

INTEGRATED ARCHITECTURAL DESIGN ALISSA OLIVEIRA & KAITLIN PETTENGER

# TABLE OF CONTENTS

PHASE 1	
PHASE 2	
PHASE 3	
PHASE 4	



PHASE 1: SITE CONTEXT DOCUMENTATION & ANALYSIS

## MONTAGE OF RESIDENTIAL AREA



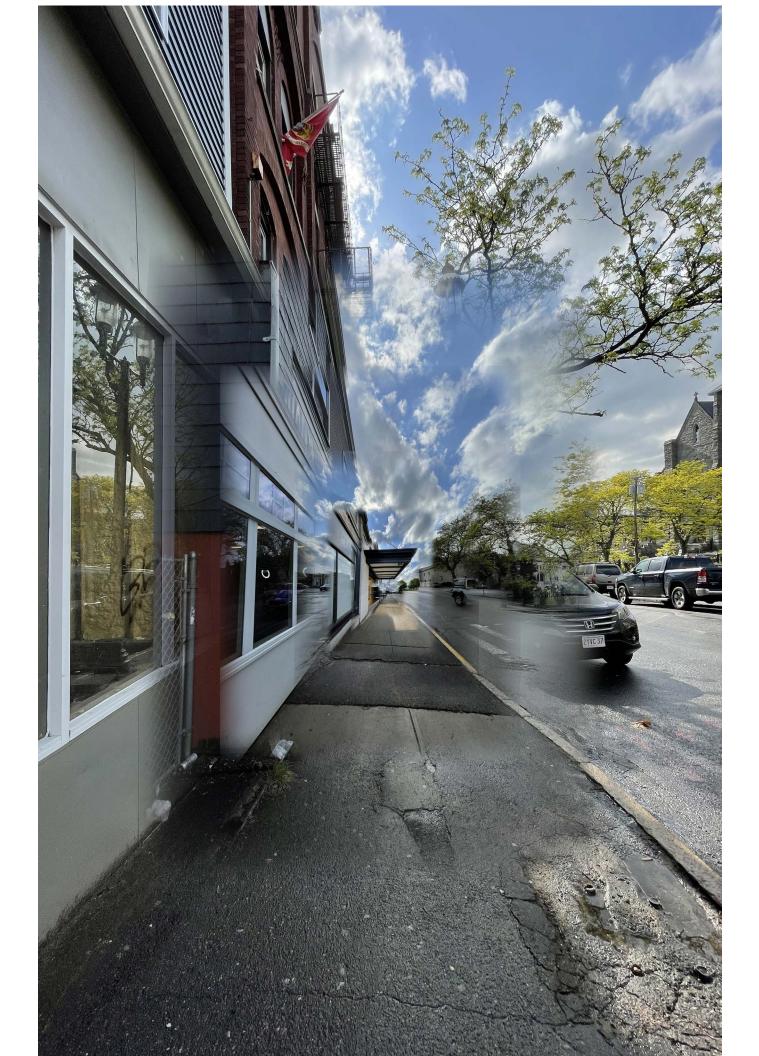
## MONTAGE OF CONCORD RIVER GREEENWAY PARK



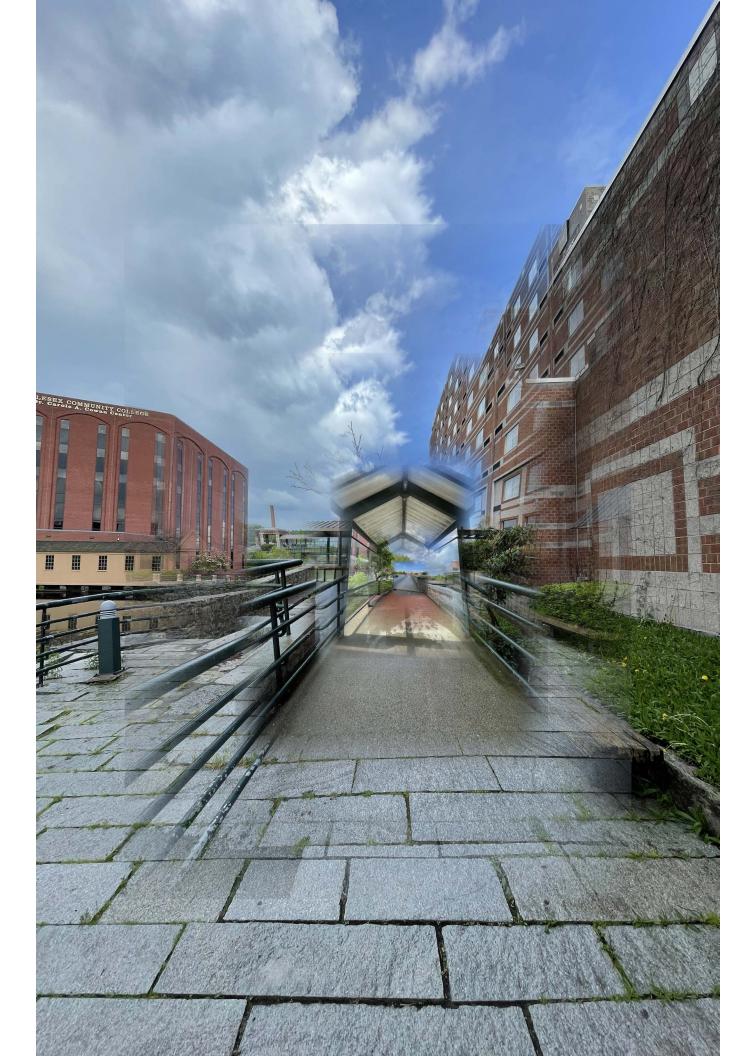




## APPROACH FROM Residential area



## APPROACH FROM UMASS LOWELL CAMPUS



## APPROACH FROM CONCORD RIVER GREENWAY PARK



Public Spaces, Hydrology, & Landscapes



Streets

Water



Parks/Landscape



Residential Buildings

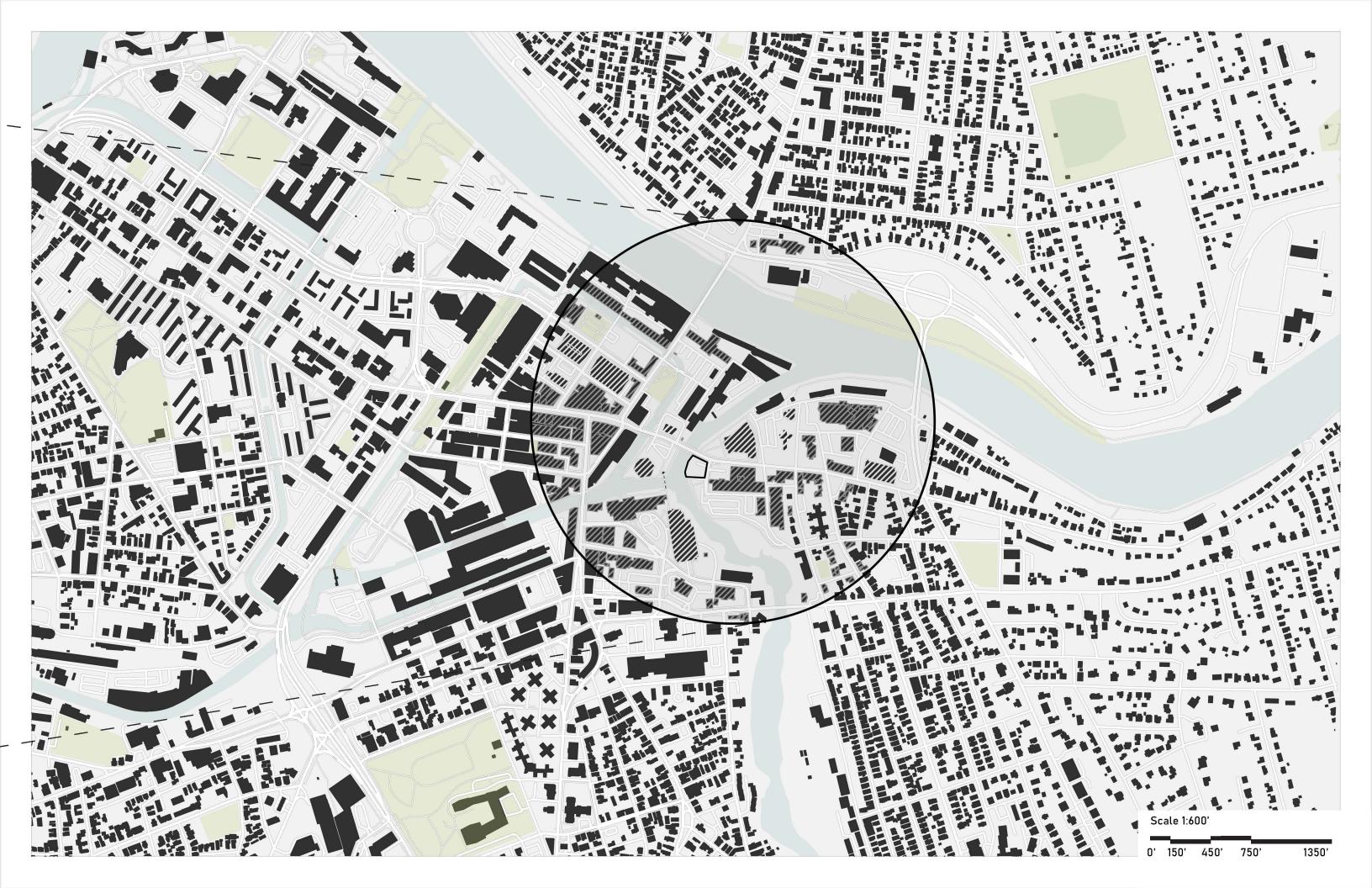


Commercial Buildings



Civic Buildings

	_		_
 Scale 1:300'			
0'75'225'	375'	675'	



# PUBLIC SPACE, LANDSCAPES & ARCHITECTURAL CHARACTER











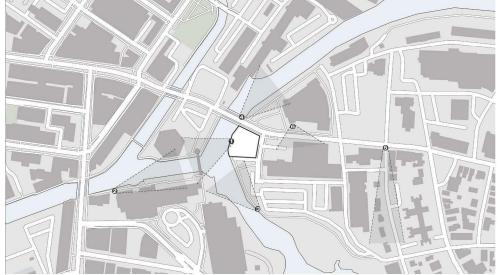














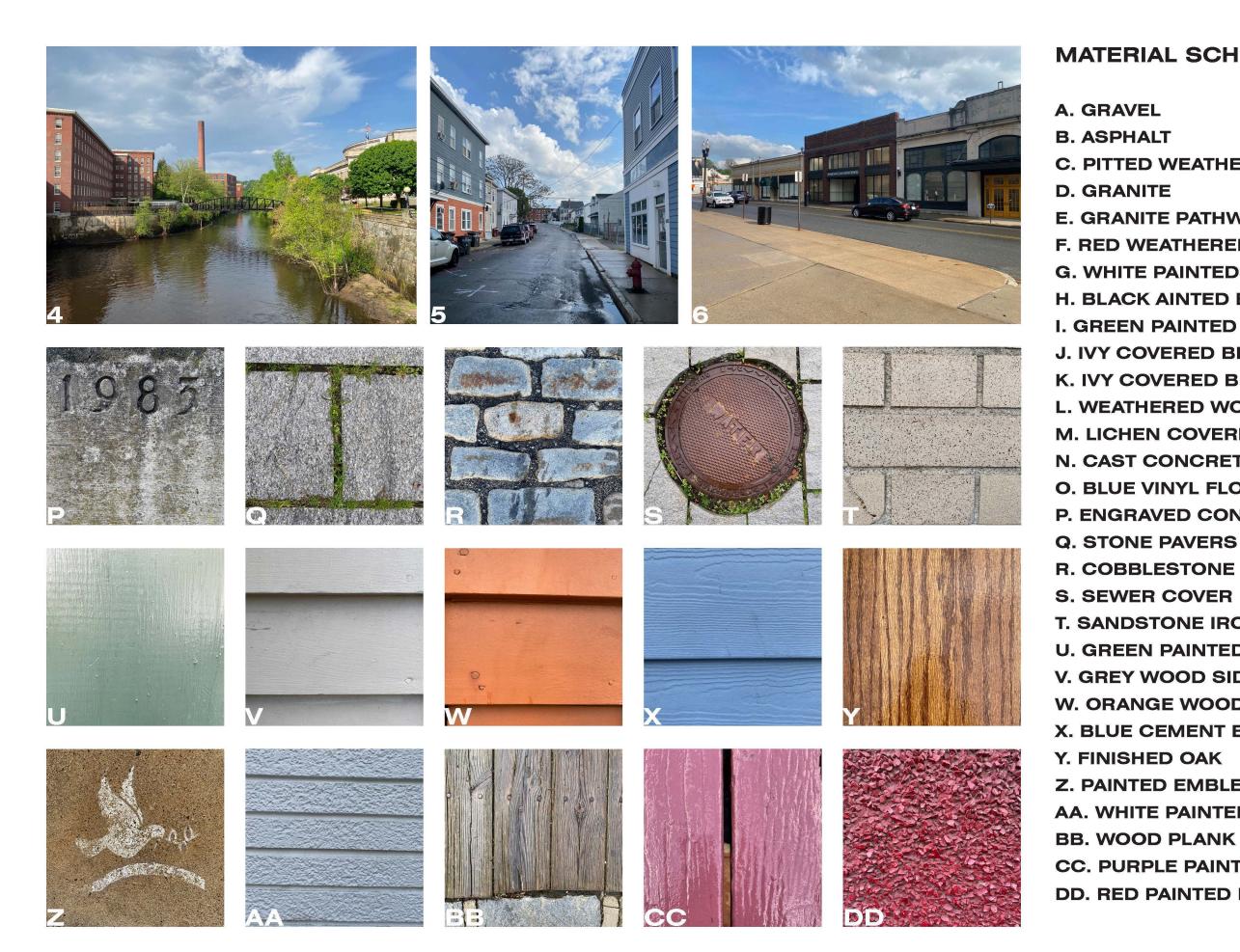












## MATERIAL SCHEDULE

C. PITTED WEATHERED CONCRETE E. GRANITE PATHWAY F. RED WEATHERED BRICK **G. WHITE PAINTED BRICK** H. BLACK AINTED BRICK I. GREEN PAINTED BRICK J. IVY COVERED BRICK K. IVY COVERED BRICK & STONE L. WEATHERED WOOD M. LICHEN COVERED CONCRETE N. CAST CONCRETE MASONRY UNIT **O. BLUE VINYL FLOORING** P. ENGRAVED CONCRETE Q. STONE PAVERS WITH MOSS GROUT T. SANDSTONE IRON SPOT BRICKS **U. GREEN PAINTED CEDAR V. GREY WOOD SIDING** W. ORANGE WOOD SIDING X. BLUE CEMENT BOARD SIDING Z. PAINTED EMBLEM ON CONCRETE AA. WHITE PAINTED AND RAKED EFIS **BB. WOOD PLANK & STONE SEAM** CC. PURPLE PAINTED WOOD DD. RED PAINTED RESIN BONDED AGGREGATE



# PHASE 2: PRECEDENT ANALYSIS & INITIAL CONCEPTS

## **CONCEPT MODEL**

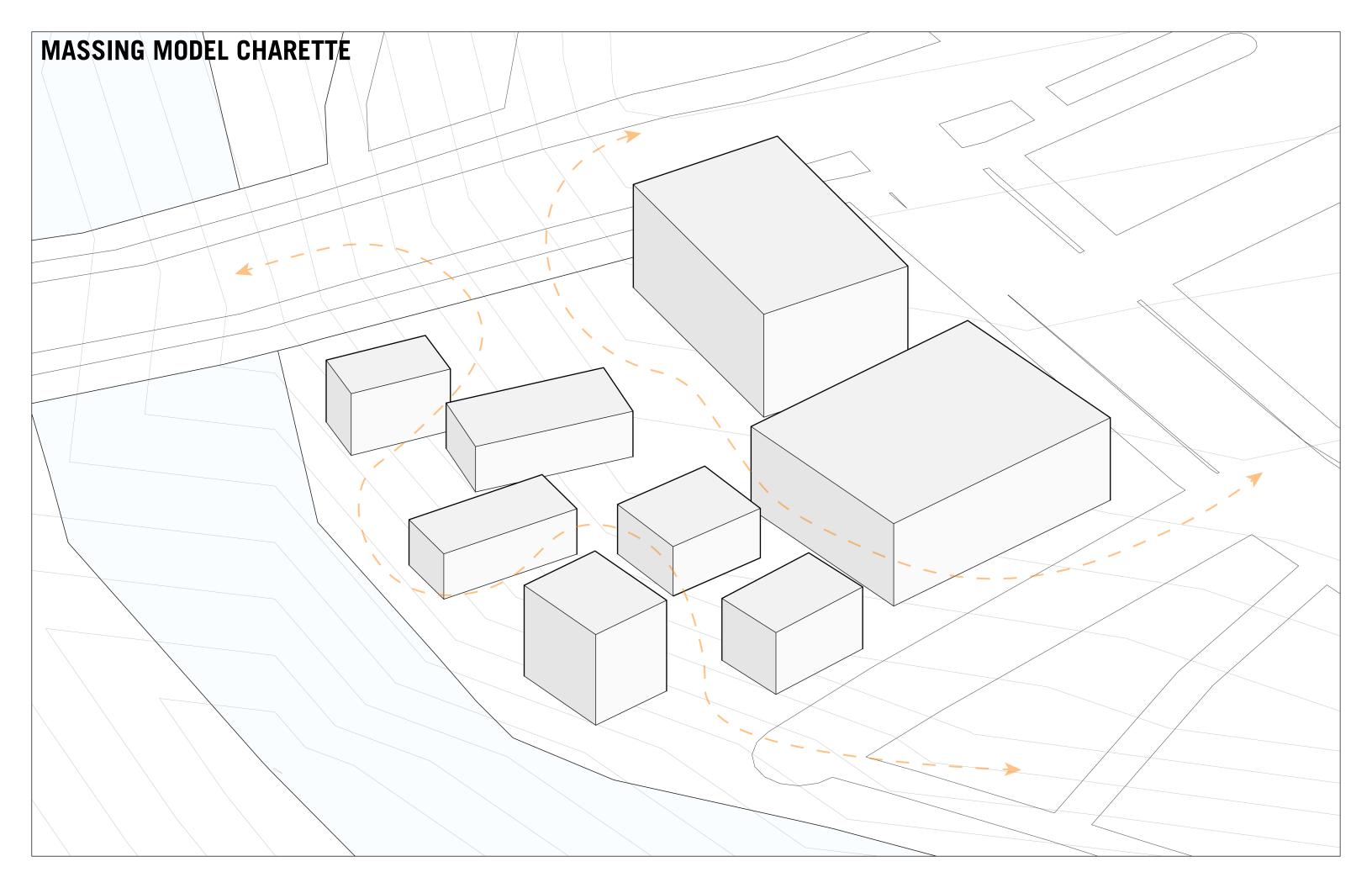


## **CONCEPT MODEL**



## **CONCEPT MODEL**

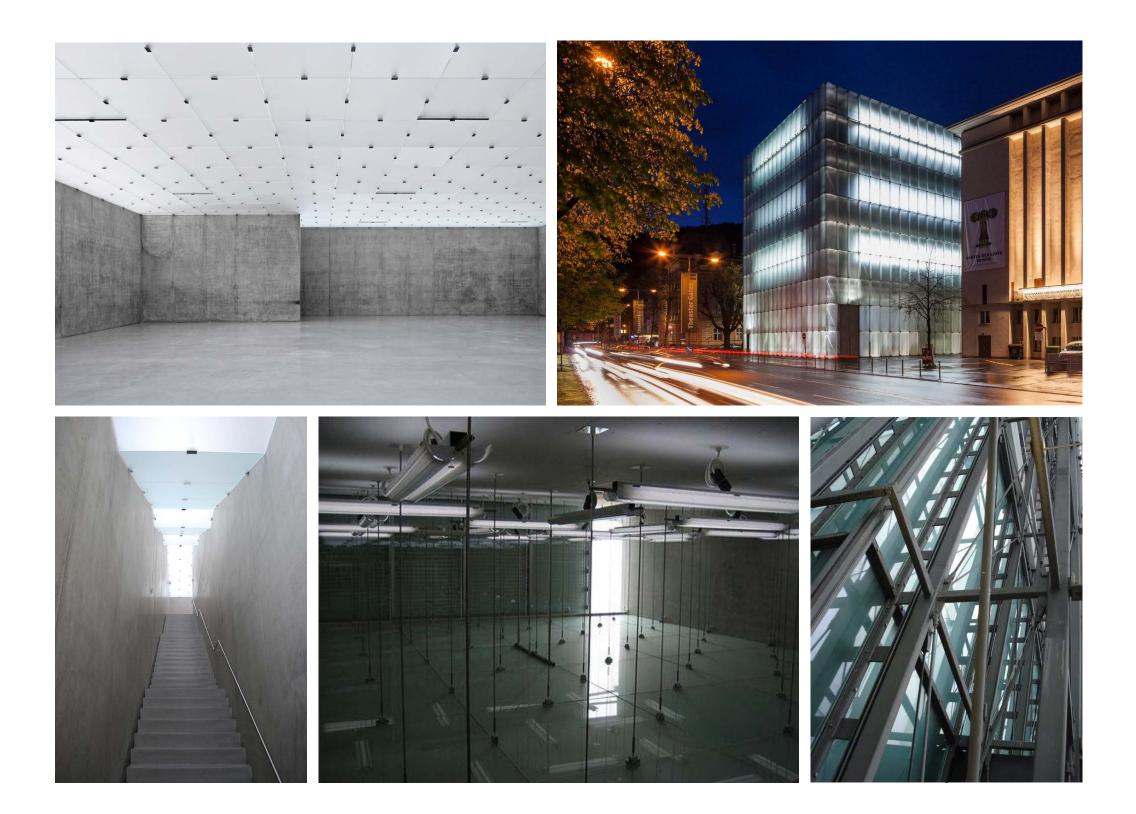






## **KUNSTHAUS BREGENZ**

ALISSA OLIVEIRA KAITLIN PETTENGER



## **OVERVIEW**

Architect: Peter Zumthor

Location: Bregenz, Vorarlberg, Austria

Under construction: from 1994 to 1997

Date Completed: 1997

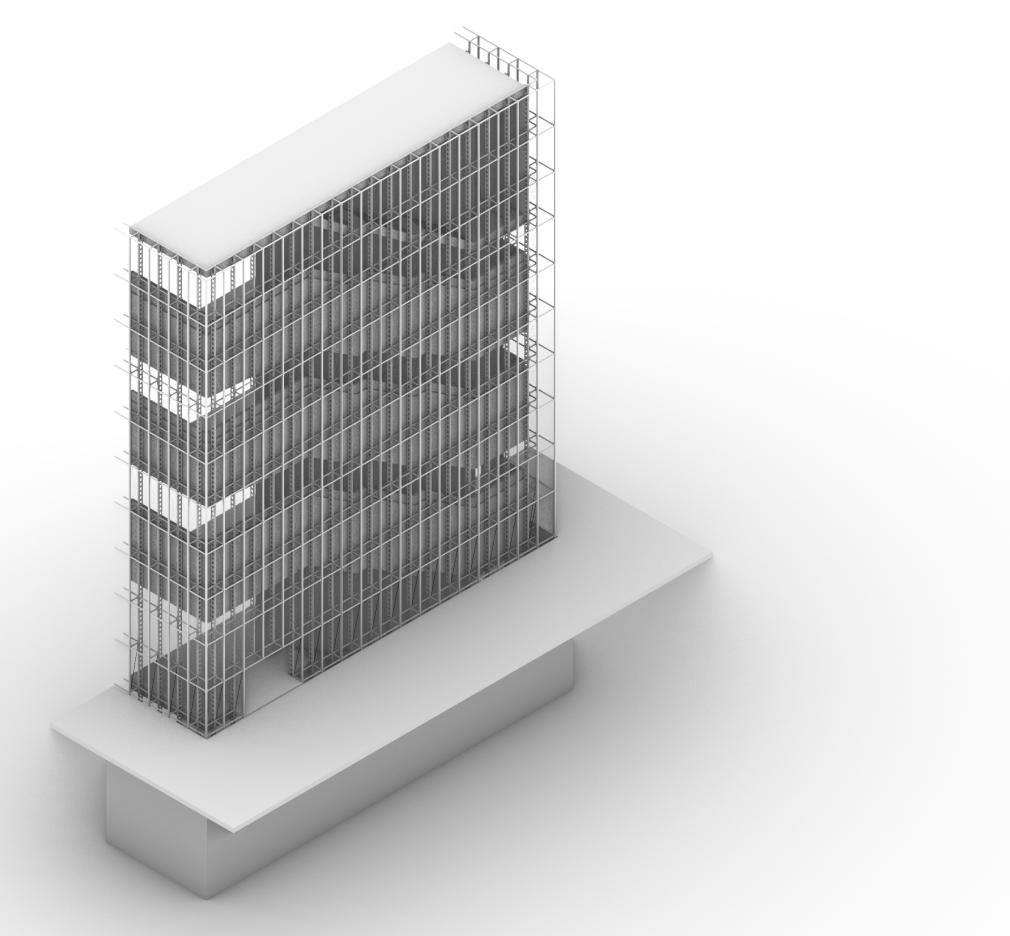
Basic Project Description: Kunsthaus Bregenz integrates with the existing row of public buildings and interacts with its environment – water, light, and civic life. The structure is in a state of constant change, rotating the use of exhibition space and accommodating international contemporary art. The minimalist design allows for spaces to adapt to the displays and creates a coexisting relationship between art and architecture.

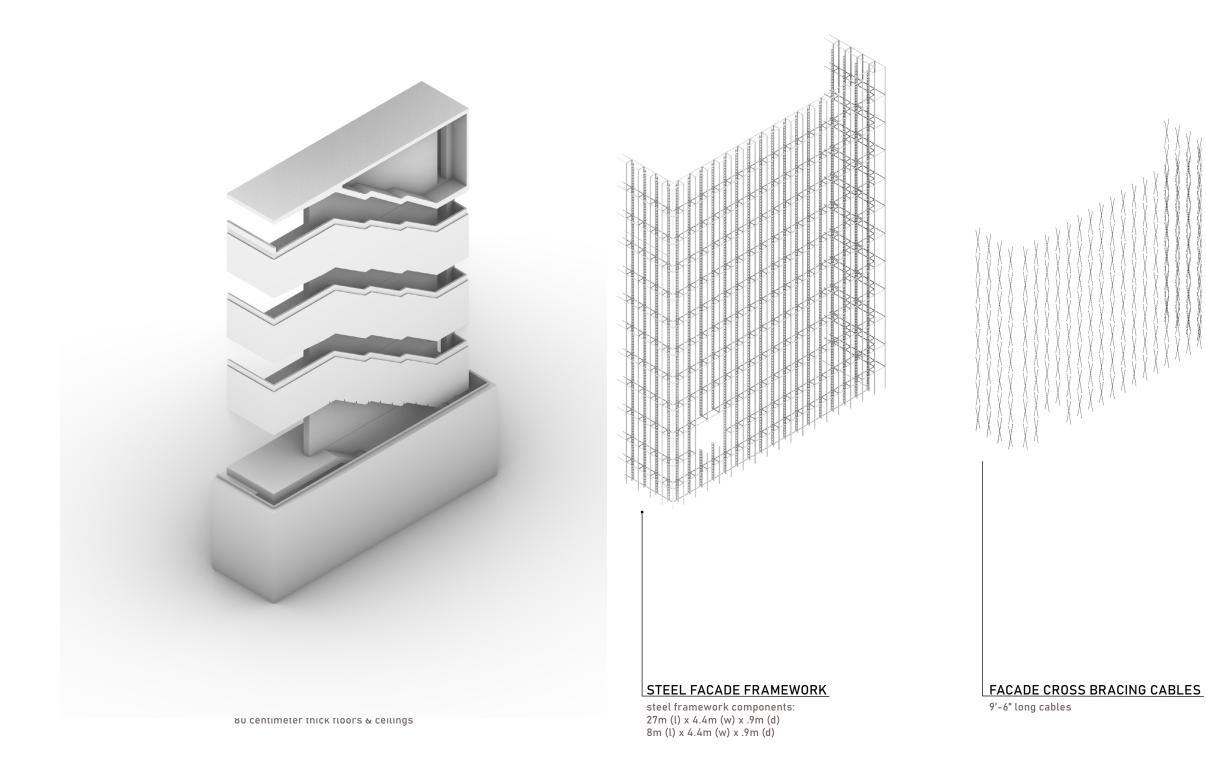
### STRUCTURE

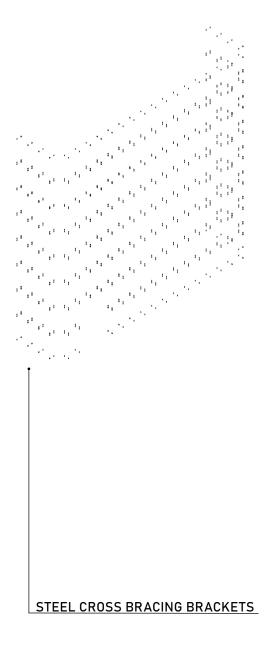
Kunsthaus Bregenz was designed using a skeleton construction system where the loads of the building are assumed on the interior structural walls. In the building this system is created by three vertical slabs of exposed concrete that extend through all levels. These walls provide support for the reinforced concrete slab floors and ceilings of the entire structure. While providing structural integrity to the building, the three walls also allow for all of the infrastructure to be concealed and create an expansive, column-free exhibition space.

Along with the interior structure, the exterior is also a free standing structure that supports the enclosure. This structure consists of a steel framework that wraps the building and part of the roof and is laterally supported by steel cables that are connected to the framework with brackets.

The overall building is 30 meters tall and each floor is 26.57 meters in length and width. Each of the three loadbearing walls are 72 centimeters thick and support the floors and ceilings which are 80 centimeter reinforced concrete slabs. The exterior facade framework consists of prefabricated steel framework components that are 27m (l) x 4.4m (w) x .9m (d) and 8m (l) x 4.4m (w) x .9m (d). This structure weighs 180 metric tons without glass. These interior and exterior structural elements work independently as support systems, but together they create an environmentally friendly building to support its surroundings.



