

VANSHIKA BHAIYA

Carnegie Mellon University | Bachelor of Architecture 2025

vbhaiya@andrew.cmu.edu | +1 (412) 320-9776

Email:
vbhaiya@andrew.cmu.edu

LinkedIn:
linkedin.com/in/vanshika-bhaiya

Instagram:
@vanshika_arch.ive



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+1 (412) 320-9776
[LinkedIn/profile](#)
[portfolio](#)

EDUCATION

CARNEGIE MELLON
UNIVERSITY, PITTSBURGH
Bachelor of Architecture | Minor in
Environmental and Sustainability
Studies – May 2025
CQPA – 3.92/4
Dean’s List: Fall 2020, Spring 2021,
Fall 2021, Spring 2022, Fall 2022,
Spring 2023, Fall 2023, Fall 2024
Relevant Coursework:
Commoning the City Studio
Design Build Studio
Materials Regeneration
Emerging Ecological Worldview
Indigenous Knowledge and
Biodiversity Conversation
Architecture and Agency
INSTITUTE FOR ADVANCED
ARCHITECTURE OF CATALONIA,
BARCELONA, SPAIN
Study Abroad – Spring 2024
CEPT UNIVERSITY, INDIA
Summer Semester – Summer 2022

SKILLS

SOFTWARE	FABRICATION
Rhinoceros	Wood Shop
Vray	Metal Shop
Revit	Laser Cutting
Enscape	CNC Routing
Grasshopper	3D Printing
Climate Studio	Vacuum
Bluebeam	Forming
Adobe Suites	Hand Tools
AutoCAD	Drawing
Microsoft	Painting
Office	Digital & Analog
Midjourney	Photography

PROFESSIONAL EXPERIENCE

DESIGNLAB ARCHITECTS, BOSTON
Intern – June 2024 - August 2024

- Conducted research for ‘Designing for Neurodiversity’ project; this developed the firm’s framework on inclusive design for all projects
- Spearheaded the concept research for an art museum; illustrated campus maps; developed renders and diagrams for 3 RFQs

DESIGNGROUP, PITTSBURGH
Intern – June 2023 - August 2023

- Created diagrams for a university space optimization study; and produced documents for pre-bid meetings for a facade renovation
- Completed conceptual renders using Revit and Enscape for a university library space to help raise funds through donations

ARCHSHOP, CMU + DFAB, CMU
Shop Monitor – Fall 2022 - Present; dFab Monitor – Fall 2023 - Present

- Supervise shop activity, guide students with fabrication, facilitate interdisciplinary thinking, and maintain shop machines and workplaces

MAWI DESIGN, CHENNAI, INDIA
Intern – July 2022 - August 2022

- Resolved the parametric design aspect of an office using Grasshopper

TEACHING ASSISTANT, CMU
Urbanism and the Social Production of Space – Present;
Materials & Assembly – Fall 2022; Drawing I + Digital Media I – Fall 2021

- Assisted Professors Jongwan Kwon, Gerard Damiani, Doug Cooper, and Matthew Huber by working with a group of 10-15 students to improve their skills, conduct help sessions, and grade assignments

ACADEMIC EXPERIENCE

ARCHITECTURAL CRAFTS COLLECTIVE, CMU
Treasurer – Spring 2023 - Present

- Maintained a financial record of the club’s expenditures, presented a budget for the academic year, and ideated various methods of funding

SPRING PAVILION, NOMAS, CMU
Designer – Spring 2023; Fabrication Team Member – Spring 2022

- Collaborated to design a low-carbon temporal bamboo structure
- Fabricated the foundations using discarded materials; led a team of 25 to assemble the structure in 3 days; directed its disassembly in 6 hours

AWARDS AND HONORS

ALWIN CASSENS, JR. MEMORIAL FUND IN ARCHITECTURE
“Urban Intelligence at the Biennale” – Fall 2024

MAPS SCHOLARSHIP, MINORITY ARCHITECTS OF PITTSBURGH
Recipient – Fall 2024, Fall 2023

BURDETT ASSISTANTSHIP AWARD, CMU
“Identifying Flood Resistant Construction Techniques and Material Application in Southeast Asian Vernacular Architecture” – Fall 2022

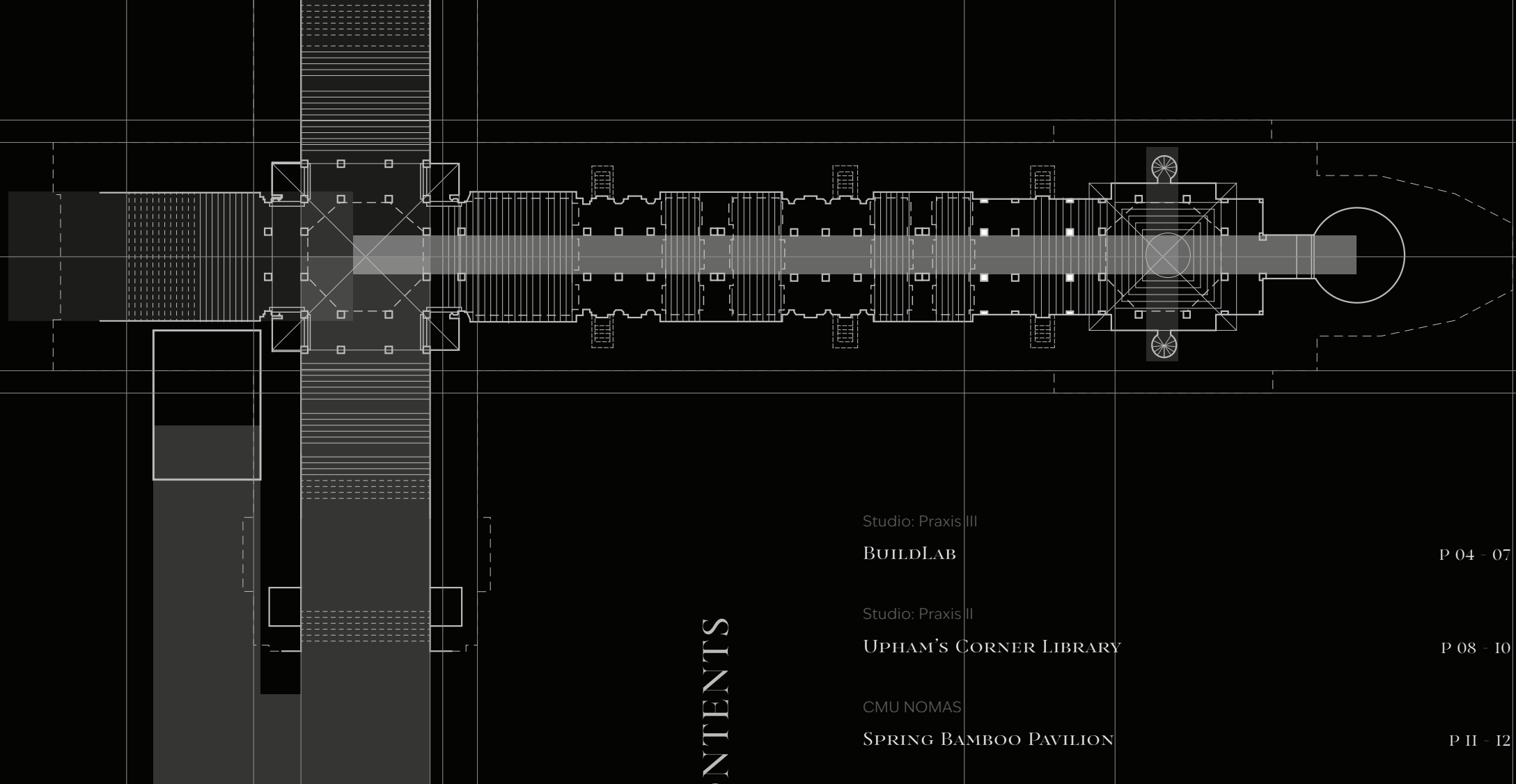


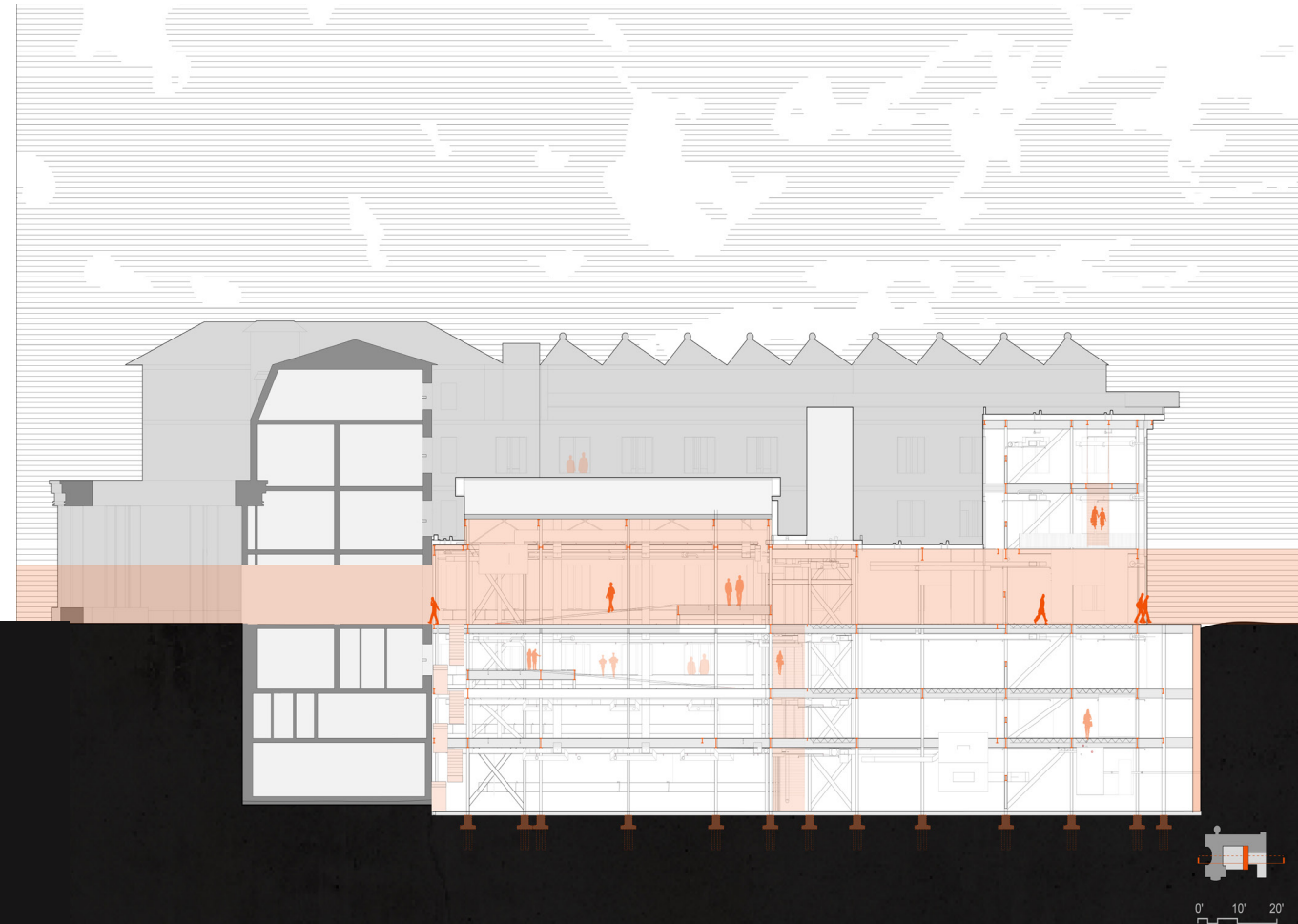
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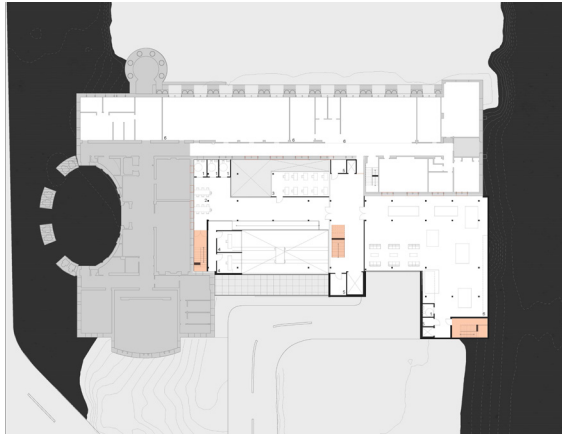
BUILDLAB

Identifying Carnegie Mellon Architecture's emphasis on the pedagogy of learning through fabrication, BuildLab aims to vertically integrate design fields through a space that serves as an addition to the Schools of Architecture and Design within the larger context of the university. Since the first floor corridor of the Margaret Morrison Carnegie Hall acts as a bridge between two parts of campus, the positioning of the new building is a symbolic interpretation of this strong axis of circulation on campus and replicates the idea through program, sequence, structure, as well as systems. BuilLab comprises of three wings - the Public wing, Fabrication hub, and Circulation bar between the two - all connected by a continuous walkway that runs from the Campus Street to the Rotunda. This decision promotes transparency as one navigates through campus, reimagines the way that the existing passageway might be used, and invites the broader campus community to engage with the schools of architecture and design.

