



UNIVERSITY OF PENNSYLVANIA

2024 *M. ARCH PORTFOLIO*  
*MAITREY PRAJAPATI*

I believe in a sensitivity that is inspired by nature to shape emotional spatial experiences. There is a tacit simplicity in the vivid and unrestrained complexity of human social lives.

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# 01 TRUSSED ANOMALIES

*instructor* Dr. Masoud Akbarzadeh

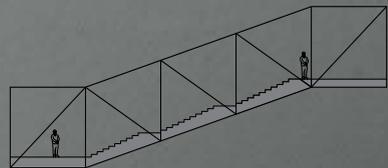
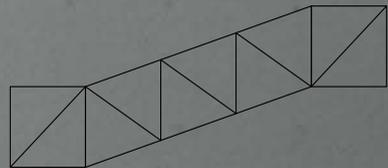
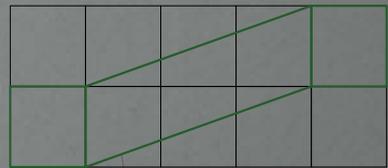
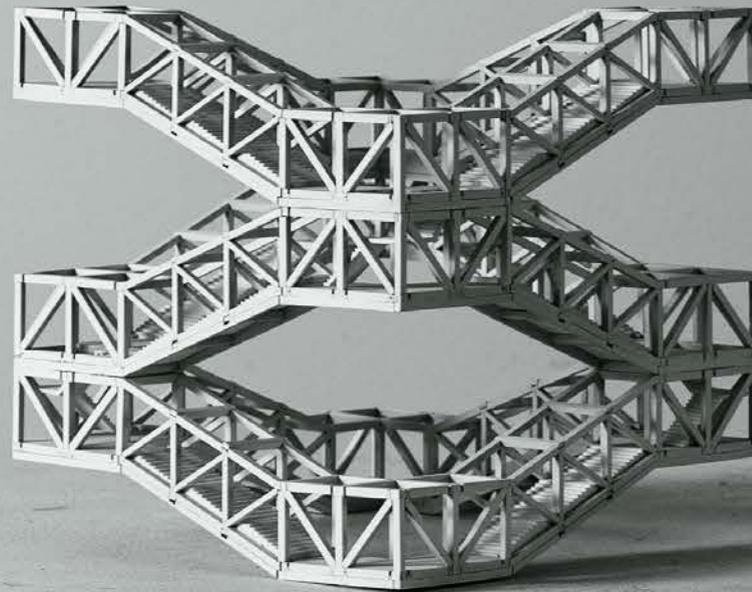
*premise* Implement circular design processes to minimize construction waste and maximize resource reuse through structural efficiency

This project aims to investigate innovative methods of design, assembly, and disassembly of prefabricated parts that meet the functional requirements of a mid-rise building. The assembly evolves progressively to ensure the structural integrity of the building and consider environmental factors of the site.

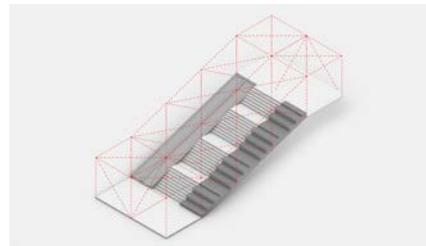
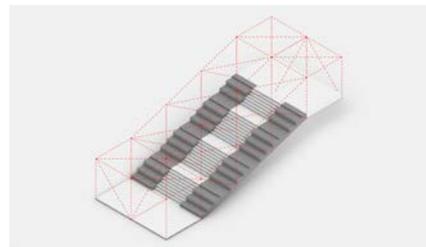
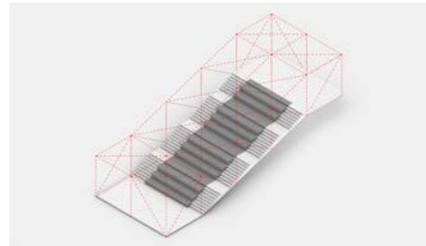
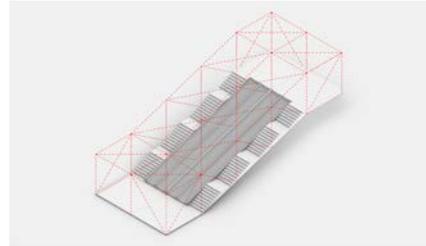
Long span trusses are studied and devised as a schematic language that can then be deployed at multiple scales. This structural paradigm seamlessly adapts to the evolving programmatic exigencies of the building – spanning entire floors, condensing into conduits, or orchestrating the building's arterial circulation system. Embracing *parametric flexibility*, these trusses metamorphose to accommodate a multiplicity of functional imperatives. The innate modularity of individual elements, coupled with the overarching massing strategy, engenders a realm of possibilities for design catered towards disassembly and subsequent repurposing.

*Team:* Clara Shim

*keywords* highrise \_ structural analysis \_ efficiency

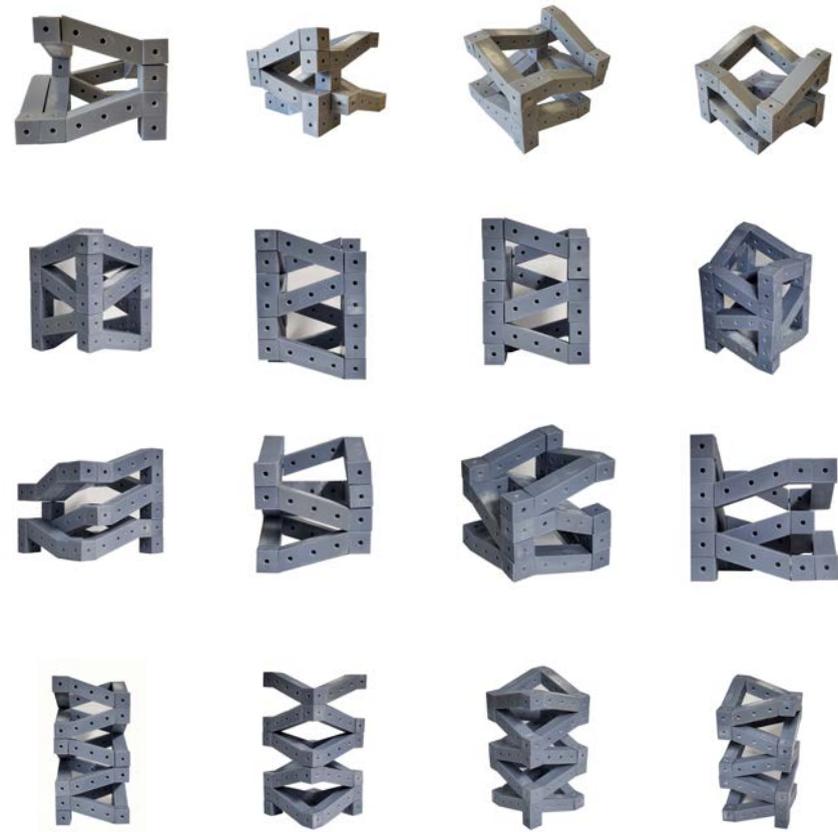


**EVOLUTION OF 'INHABITABLE' TRUSS MORPHOLOGY**



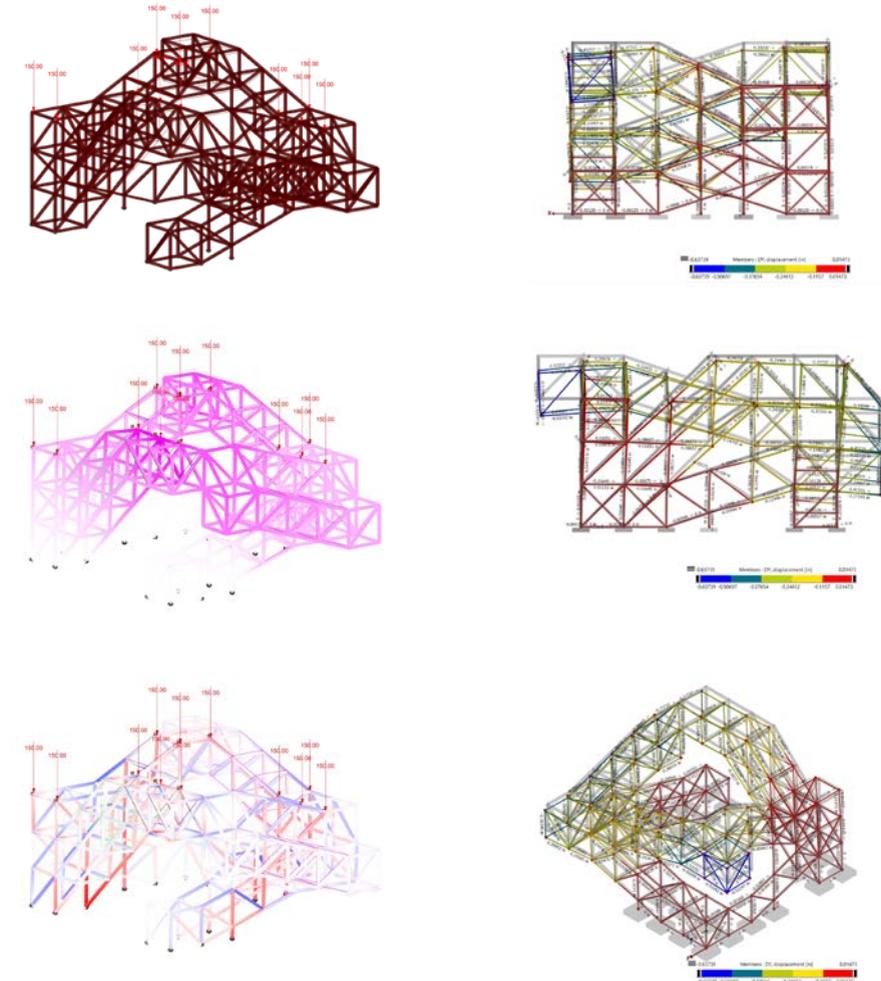
**PROGRAMMATIC CIRCULATION**



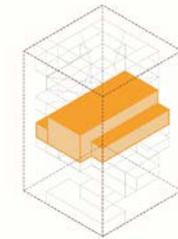
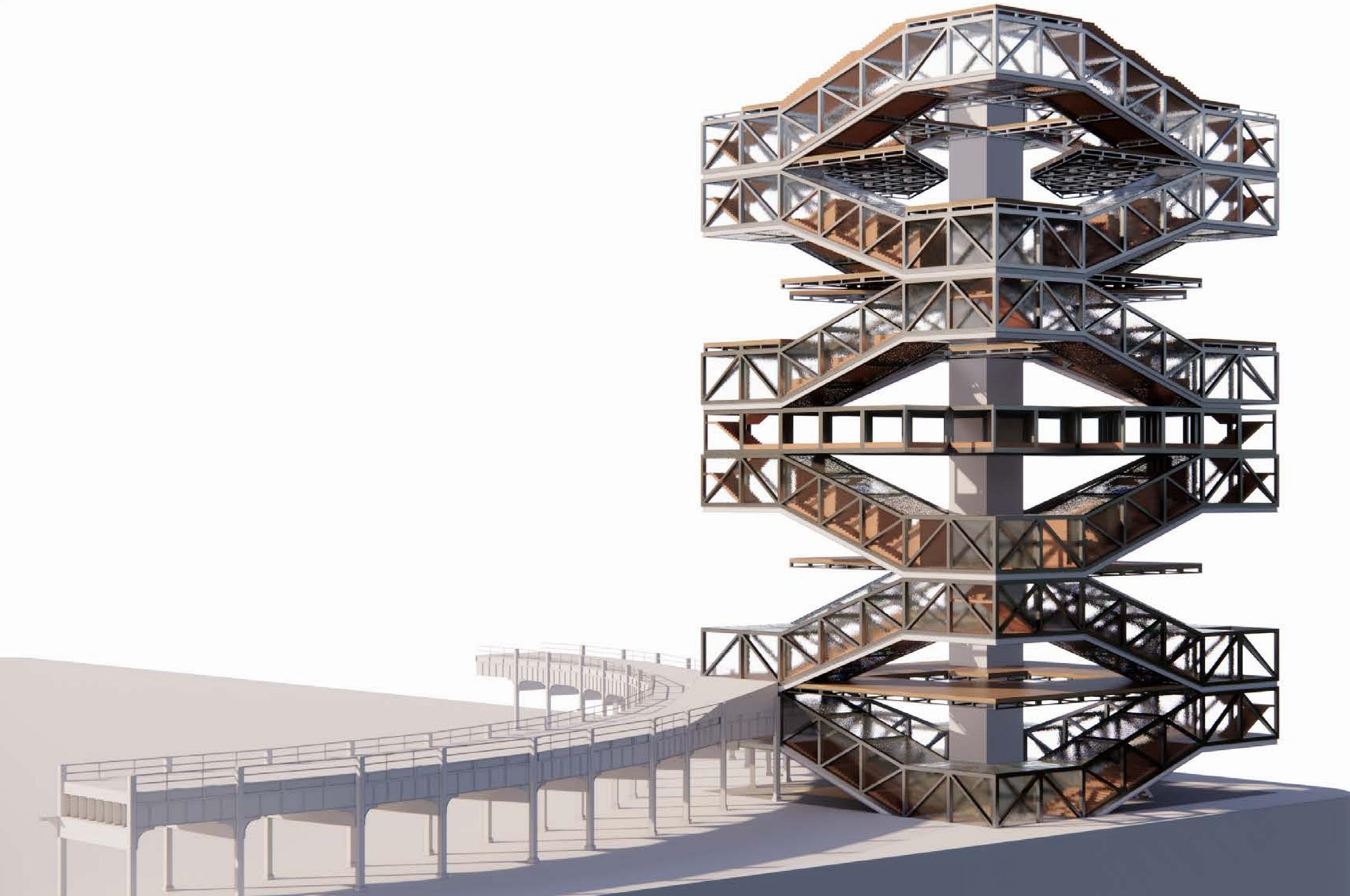


### ITERATIVE STRUCTURAL ANALYSES

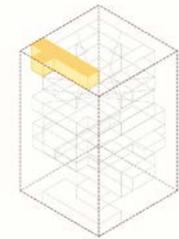
Deflection and axial stress analysis of each design option was instrumental in the process, allowing for a final structure that is highly efficient in material use and structural efficiency. Geometric conditions led to varying load characteristics, and truss members were selected accordingly.