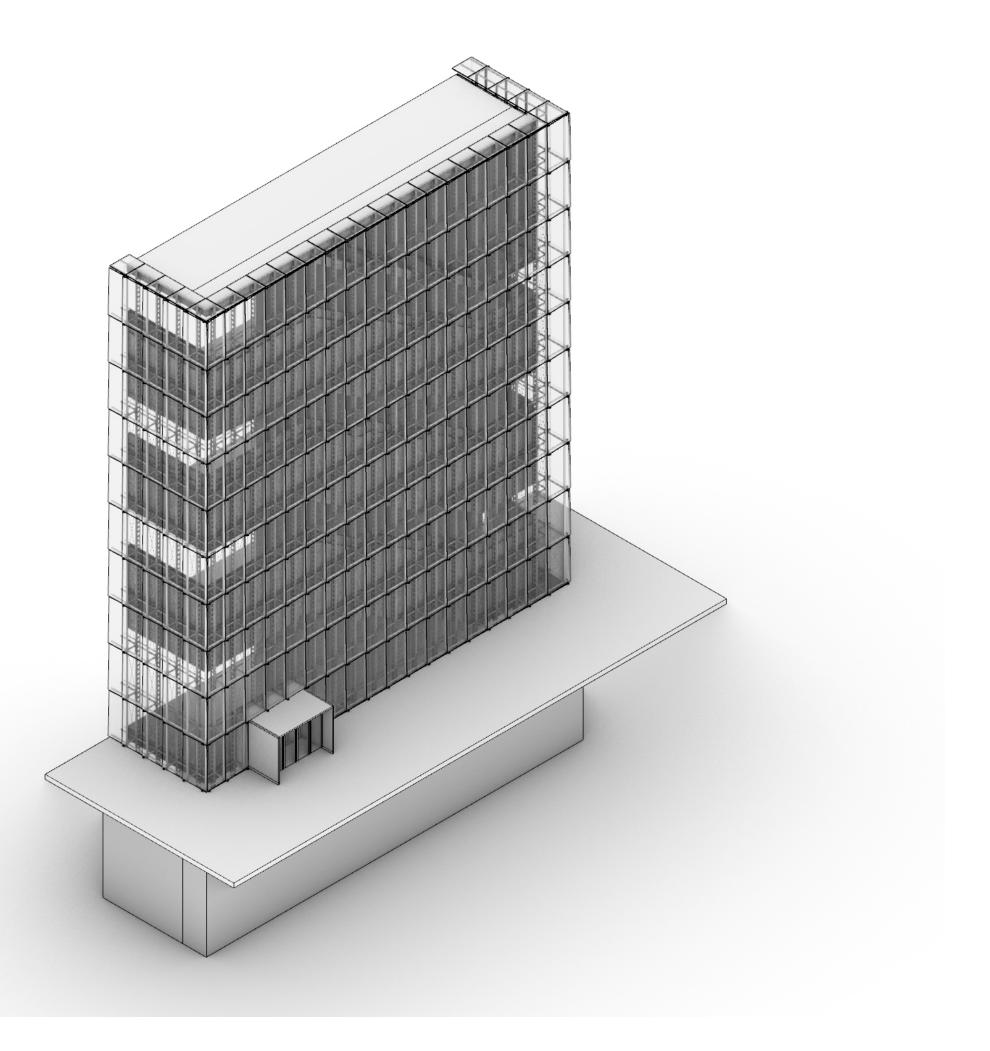


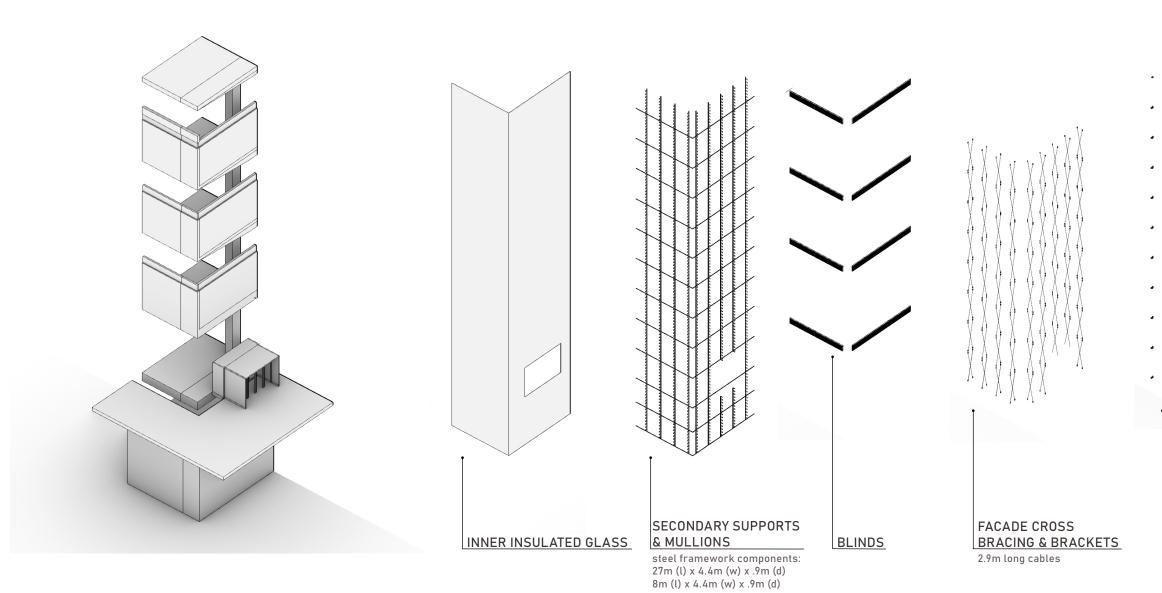


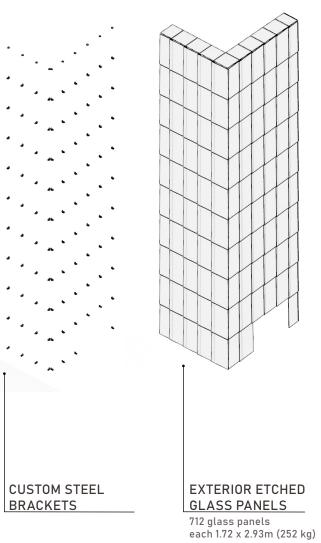
### ENCLOSURE

The glass facade of Kunsthaus Bregenz creates a conversation between the heaviness of the concrete and instead brings lightness to the building. In addition to lightness in weight, the facade system is essential to the building's lighting system. The glass absorbs the light from the sky, filters and guides the light to all floors of the building. The facade is self-supporting and envelopes the free standing concrete structure like a double casting. This consists of a steel frame truss system that accommodates the glass panels on the exterior and the thermal facade interior. The space between the two panels of glass allows for maintenance and servicing as well as spotlights to illuminate the exterior at night. Holding these glass panels are custom made brackets to accommodate the visual overlay of glass tiles and present a frameless facade around the building.

The facade consists of 712 glass panels each 1.72 x 2.93 m (252 kg) which are laminated security glass. These are comprised of 2 x 10 mm float glass/ white glass with 4 layers of film, externally etched. Holding these panels are custom brackets connected to the steel structure. There is a 90 centimeter gap situated between the interior and exterior glass for maintenance. Together this enclosure system supports the daylighting strategy for the entire structure and regulates the humidity and ventilation for the building.

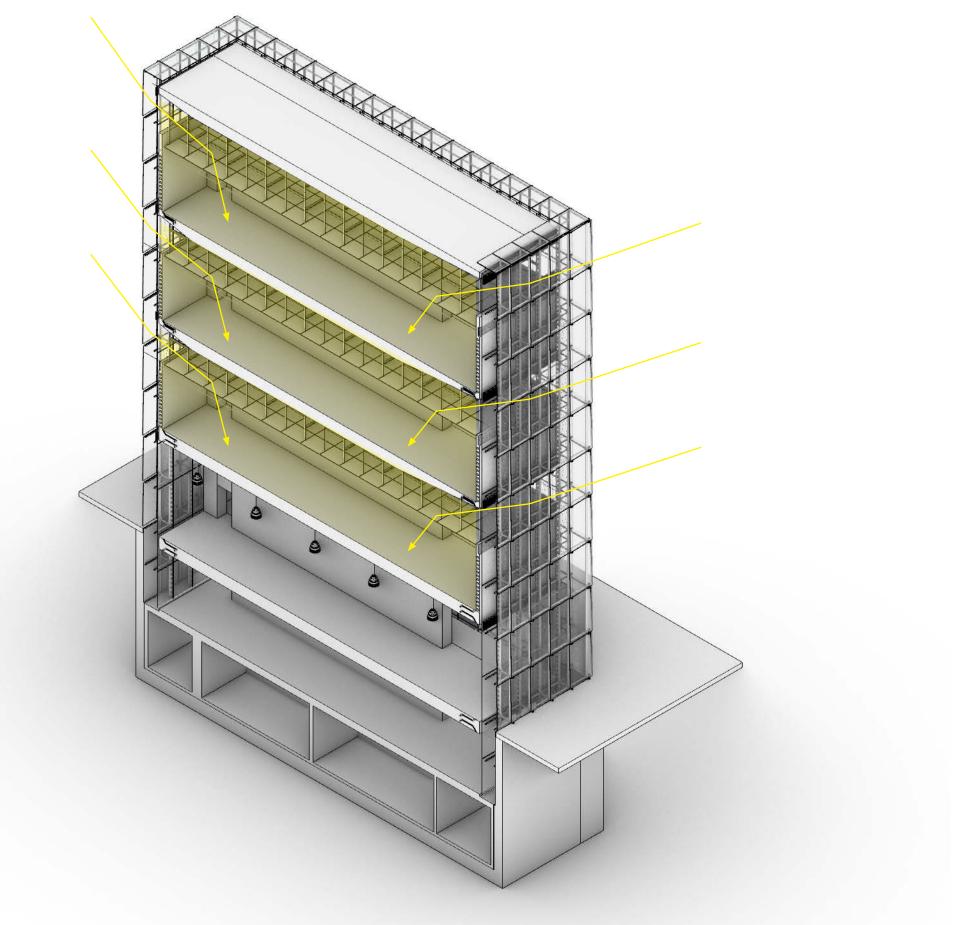




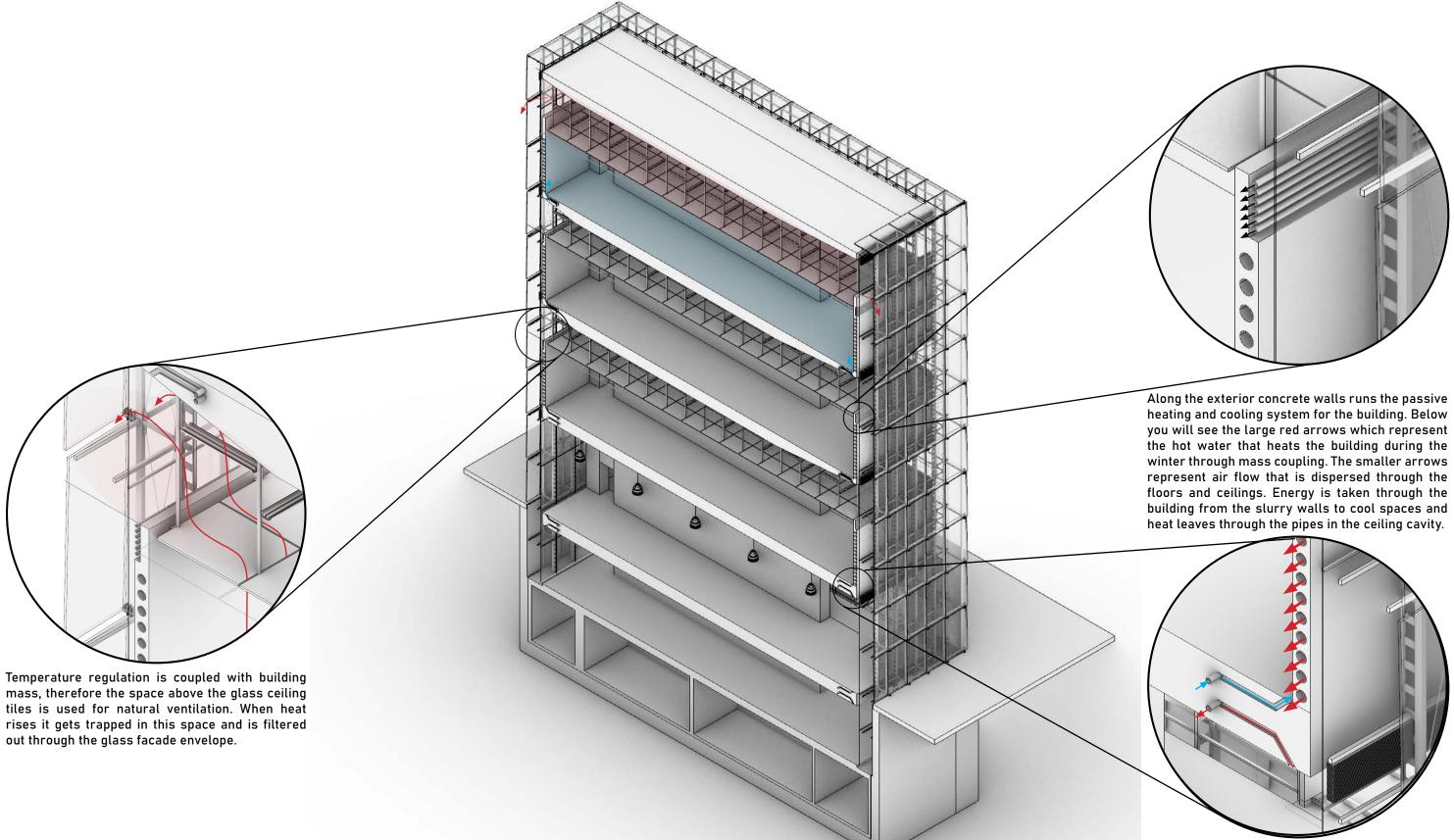


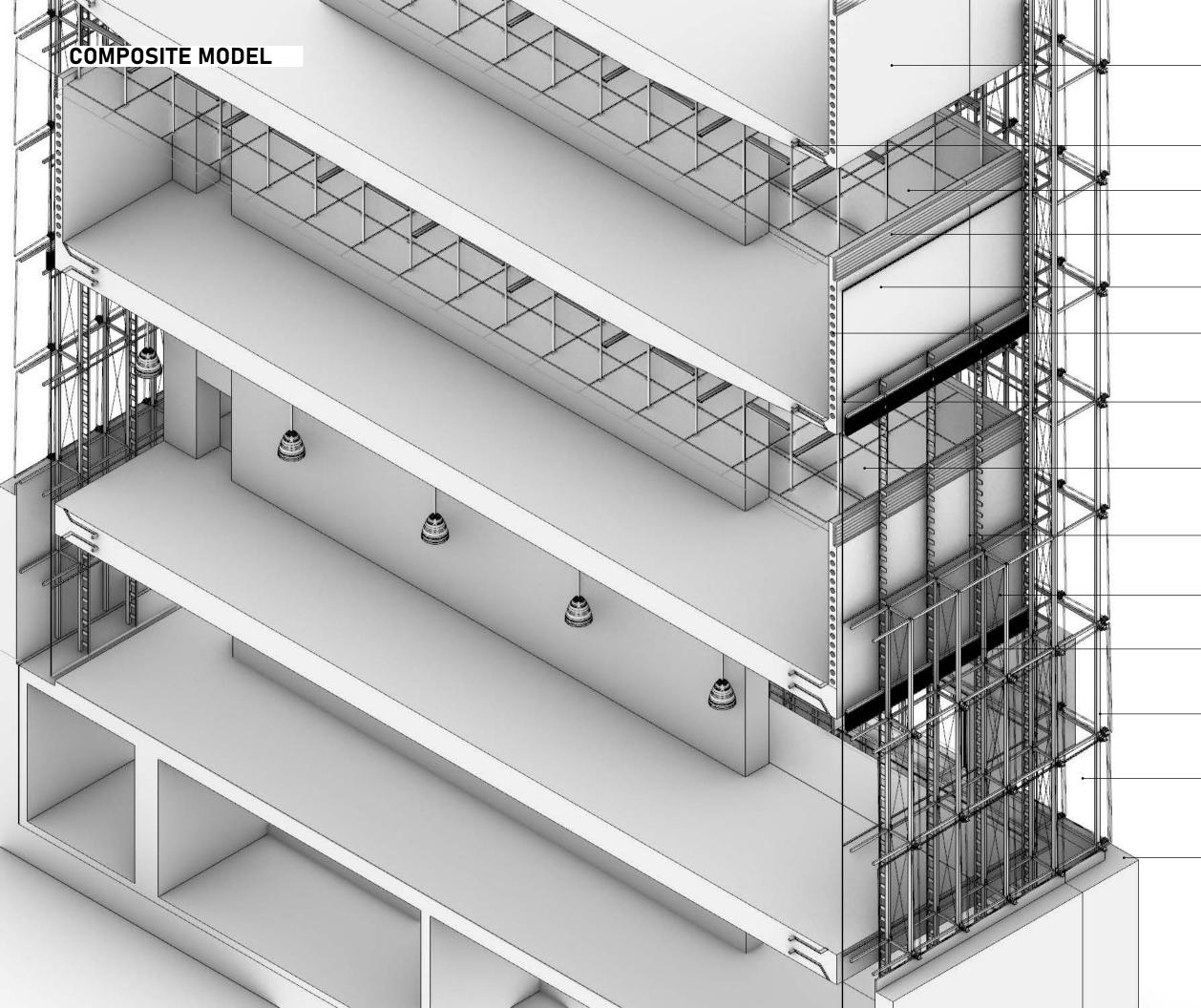
## ENVIRONMENTAL CONTROLS

Kunsthaus Bregenz is located in Karl-Tizian-Platz, on Lake Constance. It was constructed in a prominent location on the lake shore with the entrance to the building facing the city. The location of the building is put to use in the heating, ventilation and air conditioning system. The structural slurry walls constructed around the basement are surrounded by groundwater that travels from the Pfander mountains into Lake Constance. Inside the slurry walls a network of pipes was constructed. A heat pump is used in the slurry walls to extract energy for heating and cooling, and in the winter months gas heating is used. Along with earth coupling, mass coupling was also used throughout the building. A system of plastic pipes was cast into the non-load bearing concrete walls and ceilings of the building where water circulates and heats or cools building mass when required. By coupling temperature regulation to building mass the air does not have to serve for heating or cooling purposes and instead serves as ventilation together with humidifying and dehumidifying. Decoupling also occurs in Kunsthaus. The exhibition spaces and the spaces above the drop ceilings function differently. The strong sources of light and heat in the upper zone are separated by the glass drop ceiling to create a climate controlled exhibition space. Above the glass drop ceiling is an artificial pendant light system to supplement the natural lighting when it is needed. The especially designed lights can be controlled individually or as a group and continually adjusted. The rest of the lighting system was designed to be natural. The daylight permeates the facade and is directed via ribbon windows into an interim space and from there is dispersed through daylight ceilings into the upper three floors. The light is refracted three times and varies in intensity depending on the time of day and season. Other forms of active systems including external thermal insulation and flexible sun protection in the form of blinds between outer glass facade and inner glazing.



## **ENVIRONMENTAL** CONTROLS





COOLING AIR DISTRIBUTION THROUGH CONCRETE FLOOR

HOT AIR VENTILATION THROUGH CEILING PANELS

MECHANICAL SYSTEMS

INTERIOR INSULATED GLASS

MASS COUPLING HEATING SYSTEM

HORIZONTAL MULLIONS FOR INNER GLASS

ETCHED GLASS CEILING PANELS

SECONDARY SUPPORTS & VERTICAL MULLIONS

FACADE CROSS BRACING

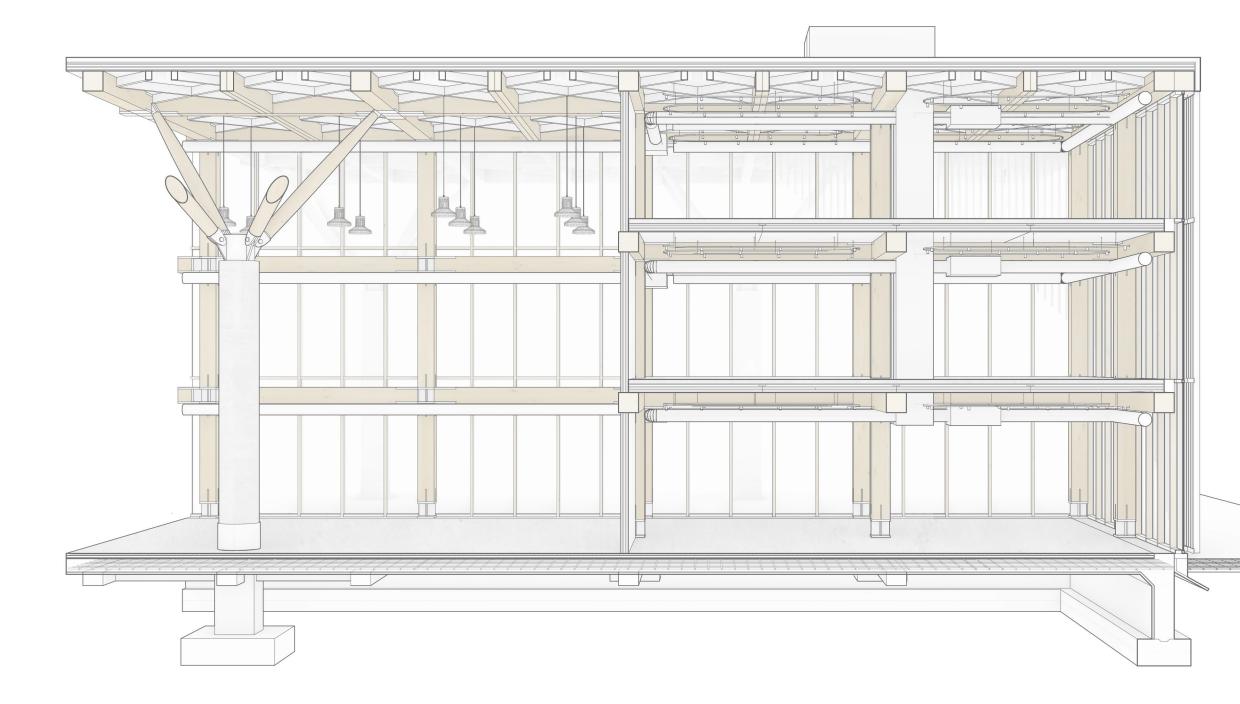
BLINDS

STEEL FACADE FRAMEWORK

EXTERIOR ETCHED GLASS PANEL

FOUNDATION & SLURRY WALL

## **COMPOSITE MODEL**



## BUILDING SYSTEM PROTOTYPES

### **MANIFESTO**

The proposed building systems intend to work in conjunction with the overall concept of our building, allowing for flexibility in the size and use of spaces. The structural system utilizes mass timber columns and beams with custom steel connectors to create moment frames within the structure where the lateral forces are absorbed in the joint. This type of design allows for large spans and flexibility in wall design throughout. Mass timber and CLT construction reduces the overall building footprint and is also longer lasting than steel in a fire situations.

Post and beam construction not only allows for flexible spacial design, but also flexible facade design. Our prototype utilizes a curtain wall envelope and facade system. The curtain wall features triple pane glass which is more energy efficient for the building than double paned glass, adding an extra layer of insulation to the envelope and prevents the transfer of heat. This works well with the vertical louvers on the east and west facades and the large overhang to the south, to passively heat and cool the building and make it more energy efficient.

Along with the passive energy systems our structure also features electric lighting and an HVAC systems for when the passive strategies become insufficient to support the entire building. Track lighting is utilized on each floor to support many functions as the lights can rotate and move on the track to cater to specific uses. To help maintain comfortability, a VAV system is used throughout our building. This works well with the open spaces within the structure because the ducts can easily follow the beams along the outer edge of the building to regulate the temperature and heat loss through the envelope.

## STRUCTURAL RESEARCH

### MASS TIMBER AND CLT CONSTRUCTION

#### FRAMING FOR HEAVY TIMBER CONSTRUCTION:

A heavy timber framing system that uses both beams and girders allows for the greatest sitecast concrete framing systems is constrained by the required spans (the spacing range of bay sizes and proportions. The beam spacing is determined by the allowable span of the floor or roof decking. For preliminary design, limit beam and girder spans to the maximum of 20ft for solid wood decking or 24ft for laminated wood decking.

#### **CROSS LAMINATED TIMBER PANELS:**

CLT panels may be assembled into complete wall and slab structural systems using common wood fastening techniques to join panels. They may also be used in combination with steel, concrete, masonry, or light wood framing. For greater fire-resistance, CLT floor panels may be combined with a concrete topping. CLT used in exterior walls cannotbe left exposed to the elements and must be covered with appropriate materials to protect the panels and control the flow of water, heat, and air through the wall.

### SITE CAST CONCRETE TWO-WAY FLAT PLATE

#### SITECAST CONCRETE STRUCTURAL COLUMNS:

between walls or columns) and by the magnitude of the in-service loads.

#### POST TENSIONING:

The span ranges of sitecast concrete systems can be increased by the use of posttensioned reinforcing (high-tensile-strength steel cable reinforcing within the concrete that is stretched tight after the concrete has cured). Posttensioning also reduces the depth of spanning members and may be desirable where floor-to-floor heights must be kept to a minimum.

#### SITECAST CONCRETE TWO-WAY FLAT PLATE:

Two-way flat plate construction is one of the most economical concrete framing systems. This system can span farther than one-way slabs, and the plain form of the slab makes it simple to construct and easy to finish. This system is a popular choice, for example, for apartment and hotel construction, where it is well suited to the moderate live loads, and the flexibility of its column placements permits greater ease of unit planning and layout than with a one-way system.

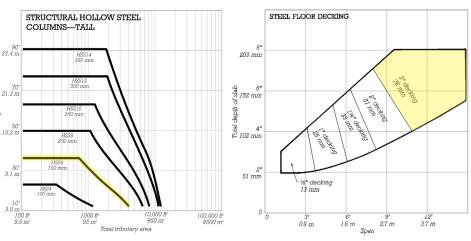
### STRUCTURAL STEEL COLUMNS

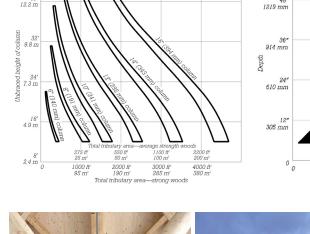
### STRUCTURAL HOLLOW STEEL COLUMNS:

Standard shapes for structural hollow steel sections include square tubes, rectangular tubes, and round pipes. Compared to wide-flange sections of the same weight, tubes and pipes are more resistant to bucklingforces, making them good choices for columns and compressive struts in all types of steel systems. They are employed as columns in long-span steel structures for their greater efficiency, and because they are available in lighter weights than other standard shapes, they are frequently used in one- or two-story steel structures as well. HSS members are popular choices for use in the fabrication of steel trusses and space frames, and their high torsional resistance makes them excellent choices for single post supports such as for signs or platforms. The simple profiles and clean appearance of hollow steel sections and pipes also make them popular for use where the steel may remain visible in the finished structure, or for structures exposed to the weather where the absence of moisture- and dirttrapping profiles and ease of maintenance are desirable characteristics.

#### STEEL FLOOR DECKING:

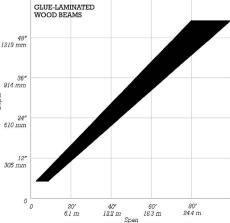
Corrugated steel floor decking with a sitecast concrete topping is the slab system most commonly used over structural steel framing. Typical span ranges for steel floor decking used with structural steel framing are 6 to 15 ft (1.8 to 4.6 m). Longer spans or shallower depths than those indicated on the chart on the facing page may be possible, although increased construction costs may result from the need for additional temporary shoring of the decking during erection.

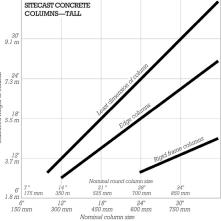


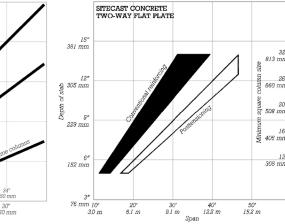


WOOD COLUMNS

TALL









LocHal Library, Tilburg, Netherlands



The Student Center UCL, London, Great Britain





RHS Garden Bridgewater - Welcome Building, Worsley, Great Britain

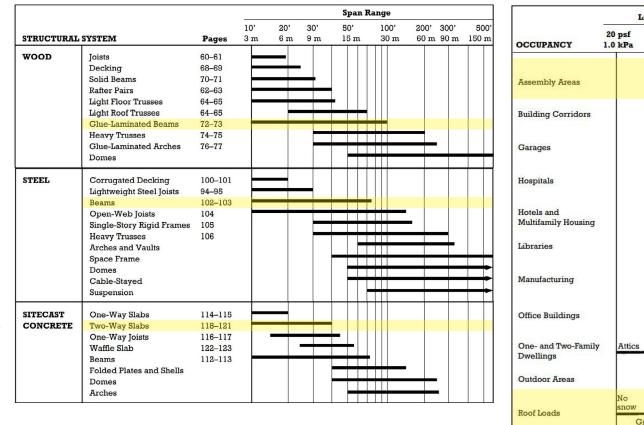
## LATERAL LOAD SYSTEMS & PRACTICAL SPAN & LIVE LOAD RANGES

#### SHEAR WALLS:

Shear walls are solid walls constructed to resist the application of lateral forces. Though most often constructed of reinforced concrete, shear walls can be made of almost any structural material and range in size from small sections of panel-sheathed wood stud walls in residential buildings to massive steel and concrete structures in the tallest buildings. In comparison to the other systems described on this page, shear walls are especially stiff, making them a good choice wherever a relatively compact arrangement of stabilizing elements is desired. Shear walls must be mostly solid, with limited openings through the wall. To minimize interference with floor plan arrangements, shear walls are often incorporated into the building core, stair towers, or other vertical structures within the building. Shear walls can also be part of the exterior wall, although in this location theylimit access to daylight and exterior views.

#### **RIGID FRAMES:**

Rigid frames depend on extra-stiff connections in the column-and-beam structural framework to resist the effects of lateral forces. These connections are most easily constructed in steel or sitecast concrete, thoughoften at added cost in comparison to simpler, less rigid connections. Rigid connections may also be constructed in precast concrete, though with greater difficulty. The absence of solid panels or diagonal bracing makes this lateral force-resisting system attractive where the greatest flexibility in plan configuration is desired. However, the rigid frame is also the most structurally inefficient lateral force-resisting system. It is most suitable for low or broad structures requiring relatively modest resistance.