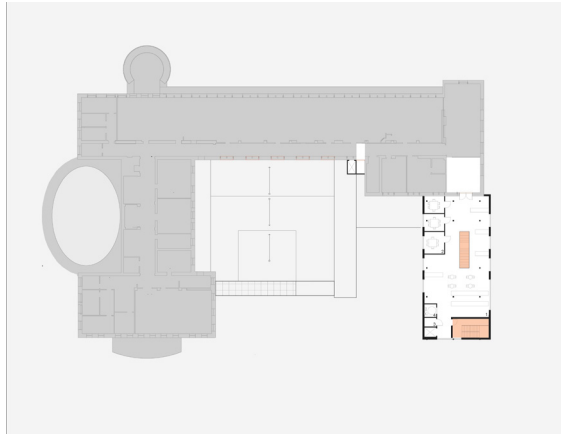


Project Vision

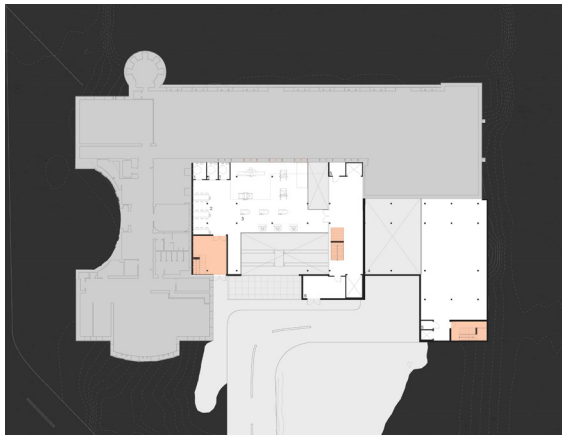
Project Proposal



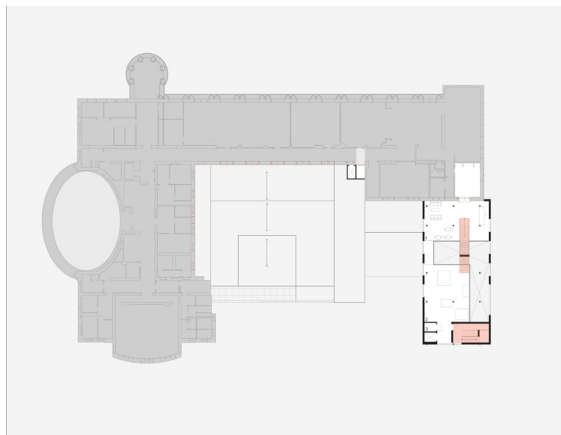
Floor A



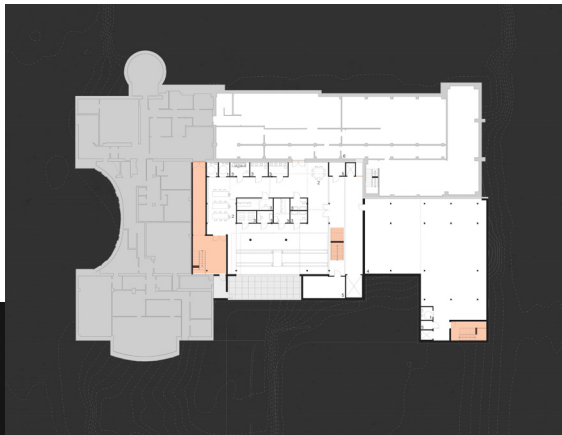
Floor 3



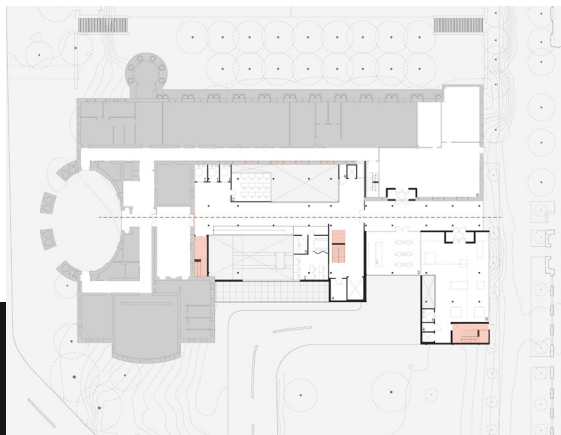
Floor B



Floor 2



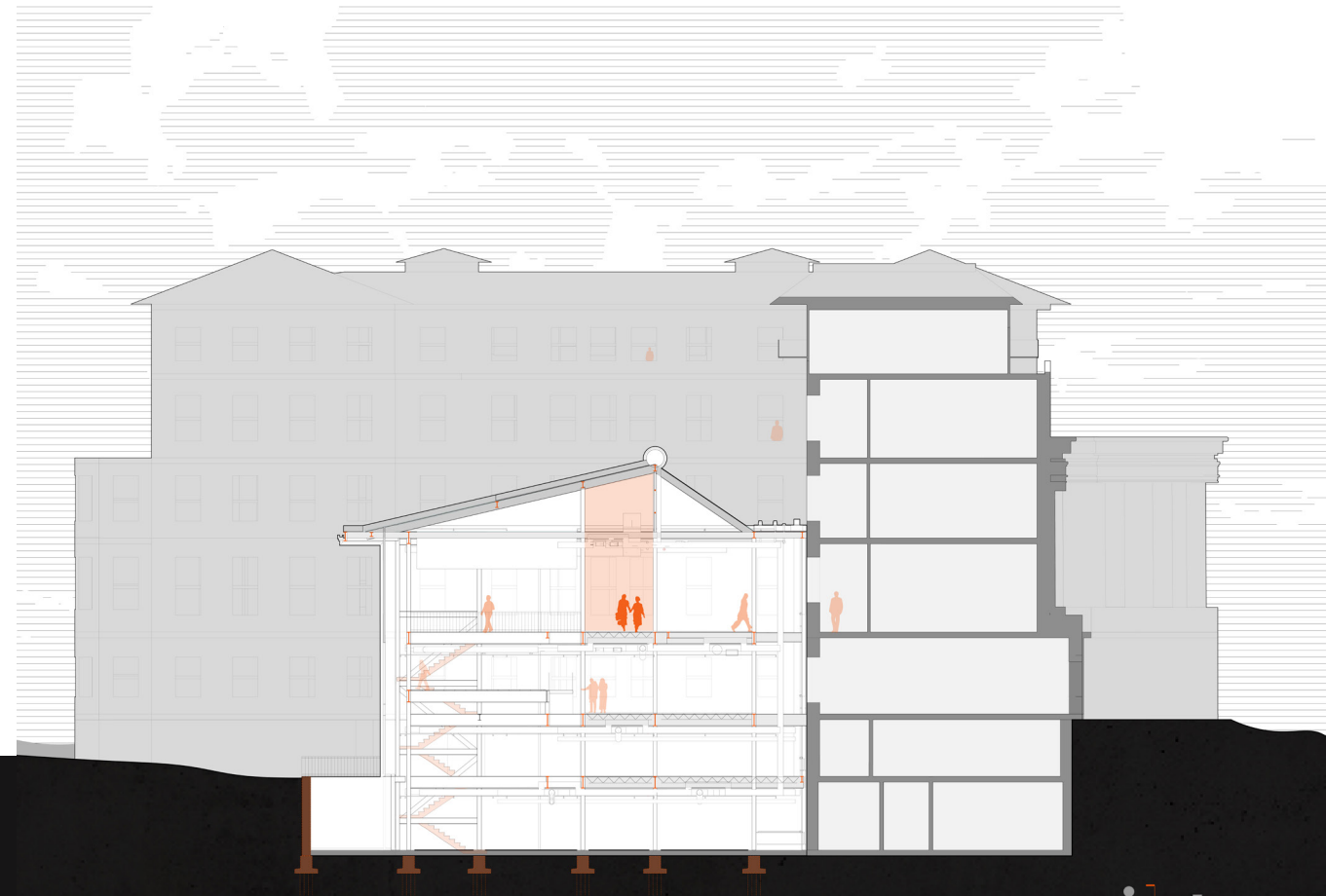
Floor C



Floor 1



Elevation from East-West Campus Street





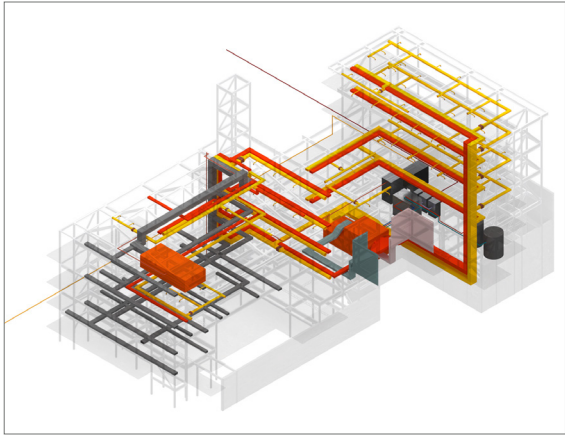
Exposed Structure and Ductwork



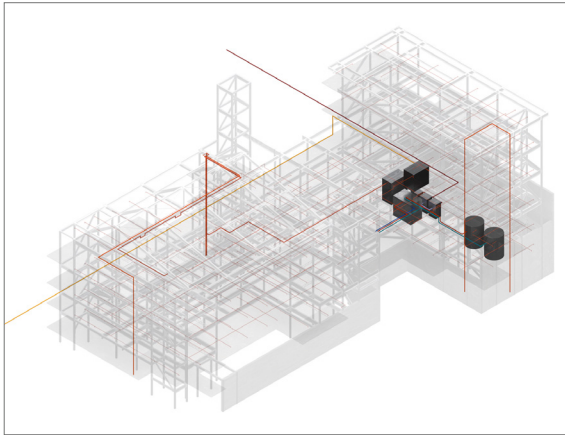
Visual Accents through System Design



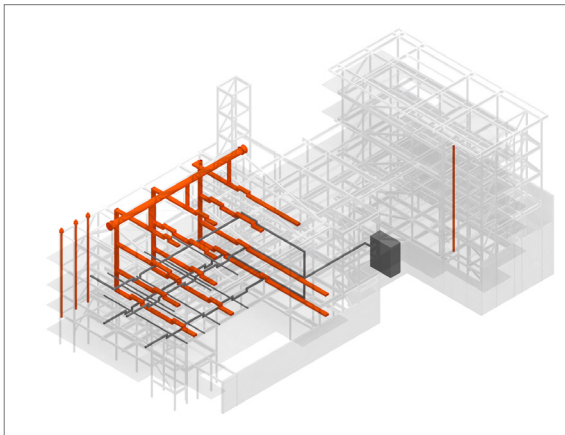
Atrium with Gantry System



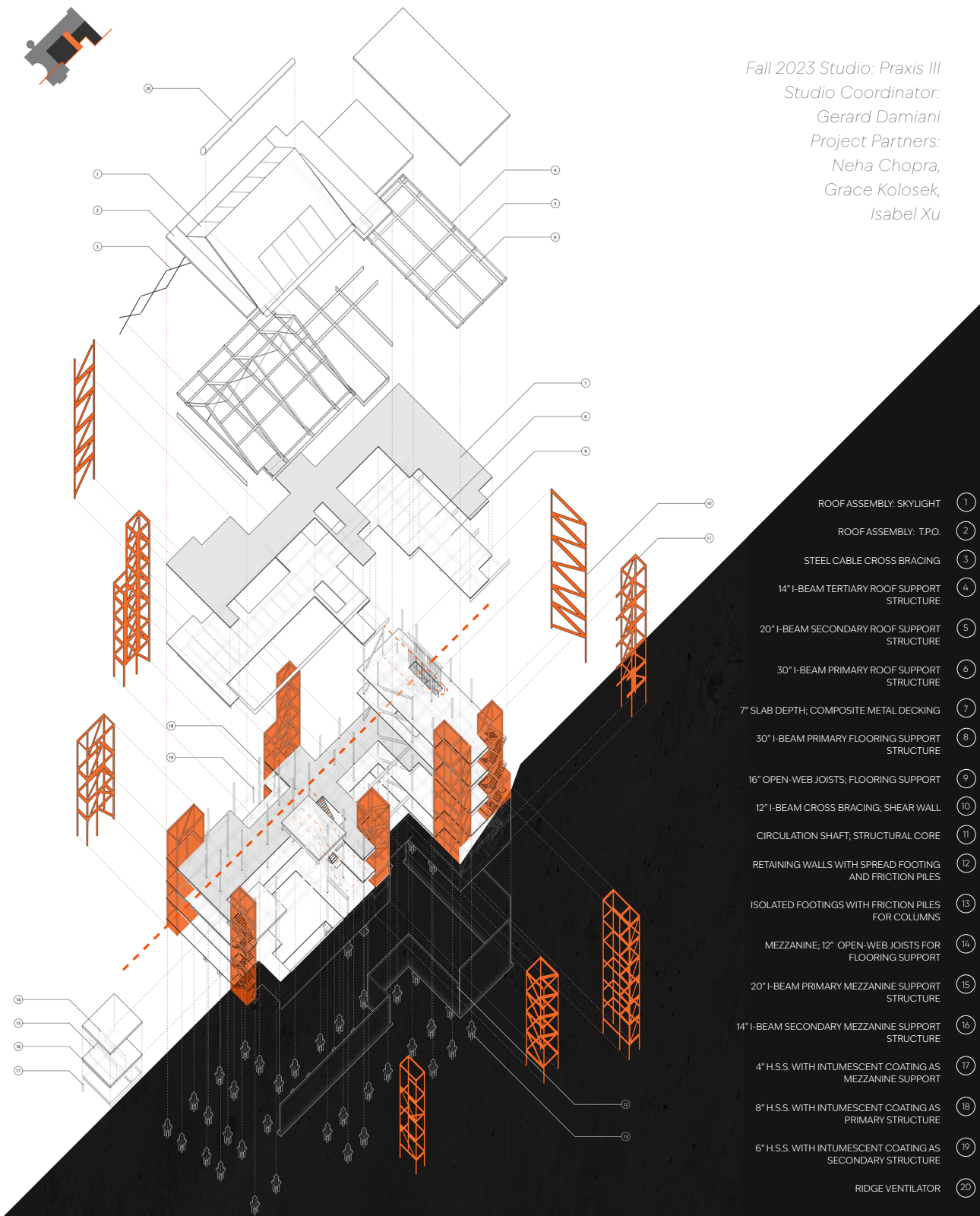
HVAC System



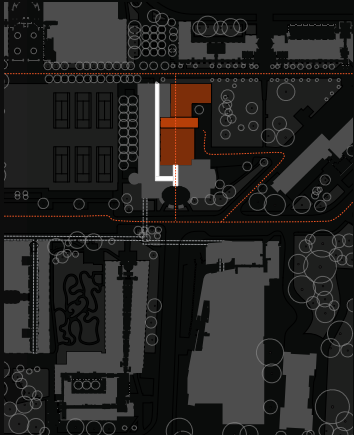
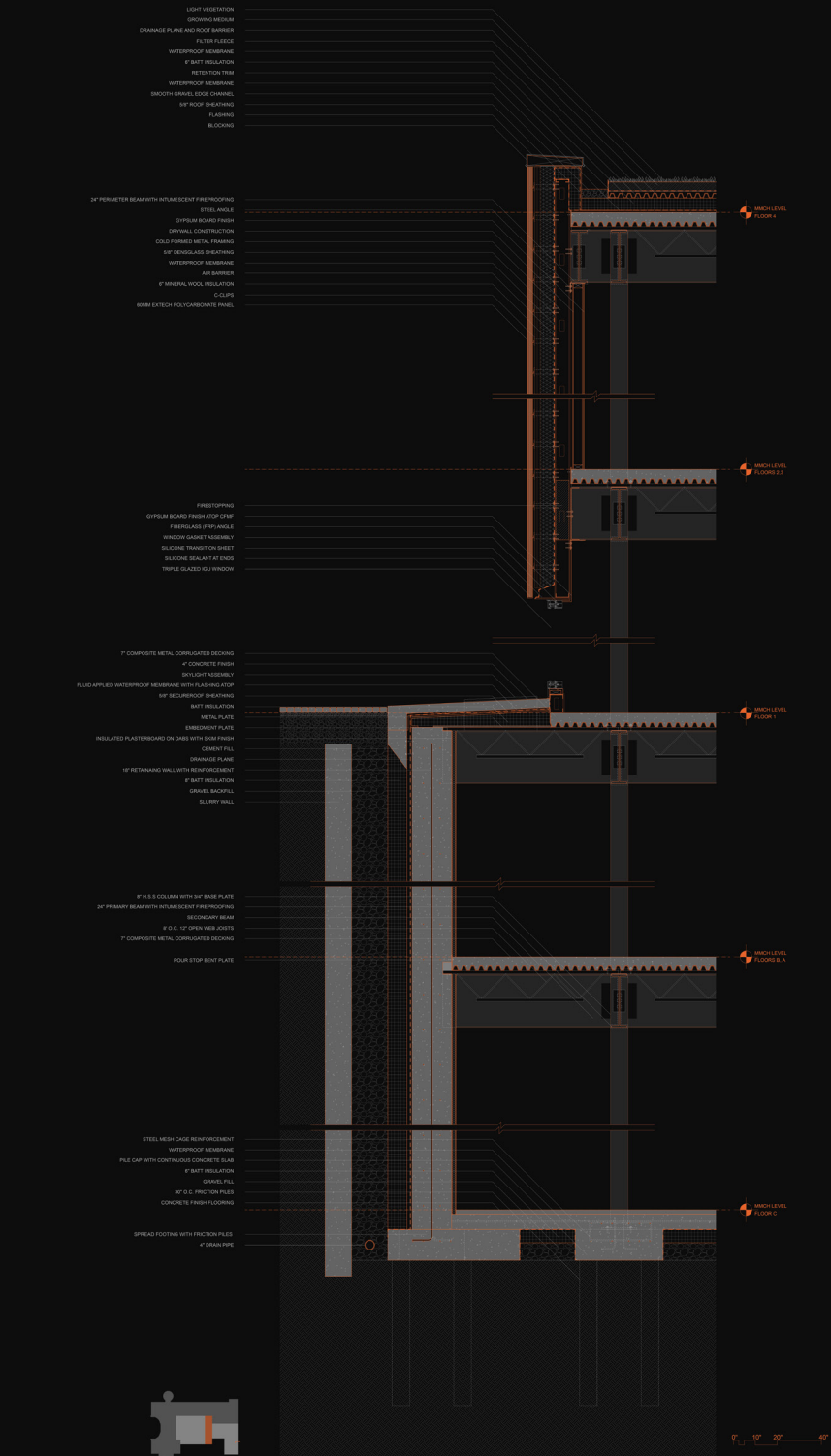
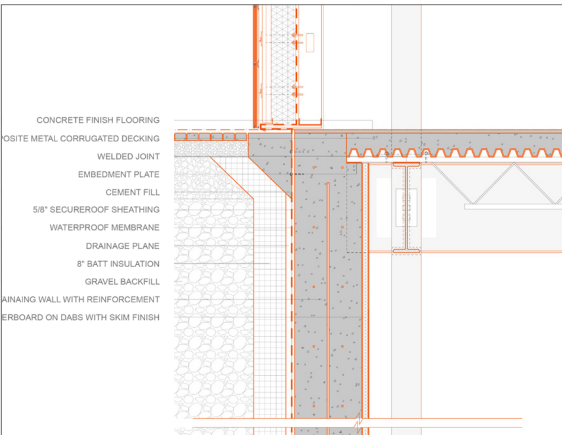
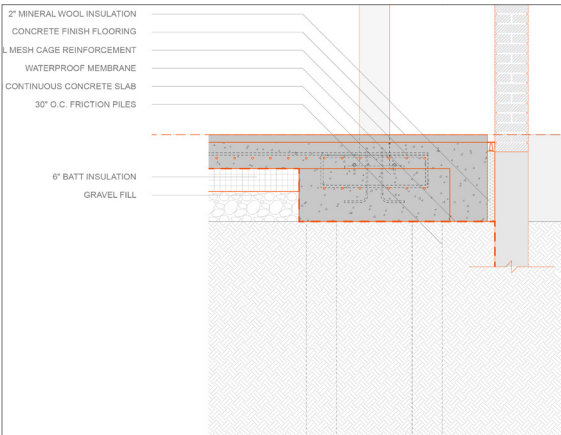
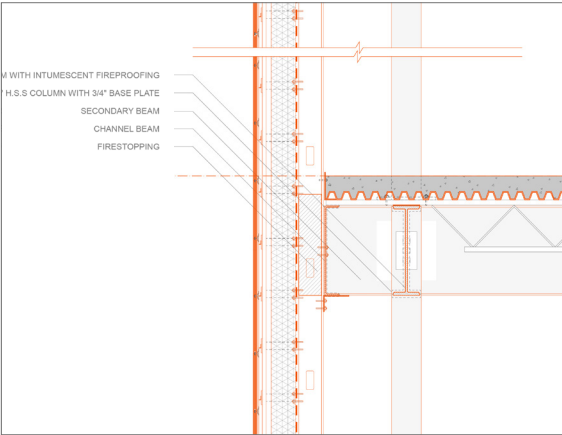
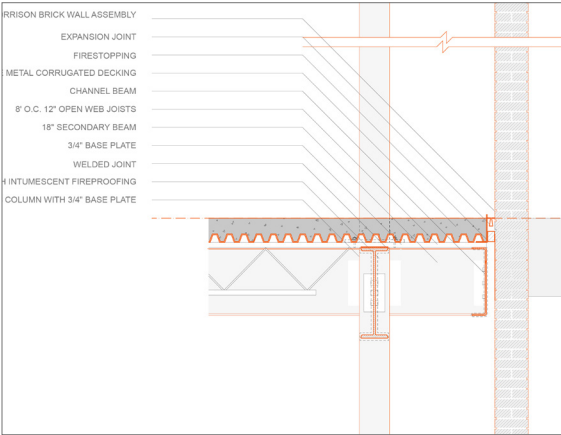
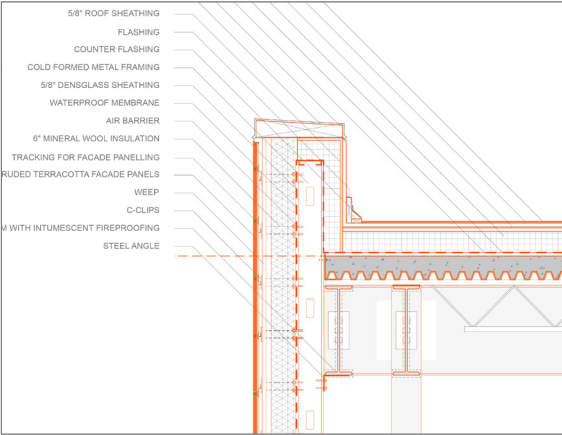
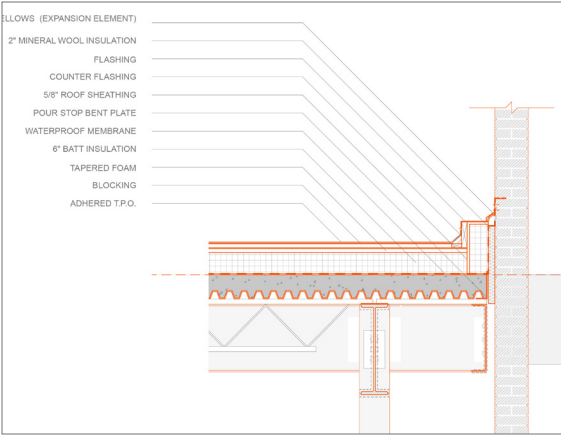
Fire Suppression System



Exhaust Duct System



Fall 2023 Studio: Praxis III
 Studio Coordinator:
 Gerard Damiani
 Project Partners:
 Neha Chopra,
 Grace Kolosek,
 Isabel Xu



Implementing the primary ideology that the building could serve as a potential teaching tool, the systems are largely exposed as the ductwork and pipes run through the building. The size of the systems is defined by the efficiency of the building envelope. Acknowledging and consciously addressing the different boundary conditions that this building is set up with, the polycarbonate assembly above grade is contrasted by three stories of space below grade that are supported structurally with the help of a slurry wall. To provide a continuous thermal barrier, batt insulation is used on the roof and along the length of the retaining wall while mineral wool is used in front of the metal stud. Terracotta is hung from the roof and insulated similarly. The interface between the new building and the existing is resolved using expansion joints and fire stopping between floors.