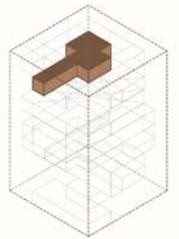
Max. Displacement	4.64 cm
Material	HSS1 6x1 6x3/4 Grade 50
Loading	Gravity + 1800 kN (400 kg.f/sq.m. pressure)



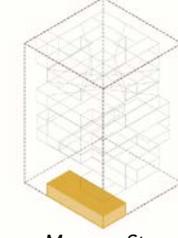
Art Space



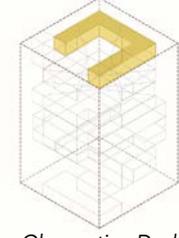
Cafe



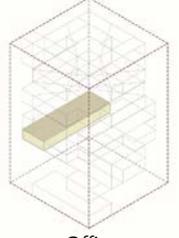
Classrooms



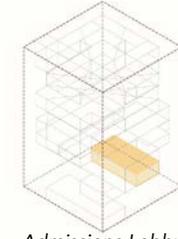
Museum Store



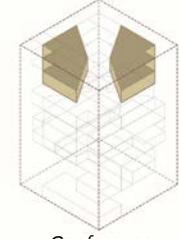
Observation Deck



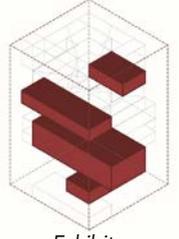
Offices



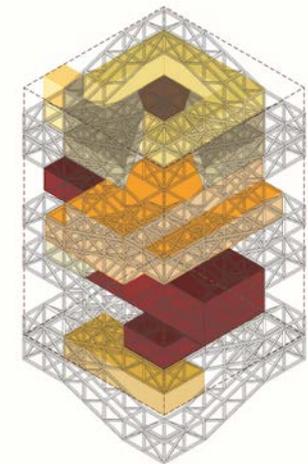
Admissions Lobby

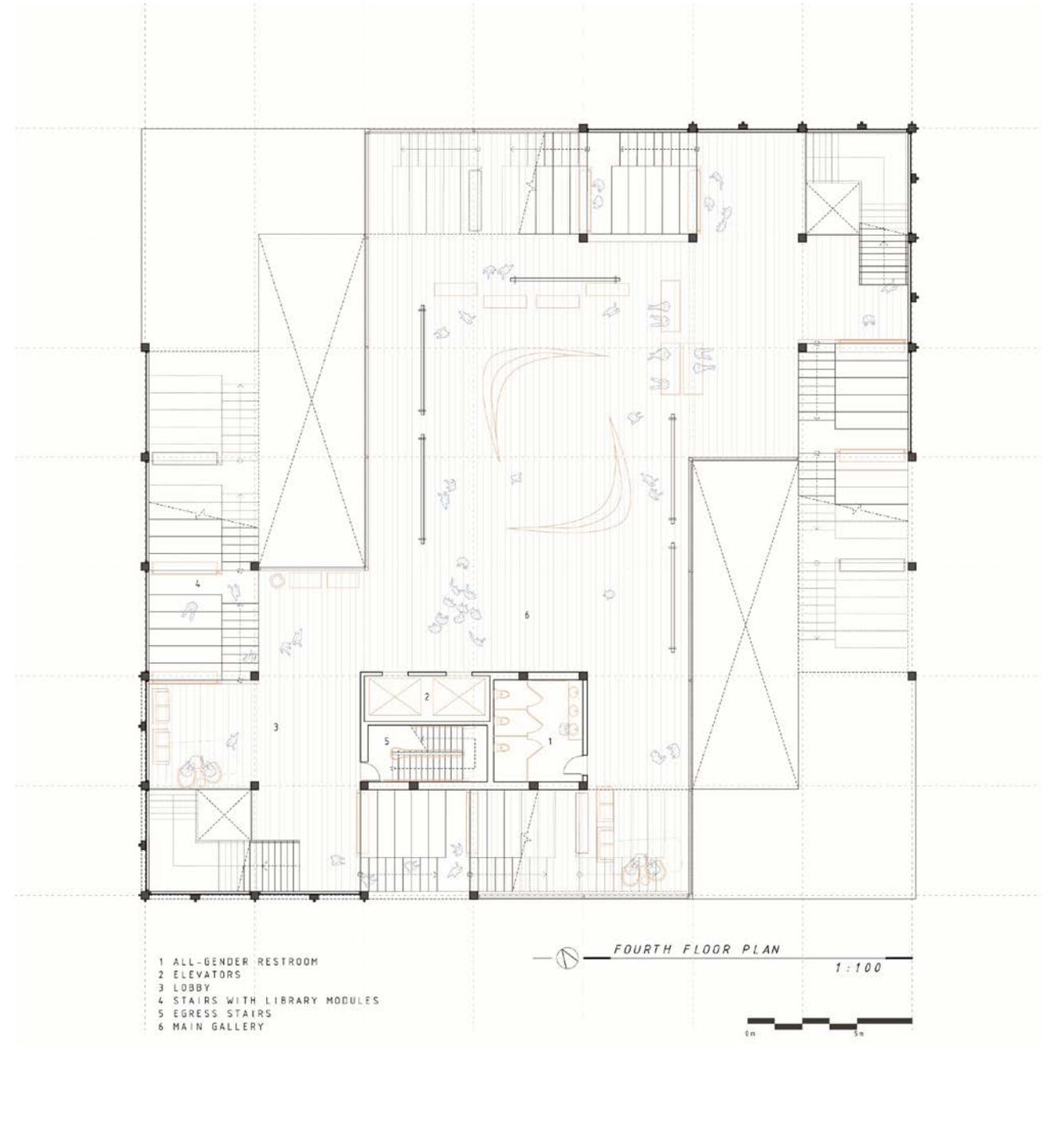
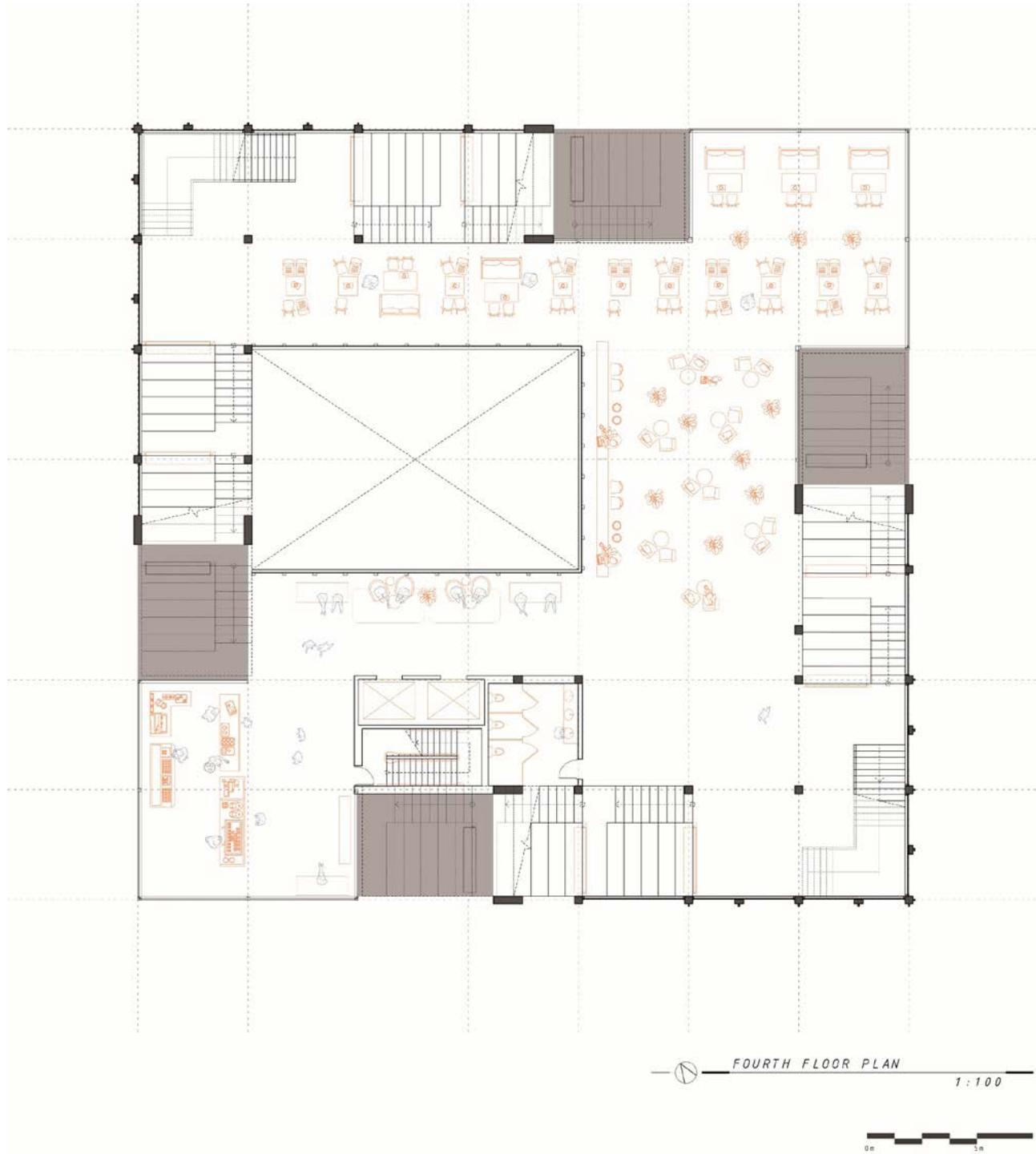


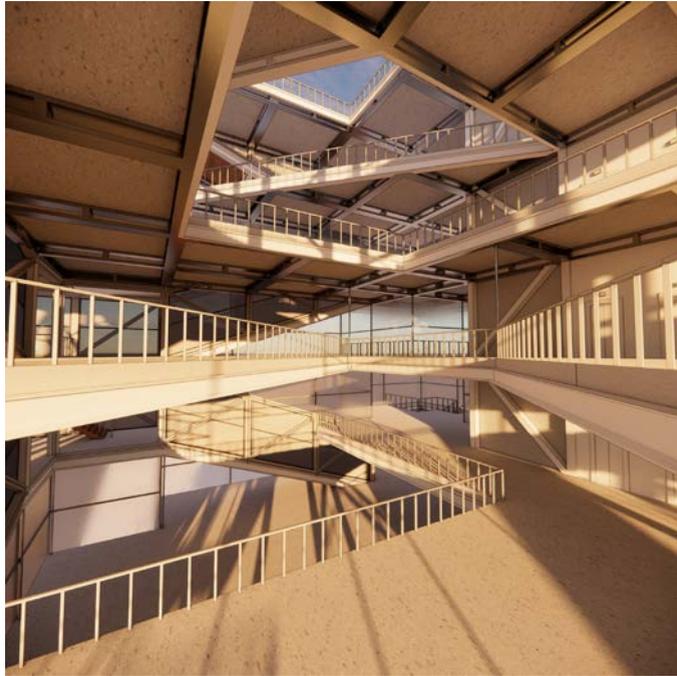
Conference



Exhibits



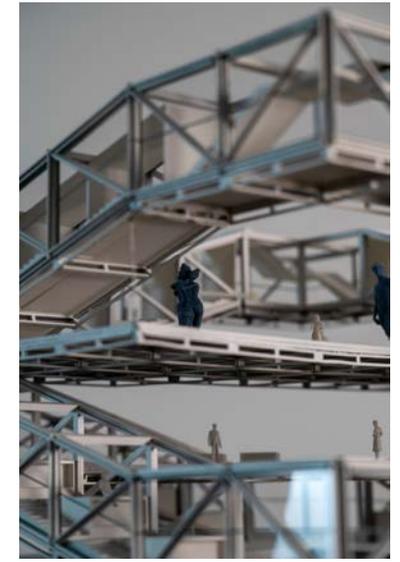
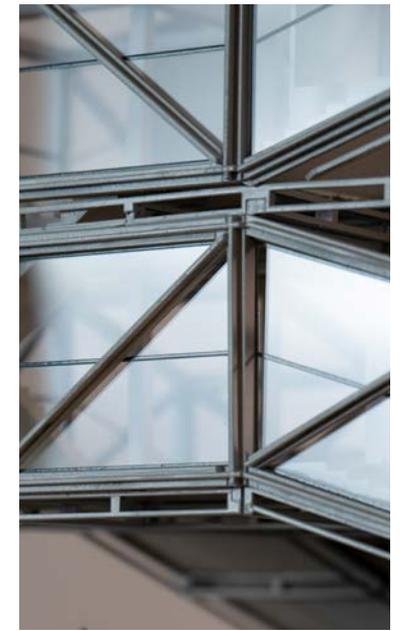
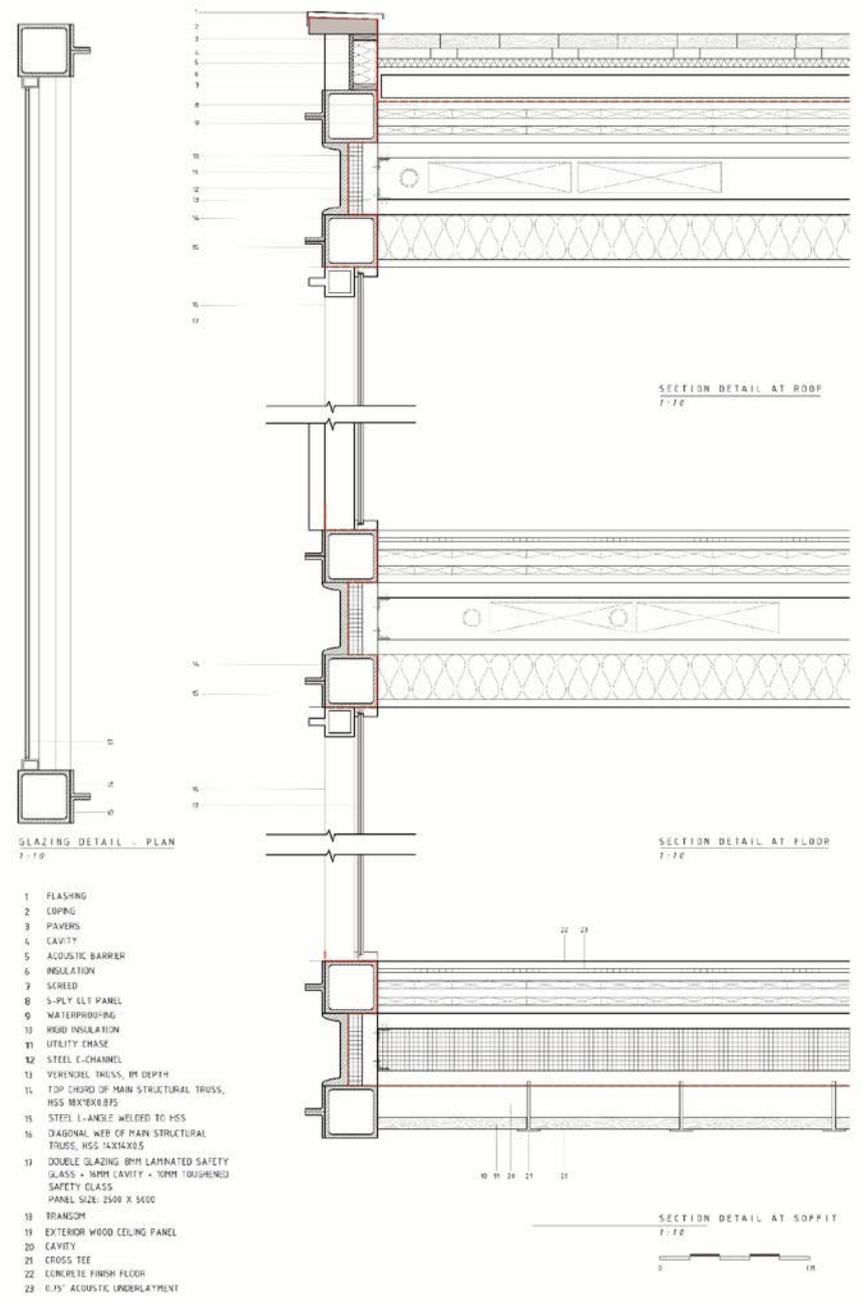