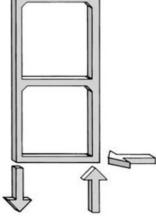
Storage Areas

Miscellaneous Public Facilities

Schools

Stores

SHEAR WALL



**RIGID FRAME** 

Light Loads	Medium Loads	Heavy Loads	Very Heav	y Loads
			50 psf .2 kPa	250 p 12.0 k
	Fixed Movable seats seats			
Defende	Stage areas Public			
Private	Fublic			
Passe	nger cars	Trucks and buse		
Private rooms	Operating rooms			
	Laboratories			
Private rooms	Public rooms			
	Reading rooms	Stack	s	
		Light		Heavy
Offices	Lobbies			
Bedrooms Living				
spaces		Pedestrian	Vehicular	
Modera snow	te Heavy snow	Extreme snow		
Green roofs	Pedestrian	Light		Heavy
Classrooms	Assembly	Shops		
	Retail	Wholesale		
Penal institutions	Bowling Gymn alleys Dance	asiums halls Armories		
Cell blocks	Restau Stadiu		s	

## ENCLOSURE RESEARCH

### **CURTAIN WALL**

A curtain wall is defined as thin, usually aluminum-framed wall, containing in-fills of glass, metal panels, or thin stone. The framing is attached to the building structure and does not carry the floor or roof loads of the building

#### PROS:

- This option is the safest when it comes to fire safety. A curtain wall system slows down the spread of fire between floors as it acts as a barrier joining against each floor plate

- Allows for passive heating
- Helps the building from swaying, helps stabilize the building laterally
- Has the ability to span multiple floors
- Can offer longer spans and heights then storefront
- Ability to have functional windows for air circulation

### **RAIN SCREEN**

A rainscreen is an exterior wall detail where the siding (wall cladding) stands off from the moisture-resistant surface of an air/water barrier applied to the sheathing to create a capillary break and to allow drainage and evaporation. The rainscreen is the cladding or siding itself[1] but the term rainscreen implies a system of building. Ideally the rainscreen prevents the wall air/water barrier from getting wet but because of cladding attachments and penetrations (such as windows and doors) water is likely to reach this point, and hence materials are selected to be moisture tolerant and integrated with flashing.

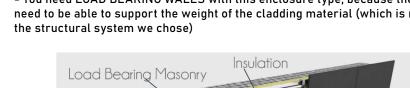
#### PROS:

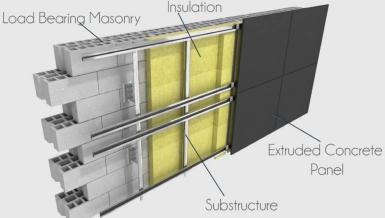
- Allows for maximum airflow
- Better water management
- Improves material durability
- Effective at blocking radiant heat gains (could also be a con)
- Avoids condensation and humidity
- Extends facade's lifetime

#### CONS:

- Limited, as there must be ventilation at the top and bottom of the screen - Higher costs

- You need LOAD BEARING WALLS with this enclosure type, because the walls need to be able to support the weight of the cladding material (which is not







George W. Peavy Forest Science Center, Oregon State University, Corvallis, Oregon

Winner Spedition, Iserlohn, Germany

### **STOREFRONT / INFILL**

A storefront is composed of commercial entrances and windows but is a non-loadbearing system. These systems are generally used on the ground floor, and are only used for a single story, but are used on second and third floors occasionally.

#### PROS:

which helps maintain indoor temperature

#### CONS:

- becomes excessive

- Is less costly, as this design saves energy since the glass is highly insulated

- Smaller spans and shorter heights due to water management - Any water entering the system is directed down the vertical mullion to the sill, where it is then weeped to the exterior of the building. Consequently, this can lead to the system become overloaded when the exposure to weather



4-Story Mass Timber Office Building, Des Moines, Iowa

### **PASSIVE SOLAR HEATING**

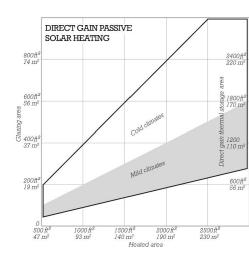
The interior space of the building acts as a solar collector, receiving sunlight directly through large south-facing windows and storing excess heat in thermal mass materials such as concrete, masonry, adobe, rammed earth, water, or phase-change salts. During sunless periods, a comfortable temperature is maintained as stored heat is released back into the space. Roof overhangs or exterior shading devices are configured to block out high summer sun when heat gain is not desirable. In colder climates, insulating shutters or curtains and high-performance glazing materials should be used to reduce heat losses through the large glass areas during cloudy days and nights.

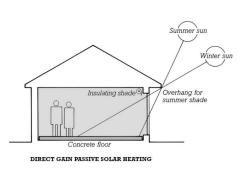
#### ADVANTAGES:

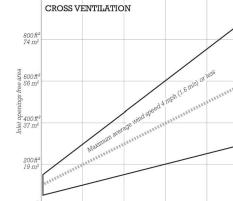
Passive solar heating has no operational costs, consumes no energy, requires little or no maintenance, and can be aesthetically satisfying.

#### DISADVANTAGES:

Except in mild climates, a backup heating system must be provided to heat the building during long sunless periods. Relatively large swings in interior temperature must be expected. Building occupants may be required to perform daily control duties such as opening and closing insulating shutters or curtains. The architecture of solar-heated buildings is strongly influenced by the need to orient and configure the building for optimum solar collection. Where floors, walls, or ceilings are used as thermal mass, these surfaces must not be covered with carpets, wall hangings, or other materials that thermally uncouple the mass from the interior. Cooling and humidity control must be accomplished with separate systems.







**CROSS VENTILATION** 

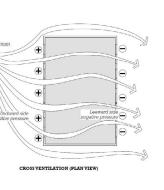
ADVANTAGES:

DISADVANTAGES:

building, excess heat is flushed to the exterior.

energy consumption, or maintenance needs.

unwanted outside noise into the building.





The Kendeda Building for Innovative Sustainable Design, Atlanta, Georgia



Outside air circulates through the building during occupied hours. Occupant comfort

Natural ventilation cooling is a passive strategy with no significant operational costs,

Natural ventilation strategies rely on large exterior openings, open floor plans, and, in some cases, interconnected floor levels. These may conflict with program

and air pollutants is not possible. The necessary exterior openings may admit

requirements, visual or acoustic privacy needs, or fire-safety regulations requiring

compartmentalization of spaces. Precise control of interior air temperature, humidity,

is improved by the direct cooling effect of the moving air. As air passes through the

Simpson Lee House, New South Wales, Australia

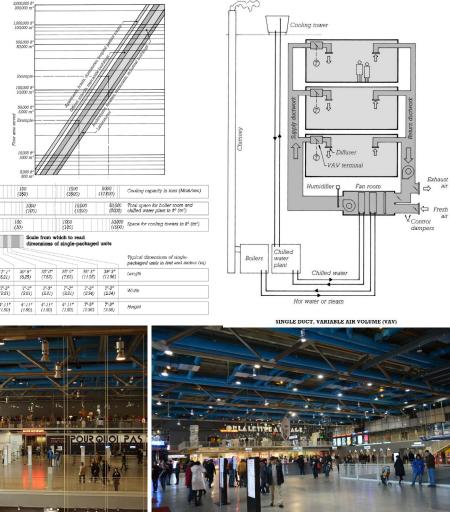
### **CENTRAL ALL-AIR VAV SYSTEM**

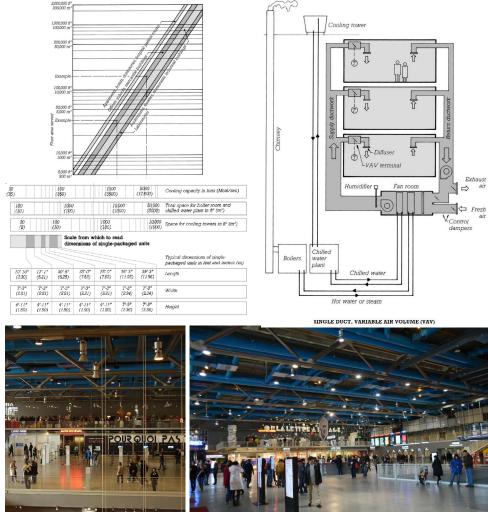
Air is conditioned (mixed with a percentage of outdoor air, filtered, heated or cooled, and humidified or dehumidified) at a central source. Supply and return fans circulate the conditioned air through ducts to the occupied spaces of the building. At each zone, a thermostat controls room temperature by regulating the volume of air that is discharged through the diffusers in that zone.

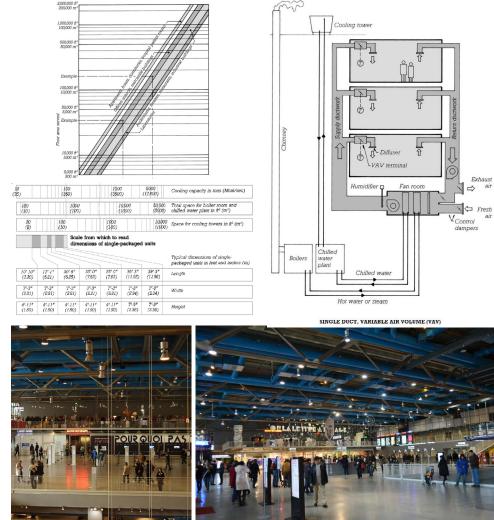
#### ADVANTAGES:

#### DISADVANTAGES:

#### MAJOR COMPONENTS:







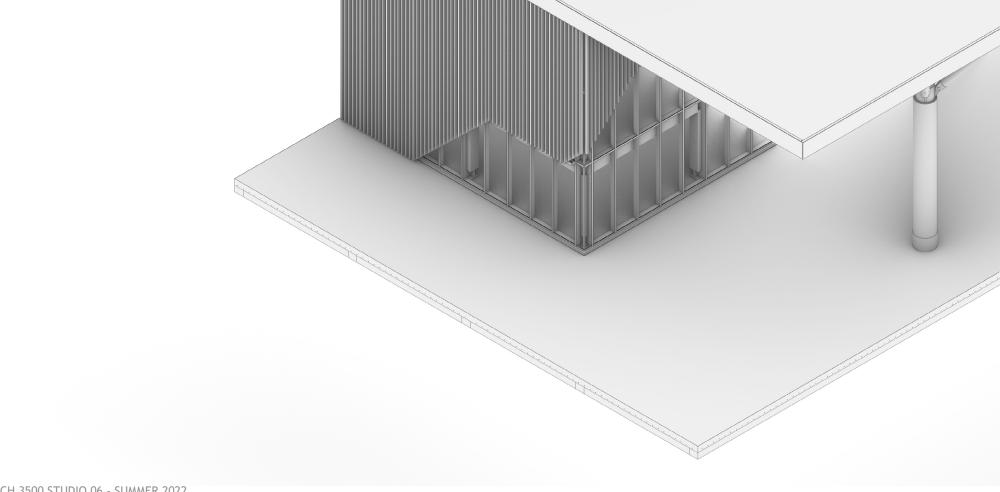
Centre Pompidou, Paris, France

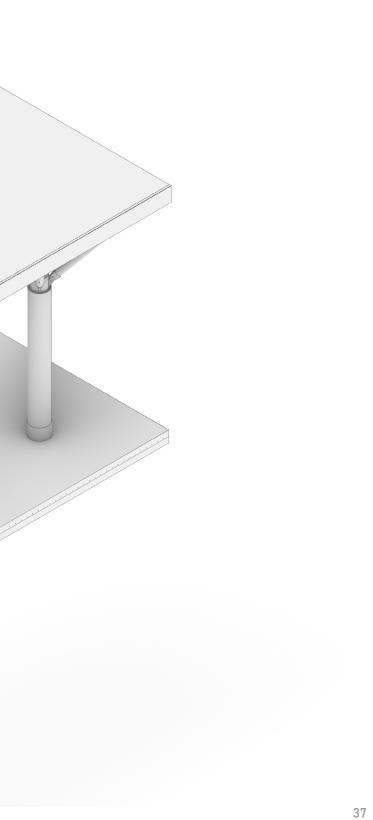
This system offers a high degree of local temperature control at moderate cost. It is economical to operate and virtually self-balancing.

VAV is limited in the range of heating or cooling demand that may be accommodated within a single system. When one area of a building needs heating while another needs cooling, a VAV system cannot serve both areas without help from a secondary system.

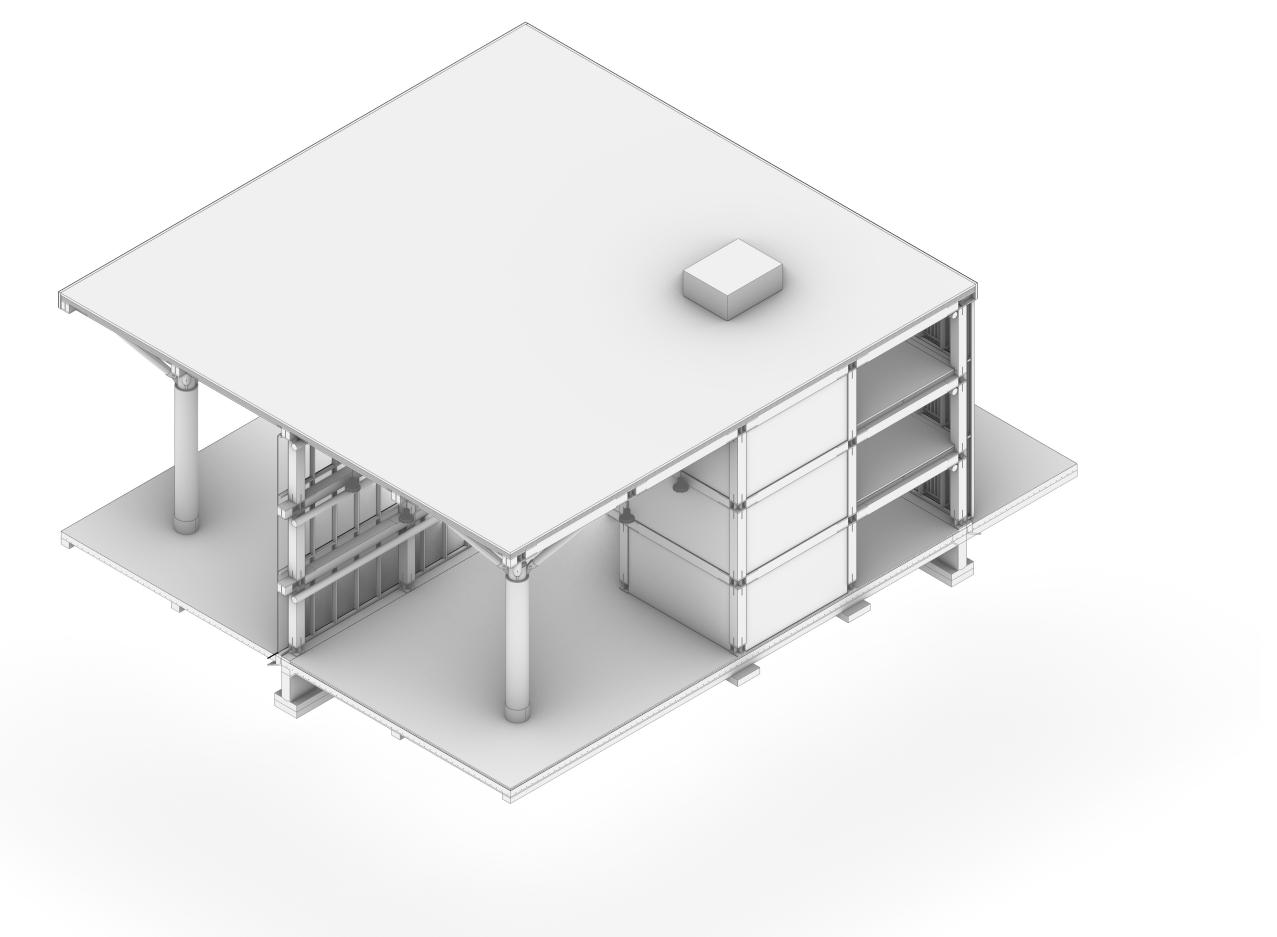
Boilers and chimney, chilled water plant, cooling tower, fan room, outdoor fresh air and exhaust louvers, vertical supply and return ducts, horizontal supply and return ducts, a VAV control box for each zone, supply diffusers, return grilles.

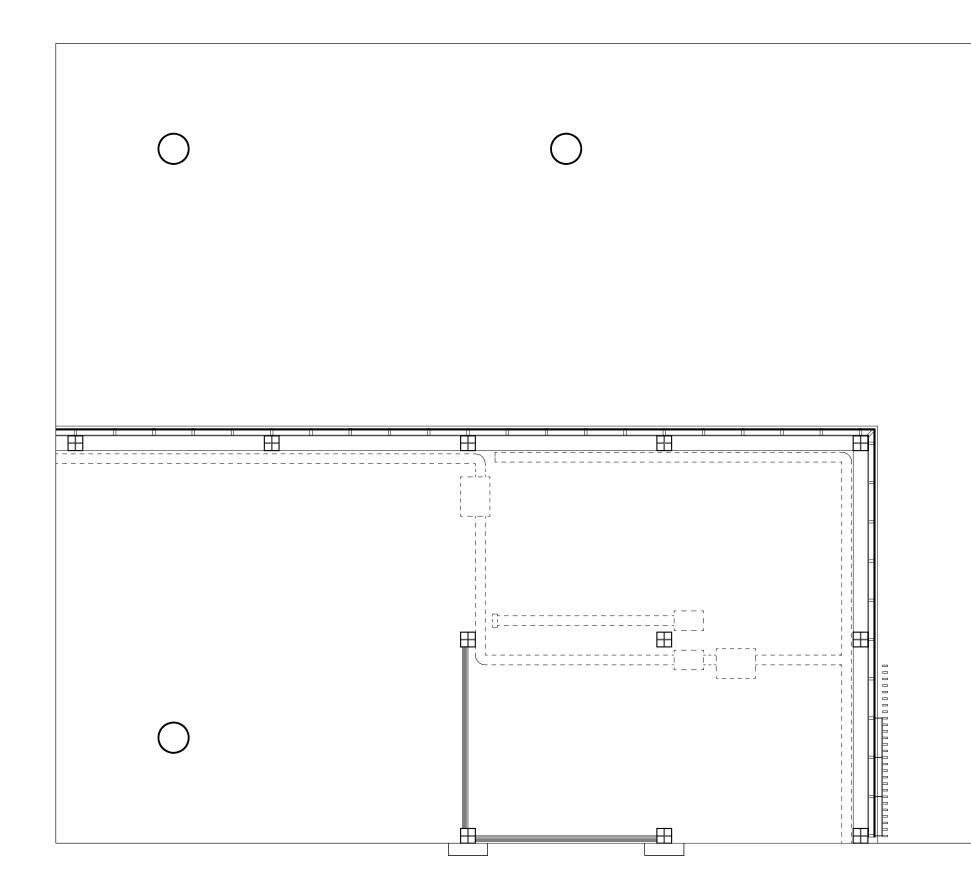
# **AXON SOUTHWEST VIEW**

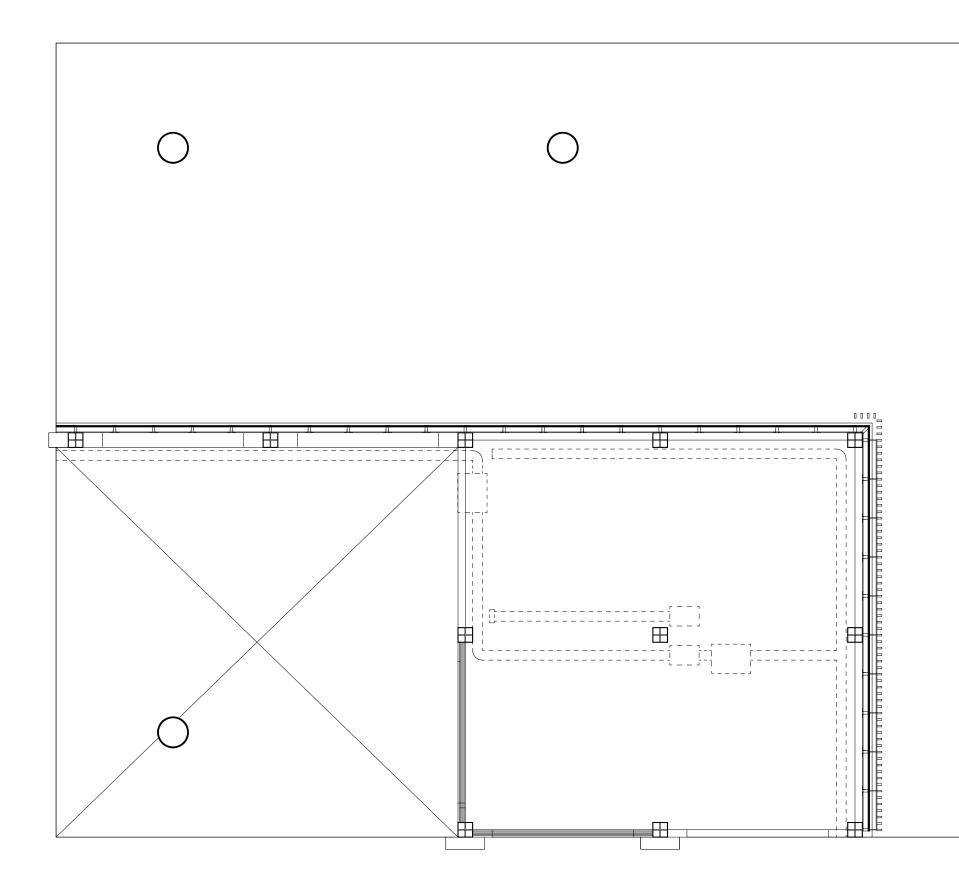


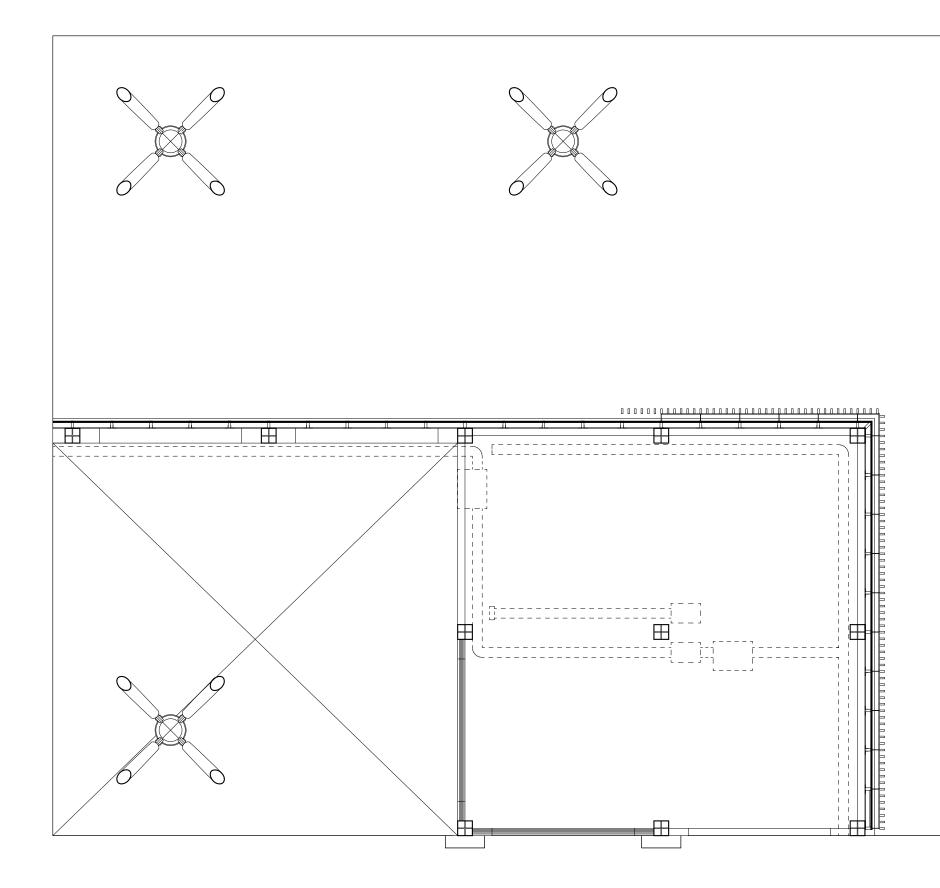


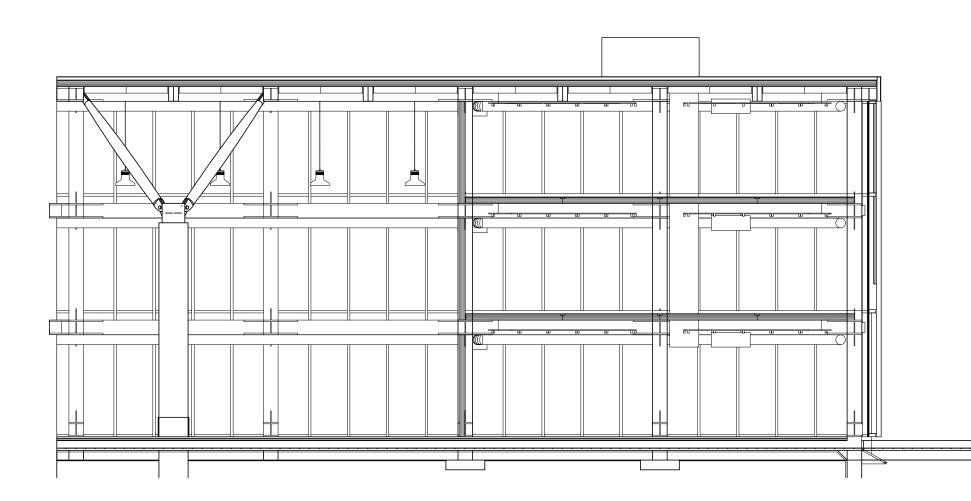
# **AXON NORTHEAST VIEW**





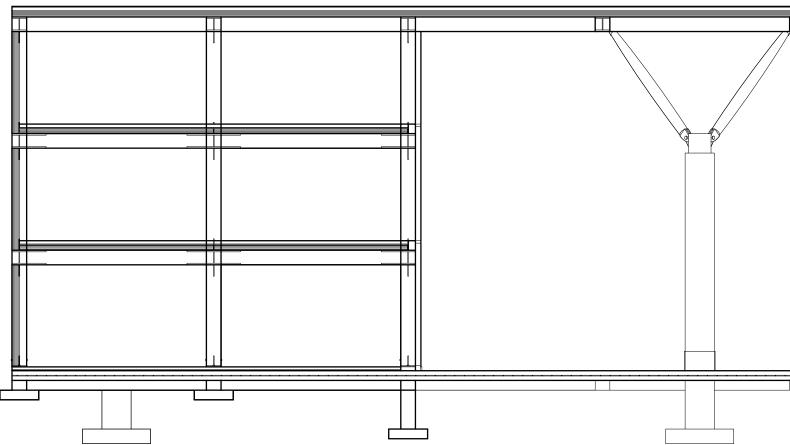






42

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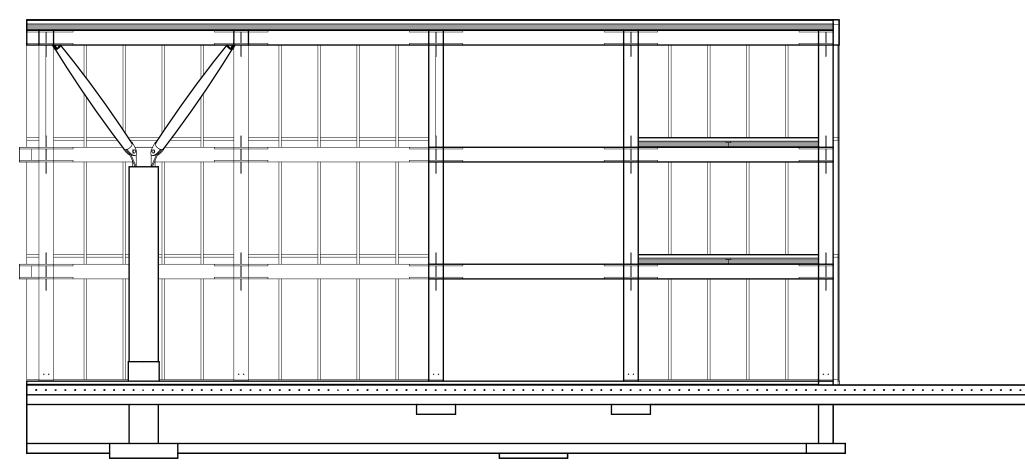