UPHAM'S CORNER LIBRARY

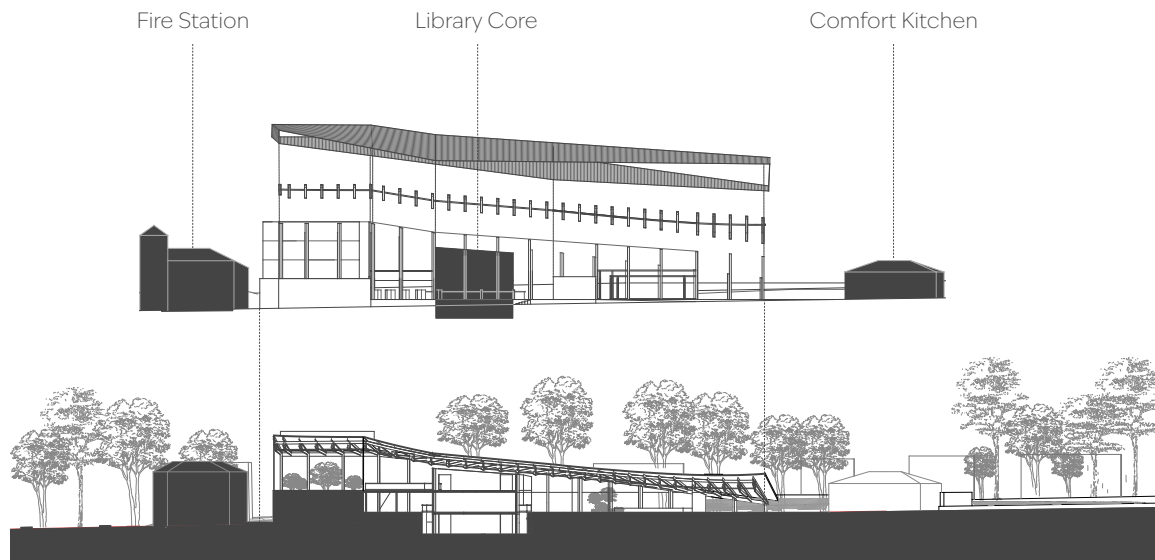
This mass timber library is situated in Dorchester, Boston in very close proximity to an old burial ground at a busy commercial intersection. Embracing the sensitivity of the project's location, the design concept revolves around the idea of revitalizing the forgotten pathways of the cemetery - that were once their 'streets'. The cemetery becomes accessible to the public and transforms the urban landscape. The library serves as an extension of the public realm as the neighborhood's living room. It promotes engagement with the street on one side and the cemetery on the other.

The massing resonates with this idea as the first floor of the library welcomes the public and a central core houses some of the more private areas with bookstacks in the lower level and digital workspaces on the upper level. While most of the library follows an open floor plan, this central core sits as an object that can be identified from the street. The "building within a building" concept creates a versatile venue with large flexible spaces as well as small private pockets and niches. The library also directly interacts with a residential project as it 'sits on top of it' and shares a communal garden with its occupants. The form of the building is visually directed towards the roof that appears to be cascading down softly from north to south. Glulam columns and beams support the leaf-like roof while the cross laminated timber core sits in the middle of the library.