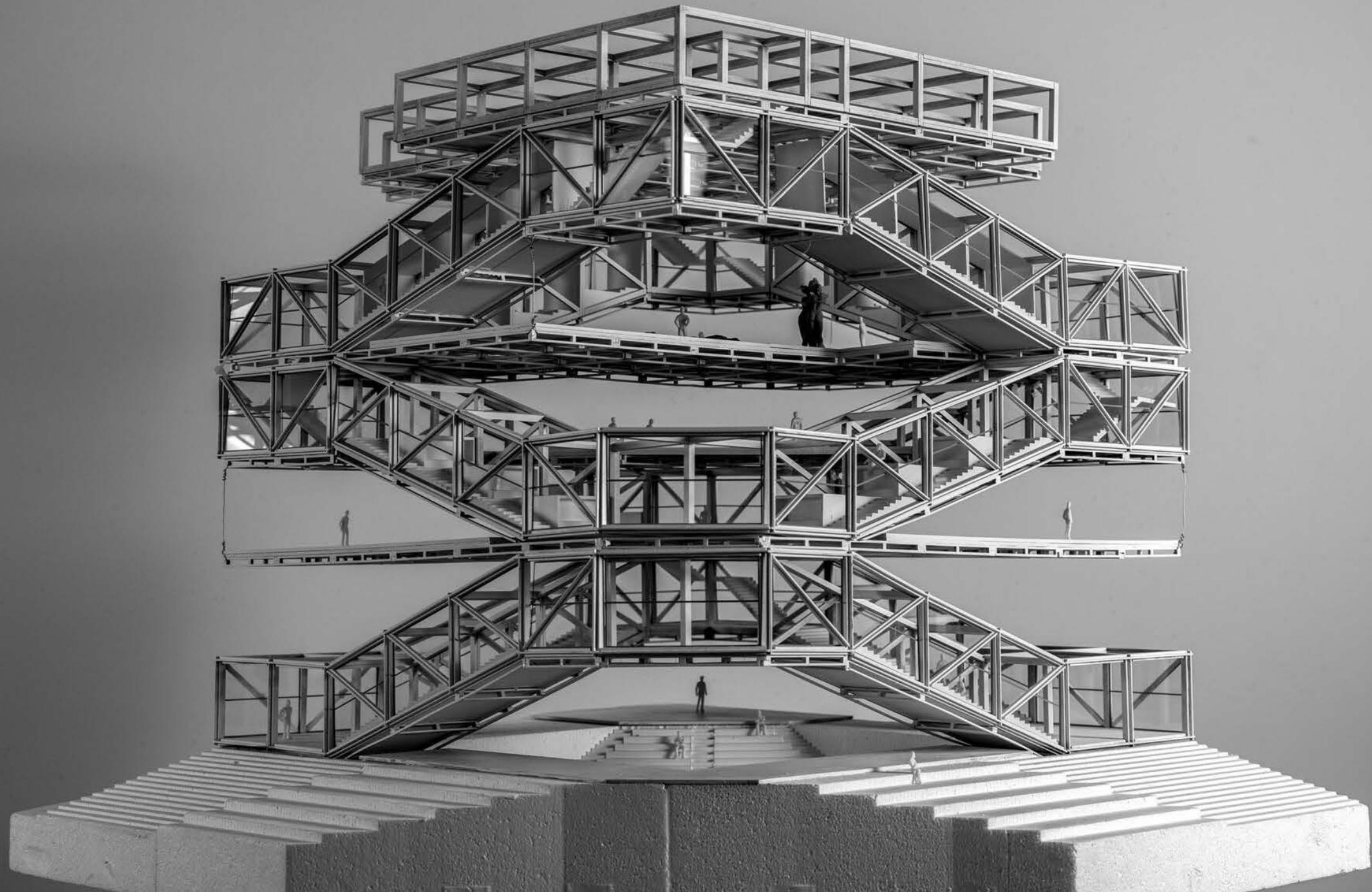


**INTERIOR RENDERS**









## 02 PRODUCE\_ COLLABORATE\_ PERFORM\_

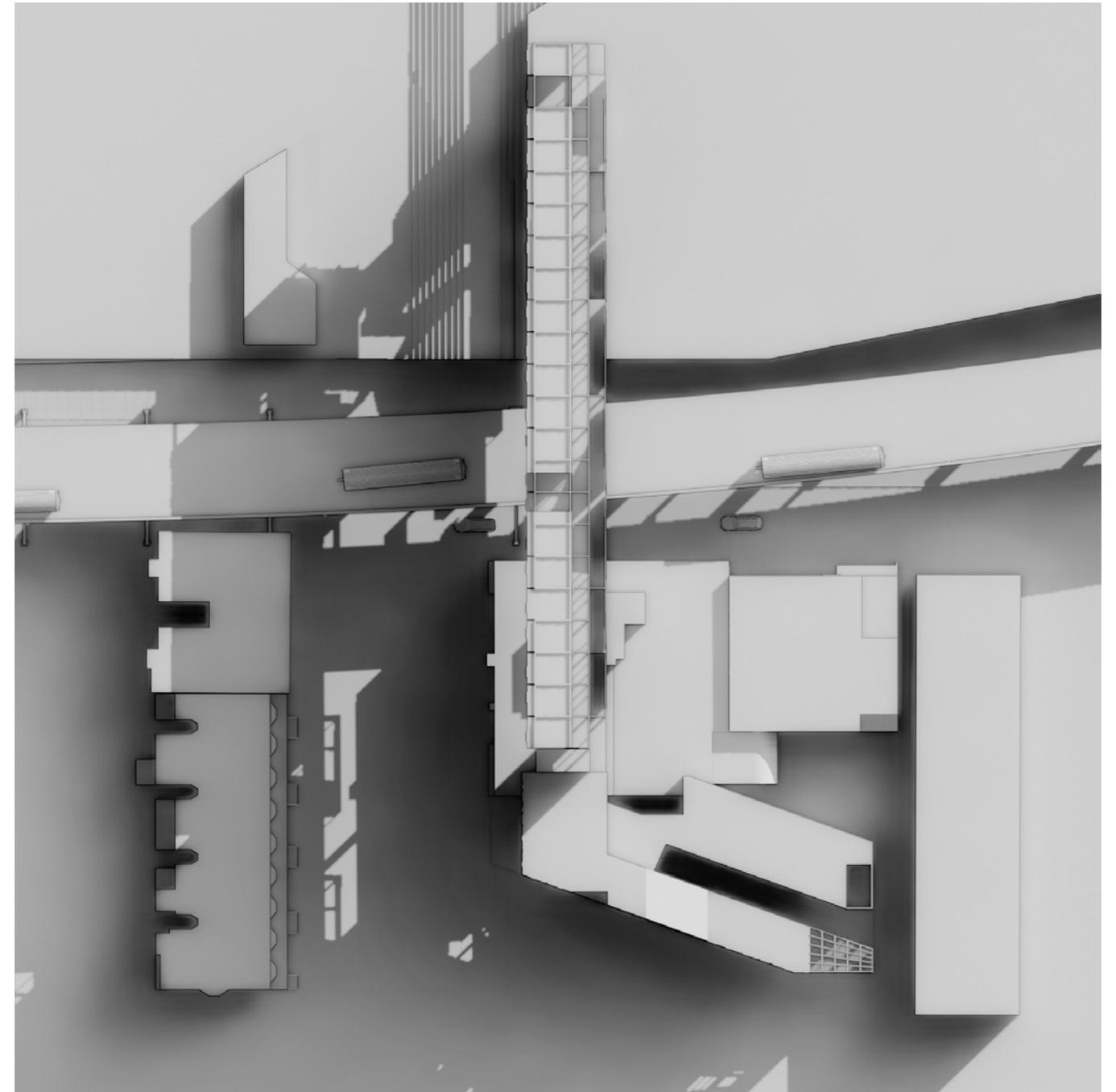
*instructor* Scott Erdy

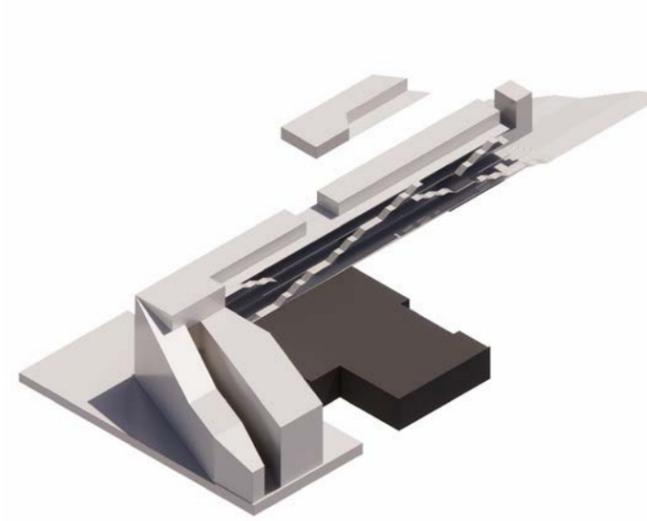
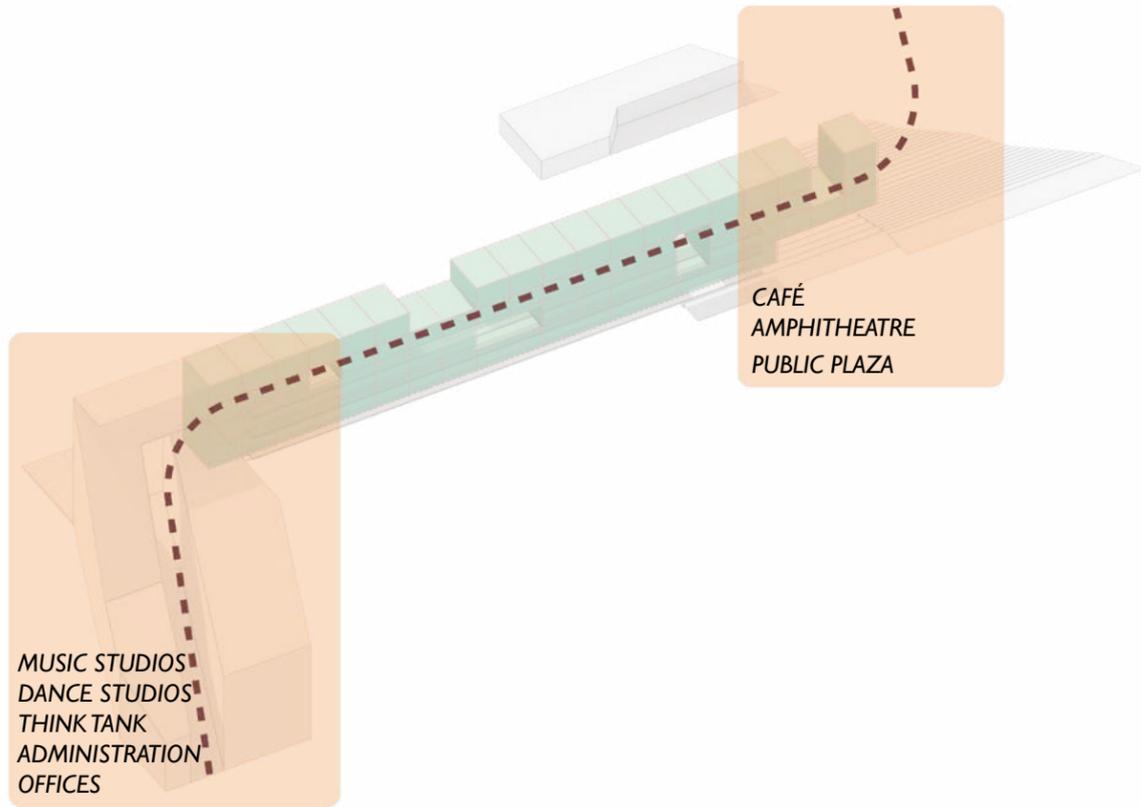
*premise* performative social space set in a community of residential musicians and artists

Some of the liveliest experiences happen in spaces of communal intersectionality – spaces that support multiple people and multiple uses, spaces that can adapt to ever increasing vagaries of social life. Public plazas allow for fluid connections between commerce, community programming and engaging social spaces. This project attempts to situate one such public plaza in the vicinity of the Bandstand studio. *Through reinvigorating the rich history of music and dance at the band stand studio, the space now functions as a multi-purpose venue where regular dances take place. The musicians residing in the compound will have a chance to showcase their music throughout the plaza and in the dance studio, integrating them into the surrounding community.*

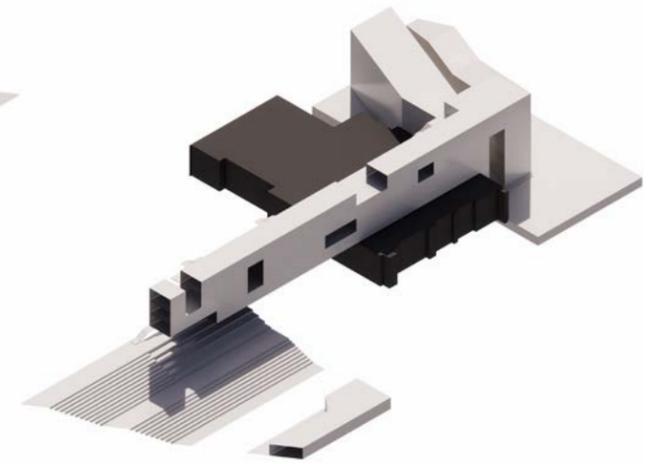
This gradual diffusion of privacy allows the neighbourhood to peek in and thus begin to engage with the artistic and entrepreneurial ventures of the Enterprise Center and the Bandstand studio. On a broader scale, there is an attempt to develop a more cohesive neighbourhood by providing small public plazas for a livelier street-scape and better access to economic opportunities and artistic expression. Community spaces are a reflection of the character of a city, and it is in those fleeting moments of interpersonal connections that urban stories and memories are made.

*keywords* housing \_ public commons

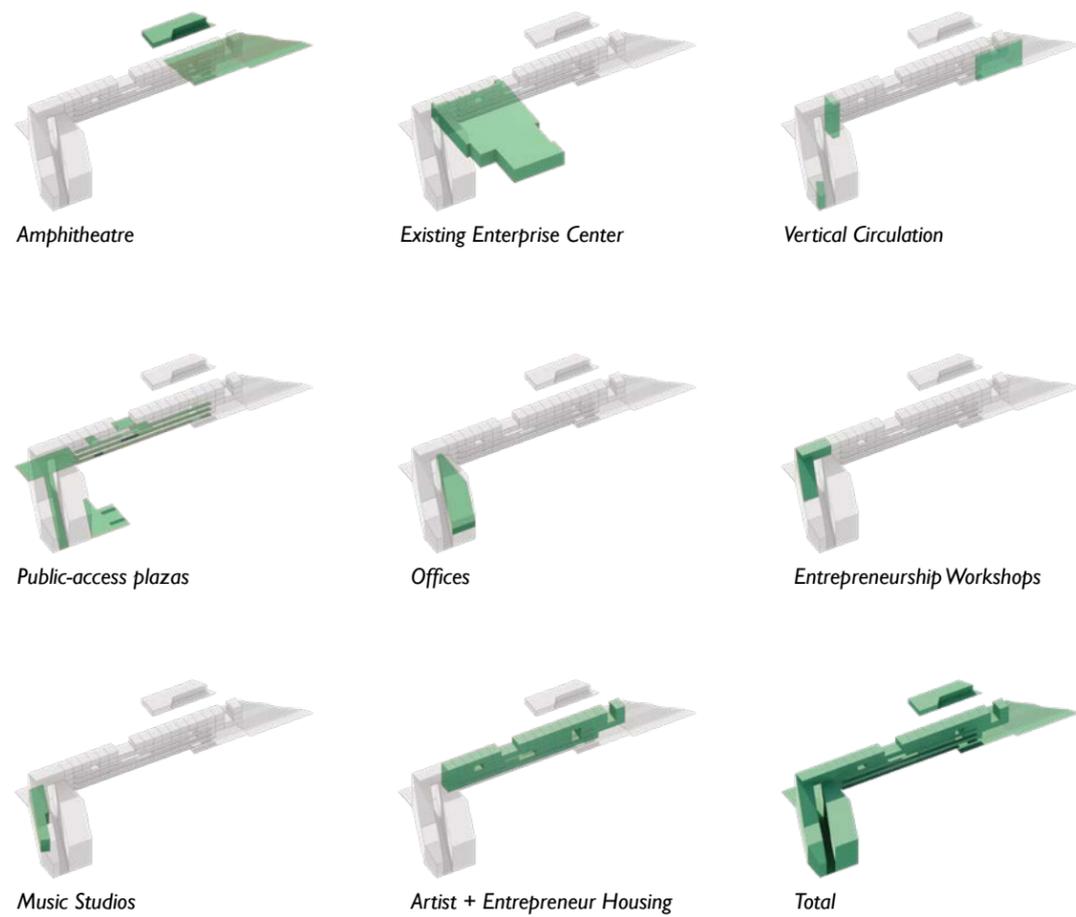




SECTIONAL ISOMETRIC - LOOKING N-W



SECTIONAL ISOMETRIC - LOOKING S-E

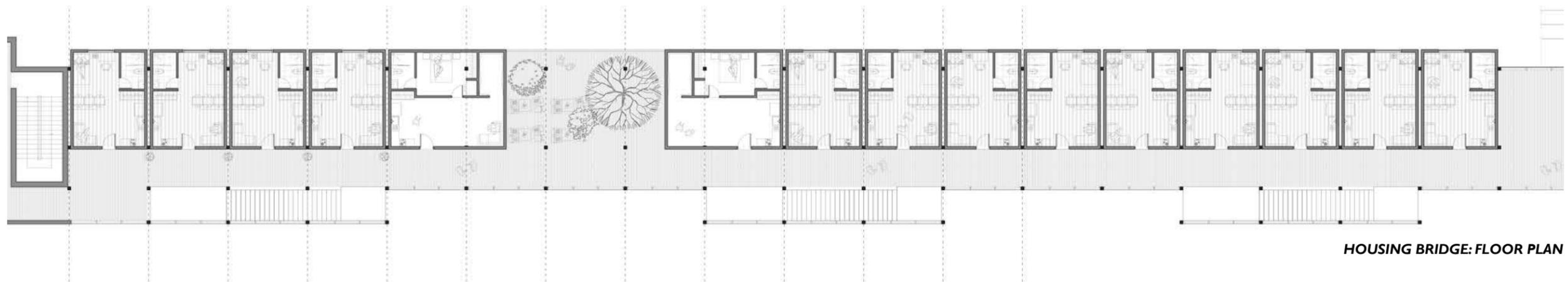


VIEW FROM AMPHITHEATRE TOWARDS MARKET ST.

