

**THE LIGHT WITHIN:
A Graduate Architecture School in
Roanoke, Virginia**

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Thesis submitted to the faculty of the Virginia
Polytechnic Institute and State University in
partial fulfillment of the degree of

Master of Architecture in Architecture

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Keywords: school, light, transparency,
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ABSTRACT

In urban conditions architecture often loses a connection with the surrounding context and viewers through inappropriate scale, design orientation and the misuse of light during the day and night. In areas of density, perception is everything.

This exploration seeks to express architecture as a language of light and transparency by emphasizing a long linear connection with the ground plane and surrounding city. This creates horizontal bands of space that emit and receive various forms of light. The goal of this thesis is to portray itself as a glowing beacon of attraction while simultaneously displaying its inner workings.



Acknowledgements

To:

Jesus, my Lord and Savior

Dr. Chellani Hathorn, Ray and Sheldia Carter, Eva Carter,
Johnathan Carter, Pamela Grayer, Scott Gartner, Steve
Thompson, Jack Davis, Dennis Jones, Jim Thompson, and
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In many ways you supported this thesis and my graduate
work. You reminded me the importance of positive thinking
when it was most crucial. I am truly grateful for your help.

Thank you all.

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Preface

This thesis begins as an exploration of the idea of a central light shaft as the primary feature for a graduate architecture school in Roanoke, VA. Allowing the circumference of the shaft to become the nucleus of the building further refined the idea. This alteration allowed me to see my original concept with a new sense of clarity. The shaft ceased to be only an atrium feature and began to include larger areas of the program for each floor. What began as a small element of the overall project then developed into a unifying concept for the building as a whole.

The proposed building incorporates the specific program elements that are important for students, especially technologies that will benefit the architect of the future. These include: a lecture auditorium with intelligent walls for enlarged visual display, a macro-rapid prototyping robotics lab, wind tunnels, and virtual reality spaces. Additional spaces include a dual level library, studio spaces, restaurant, coffee bar, performance stage, and more. These functions are made visible through the transparent qualities of the building that display the operations of an architecture school as one passes by.

Two years of continuous modifications has provided me time to judge my decisions qualitatively. I have come to better understand the consequences of decisions and how much time certain design endeavors truly take. The guiding principles of the thesis are the classic ones of “utilitas, firmitas, and venustas.”

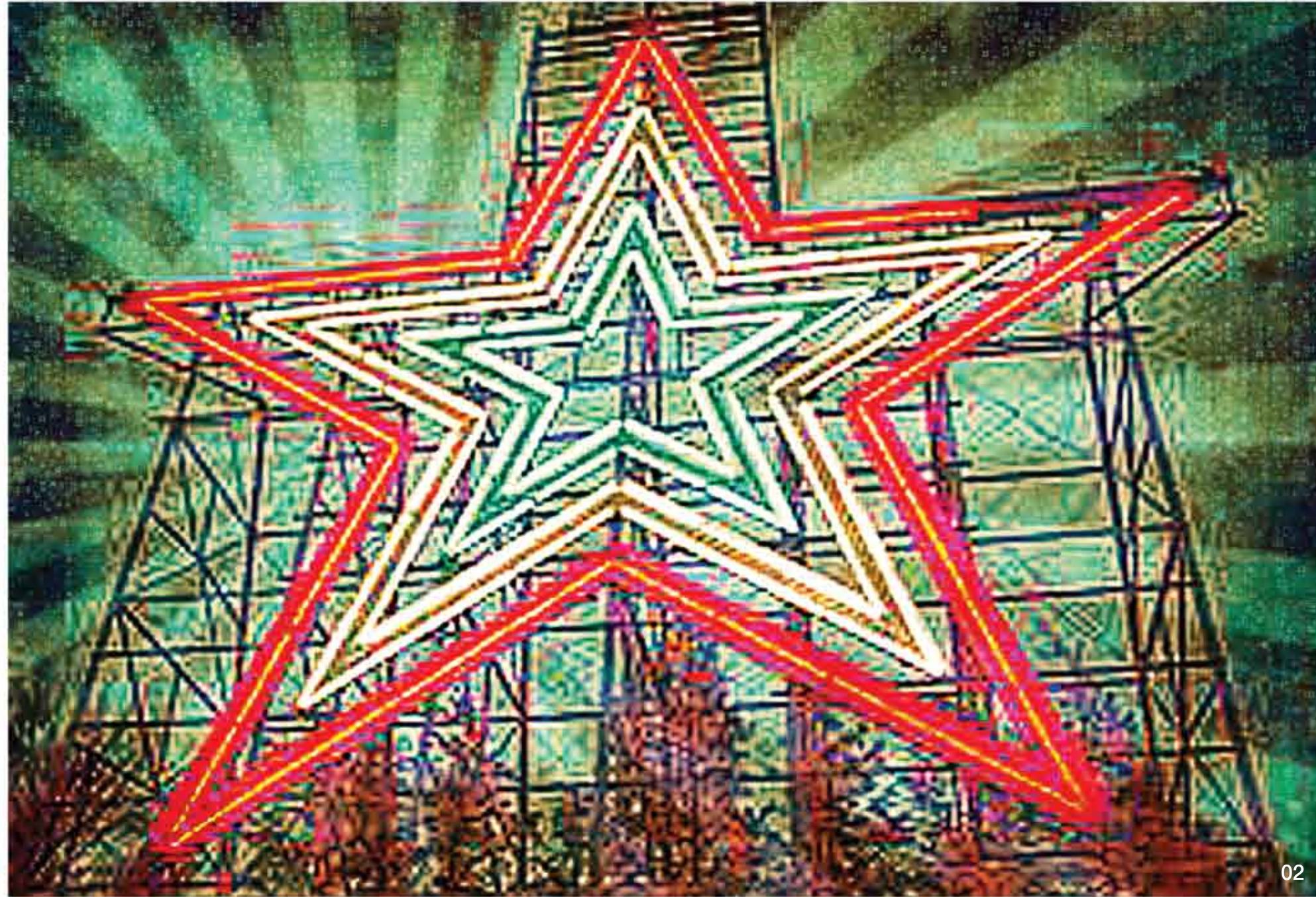


Lights.....Camera.....Architecture

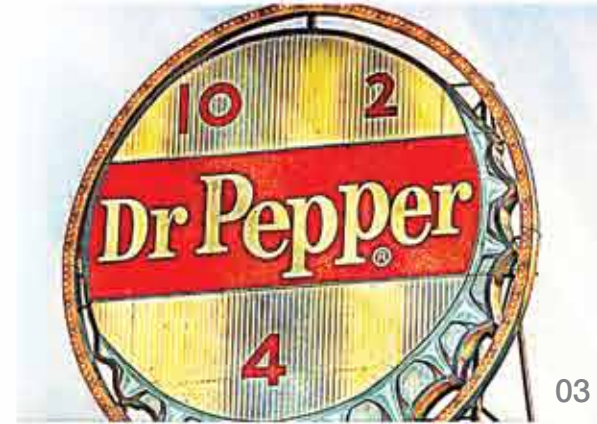
Architecture sets the scene for life.
It establishes itself as the signage
of place and space.

“Architecture appears for the first time when the sunlight hits
a wall. The sunlight did not know what it was before it hit a
wall.”

- Louis Kahn



02



03



04



05



06



07

Roanoke Lights

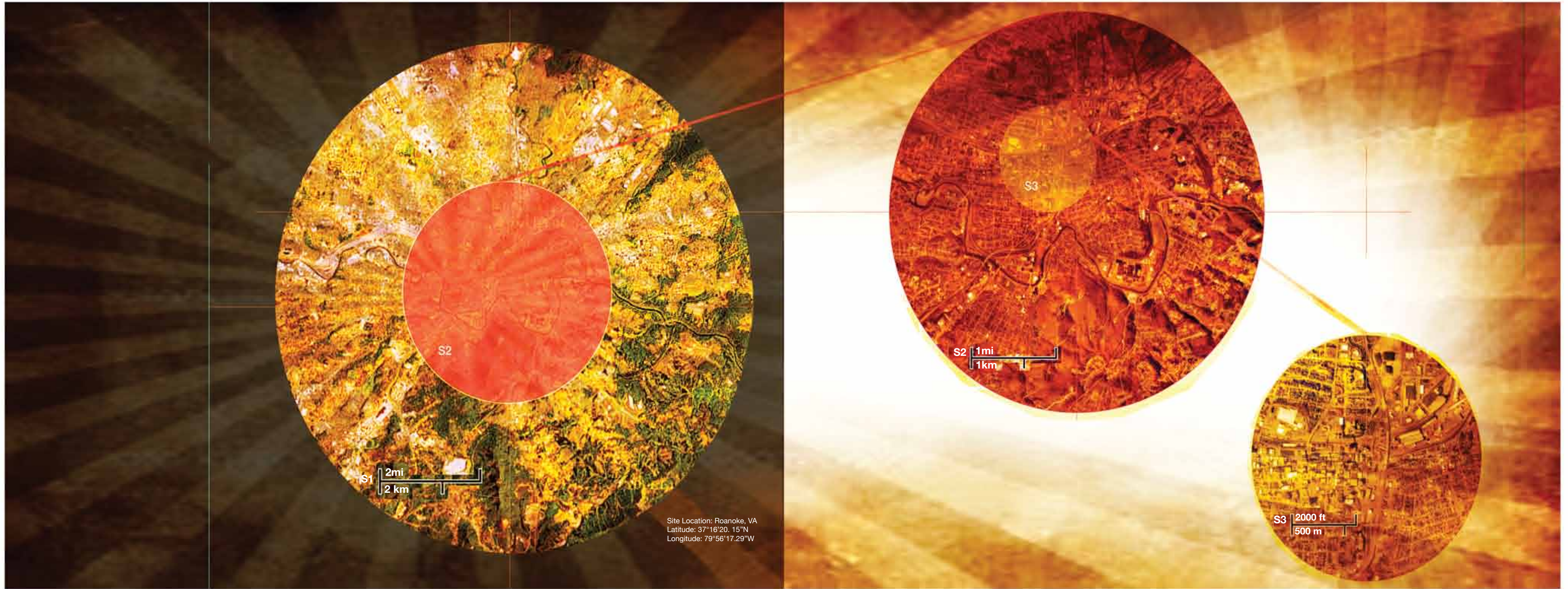
Roanoke has a history of signage through the use of electrical light that sends vibrant colors and arrays of neon light into the night sky.

This same effect can be achieved with architecture that exhibits these three qualities:

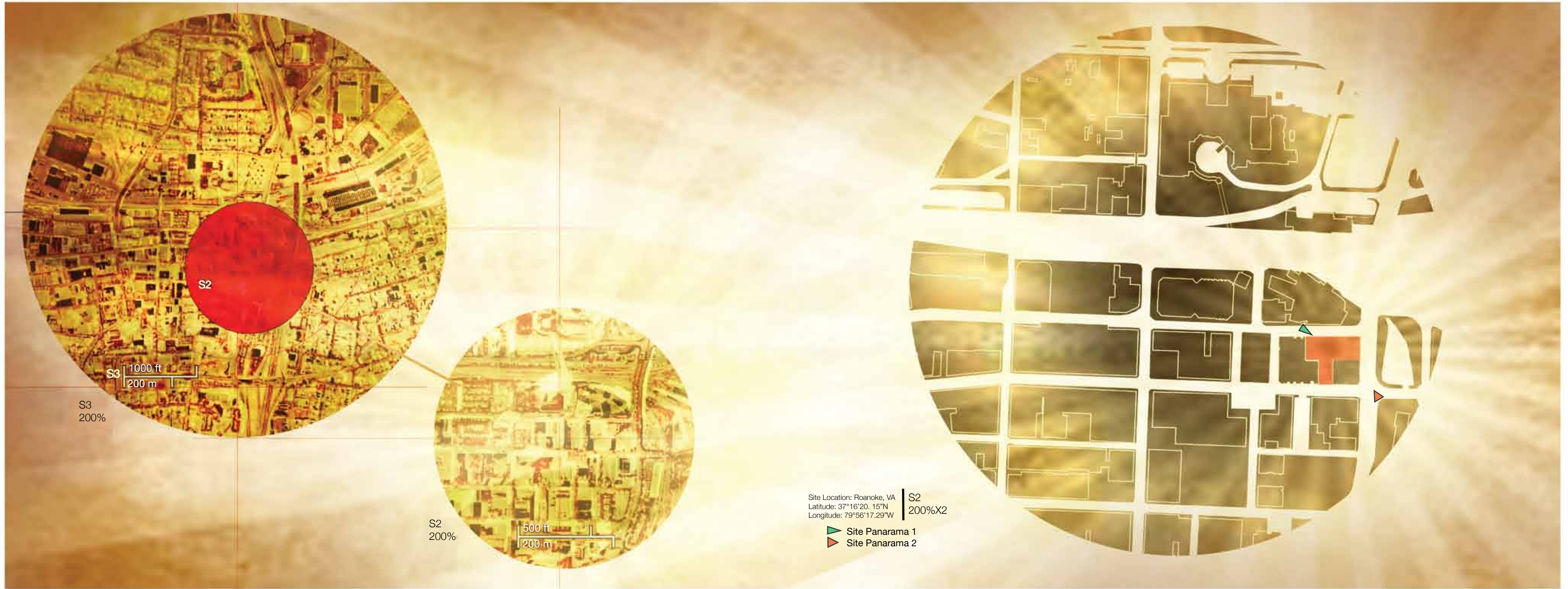
- must be wrapped in glass and transparent
- must be narrow and emphasize the horizontal
- must emit colorful light

“Architecture is the learned game, correct and magnificent, of forms assembled in the light.”

- Le Corbusier



Site Zoom 1



Site Location: Roanoke, VA
 Latitude: 37°16'20.15"N
 Longitude: 79°56'17.29"W

S2
 200%X2

Site Panorama 1
 Site Panorama 2

Site Zoom 2

Site and Panorama

This project is sited in Roanoke, Virginia adjacent to the Taubman Museum. The site shape resembles a "T", and currently is a parking lot. The longitudinal length of the site running east and west is approximately 200 ft long. The other longitudinal length running north and south is 180 ft in length.

Presently, the south portion of the site is occupied by a small building that will be demolished and excavated with the existing parking lot.

The previous site pages show a satellite view of Roanoke (page 3). The circular images on pages 3 and 4 zoom into an appropriate viewing scale of the site and the immediate context of downtown Roanoke.



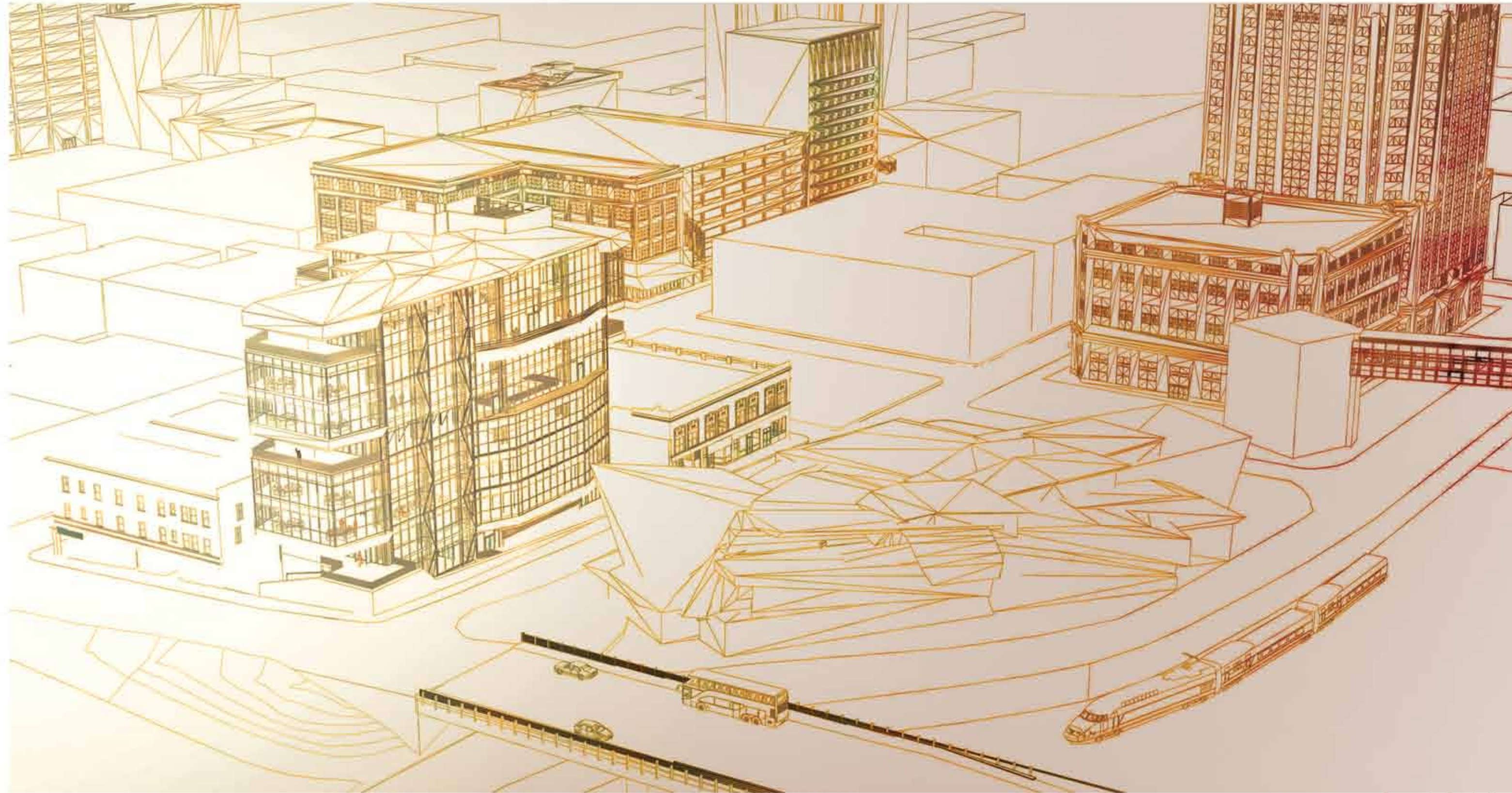
Panorama 1

Site and Panorama

This panorama shows a view of the southern approach towards the site, while capturing the street perspective of the surrounding buildings. The key element of this image is Lee Highway, the central corridor in the image as it allows the pedestrian to observe the site upon entering downtown. The site position and orientation lends itself as a window of opportunity to leave a lasting impression through creating an iconic design that introduces the viewer to the surrounding city. These ideas lead an initiative to design a midrise building of squatter portions with the intention of creating a strong foreground. The taller more distant buildings will be the picturesque backdrop to accent the southern view (see main perspective no. 2).



Panorama 2



“For the world is thoroughly inconsistent, there is no single dominating principle. Rather, there are as many principles as there are infinities. We must make this eternal inconsistency our own. Prometheus’ weakness is for monumentality at any price. For projections and recesses in the walls, etc., make demands on the solidity of the building, yet are undeniably necessary to unconditional sublimation. On the other hand, the principles of number and mass stand against them. To resolve this demands skill and lightness of construction, which, as I see it, will achieve the shimmering effect of interpenetration on all sides: This means lightness and versatility. Monumentality is not essential everywhere, not in every hut. But the hut should be flexible, and although it should be absolutely stable, its rigidity should be light, its components intersecting and stimulating each other, creating the most apt expression of the building type.”

-Bruno Taut (Glas)



“Organic buildings are the strength and lightness of the spiders' spinning, buildings qualified by light, bred by native character to environment, married to the ground.”

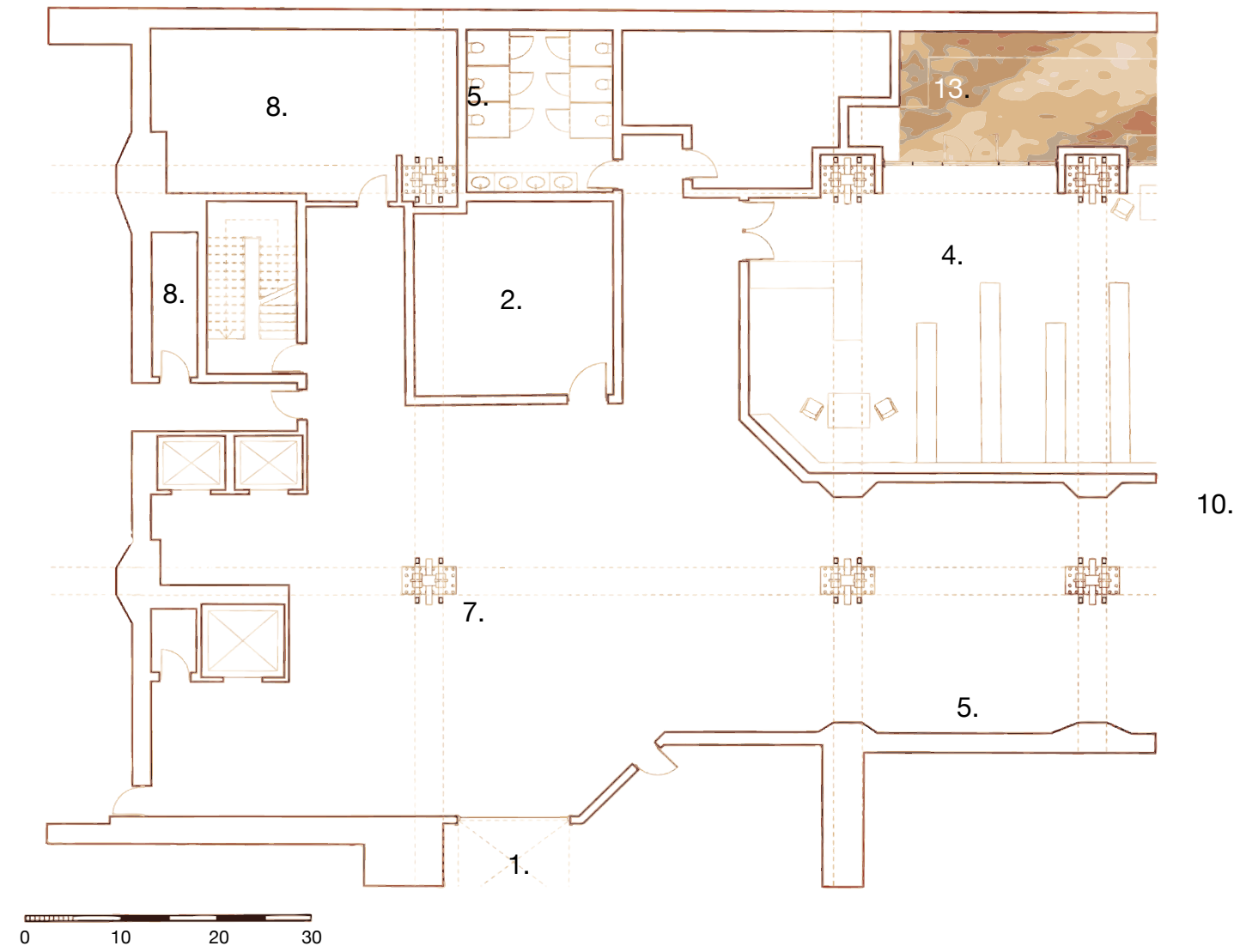
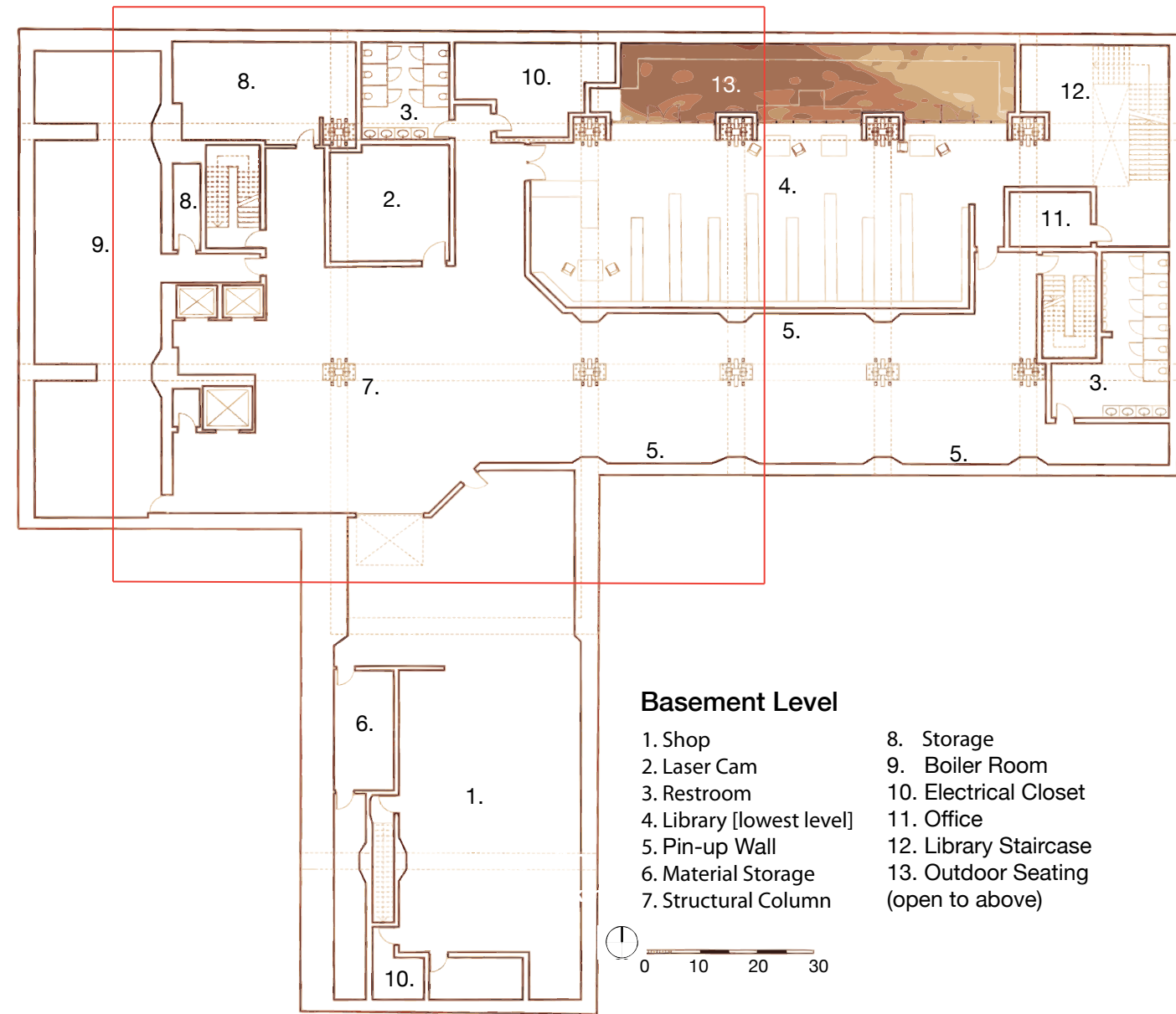
-Frank Lloyd Wright

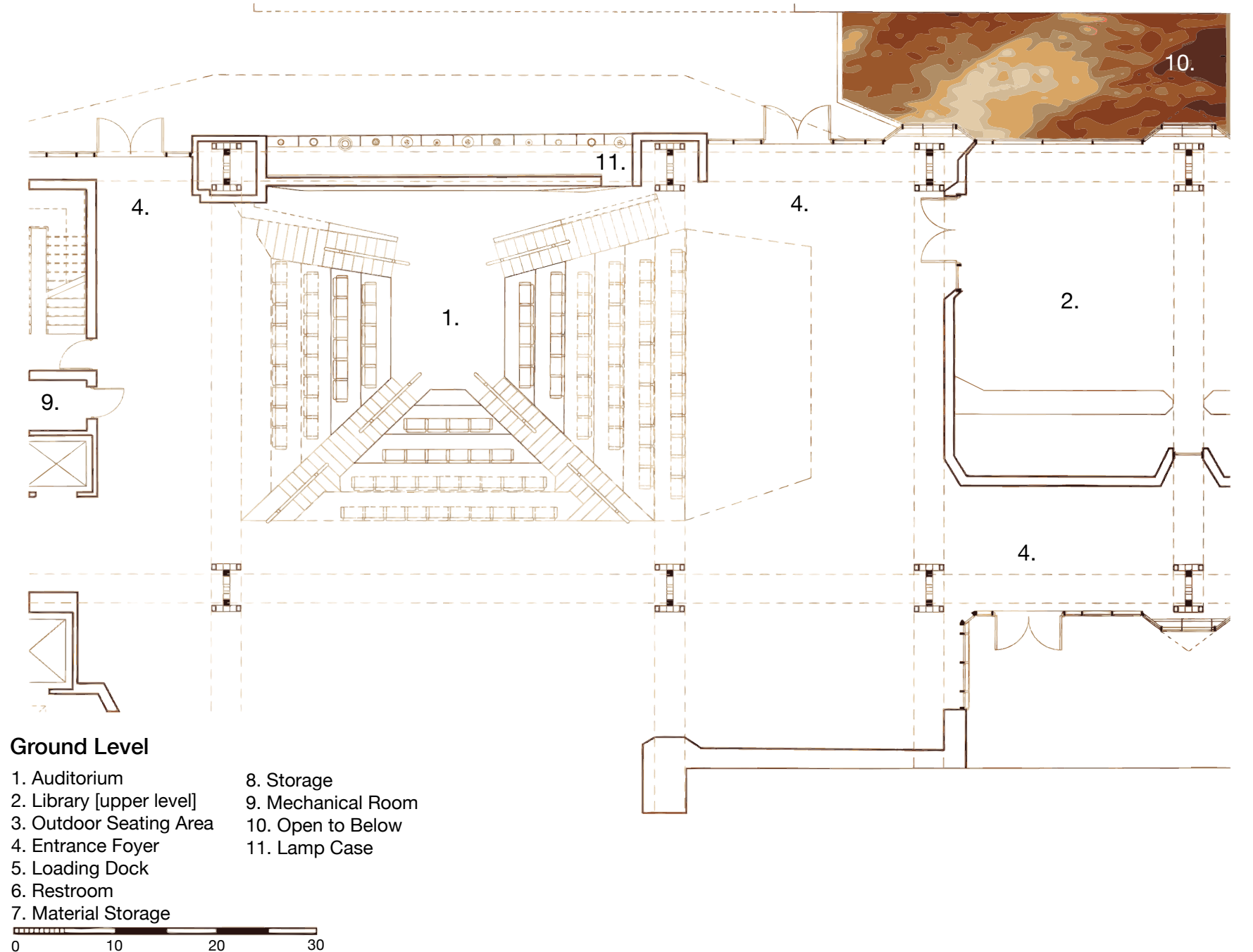
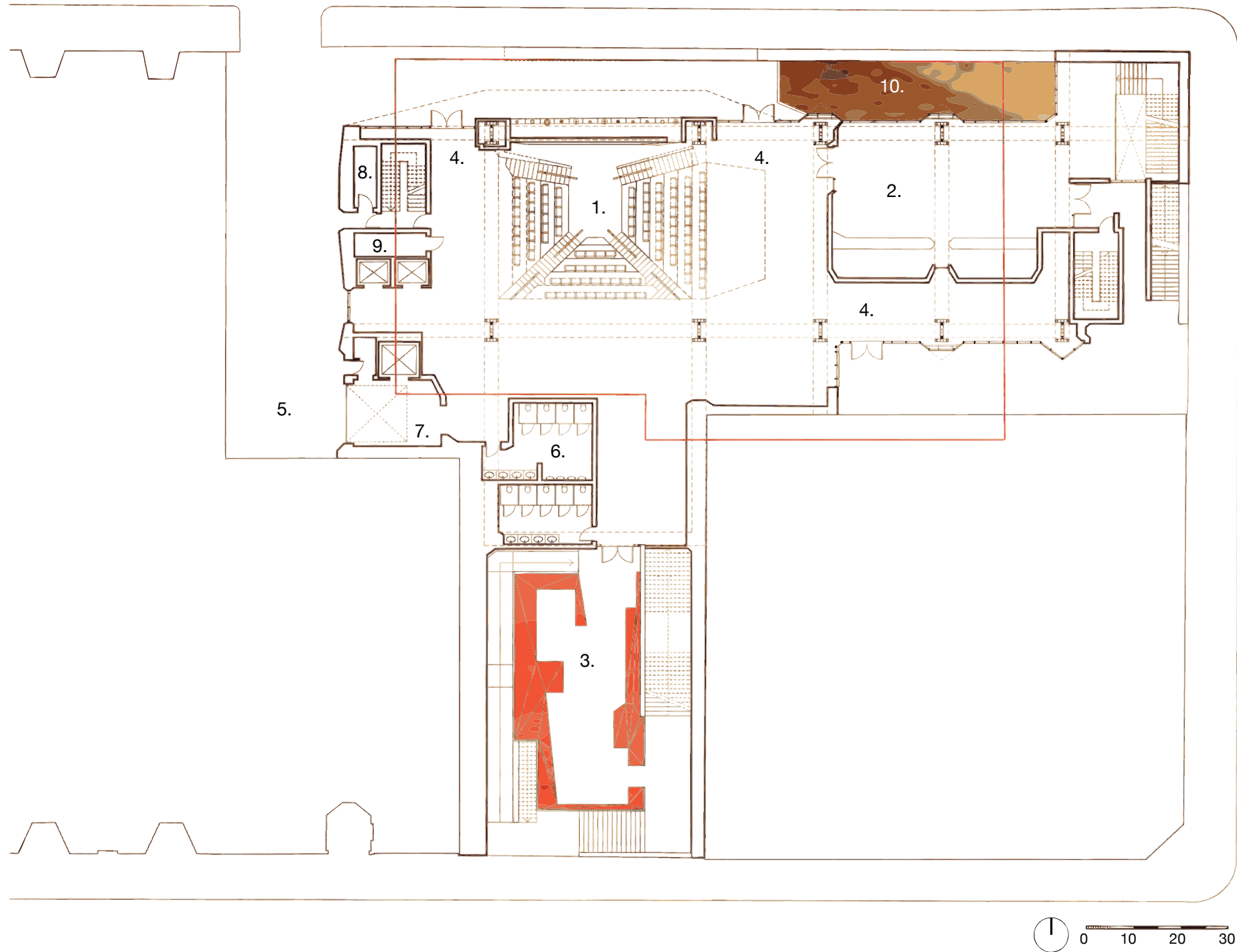
“I sense a Threshold: Light to Silence, Silence to Light – an ambiance of inspiration, in which the desire to be, to express, crosses with the possible ... Light to Silence, Silence to Light crosses in the sanctuary of art.”

