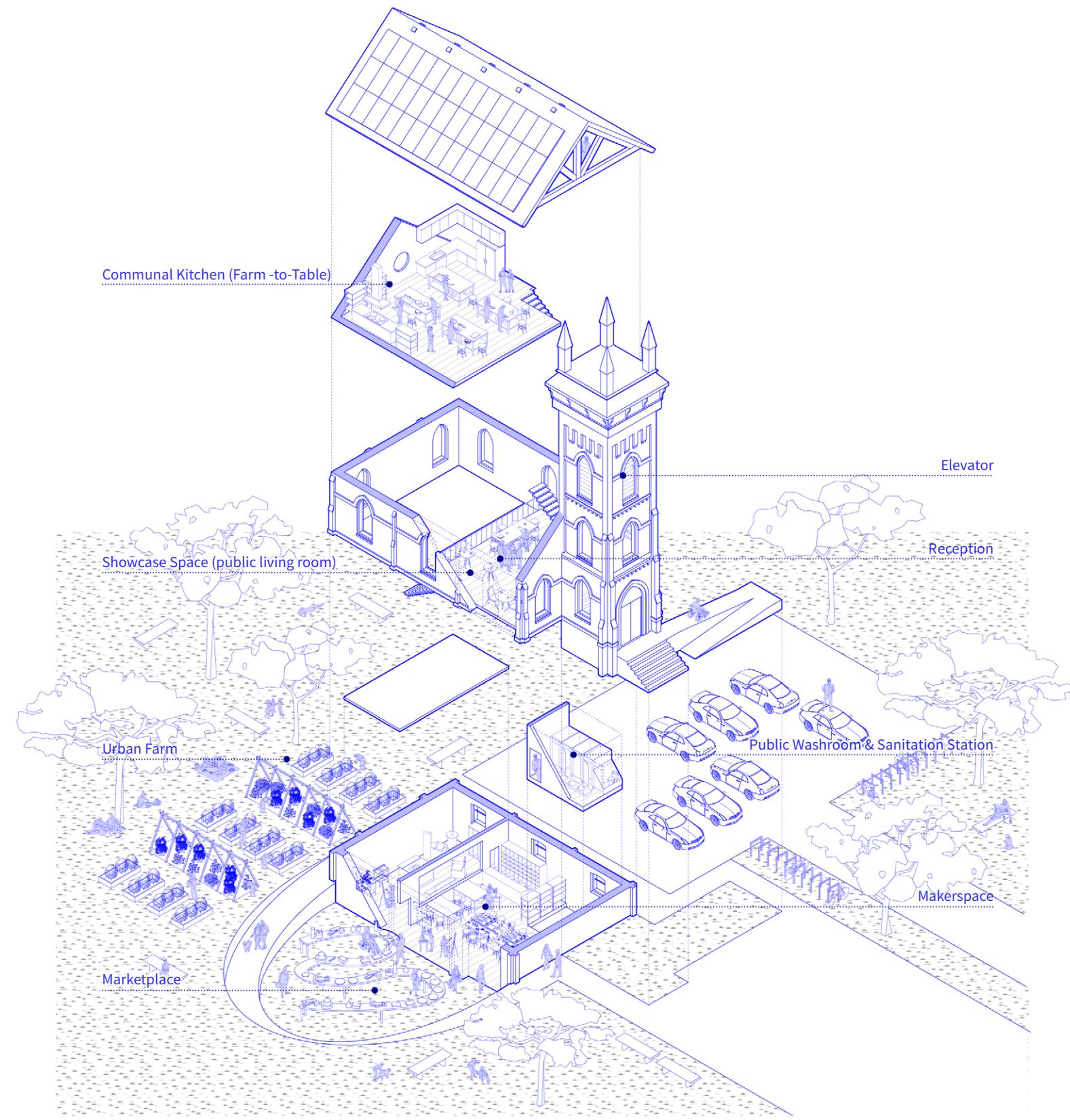


3.0 Cecil Community Centre
Toronto, ON





Interior Perspective



Exploded Program Diagram

04. Daniels x Lululemon

Course: ARC399 - Research Opportunity: Daniels x Lululemon

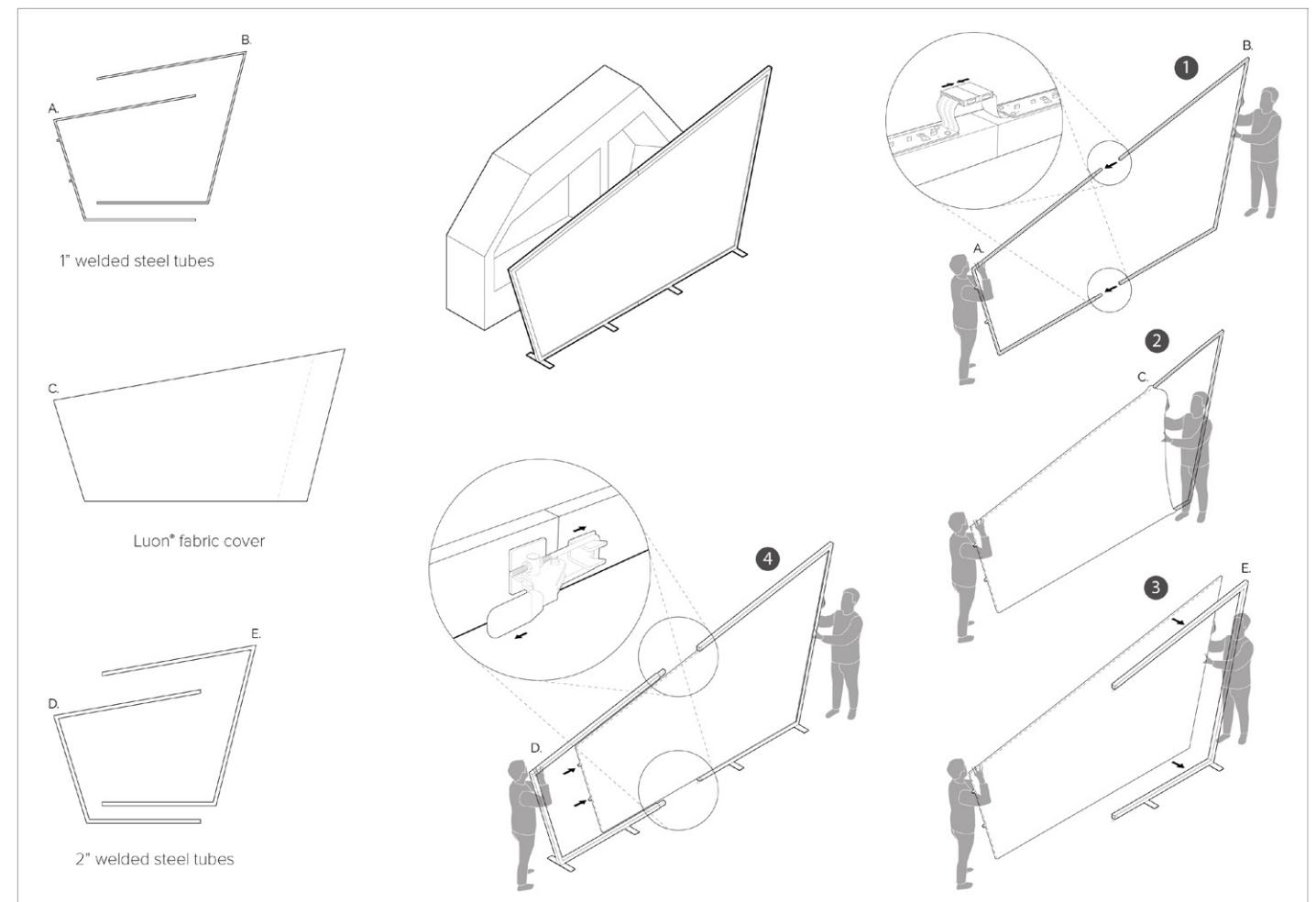
Instructor: Jay Pooley

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

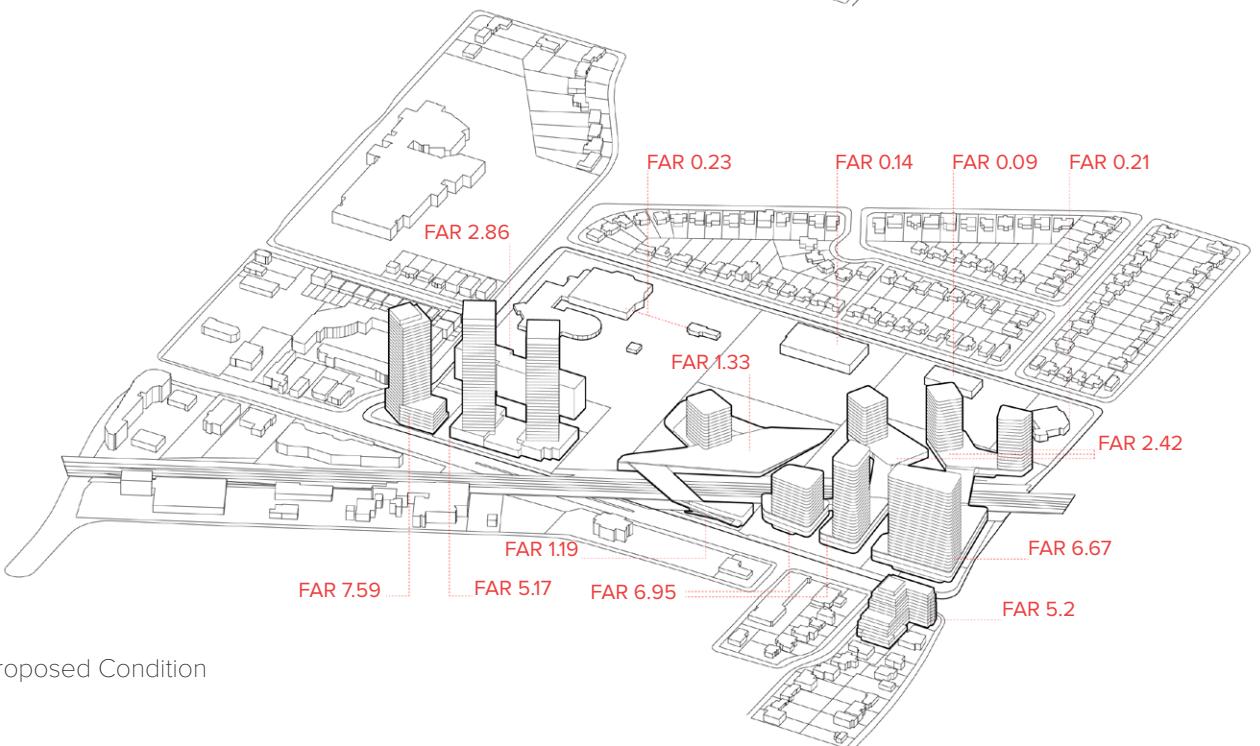
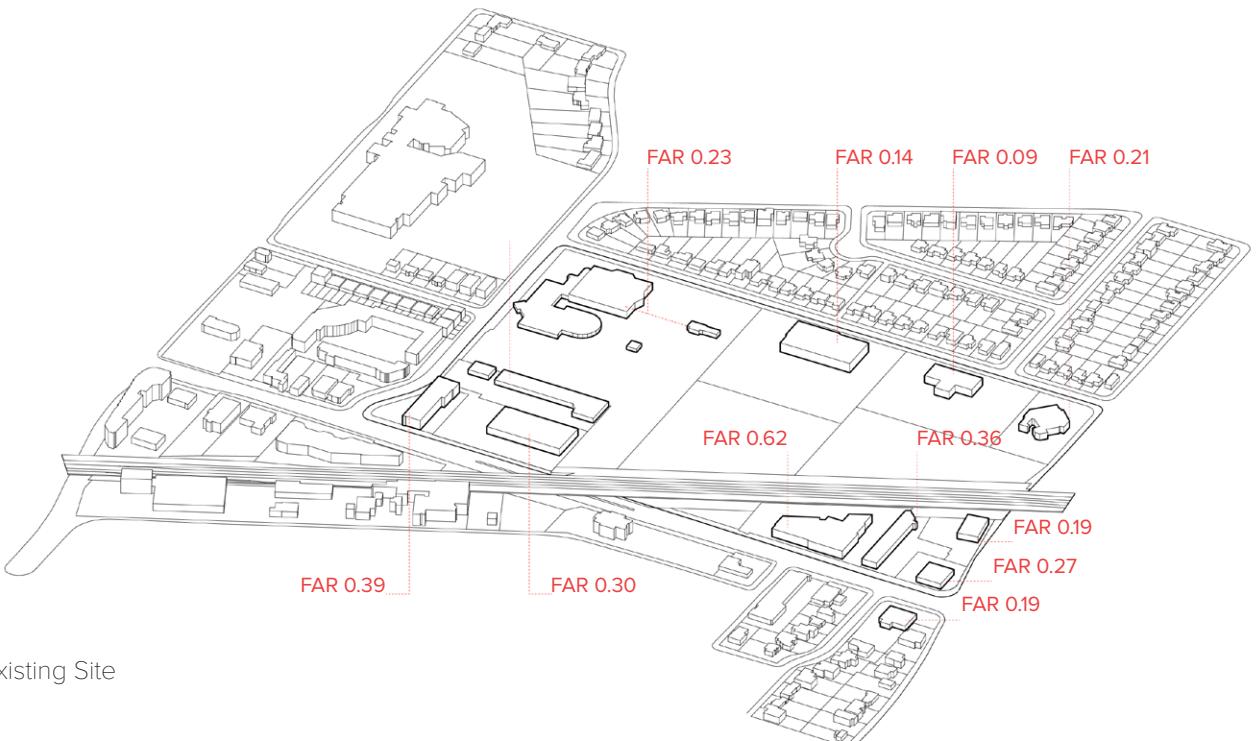
05. Grounds in Flux

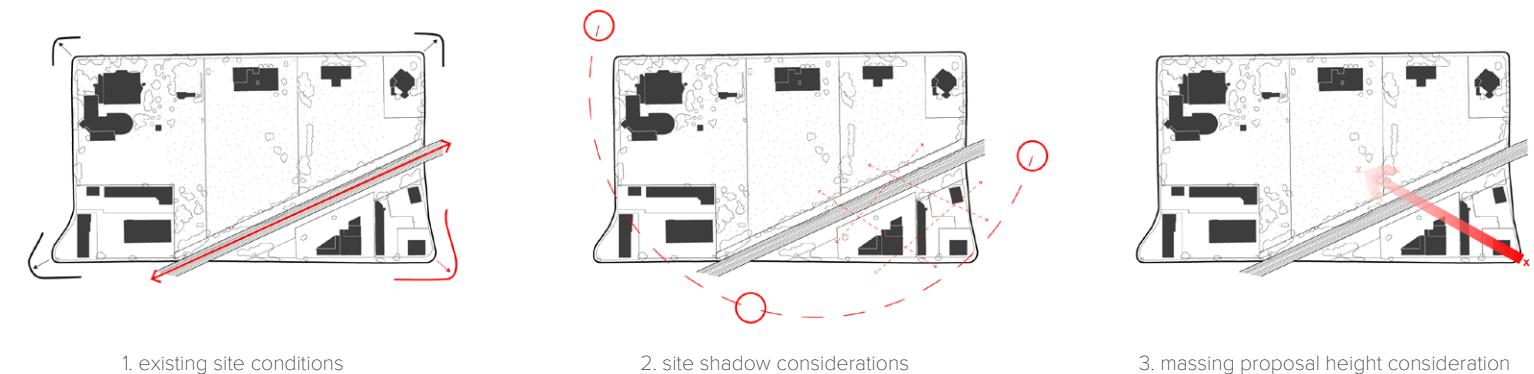
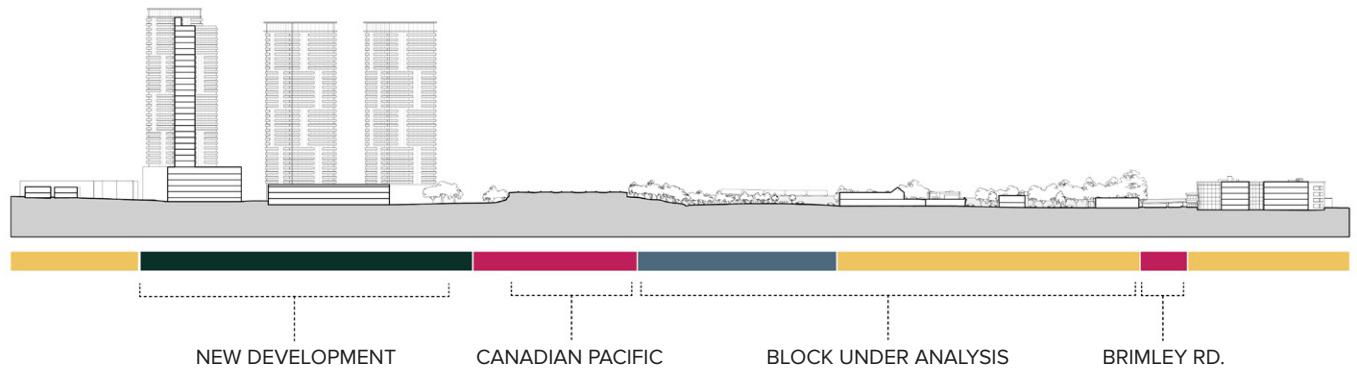
Course: ARC2013 - Design Studio III

Instructor: Roberto Damiani

Grounds in Flux is a community hub with purpose-built rentals in the core of Scarborough, Toronto at the intersection of Brimley Rd and Sheppard Ave E. In the past few years, the single-family neighbourhood has experienced population growth while many are still left in unacceptable or unaffordable housing, calling for a need in increased density. Its close proximity to community resources, public transit, and its locale at the edge of an employment zone positions it as an ideal location for a new residential and