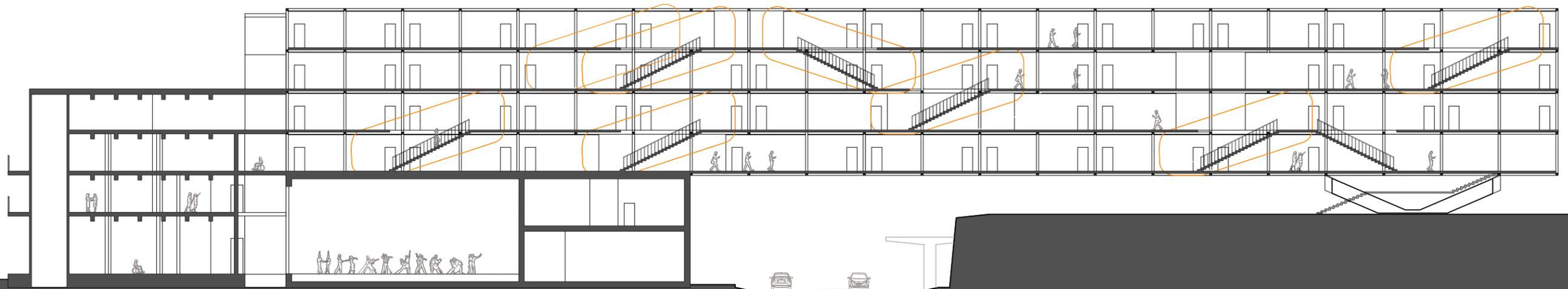




**HOUSING BRIDGE: MARKET ST. LOOKING W**

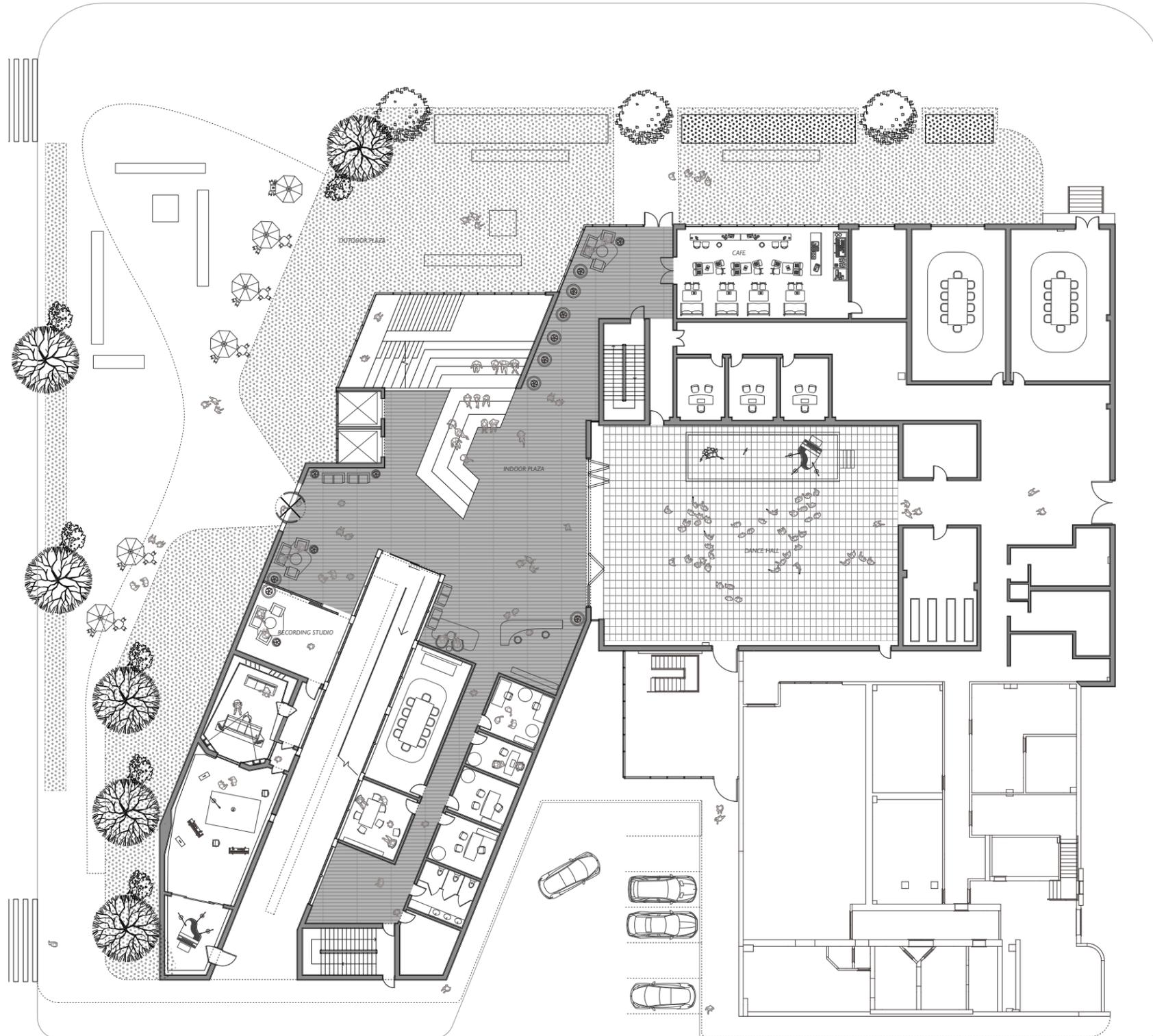


**HOUSING BRIDGE: FLOOR PLAN**



**PERFORMATIVE SOCIAL SPACE THROUGH MUSIC + DANCE**

The building proposal is a suggestion of movement – metaphorically and formally. This movement through the building and the site takes the form of both a semi-private interiority, and a public exteriority. Existing pedestrian routes are carved out from the massing to create a “storefront lane” for curious onlookers on their way to the nearby grocery store – they can peek in and watch the artists working in their music studios.



**GROUND FLOOR PLAN**



**CORNER OF 45TH AND LUDLOW: PUBLIC PLAZA**



# 03 HARVEST VILLAGE

*instructor John Becker, Mary Rogero*

*premise Master-plan and design for an attached housing neighbourhood as a part of an educational regenerative rural community*

*Harvest Village is a Net-Zero energy ecological community located adjacent to the former Maude Marshall elementary school, forming a part of the broader proposal to build an educational co-living community in the outskirts of Oxford, Ohio. The master plan for our project envisions a synergistic relationship between the housing and the school as an integrative and holistic experience for students, faculty and residents alike. This unique connection will be strengthened by an innovative pollinator prairie, planted with a diverse mix of native flowers and grasses, enriching the greater ecosystem of the surrounding community by sustaining native birds, bee population essential to food production, and a dynamic butterfly habitat. The attached housing community is specifically designed to be energy efficient, reduce embodied carbon and promote effective and efficient water use. Our team designed a variety of housing sizes to encourage a diverse mix of community members interested in experiencing engaged community living in a regenerative landscape environment.*

*This project was a collaborative effort and the author was the leader of the design team consisting of 14 students. Along with general project management, the author's role focused on production of detailed sections, energy analysis, and architectural design.*

*keywords housing \_ community architecture \_ conservation*

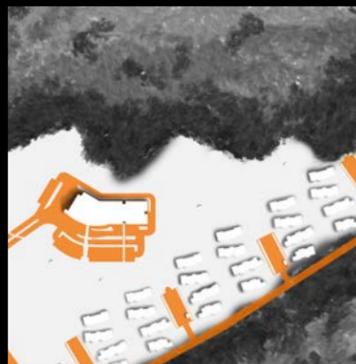




**SITE PLAN WITH MASSING SHOWING THE RESIDENTIAL HOUSES AND SCHOOL**



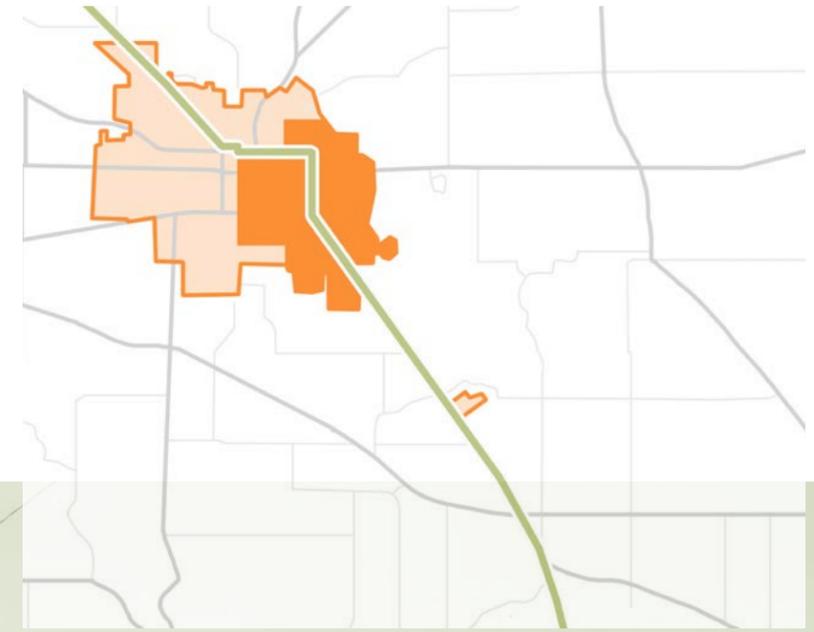
**PUBLIC SPACES**



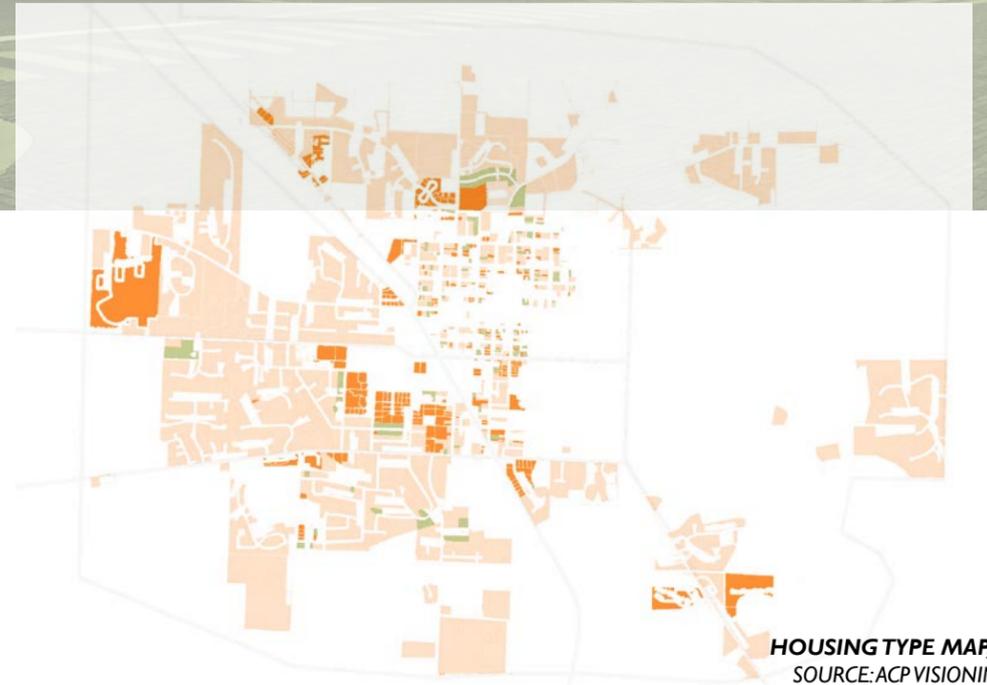
**PARKING ANALYSIS**



**PATHS AND NODES**



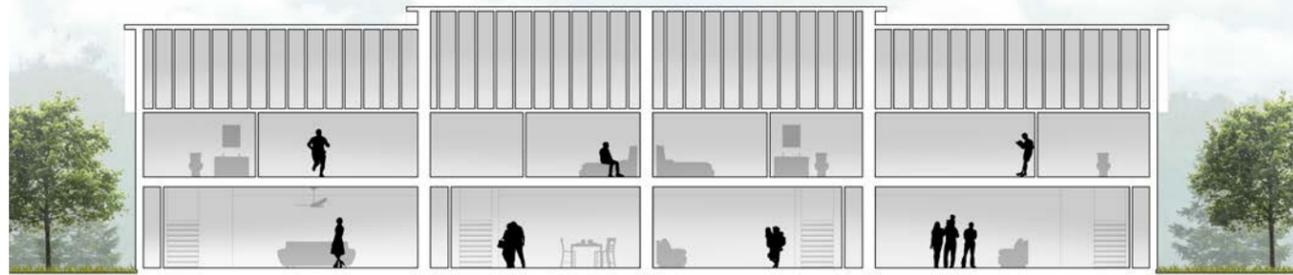
**CONTEXT MAP**



**HOUSING TYPE MAP, OXFORD OH**  
SOURCE: ACP VISIONING + PLANNING



SECTION THROUGH A 3 BEDROOM UNIT



SECTION THROUGH A 4-UNIT RESIDENTIAL BLOCK



COMMUNITY WIDE PV SUMMARY

Unit	Angle	Effective EUI	Load (kWh/)	System Size for year 1 (Panels)	System Size for Year 25 (Panels)
1B	30	17.29	4525	3.45 kW (10)	3.725 kW
1BA	30	16.32	4825	3.725 kW	3.81 kW (11)
2B	30	12.86	6500	4.83 kW (14)	5.175 kW
2BA	30	11.09	8150	6.21 kW (18)	6.555 kW
3B	30	14.63	8400	6.21 kW (18)	6.55 kW (19)

3 BEDROOM PV BREAKDOWN

**8,407 kWh/Year**  
System output range from 7,702 to 8,332 kWh per year this location.

Month	Solar Radiation (kWh/m <sup>2</sup> /day)	AC Energy (kWh)	Value (\$)
January	3.02	482	40
February	4.18	593	49
March	4.48	694	58
April	5.64	802	66
May	5.89	843	70
June	6.22	846	70
July	6.26	875	73
August	6.29	873	72
September	5.59	767	64
October	4.61	670	56
November	3.47	524	43
December	2.72	438	36
<b>ANNUAL</b>	<b>4.86</b>	<b>8,407</b>	<b>\$697</b>

Harvest Village's electrical needs will be primarily solved by unit-specific PV systems and a small micro-grid. The PV systems are localized on the southern gables of each of the specific units scattered around the community. We carefully selected the SunPower X21-345 for its high energy density (19.11 W/ft<sup>2</sup>) and increased output at the end of its 25 year warranty (91.75%). An array for each of the unique unit types was sized according to the expected panel production during the 25th year to ensure the system's optimal capacity. In order to ensure its overall resilience, the panels themselves make up a larger micro-grid, where excess energy output from the panels can be stored in batteries and offset increased energy loads on cloudy days or in the event of a significant natural disaster, providing a more resilient, fully renewable power source for the community.