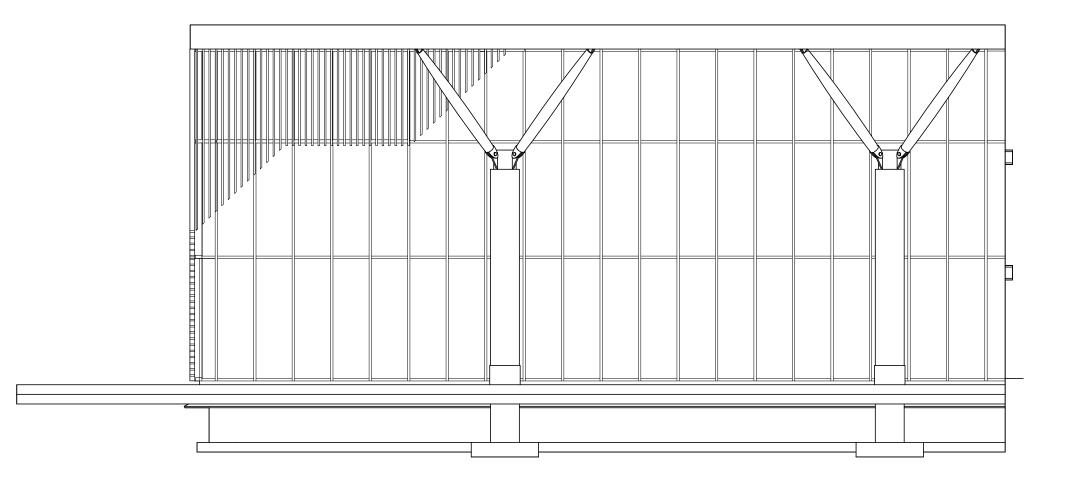


43

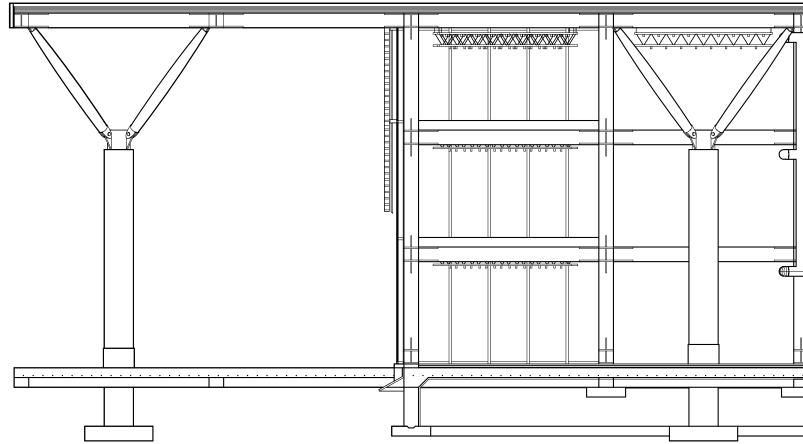
## NORTH ELEVATION



# SOUTH ELEVATION

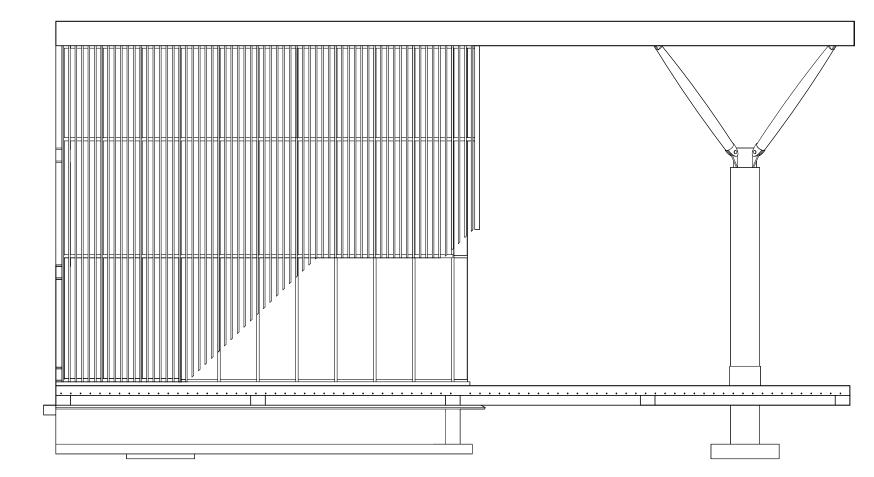


# EAST ELEVATION

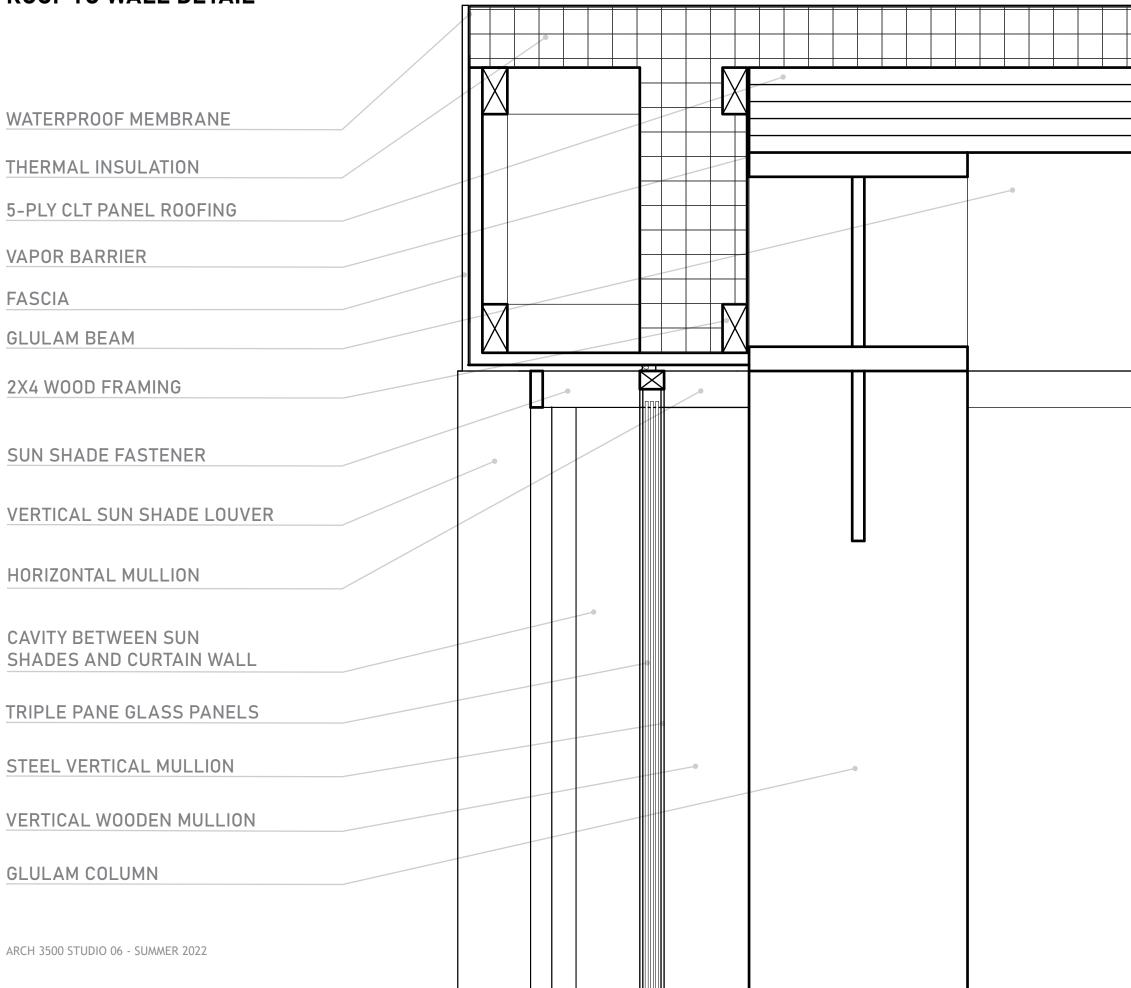




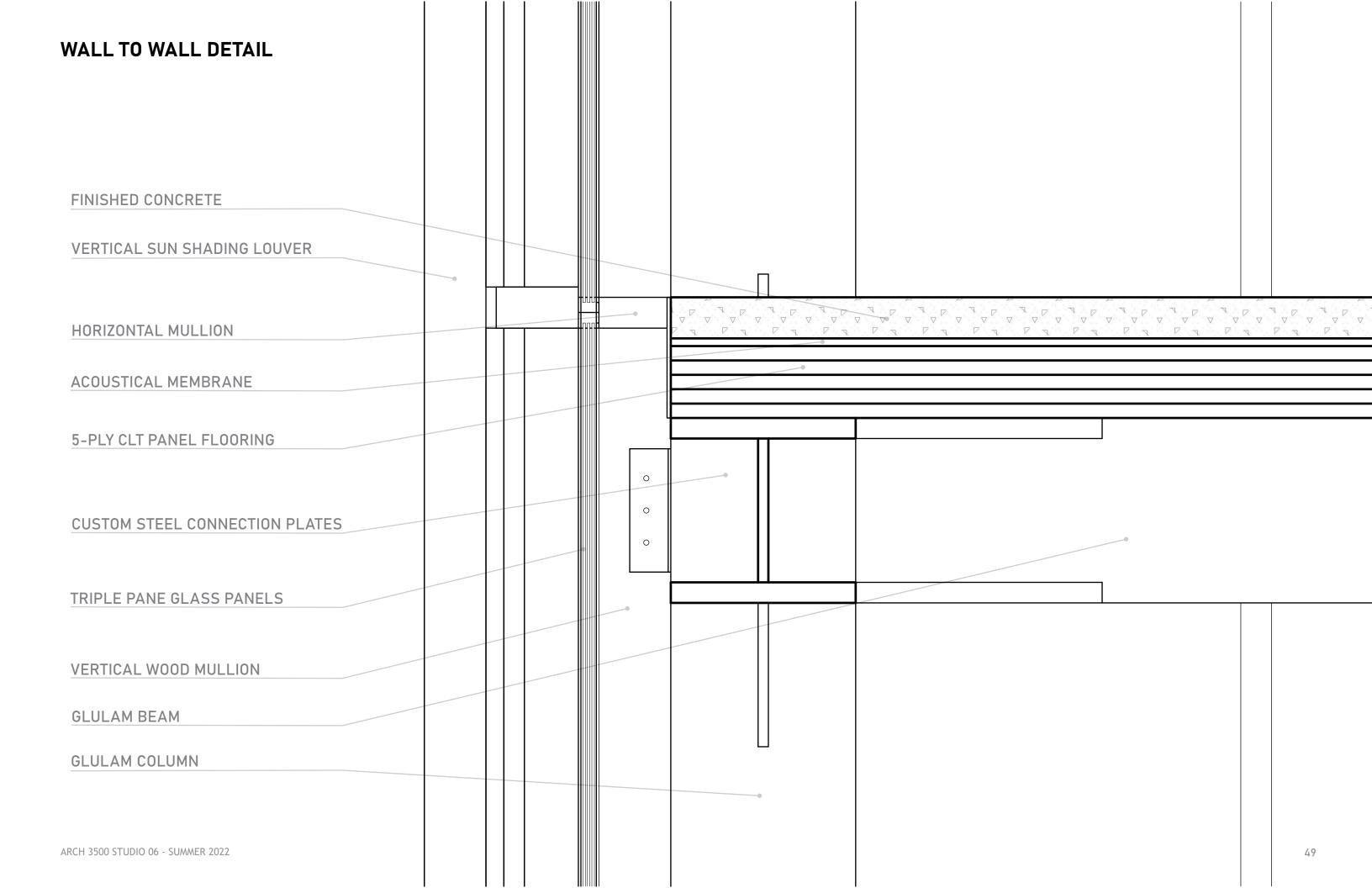
# WEST ELEVATION



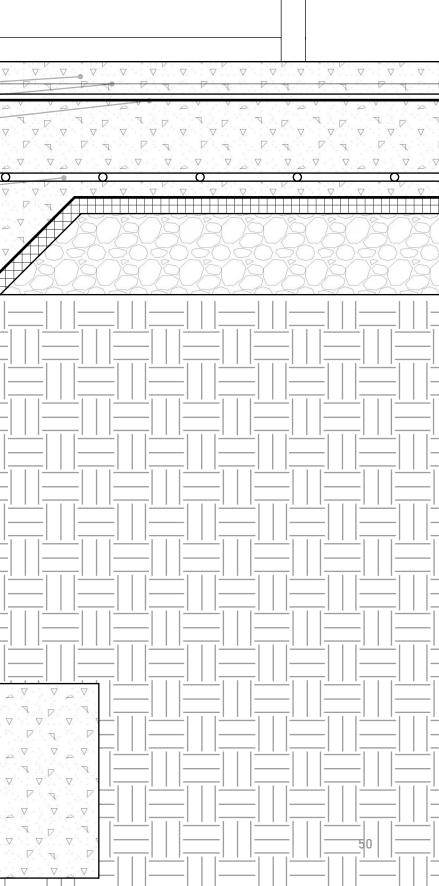
# **ROOF TO WALL DETAIL**



	48

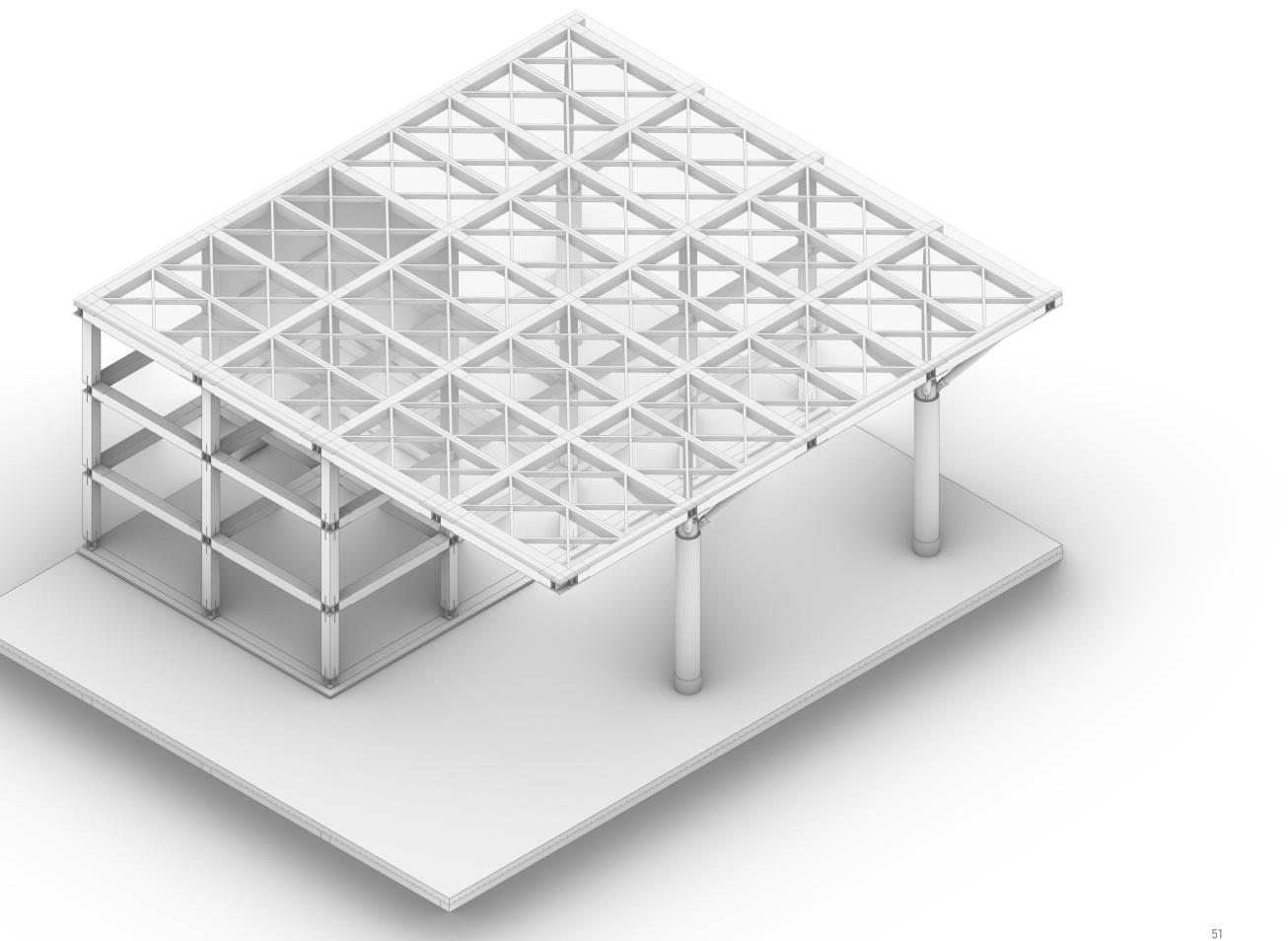


WALL TO FLOOR DETAIL	
VERTICAL SUN SHADES	
TRIPLE PANE GLASS PANELS	
RIGID INSULATION	
FINISHED CONCRETE FLOORING	
MESH FOR CONCRETE	
SLAB ISOLATION MEMBRANE	
STEEL REBAR	
INSULATION SKIRT	
ANCHOR BOLT	
CONCRETE SLAB	
WEATHERPROOF MEMBRANE	
RIGID INSULATION	
FOUNDATION WALL	
CONCRETE FOOTING	
ARCH 3500 STUDIO 06 - SUMMER 2022	



## STRUCTURAL COMPOSITE

The structural system utilizes mass timber columns and beams with custom steel connectors to create moment frames within the structure where the lateral forces are absorbed in the joint. This type of design allows for large spans and flexibility in wall design throughout. Mass timber and CLT construction reduces the overall building footprint and is also longer lasting than steel in a fire situations.



# STRUCTURE

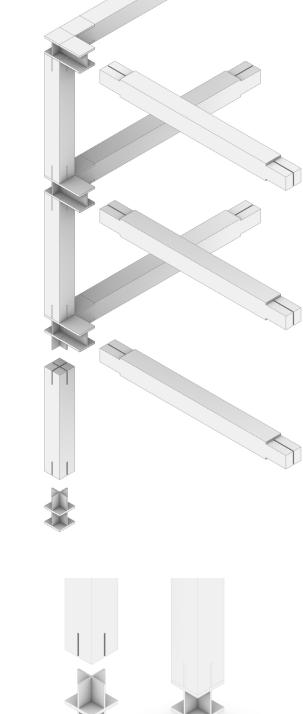
CUSTOM STEEL TO WOOD MOMENT FRAME CONNECTOR



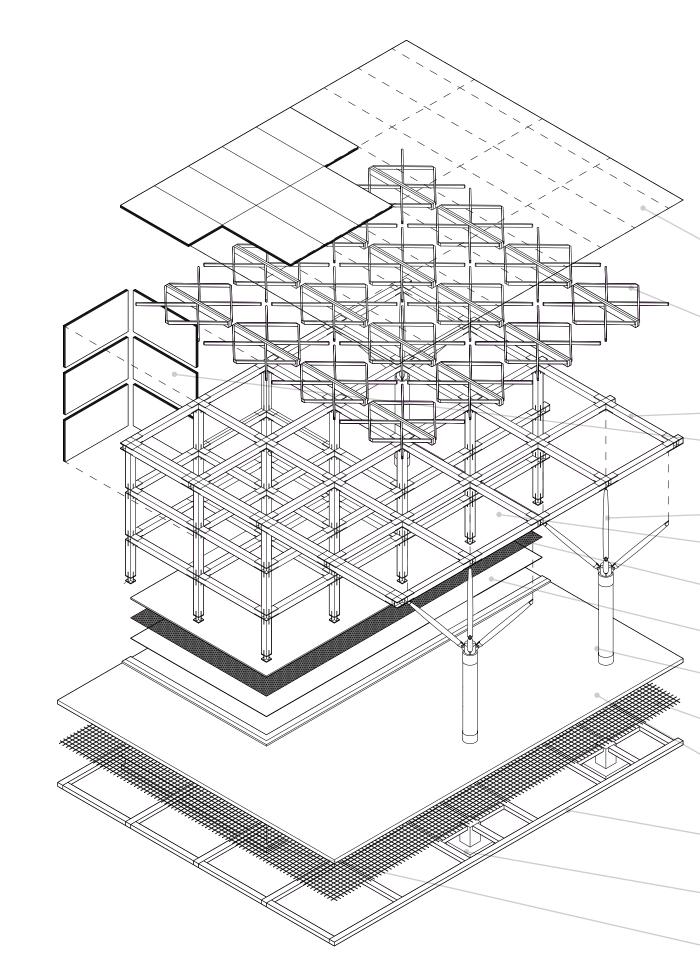








COLUMN BASE DETAIL



FO	UND	ATION	WALL
		/	

52

CONCRETE	FOOTING

WEATHERPROOF MEMBRANE

STEEL REBAR

TIE BEAMS

CONCRETE SLAB

SLAB ISOLATION MEMBRANE

MESH FOR CONCRETE

FINISHED CONCRETE FLOORING

TRIPLE HEIGHT DISTRUBUTED COLUMNS

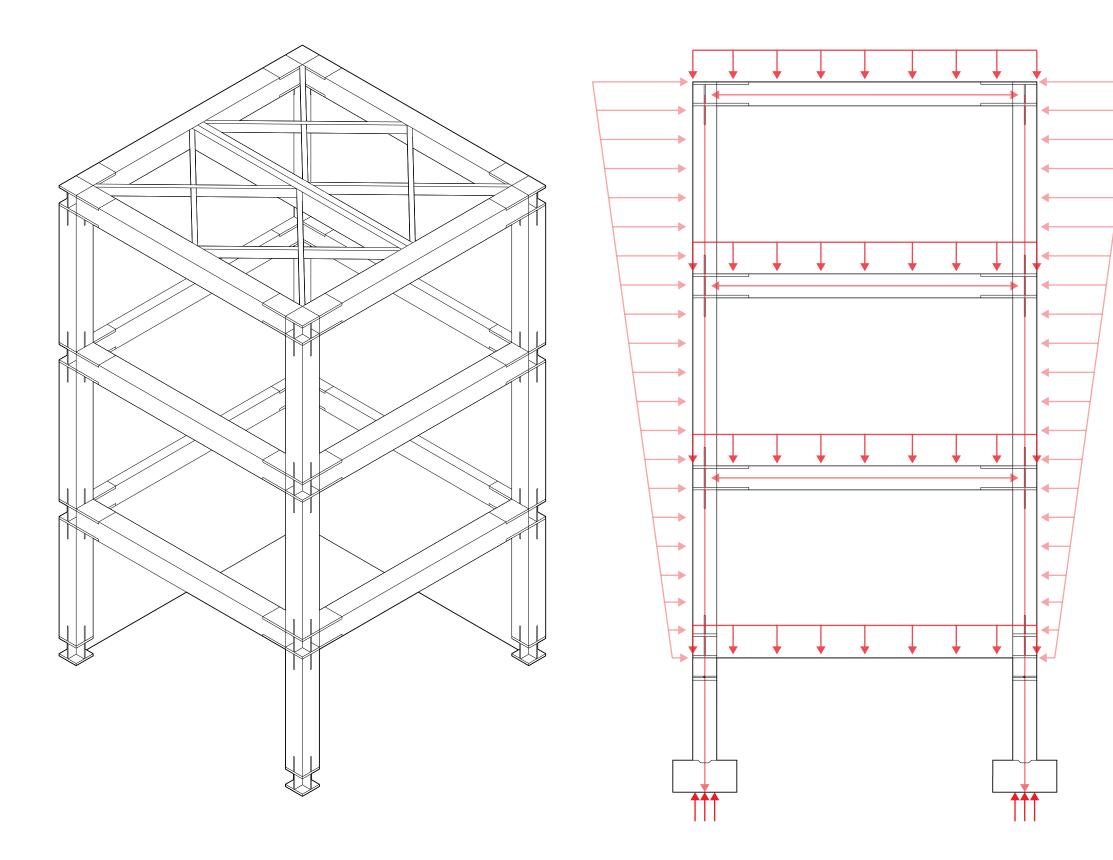
SHEAR WALLS

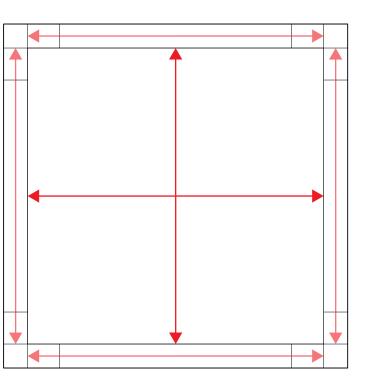
MASS TIMBER MOMENT FRAME STRUCTURE

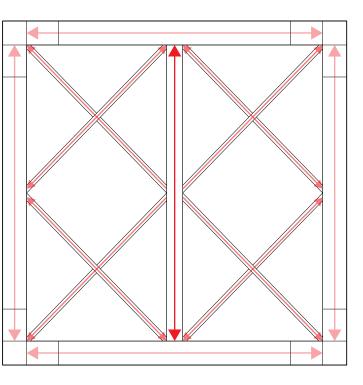
ROOF HORIZONTAL BRACING MEMBERS

ROOF 3-PLY CLT DECKING

# STRUCTURE





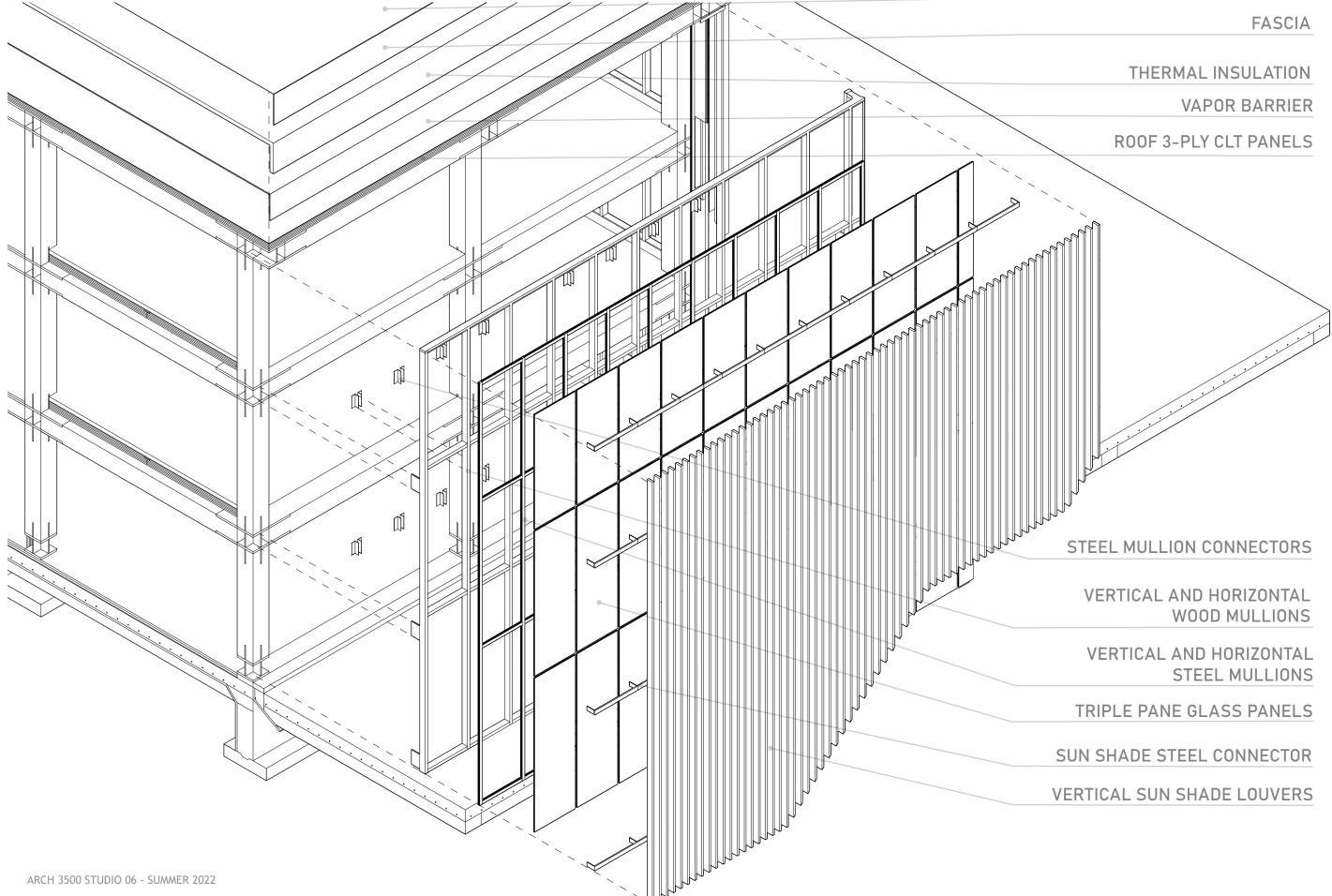


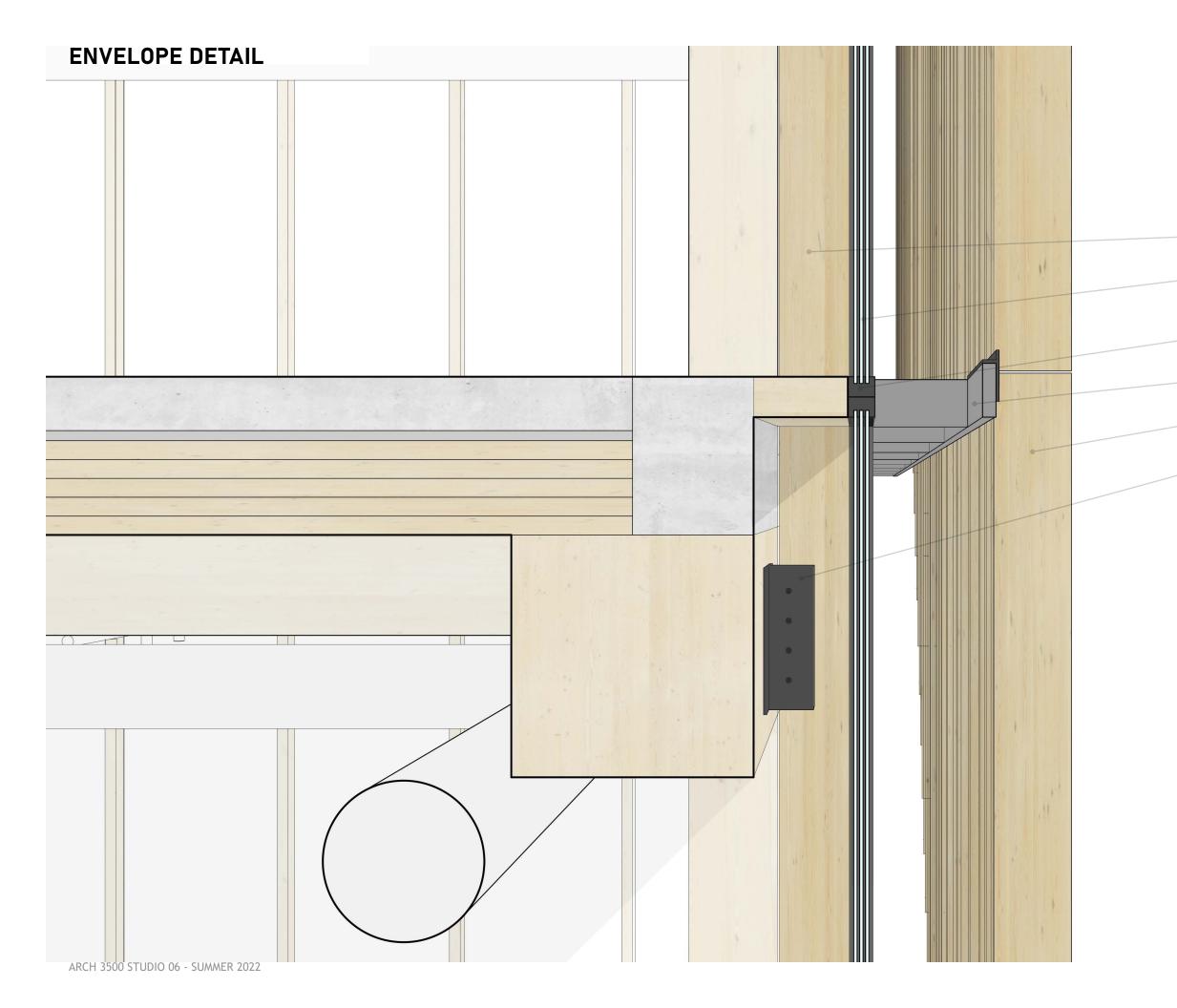
## **ENCLOSURE COMPOSITE**

The curtain wall features triple pane glass which is more energy efficient for the building than double paned glass, adding an extra layer of insulation to the envelope and prevents the transfer of heat. This works well with the vertical louvers on the east and west facades and the large overhang to the south, to passively heat and cool the building and make it more energy efficient.