-Louis Kahn

“Color in certain places has the great value of making the outlines and structural planes seem more energetic.”

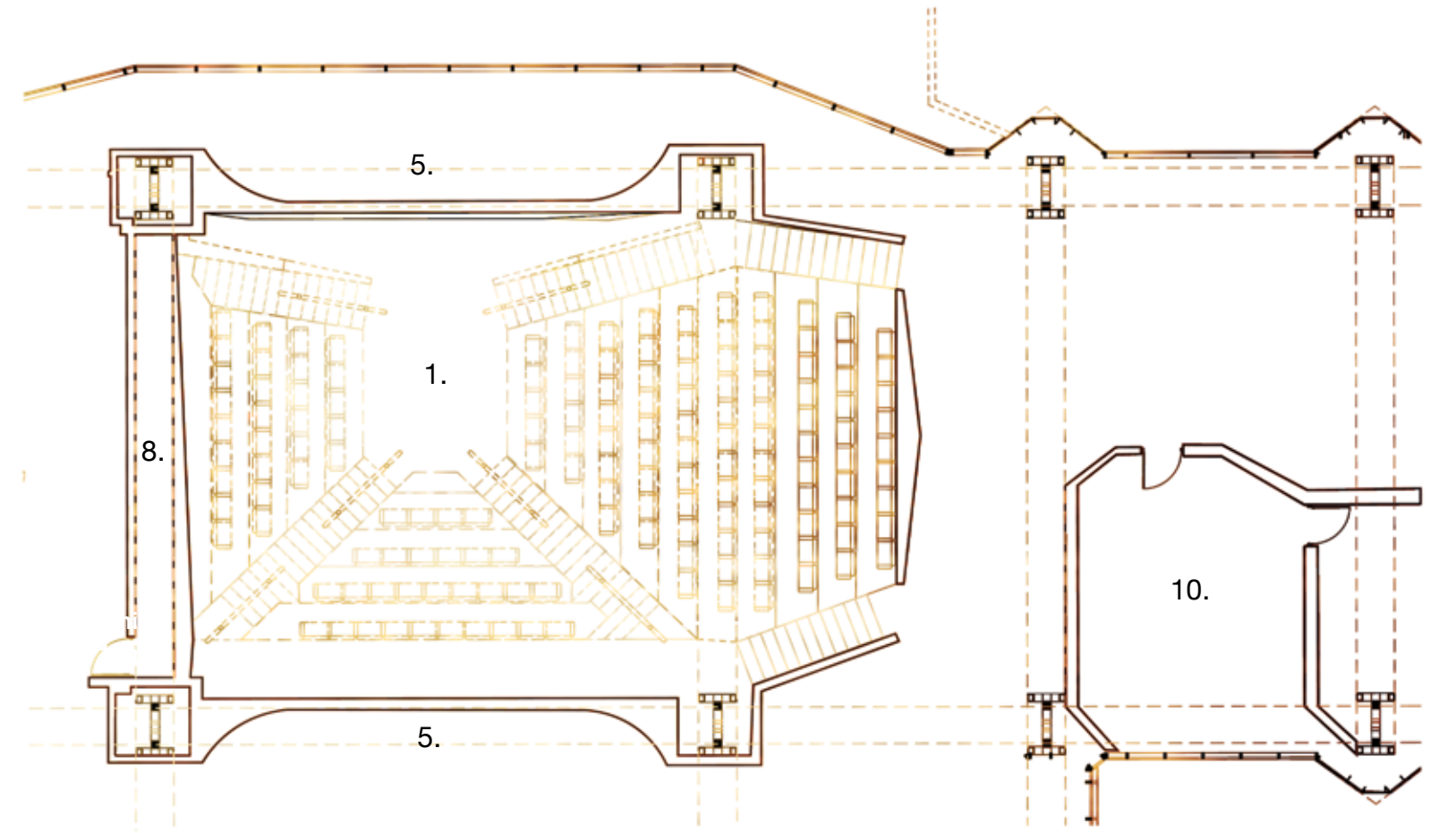
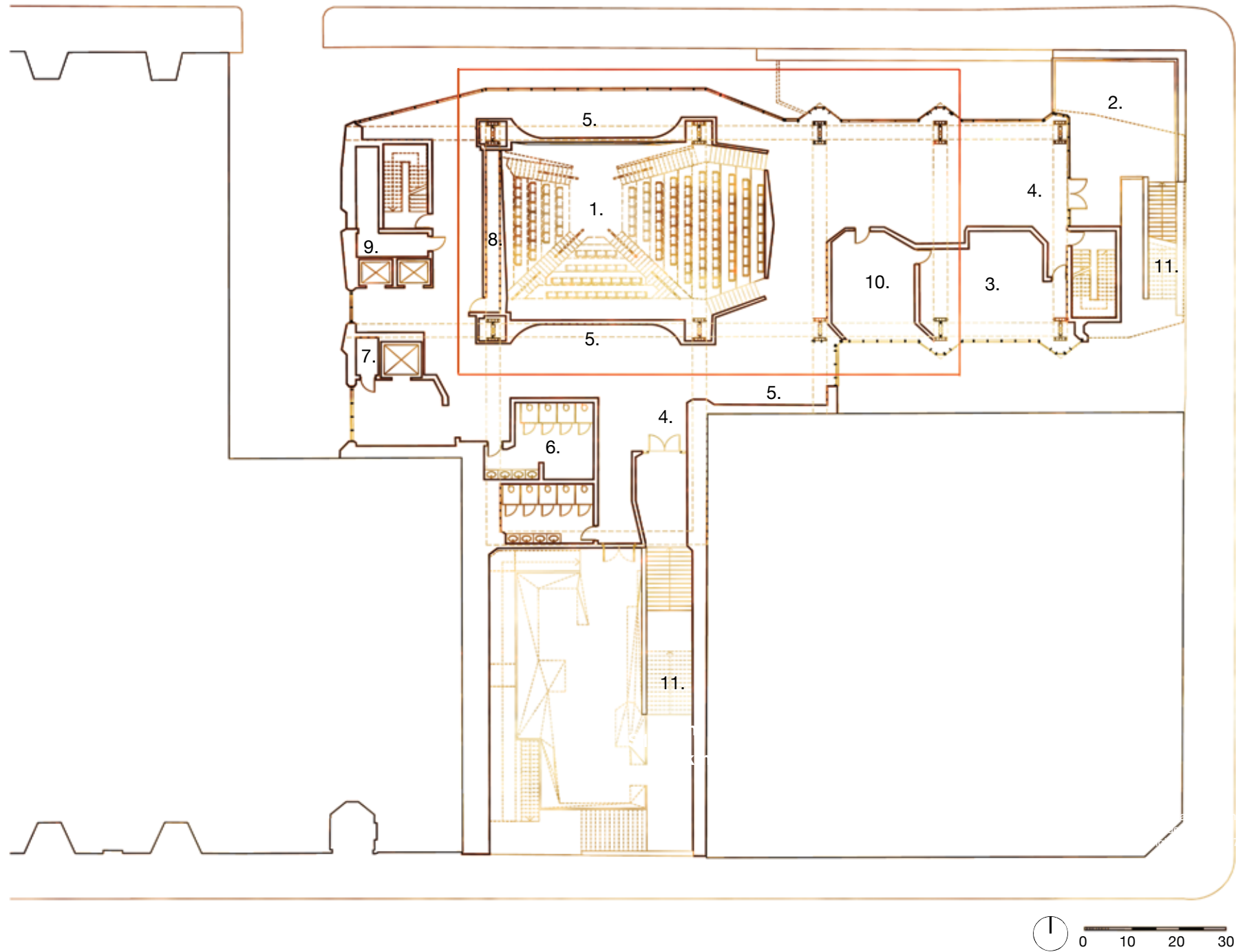
-Antoni Gaudi





Ground Level

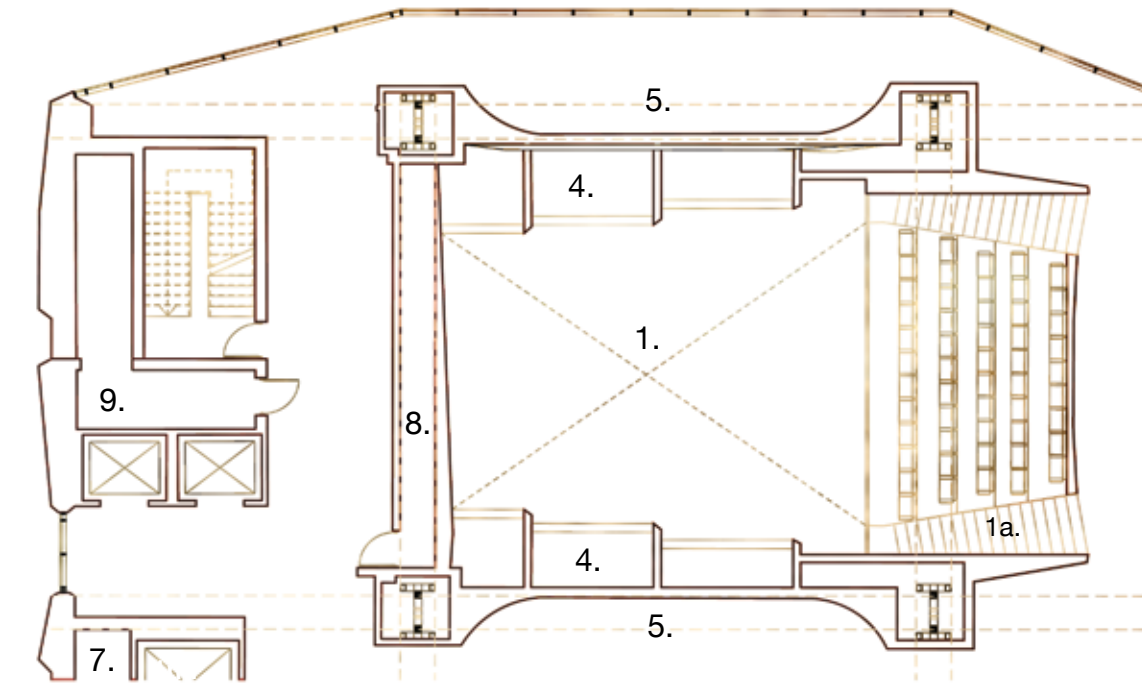
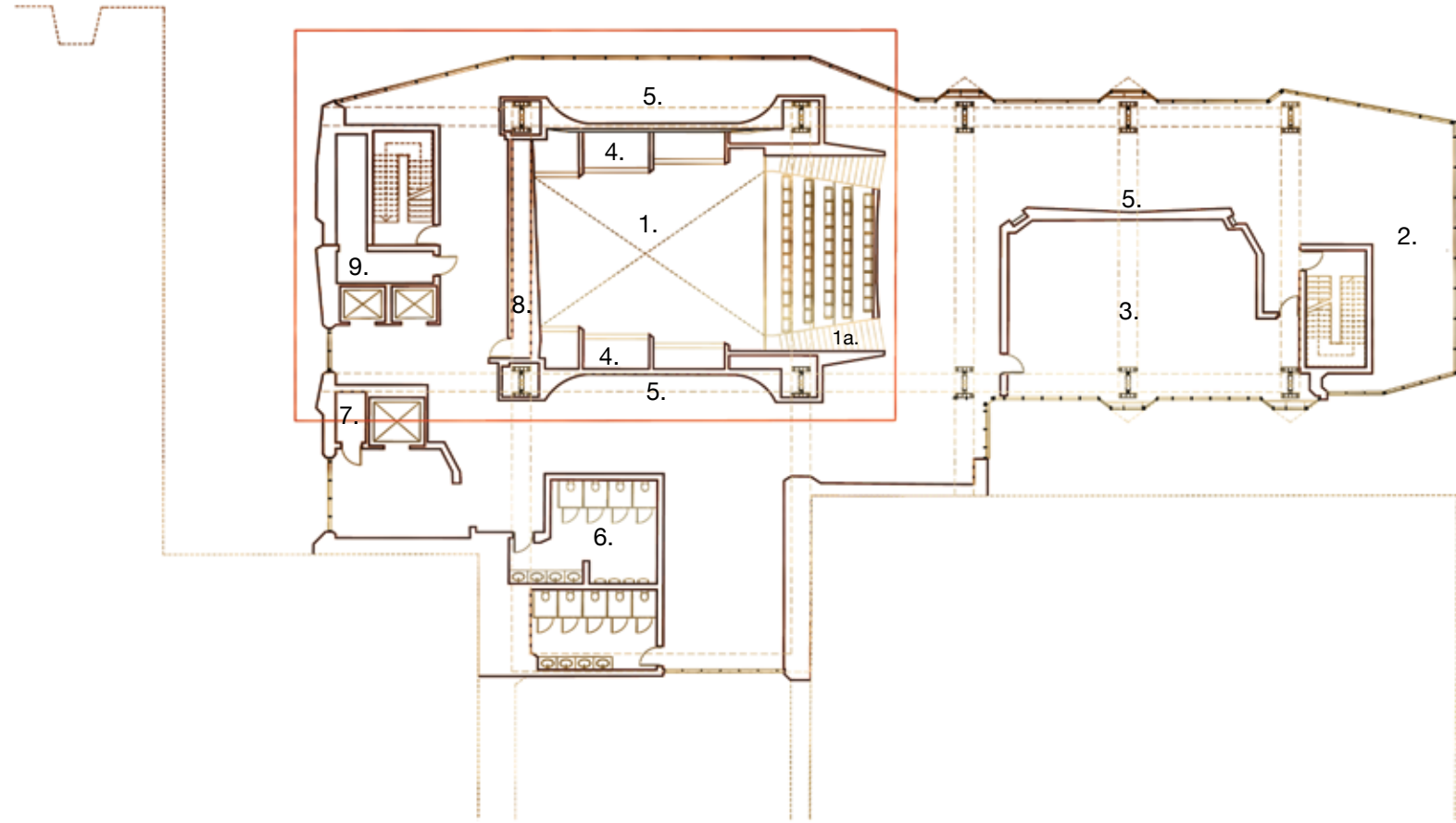
- 1. Auditorium
- 2. Library [upper level]
- 3. Outdoor Seating Area
- 4. Entrance Foyer
- 5. Loading Dock
- 6. Restroom
- 7. Material Storage
- 8. Storage
- 9. Mechanical Room
- 10. Open to Below
- 11. Lamp Case



Second Level

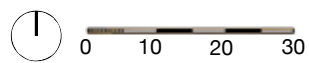
- | | |
|-------------------|--------------------------|
| 1. Auditorium | 8. Electrical Closet |
| 2. Main Porch | 9. Mechanical Room |
| 3. Dean's Office | 10. Secretary |
| 4. Entrance Foyer | 11. Outside Stair Access |
| 5. Pin-up Space | |
| 6. Restroom | |
| 7. Utility Closet | |

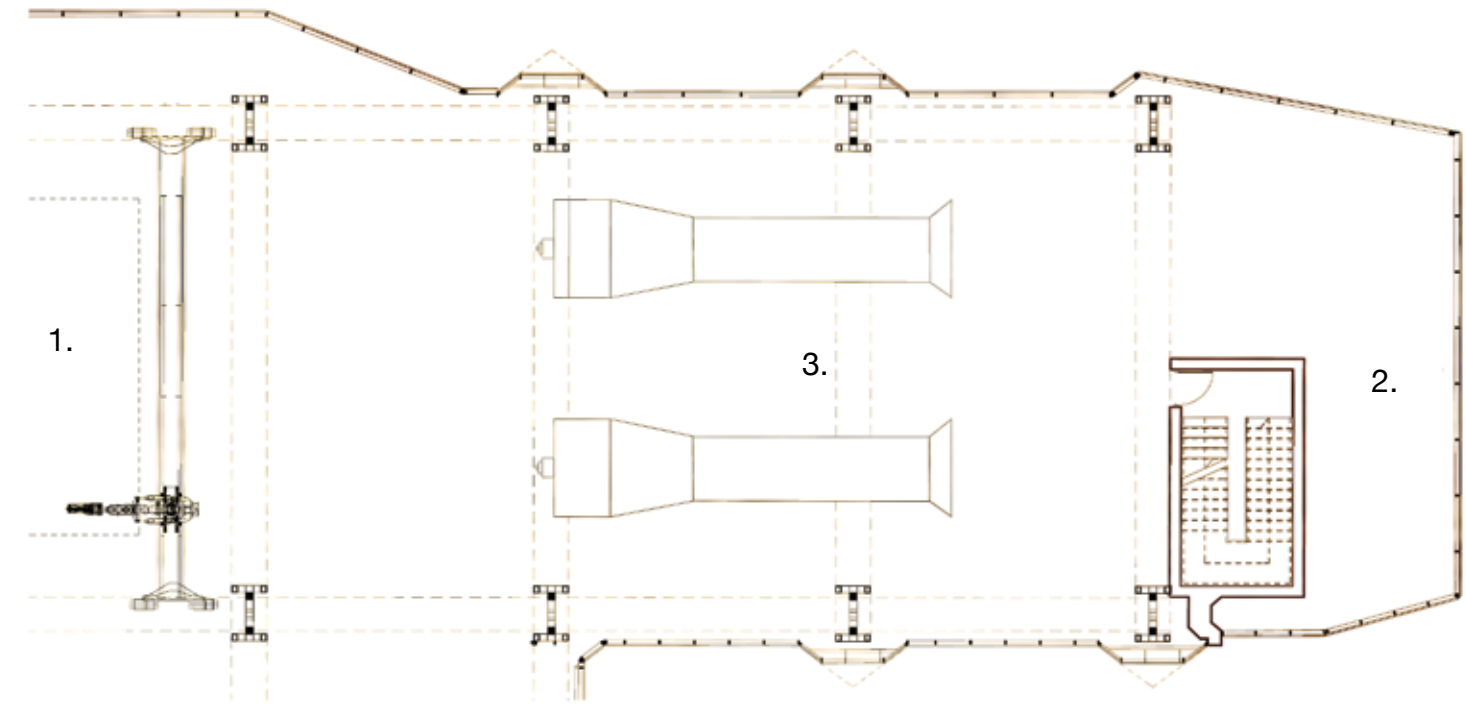
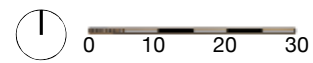
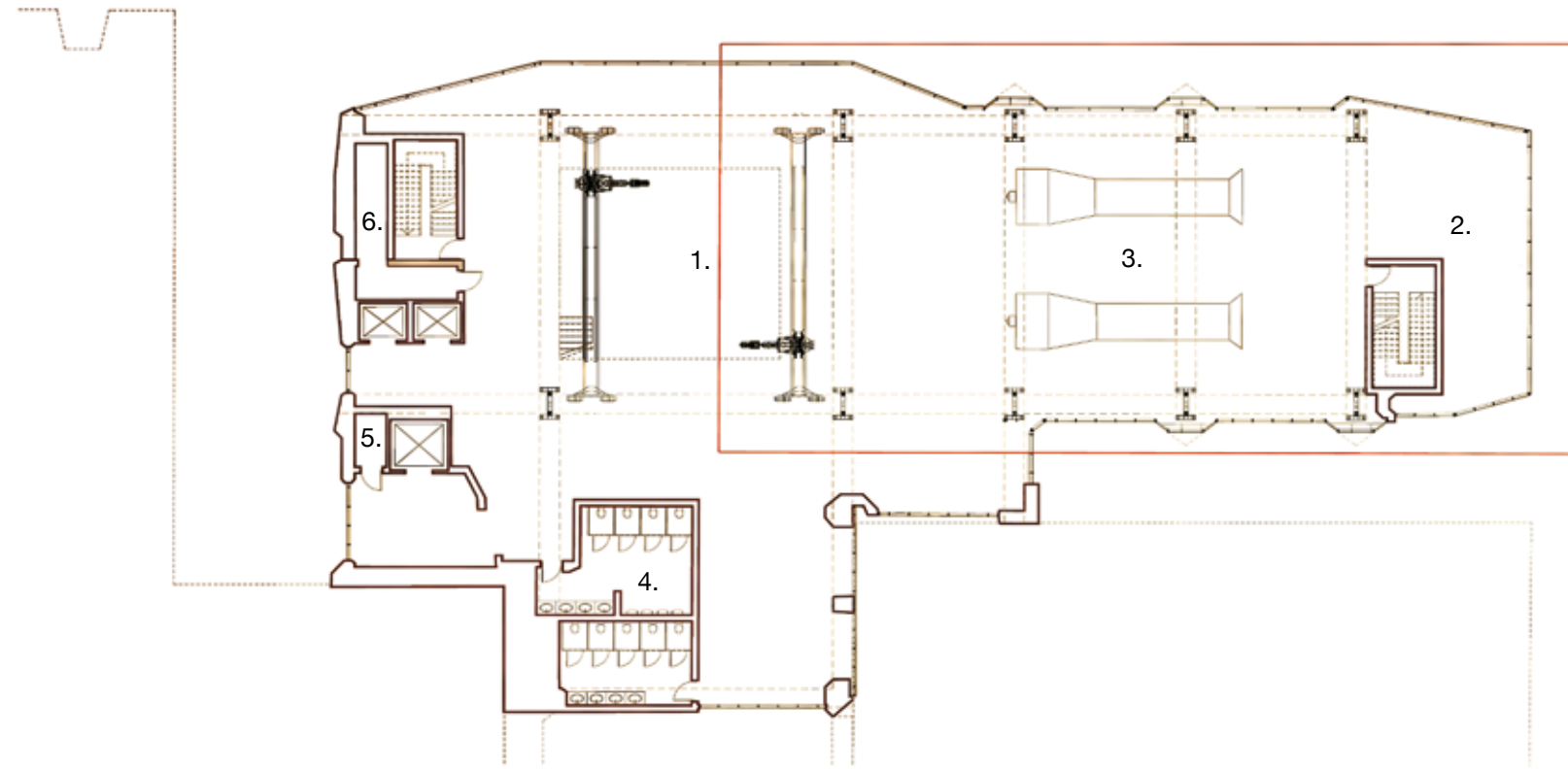




Third Level

- | | |
|---|----------------------|
| 1. Auditorium
(open to below) | 5. Pin-up Space |
| 1a. Top Level Seating | 6. Restroom |
| 2. Lounge Area | 7. Utility Closet |
| 3. Class Room | 8. Electrical Closet |
| 4. Fly Loft
(for electrical equipment) | 9. Mechanical Room |

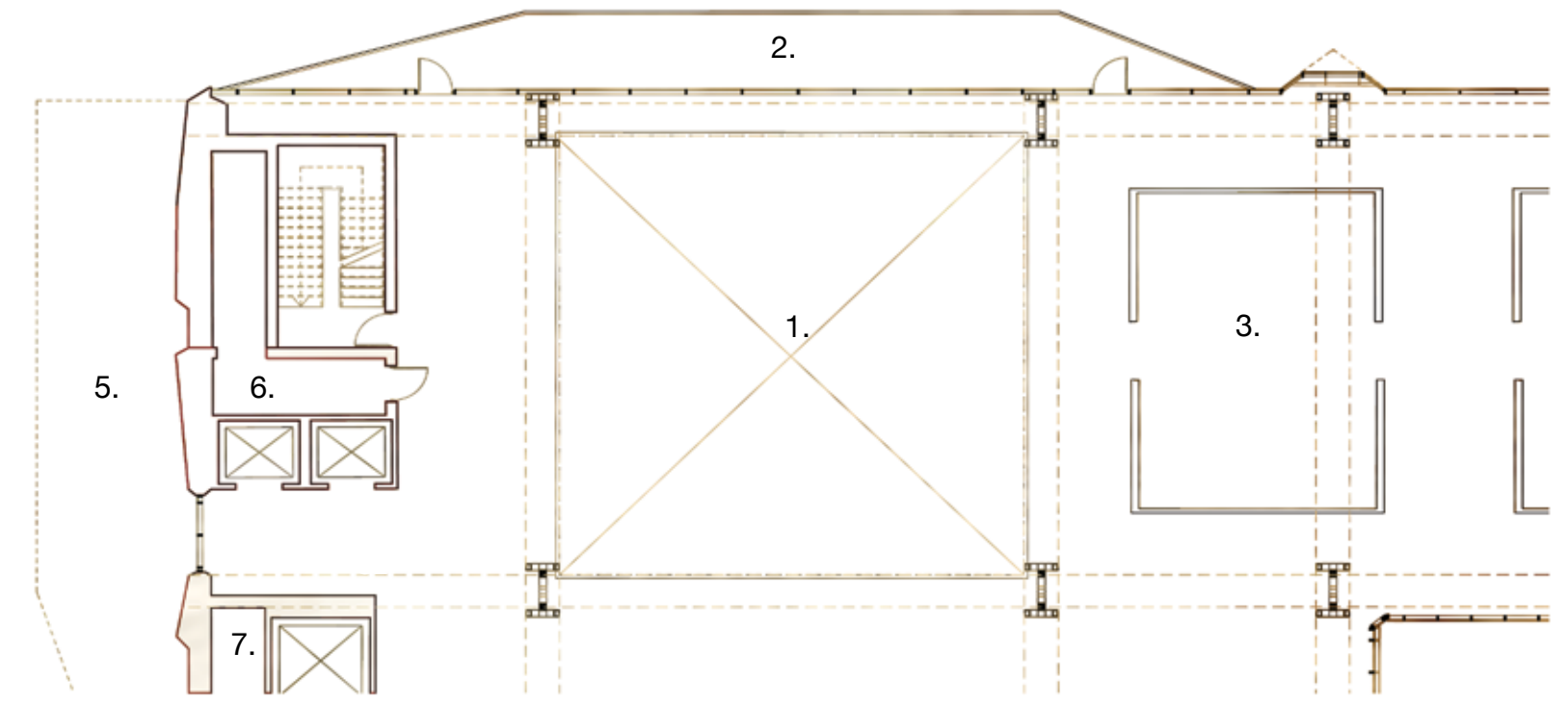
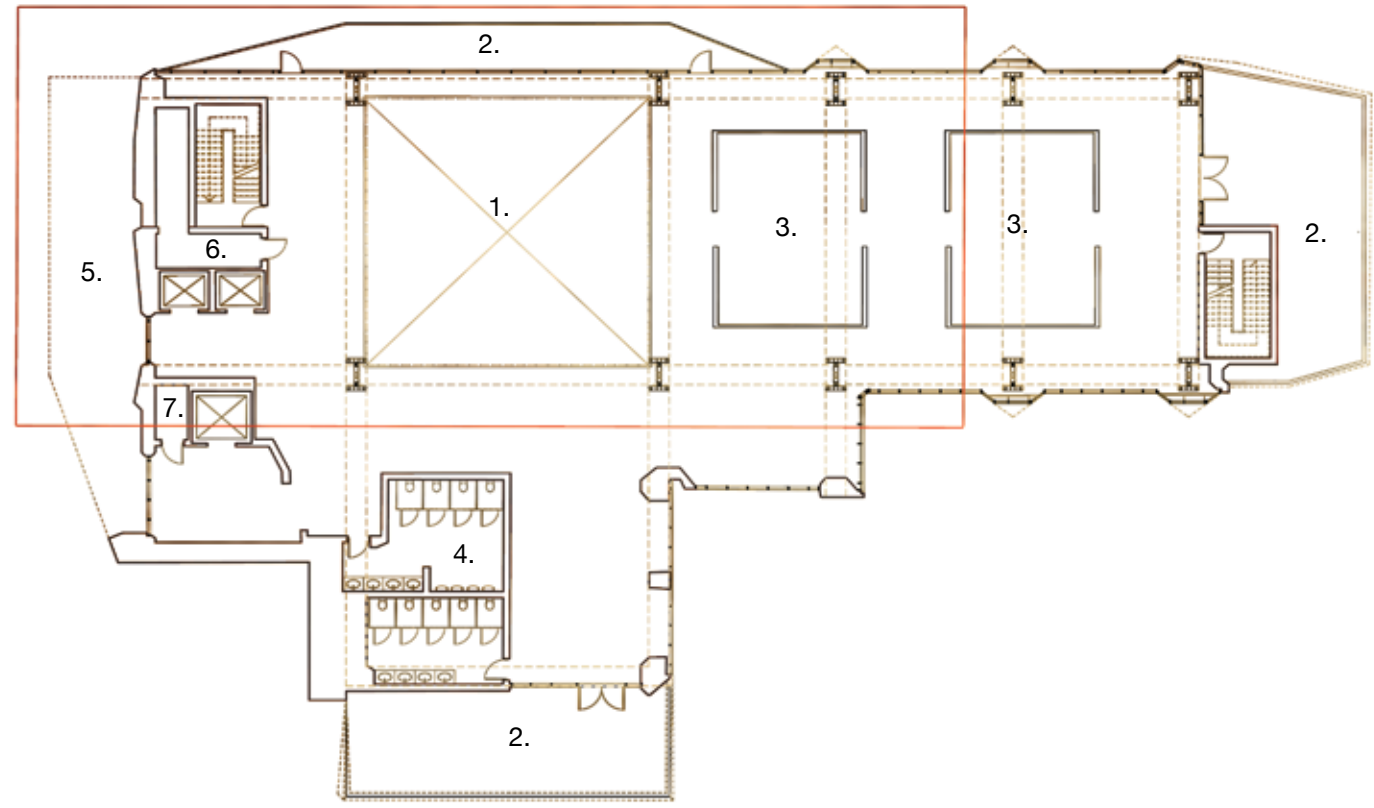