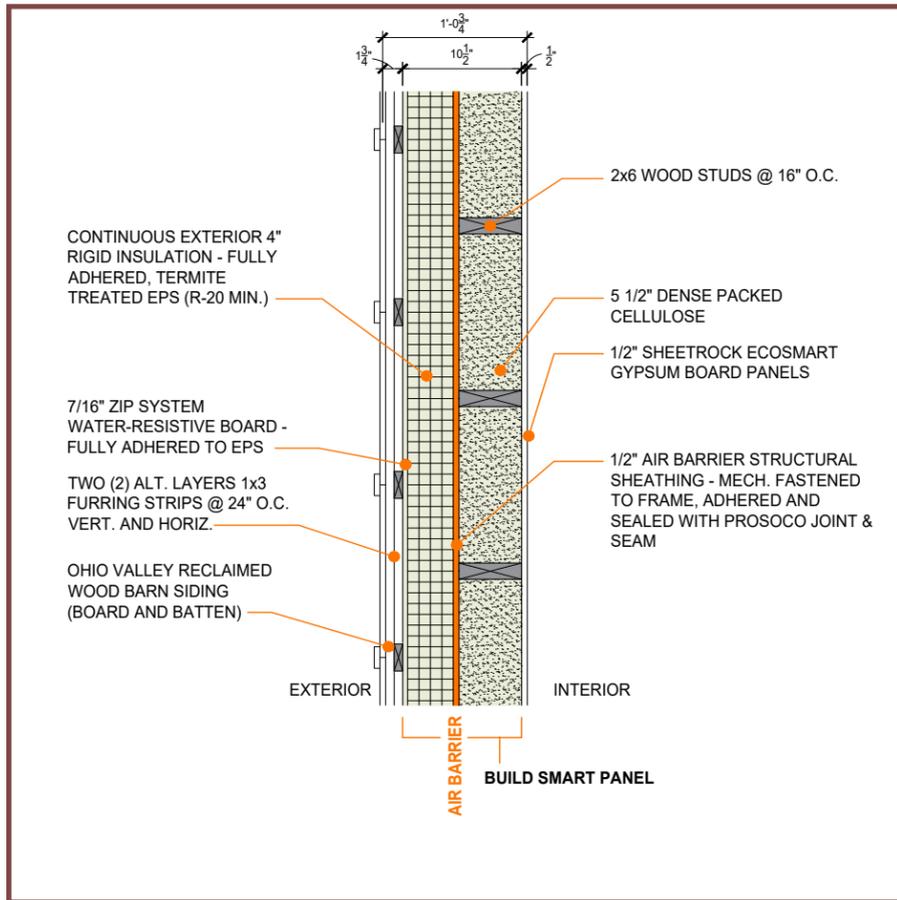
LOCATION:  
Weather Data Source: Lat, Lon: 39.49, -84.7 (1.4mi)  
Latitude: 39.49 N  
Longitude: 84.7 W

PV SYSTEM SPECIFICATIONS:  
DC System Size: 6 kW  
Module Type: Standard  
Array Type: Fixed (Open Rack)  
Array Tilt: 30°  
Array Azimuth: 180°  
System Losses: 12.74%  
Inverter Efficiency: 96%  
DC to AC Size Ratio: 1.2

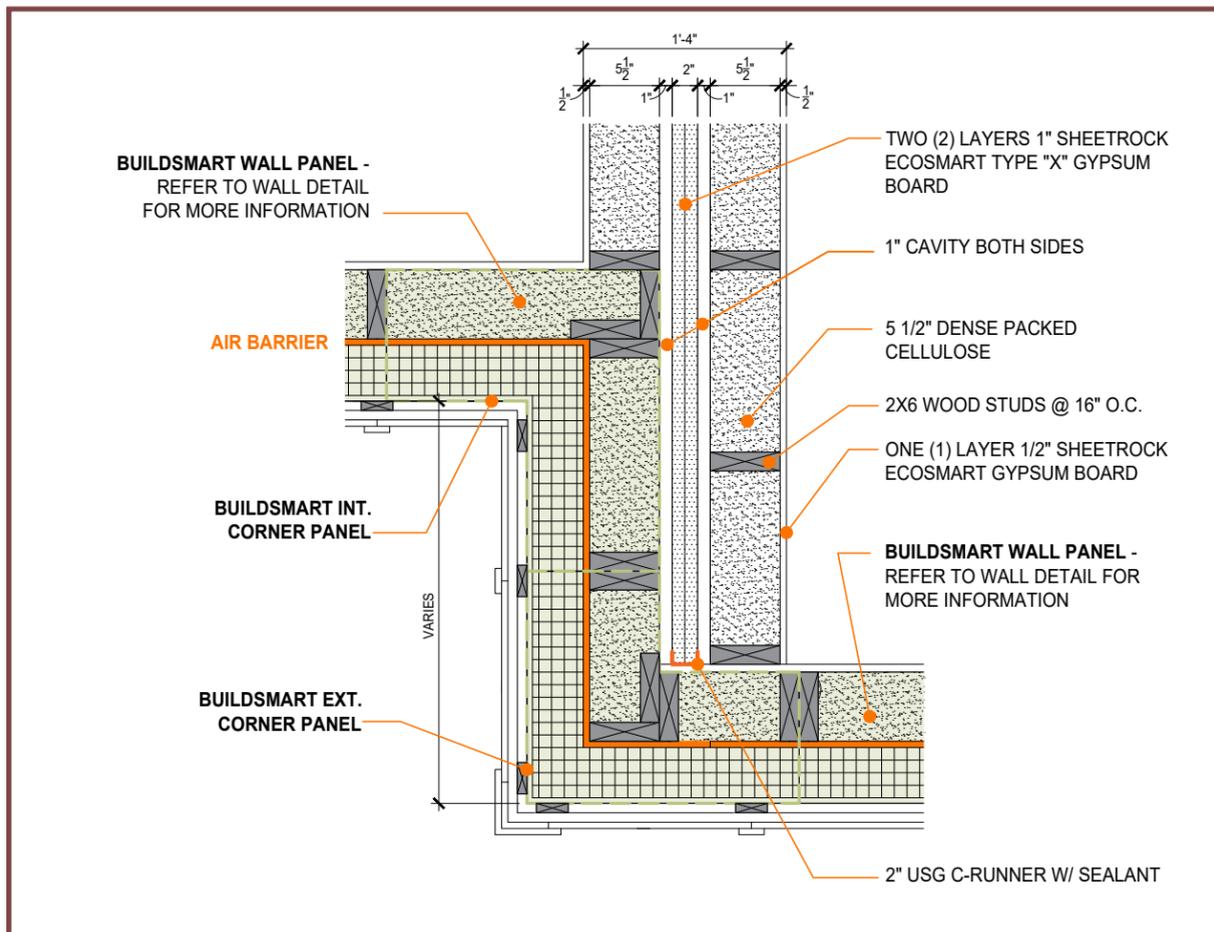
ECONOMICS:  
Average Retail Electricity Rate: 0.083

PERFORMANCE METRICS:  
Capacity Factor: 16.0%





EXTERIOR WALL TYPE DETAIL: PLAN



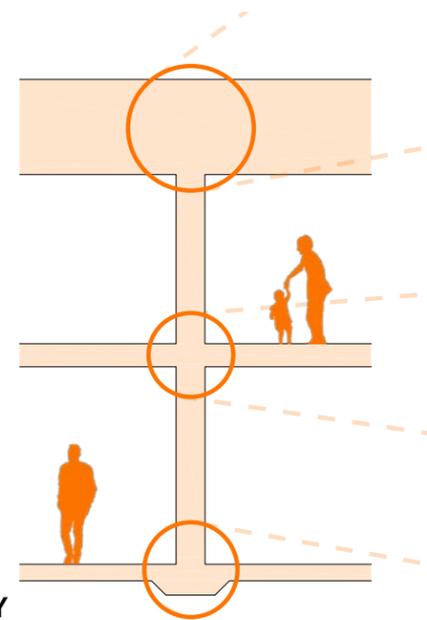
SEPARATION WALL TYPE DETAIL: PLAN

**DETAIL SECTIONS**  
CONTROL LAYERS

In addition to being the team-leader, my role was to produce the detailed wall sections. This is the most important part of building operation and construction in Net Zero Passive House homes.

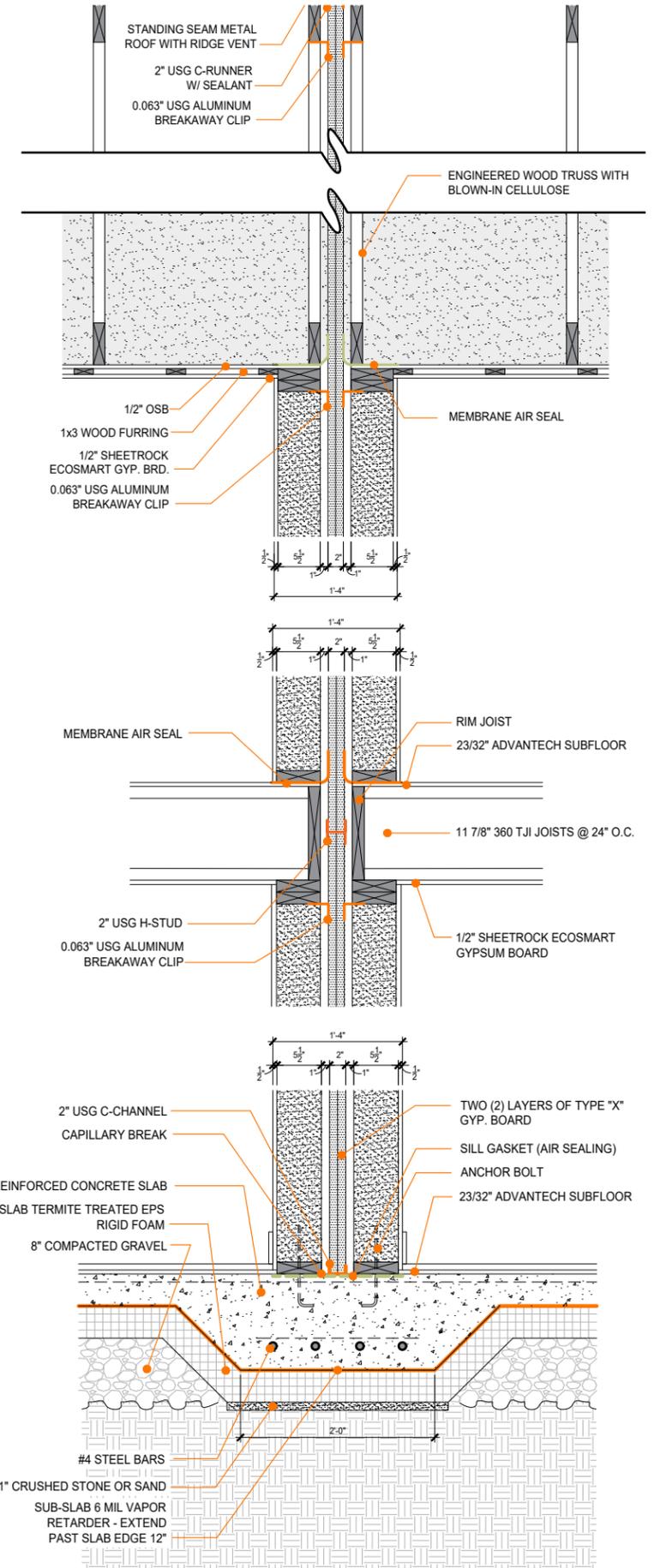
Unit fire separation walls are unique conditions that require proper air sealing to ensure indoor air quality and general comfort through compartmentalization. In our enhanced wall system, air sealing is ensured through the use of capillary breaks and sill gaskets along the bottom of the gypsum boards at the foundation and membrane air sealing tape at the second floor and roof bearing condition. Exceptional insulation values are utilized at all structural components to ensure a tight, efficient envelope. Additionally, the goal of integrating high energy performance with a vernacular aesthetic greatly affected the air and water sealing technique.

**PASSIVE HOUSE CRITERIA:**  
Foundation Insulation: R-20  
Wall Insulation: R-34  
Roof Insulation: R-43  
Air Tightness: 0.06ft<sup>2</sup> @ 50 Pa



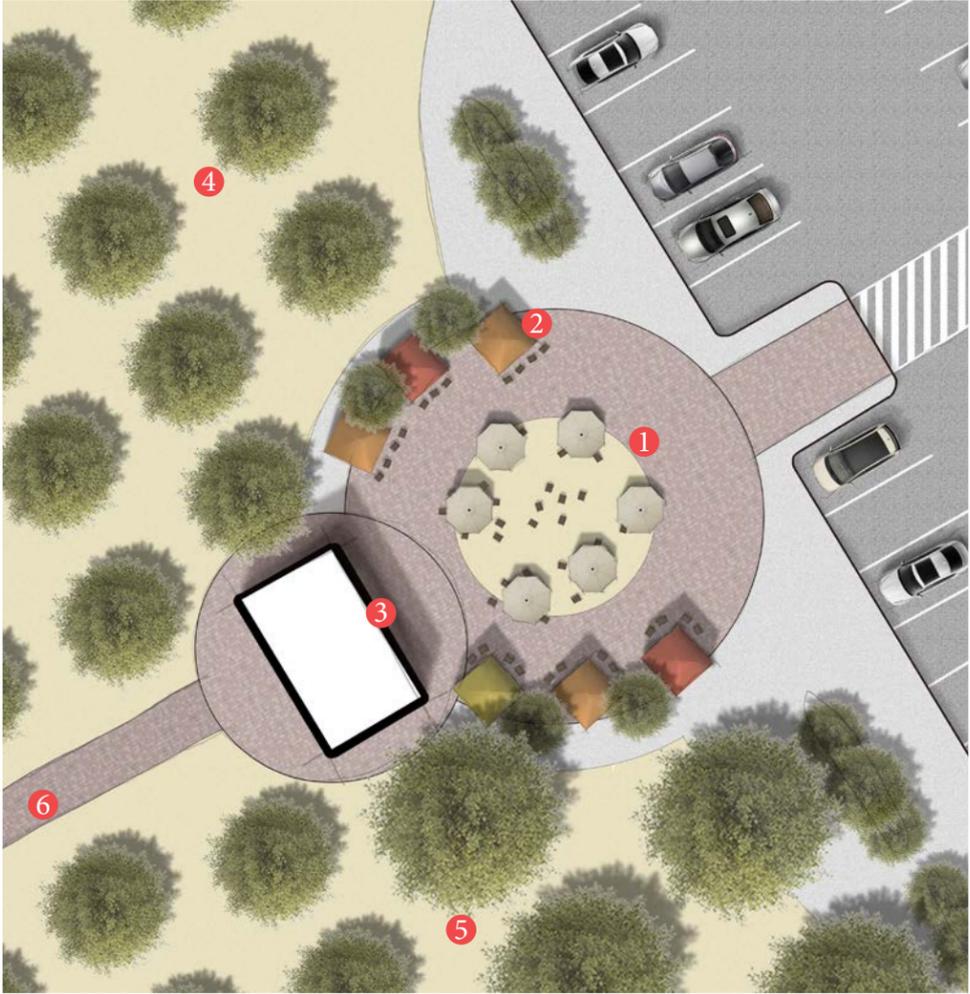
KEY  
NOT TO SCALE

SECTION - DIAGRAM



SEPARATION TYPE WALLS: FULL SECTION

**COMMUNITY SPACES**  
 FOSTERING AN ECOLOGICALLY SUSTAINABLE WAY OF LIVING



- 1. Grassed Lawn
- 2. Farmers' Market
- 3. Community Barn
- 4. Apple Orchard
- 5. Walnut Orchard
- 6. Path to BCRTA bus stop



GREENWAY SPACES



COMMUNITY BARN AND FARMERS' MARKET

# 04 LIMINAL THRESHOLDS

*instructor* Ryan Pallider

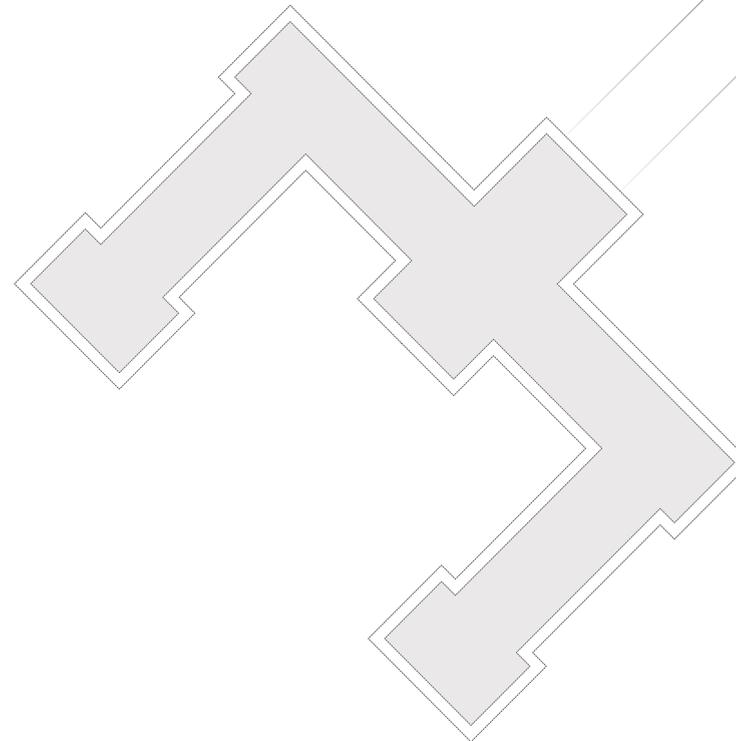
*premise* An addition to the Philadelphia Museum of Art in Philadelphia, USA, addressing issues of museum identities and de-colonization.