**ENVELOPE** 





#### VERTICAL AND HORIZONTAL WOOD MULLIONS

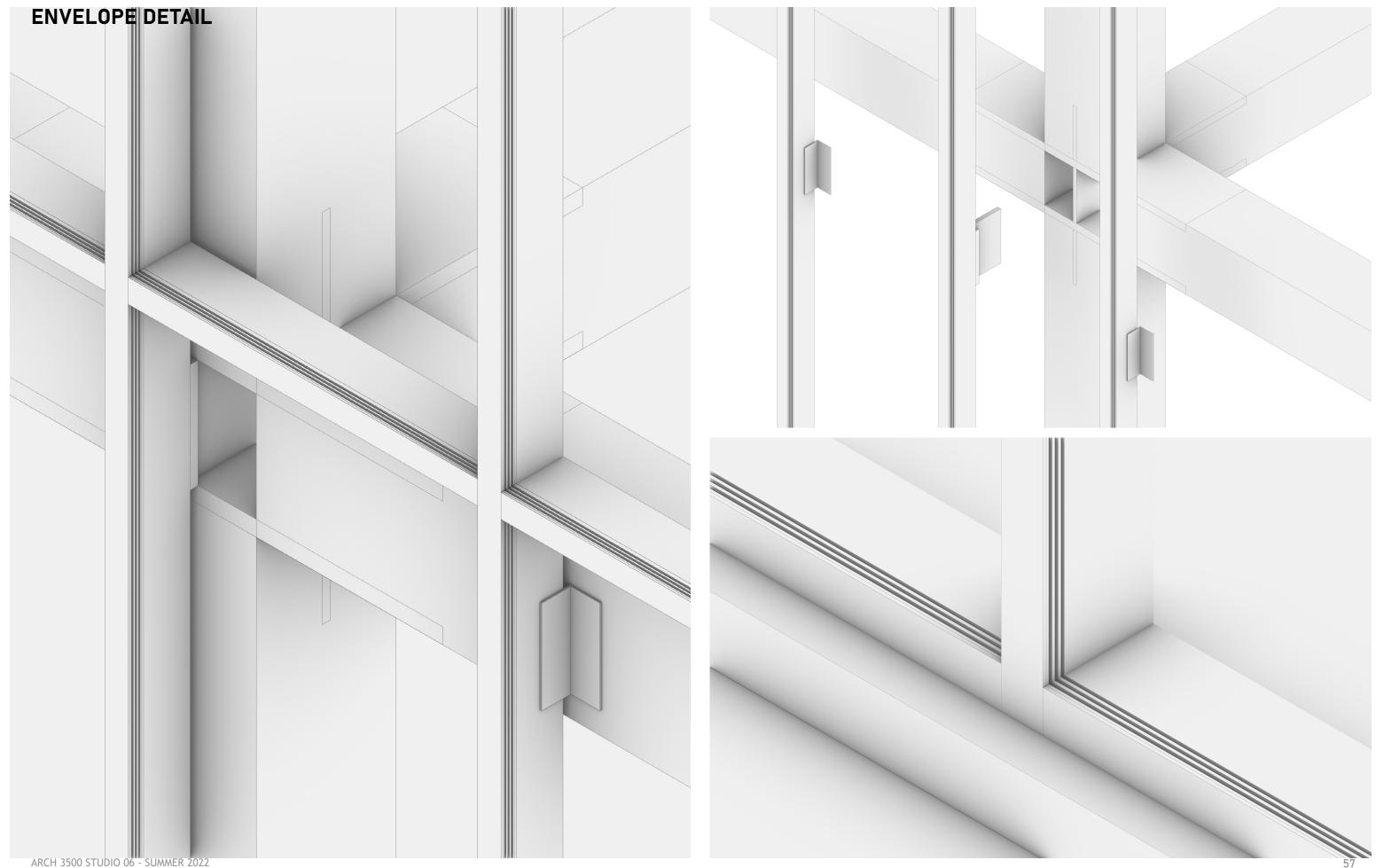
#### TRIPLE PANE GLASS PANELS

VERTICAL AND HORIZONTAL STEEL MULLIONS

#### SUN SHADE STEEL CONNECTOR

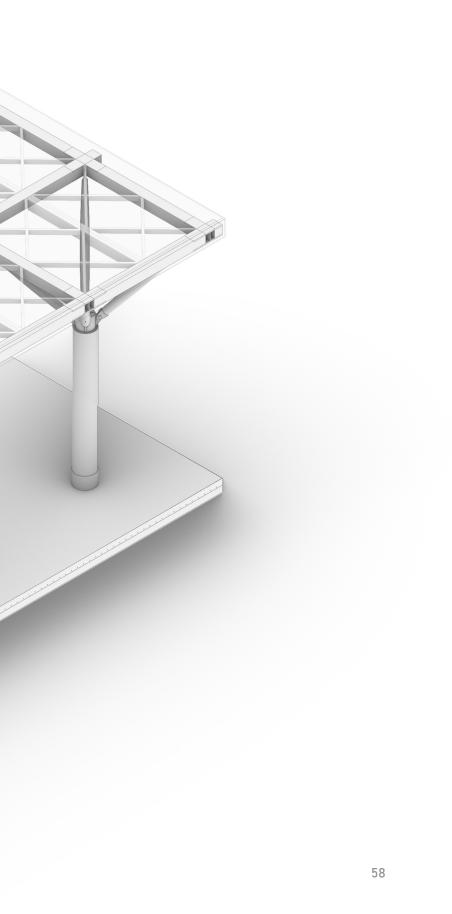
### VERTICAL SUN SHADE LOUVERS

### STEEL MULLION CONNECTORS

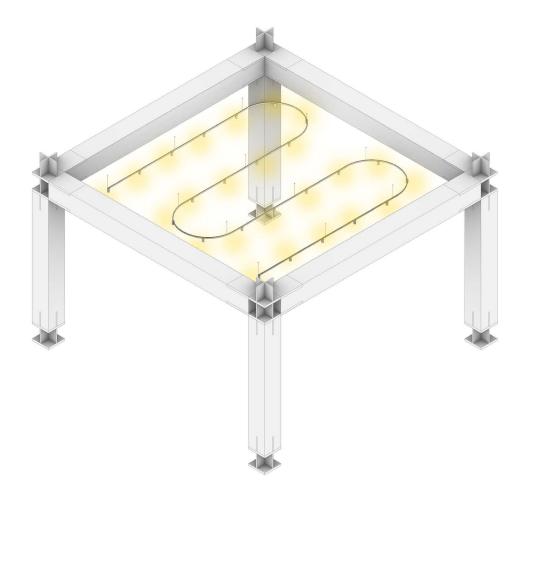


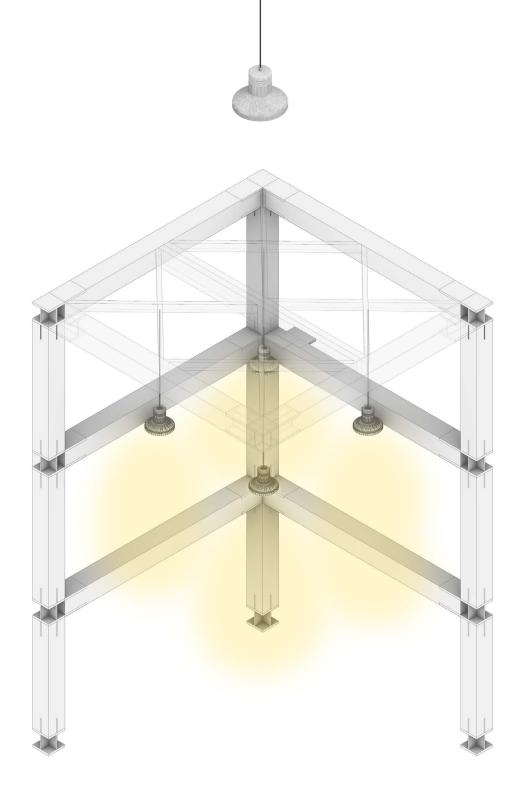
### **ENVIRONMENTAL CONTROLS AND LIGHTING COMPOSITE**

Our building utilizes passive heating and cooling through horizontal and vertical louvers. The long overhang to the south of the building keeps direct sun out of the interior in summer months and helps cool the structure. In the winter the sun is low enough to project light into the building throughout the day and heat the interior in the cold months. Along with the passive energy systems our structure also features electric lighting and an HVAC systems for when the passive strategies become insufficient to support the entire building. Track lighting is utilized on each floor to support many functions as the lights can rotate and move on the track to cater to specific uses. To help maintain comfortability, a VAV system is used throughout our building. This works well with the open spaces within the structure because the ducts can easily follow the beams along the outer edge of the building to regulate the temperature and heat loss through the envelope.



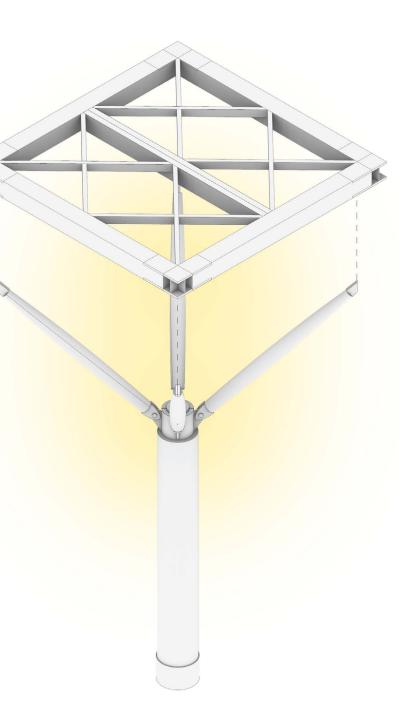
# ELECTRIC LIGHTING





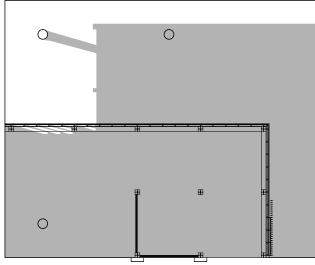
### TRACK LIGHTING

#### HANGING PENDANT LIGHTING

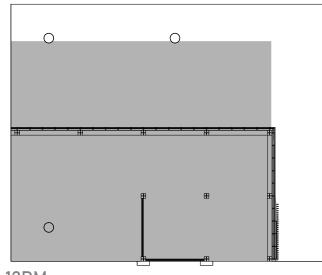


### AMBIENT LIGHTING

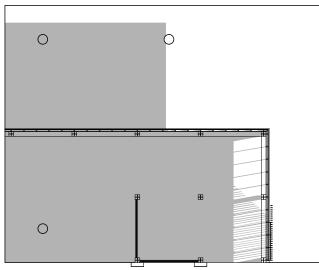
# PASSIVE ENERGY: DAYLIGHTING



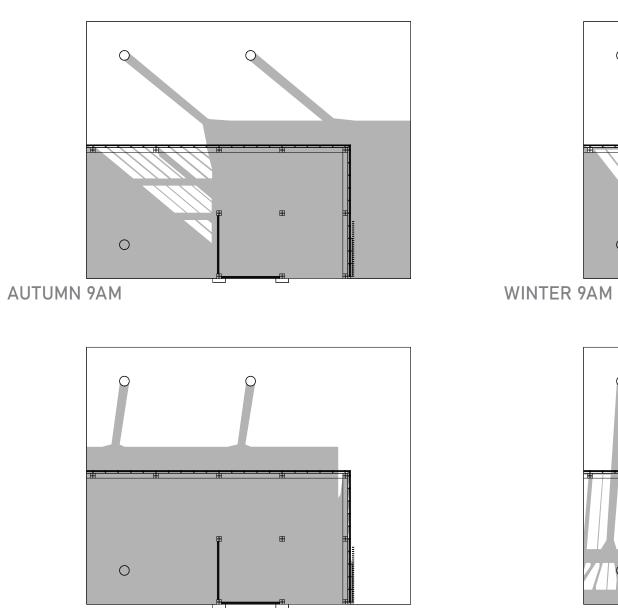
SUMMER 9AM



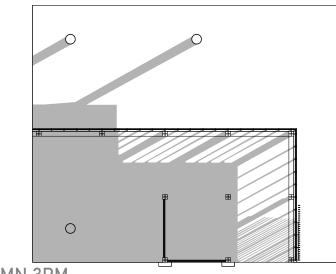




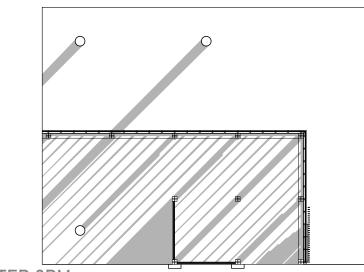
SUMMER 3PM ARCH 3500 STUDIO 06 - SUMMER 2022



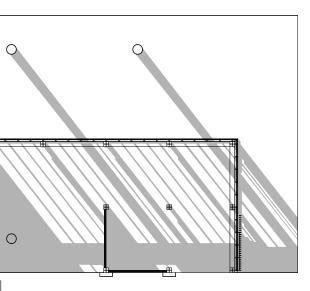
AUTUMN 12PM

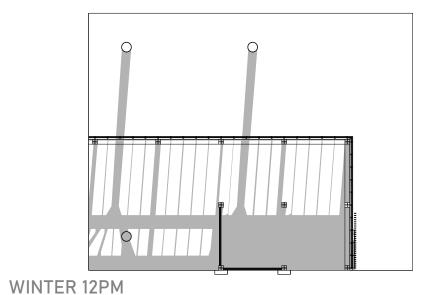


AUTUMN 3PM

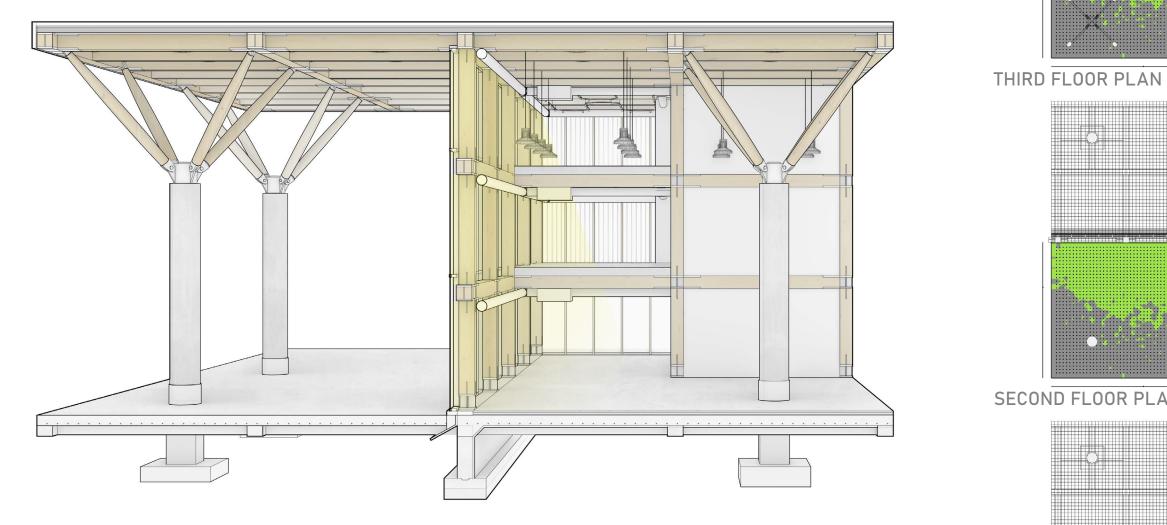


WINTER 3PM

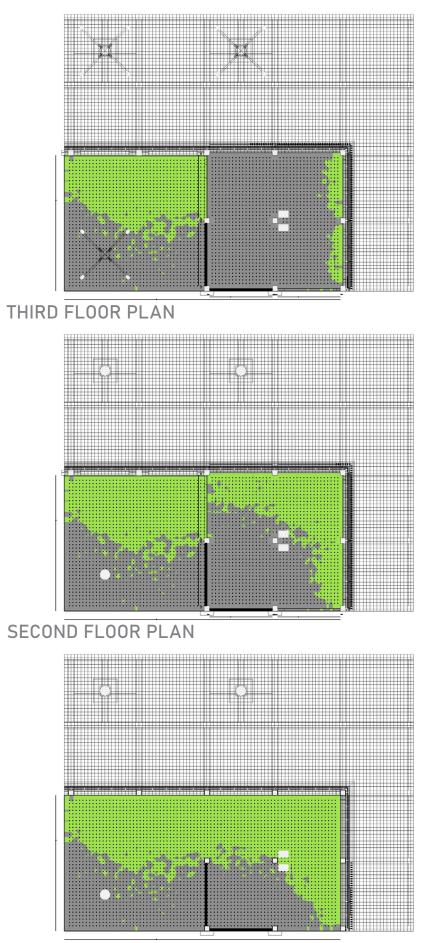




# **PASSIVE ENERGY: DAYLIGHTING**



SCALE: 1/4" = 1'0"



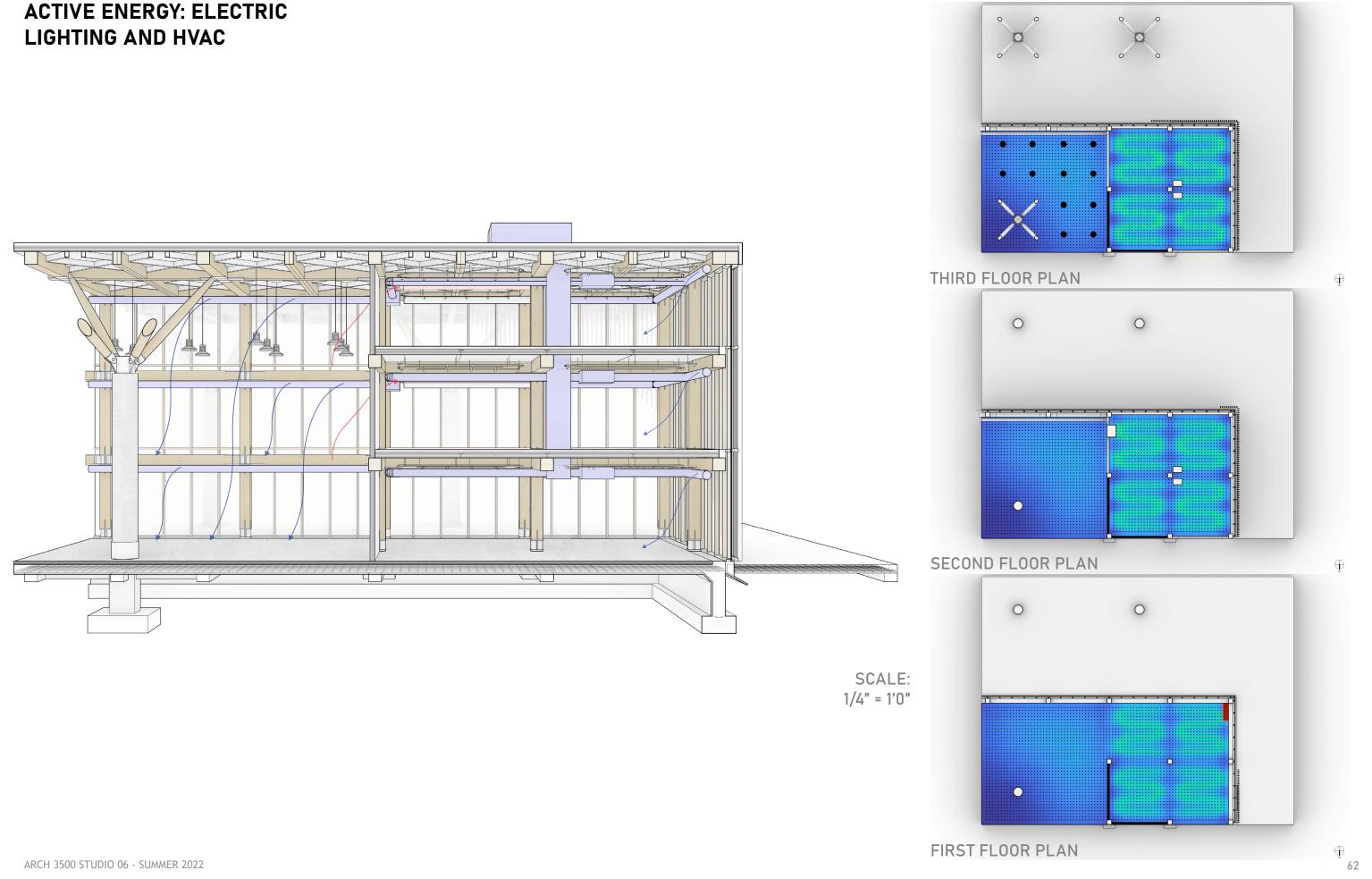
FIRST FLOOR PLAN

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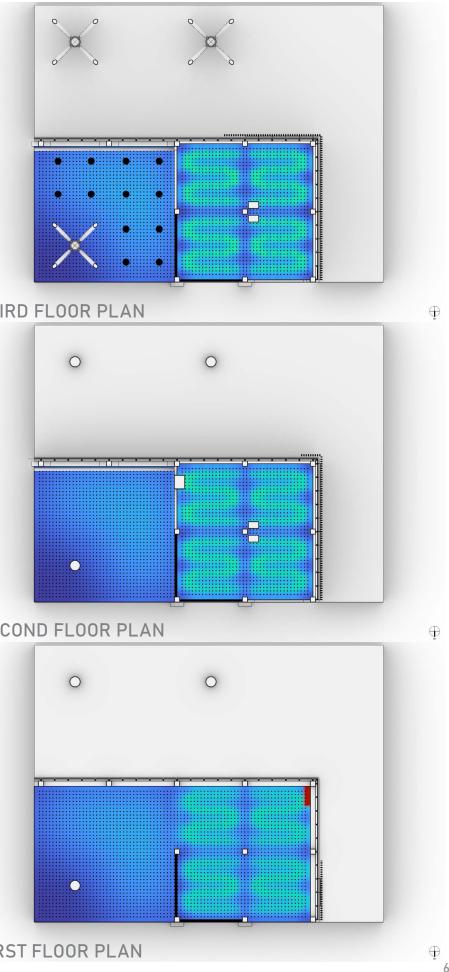
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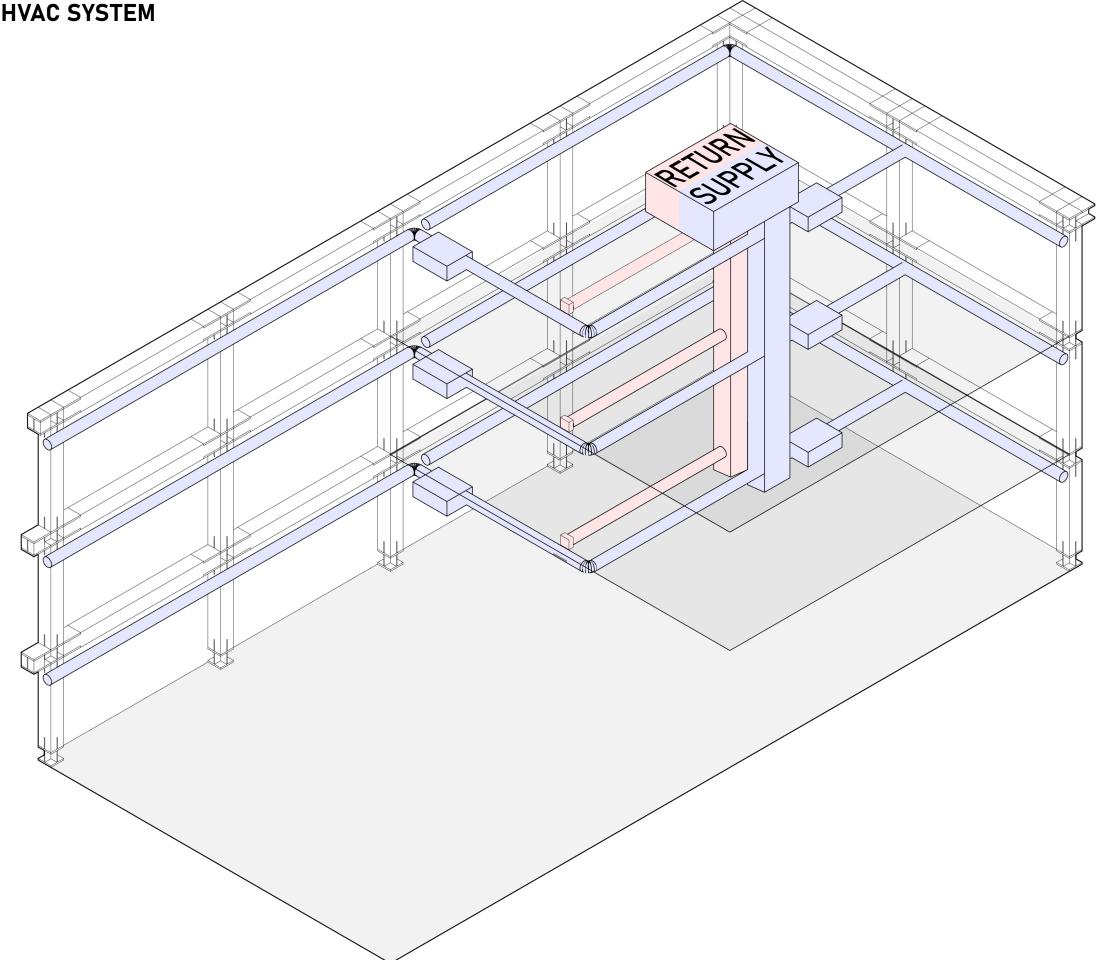
# **ACTIVE ENERGY: ELECTRIC**



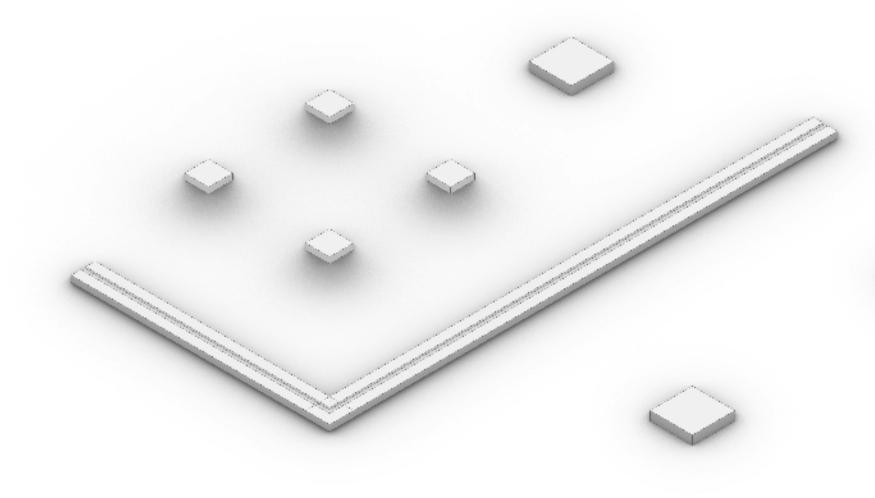


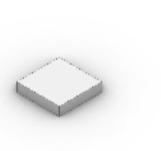


## **ACTIVE ENERGY: HVAC SYSTEM**



Footings





INTEGRATED ARCHITECTURAL DESIGN: 4B DIY REI

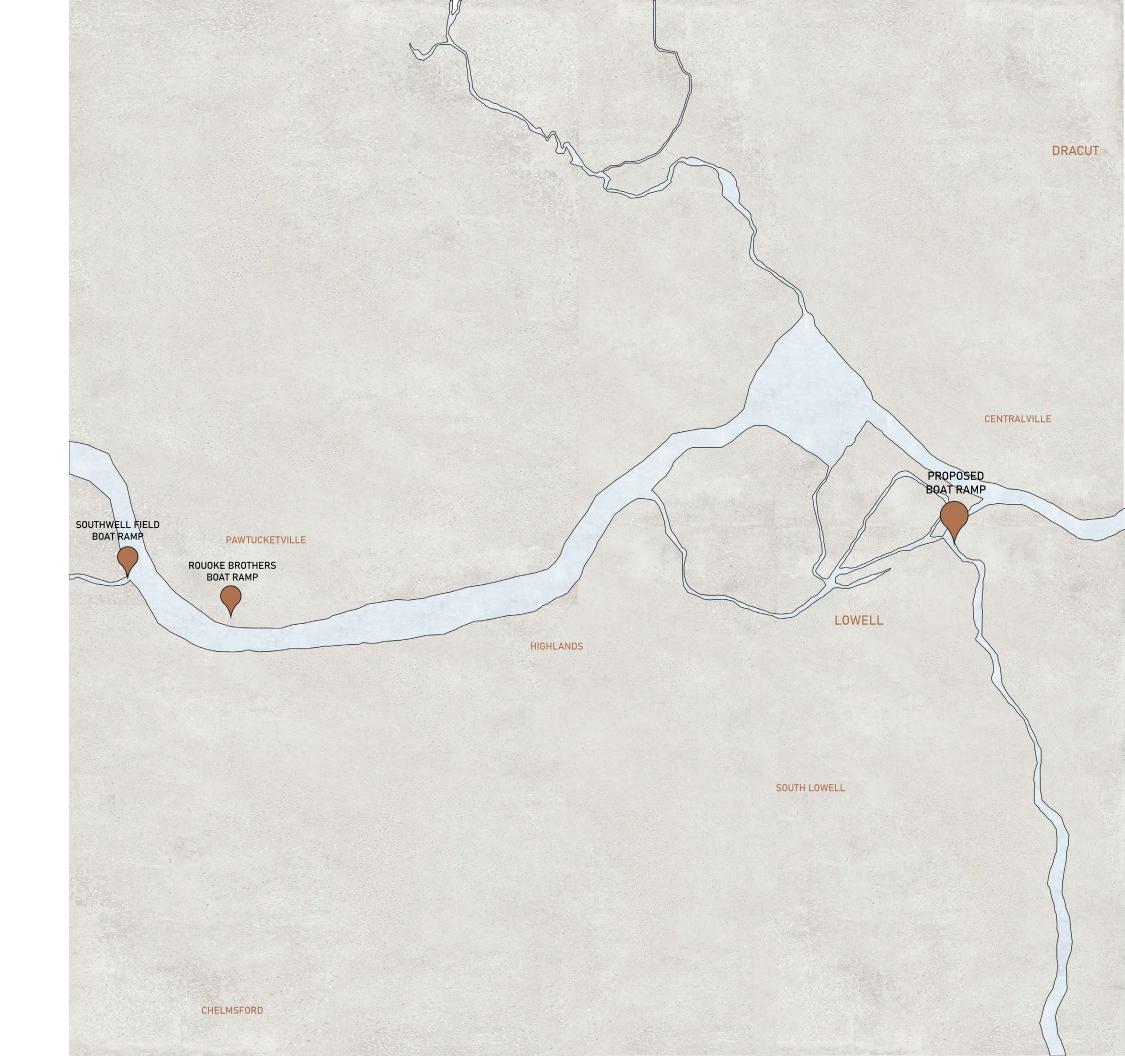


# **INITIAL SITE FINDINGS**





# LOCAL ISSUES



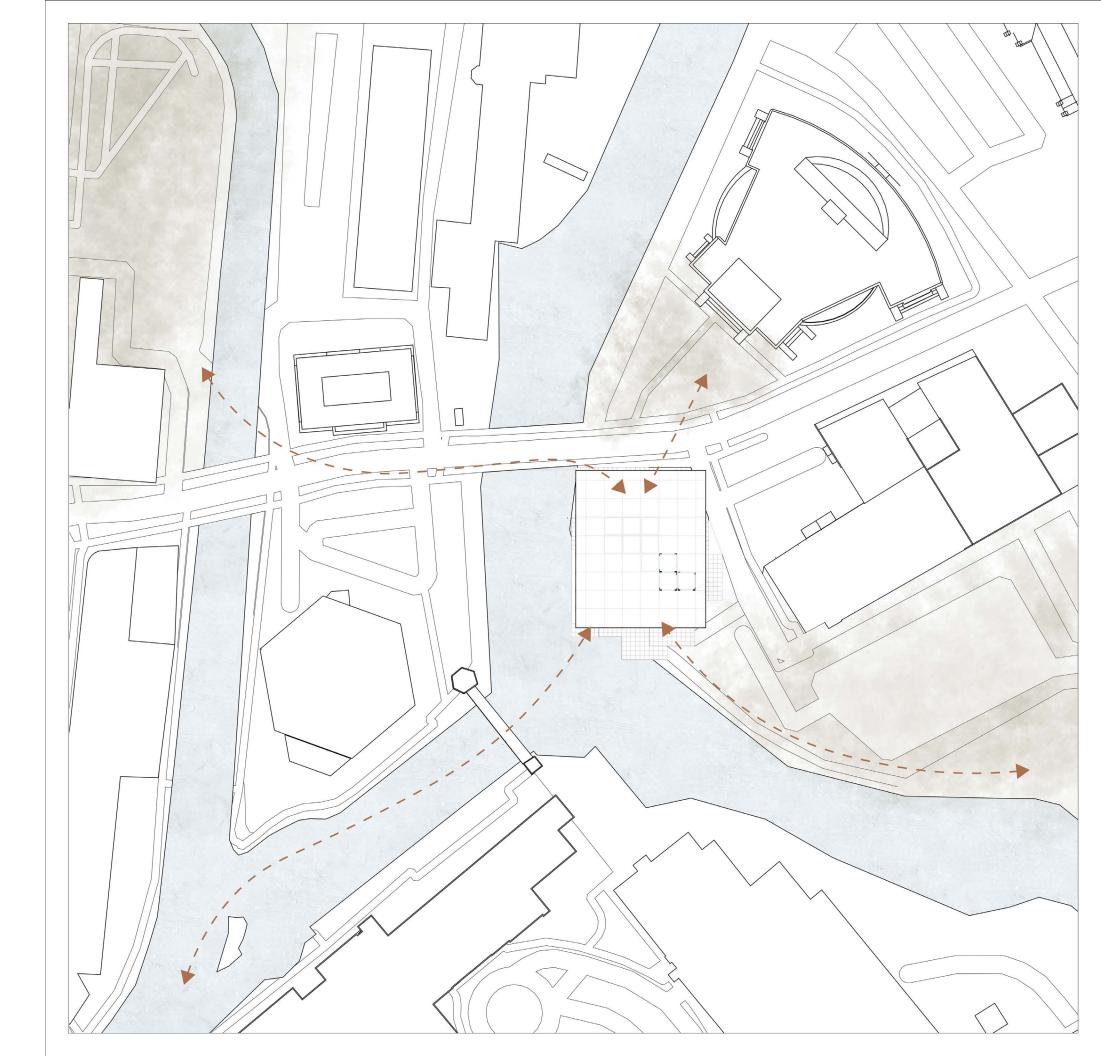
# **VALUE AND GOALS STATEMENT**

**Create, Grow, Connect** A community of learners, dedicated to creating for and connecting to the earth, to grow towards a sustainible future