community hub. The site remains detached as a train rail bifurcates the block, isolating the commercial street corner from the institutions just North of the rail. In order to bridge the North and South, elevated podiums stretch across the rail as means for circulation. The massings can be understood as three parts: ground floor for commercial and institutional uses, elevated podium for commercial activity, and rental towers above. With inclusionary zoning, the rental towers are able to increase density and increase affordable housing by consolidating affordable units on the lower levels, and connecting each floor through shared amenity spaces.

Collaborator (research): Emilie Tamlik



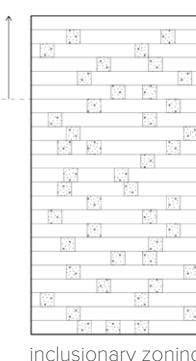


● Retail ● Circulation ● Residential ● Service/Auto

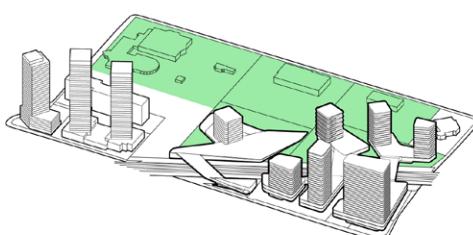
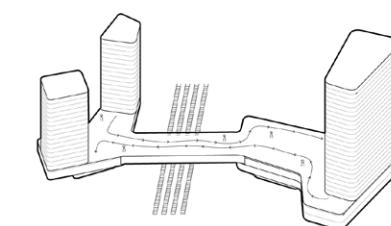
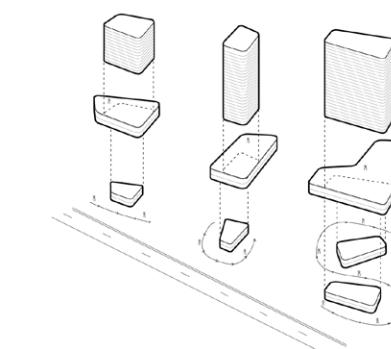
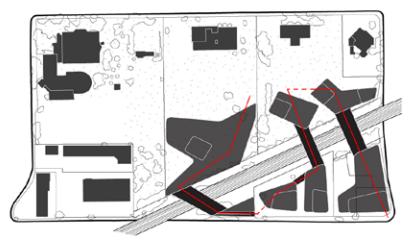
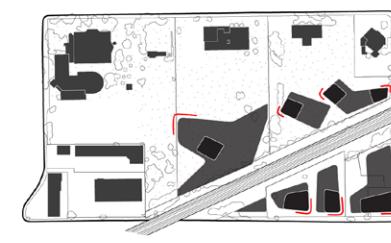
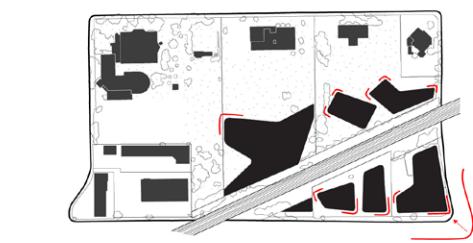
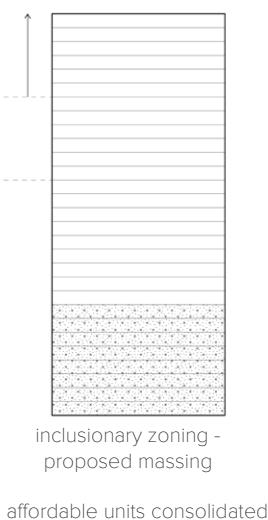
FAR 2.0
0% affordable housing