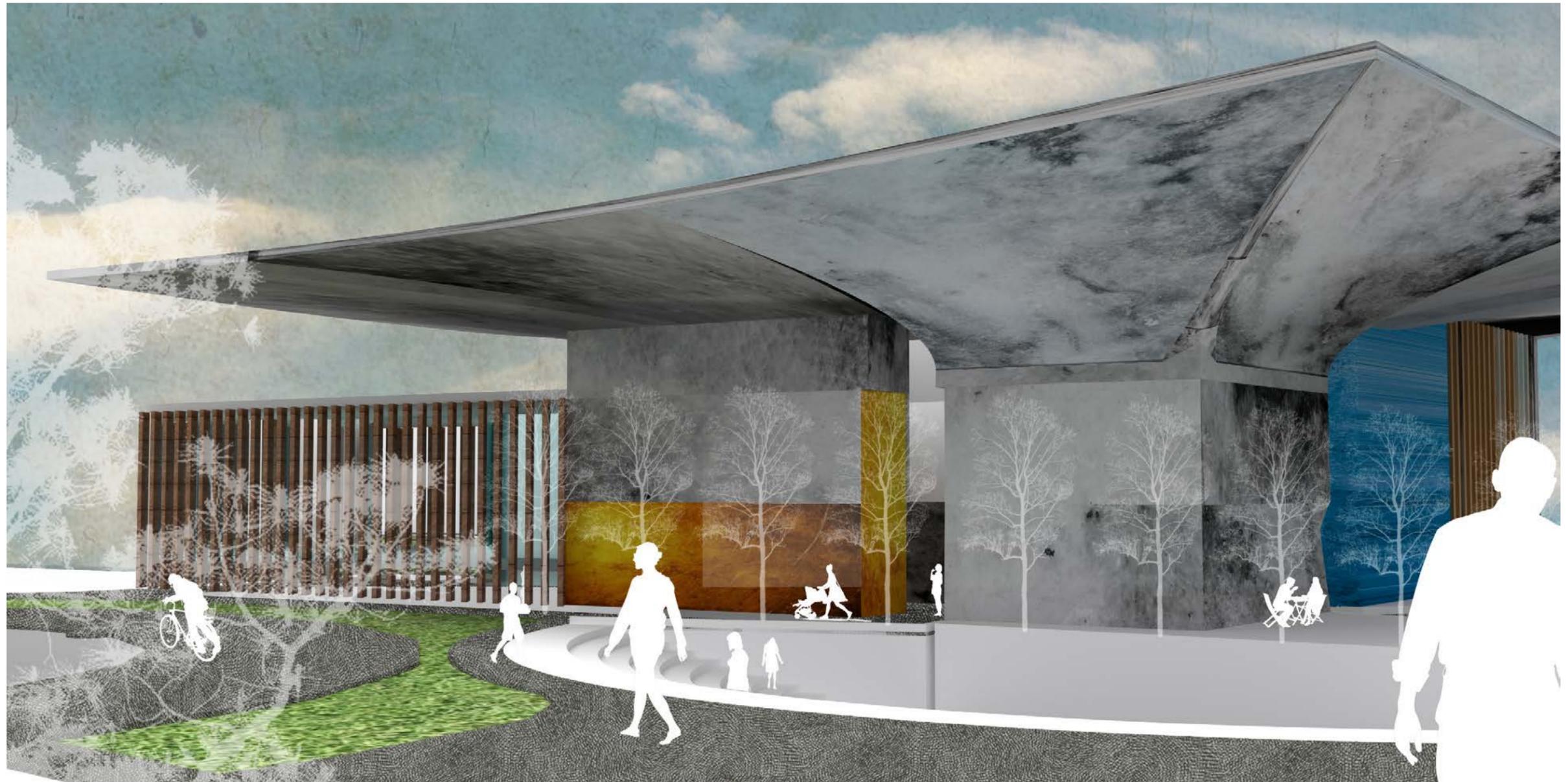
*This is a museum unfurled. Stripped of the facades of inadmissible walls and looming columns, this is an institution that attempts to rationalize the experience of engaging with art. Unlike its neighbour, this institution strives to be a locus of interactions between holistic community engagements and accessible art. This locus takes the form of the open-to-sky oculus, which is the thematic centre of the whole complex.*

*The entry promenade pays an homage to the lively, vibrant streets of Philadelphia, which belong to everyone from all the walks of life. Education and art are treated as mutually evolving and co-existing entities, and the spaces that hold these functions are visually connected for anyone who strolls through, while providing people the agency to engage only as much as they wish to. These forms evolve from the over-arching roof – appendages of a central whole, but take on their own distinct identities as they move farther towards the entrance. There's a disintegration of the facade that allows for transparency, and this must be emblematic of any institution that might attempt to respectfully serve the varied communities of a city like Philadelphia.*

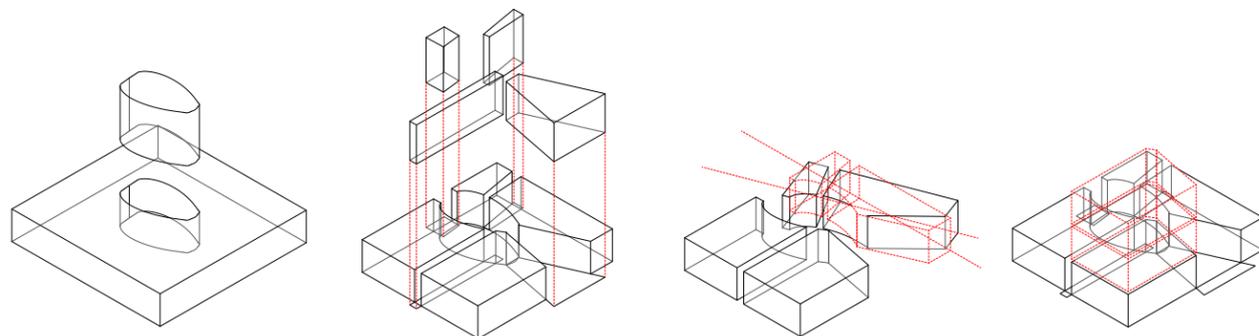
*A museum doesn't have to be an Acropolis on a hill. It's a walk down the street, accessible, familiar, and inclusionary.*