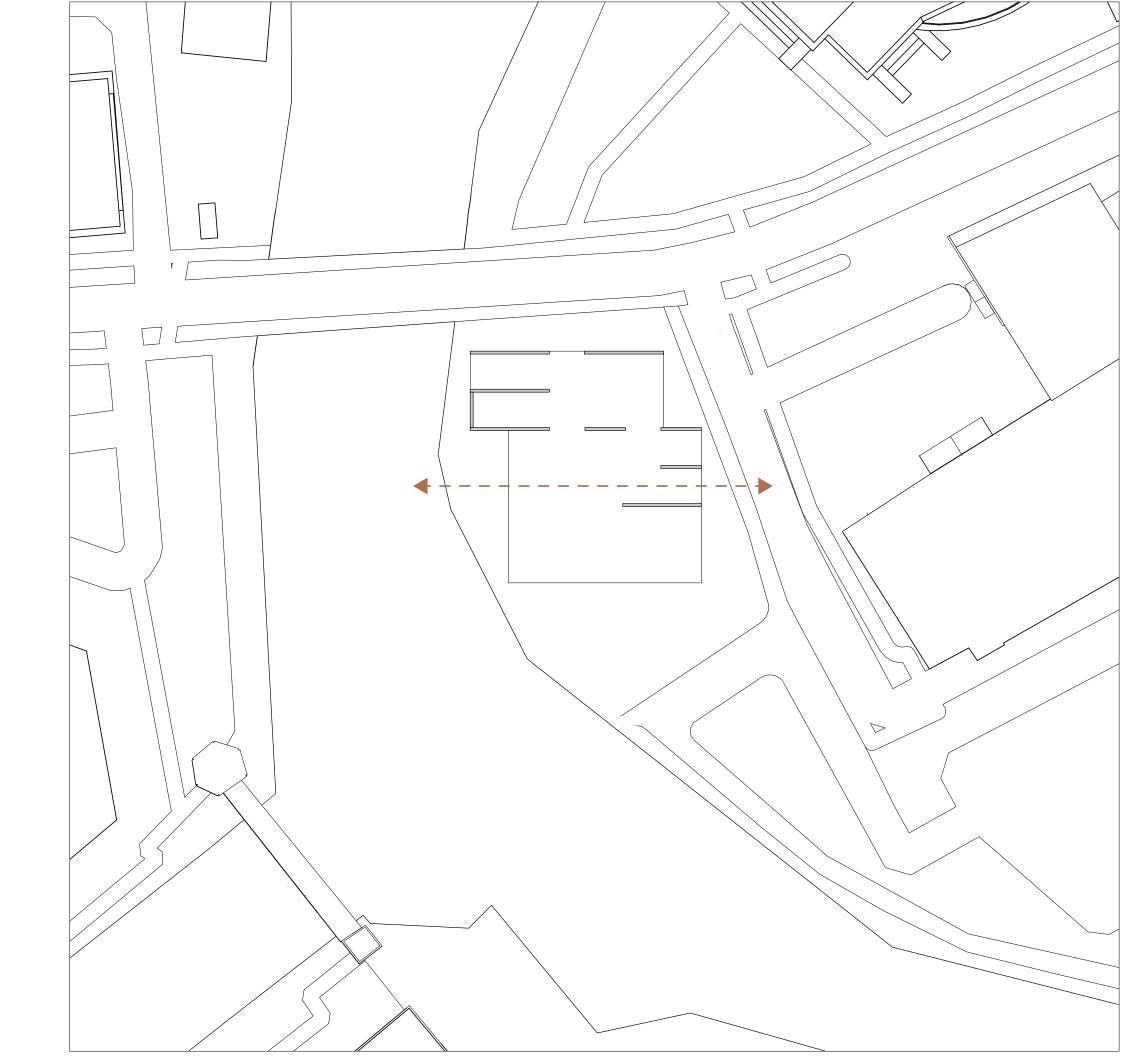
# **EXECUTIVE SUMMARY**

This design encompasses the symbiotic relationship of the part and the whole and the relationship of people with nature. The shifting of cubes within the structure allows for the individual sections of the building to be recognized as parts to the larger whole. Like the structure, the program acts as parts that create a makerspace that supports sustainability and connection to the outdoors. The building itself gives back to nature with its use of mass timber and CLT construction, as it sequesters CO2 and cuts carbon emmisions for the building. The program offers spaces for hydroponics, woodworking, ceramics, textiles, and mixed media, allowing the community to create for the environment and experience nature. The production of new plants, pots, benches, outdoor equipment and gear fosters the urge for change in our environment and the need for connection to our roots.

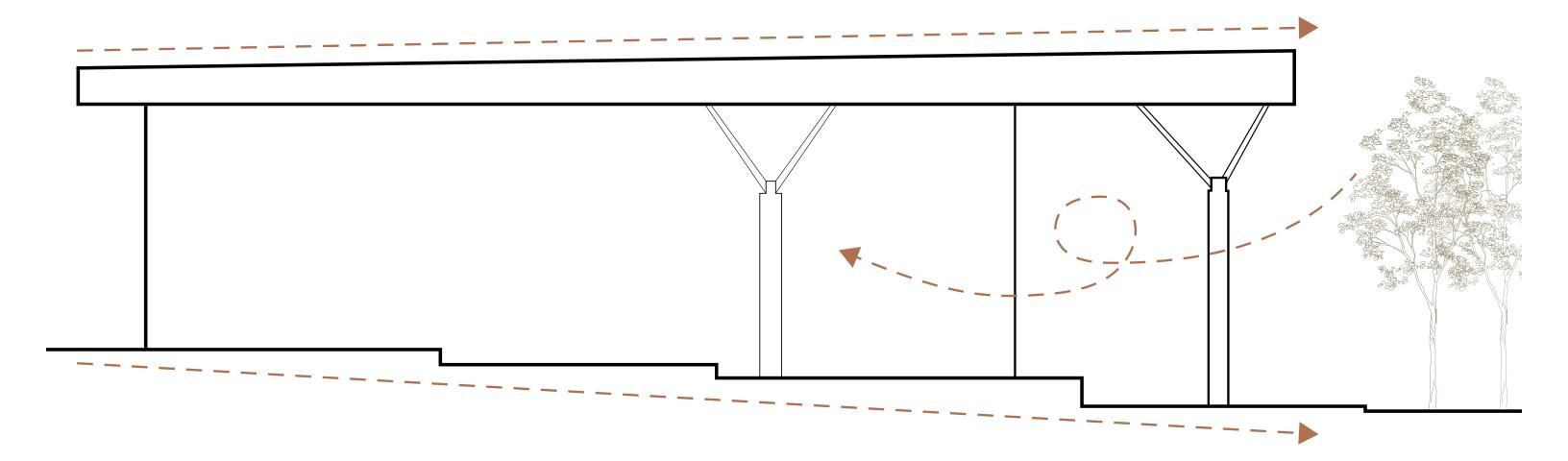
# SURROUNDING CONNECTIONS



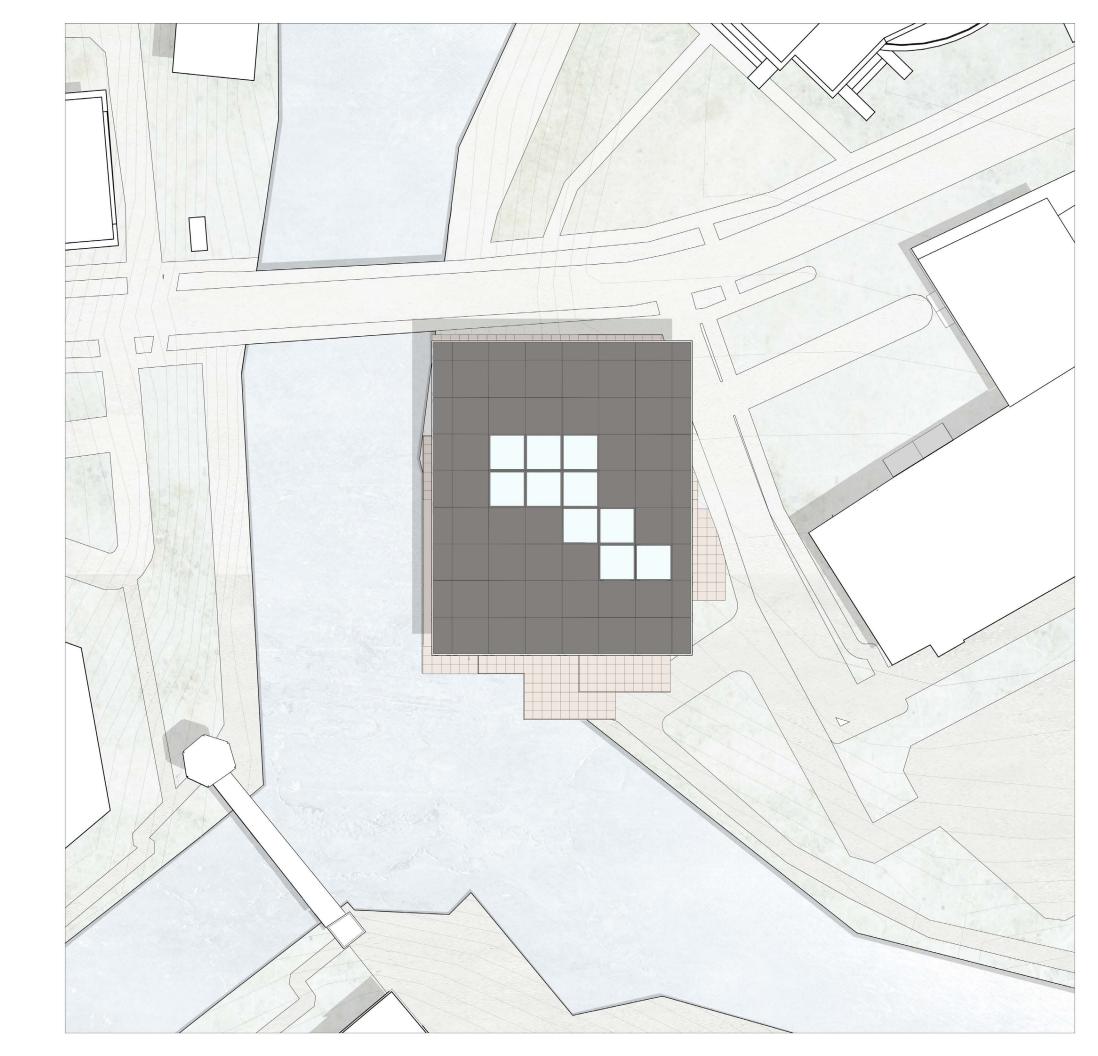
# **RESPONDING TO URBAN FORM**



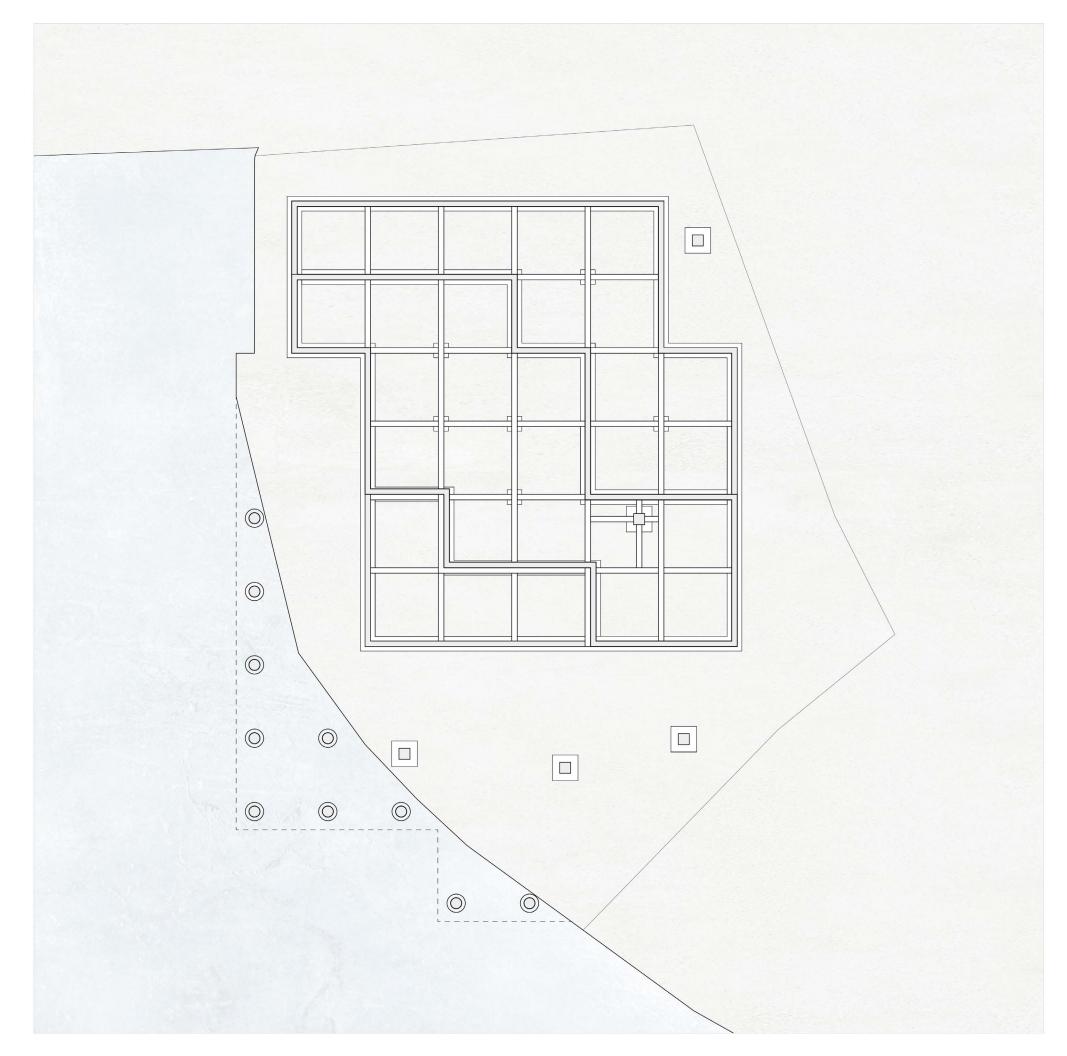
# **INVITING THE NATURAL ENVIRONMENT**



SITE PLAN



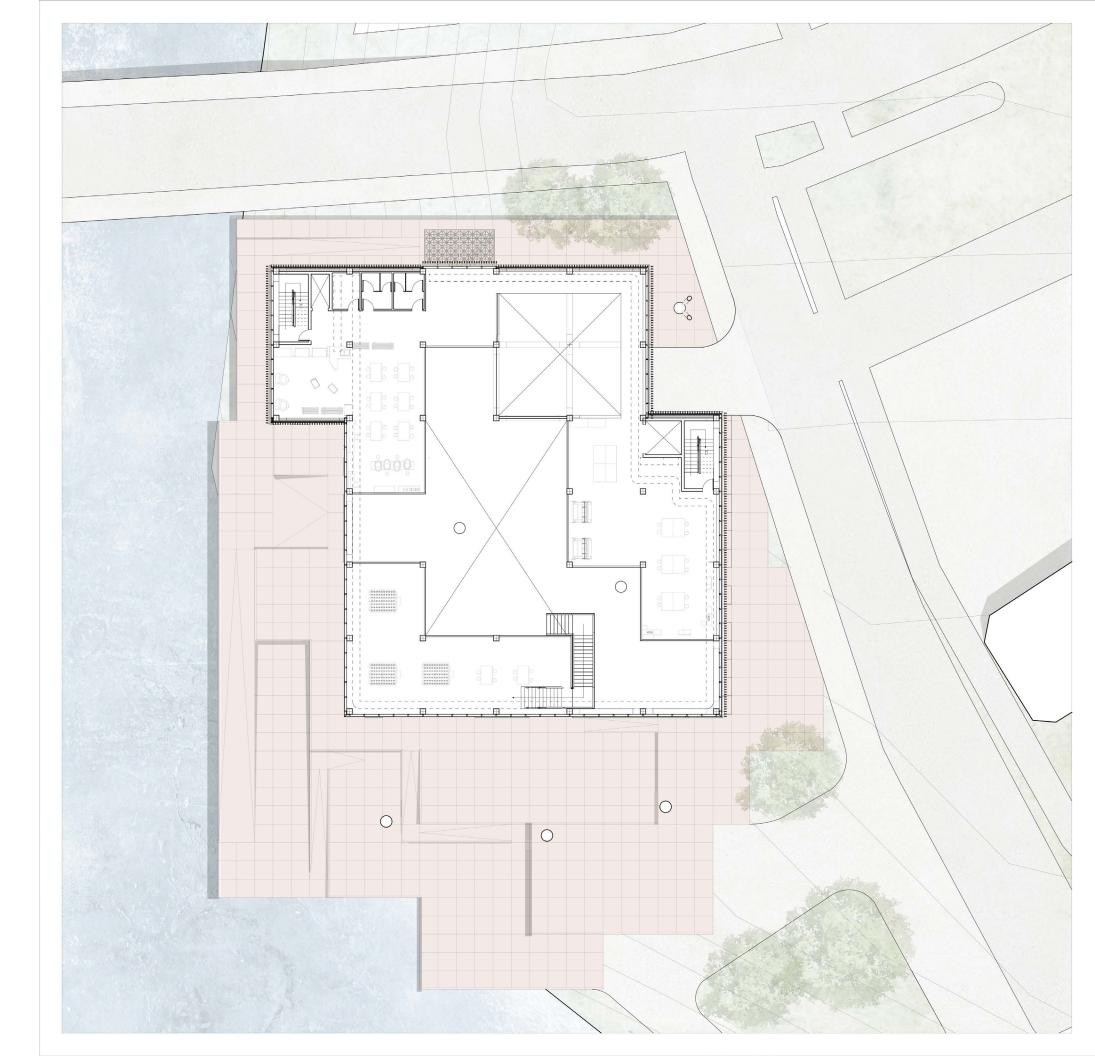
# **FOUNDATION PLAN**



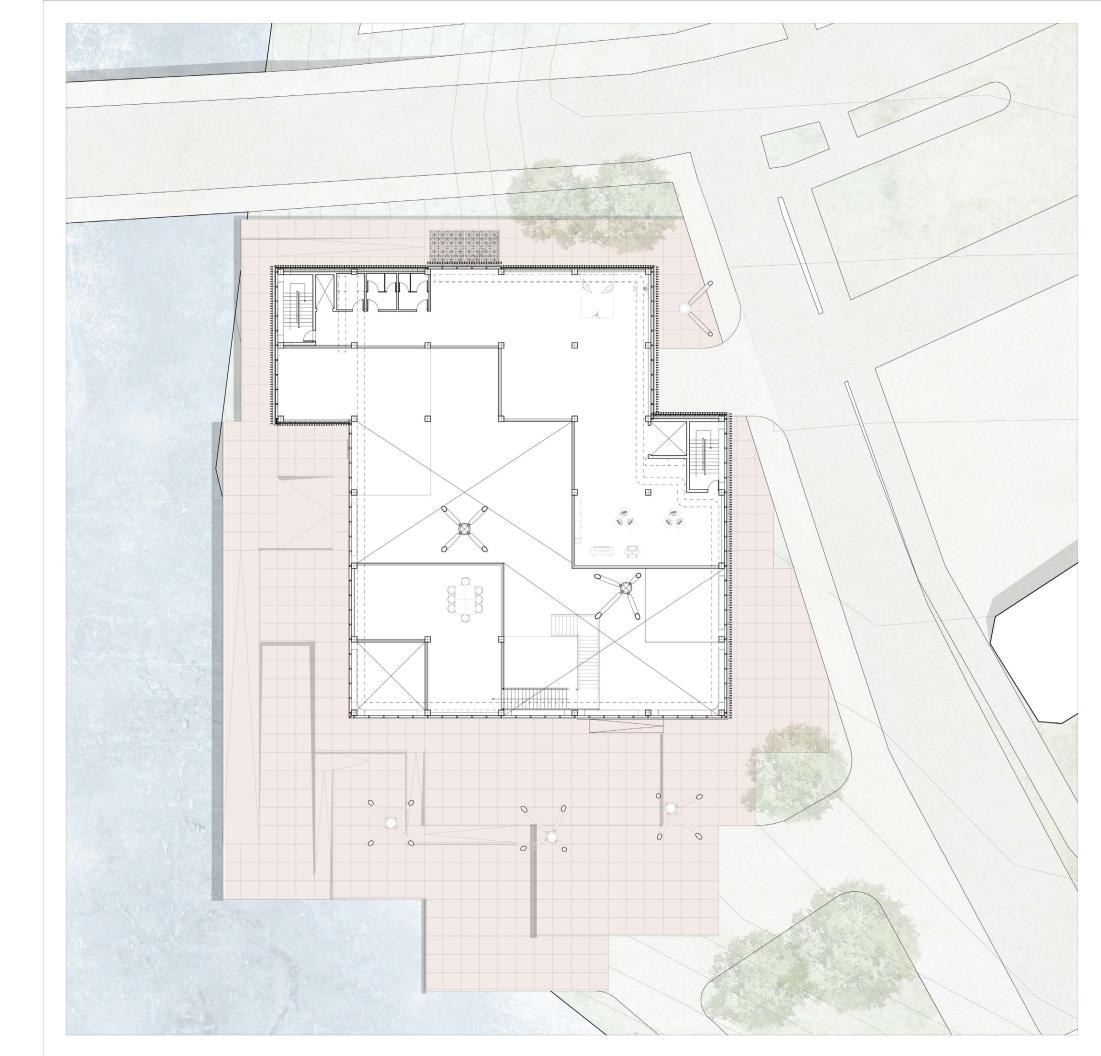
# **GROUND FLOOR PLAN**



# **SECOND FLOOR PLAN**



# THIRD FLOOR PLAN



# WOOD SHOP

Woodshop Square Footage: 2,400 sf

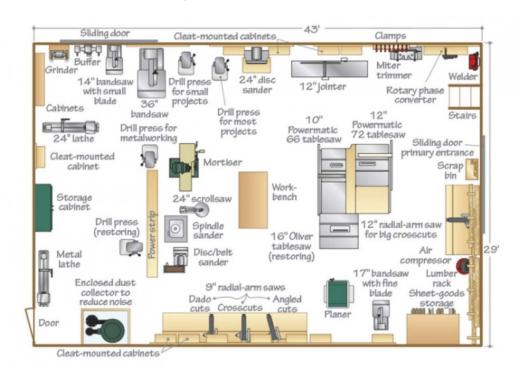
The woodshop is a space where makers can use machines and tools such as CNC machines, power saws, handsaws, sanders, drills and other woodworking tools. This space will also feature tools specific to creating outdoor equipment such as bow and arrows and small boats. Our space encourages the creation of benches, bow and arrows, boats, tables and chairs, planters, windchimes and any other outdoor gear and equipment that is thought possible.

#### TOOLS:

Planes, Sanders, Files, Hammer, Mallet, Drill, Screw Gun, Tape Measure, Square, Sawhorses Hand saws Power saws

#### FURNITURE:

Workbench with storage **36x48x38** Bench top stools Cabinets for tool storage











# **CERAMICS ROOM**

Ceramics Room Square Footage: 1,200 sf

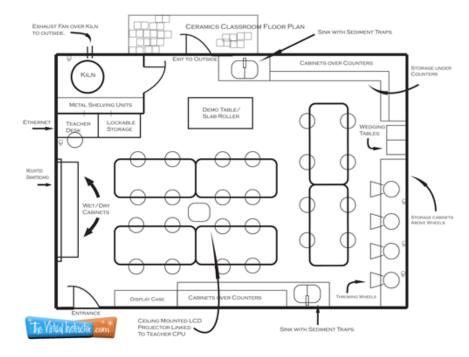
The ceramics room is located on the second floor of the makerspace and consists of a studio/teaching area, clay mixing and storage area, and a glazing and kiln space. The ceramics room is centered around the idea that the creations will support outdoor spaces and the connection back to nature.

#### TOOLS:

Pottery wheel **20x24x20** elephant ear sponges potter ribs loop tools needle tools fettling knives toggle clay cutters

#### FURNITURE:

Kiln **23x27** Work benches **36x48x38** Bench top stools Cabinets for tool storage









# **TEXTILES/FABRIC/MIXED MEDIA ROOM**

Mixed Media Room Square Footage: 1,800 sf

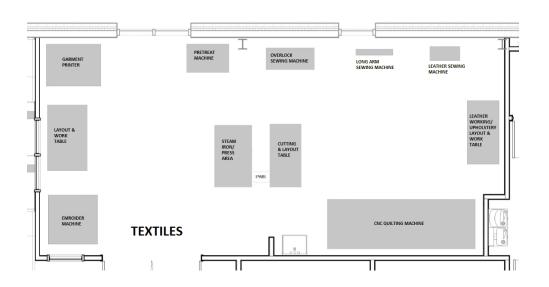
The textiles/fabric/mixed media room is located on the second floor of the makerspace and consists of areas with sewing machines, fabric and material storage and loom and weaving space. The fabric and mixed media room specializes in outdoor equipment and furniture including backpacks and outdoor clothing, tents and camping equipment, and hammocks .

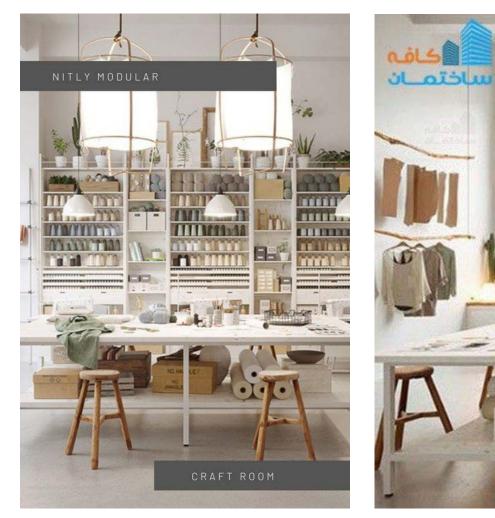
#### TOOLS:

Button maker Sewing machines Fabric Small table tools

#### FURNITURE:

Loom Work benches **36x48x38** Bench top stools Cabinets for tool storage











# **HYDROPONICS LAB**

Hydroponics Lab Square Footage: 1,600 sf

The hydroponics lab is located on the first floor of the makerspace and consists of growing trays and tables for plant propogation. This space has large open windows and a direct connection to the outdoors with access to water from the canal. This space intends to connect its users to the outdoors and grow plants local to the area and region that will be able to be replanted throughout the city.

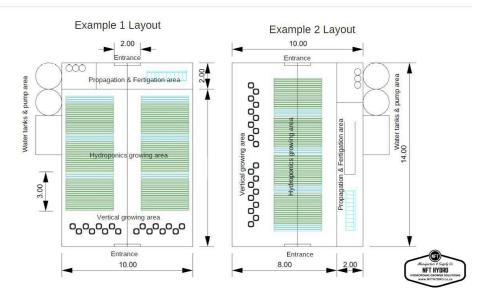
#### TOOLS:

Growing medium Grow trays

#### **FURNITURE:**

Water Basin: Small plants need half a gallon of water; medium plants need 1 1/2 gallons; large plants need 2 <sup>1</sup>/<sub>2</sub> gallons

Grow Tables









# **MEDIA/POST PRODUCTION ROOM**

Media/Post Production Room Square Footage: 2,800 sf

The Media/post production space is located on the third floor of the makerspace and consists of printing space, a photography room, computer lab, and cutting tables. This space allows for the photograpy of products, as well as photo editing and the production of presentations, booklets and brochures.