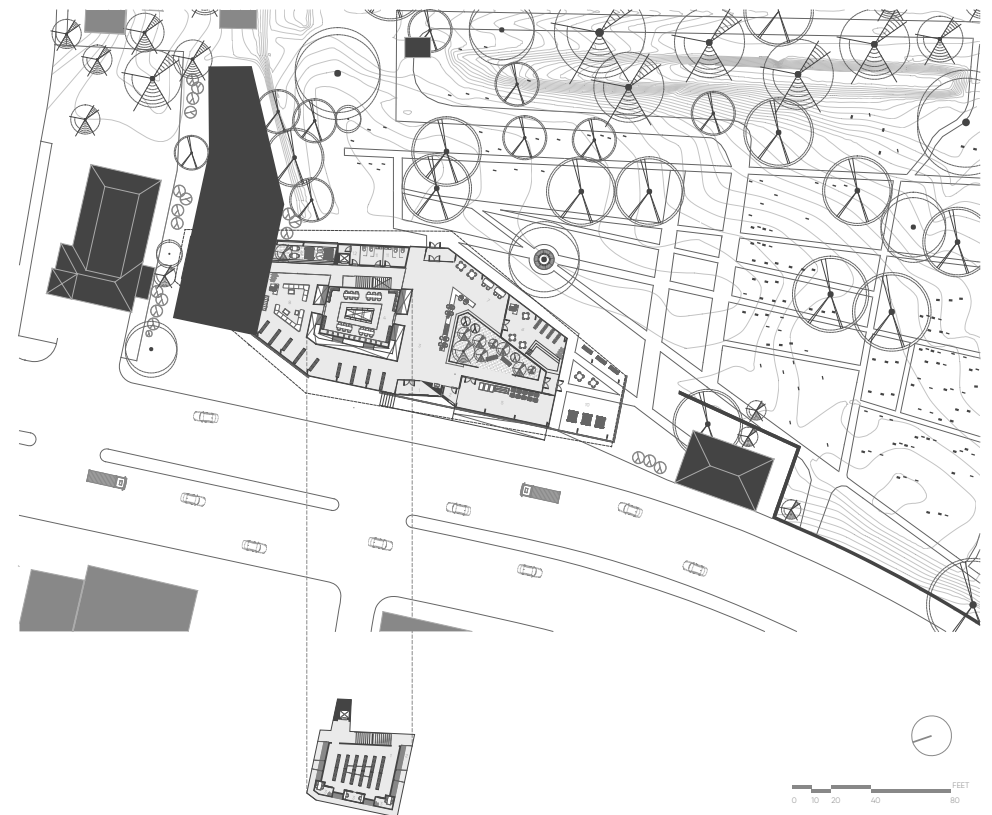
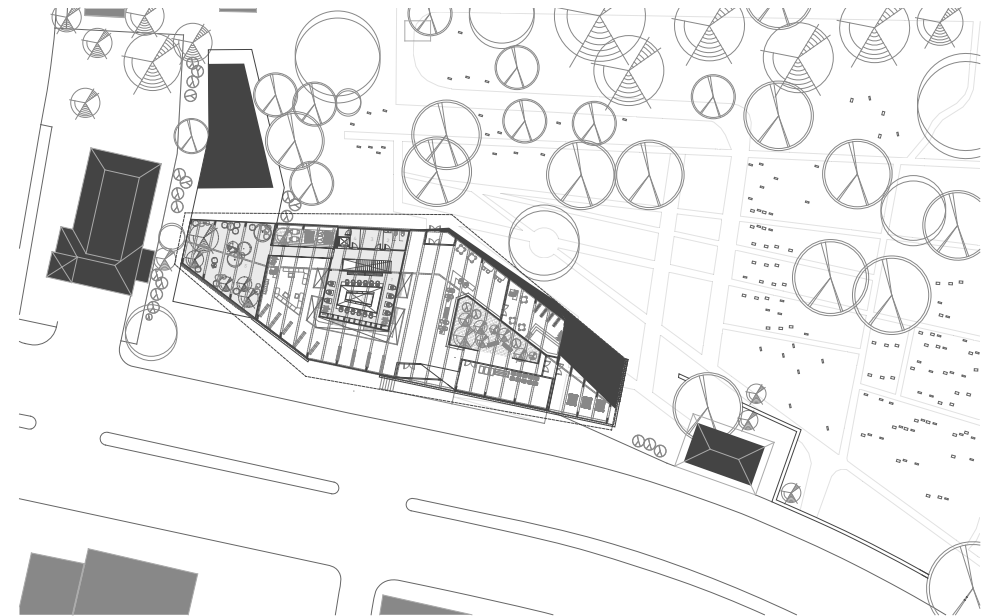
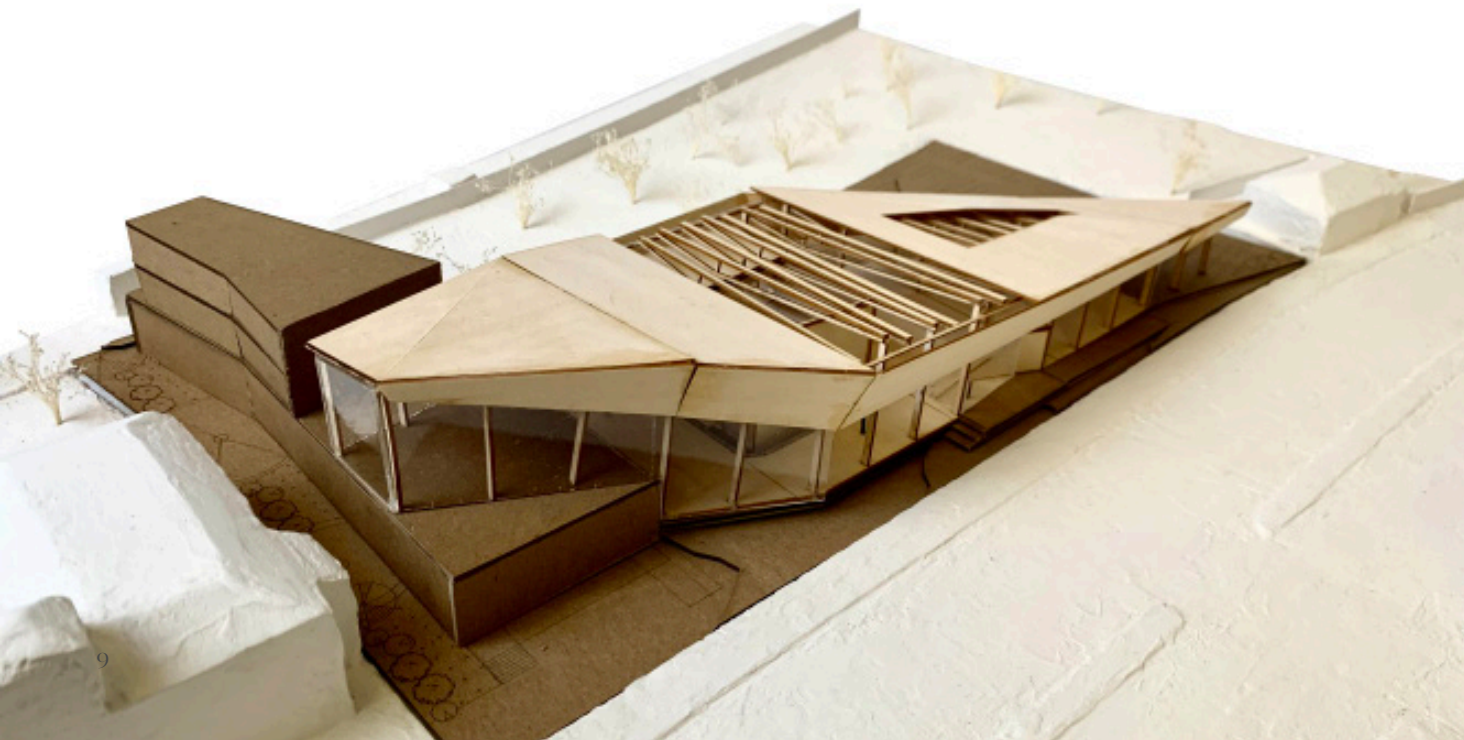


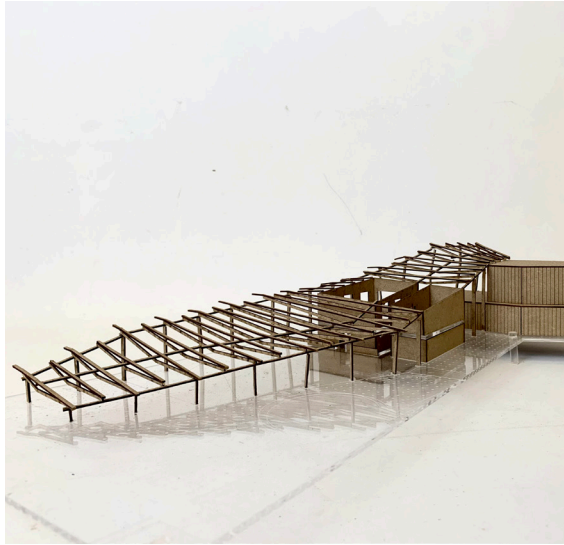
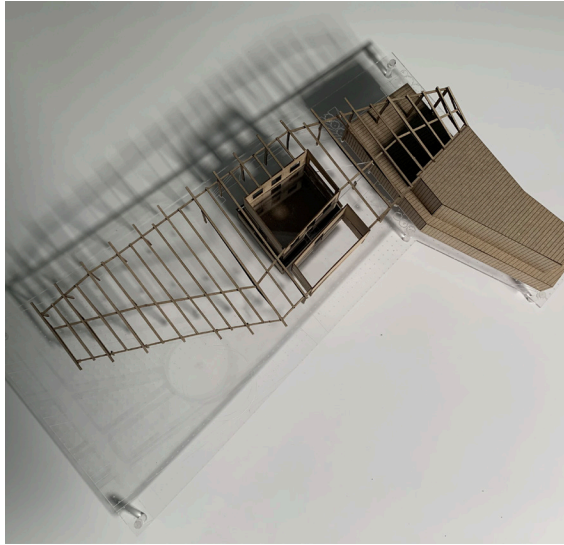
Juxtaposition of Solid and Void for Massing Iterations



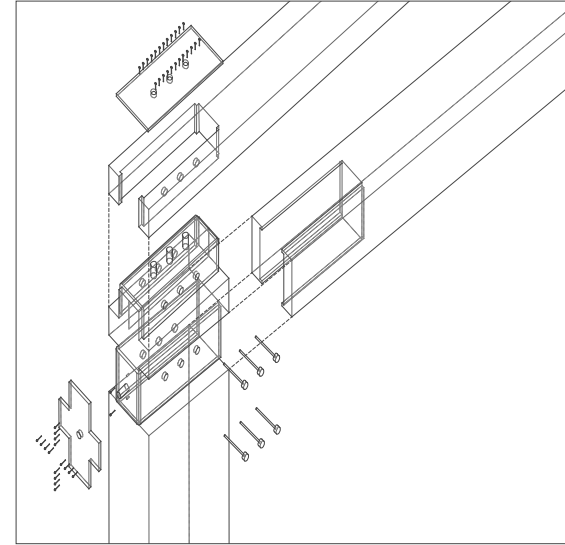


Pavilionization of the Core as an Object of the Urban Fabric

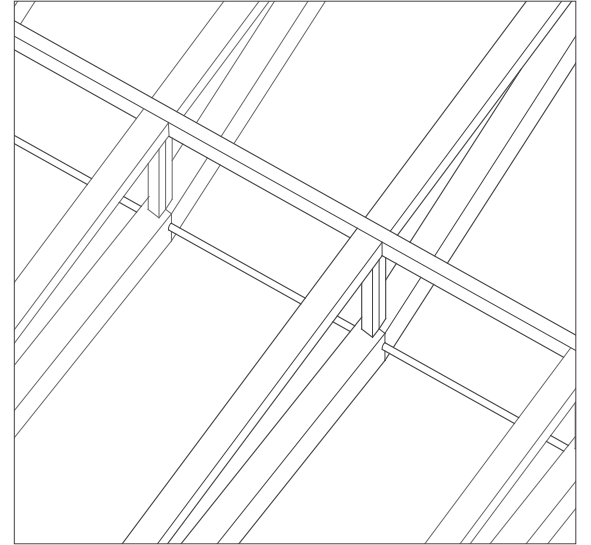




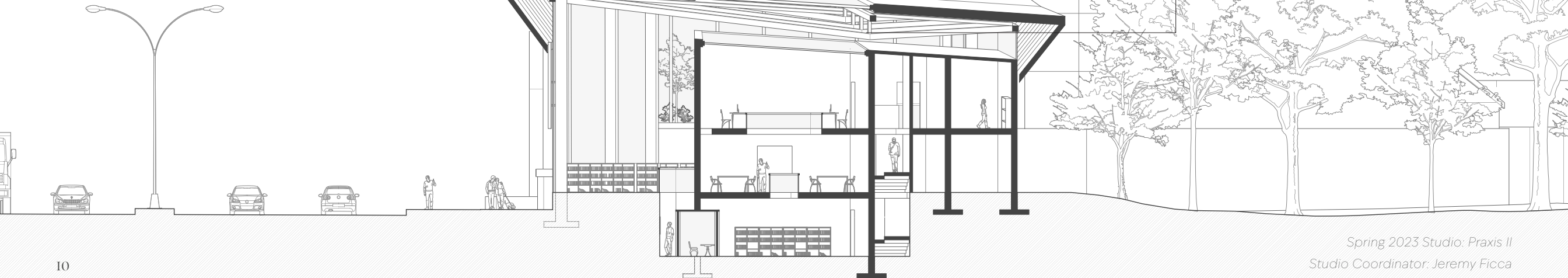
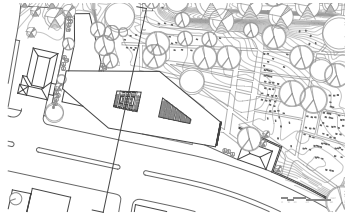
Structure Model to Test Complementary Use of
Glulam and Cross Laminated Timber



Beam to Column Connection: Custom CNC Milled
Parts with Pre-Fabricated Steel Plates



Inverted Truss Beam to Ridge Beam Connection: with
Horizontal Steel Supports





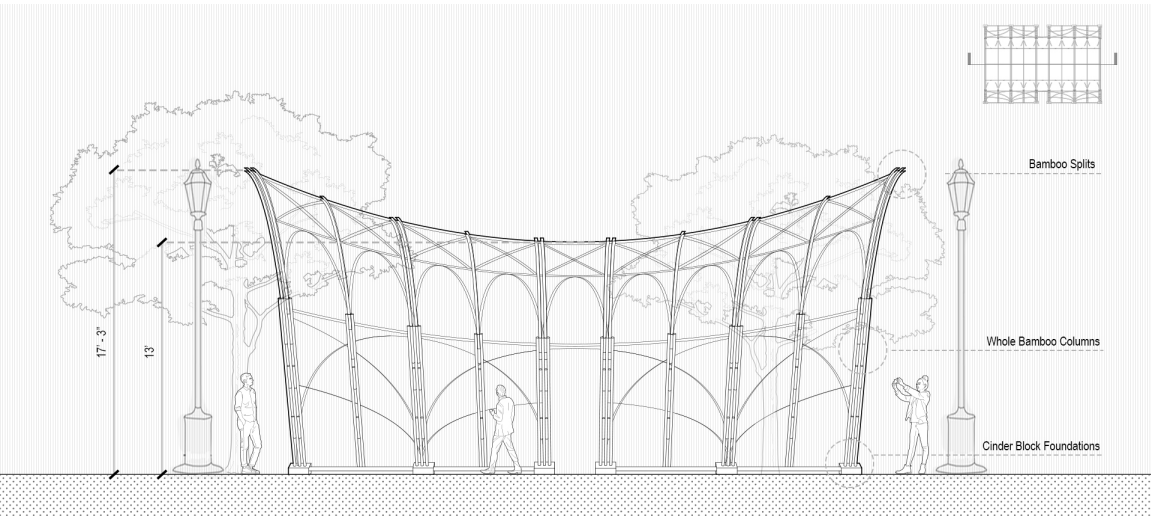
Emphasis on Design for Assembly and Disassembly



Multiple Ways of Utilizing the Same Material

CIRCULARITY THROUGH TEMPORALITY

Responding to the theme of 'Temporality,' the 2023 Spring Carnival Pavilion utilized the material of bamboo in a multitude of ways to create a low-carbon structure that would act as an entrance and landmark for the event. Under the guidance of Professor Vicki Achnani, various techniques of cutting, splitting, and joining were employed to realise the collaborative design. Leading one of the teams to make the foundation and primary joint of the structure using discarded CMU blocks, reused lumber, and recycled plywood, teamwork served to be a driving factor for this on-site project. Investigations were completed through a semester-long design process that emphasized model making, followed by off-site fabrication to increase the efficiency of the next process of assembly on site. The project stressed the use of vernacular methods of design, limiting the use of steel hardware to joints that required additional support. The pavilion was then disassembled in a few days and the parts were stored to be reused for a permanent structure that will be built this coming summer in the neighborhood of Hazelwood in Pittsburgh as part of another project.