*keywords* museum\_institutional\_social

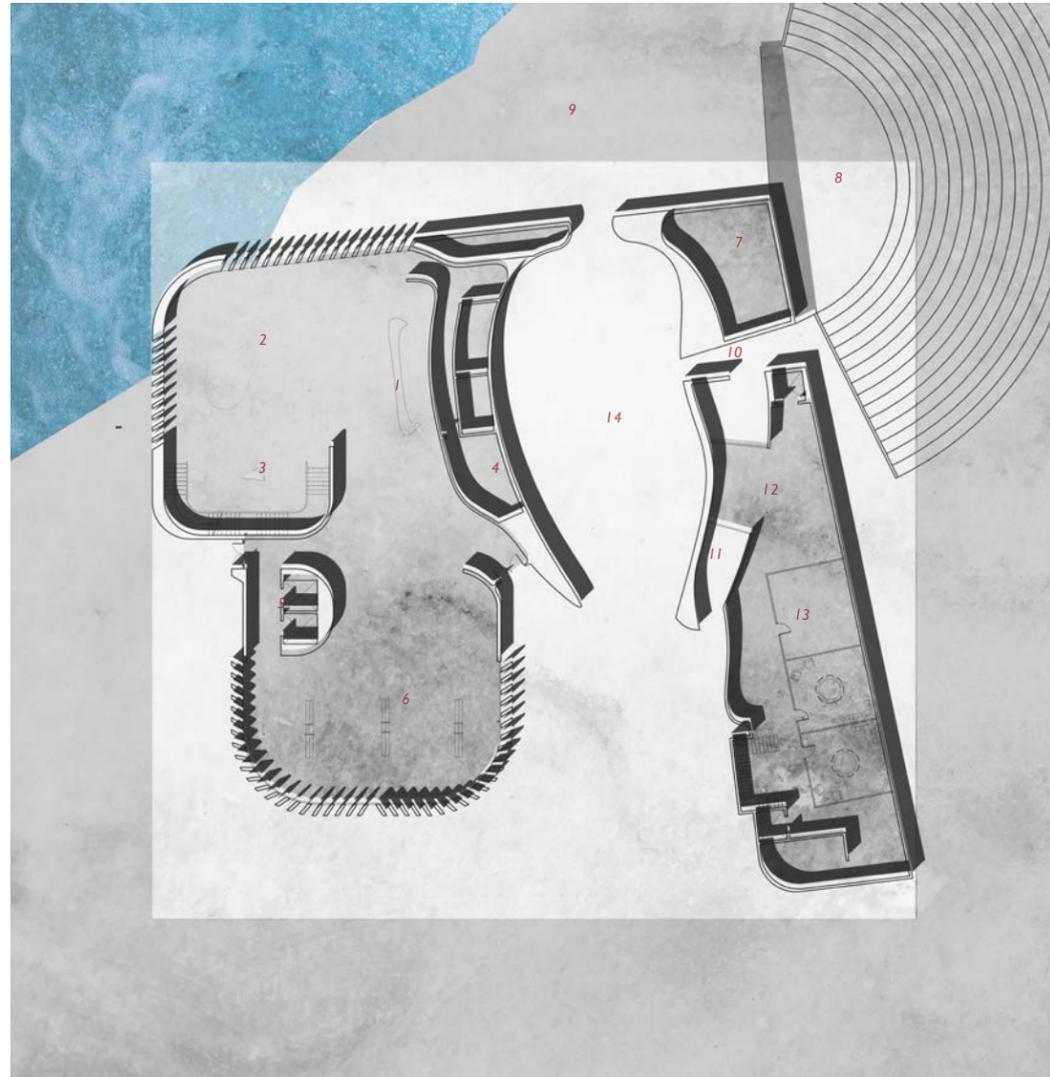




RENDERING FROM THE AUDITORIUM

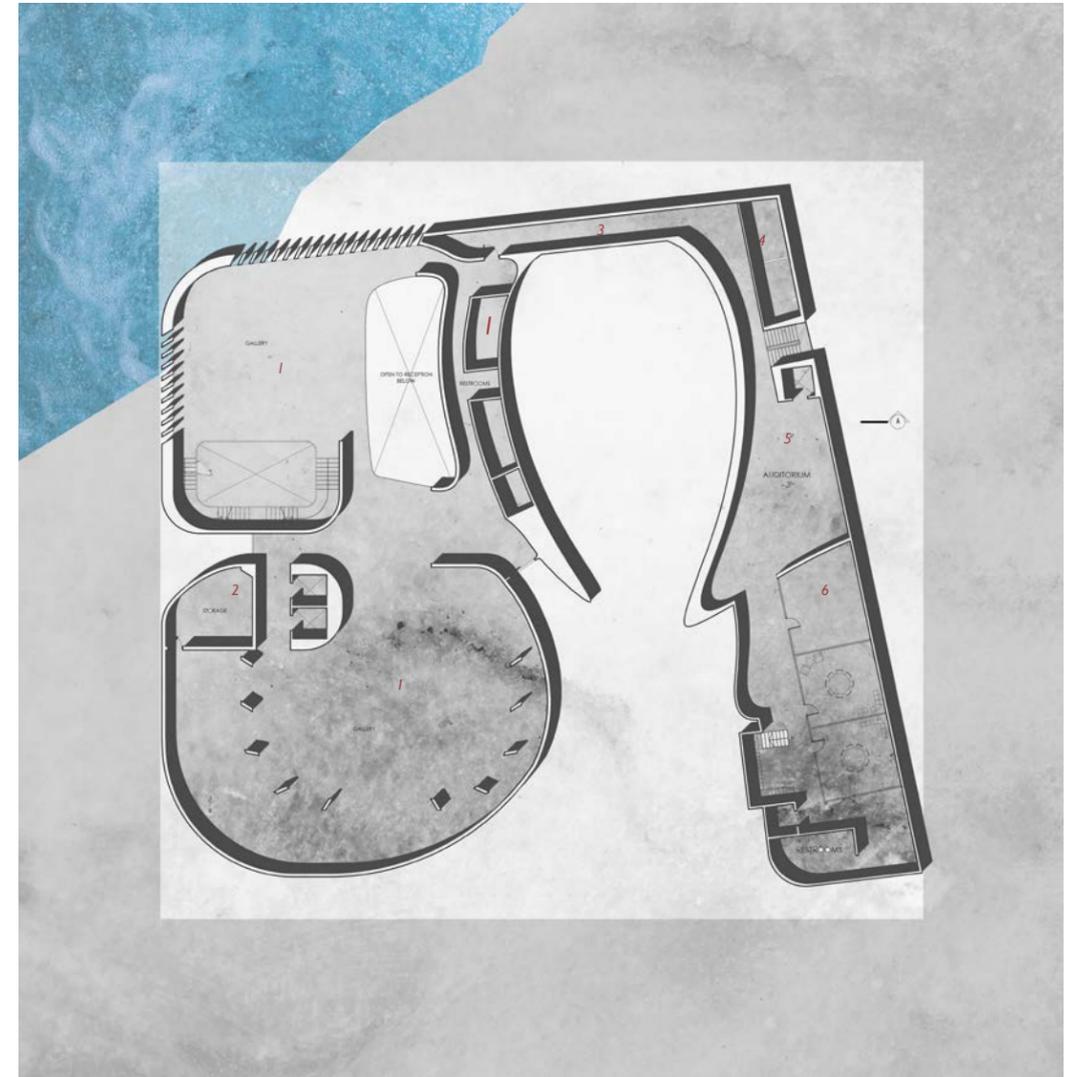


MORPHOLOGY



**GROUND FLOOR PLAN**

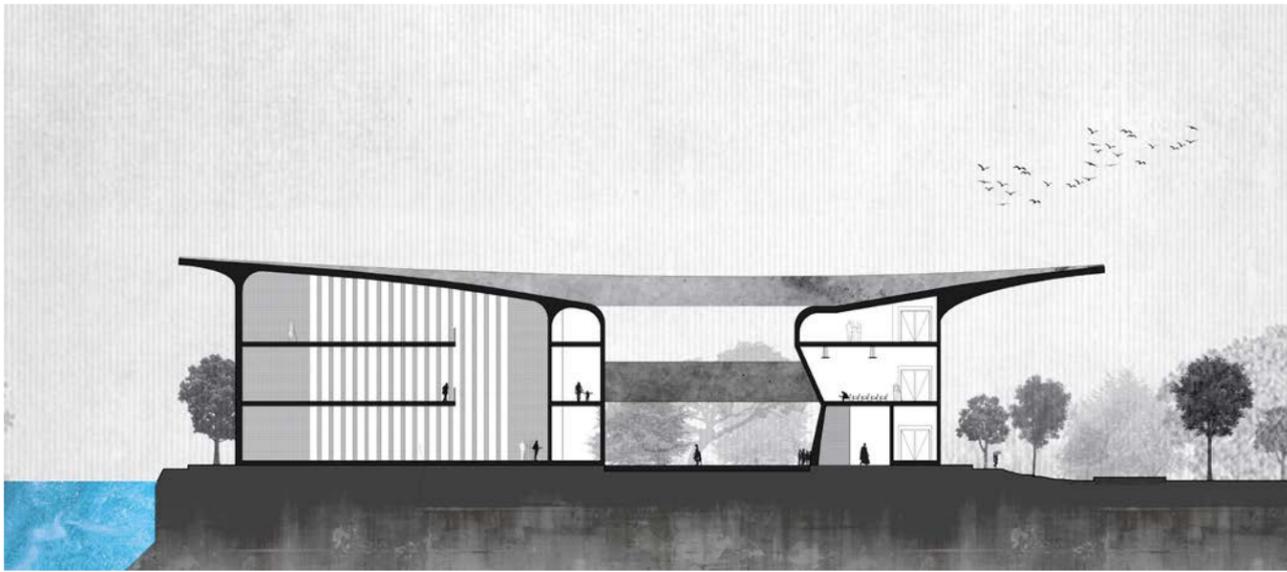
- 1 museum lobby
- 2 sculpture lounge
- 3 stairwell
- 4 bathrooms
- 5 elevator lobby
- 6 gallery A
- 7 staging area
- 8 amphitheatre
- 9 schyukill courtyard
- 10 passageway
- 11 education wing forecourt
- 12 education wing reception
- 13 classrooms
- 14 oculus



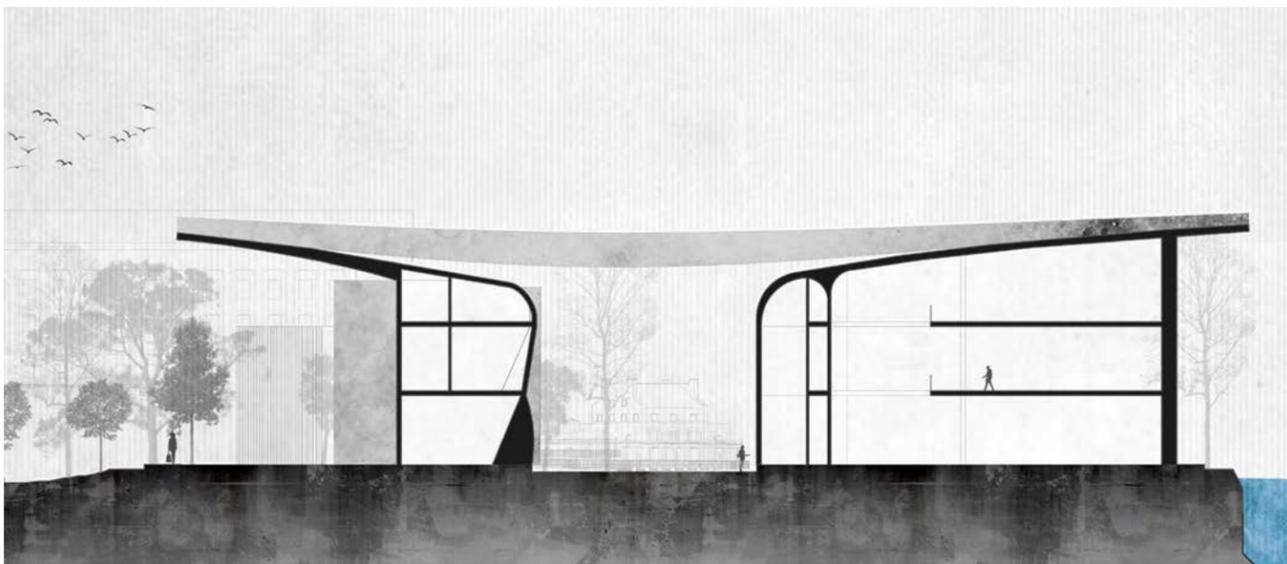
**FIRST FLOOR PLAN**

- 1 galleries
- 2 storage
- 3 bridge to education wing (restricted access)
- 4 offices
- 5 lecture hall
- 6 reading rooms

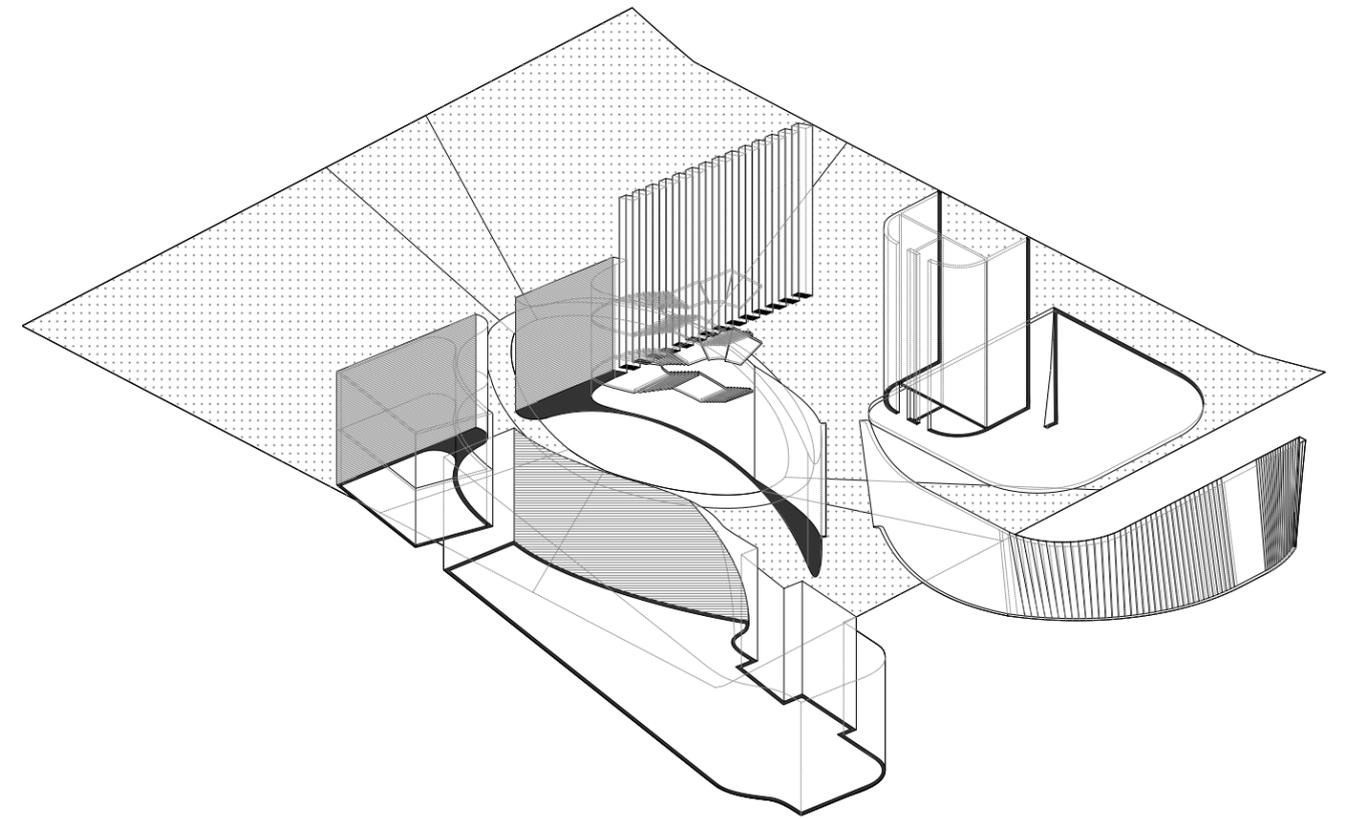




SECTION TOWARDS THE RIVER



SECTION TOWARDS THE PMA AND FAIRMOUNT WATERWORKS



CHOISY AXONOMETRIC



ELEVATION COLLAGE

# 05 TACTILE PROPOGATION

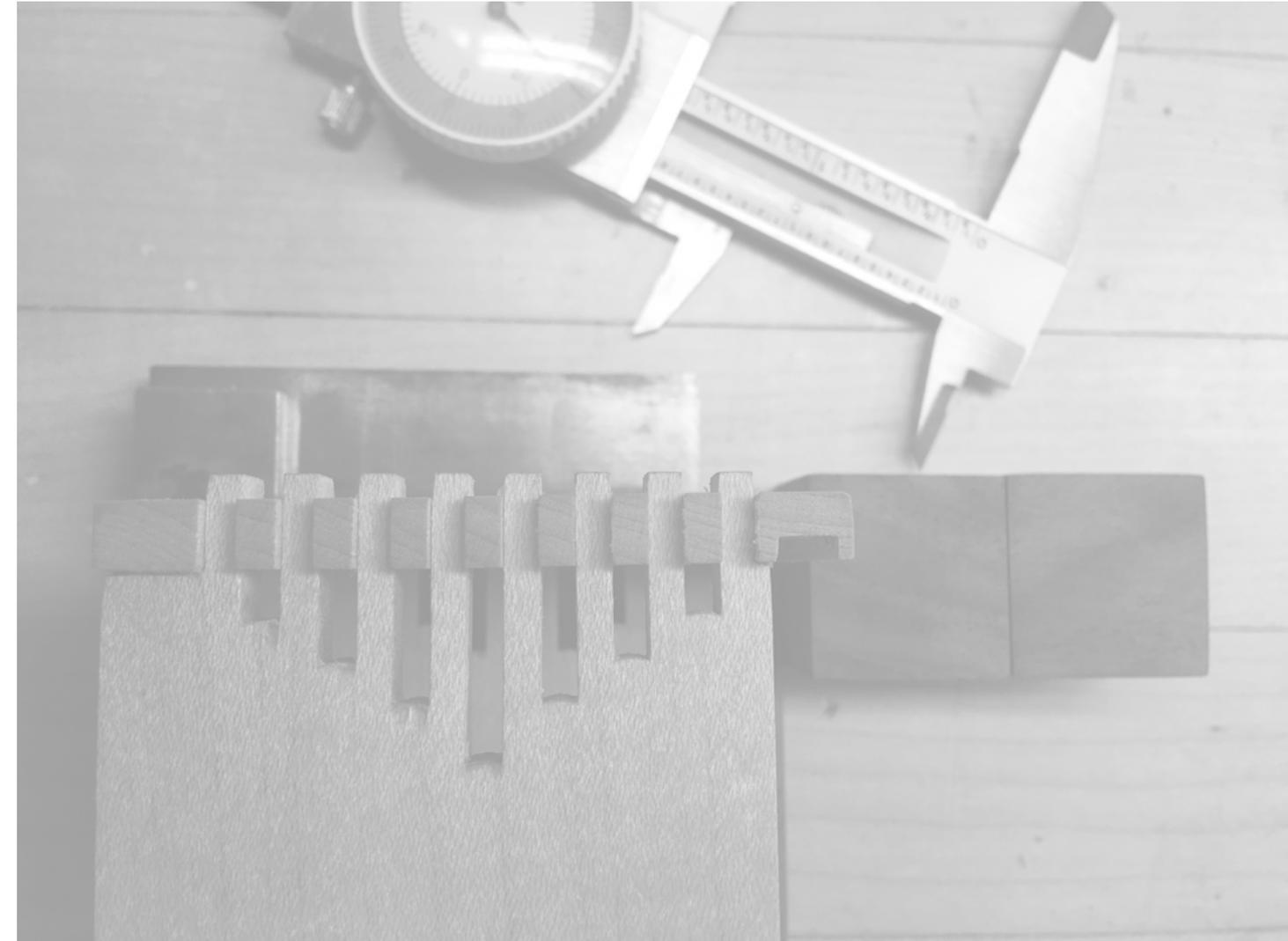
*instructor John Reynolds*

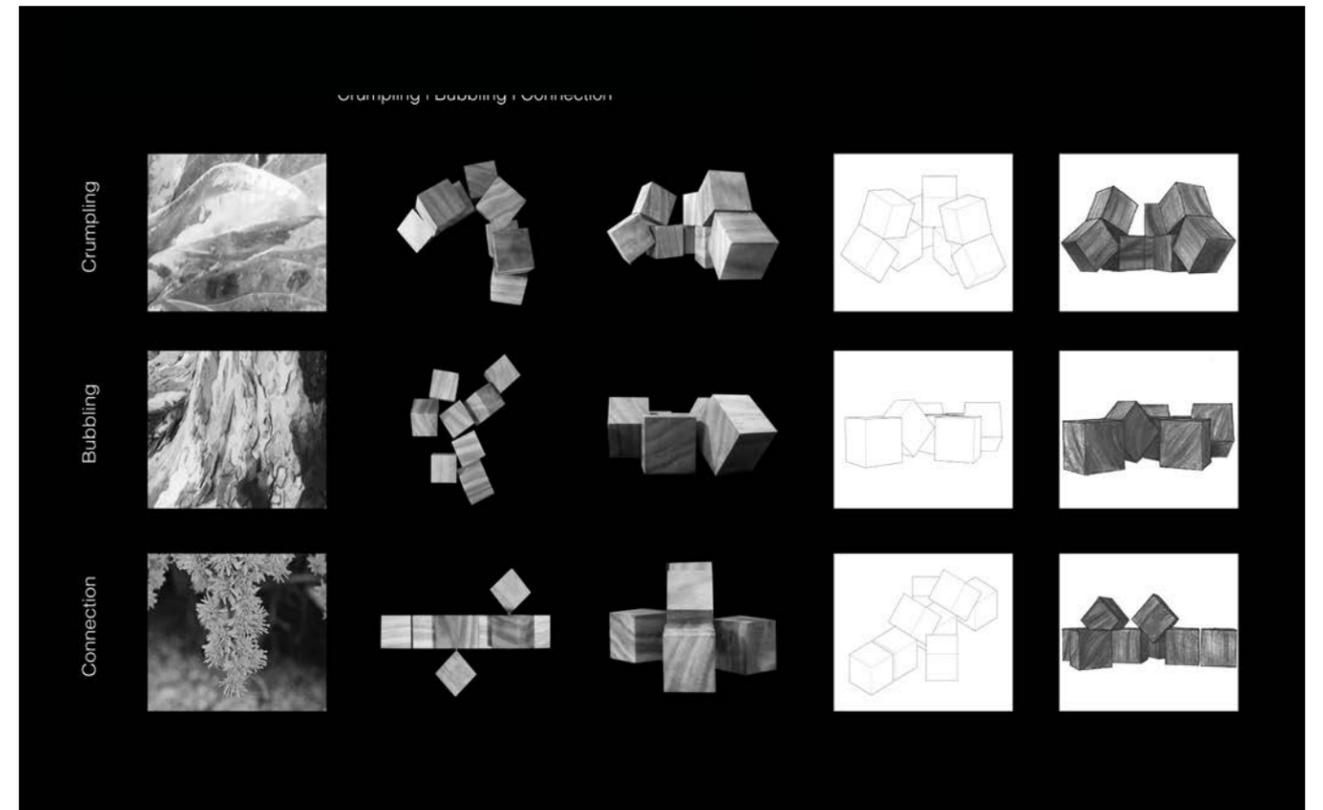
*premise A visitor centre and museum for Frank Lloyd Wright's historic Westcott house in Springfield, Ohio*