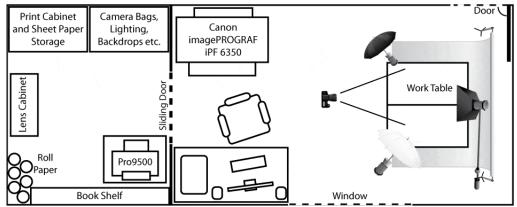
#### TOOLS:

Cameras Computers Dark Room

#### FURNITURE:

Printers Plotter Cutting tables Backdrop





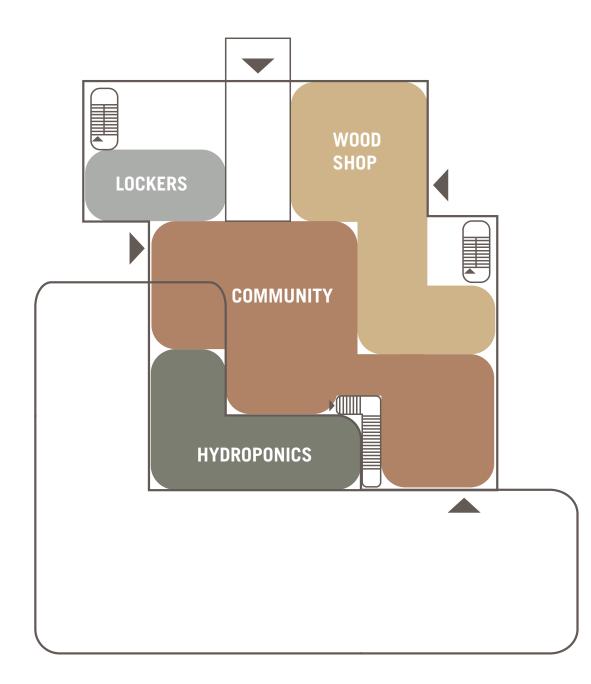


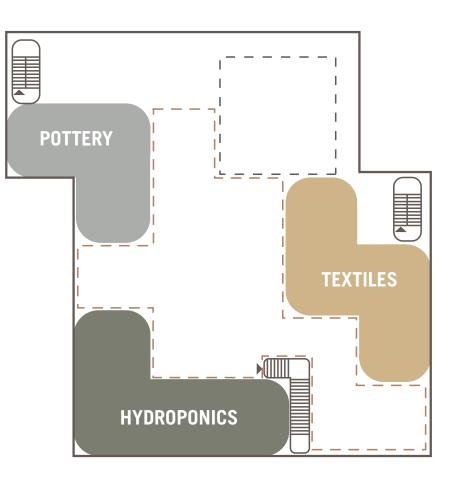




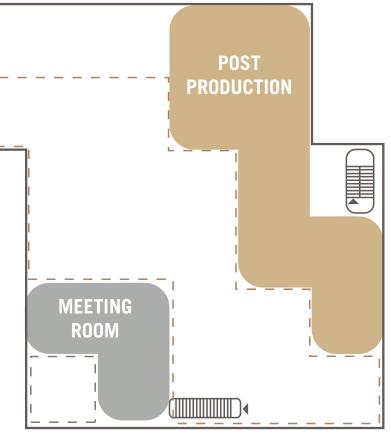


# **PROGRAM RELATIONSHIPS**

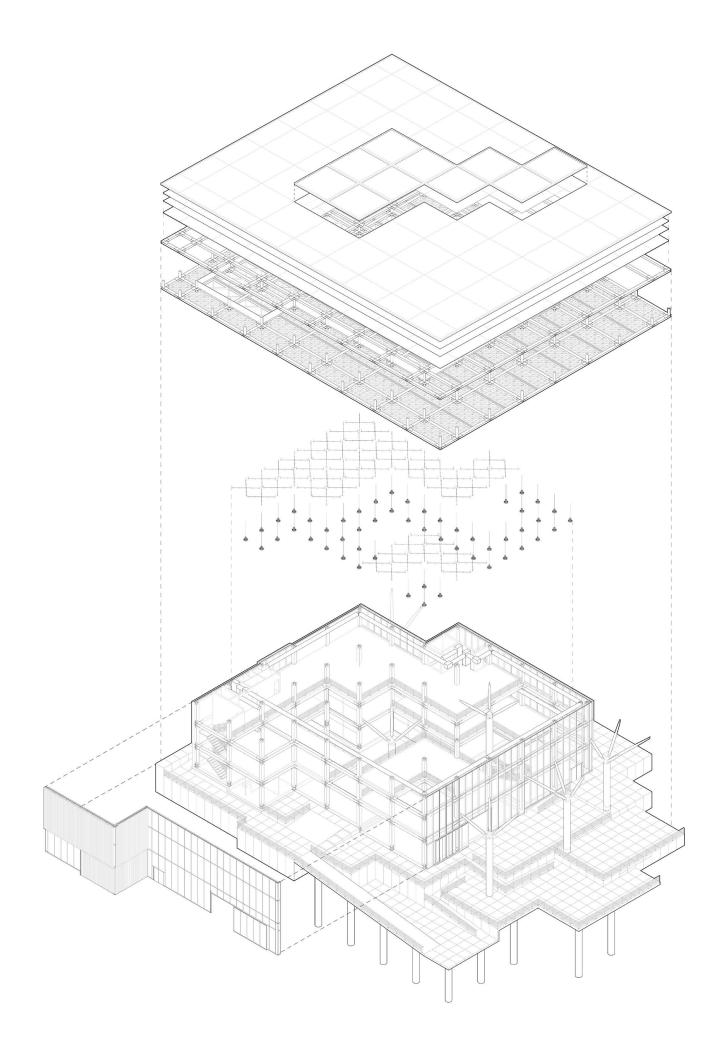




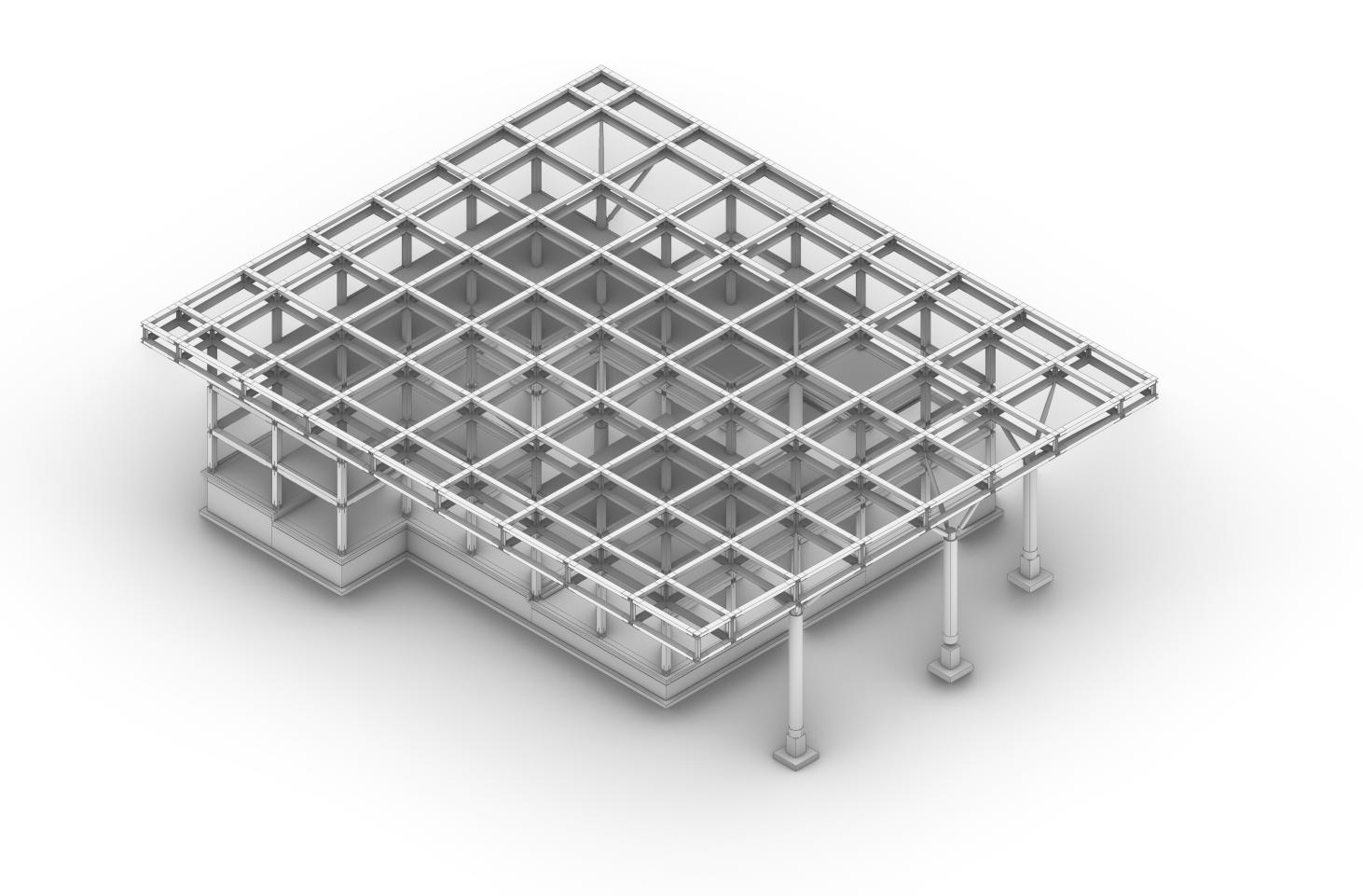




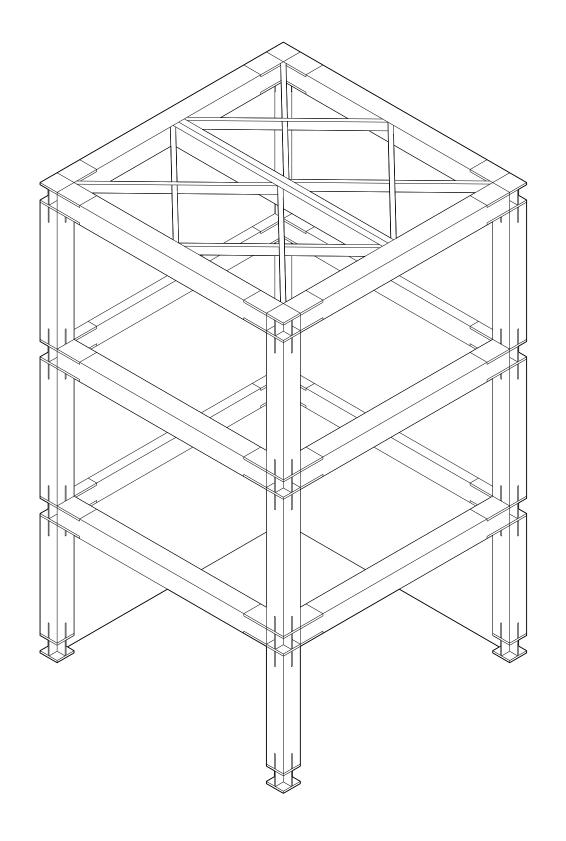
## **INTEGRATED SYSTEMS MODEL**

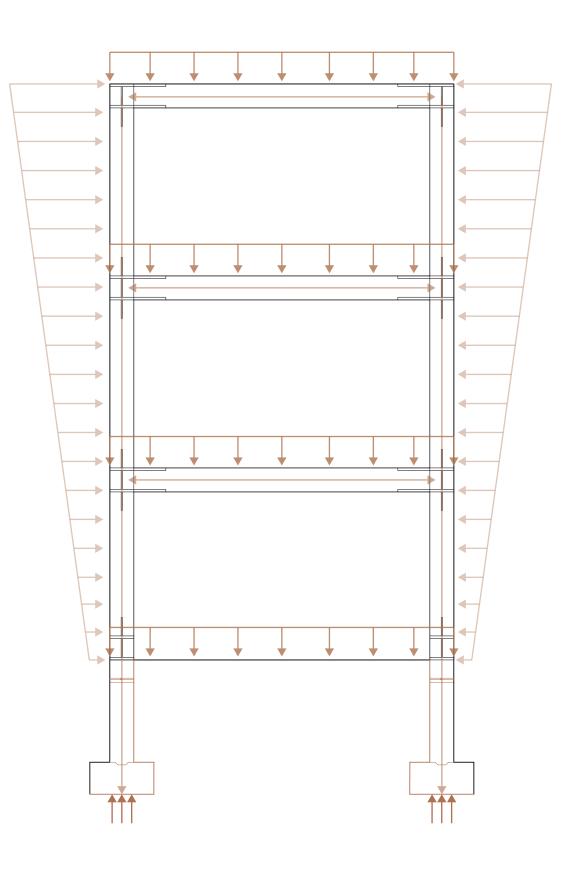


### **STRUCTURE SYSTEM COMPOSITE**

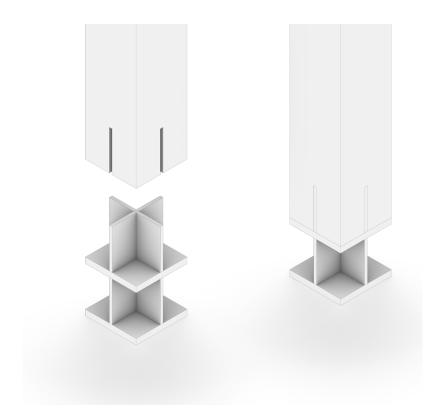


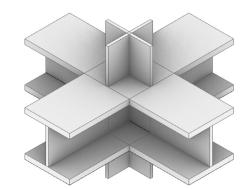
### **STRUCTURAL LOAD DISTRIBUTION**

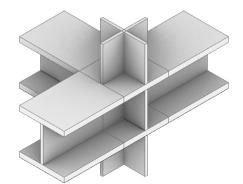


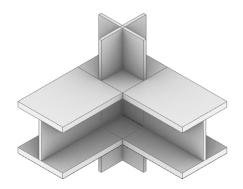


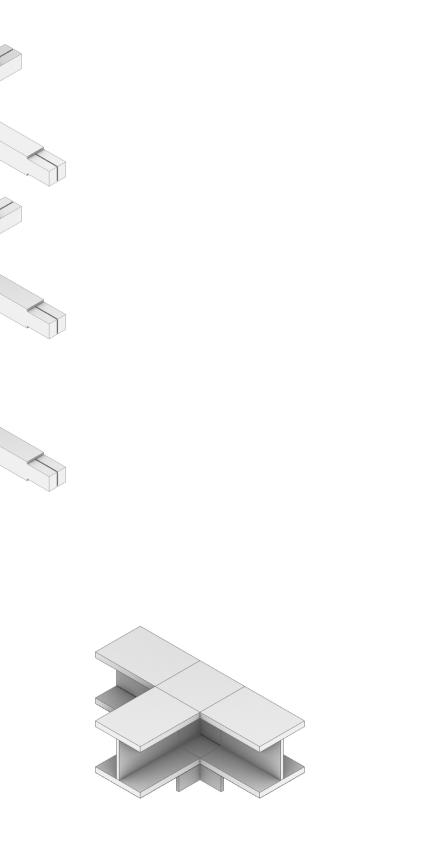
## **CUSTOM STEEL MOMENT FRAME CONNECTORS**



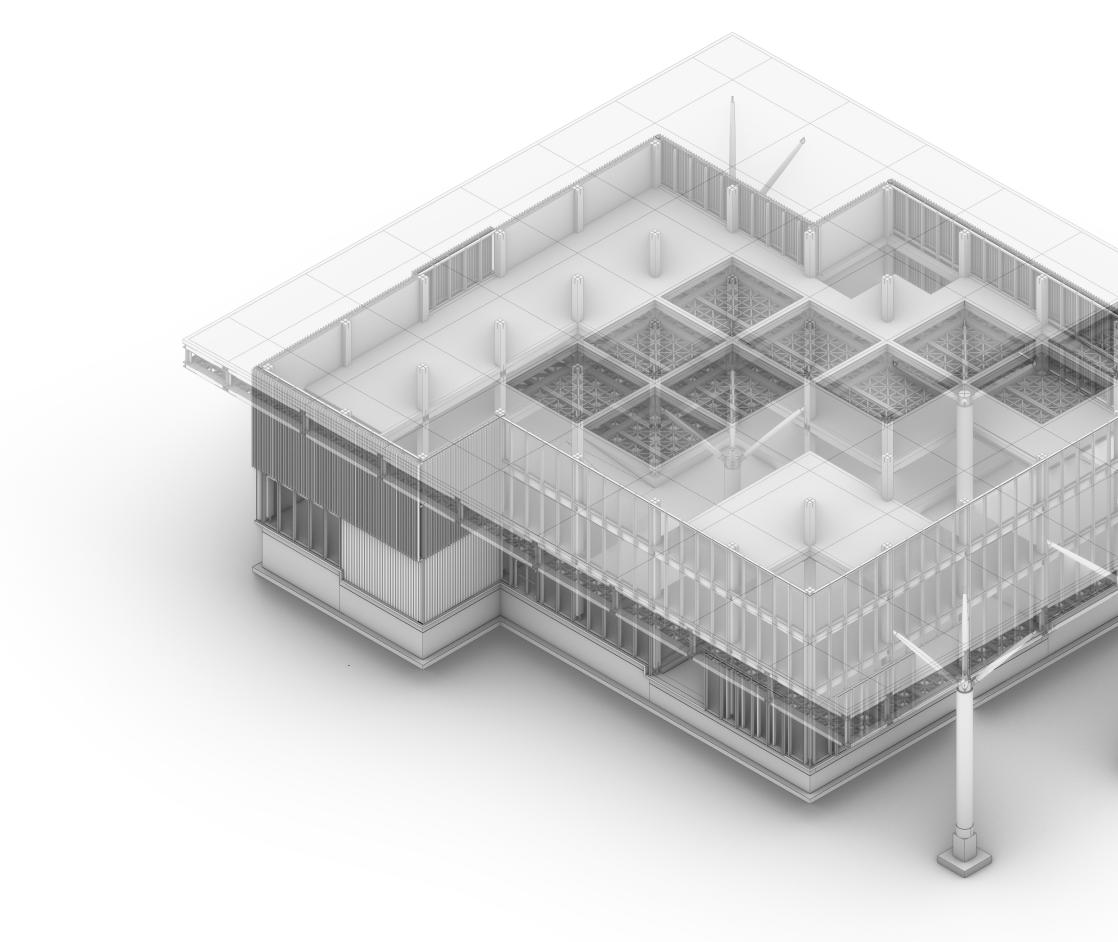


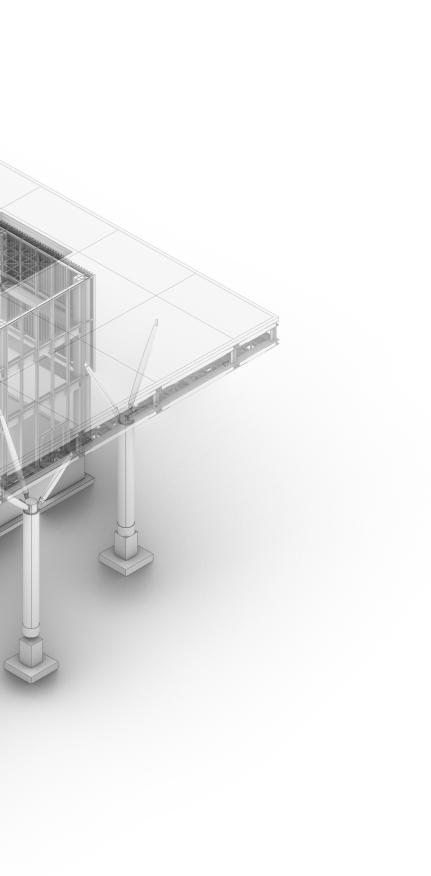




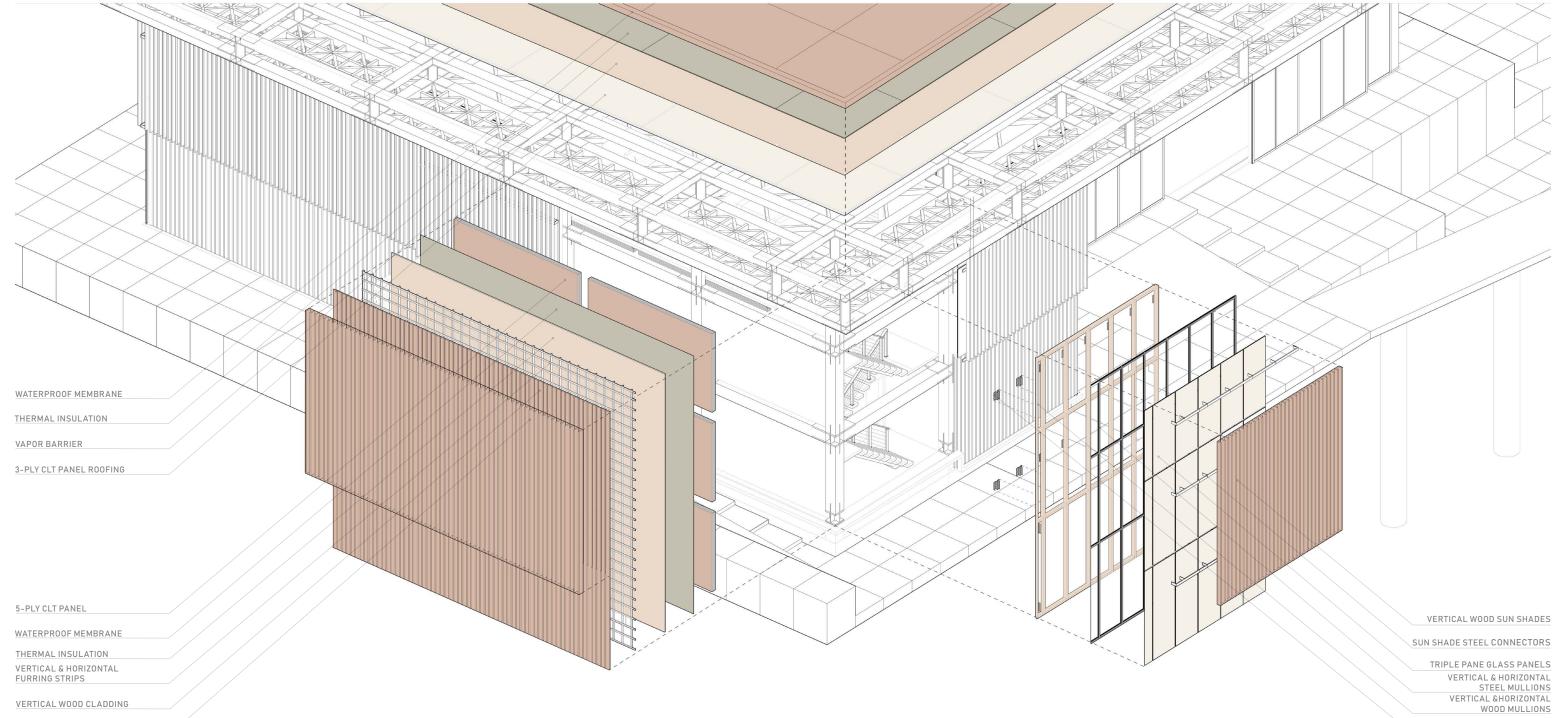


### **ENCLOSURE SYSTEM COMPOSITE**





### **ENCLOSURE BREAKDOWN**

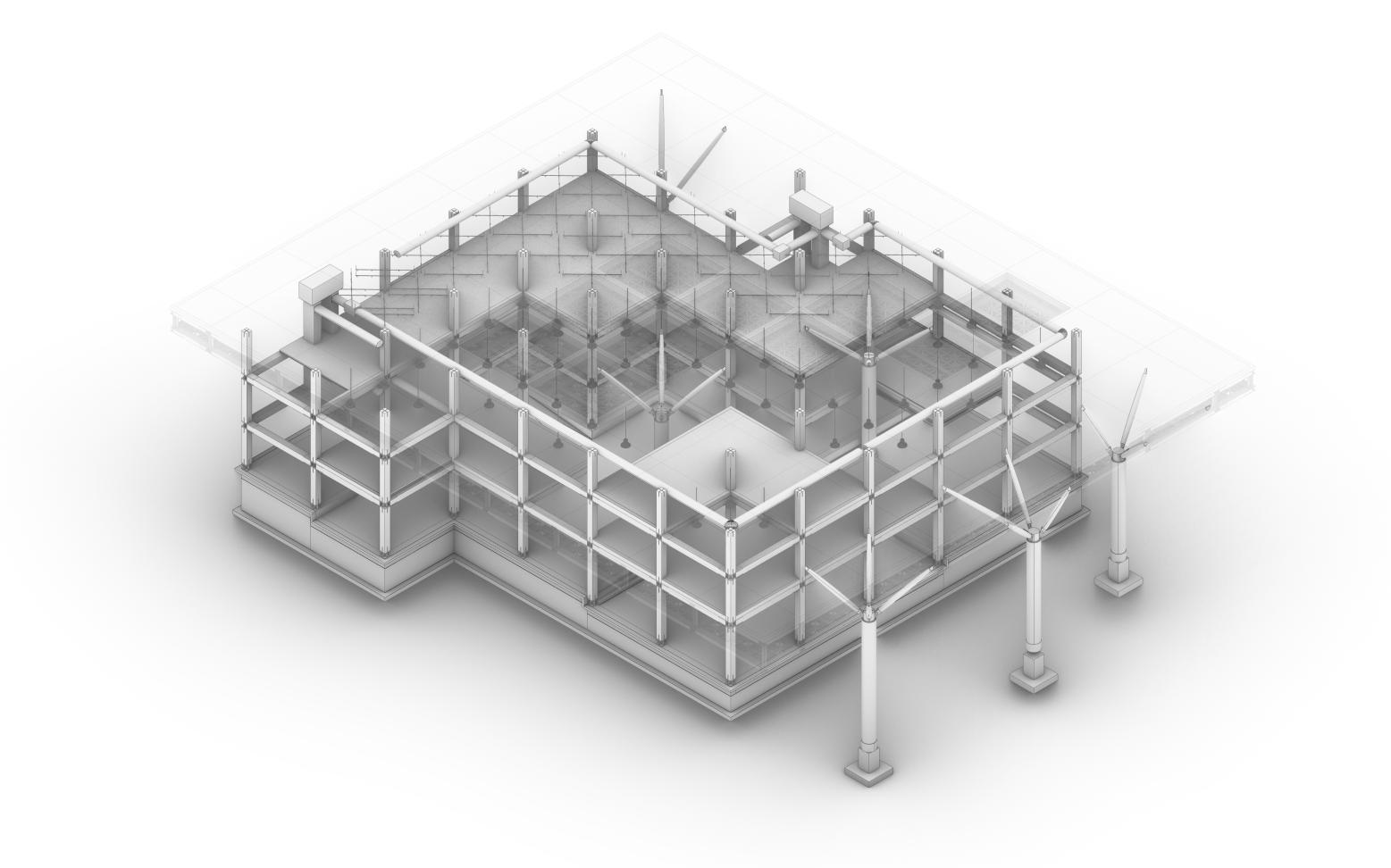


VERTICAL WOOD SLATS

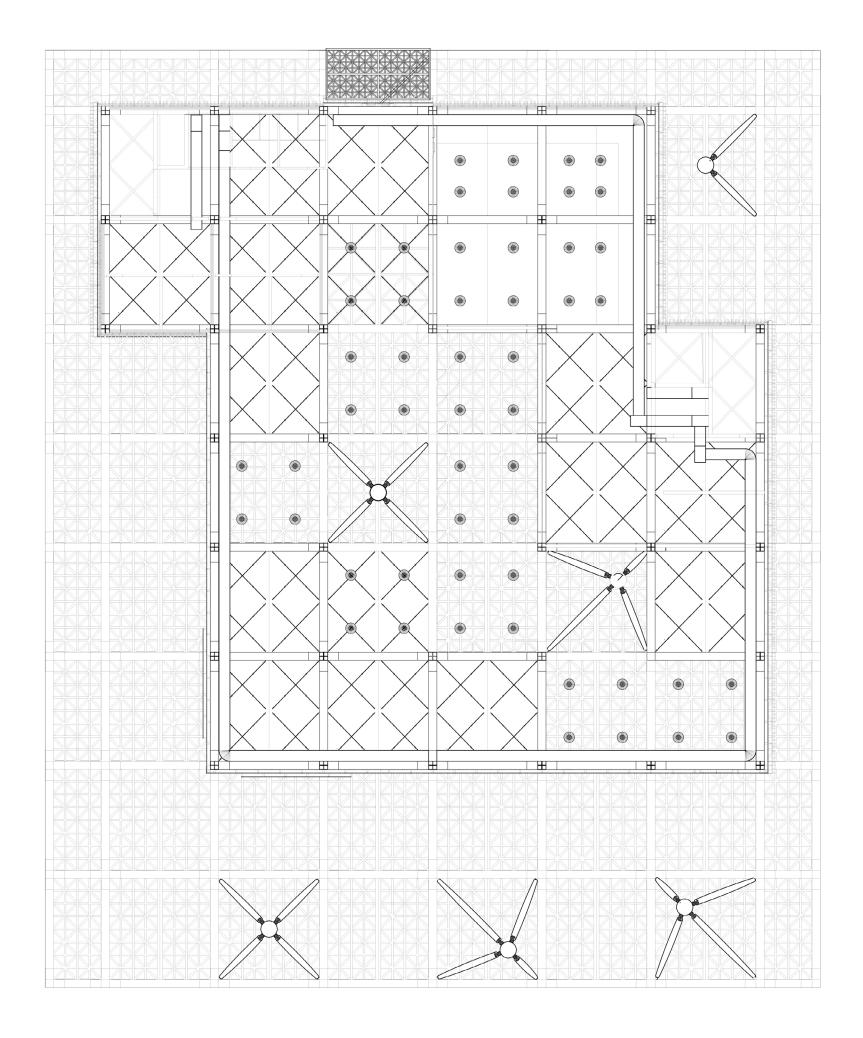
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STEEL MULLION CONNECTORS