Fourth Level

- 1. Robot Lab
(macro-rapid prototyping arm)
- 2. Lounge Area
- 3. Wind Tunnels
- 4. Restroom
- 5. Utility Closet
- 6. Mechanical Room

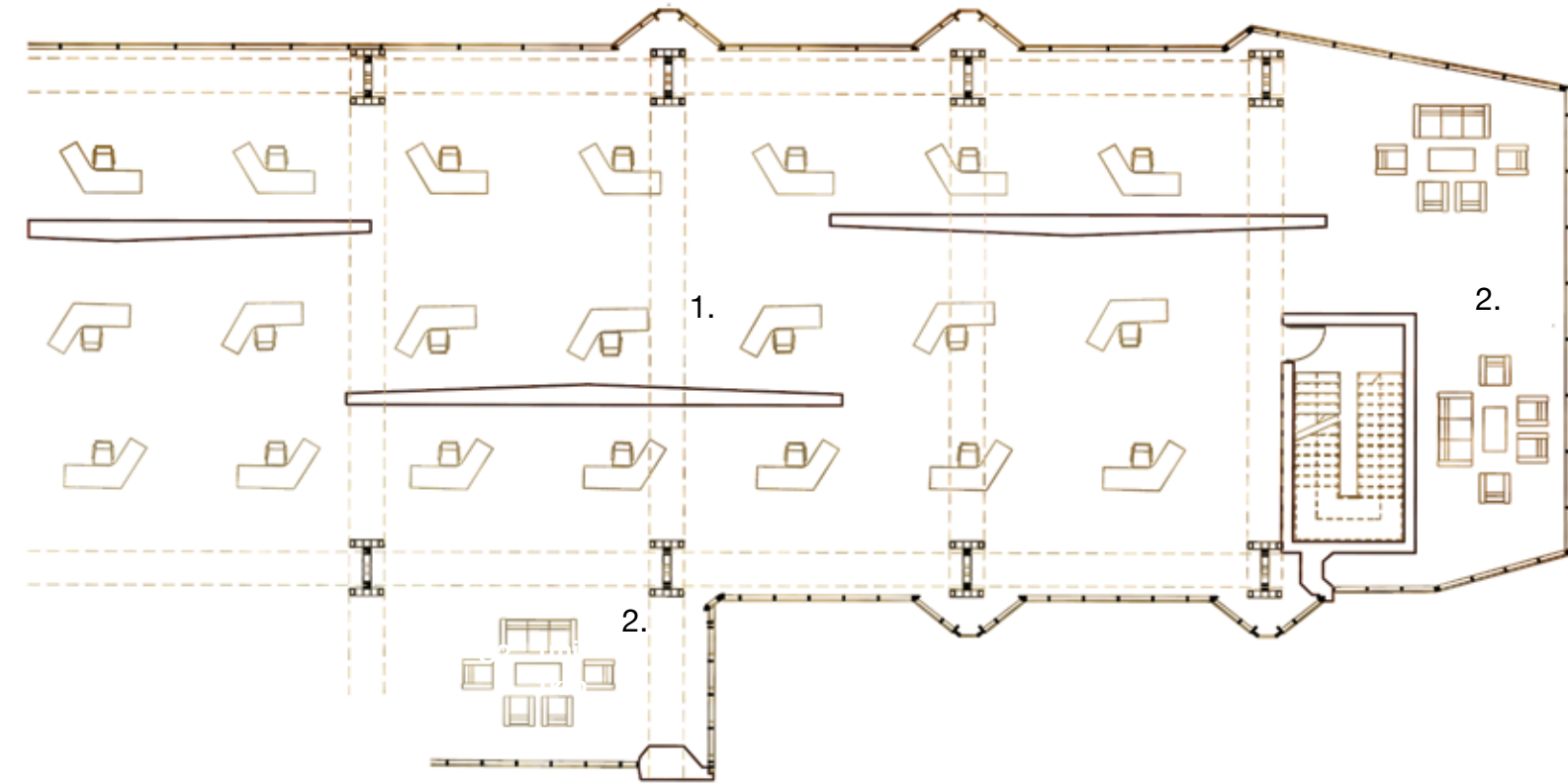
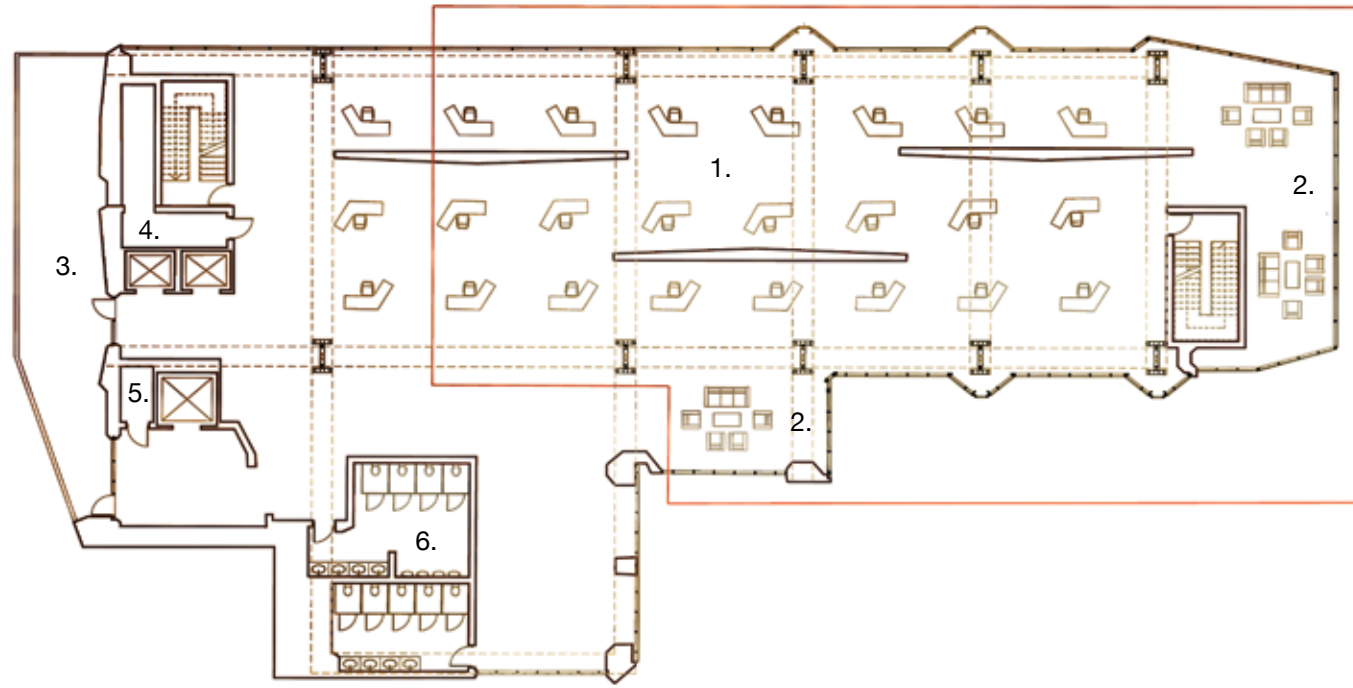




Fifth Level

- 1. Robot Lab (open to below)
- 2. Balcony
- 3. Virtual Reality Space
- 4. Restroom
- 5. Overhang (balcony above)
- 6. Mechanical Room
- 7. Utility Closet

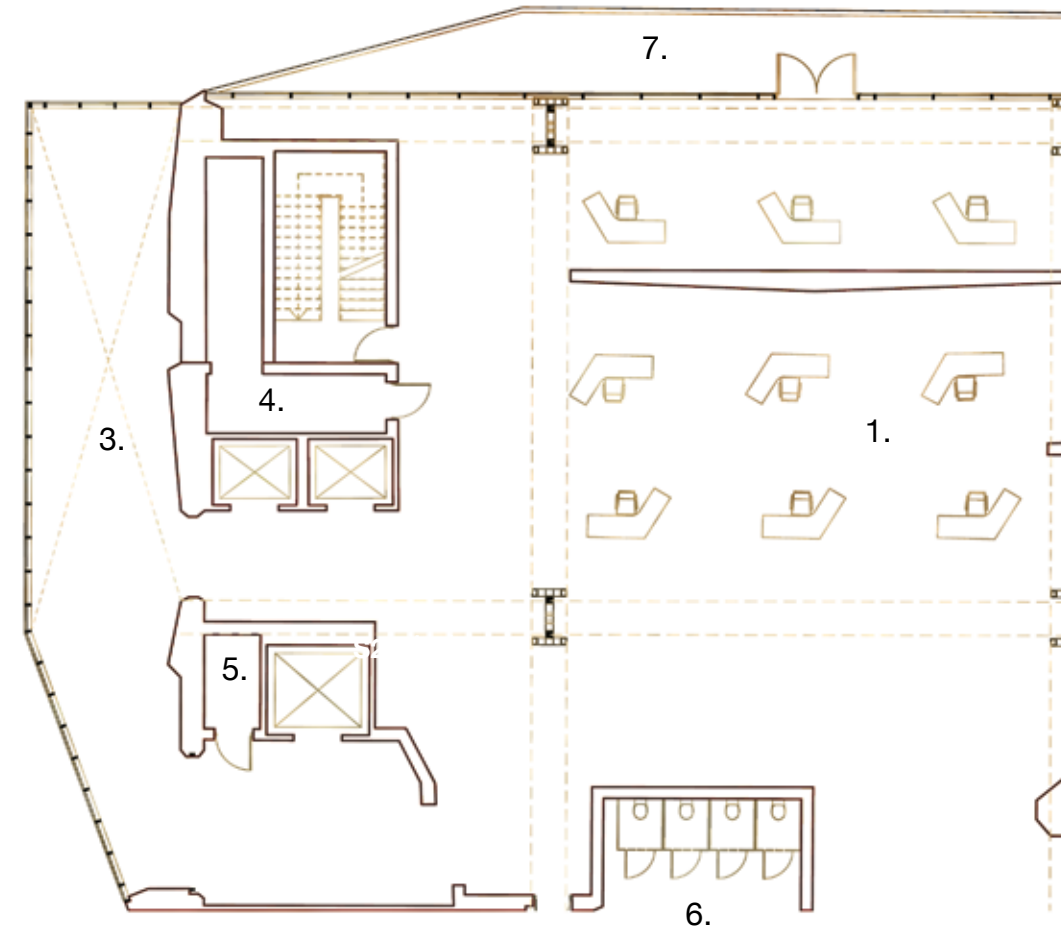
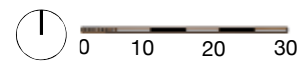
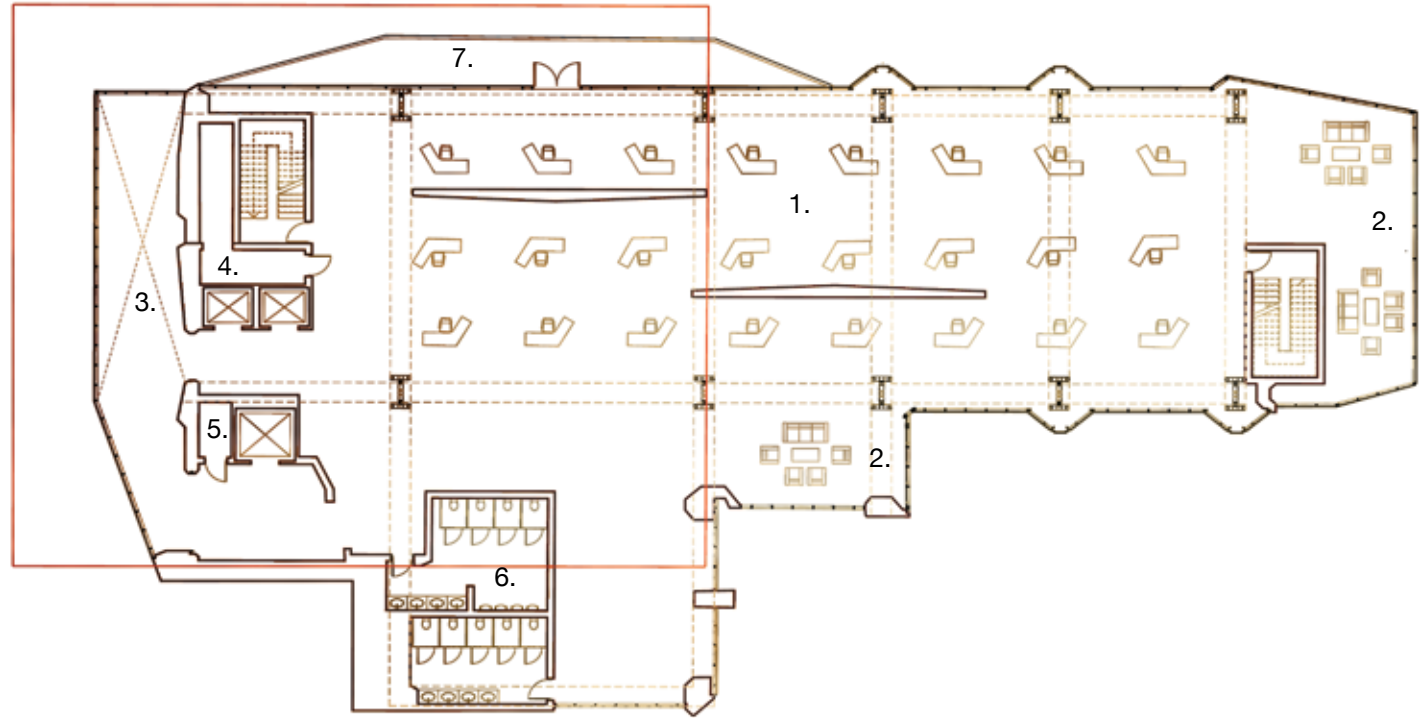




Sixth Level

- 1. Studio Spaces
- 2. Lounge Area
- 3. Balcony
- 4. Mechanical Room
- 5. Utility
- 6. Restroom

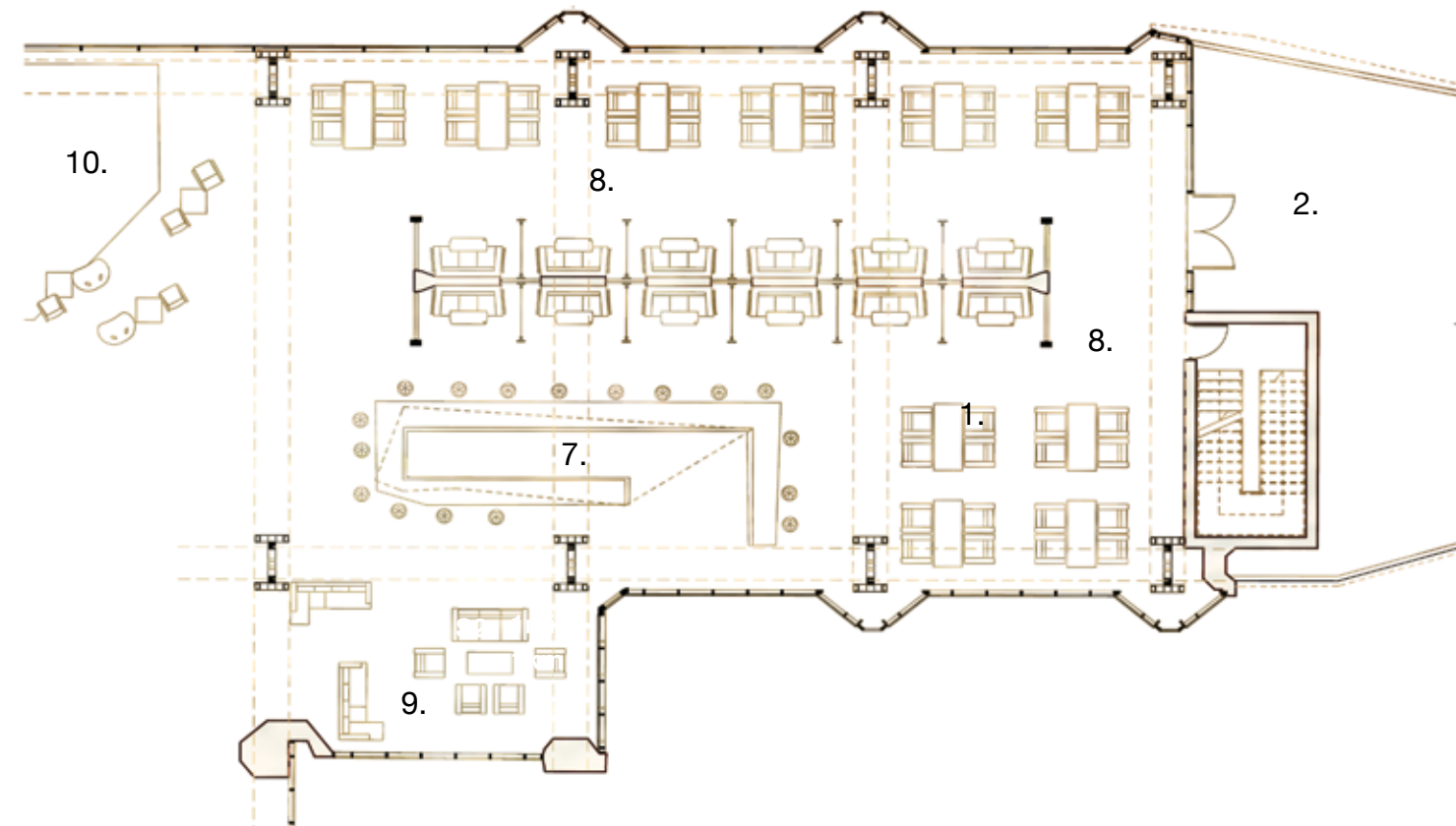
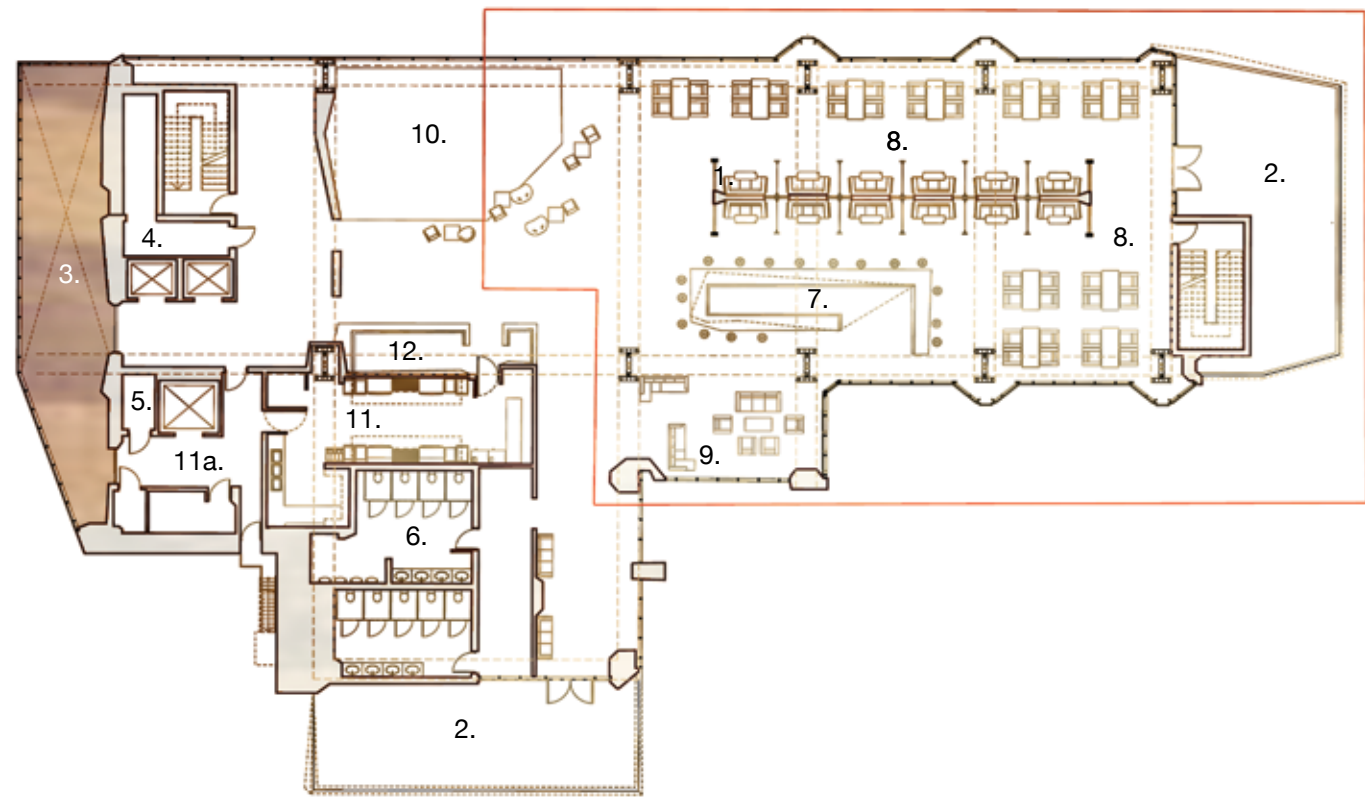




Seventh Level

- 1. Studio Spaces
- 2. Lounge Area
- 3. Atrium Space
- 4. Mechanical Room
- 5. Utility
- 6. Restroom
- 7. Balcony

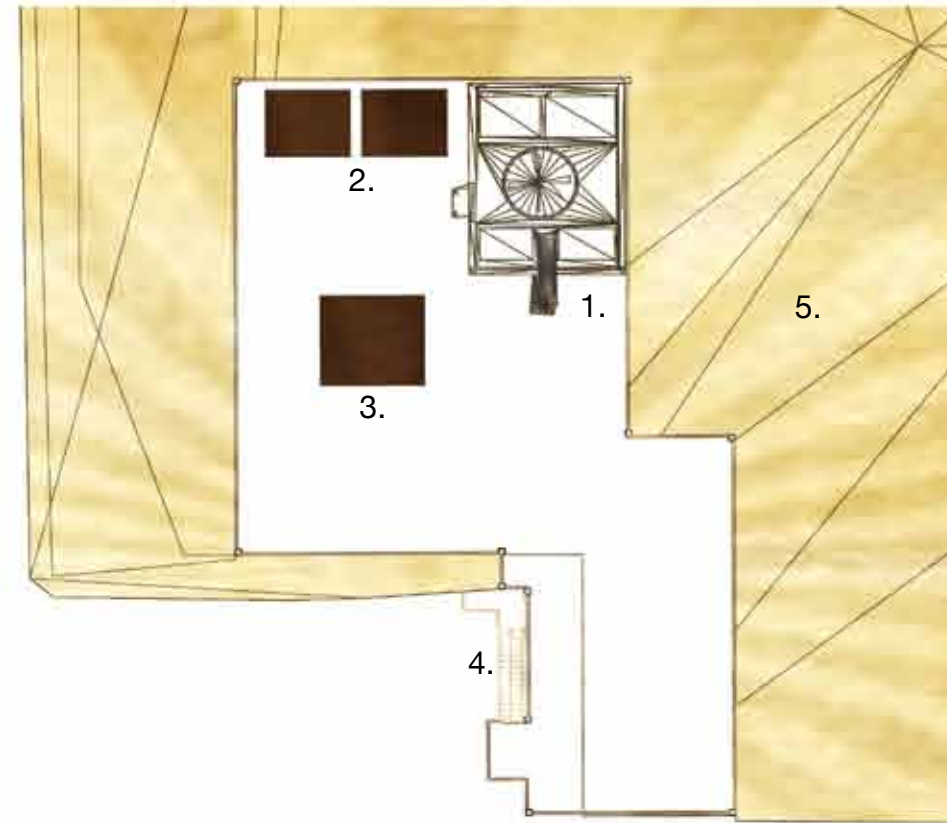
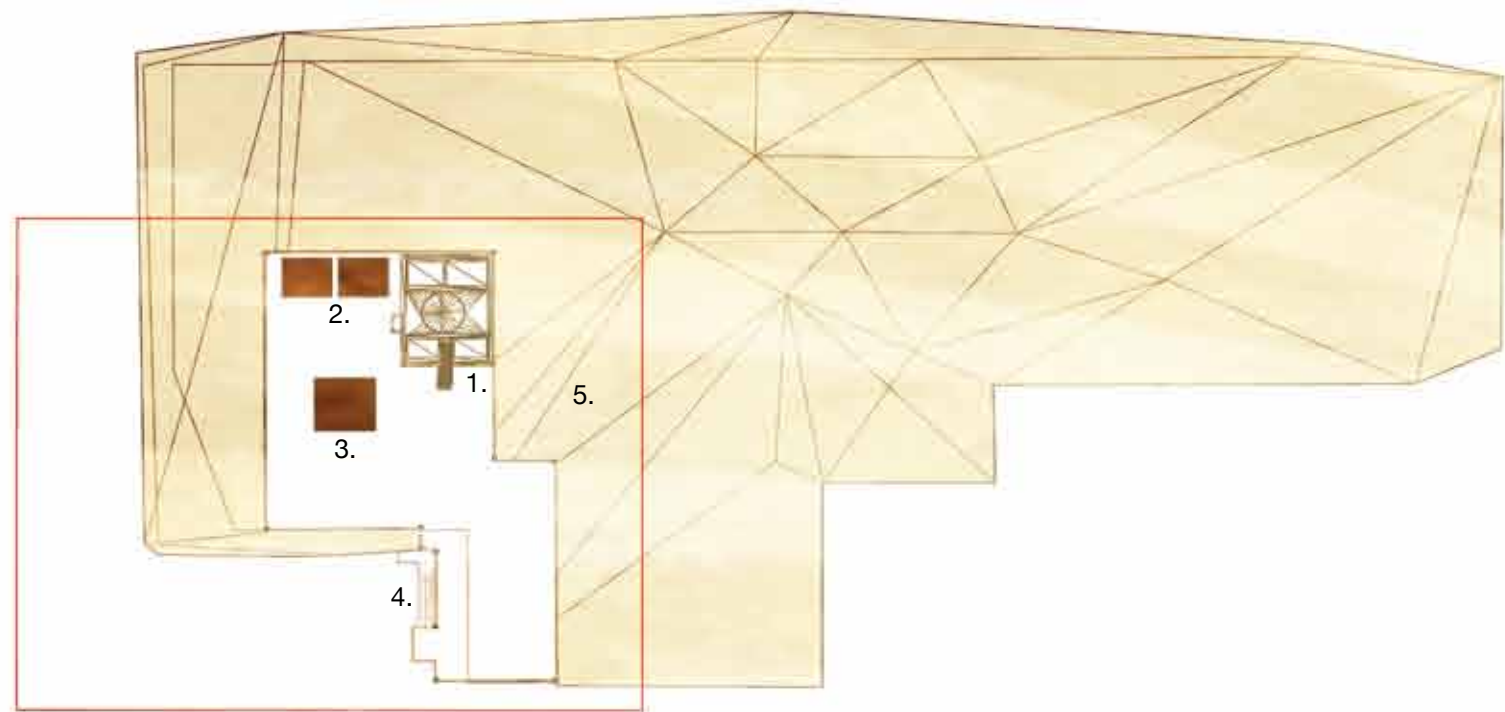




Eighth Level

- | | | |
|------------------------------------|---------------------------|----------------------------------|
| 1. Studio Spaces | 5. Utility | 10. Restaurant Performance Stage |
| 2. Balcony | 6. Restroom | 11. Kitchen |
| 3. Atrium Space
(open to below) | 7. Coffee Bar | 11a. Kitchen Service Area |
| 4. Mechanical Room | 8. Restaurant Seating | 12. Restaurant Reception Desk |
| | 9. Restaurant Lounge Area | |





Roof Level

- 1. Roof Top Water Chiller
- 2. Elevator Penthouse
- 3. Cargo Elevator Penthouse
- 4. Roof Access Stair
- 5. Roof Skin





Perspective Render No. 3



Perspective Render No. 4



North Elevation



South Elevation



East Elevation



West Elevation



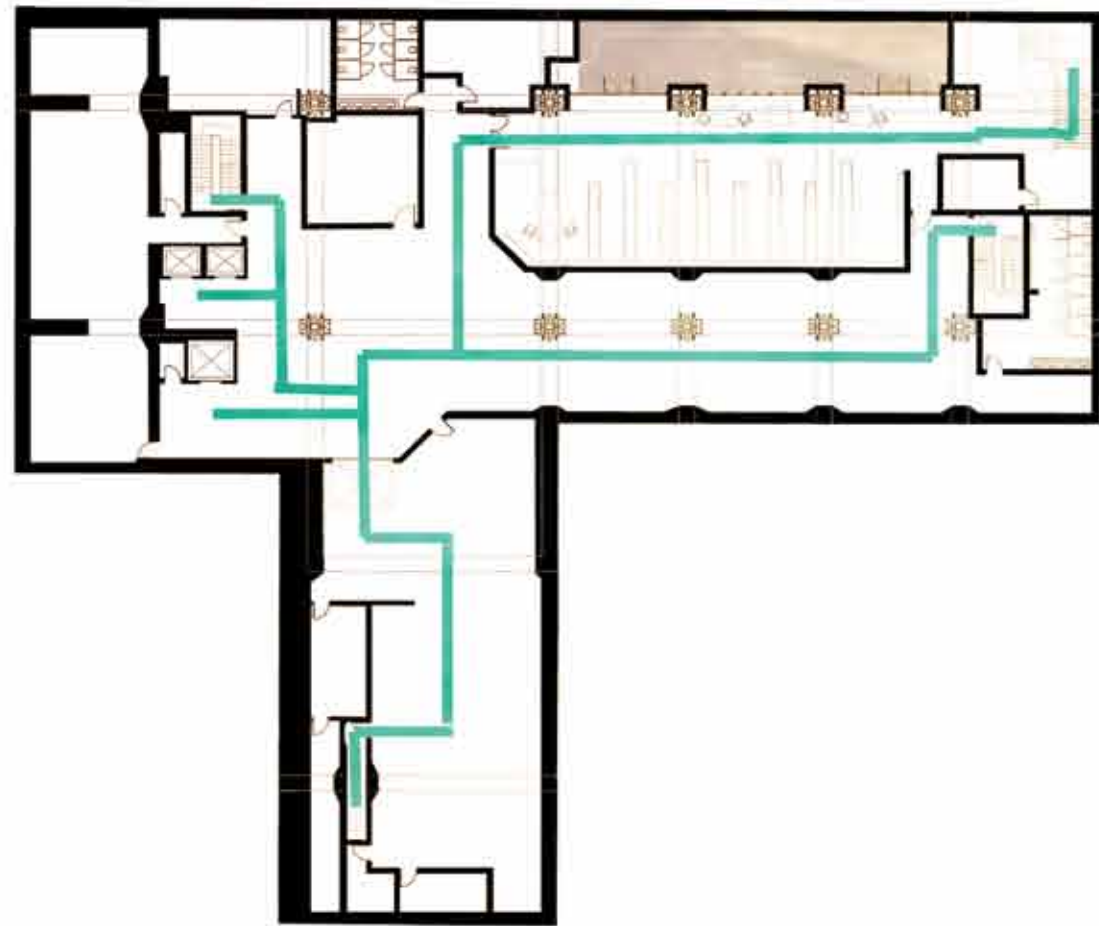
Perspective Render No. 5

“Every time a student walks past a really urgent, expressive piece of architecture that belongs to his college, it can help reassure him that he does have that mind, does have that soul.”