*The Westcott House Visitor Centre will be located just outside the famous Westcott House of Frank Lloyd Wright, and shall serve as a future visitor centre for this tourist attraction. It is the place where guests are prepared to experience a Frank Lloyd Wright house. This is accomplished by focusing on Wright's main design principle – giving inhabitants of the built environment an intimate connection with nature. Nature is the most important part of FLW's design philosophy, and it is from there that he drew immense inspiration to design structures that were in harmony with humanity and its environment. It is this organic architecture that the project focuses on.*

*The project programme was developed in collaboration with Bohlin Cywinski Jackson, and the process was undertaken as a series of smaller exercises that lead up to the final design of the visitor centre. All the initial exercises are characterized by a depth of exploration on construction material and craft and when taken together, they help develop a detail orientated design that is in tune with the tradition of Frank Lloyd Wright.*

*keywords sustainability \_ facade analysis \_ furniture*

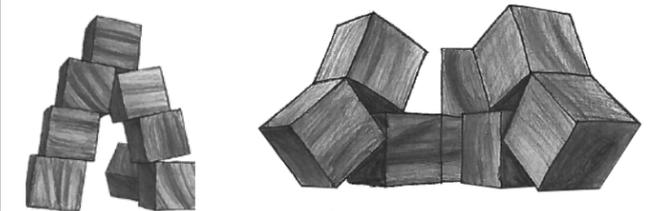




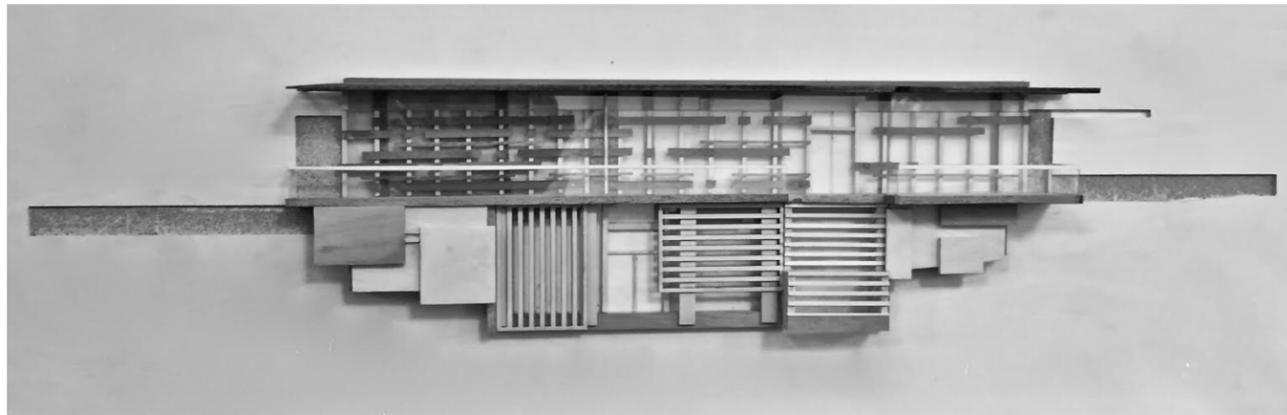
**FROEBEL FABRICATION - GIFT SET 3**  
 A VOCABULARY FOR DESIGN



*Initial stages of the project involved crafting the Froebel Gift set 3 and using the pieces to represent ideas from nature. Extreme attention was paid to the detail of every single part of the process - from selection of appropriate White Sycamore bark to aligning the grains of the Walnut wood cubes in the same direction.*



**FACADE LAYERING AND SPATIAL DEPTH**  
 STUDIES IN MANIPULATION OF SHADOWS



WEST FACADE BAS RELIEF



SOUTH FACADE BAS RELIEF



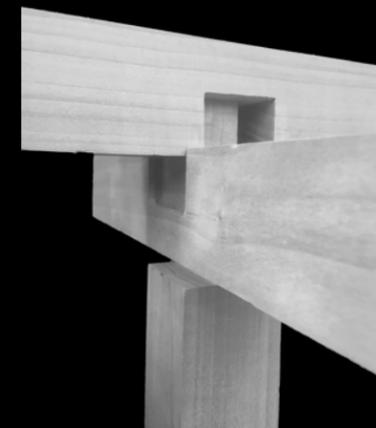
MALLET CONSTRUCTION PROCESS

**MALLET AND NATURE-INSPIRED JOINERY**  
 AN EXTENSION OF THE HAND

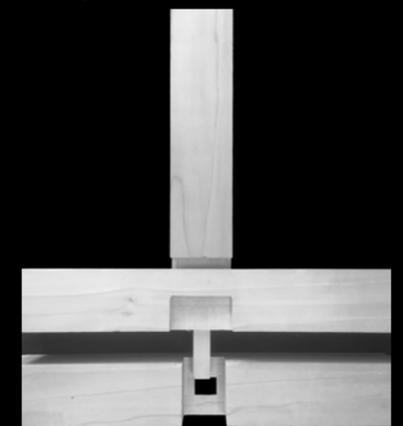
Part of the Westcott Studio process involved handcrafting mallets specific to the user. This allowed us to explore our own intimate connection with materials and respond to how the sense of touch relates to architecture. The mallet is then used to make traditional Japanese joinery with the help of a chisel, and develop a cohesive structural system of the building.



COLUMN-BASE CONNECTION



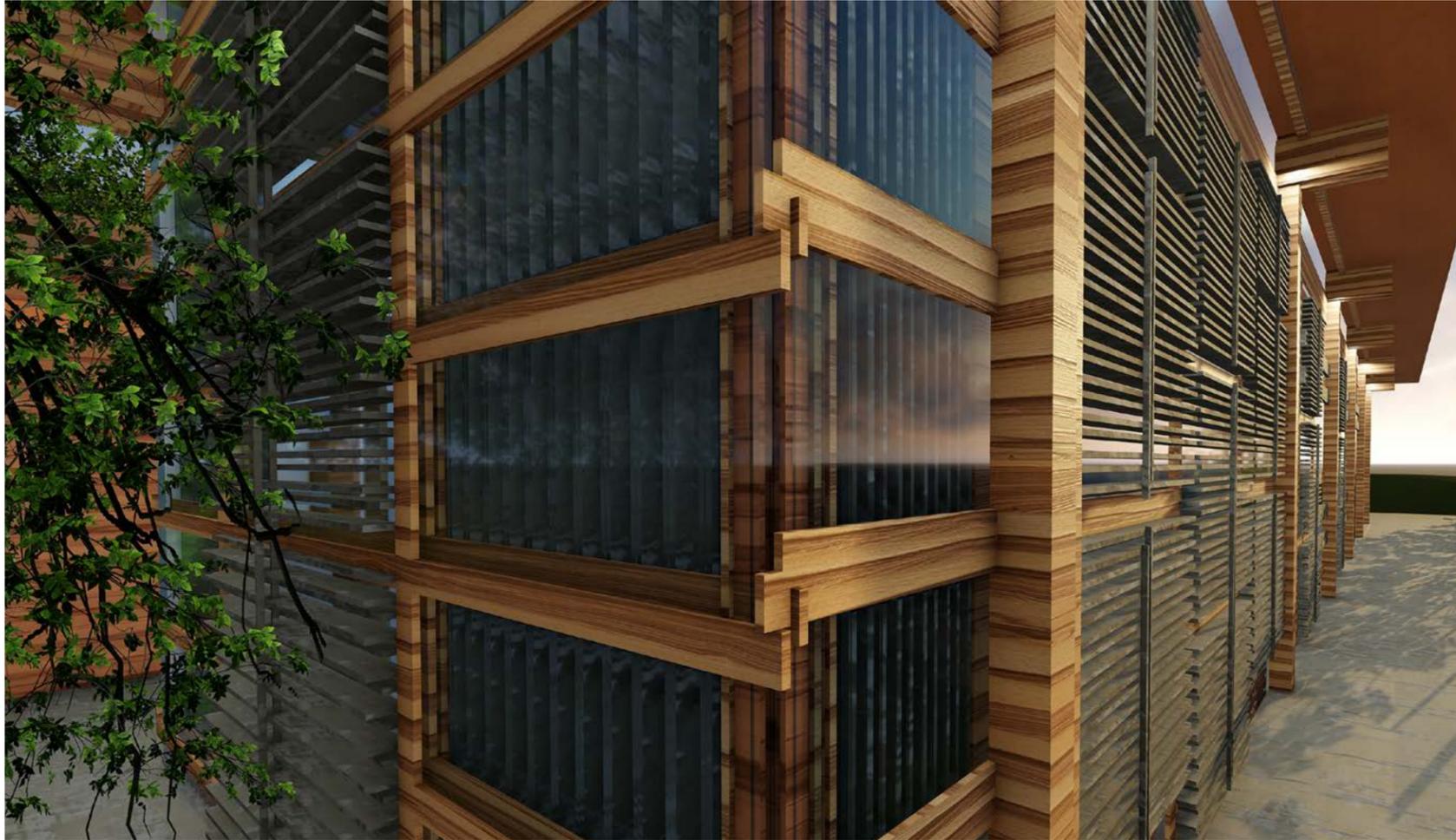
COLUMN-BEAM CONNECTION



SHEAR PIN



JOINT CONSTRUCTION PROCESS



**CORNER CONDITION: REFERENCES THE FROEBEL BOX**

# 06 EXPERIENCING PALLADIO

advisor Dr. Patrizio Martinelli

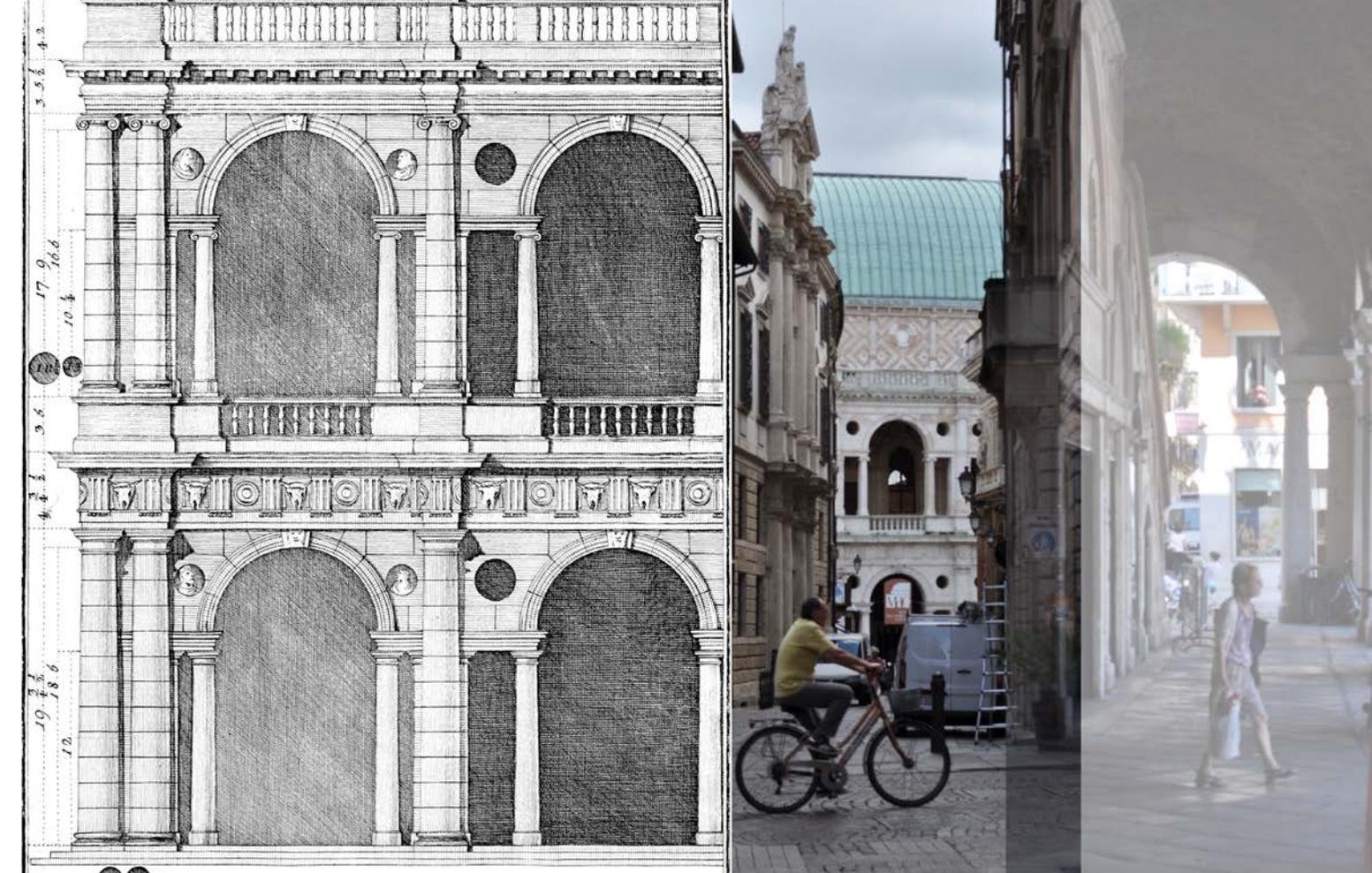
descrip. A theoretical analysis and phenomenological representation of Palladian architecture as a part of USS reserach grant

Andrea Palladio has been one of the most influential architects of all time, and also has been the most studied. Palladio's simplicity has a certain maturity of elegance. It feels that the extraneous elements are so carefully edited out that what remains is a perfection of exacting composition in an urban canvas.

My research argues that Palladio's work is undoubtedly a reflection and a function of the place that it is situated in. This phenomenological approach necessitated something other than the traditional frontal and orthographic architectural projection in which Palladio's work has always been represented.

My work posits that the medium of collage would be the most appropriate to put this understanding into practice, for the overlapping of things in a disjointed fashion works in the same way our brain stores information, or the way brain 'sees'. It can be used to portray how the place can experienced in real life, or rather, how I experienced it. To express an experience that goes beyond traditional representation. Here, the Palladian spaces are represented by the means of collage and photo-montage, for they are the perfect way of depicting layered experiences. These multi-referential images portray a private understanding of Palladio.

keywords historical analysis \_ phenomenology \_ research



Most of the Palladian city-palaces are not afforded a front view, so they are experienced perspectively from narrow streets. It is here that Palladio's sophistication of facade design and proportions come into play - some things seem larger than what they are, curved surfaces appear straight, trapezoidal rooms become spatially rectangular. Vicenza cannot be experienced without Palladio, and neither can Palladio without Vicenza.



PALAZZO BARBARO

**PHENOMENOLOGICAL ANALYSIS AND EXPERIENTIAL DESIGN**  
 REPRESENTATION OF BUILDINGS THROUGH COLLAGES



BASILICA PALLADIANA

*Palladio's simplicity has a certain maturity of elegance. The buildings can be understood as a layering of elements that are placed together to compose a whole. Hence, I believe that the medium of collage would be most appropriate to put my theoretical learning of Palladio into practice, for the overlapping of things in a disjointed fashion works in the same way our brain stores information, or the way brain 'sees'. It can be used to portray how the place can be experienced in real life, or rather, how I experienced it. To express an experience that goes beyond traditional representation.*



VILLA ALMERICO CAPRA 'LA ROTONDA'



VILLA FOSCARI 'LA MALCONTENTA'

# 07 PHOTOGRAPHY

advisor Brent Wahl  
descrip. Architectural, Portraiture and Photo-journalism