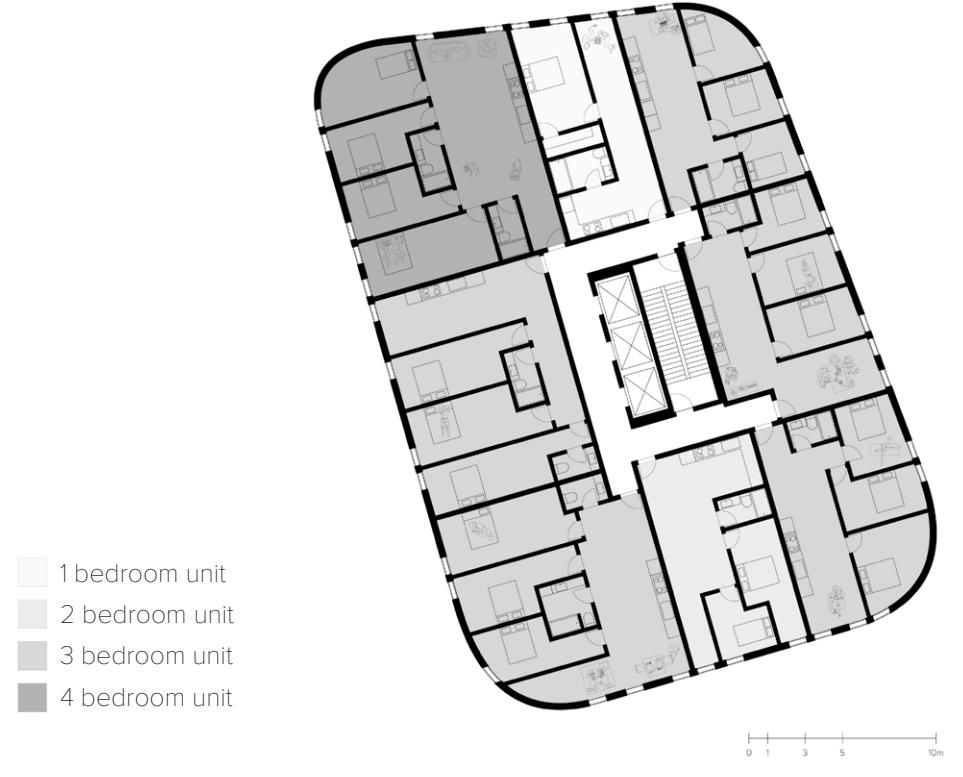


FAR 4.0
10-20% affordable housing

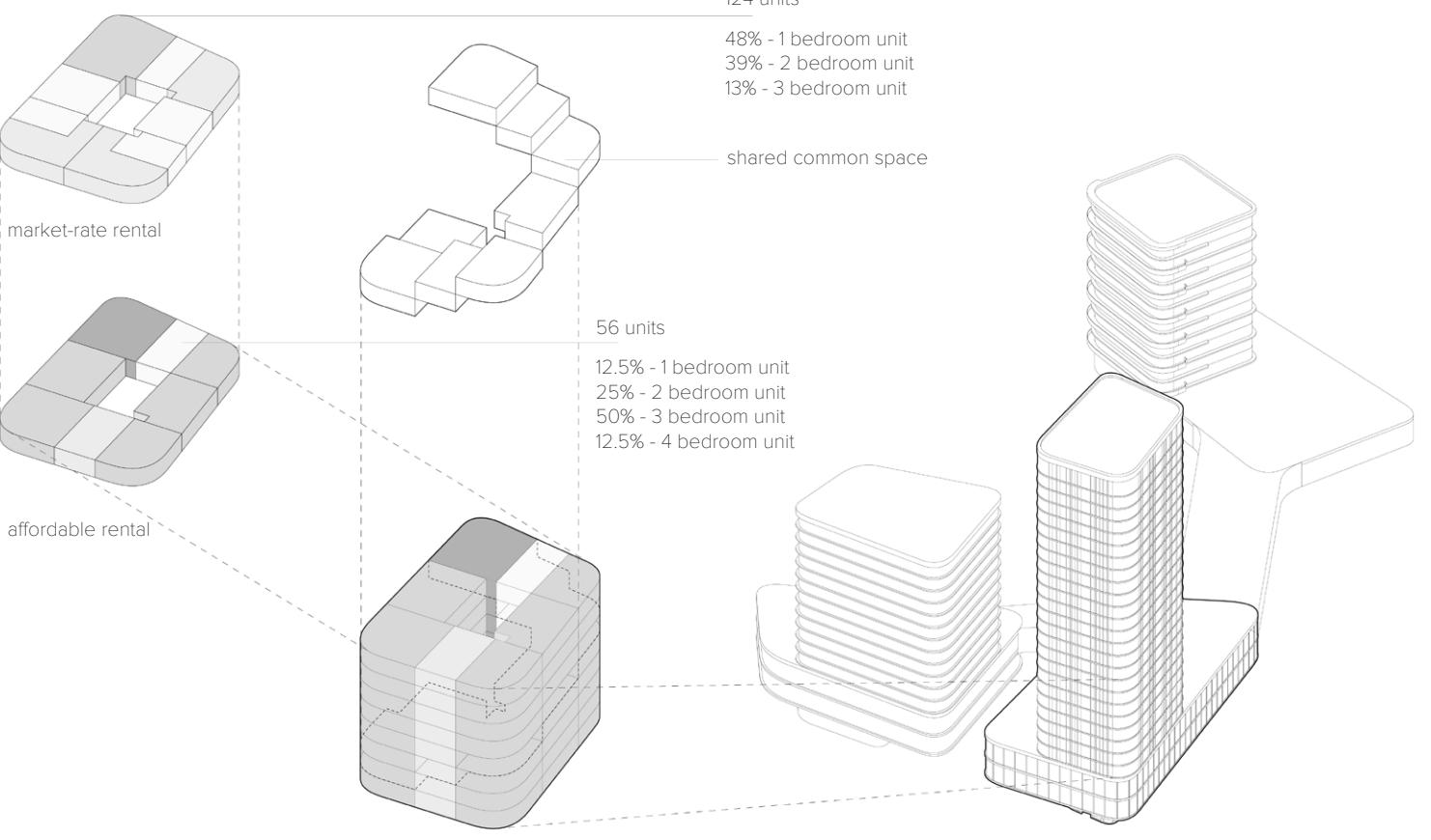


FAR 6.0
30% affordable housing

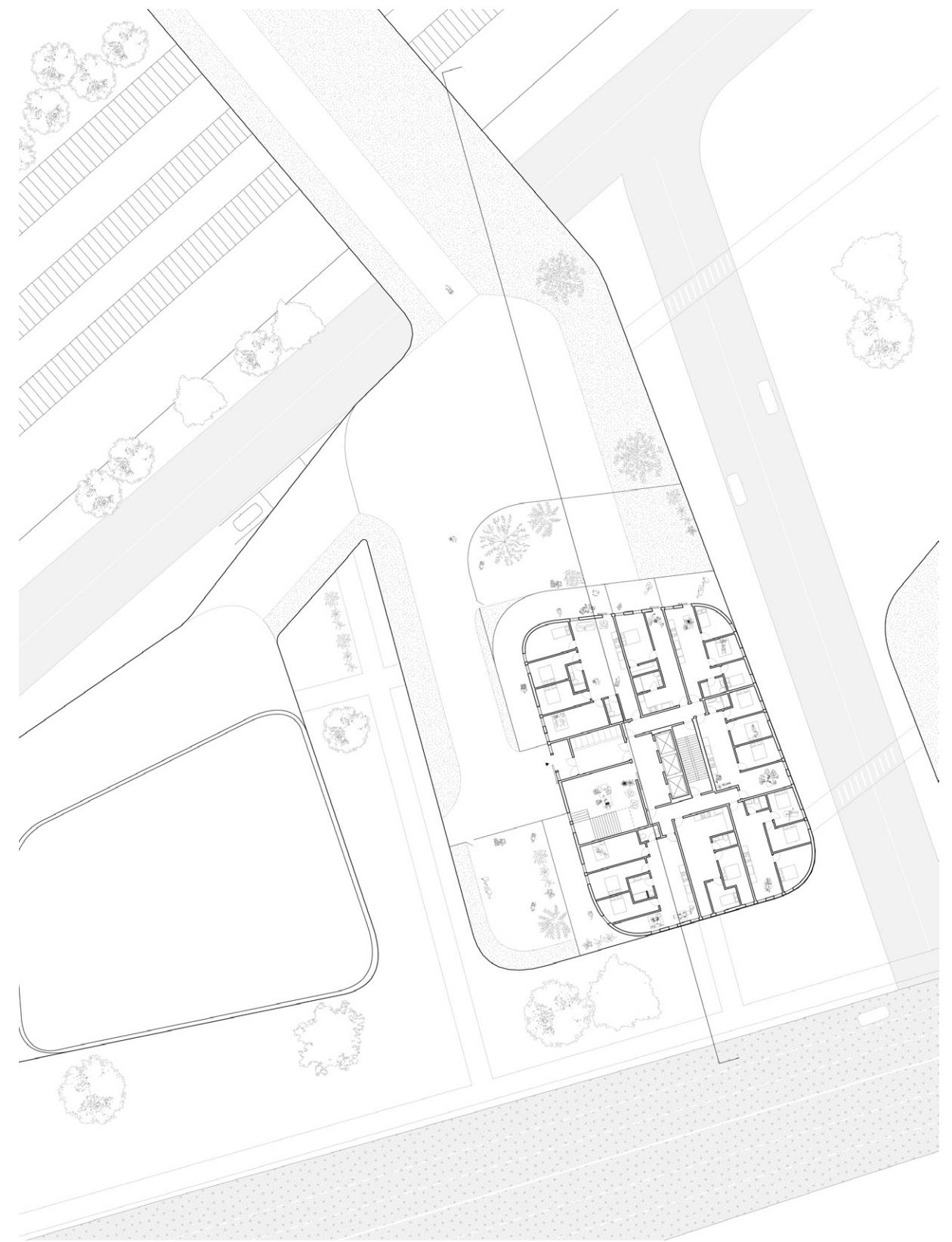


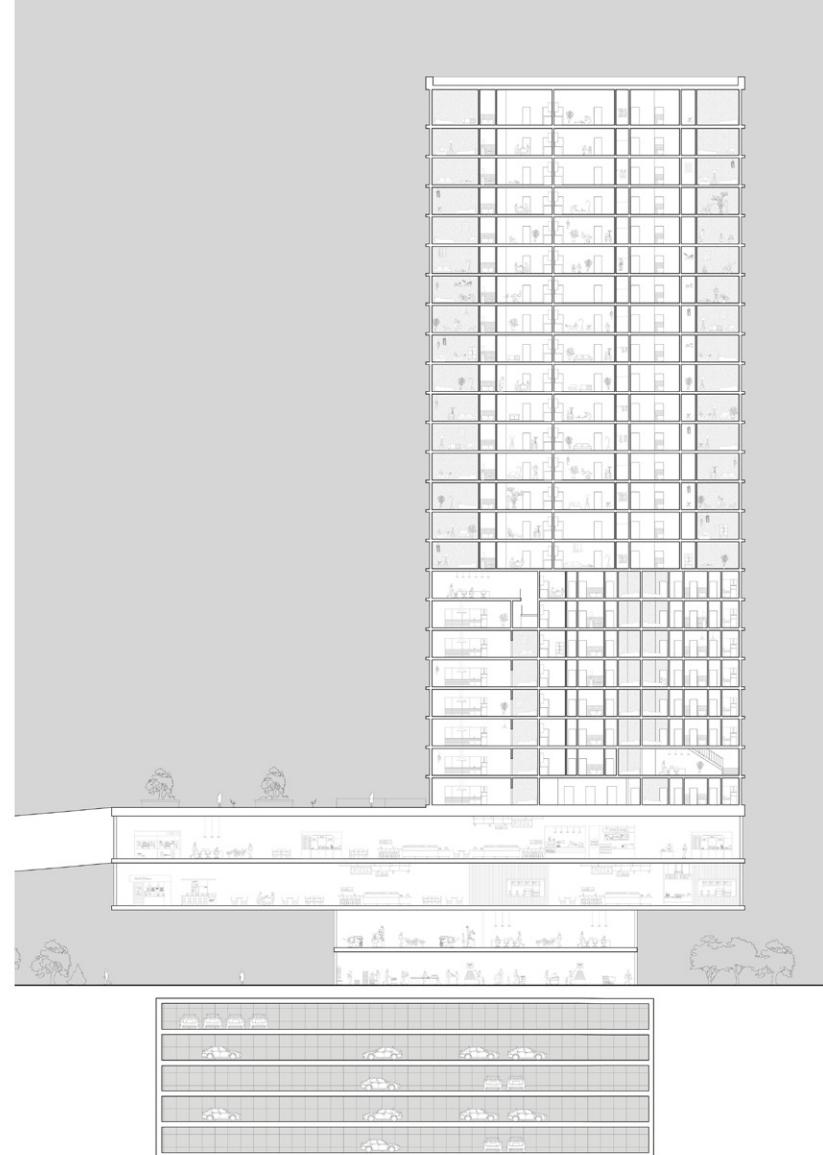


Affordable Rental Plan



Unit Stack Diagram





North-South Section



Sheppard Ave. Streetfront Collage

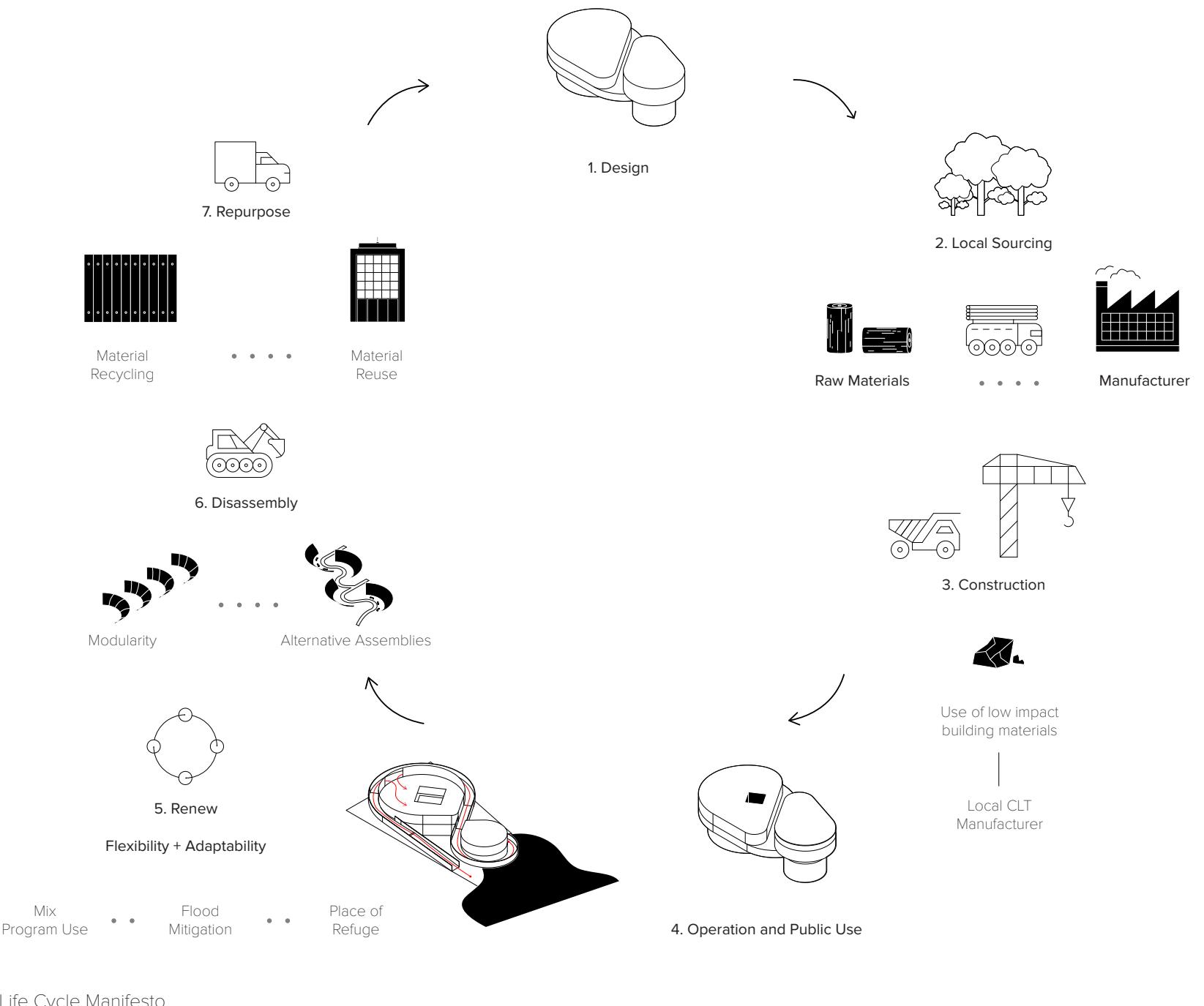
06. Soft Entwine

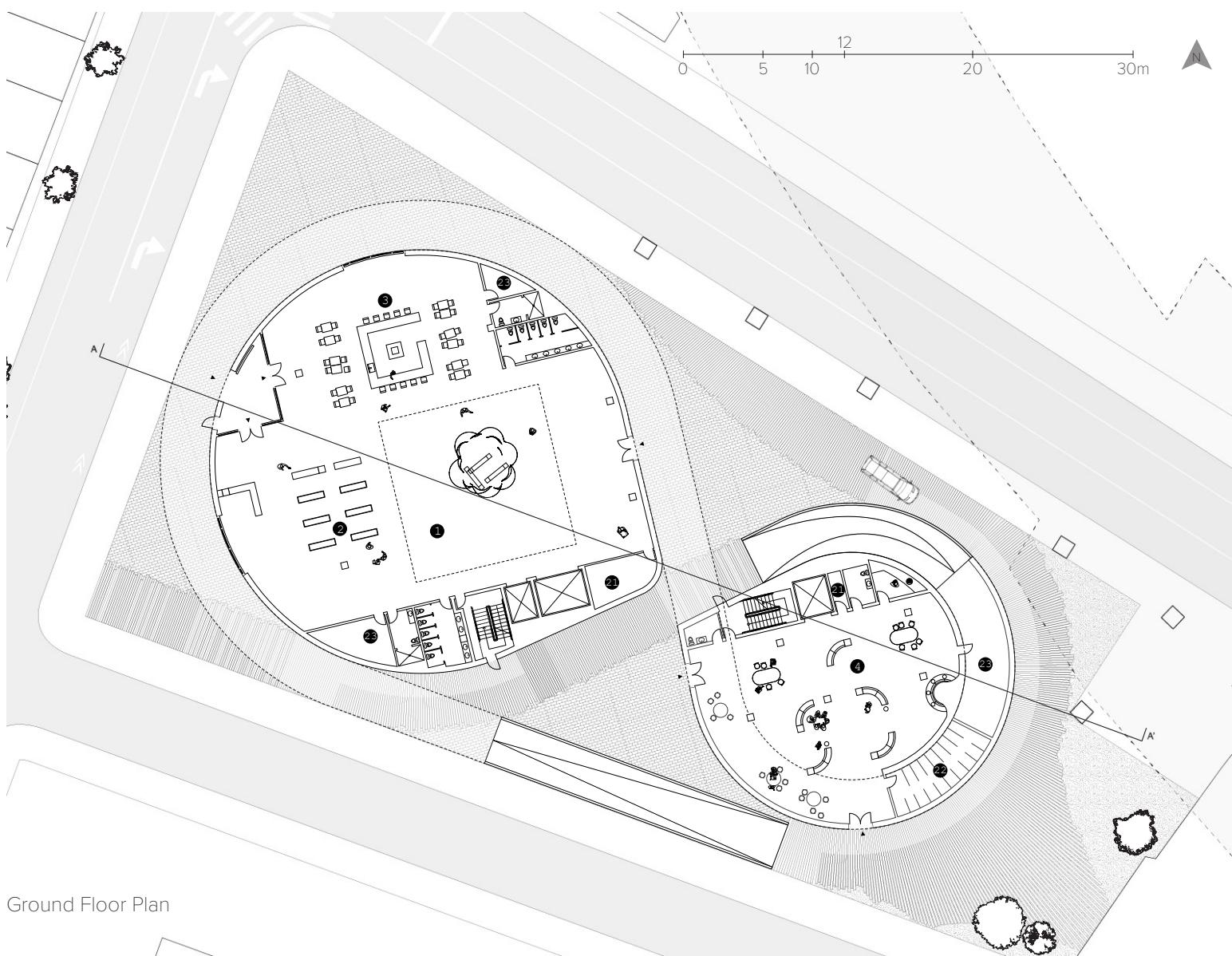
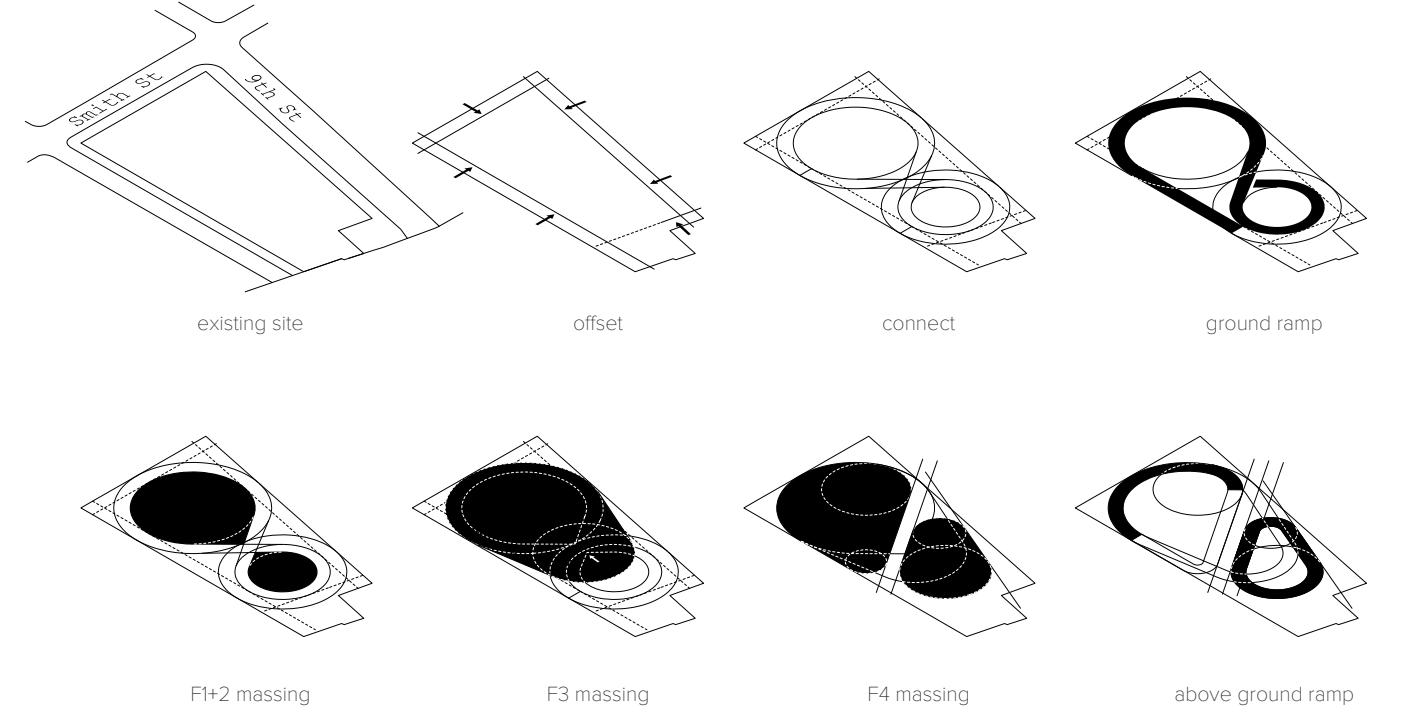
Course: ARC2014 - Design Studio IV