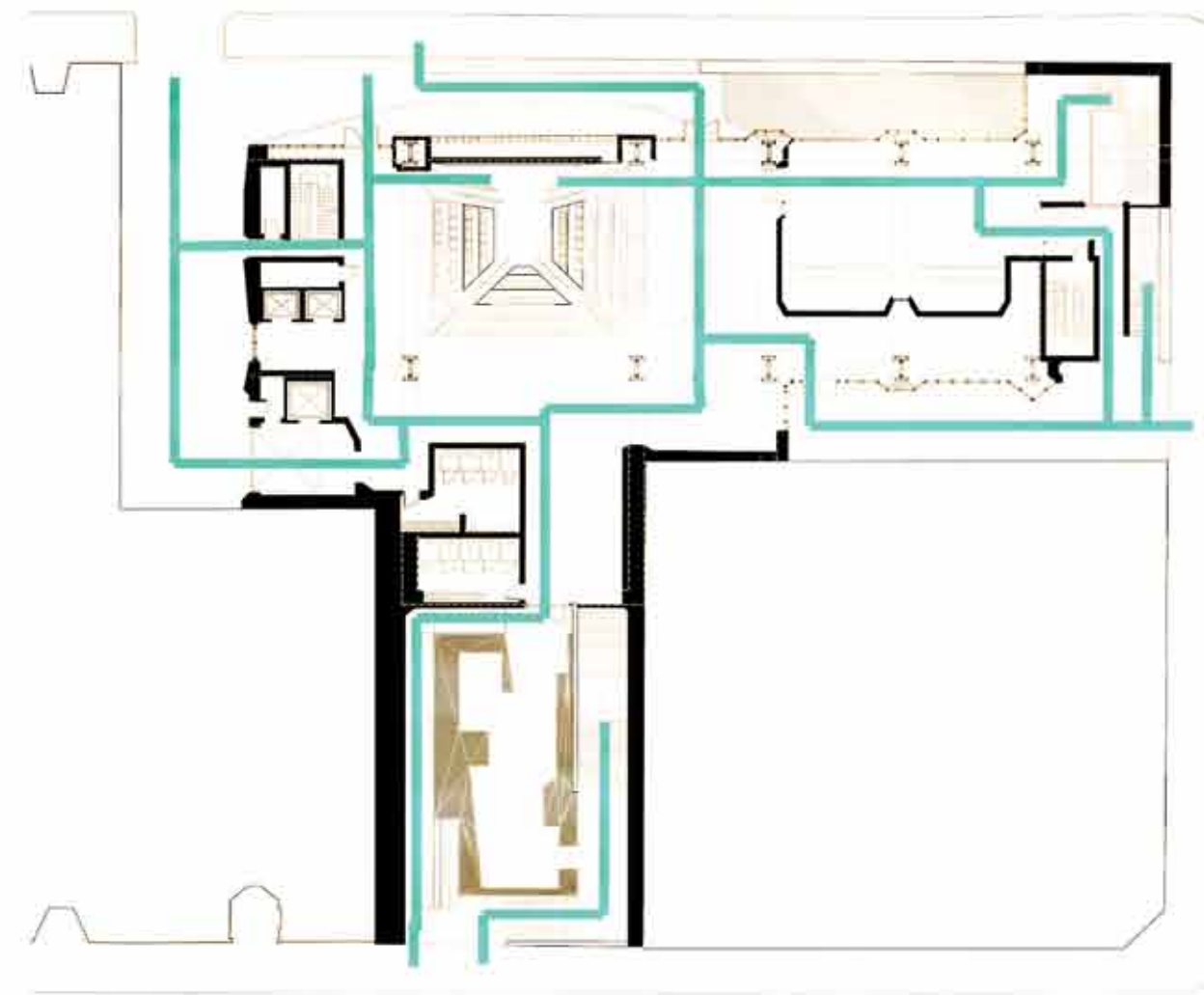
-Louis Kahn

“You can't really say what is beautiful about a place, but the image of the place will remain vividly with you.”

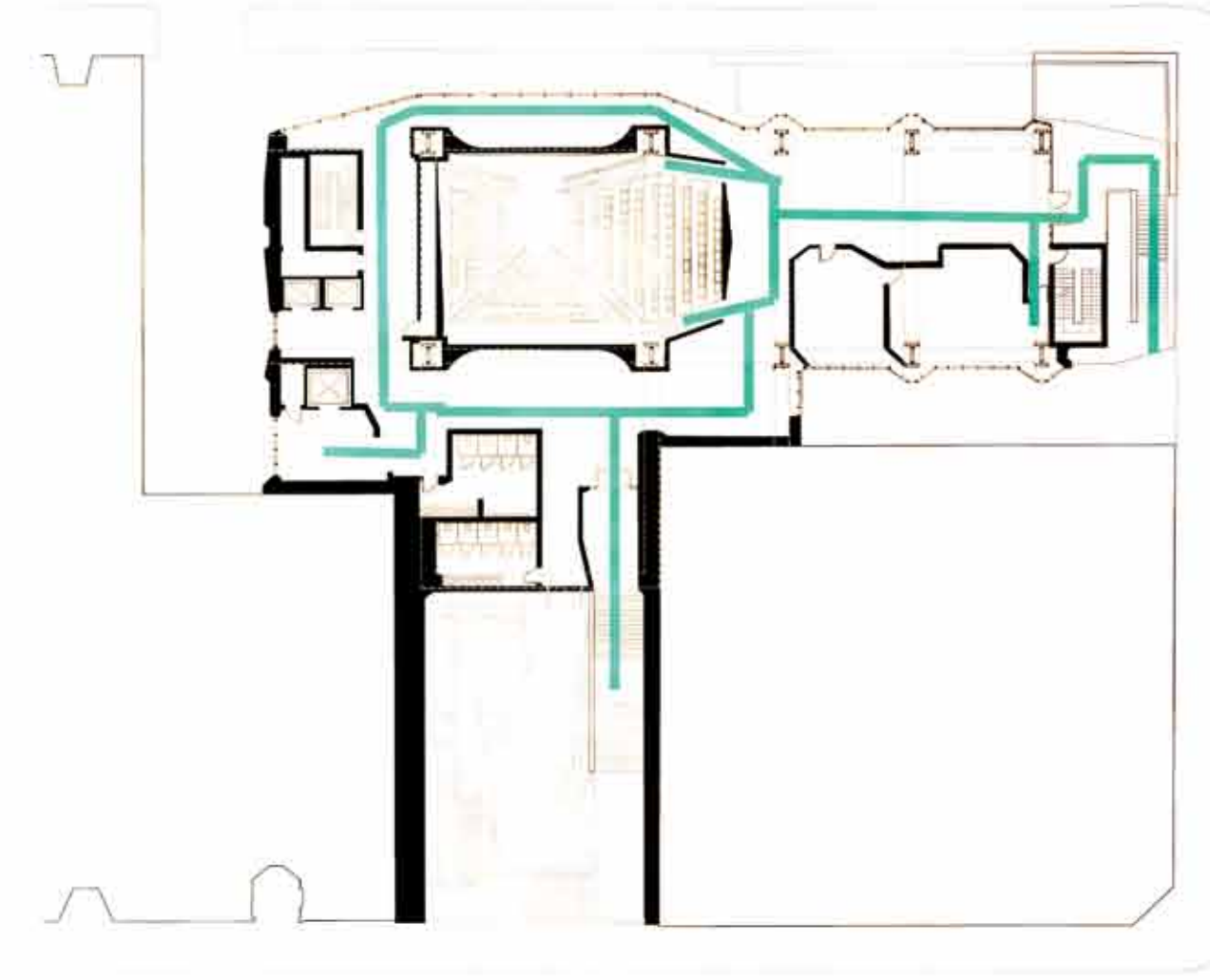
-Tadao Ando



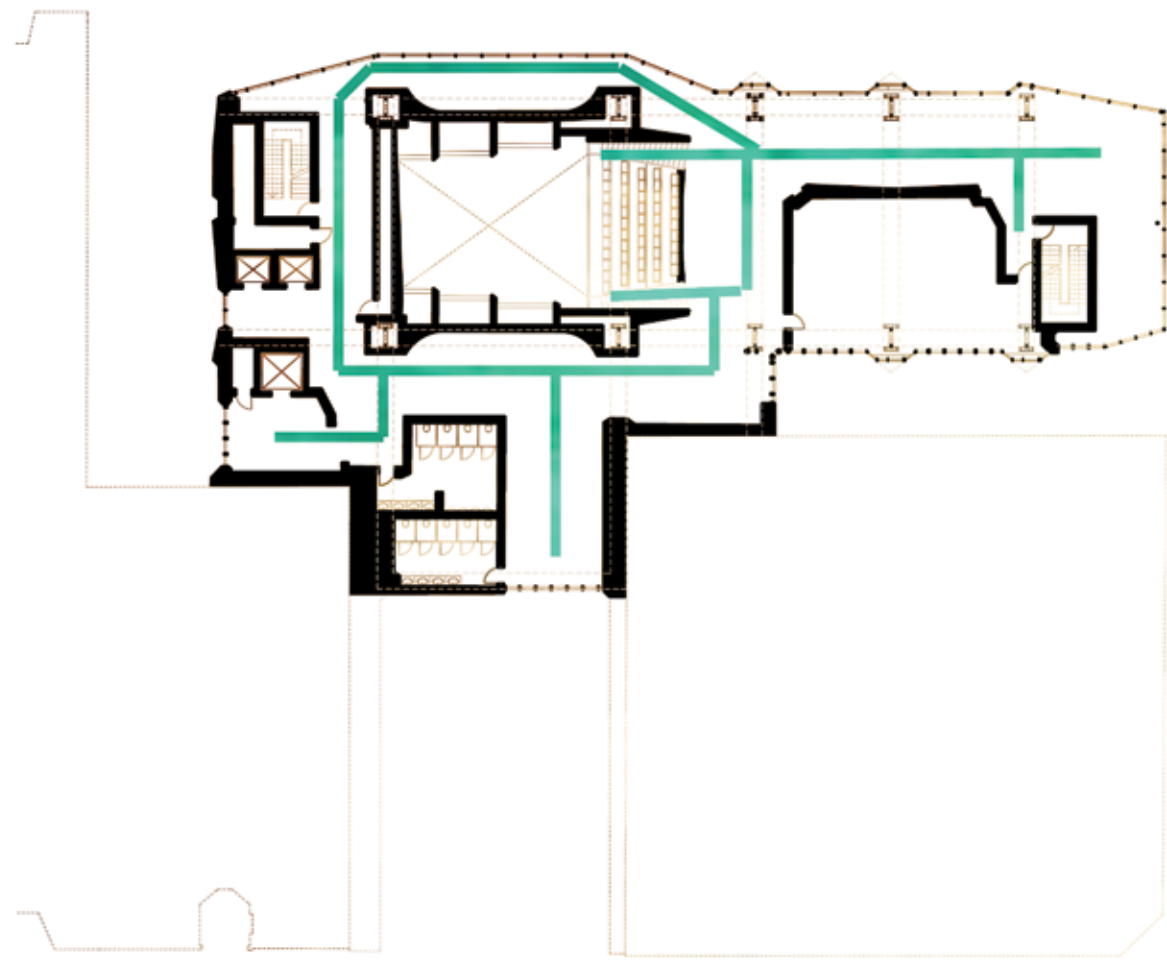
Basement Level



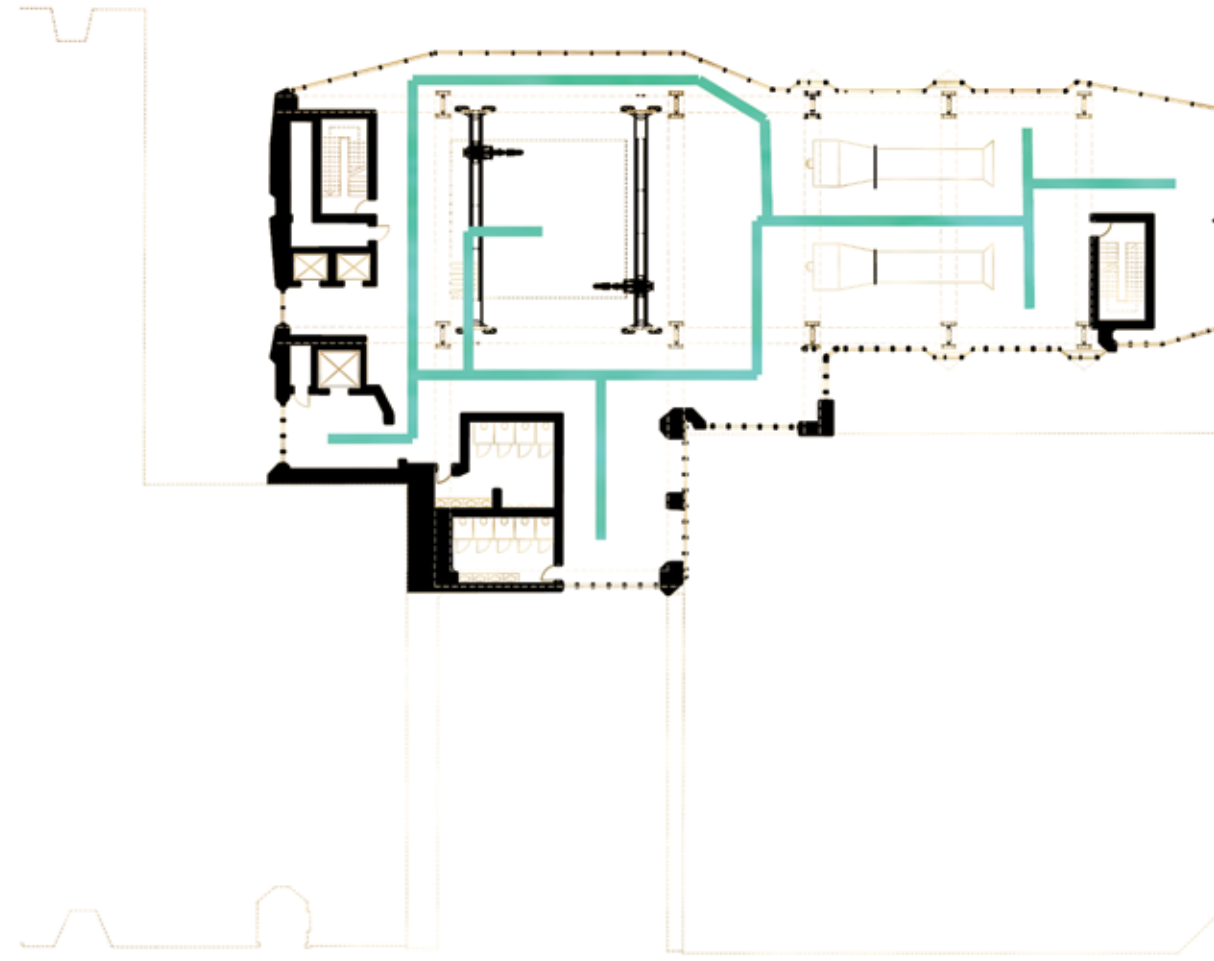
Ground Level



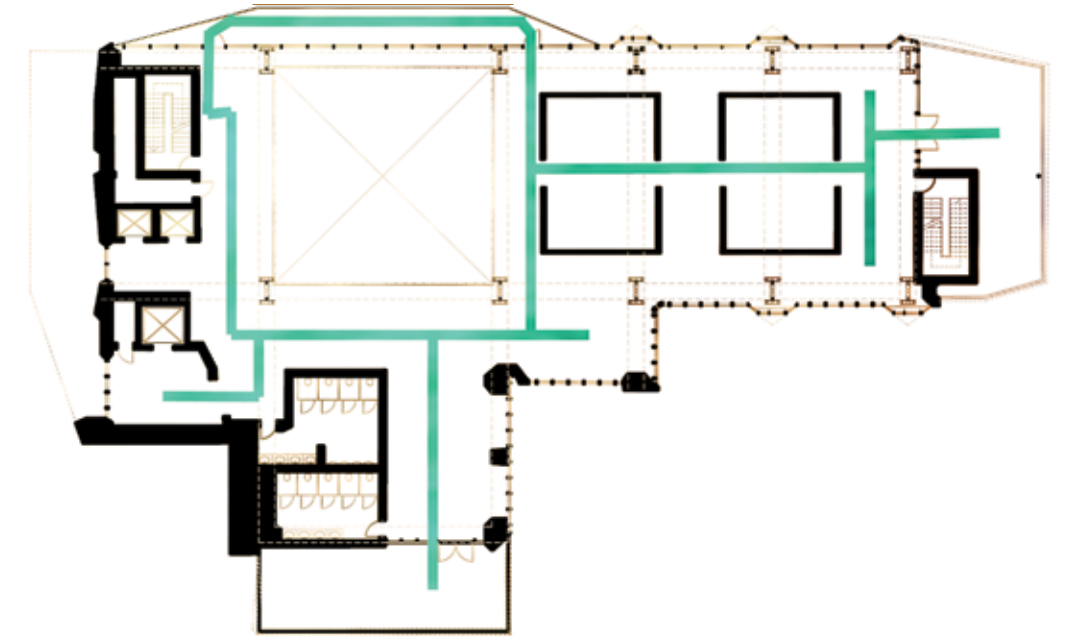
Second Level



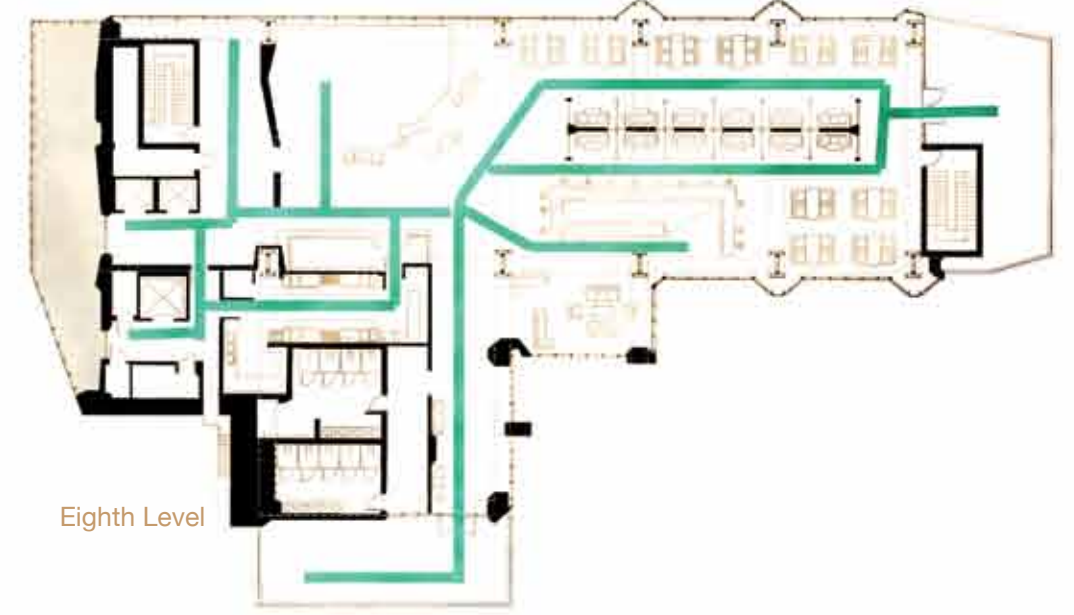
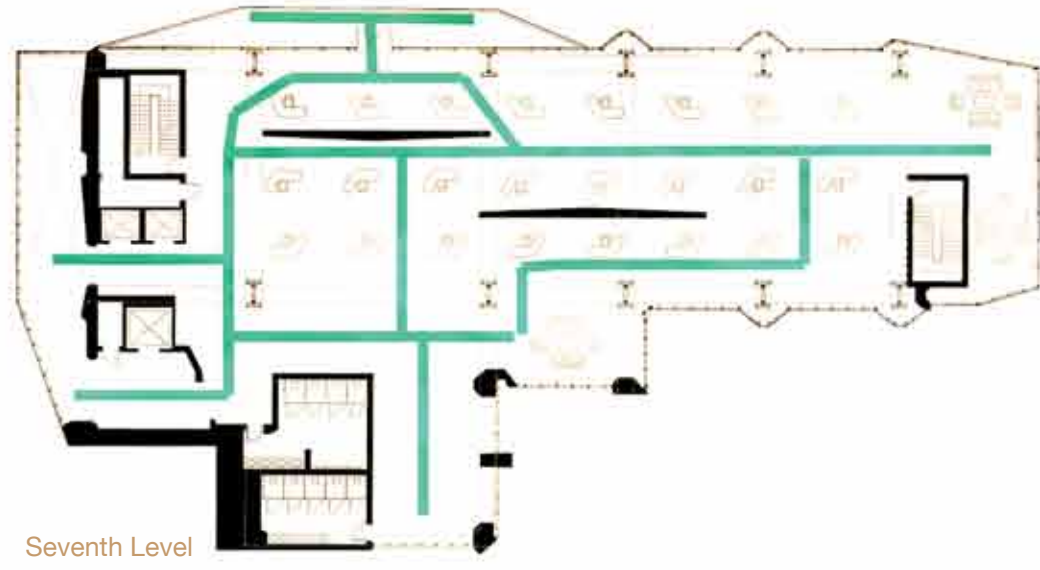
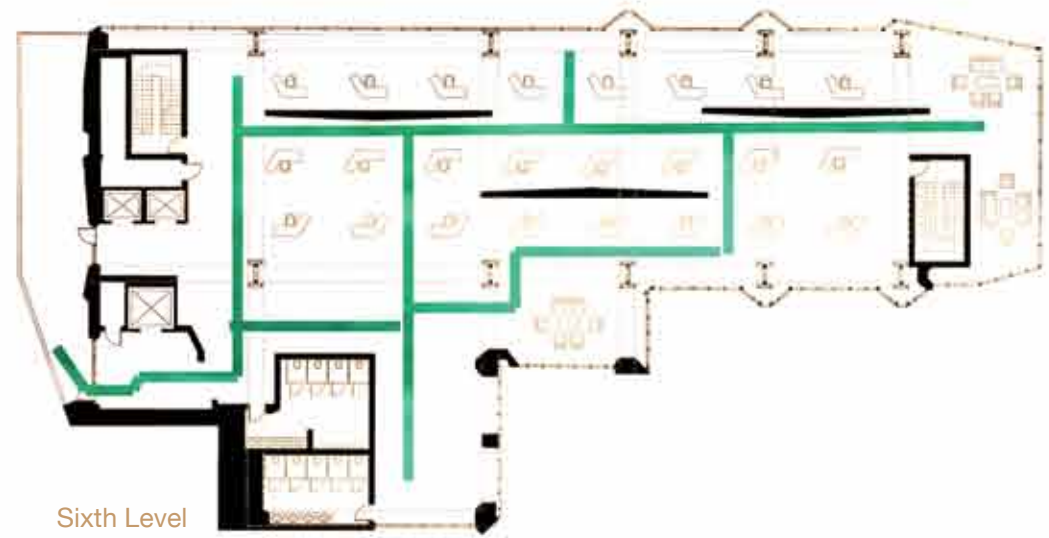
Third Level