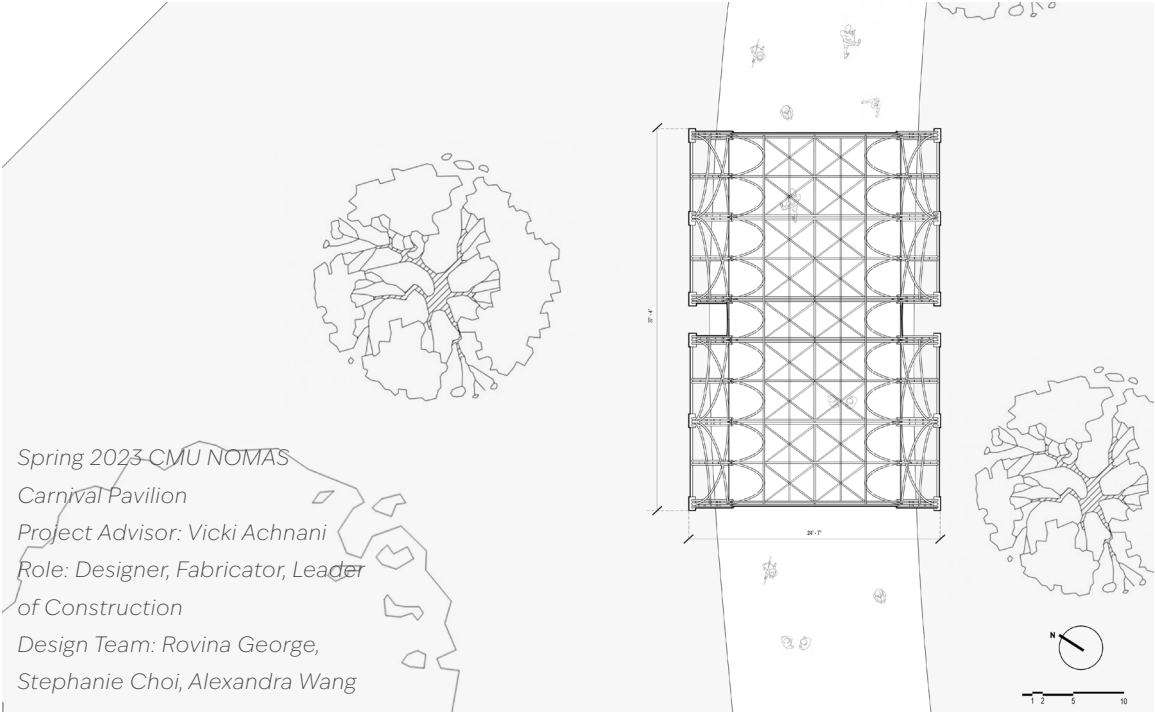


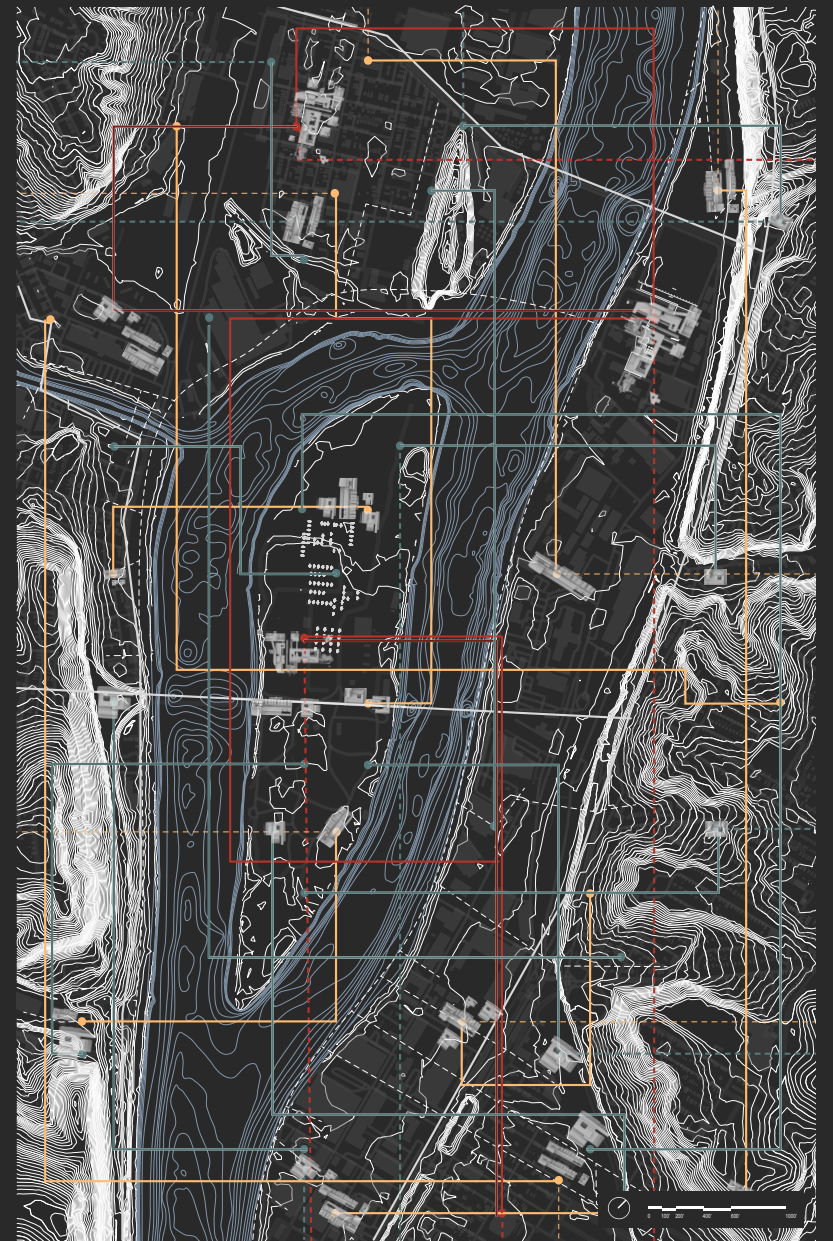
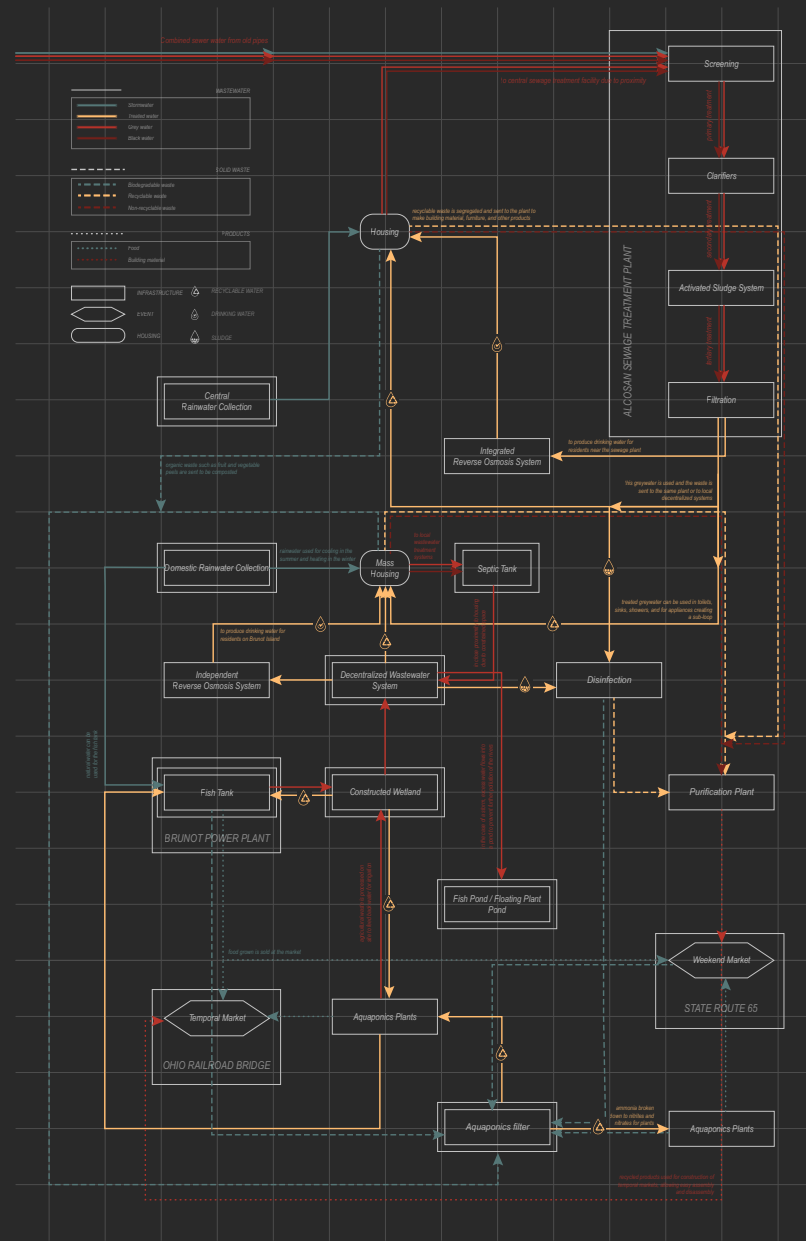


Reduction of Non-Biodegradable Joinery Techniques



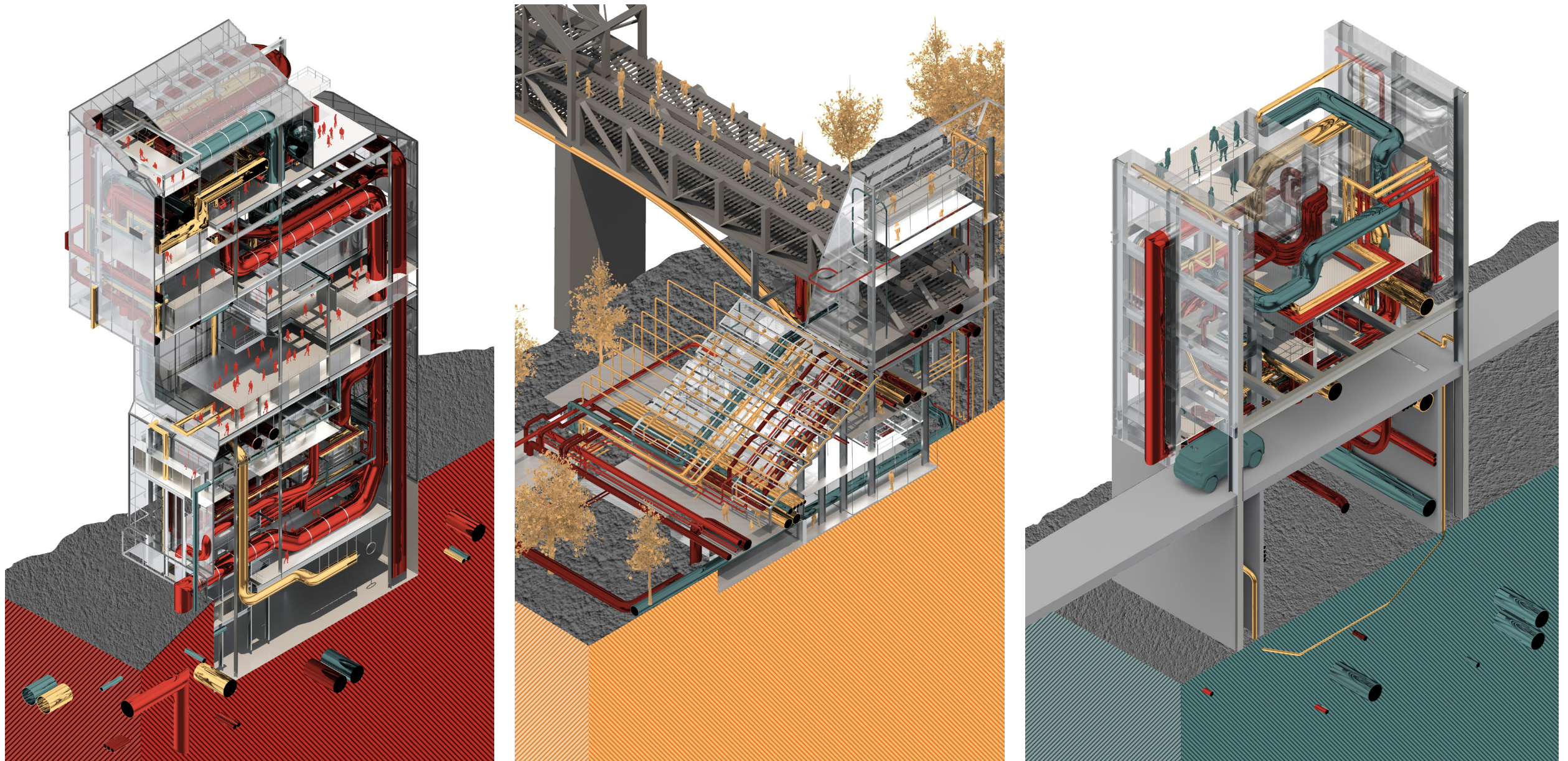
Site-Specific Design and Problem Solving





A CLOSED LOOP IS NOT A CIRCLE

This project addresses Pittsburgh's river pollution and the primary causes of the waterways' poor health. While industrial activity along the river and lack of home sewage treatment are some of these causes, the main problem lies in the combined sewage system, which carries both sewage and stormwater alike. The current process depends on a centralized system - one that is often overburdened rather than being efficient in the case of extreme weather conditions. Hence, to challenge the present system and decrease transportation costs, energy usage, and environmental damage, a decentralized network for sewage treatment as well as wastewater management is proposed - integrating architecture with infrastructure.



This network segregates the flow of pipes into four different kinds - stormwater, black water from toilets, greywater, and treated water which can be used for irrigation, household purposes, or for drinking based on the level and type of treatment to close the loop. However, at different scales and varying geographic locations, there might exist one or more subloops that are either focused on a decentralized system at the individual level of the house, or as part of a larger industrial process. This network can be implemented in the rest of the city as well. A decentralized wastewater management system like this one encourages an environment where individuals and communities occupy spaces that house these pipes and tanks - almost like the infrastructure is the ornamentation of a building. Each of our designs here explores a certain typology in our proposed design and narrates its characteristics at different scales.



Fall 2022 Studio: Praxis I
 Studio Coordinator:
 Heather Bizon
 Studio Professors:
 Jared Abraham and Zaid
 Kashef Alghata
 Studio Partner:
 David Warfel

THE OASIS

Translating chef Rene Redzepi's philosophies onto an architectural landscape located in Pittsburgh's South Side Works, the Oasis aims to connect the site back with the community and its heritage. Redzepi focuses heavily on the temporal - only using food that is local to the region and in season at that moment. The Oasis translates this ideology by encouraging interaction with a central foraging garden and the bustle of a market kitchen.