Instructor: Chris Cornecelli

Continuity invites curiosity. Bridging together art and community through continuous circulation as program, users are brought together to experience the various production stages of creation. Through the weaving of spaces, Soft Entwine proposes an architecture of circulation that is both playful and multifaceted.

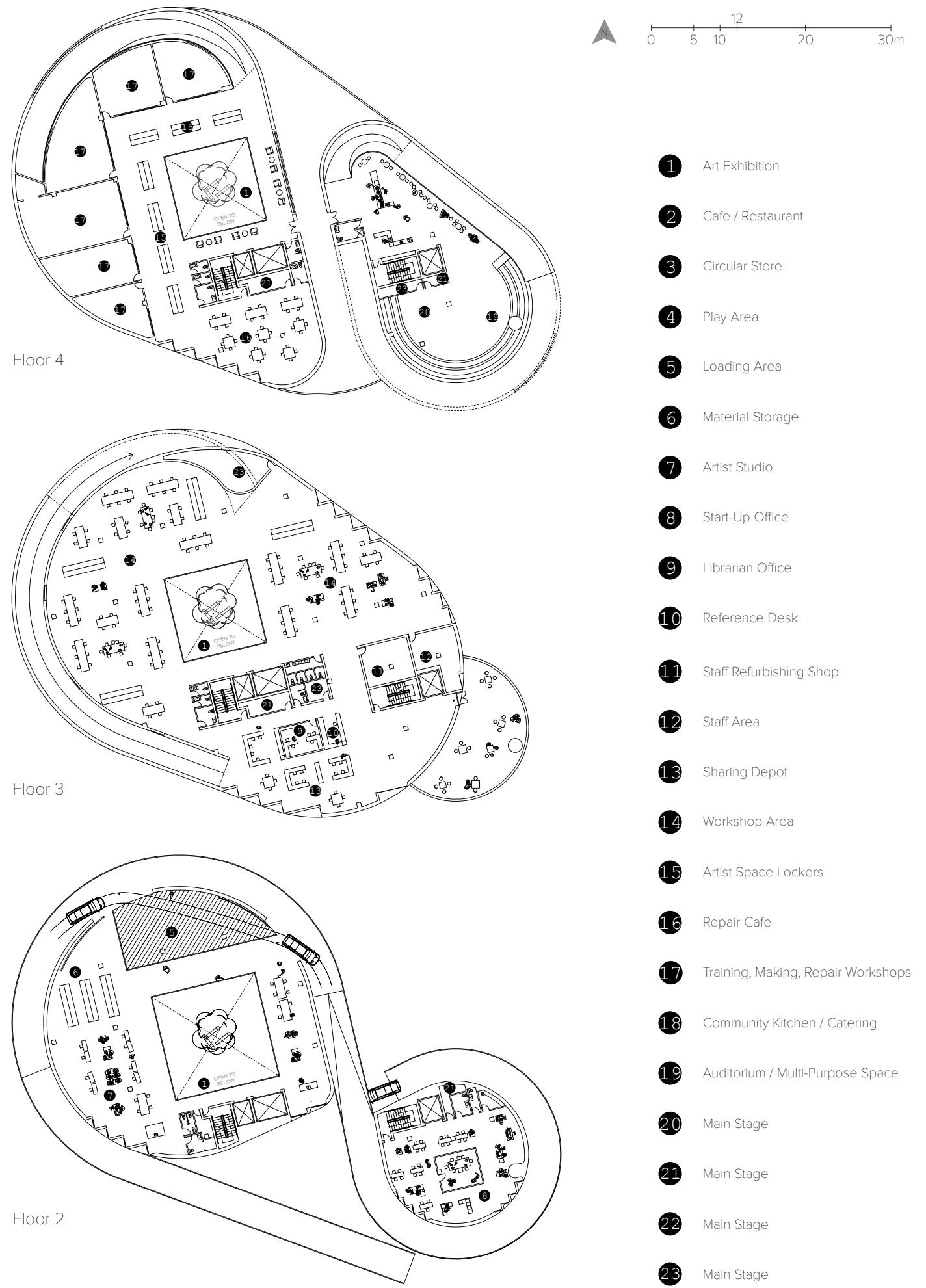
Located in the neighborhood of Brooklyn, New York at 503 Smith Street, the site along the Gowanus canal embodies the magnitude and urgency of the climate threat in an area transitioning away from a heavy industrial past into an eco-industrial and mixed use future. The project aims to reimagine the social and material dimensions of buildings to define the urgent transition of the industry into a low carbon and circular economy. It is a social infrastructure for the neighborhood anchored around a library of things, a reuse factory and also an exhibition and workspace space for the local artists' community.