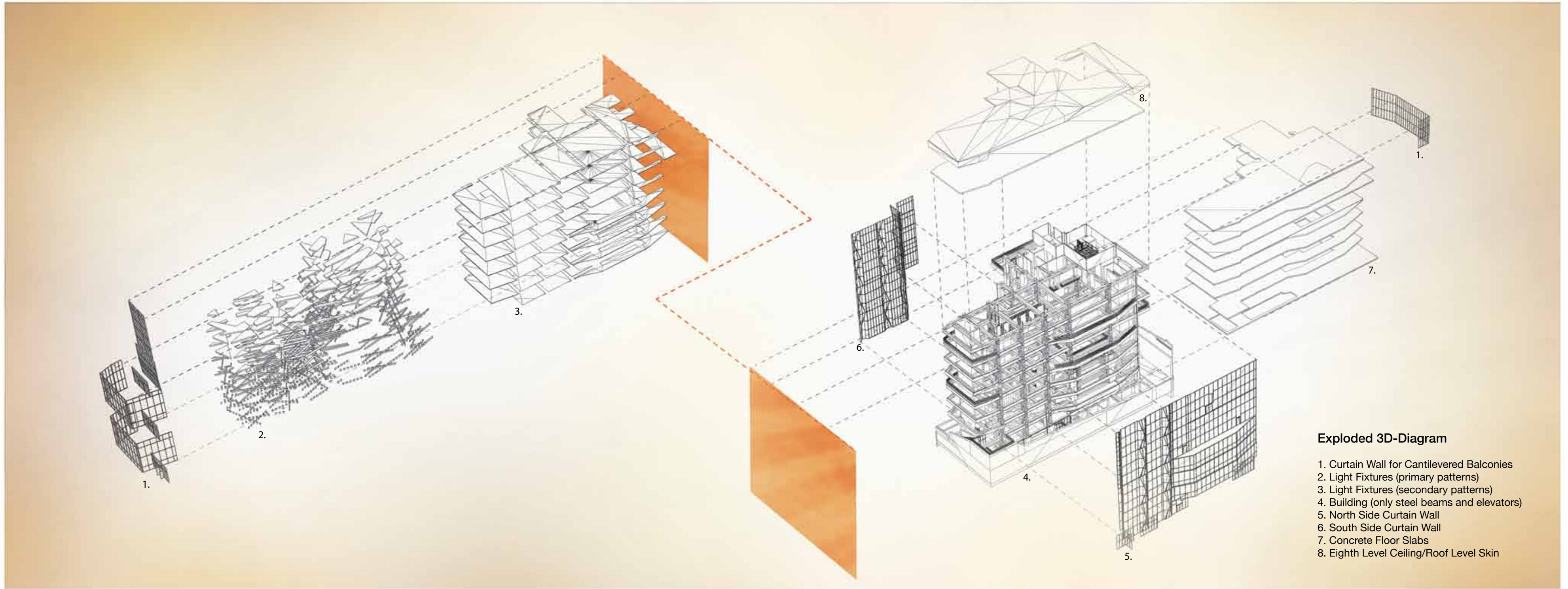


Fourth Level



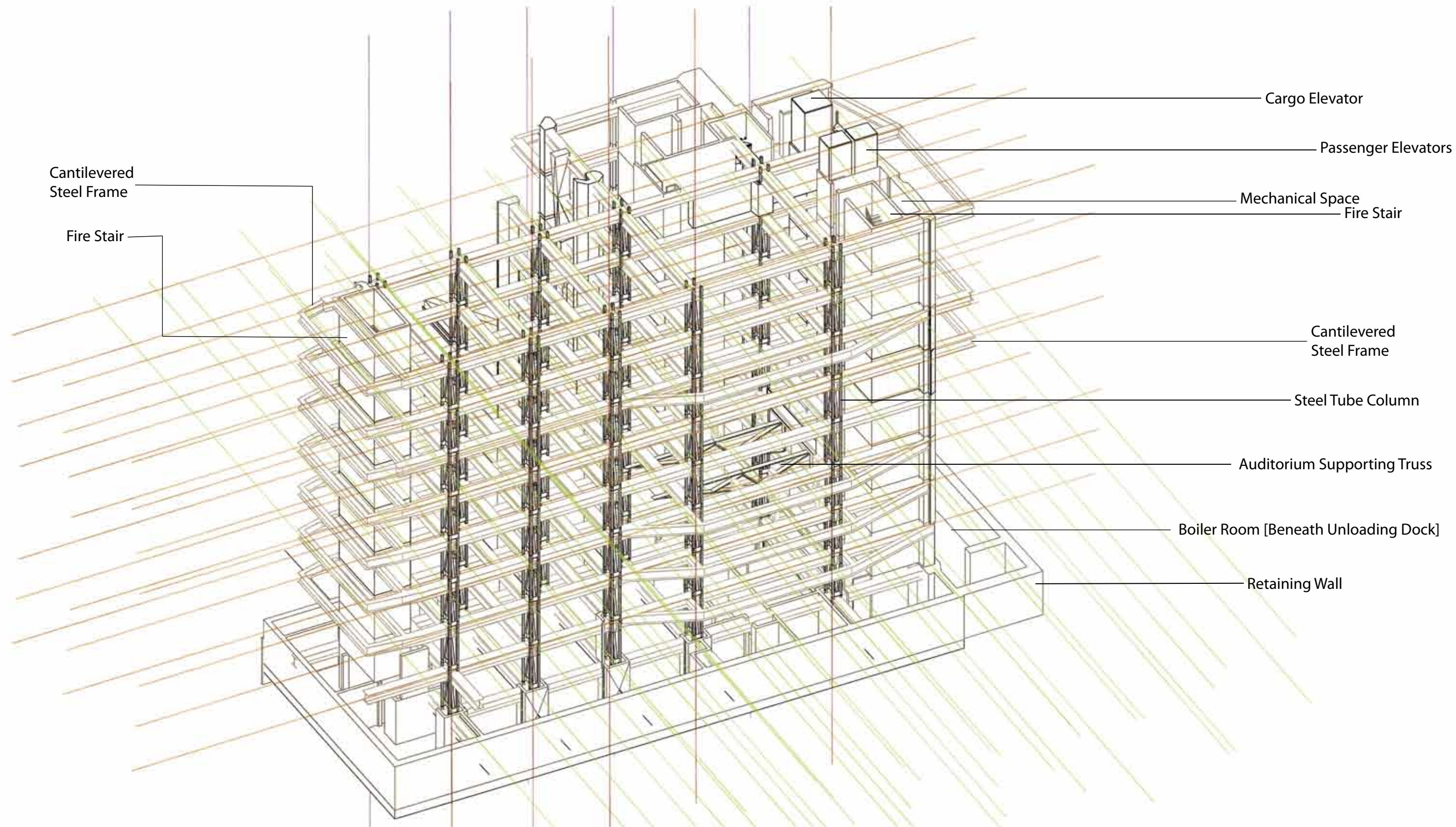
Fifth Level

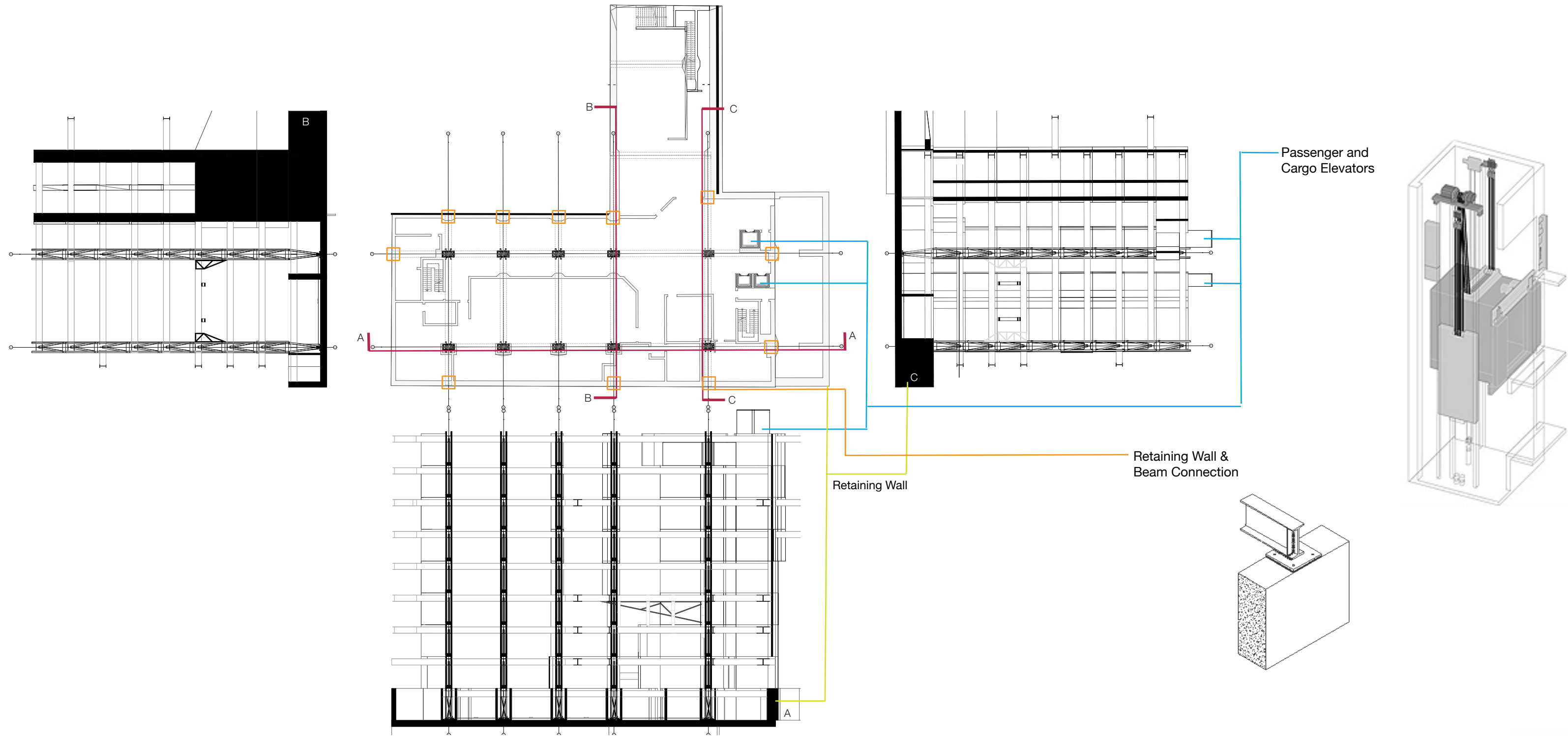


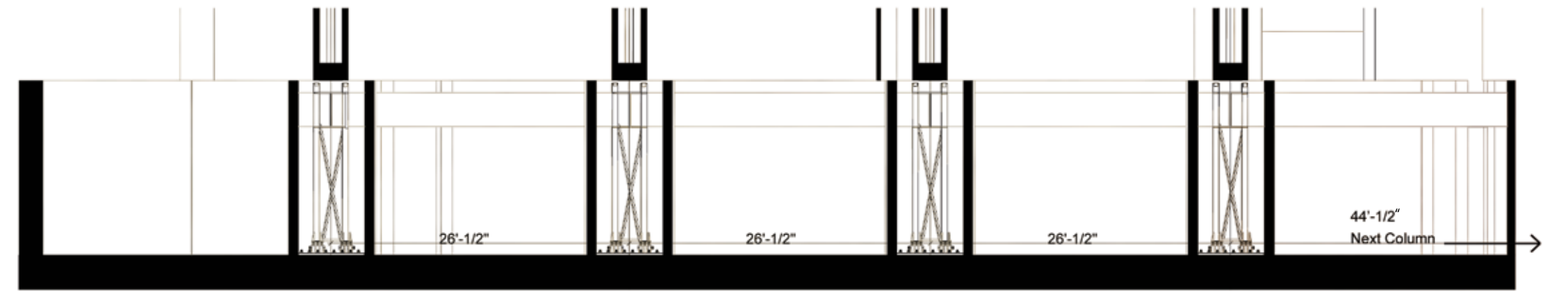
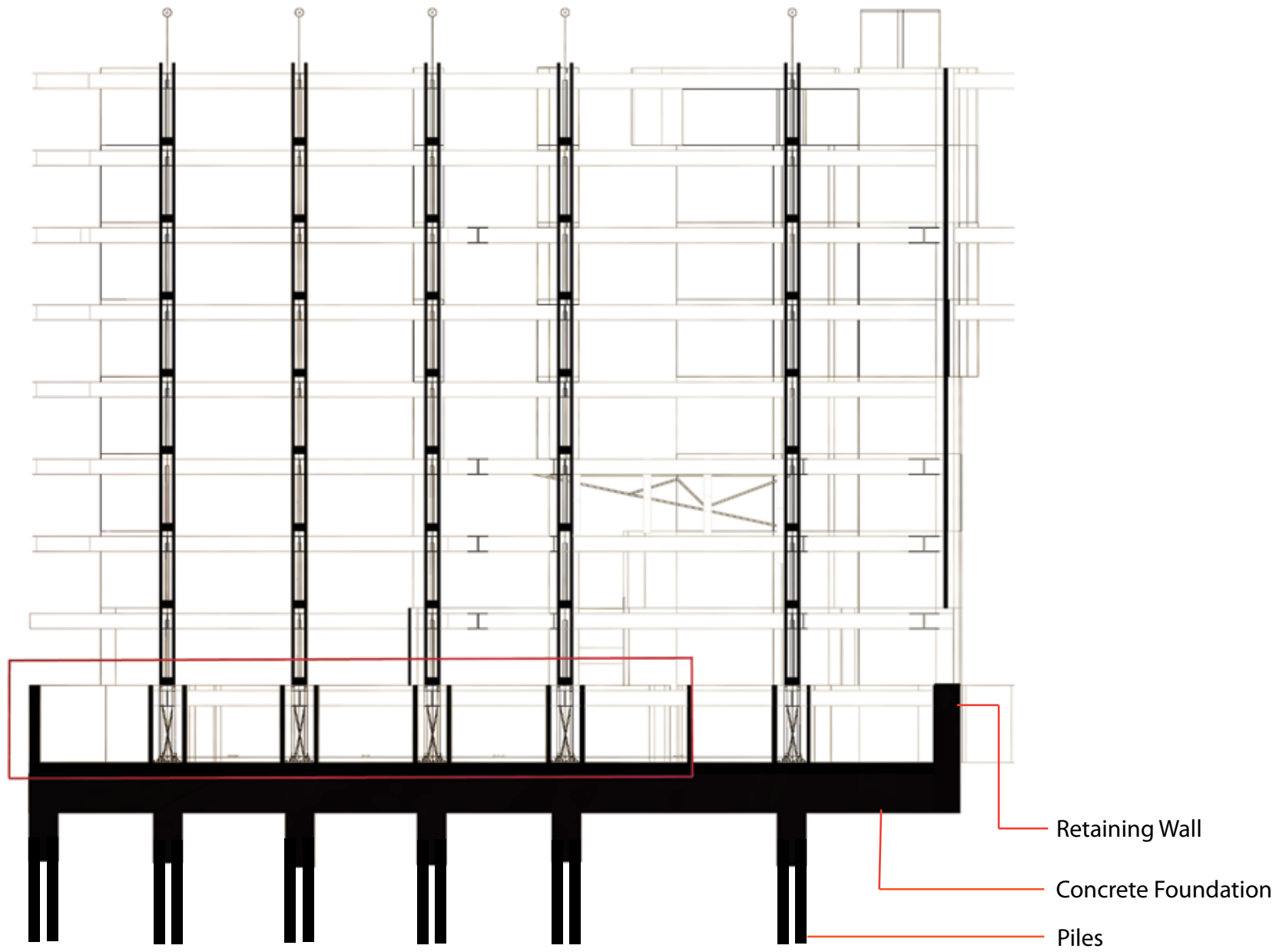


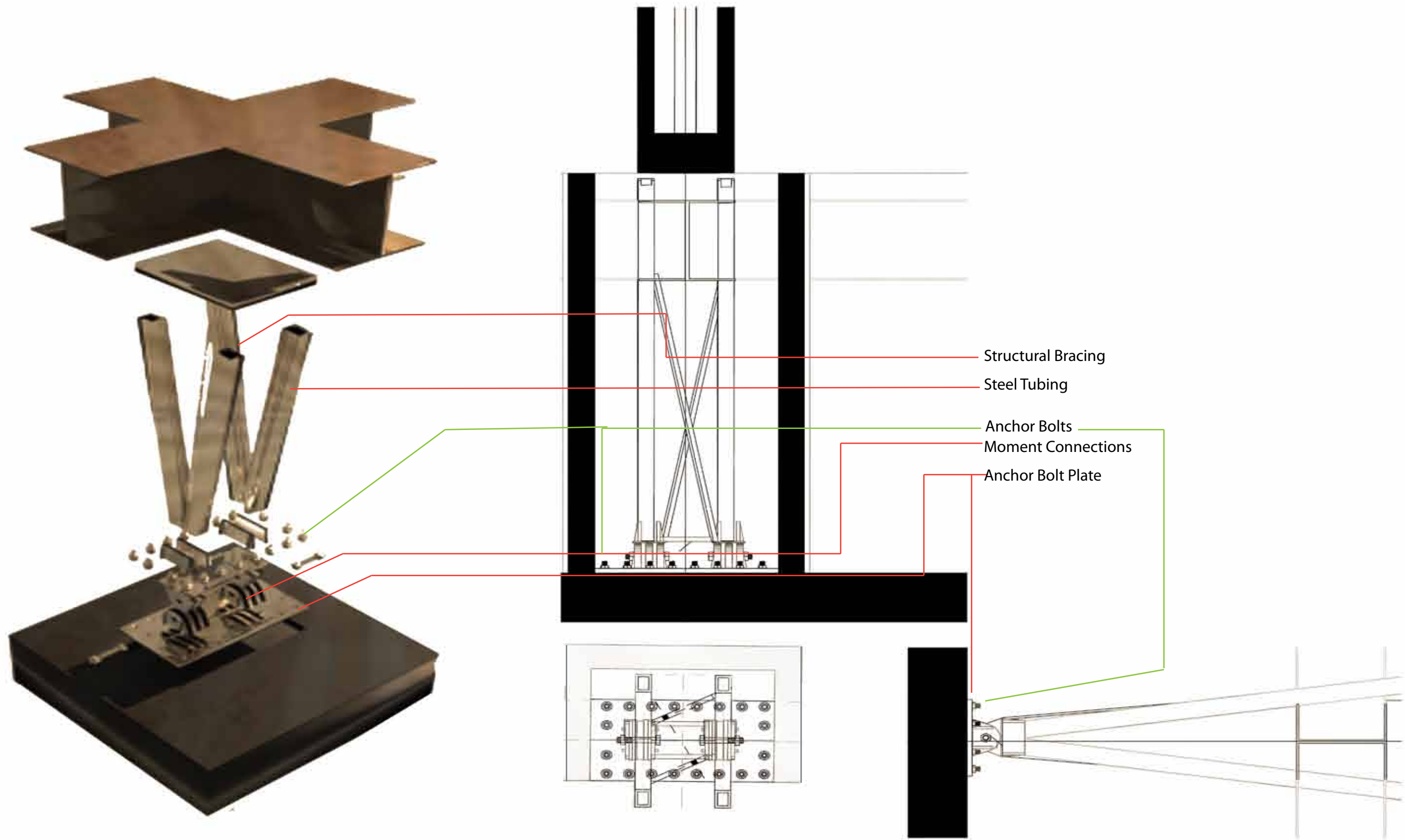
Exploded 3D-Diagram

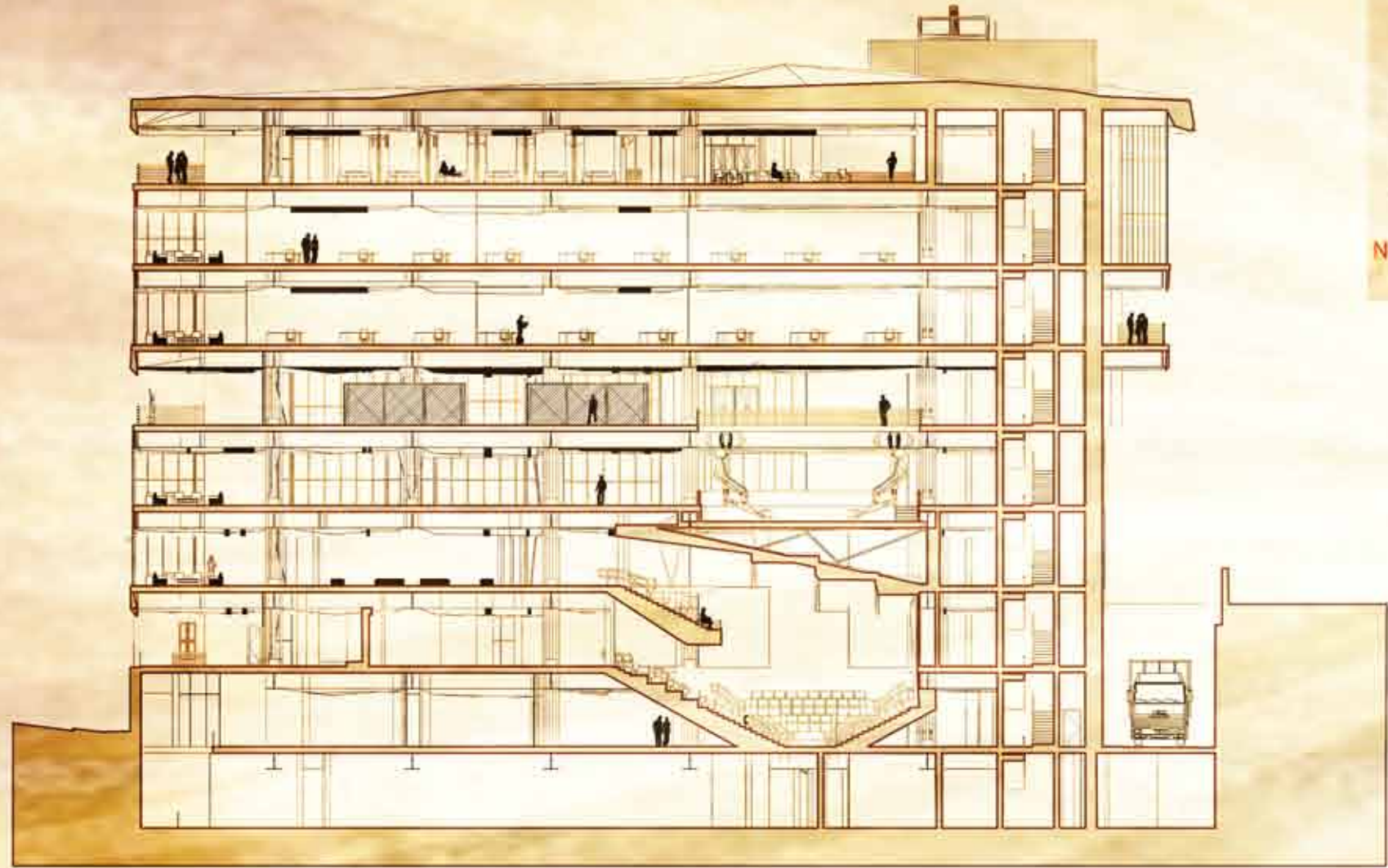
- 1. Curtain Wall for Cantilevered Balconies
- 2. Light Fixtures (primary patterns)
- 3. Light Fixtures (secondary patterns)
- 4. Building (only steel beams and elevators)
- 5. North Side Curtain Wall
- 6. South Side Curtain Wall
- 7. Concrete Floor Slabs
- 8. Eighth Level Ceiling/Roof Level Skin



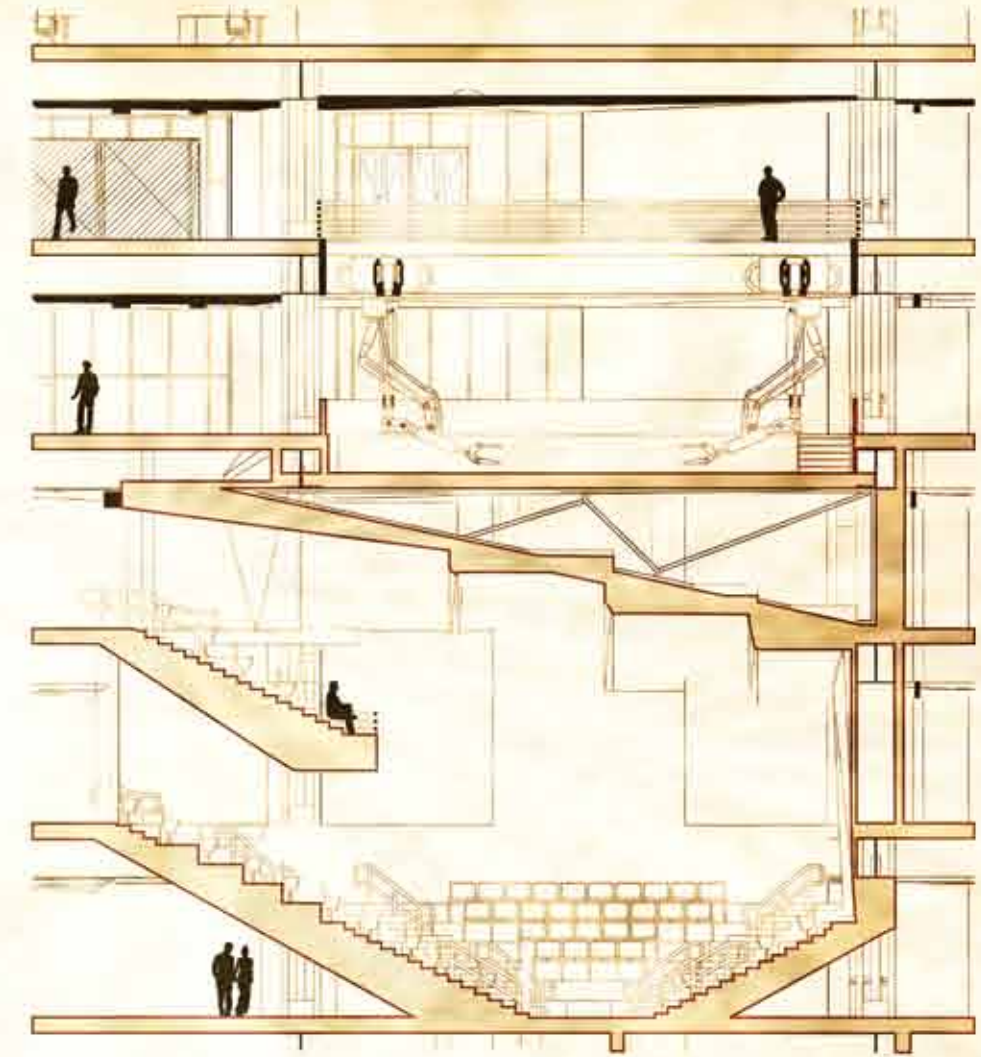






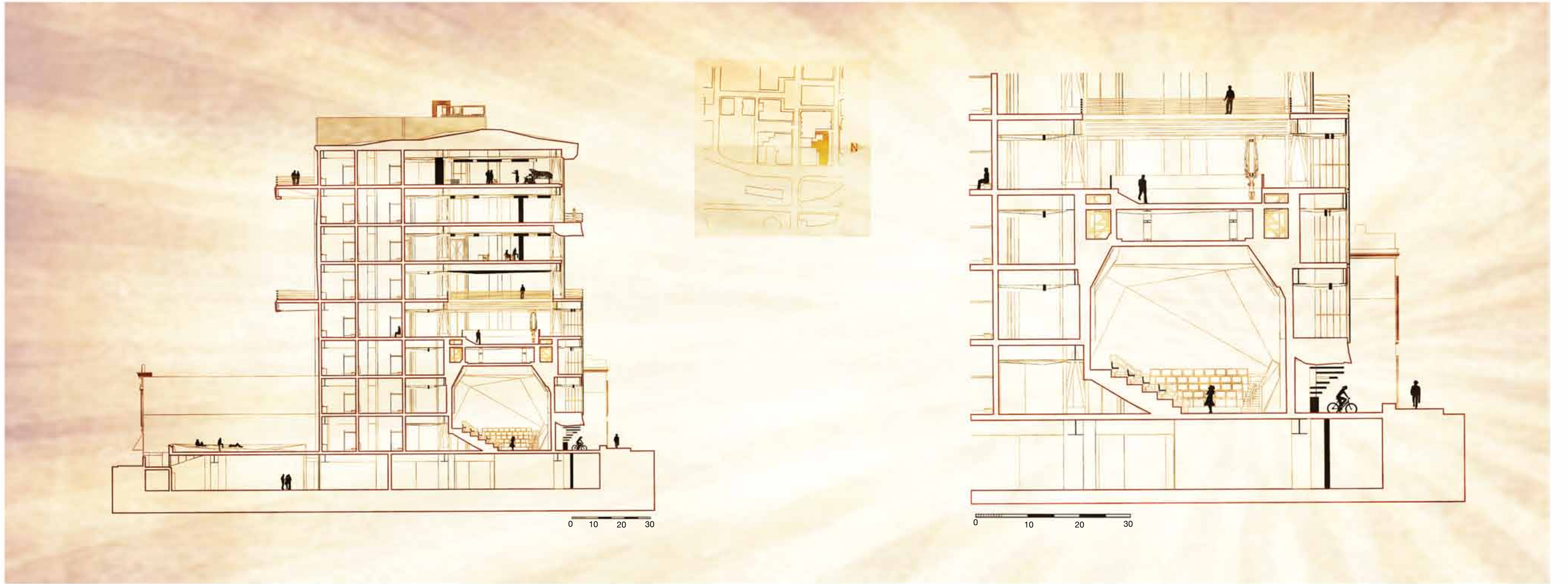


0 10 20 30

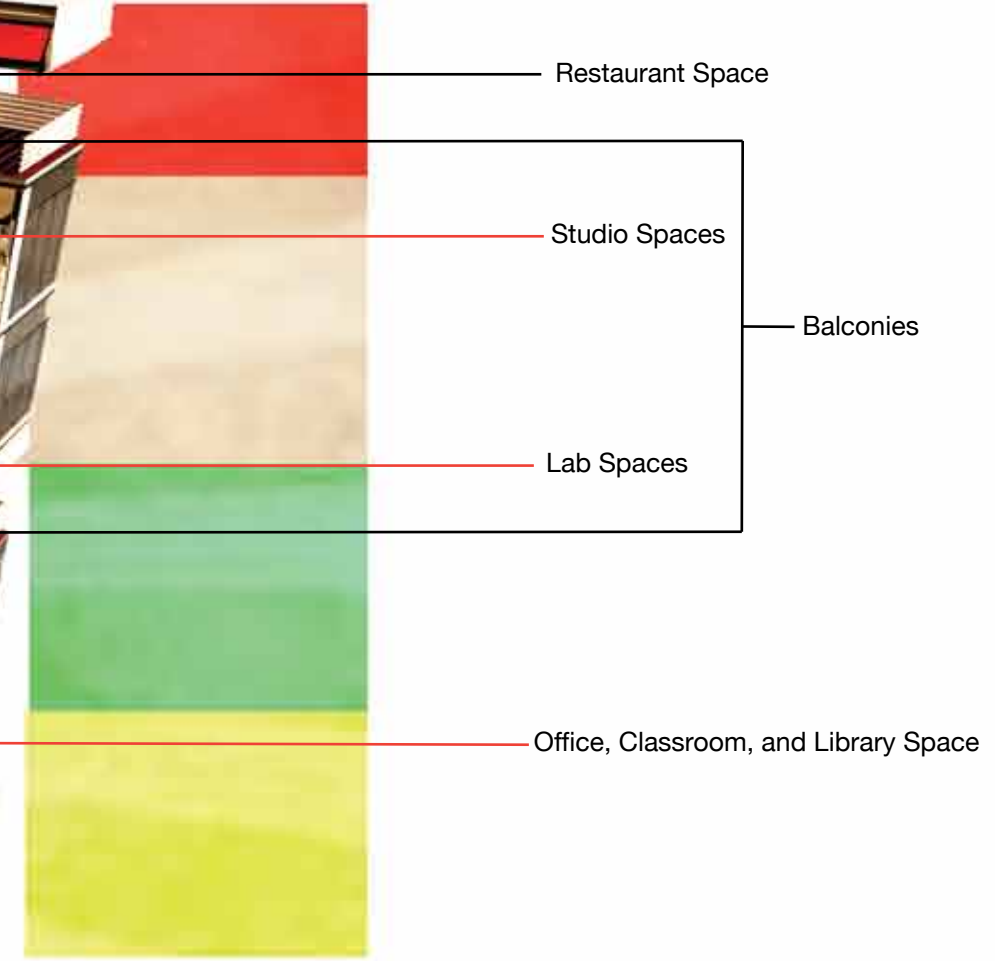
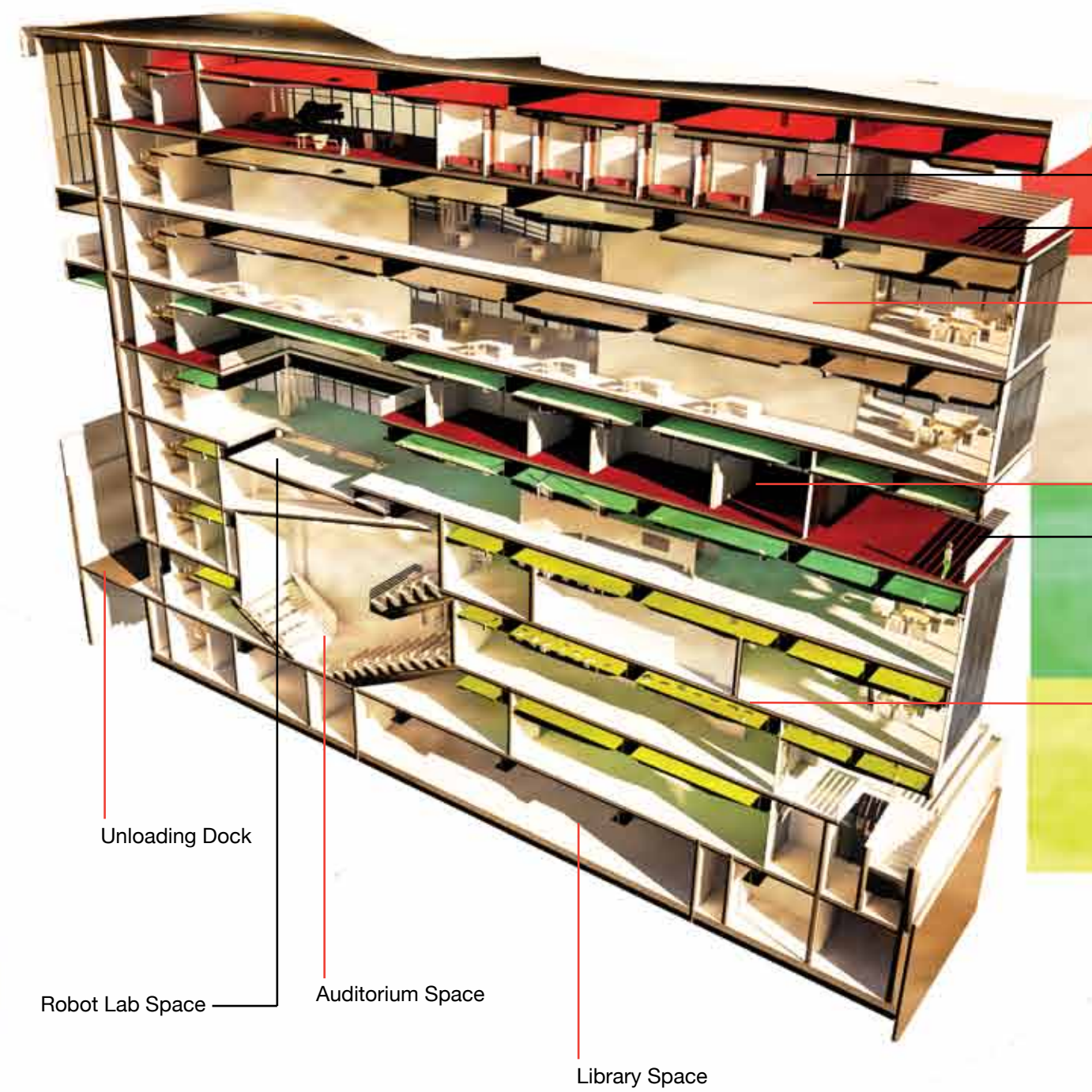
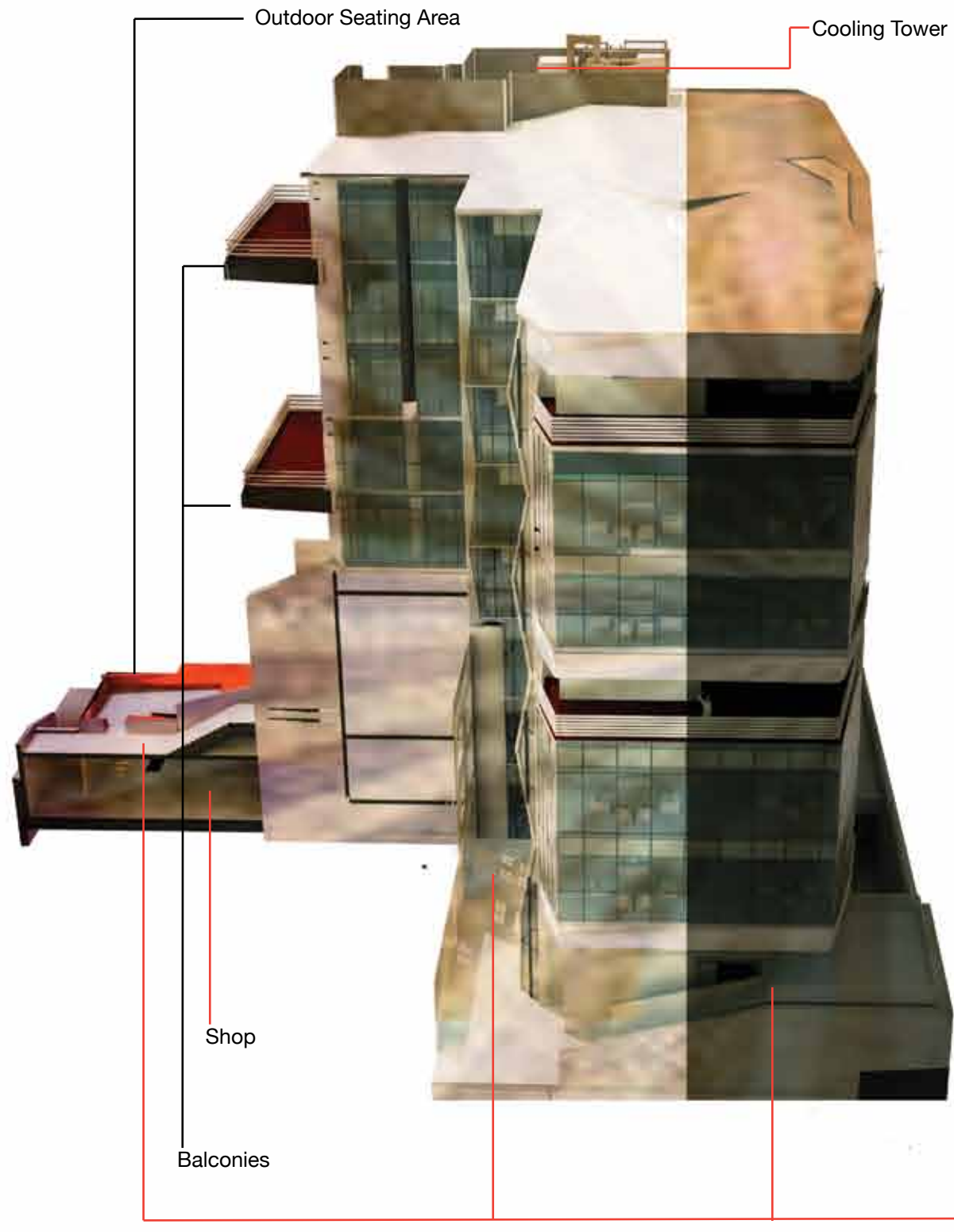