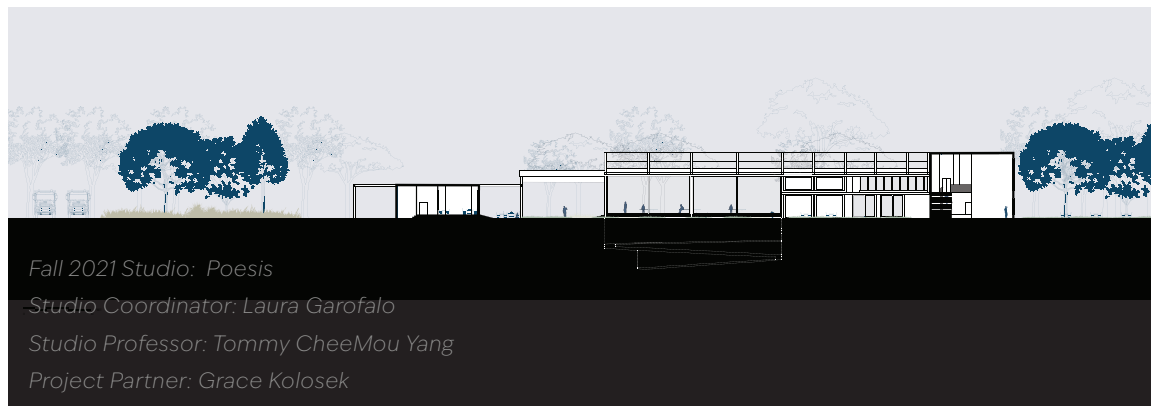
The parti of the oasis is a courtyard building funneling those interacting with the institute into the center. The primary entrance leads one to the outdoor market which engages the local community by bringing local vendors to the site. The market is multi-seasonal and has the ability to be operable even in the winter using a latticed garage door system. The design of the Oasis also increases transparency by separating the site from the gentrified East Carson Street with the help of the sloped walkway. The walkway's roof doubles as an intensive green roof which provides irrigation for the central foraging garden. The design maximizes thresholds to connect every space to a central hub, but through the engagement of the market kitchen, a true oasis is created away from Carson Street.



Moment Model of Open Market



Through the Walkway toward the Open Market

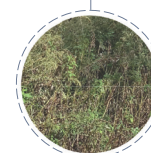
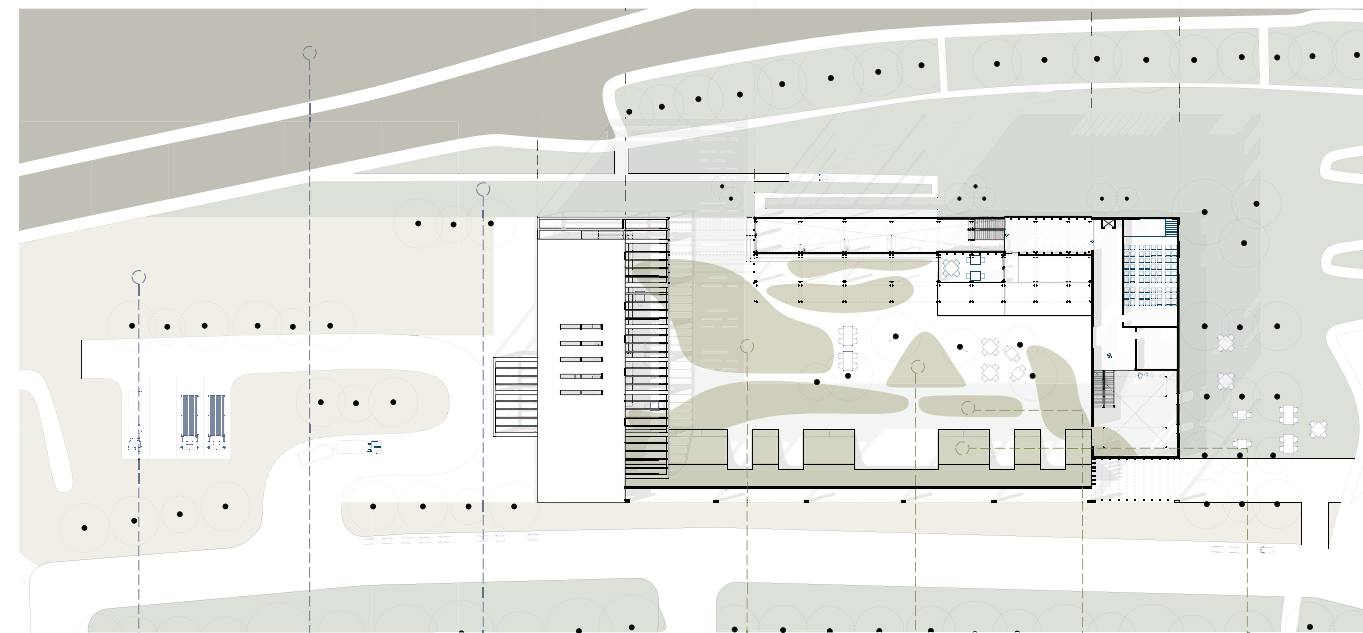
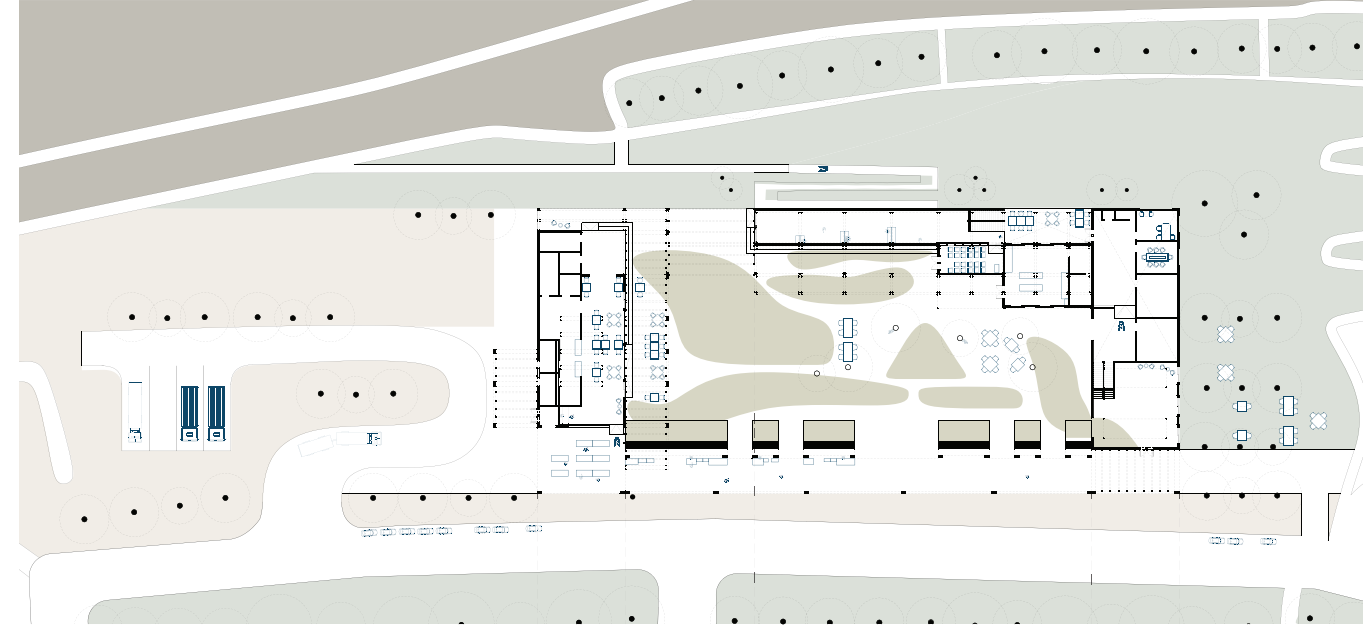


Fall 2021 Studio: Poesis

Studio Coordinator: Laura Garofalo

Studio Professor: Tommy CheeMou Yang

Project Partner: Grace Kolosek

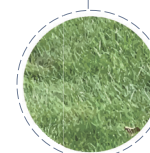


TALL GRASS



WILD SHRUBS

SURROUNDING VEGETATION



MAINTAINED GRASS



CHICKWEED



RHUBARB STALKS



RAMPS



MORELS

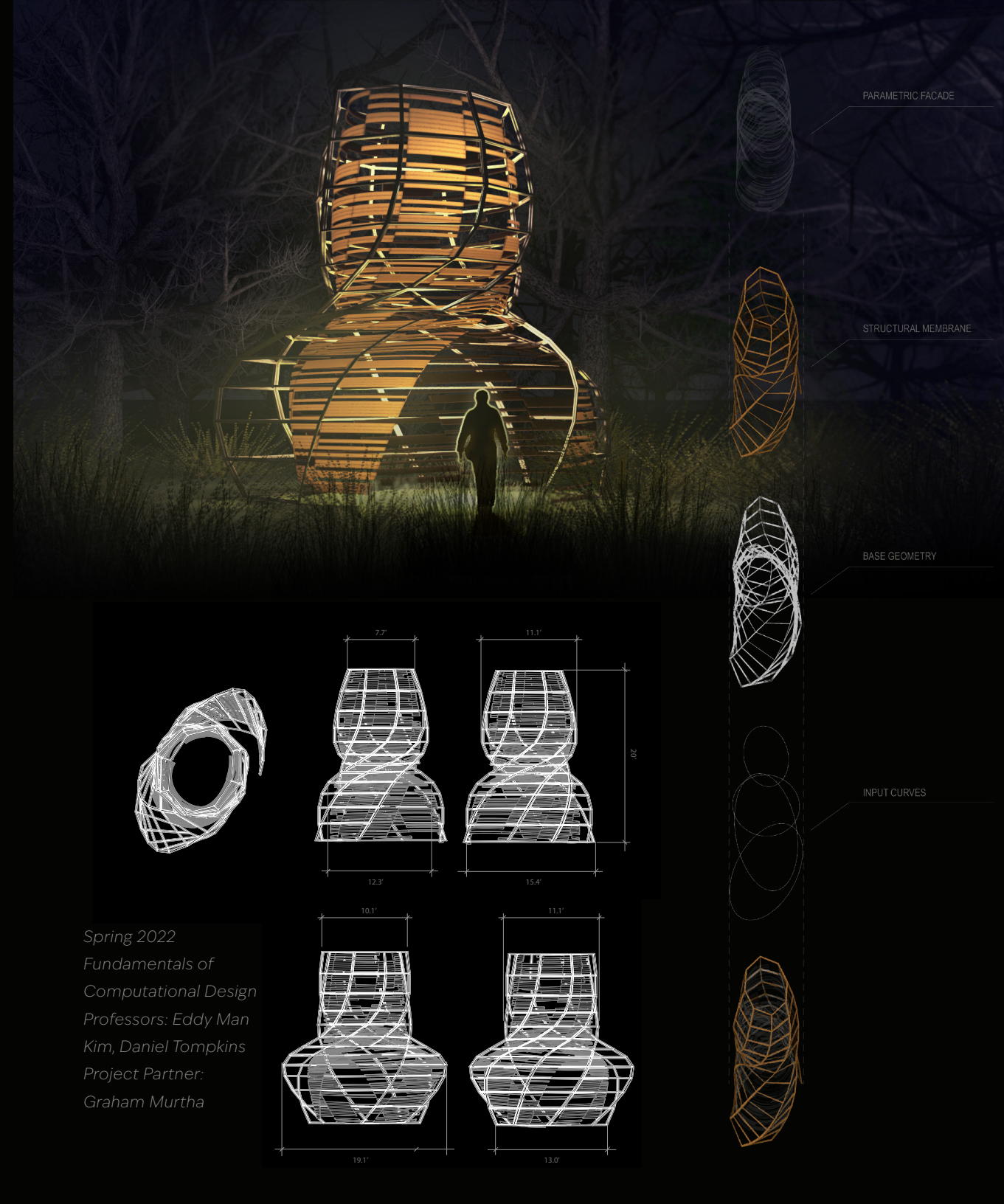
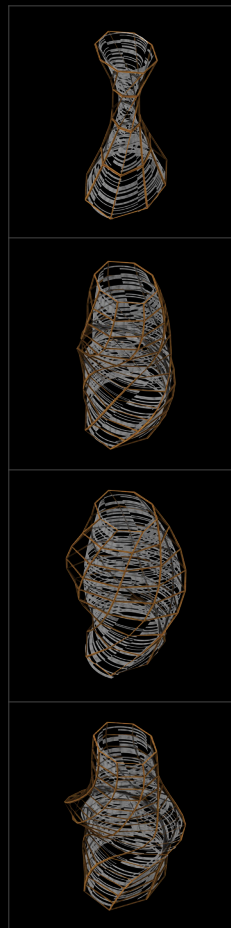
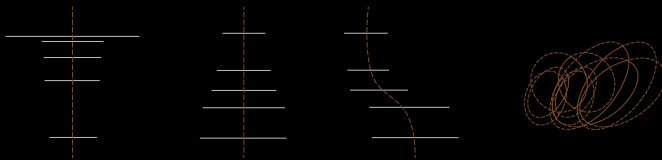
FORAGING GARDEN

ARBOREOUS LANTERN

This project explores the possibilities of creating parametric variations that are informed by a varying number of ellipses serving as input curves as well as varying radii, rotation angles, and distances of the ellipses from one another. Manipulating a drive curve and further transforming the input curves by finding the intersection between two sets of ellipses, this project focuses on the design of a structure and its development through representational techniques.

The design is inspired by the biophilic design work of Neri Oxman, who simulated organic textures in her work to create unique lighting and material conditions, and by the double circulation system of the Gherkin. The Arboreous Lantern sits in a forested park area and blends in with the scenery as a skeletal tree form, bursting with light from within. It behaves as a sculptural structure that provides a spatial experience, for any user engaging with it.