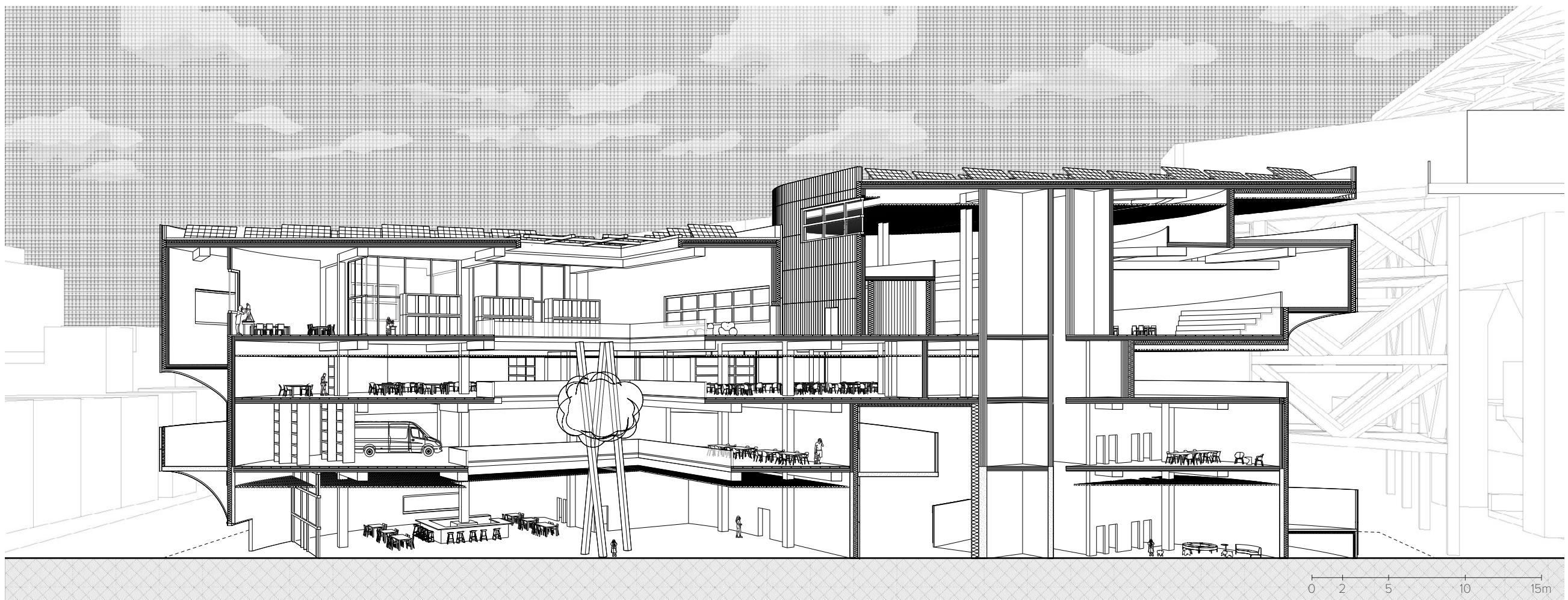
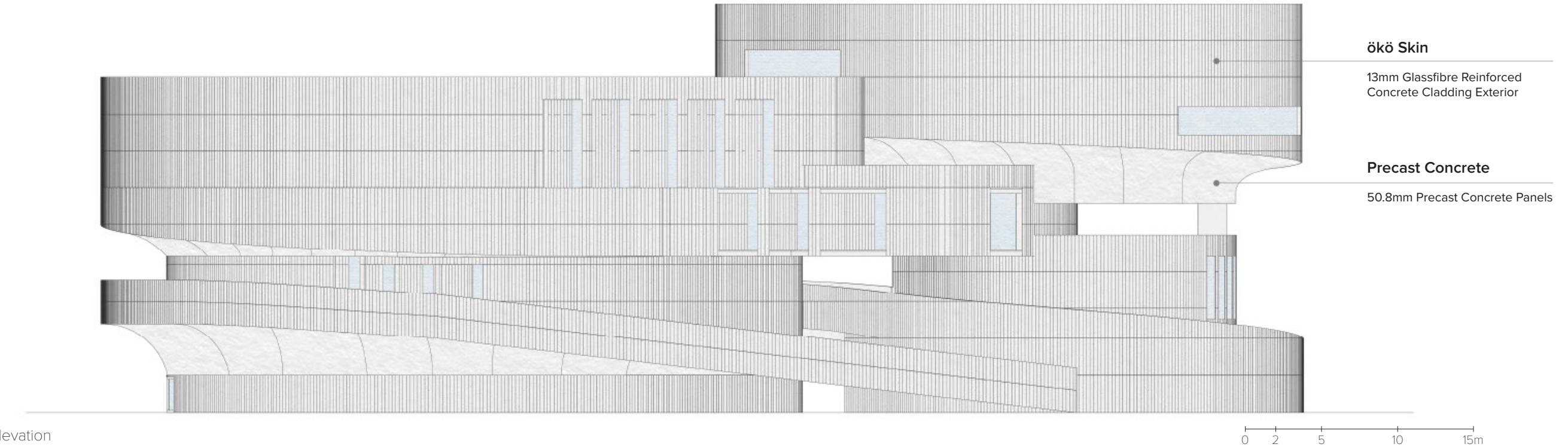
Collaborator: Amelia Chung



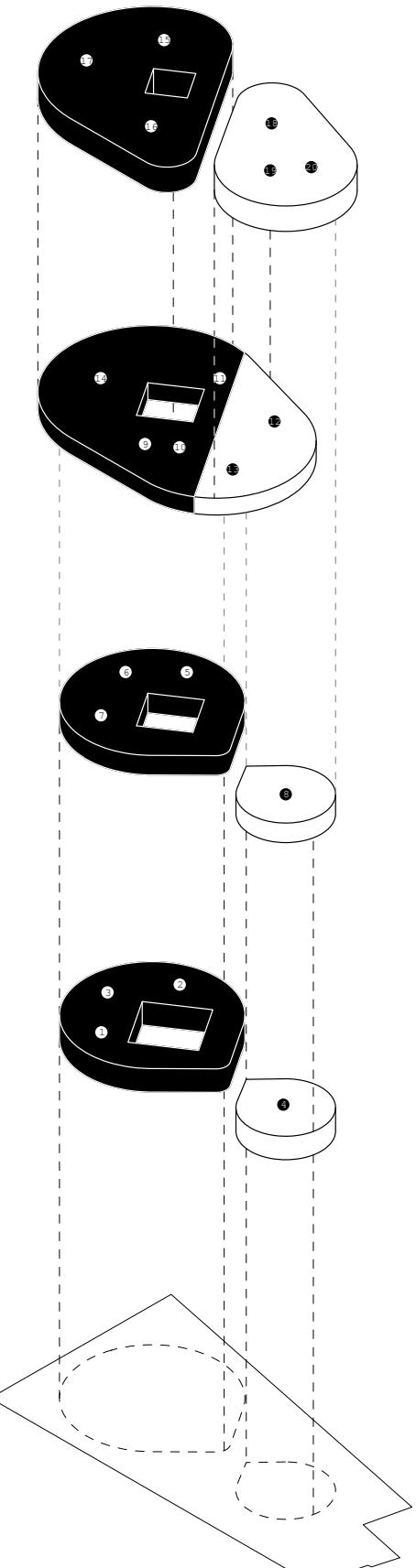


Ground Floor Plan

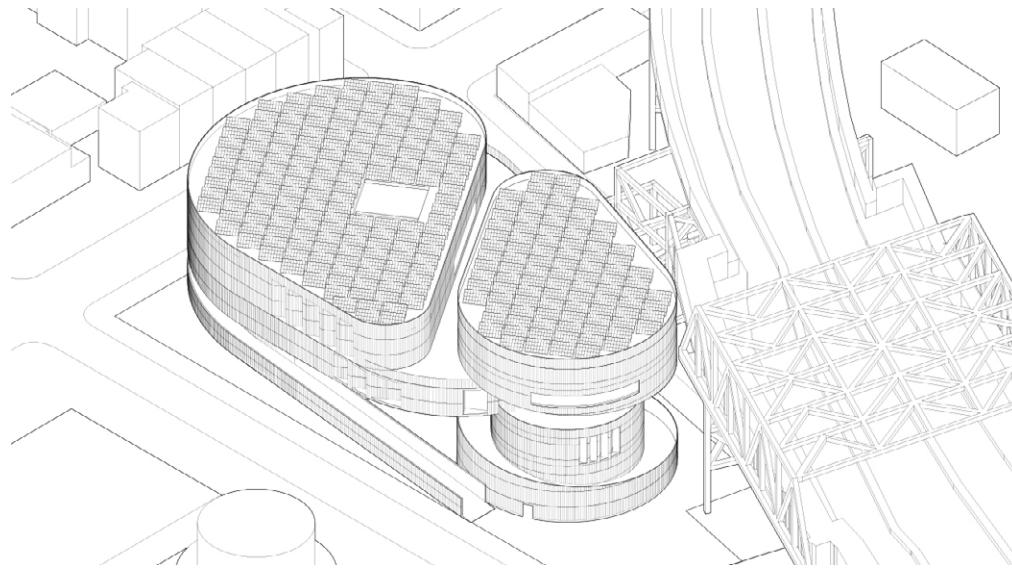




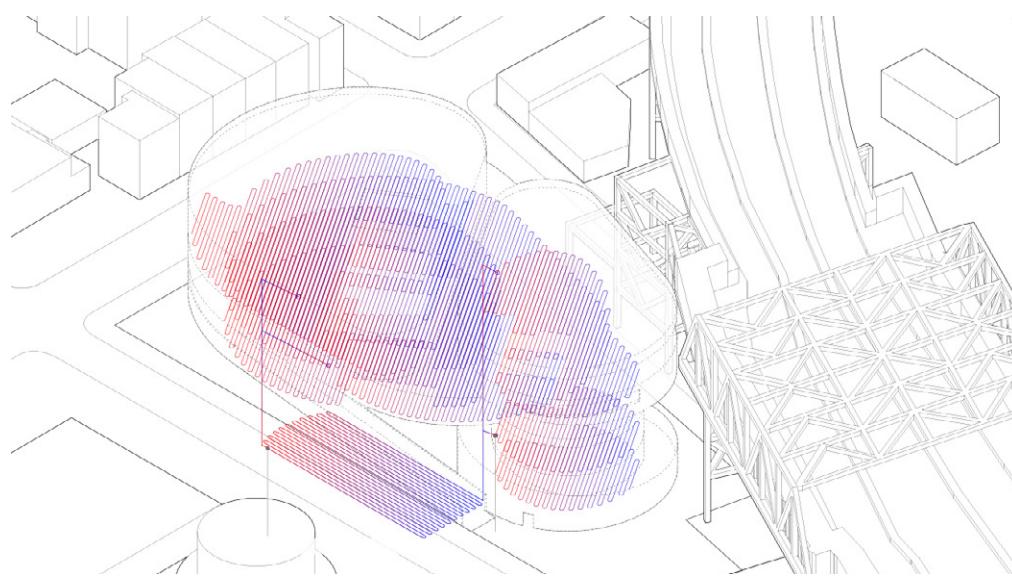
Section A-A'