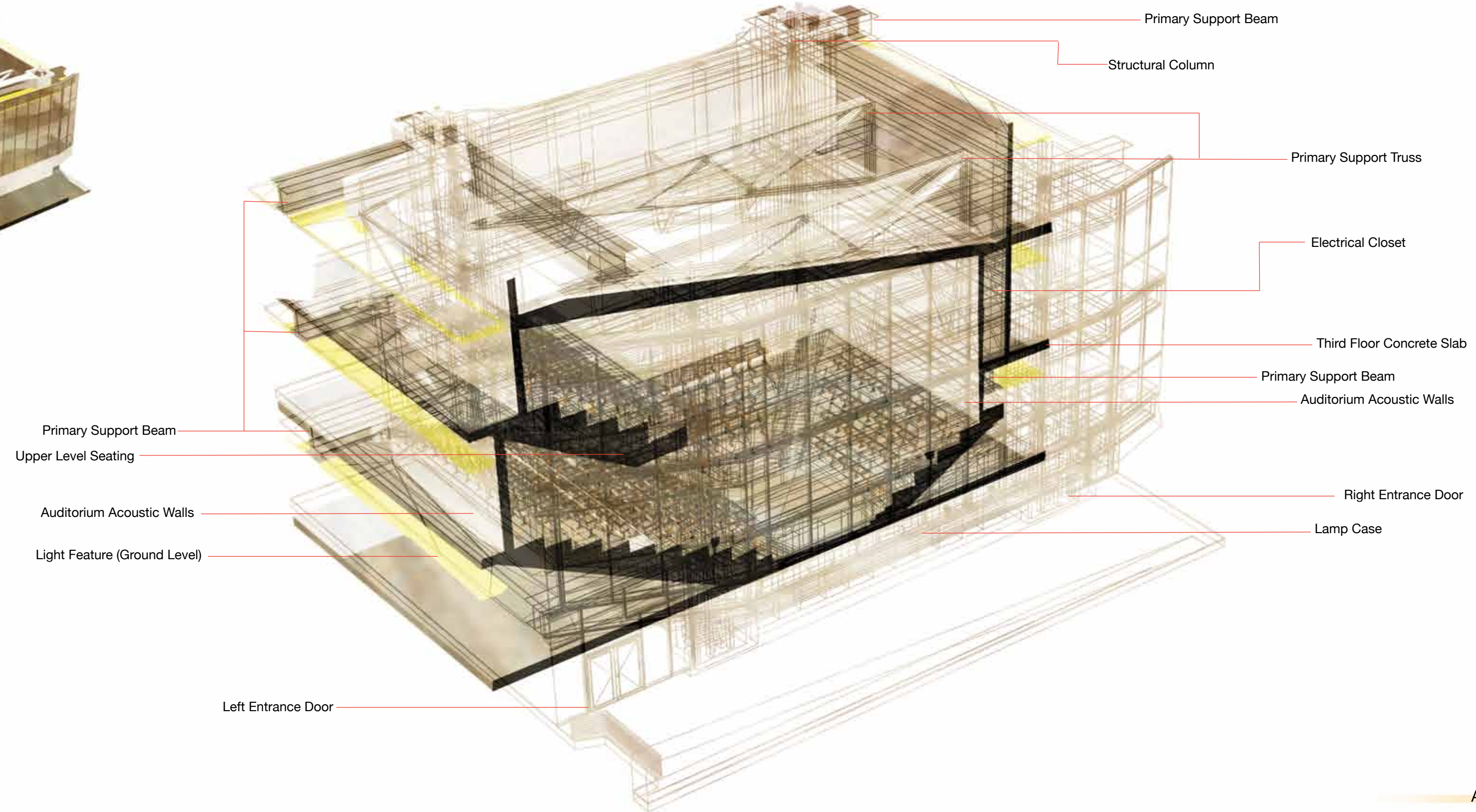
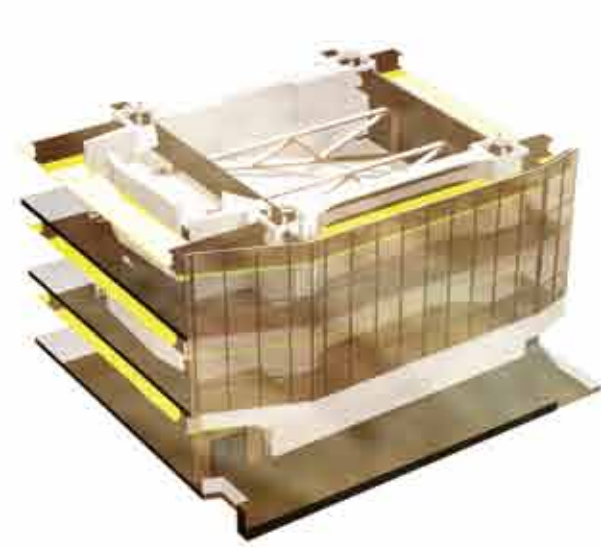
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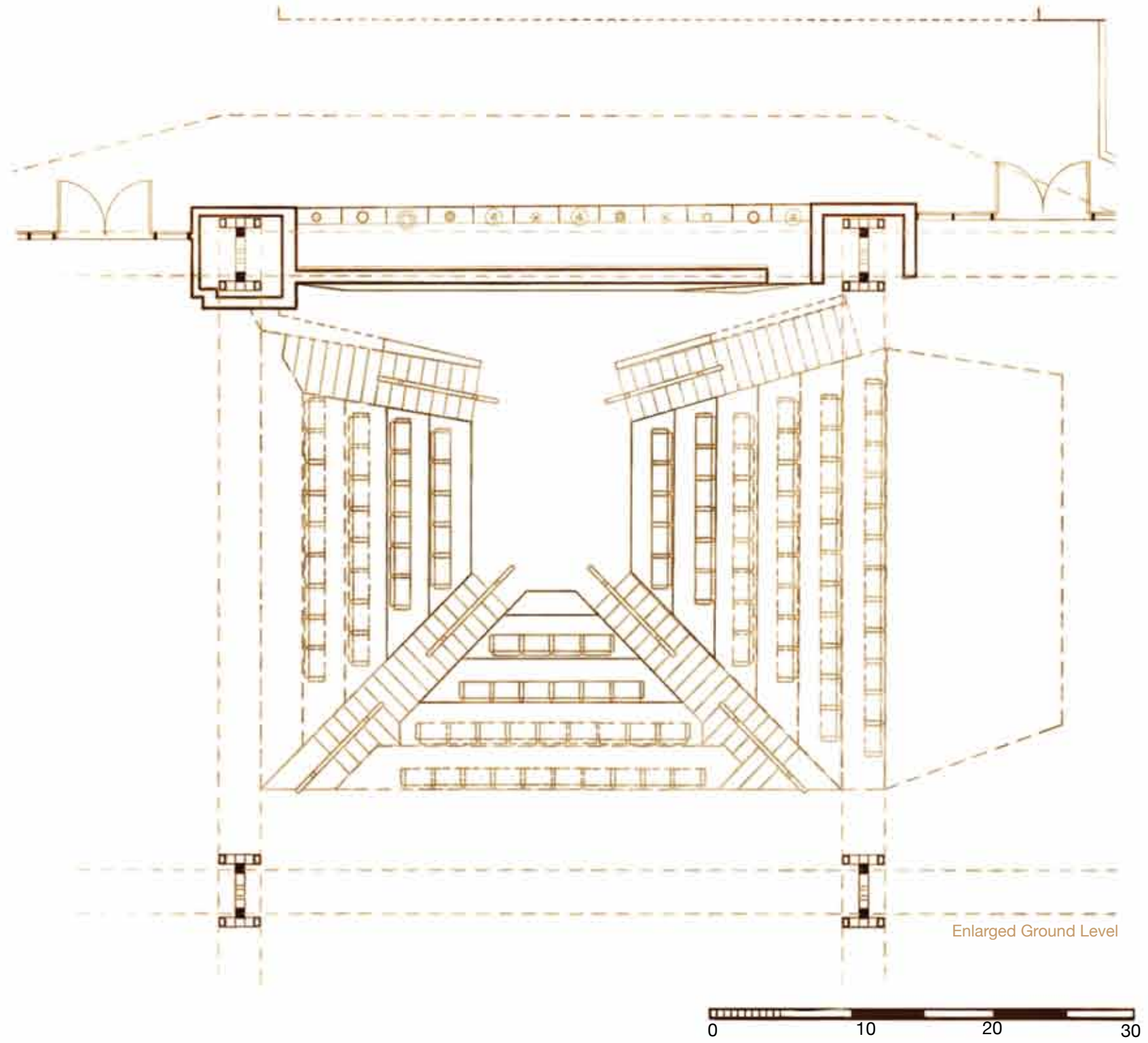
Longitudinal Section No. 1



Longitudinal Section No. 2



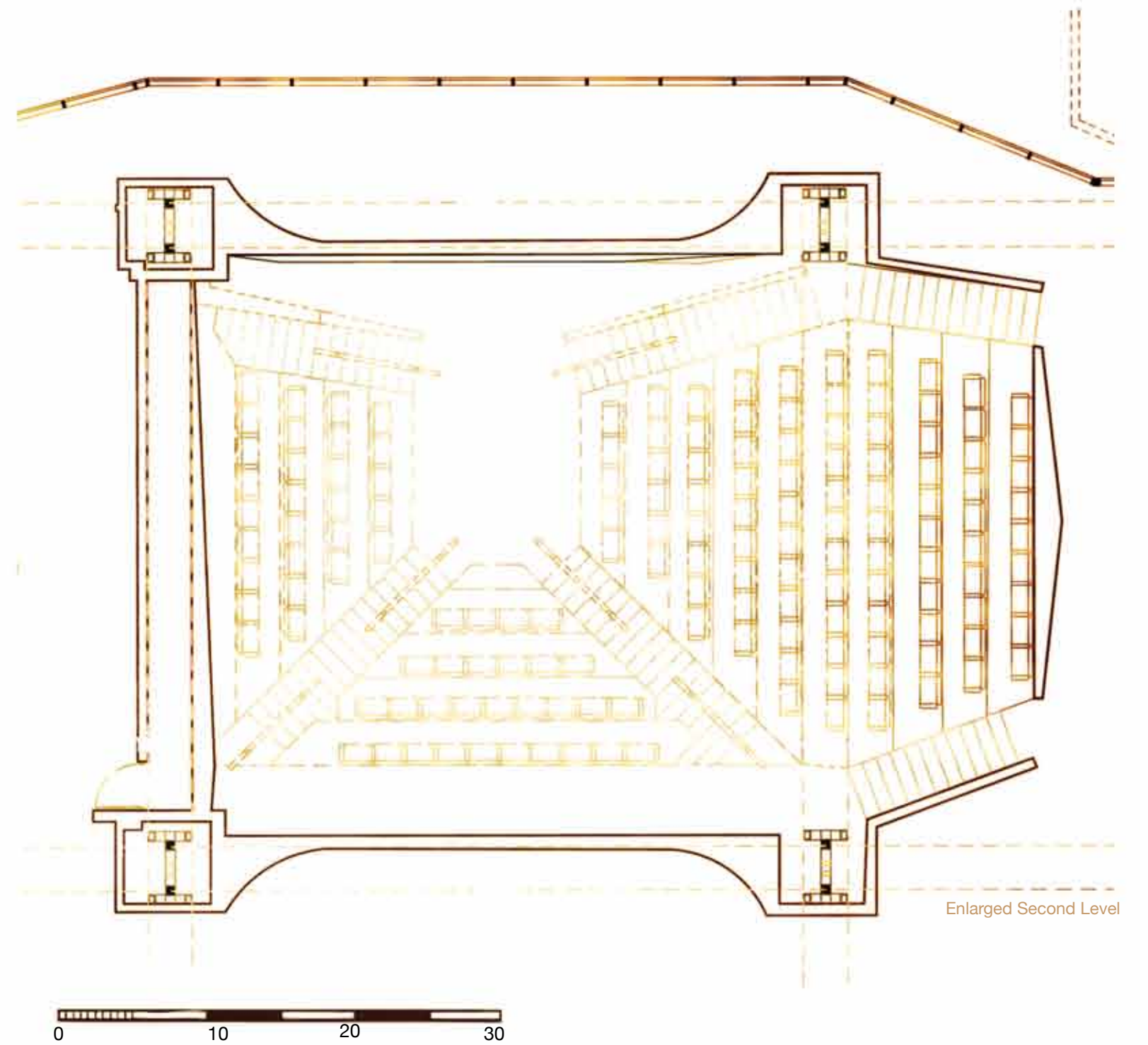




Interior Perspective No. 1

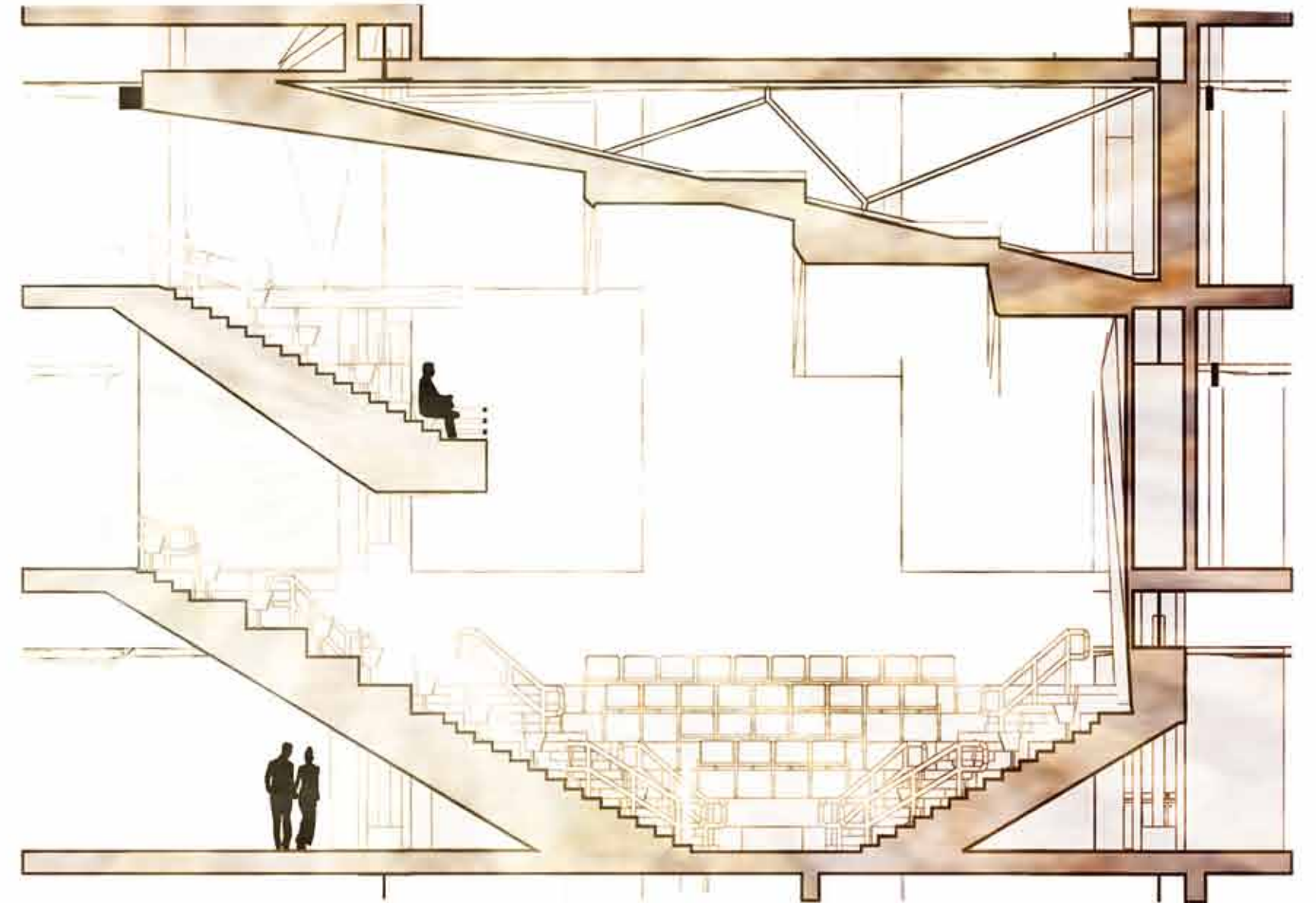


Interior Perspective No. 2





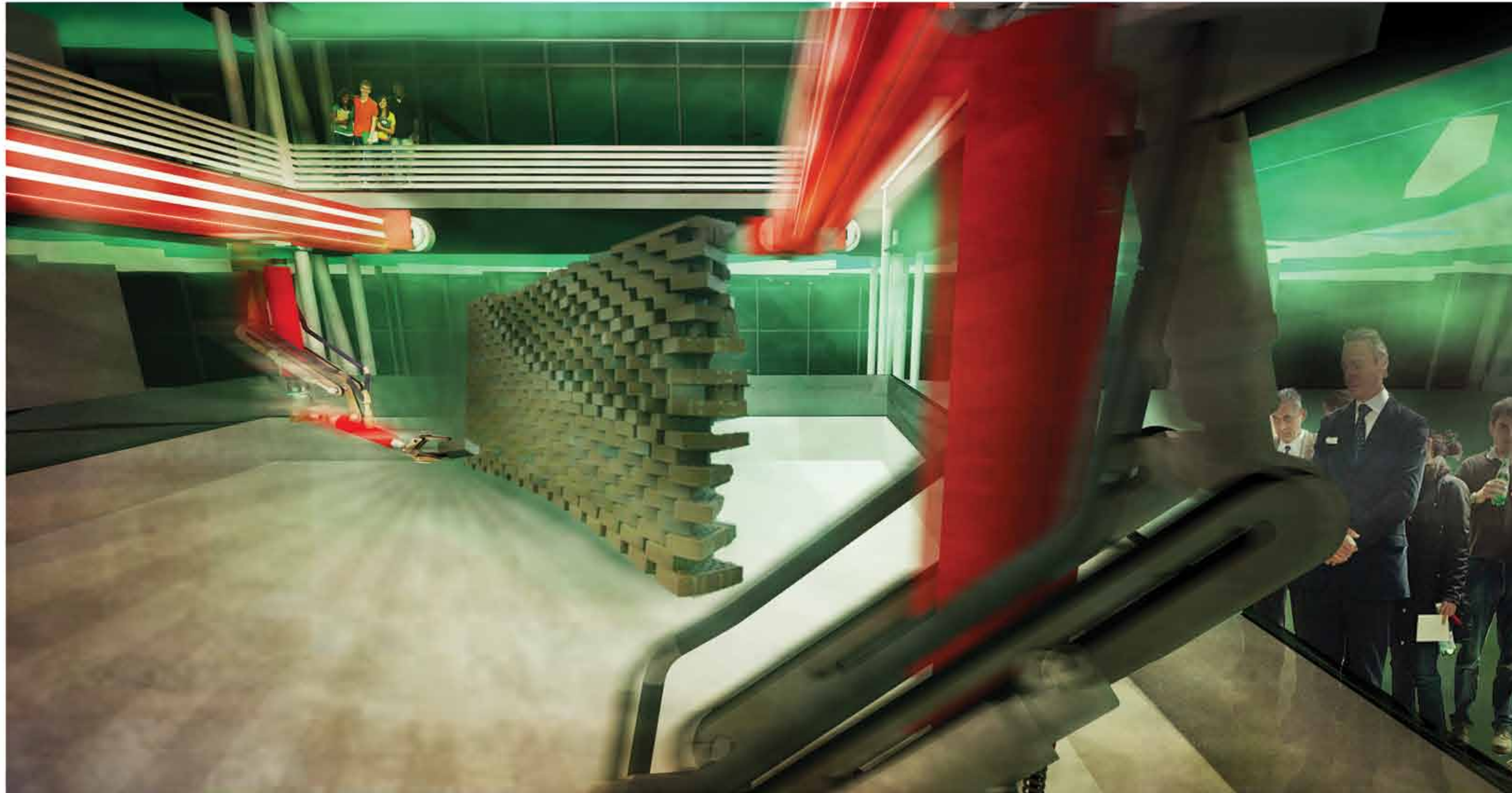
Interior Perspective No. 3



Enlarged Longitudinal Section No. 1



Auditorium 40



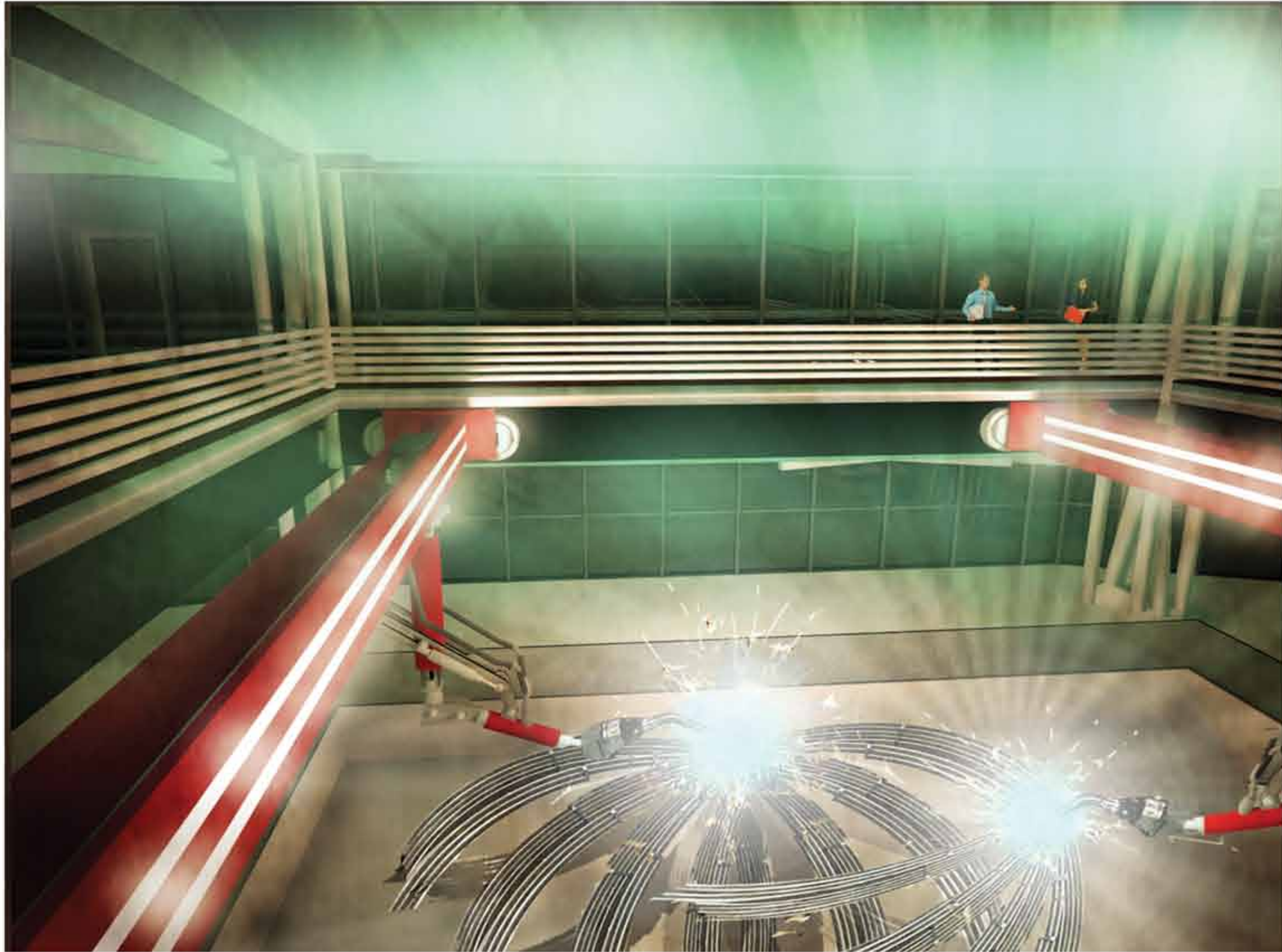
Marco Rapid Prototyping Arm

The fourth and fifth level houses a two level robotic lab with two fully automated robotic arms that hydraulically suspend from sliding cranes. The sliding cranes connect across the major structural bay of the building creating a generous space for construction.

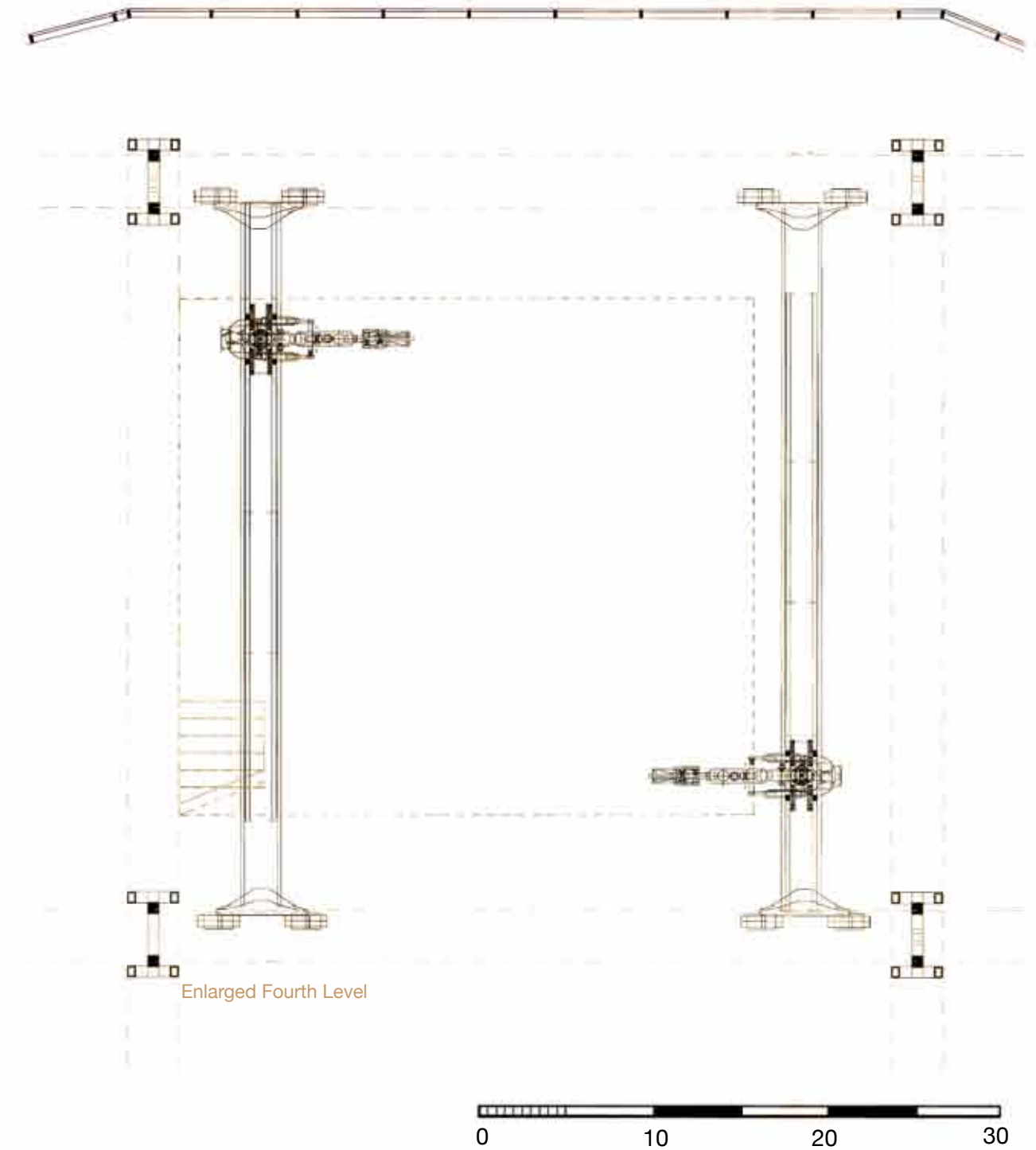
This lab was designed with overall idea that architecture should use expansive versions of existing technologies for our purpose. Architecture schools should have labs that allow for prototyping on a grand scale (macro) as a major step in manifesting 3D models into physical representations of size and scale.

“The architect must be a prophet... a prophet in the true sense of the term... if he can't see at least ten years ahead don't call him an architect.”

-Frank Lloyd Wright

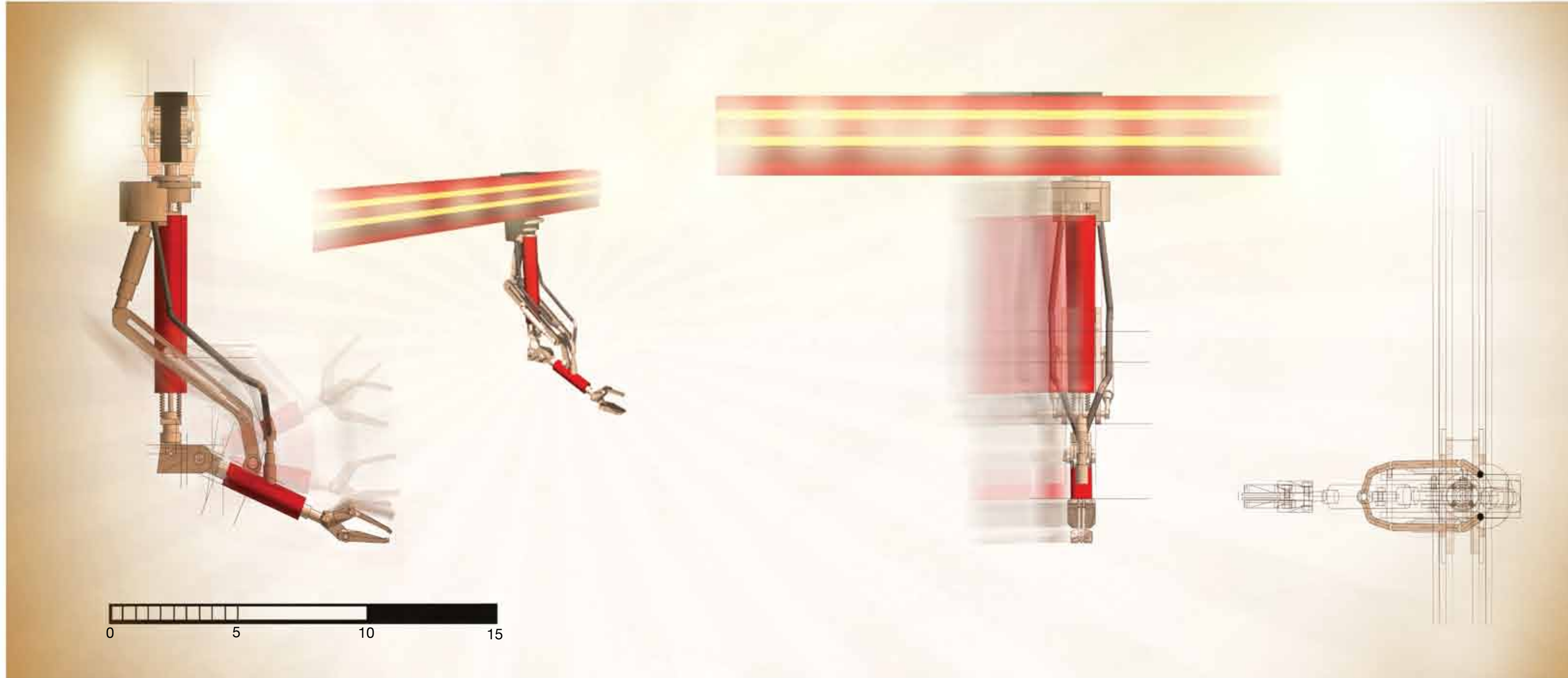


Interior Perspective No. 5



Enlarged Fourth Level





3D Robot Arm Profile

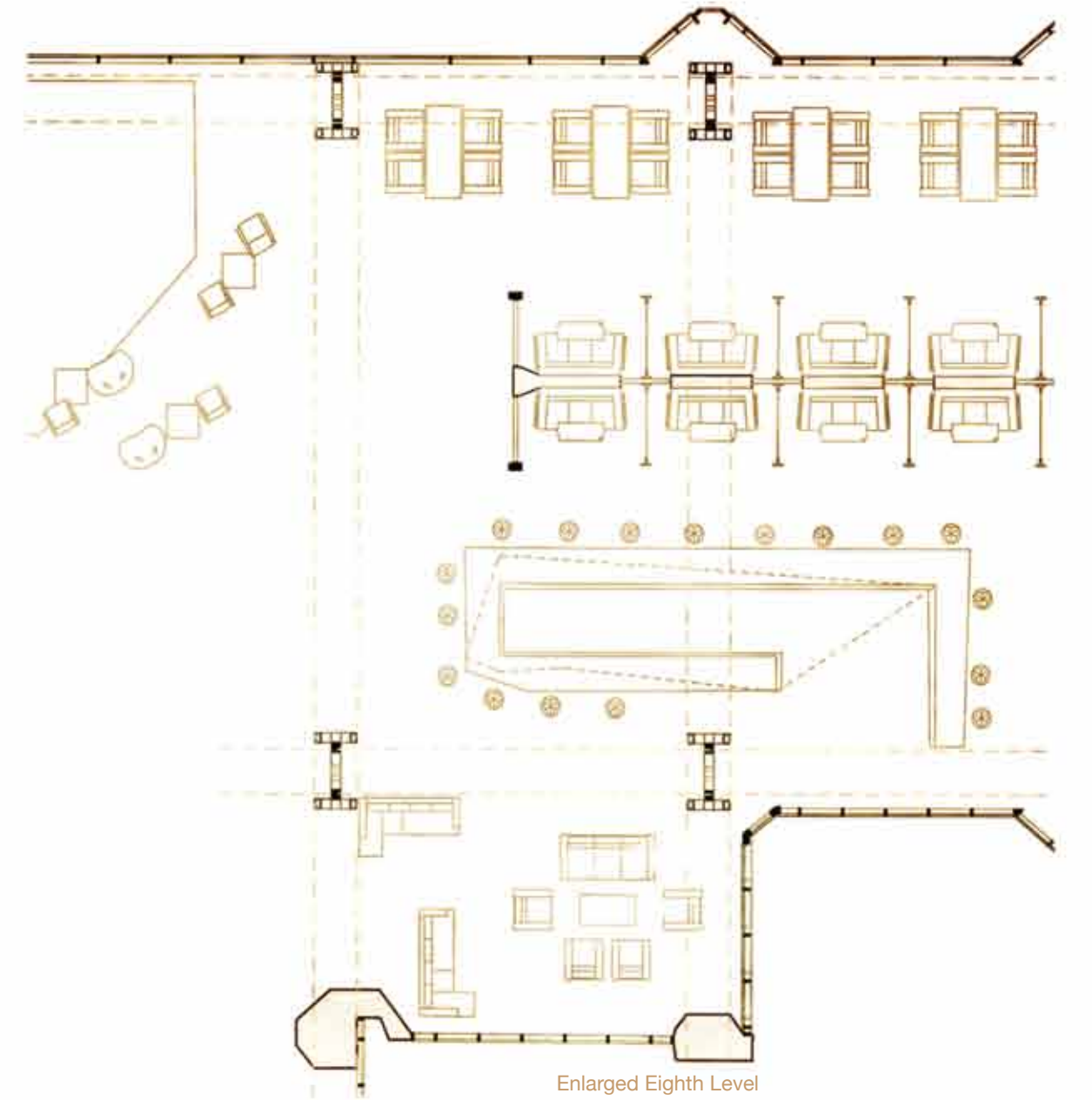
Robot Arm Profile

The major idea surrounding the creation of the robotic arm is to explore the use of automation in architecture. Robots should be an intricate part of the studio environment as a way to construct studio work using modern tooling methods such as grappling, welding, laser cutting, punching, water jet cutting, and CNC machining. The tooling methods can be implemented through interchangeable robot hands used in construction assemblies.