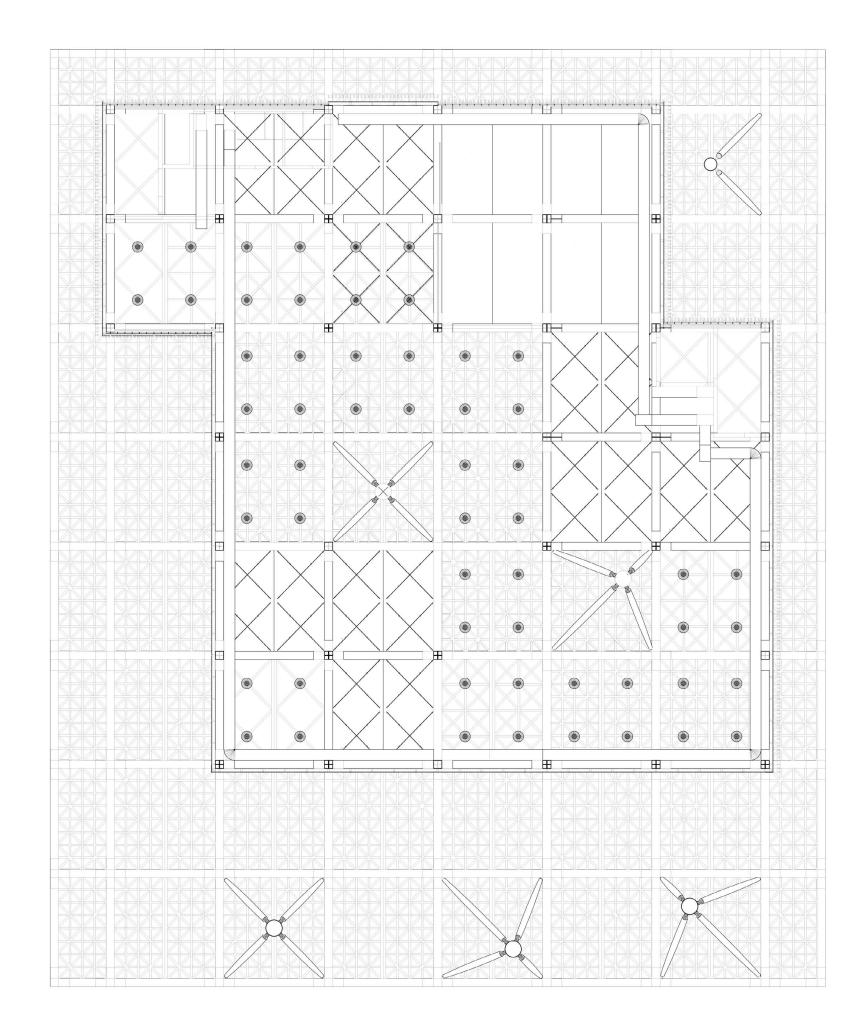
## **HVAC & LIGHTING COMPOSITE**



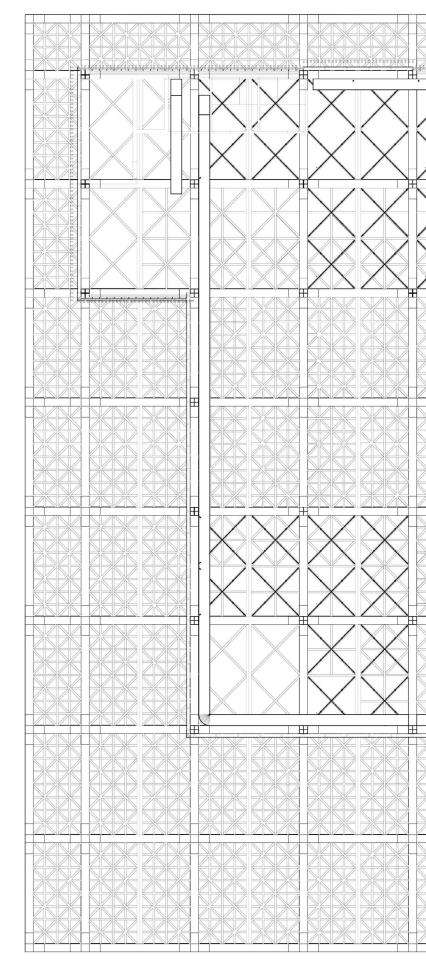
## **GROUND FLOOR RCP**



## **SECOND FLOOR RCP**



## THIRD FLOOR RCP

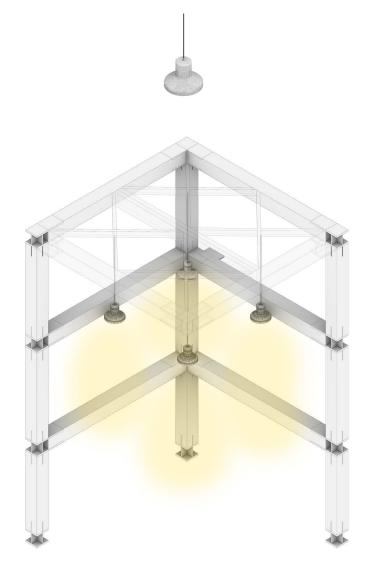


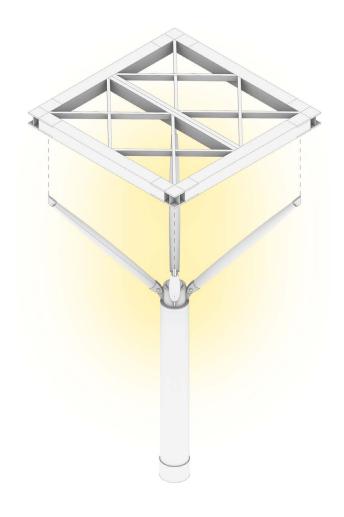
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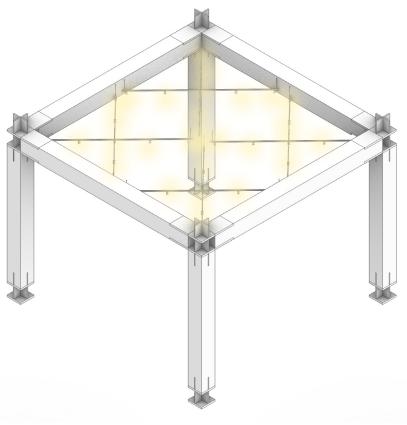
## LIGHTING FIXTURES

PENDANT LIGHTING SYSTEM

#### RADIANT LIGHTING SYSTEM



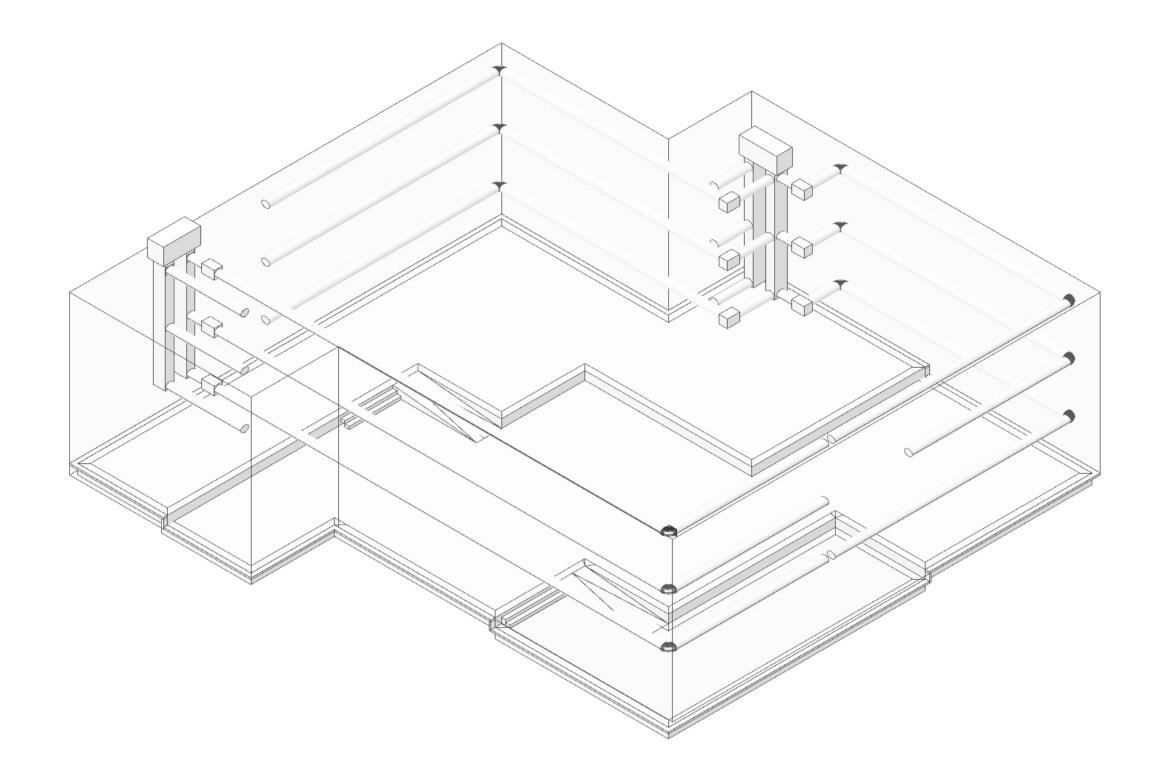




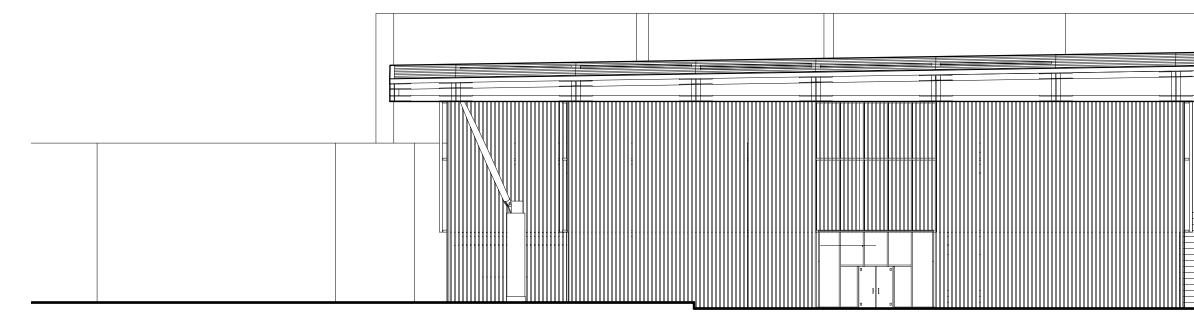


#### TRACK LIGHTING SYSTEM

### HVAC: VAV AIR HANDLING SYSTEM

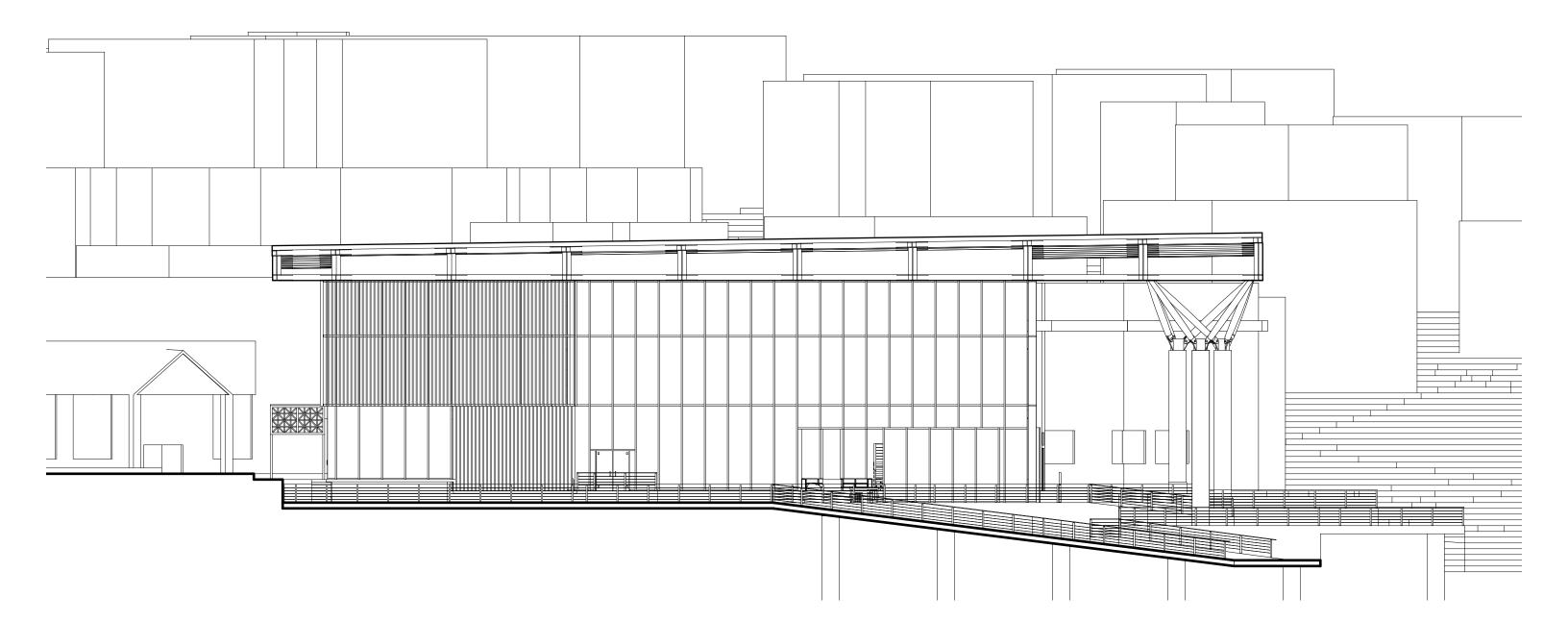


## **NORTH ELEVATION**

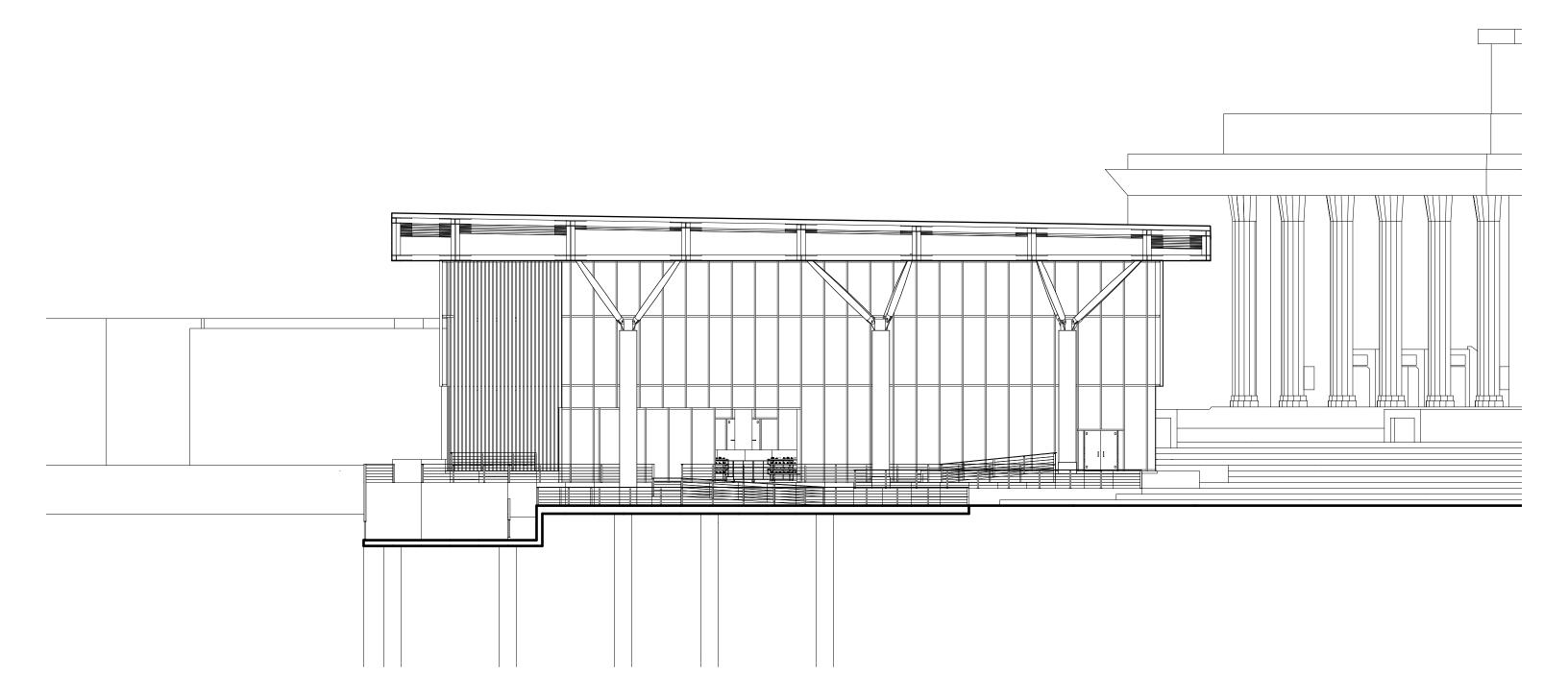




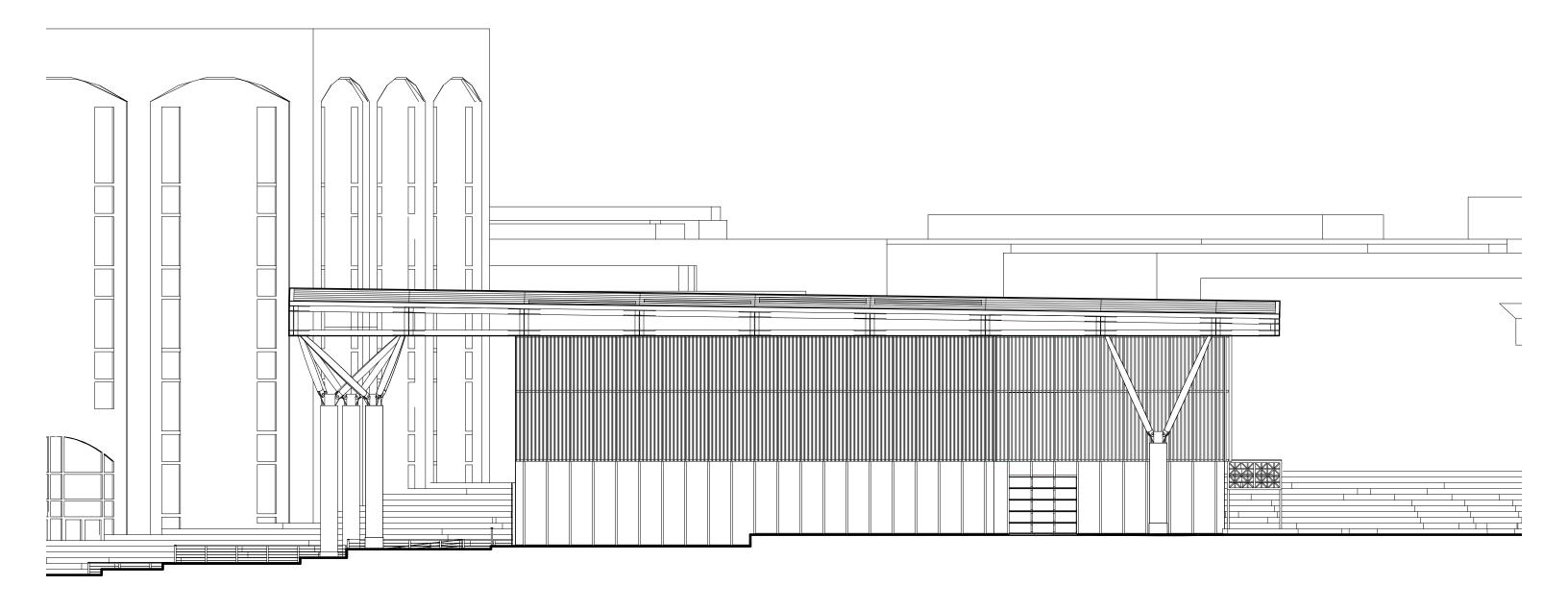
# EAST ELEVATION



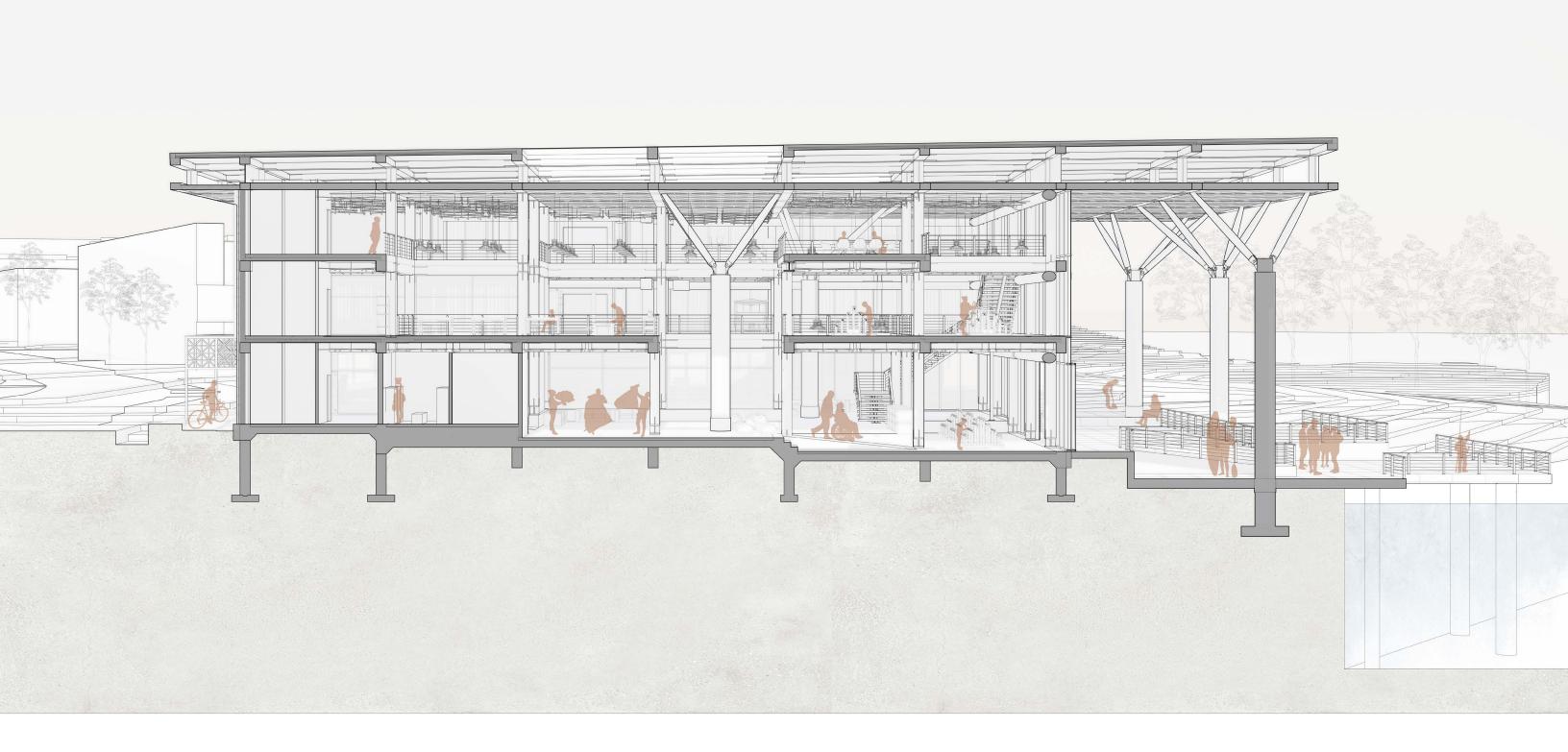
## **SOUTH ELEVATION**



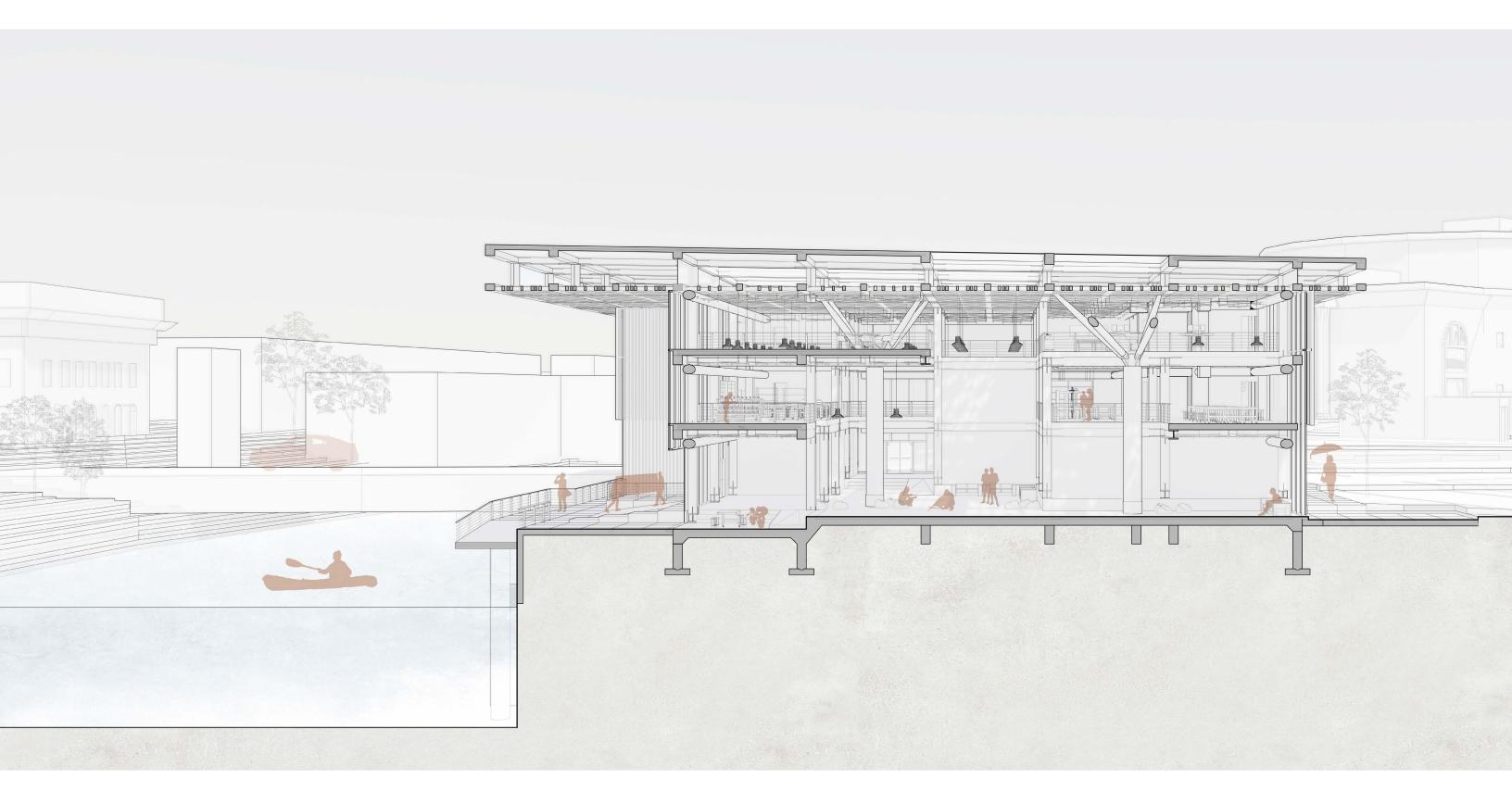
# WEST ELEVATION

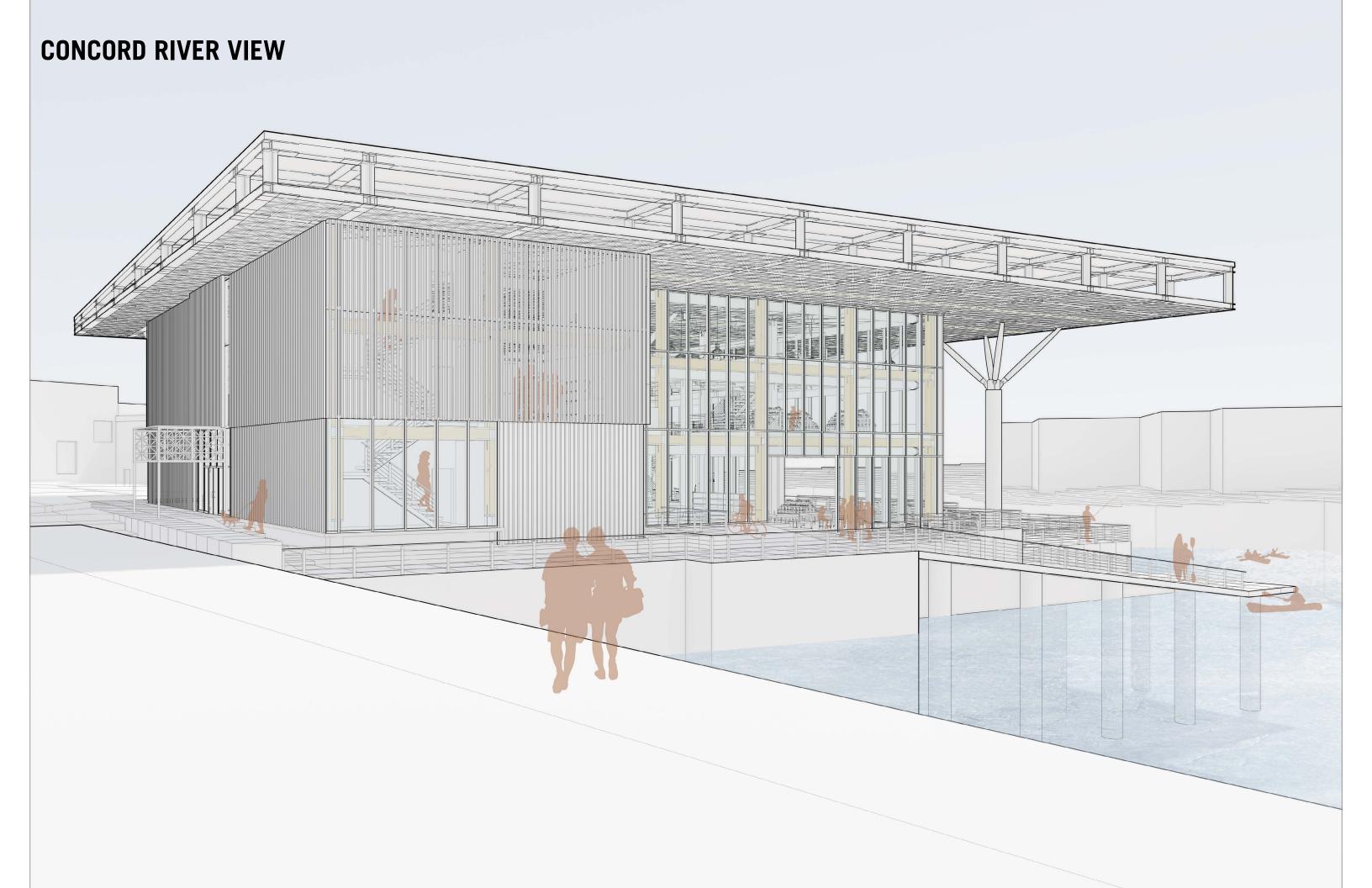


### LONGITUDINAL SECTION PERSPECTIVE



### **CROSS SECTION PERSPECTIVE**





### **PARK VIEW**



# **INTERIOR VIEW**



### **DETAILED SECTION**