Varying the radii and rotation angles of the ellipses

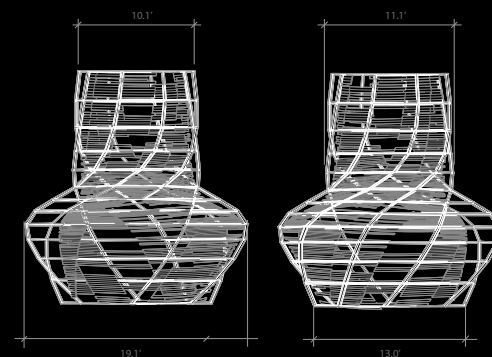
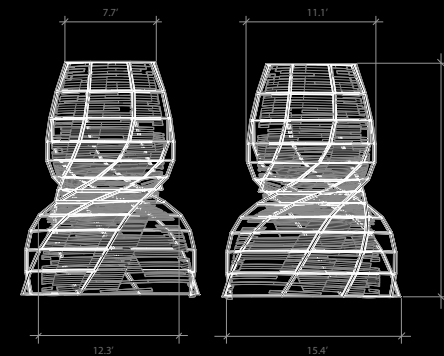
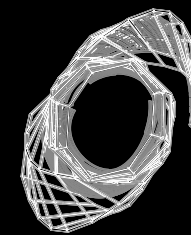


PARAMETRIC FACADE

STRUCTURAL MEMBRANE

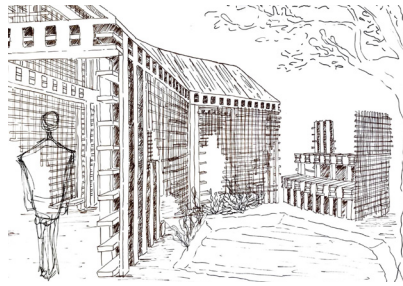
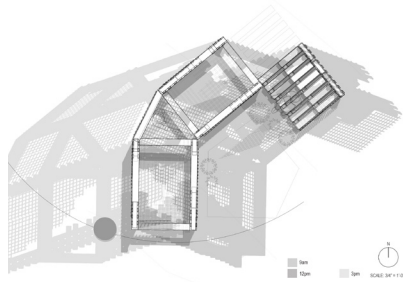
BASE GEOMETRY

INPUT CURVES



Spring 2022
Fundamentals of
Computational Design
Professors: Eddy Man
Kim, Daniel Tompkins
Project Partner:
Graham Murtha

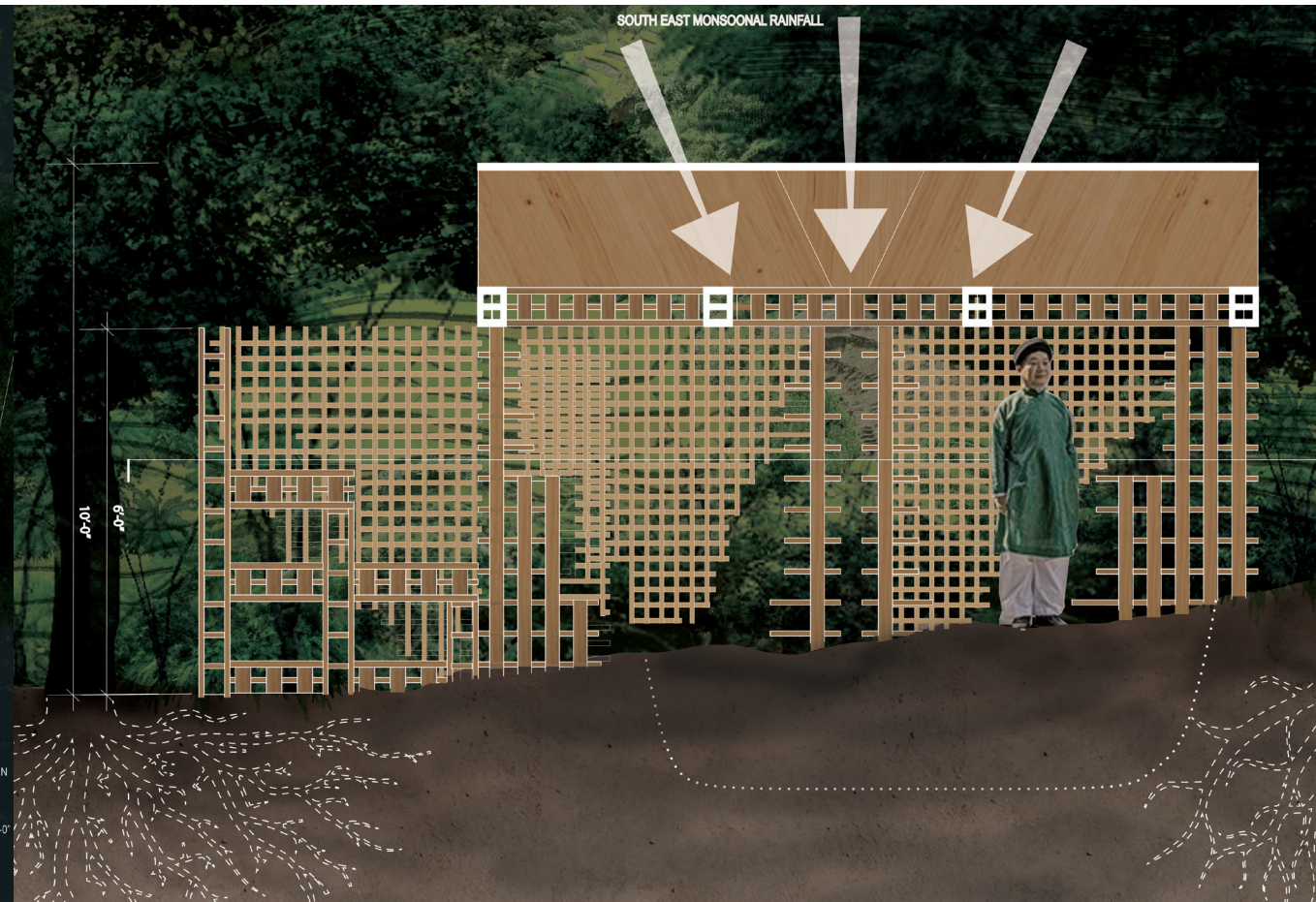
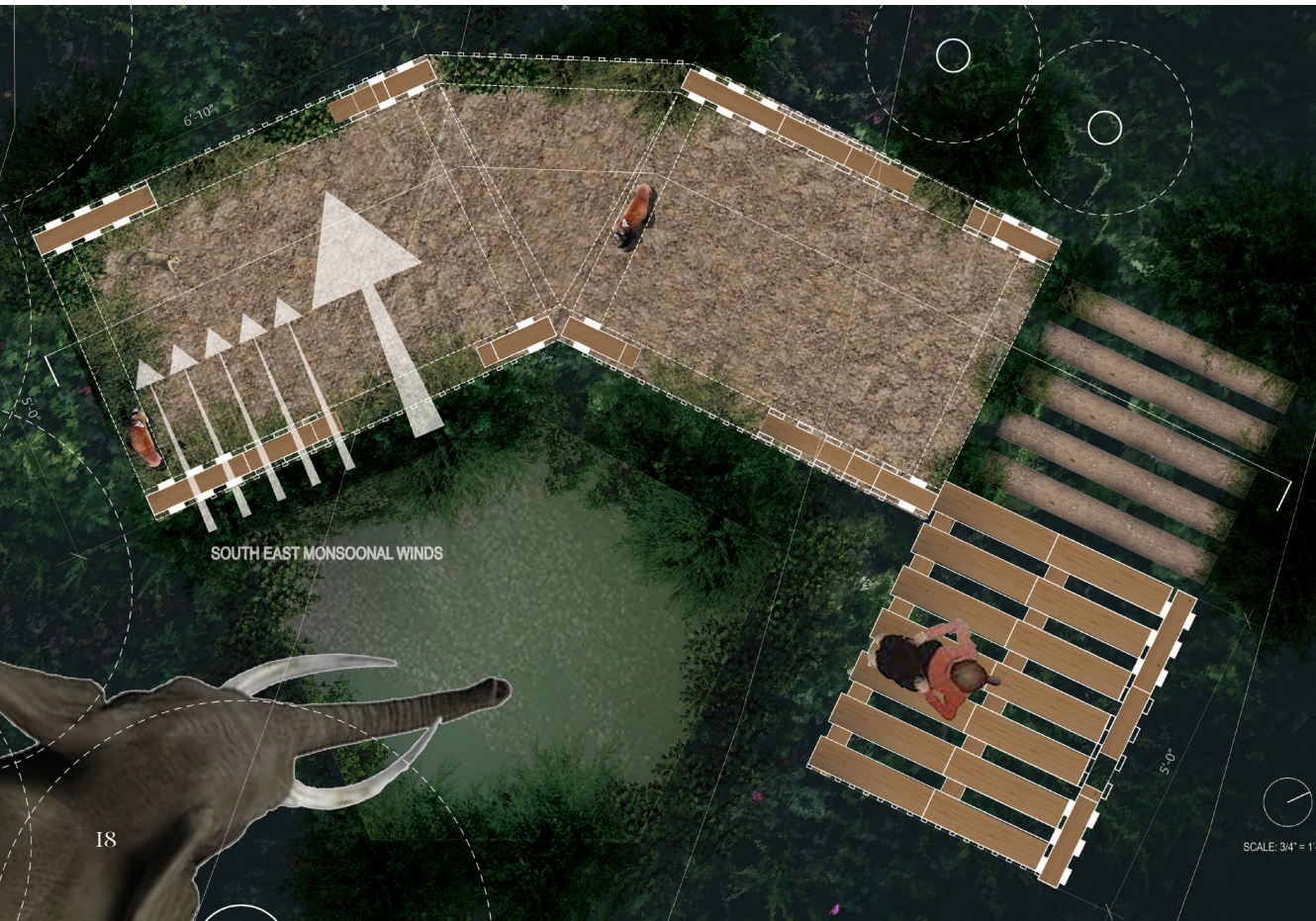
THE SHEI GRID



The Shei Grid aims to respond to the high annual temperatures and heavy rainfall received in the Yunan province of South West China. The Shei Grid, which translates to 'water grid', collects water received from the monsoonal winds into a pool. This pool then serves as an 'environmental stage' for recreation as well as occupation by animals and human beings.

Structurally, the wall is divided into two components - a passageway to provide shade and a seating structure. The North-South orientation of the wall and gabled roof blocks the monsoon winds causing water to be collected. These winds also experience an additional behavior of diffraction as the grid like walls and bamboo lattice implement the idea of "wall-less" structures that are prevalent in precedents of this biome. The lattice reduces light intensity, providing shade to the inhabitants inside.

Fall 2021 Studio: Poesis
Studio Coordinator: Laura Garofalo
Studio Professor: Tommy CheeMou Yang



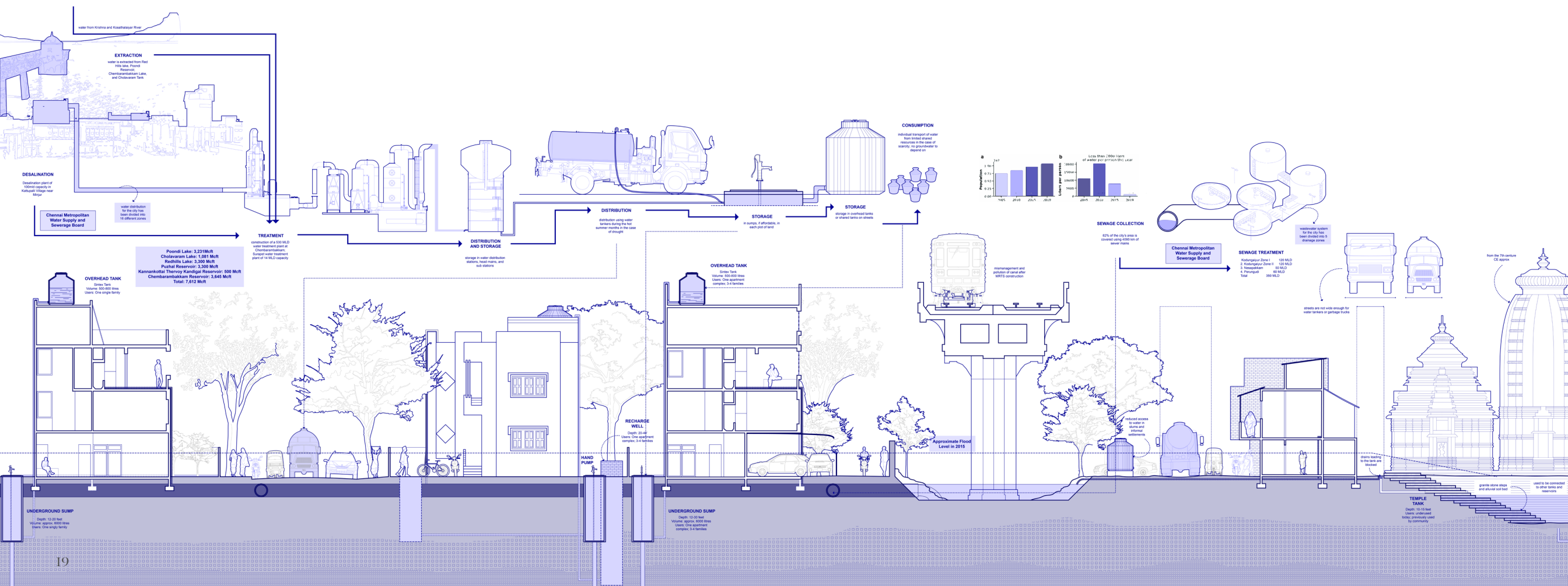
WATER FLOWS / WASTE STREAMS

Located on the southeastern coast of India, Chennai, previously known as Madras, was historically celebrated for its rich water landscape. However, rapid urbanization and limited land availability have drastically reduced the city's water bodies from 12.6 square kilometers in 1893 to a mere 3.2 square kilometers in 2017, resulting in a profound loss of urban ecological infrastructure. Due to these reasons, the city experiences intense floods during the monsoon, followed by droughts in the subsequent summers due to inadequate groundwater recharge. The situation is further worsened by unregulated sewage dumping into the remaining waterways.

The current water flow system in Chennai is linear. Water is extracted from reservoirs or underground wells, transported near the city for treatment, and distributed across 16 broad zones. In contrast, the city's solid waste management

system is heavily influenced by the informal network of Kabadiwallas (waste collectors). Kabadiwallas recover post-consumer waste through an ecosystem driven by informal labor.