The robot arm was designed to move laterally along a sliding crane that moves forward and backward. The arm itself has substantial range of lowering and lifting itself to complete various model sizes. The entire arm was designed and assembled in the BIM program, ArchiCAD (version 16).



Interior Perspective No. 6





Interior Perspective No. 7

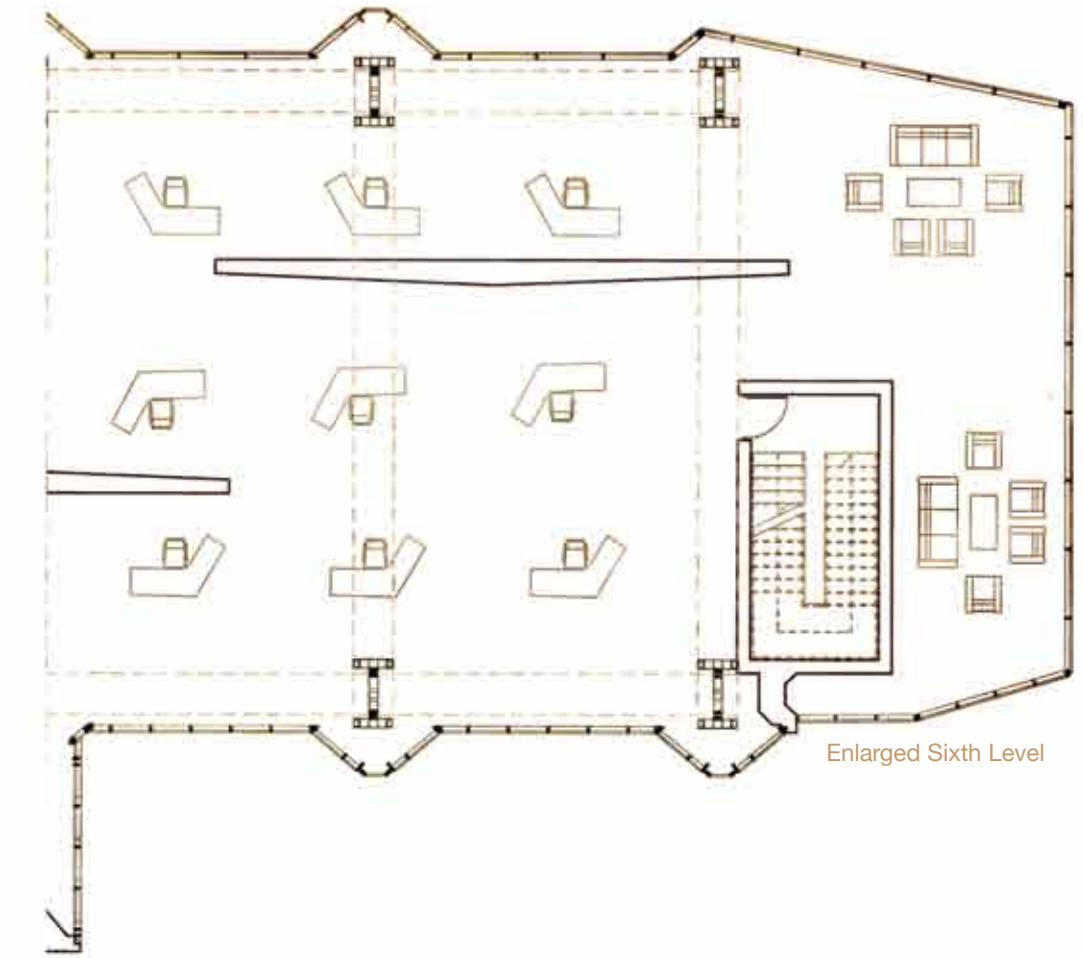


Enlarged Longitudinal Section No. 1





Interior Perspective No. 8

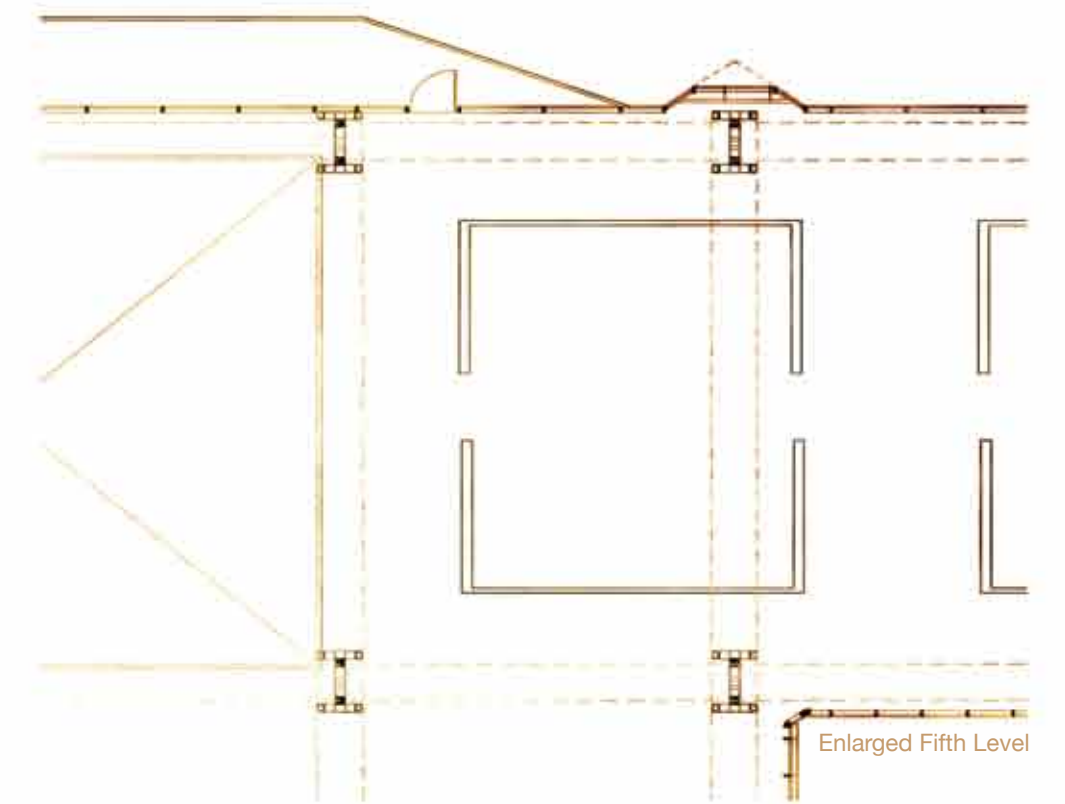


Enlarged Sixth Level





Interior Perspective No. 9

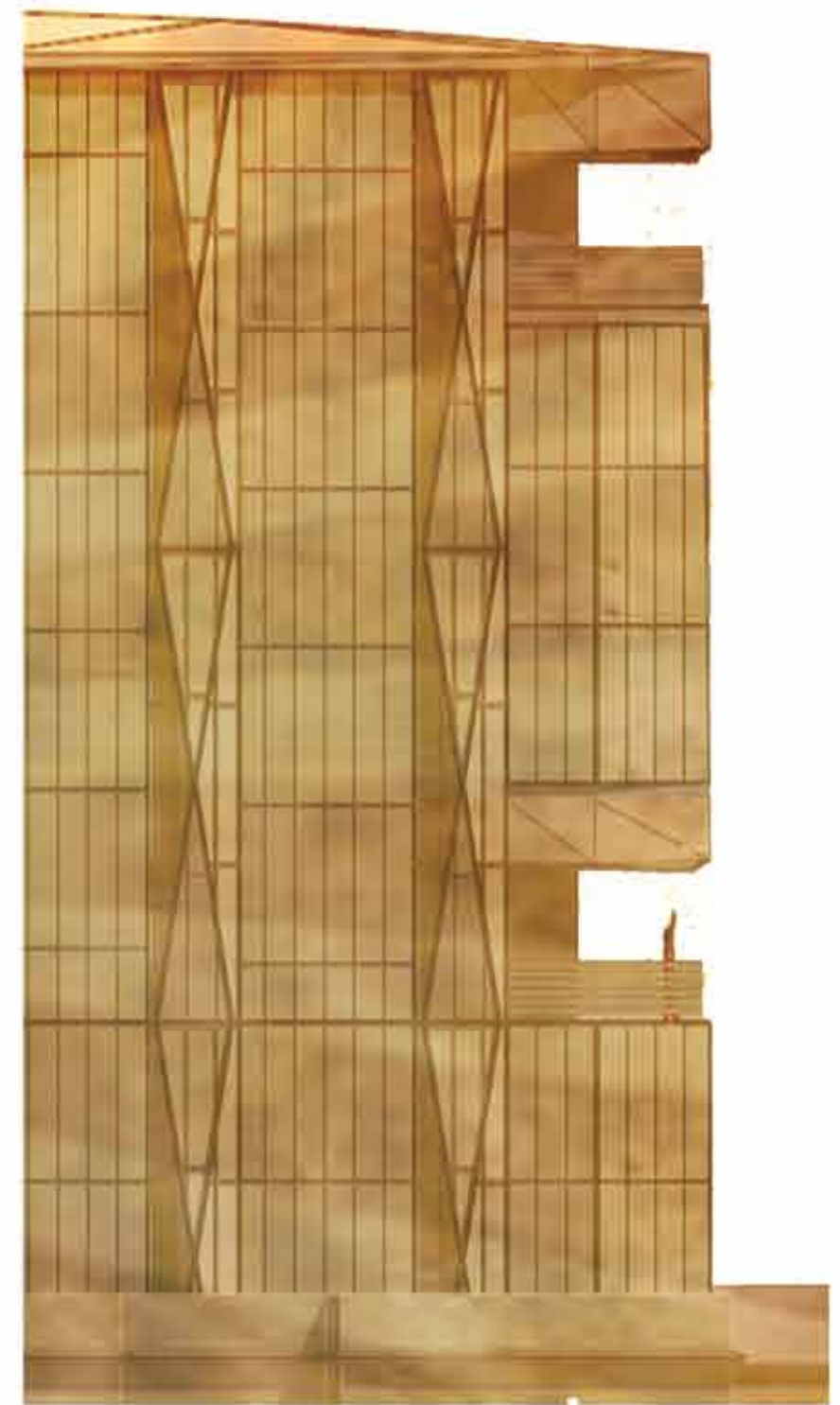


0 10 20 30

Enlarged Fifth Level



Perspective Render No. 6

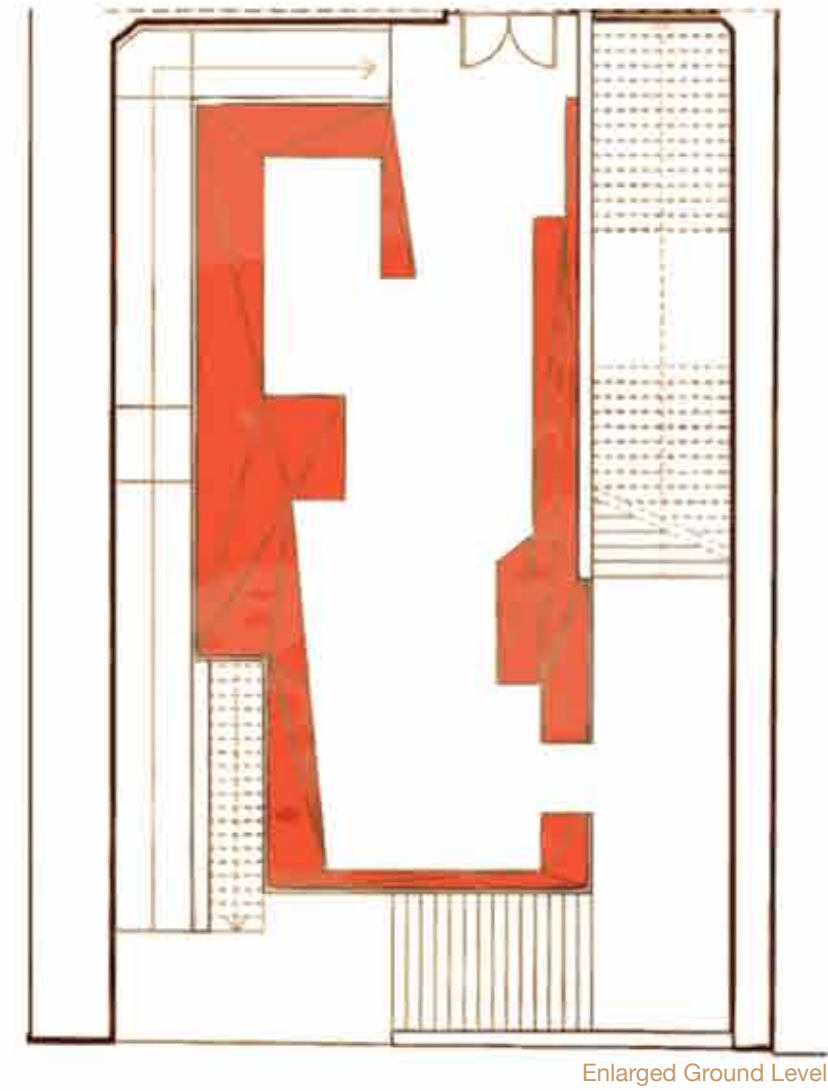


Enlarged South Elevation



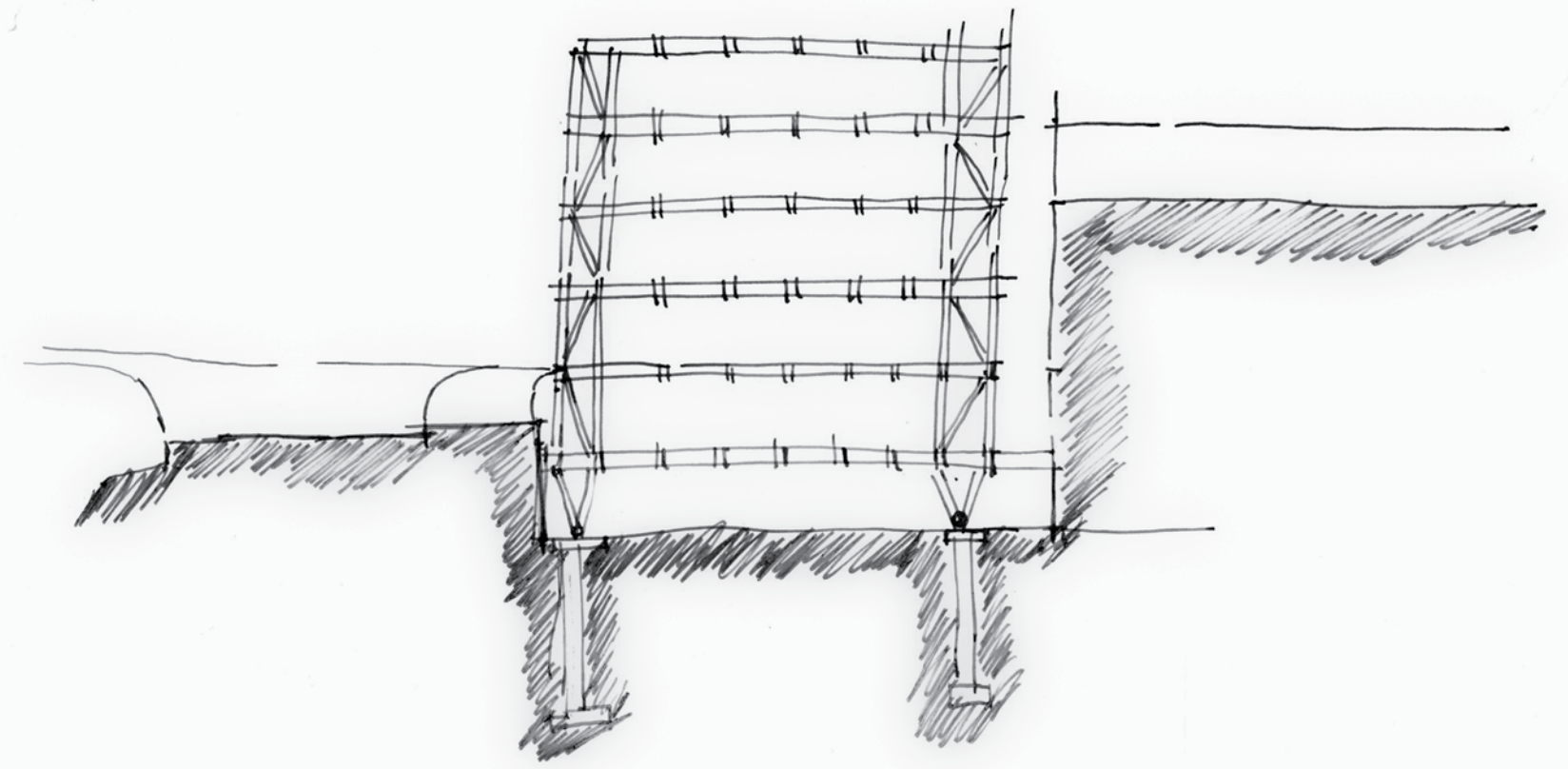
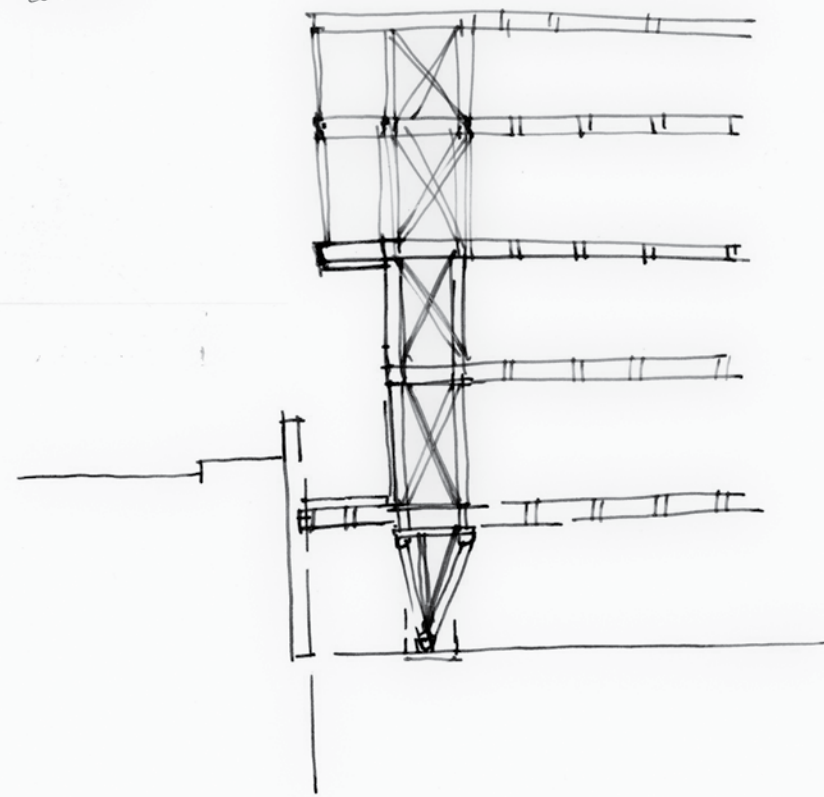
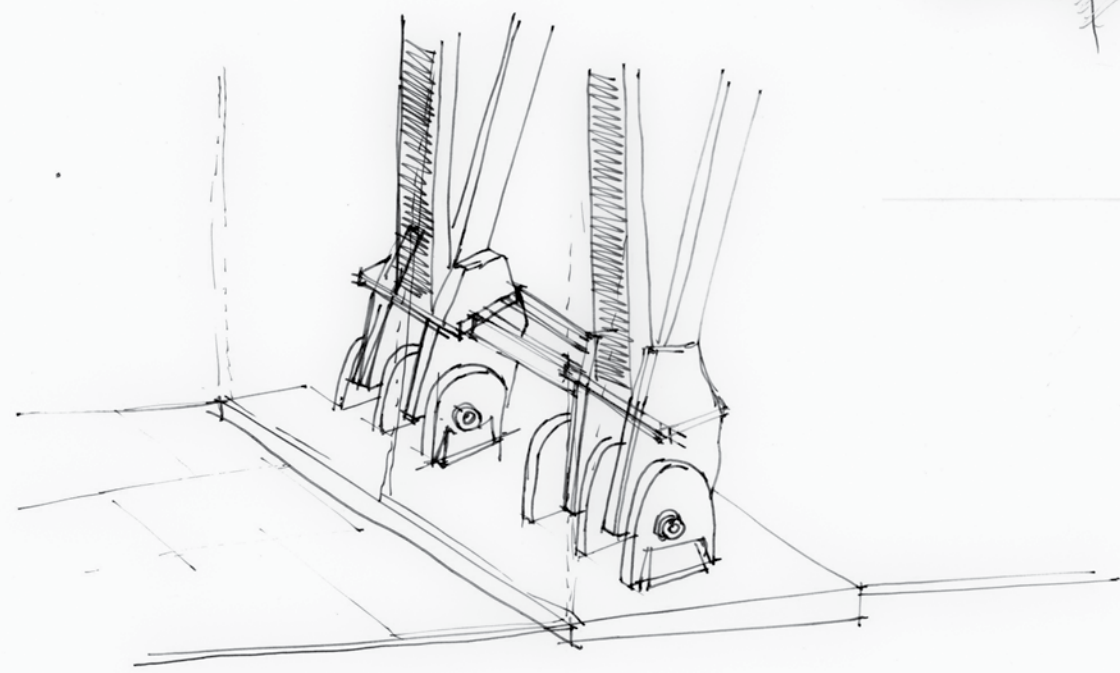
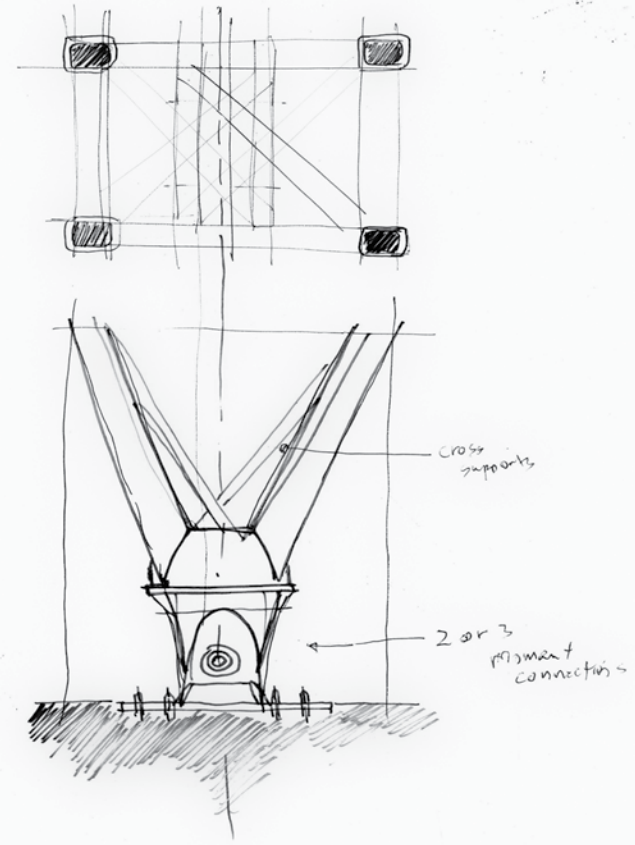


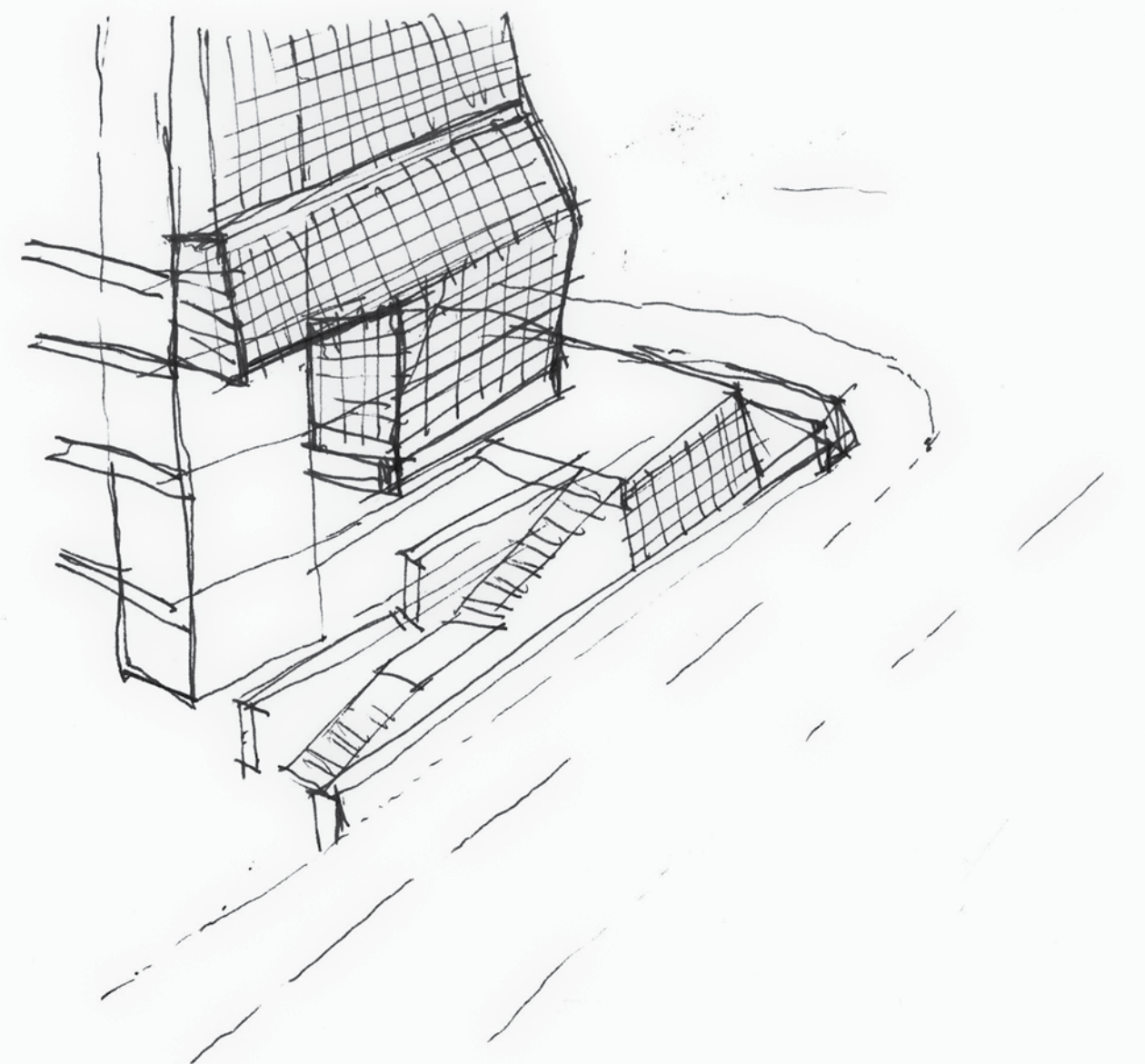
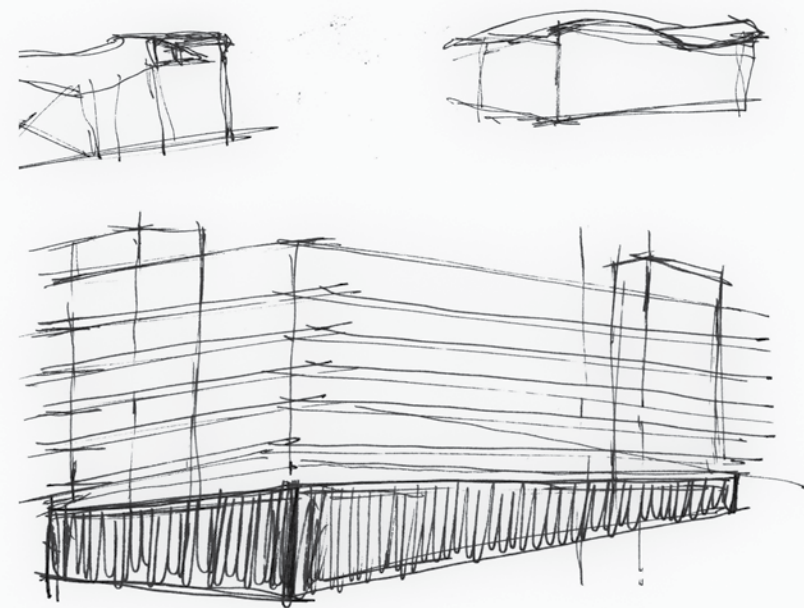
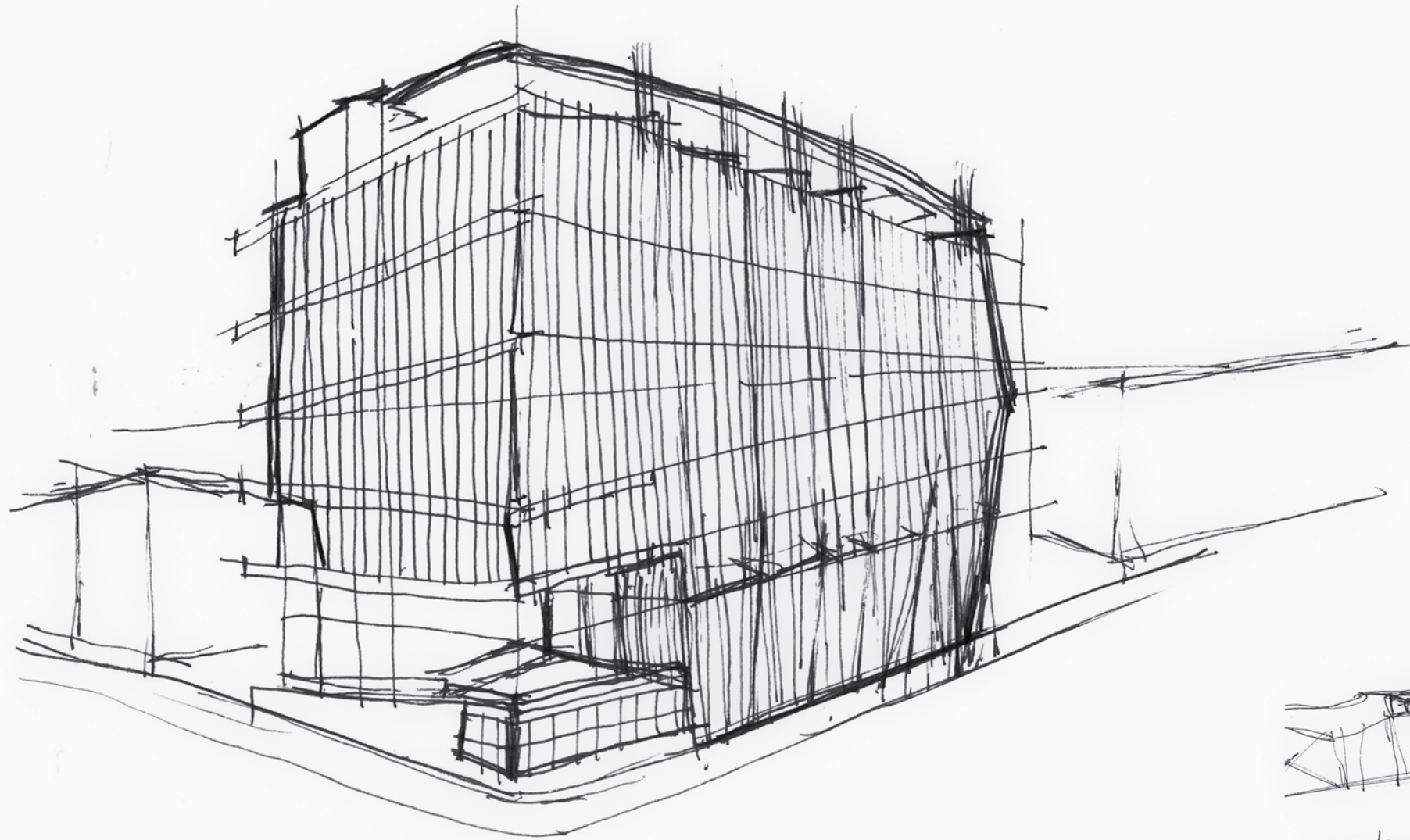
Perspective Render No. 6