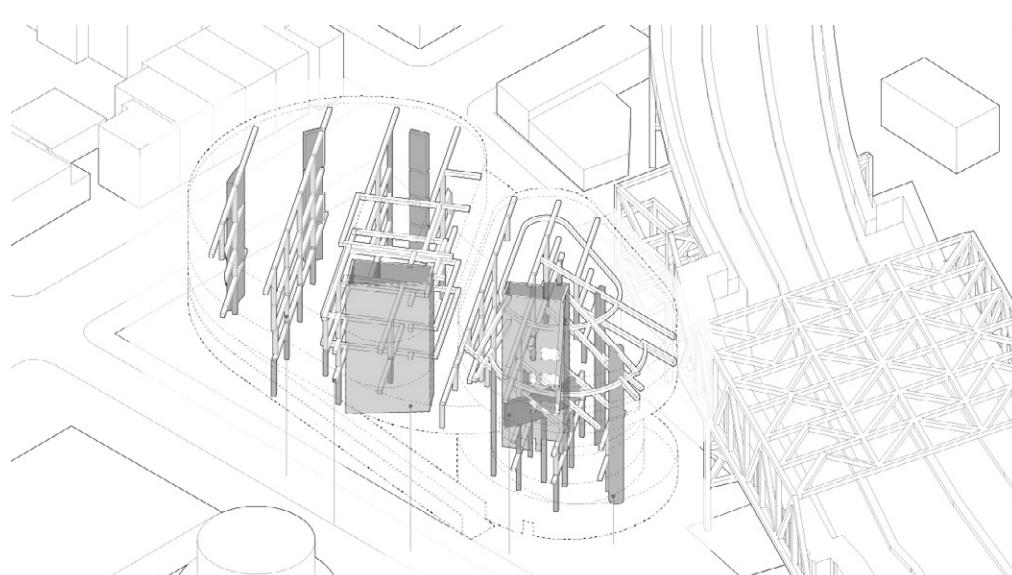
- 1 Art Exhibition
- 2 Cafe / Restaurant
- 3 Circular Store
- 4 Play Area
- 5 Loading Area
- 6 Material Storage
- 7 Artist Studio
- 8 Start-Up Office
- 9 Librarian Office
- 10 Reference Desk
- 11 Staff Refurbishing Shop
- 12 Staff Area
- 13 Sharing Depot
- 14 Workshop Area
- 15 Artist Space Lockers
- 16 Repair Cafe
- 17 Training, Making, Repair Workshops
- 18 Community Kitchen / Catering
- 19 Auditorium / Multi-Purpose Space
- 20 Main Stage



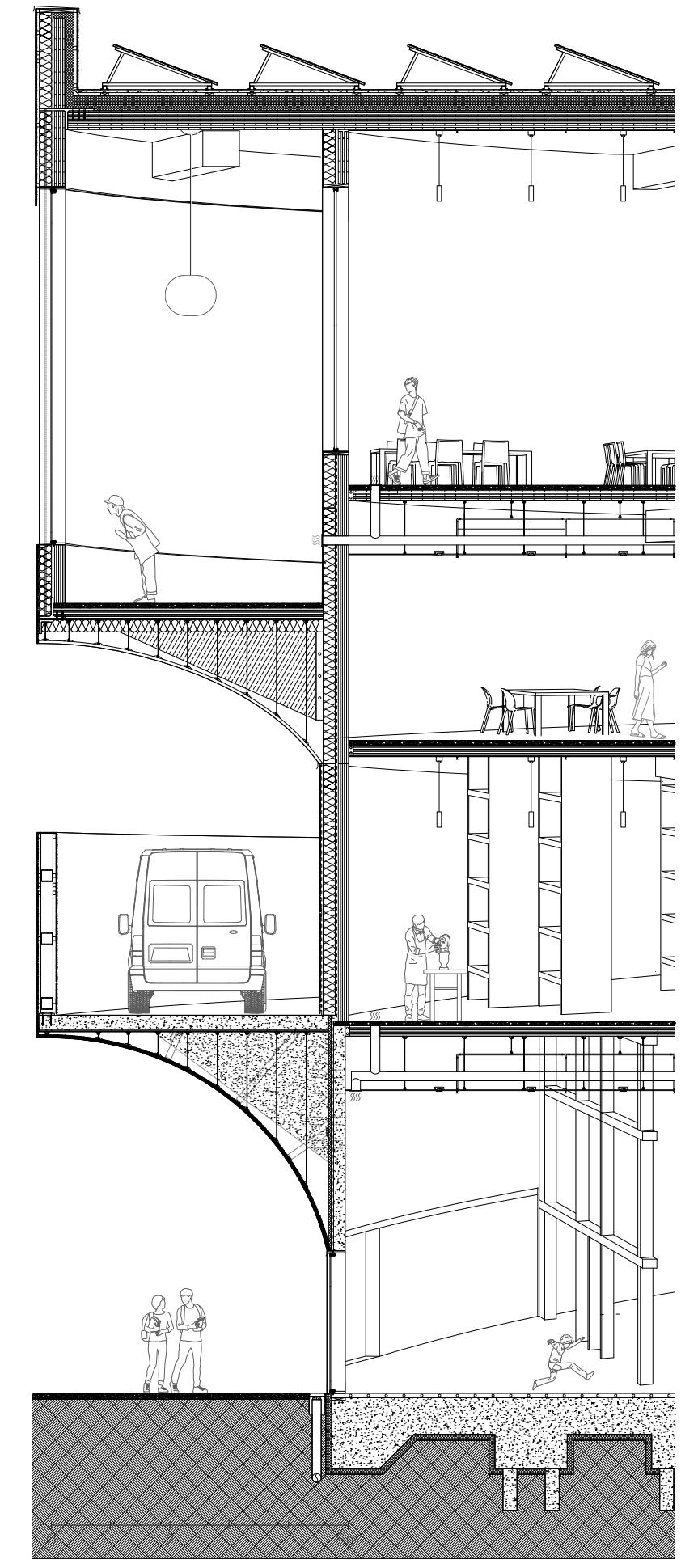
Renewable Energy Sources - Roof Mounted PV Panels



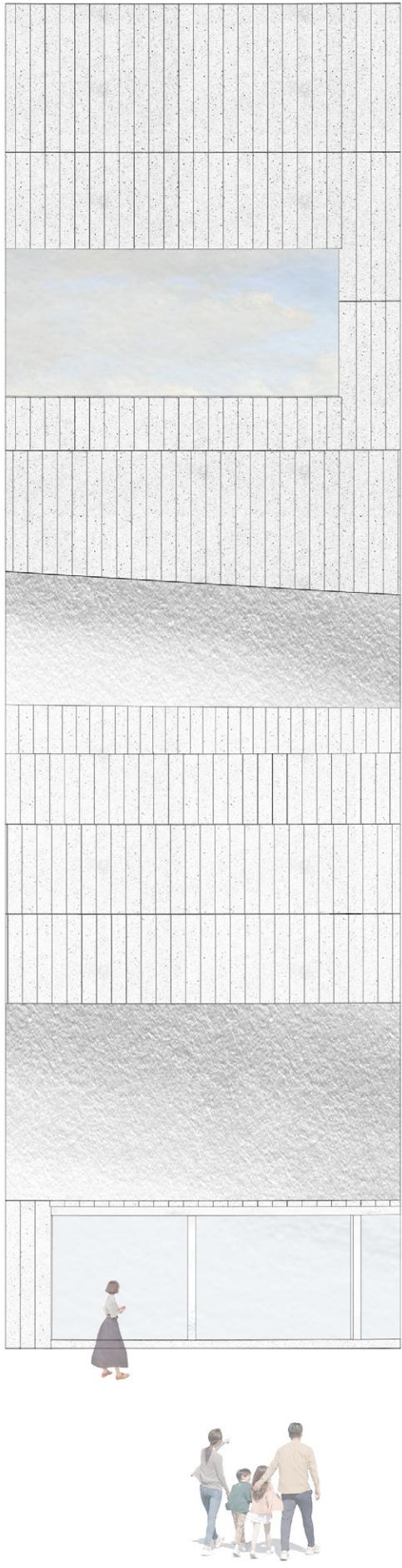
Renewable Energy Sources - Hydronic Radiant Heating and Cooling



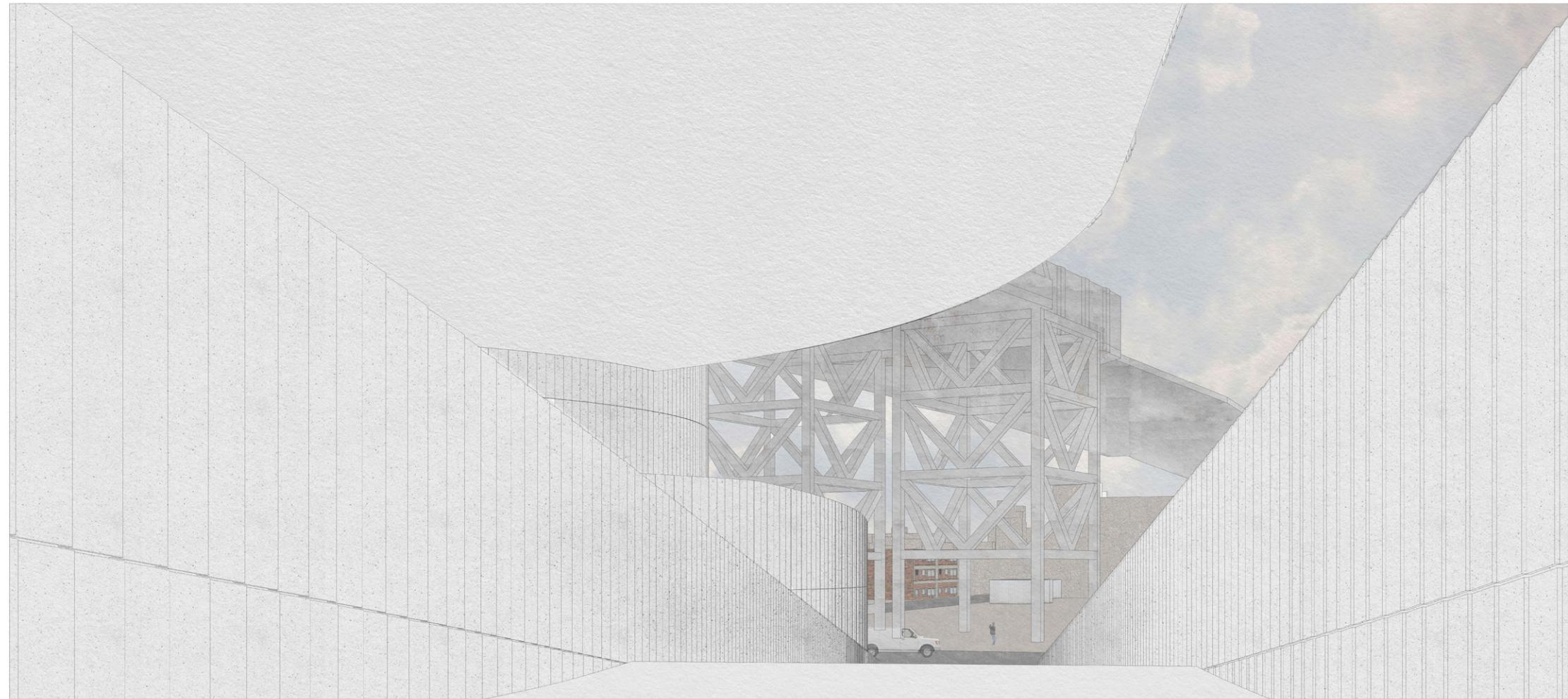
Structural System - Mass Timber & Concrete Core