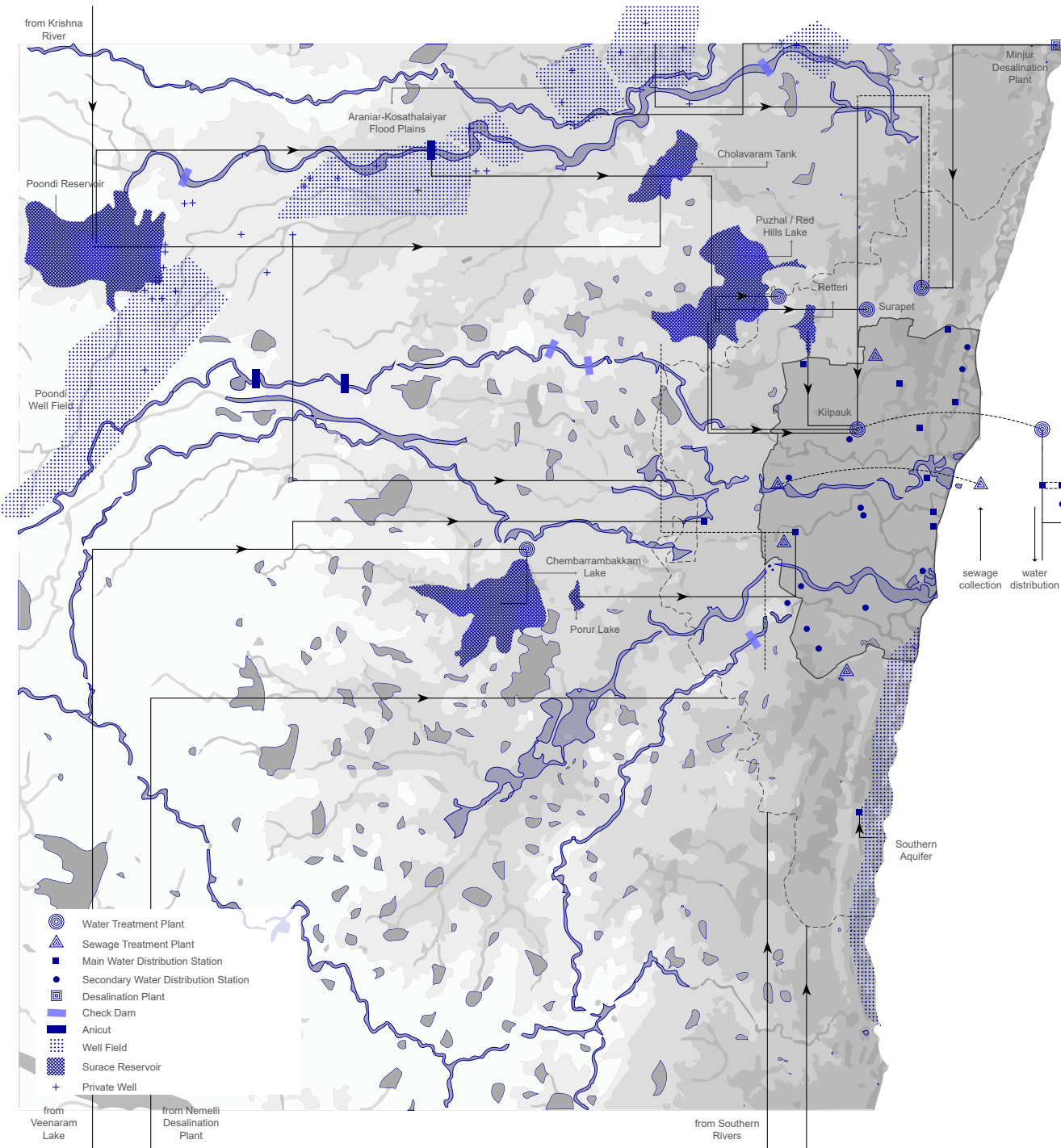
My research proposes a transformative circular economy approach that harnesses the potential of Kabadiwallas to address the shortages in Chennai's linear water management system. The hypothesis involves redirecting waste streams to create water-harvesting objects at various scales—ranging from individuals and households to entire neighborhoods. This approach transcends traditional waste management by promoting skill development, recognizing informal labor, and establishing educational centers for circular practices. In response to this research and visual mapping, my thesis project will be further developed during Spring 2025 to visualize spatial interventions.

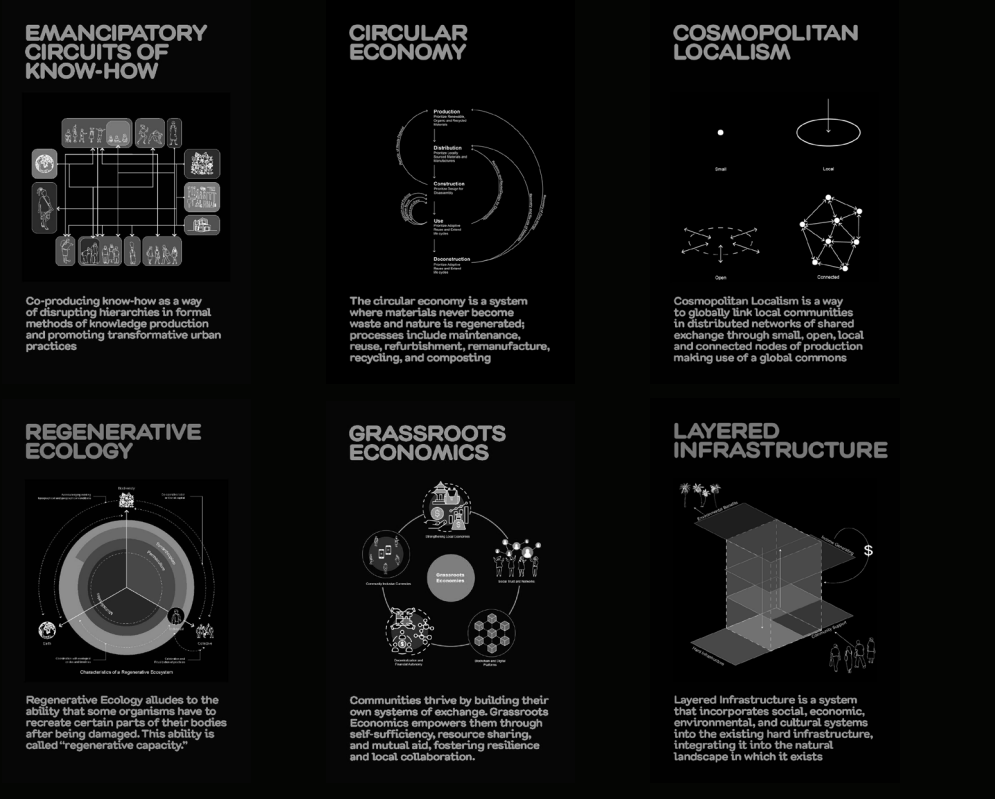
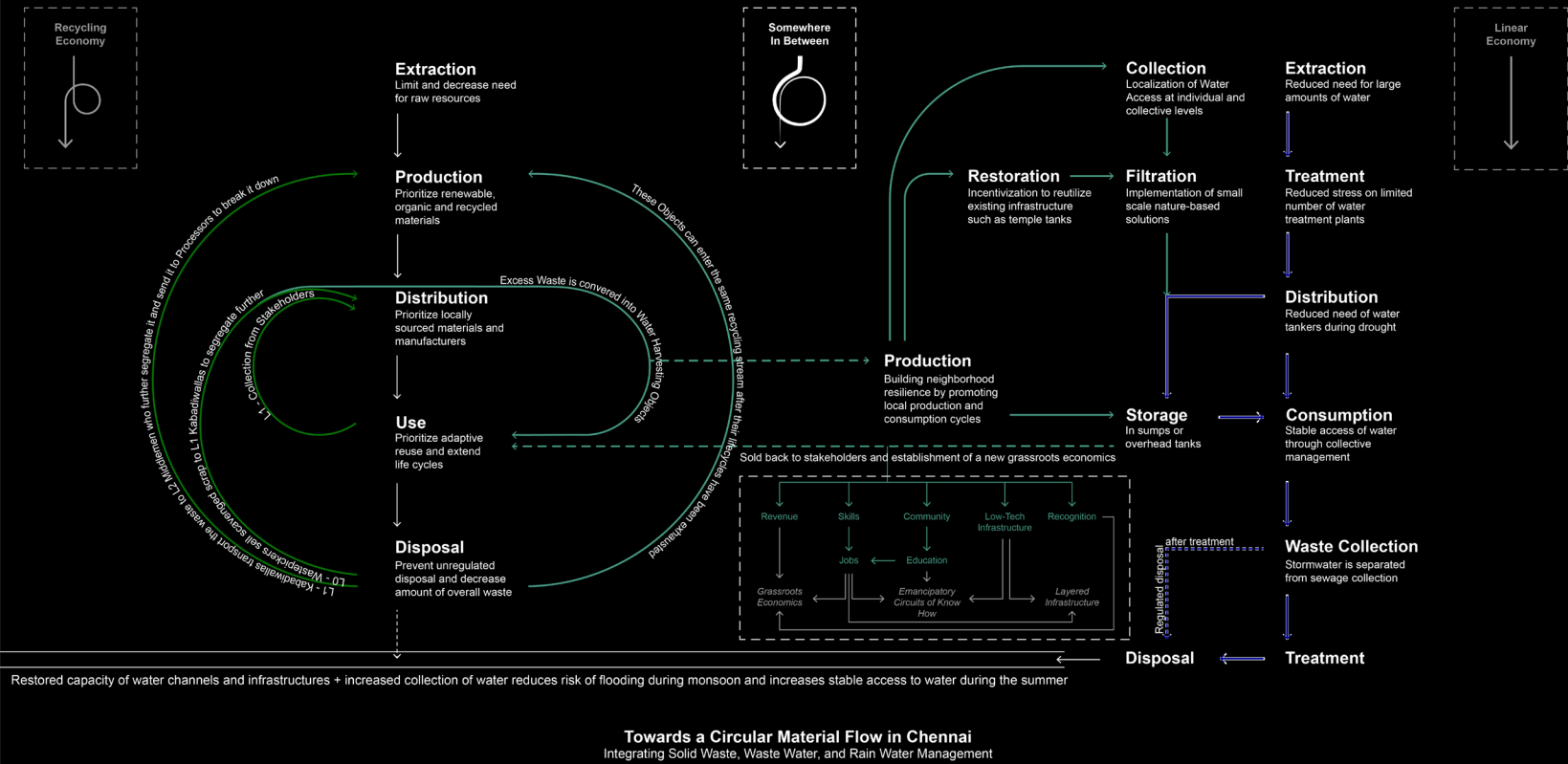
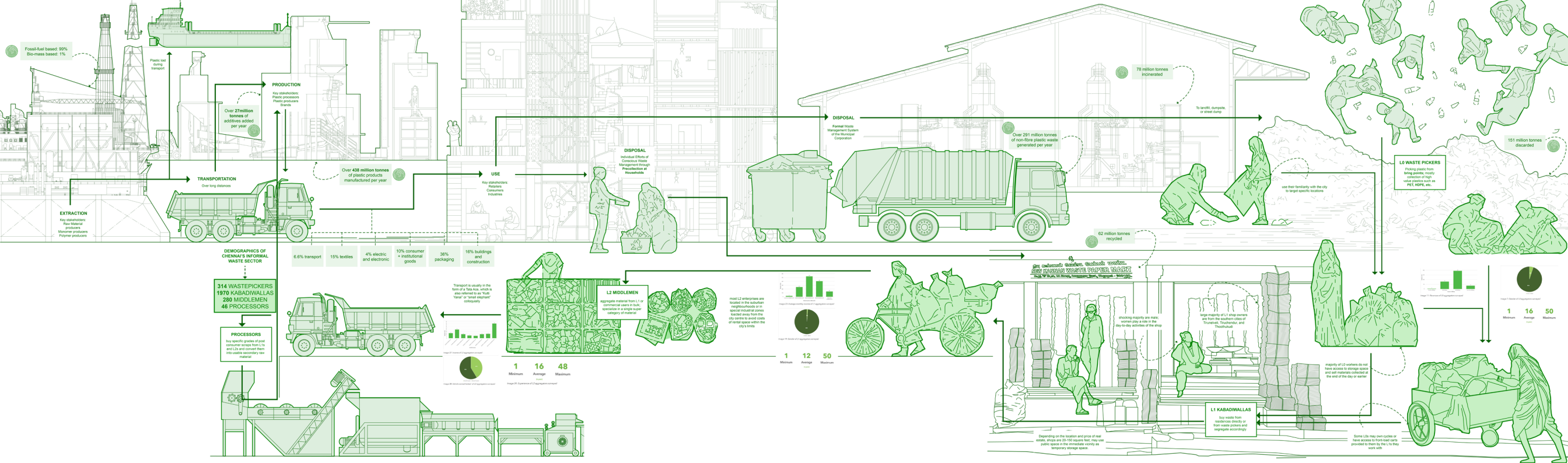


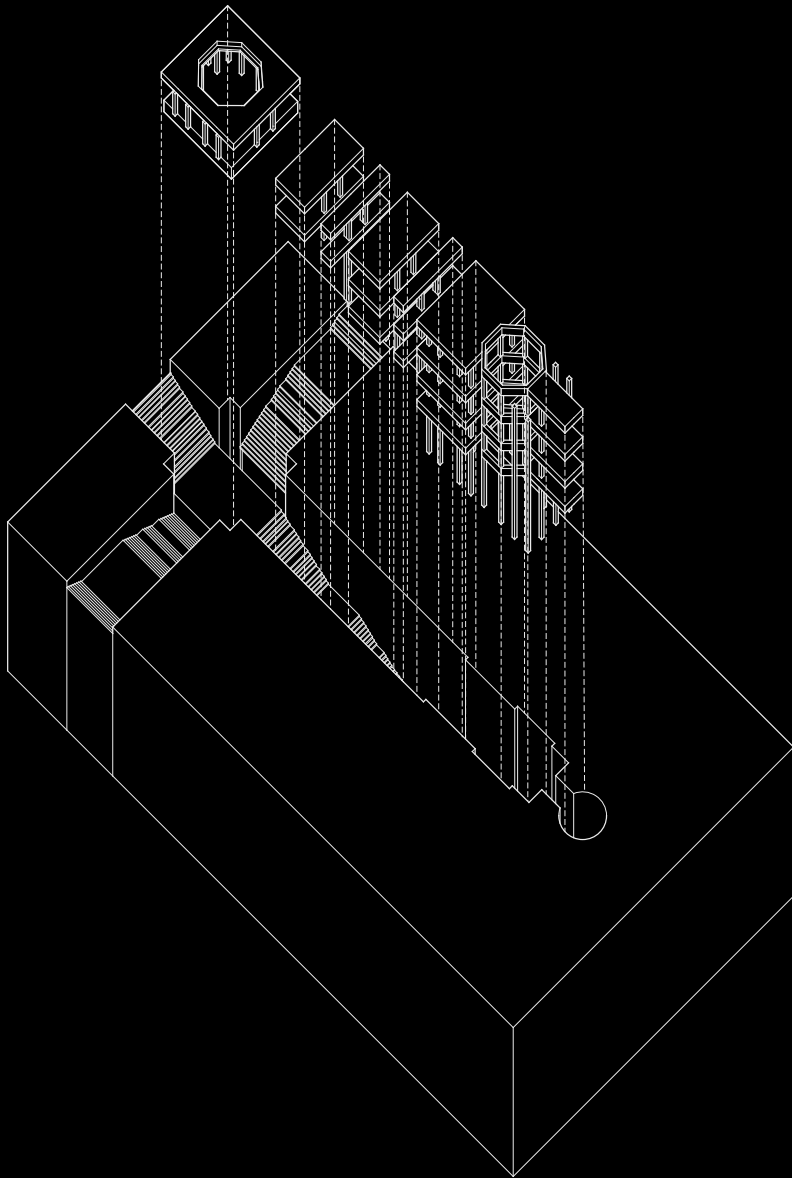
What if Chennai's waste streams were diverted to establish cosmo-local production cycles of low-tech water harvesting infrastructure by elevating existing waste management networks to address the city's water uncertainty?

Fall 2024 Studio: Commoning the City

Studio Professor: Stefan Gruber







Vanshika Bhaiya
vbhaiya@andrew.cmu.edu
+1 (412) 320-9776