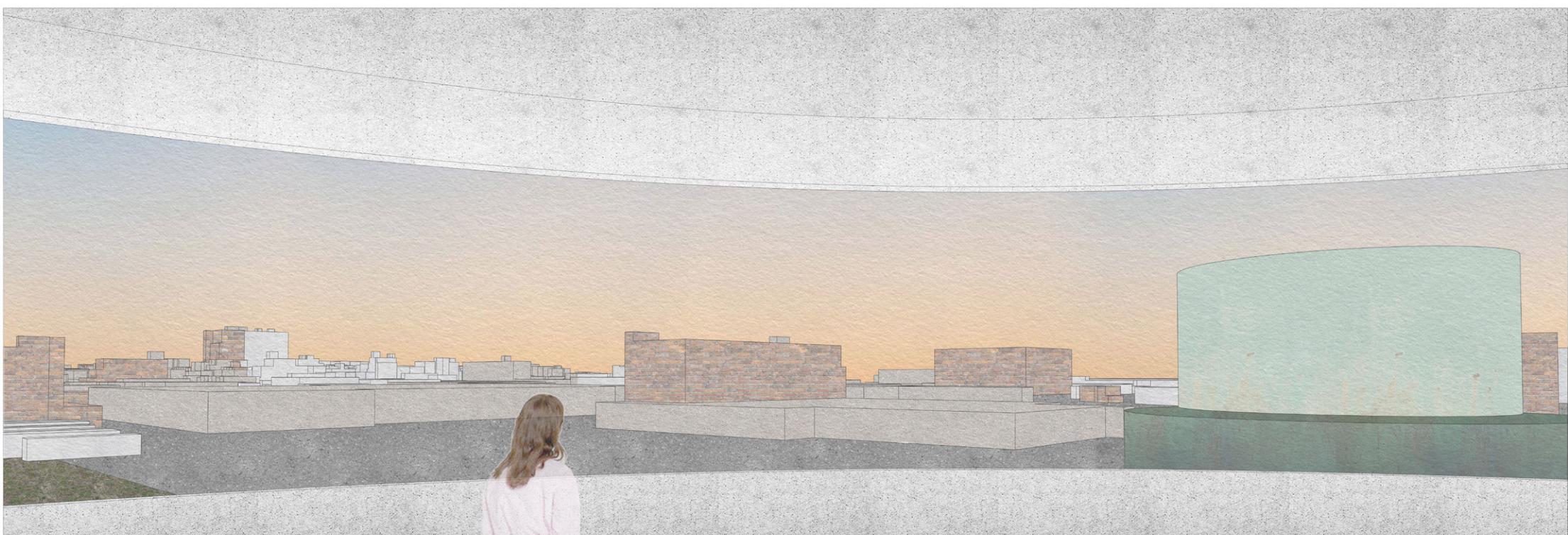
Detail Section



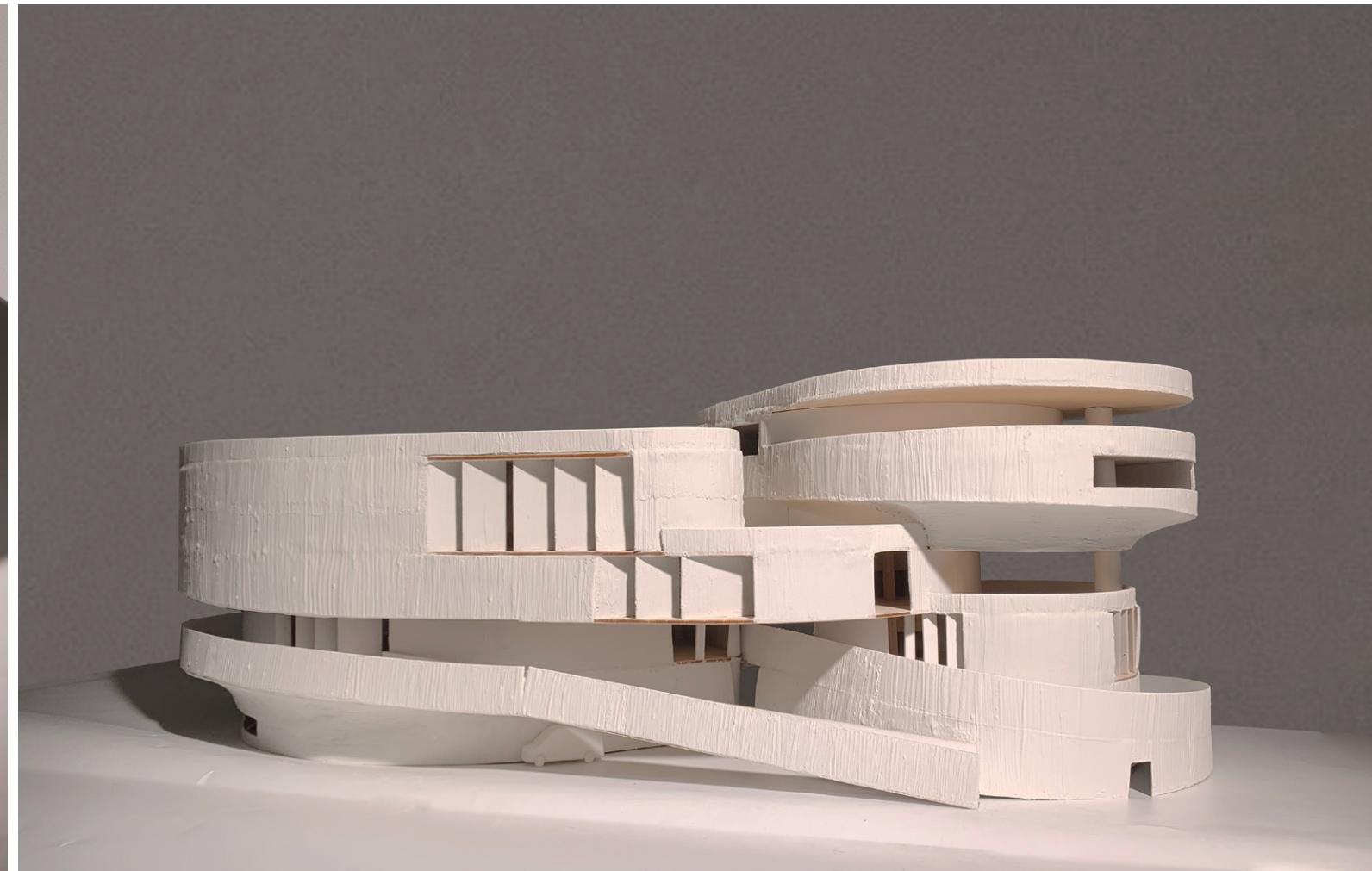
North Entrance - Collage



Auto Ramp Entrance - Collage



South Balcony - Collage



1:100 Model

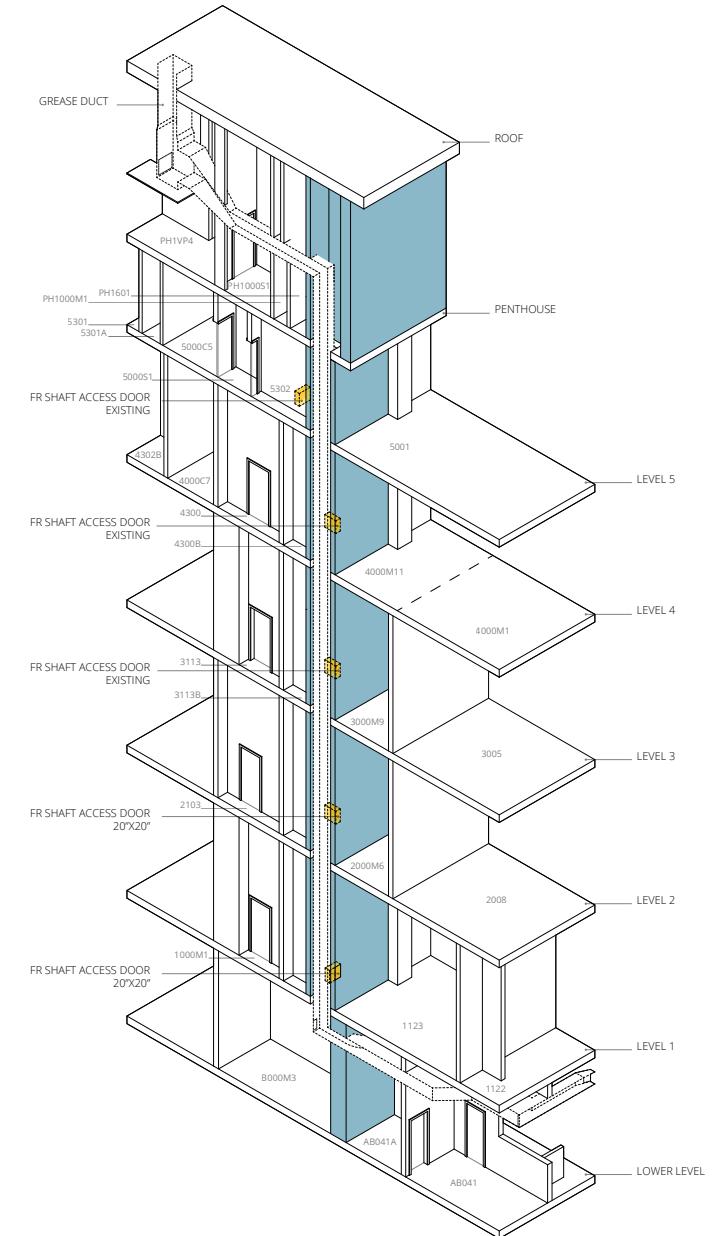
07. Annum Architects

Annum Architects, formerly known as Ann Beha Architects, is a prominent architectural firm based in Boston renowned for its innovative and sustainable design solutions for its work in educational institutions, cultural institutions, and historic preservation. With a commitment to integrating modern design principles with a deep respect for historical context, Annum Architects has successfully executed numerous projects that reflect a balance between contemporary aesthetics and preservation of cultural heritage.

While on my one year internship, I had the opportunity to work on pre-design, schematic design, and design development for the Smithsonian National Museum of American History in Washington, D.C. east wing renovation. In addition, a few enabling projects including a grease duct riser feasibility study, emergency generator project in construction documentation, and AHU project in construction administration.



Interior Renders - Schematic Design Iterations



Grease Duct Riser - Feasibility Study

thank you ☺