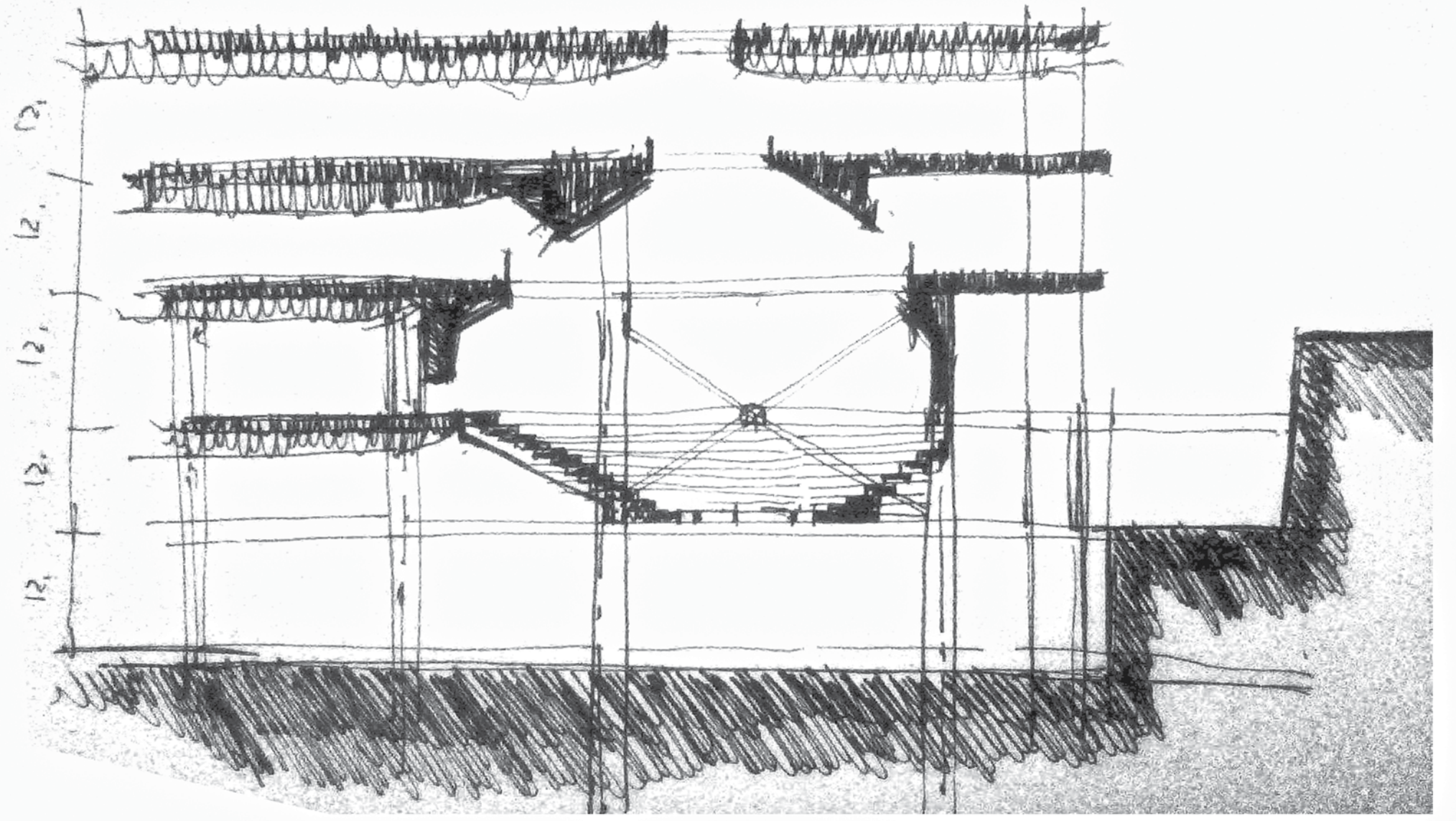
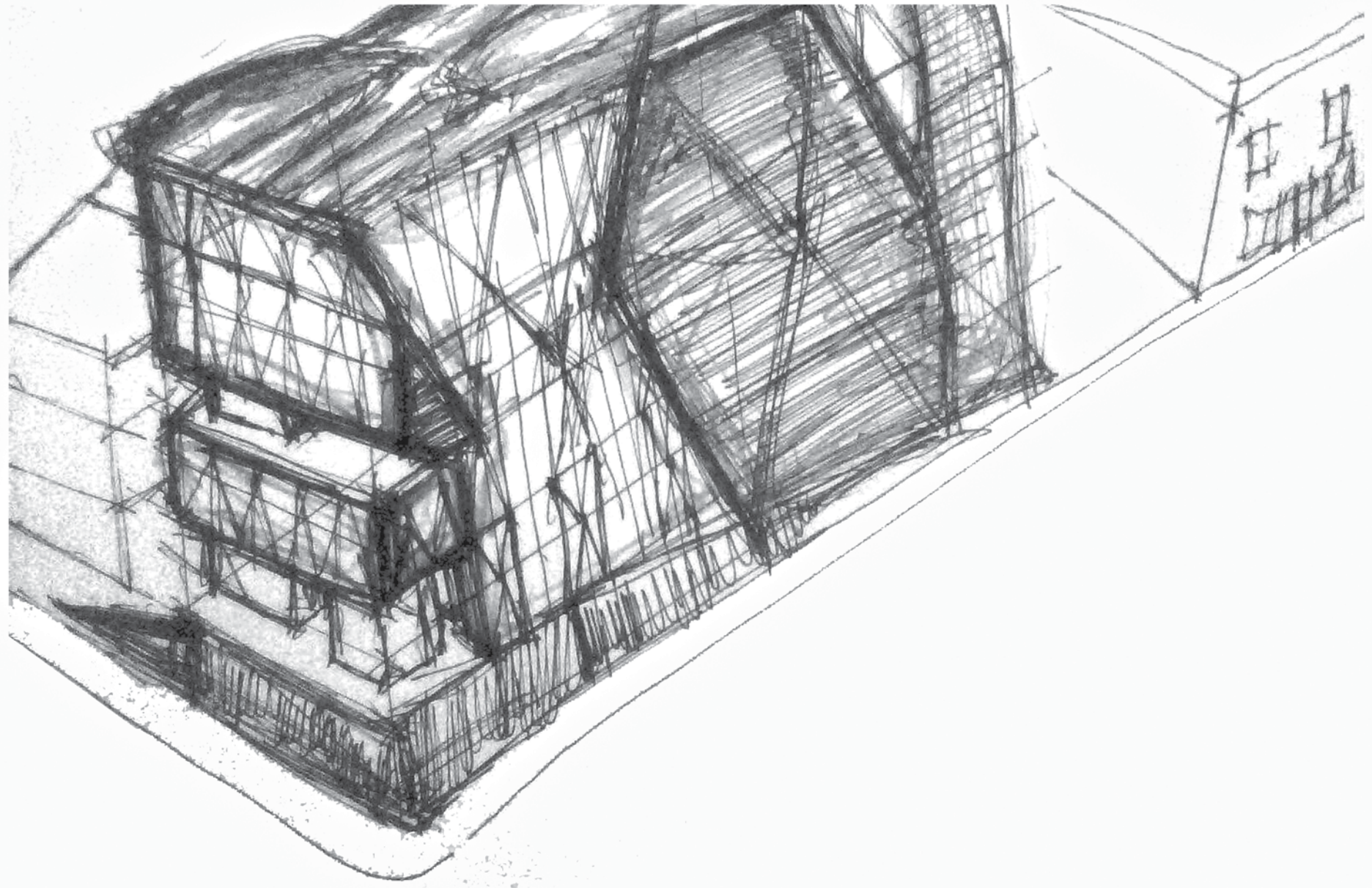


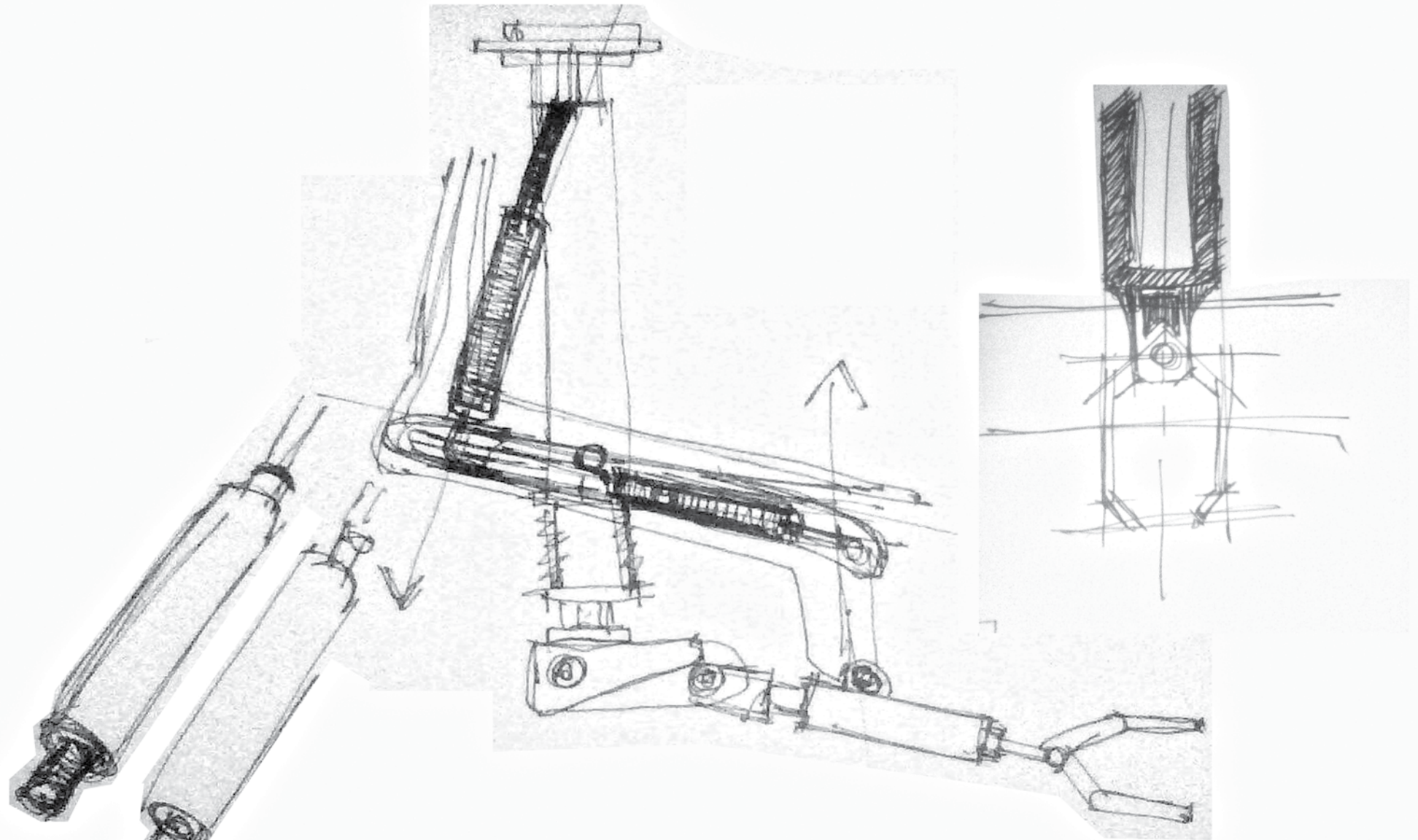
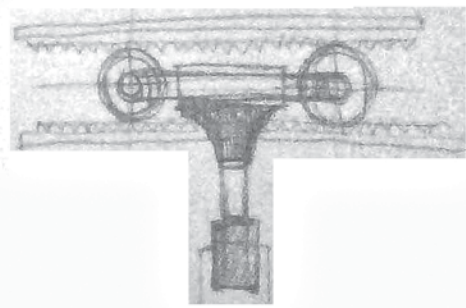
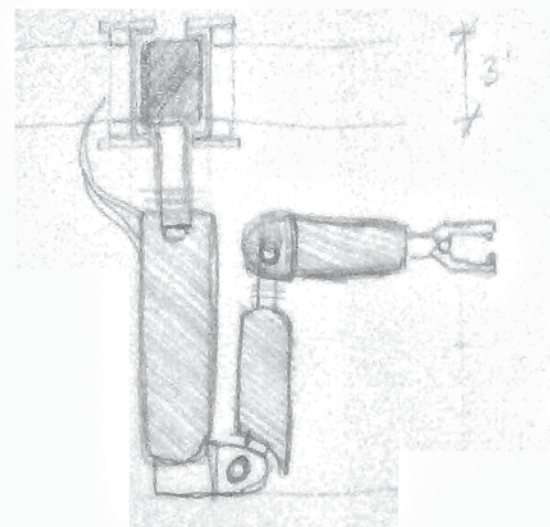
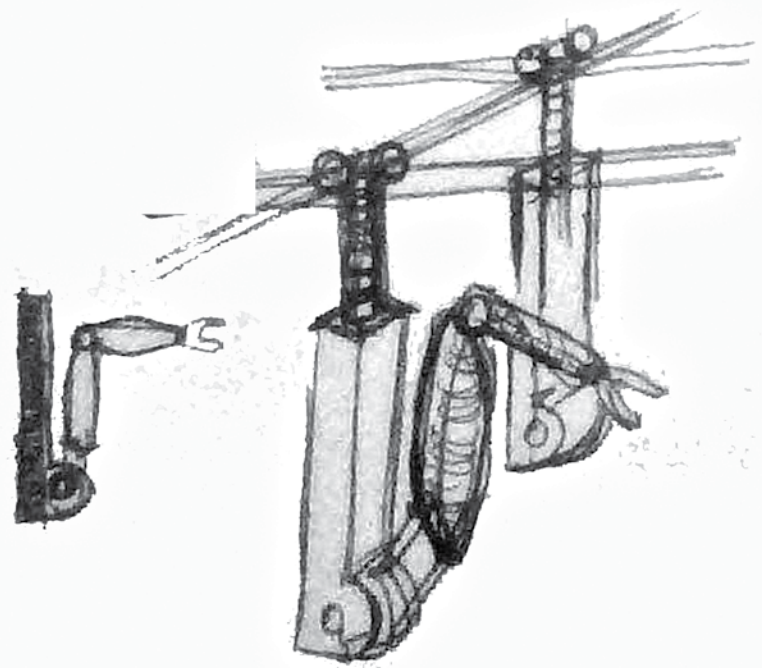
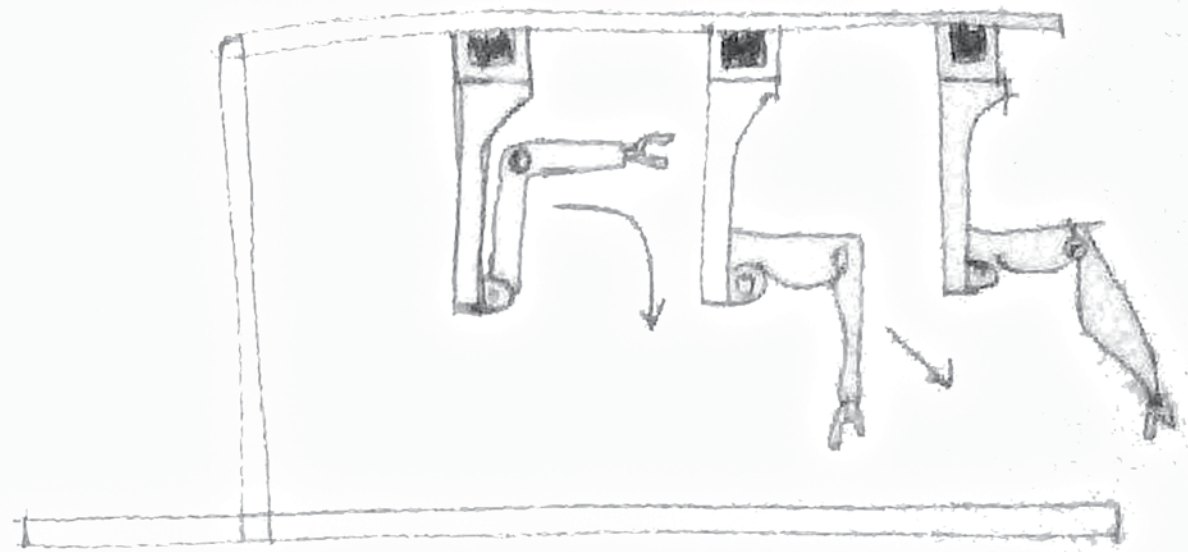
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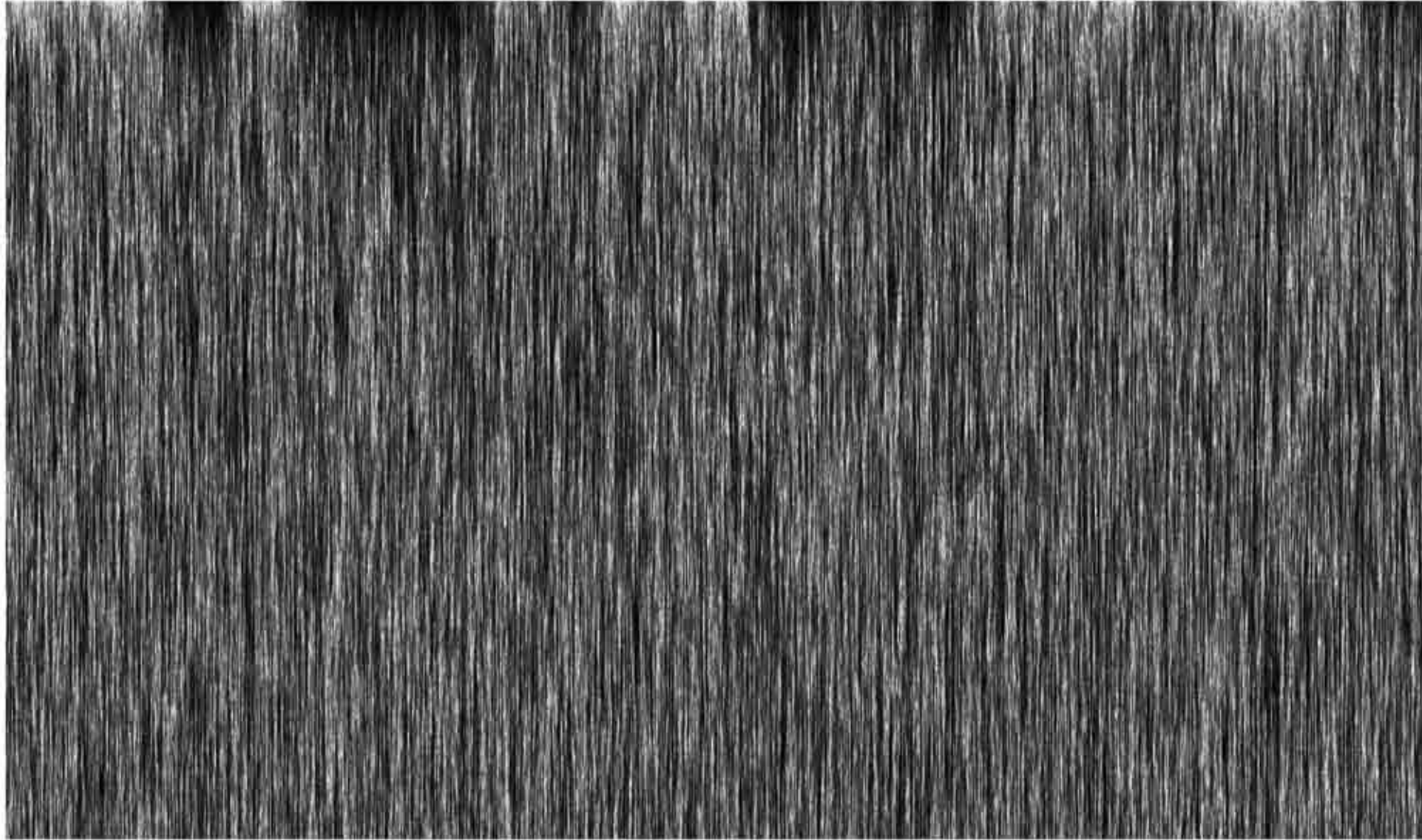
Enlarged Ground Level



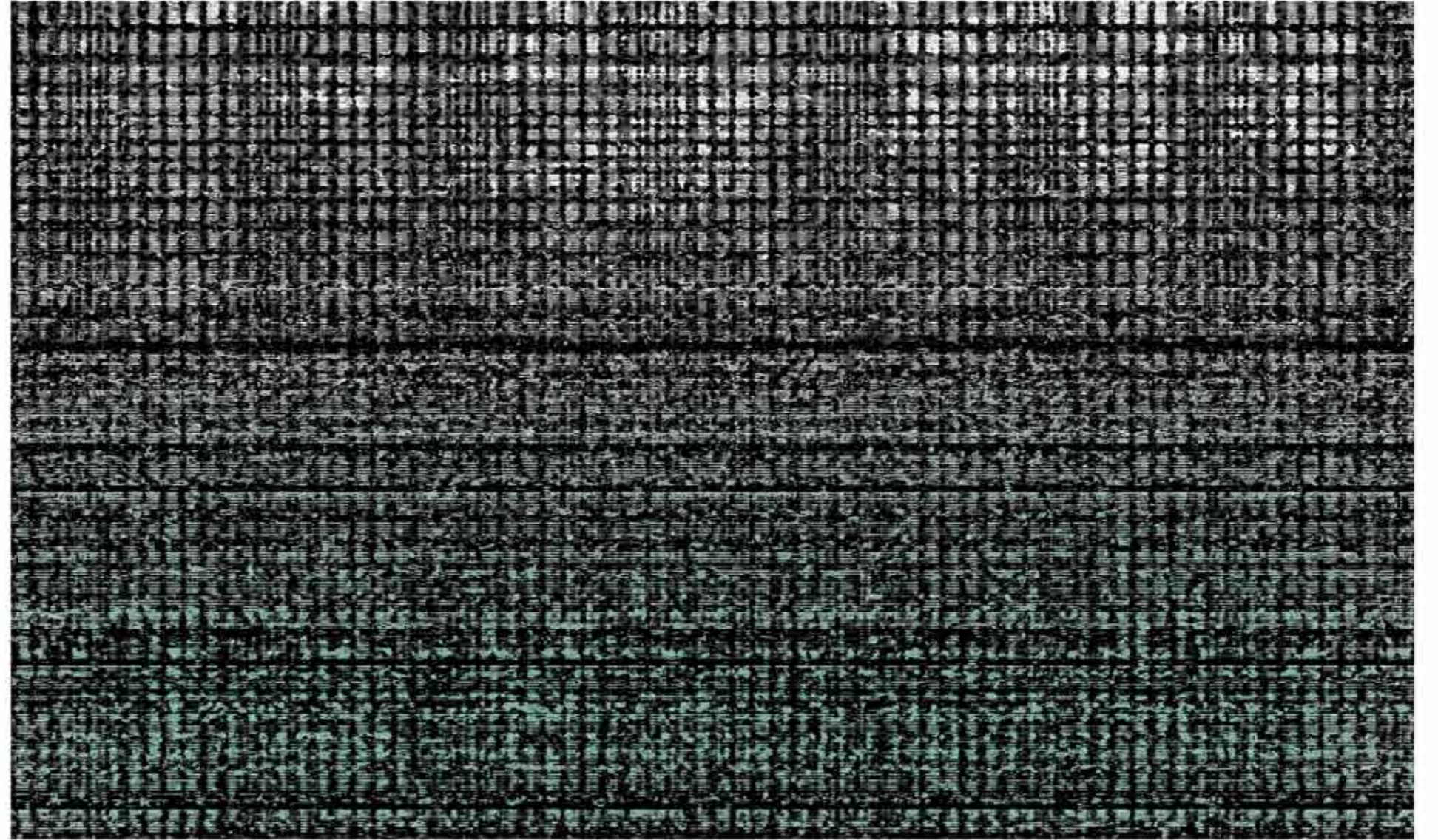




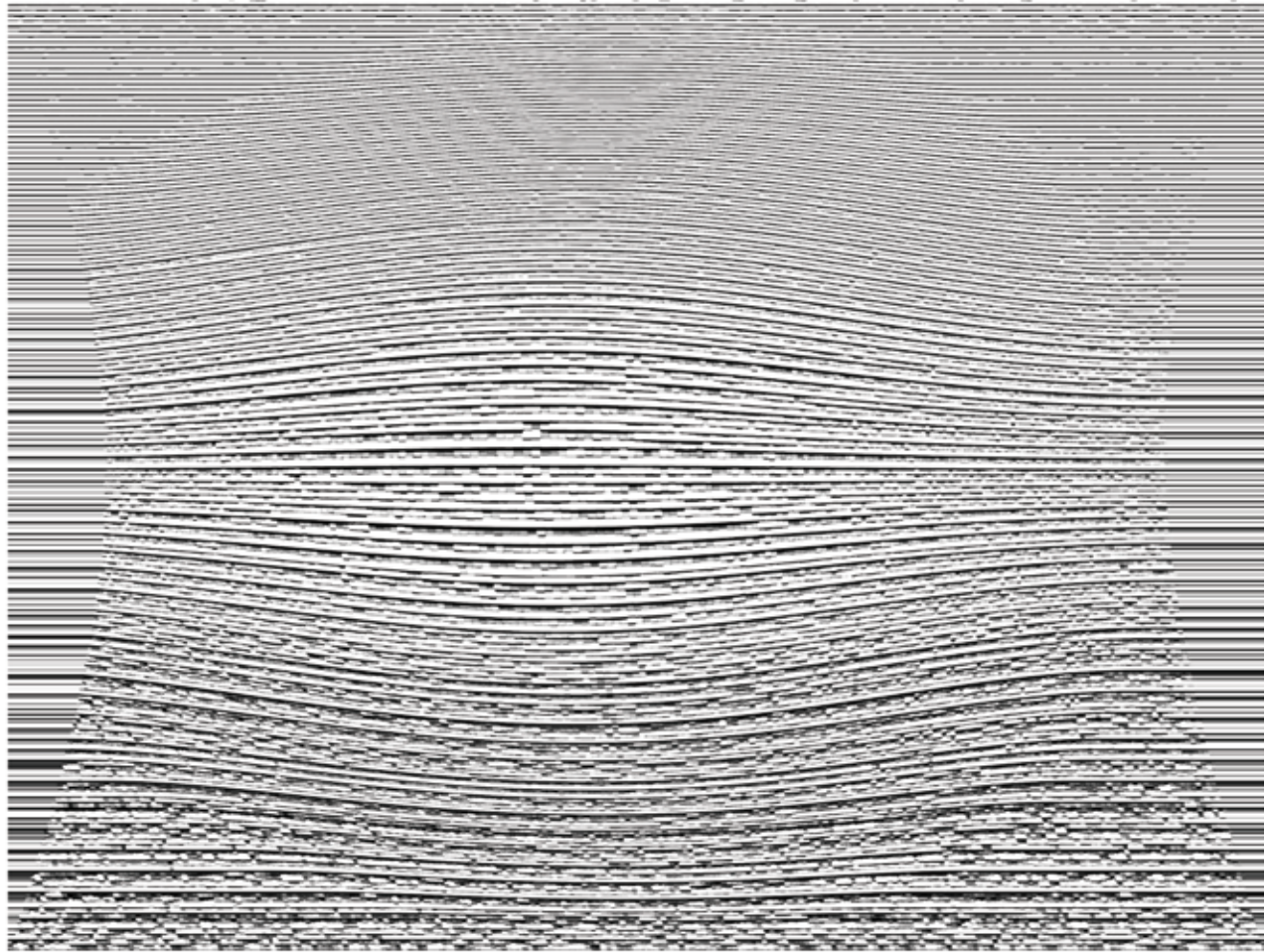




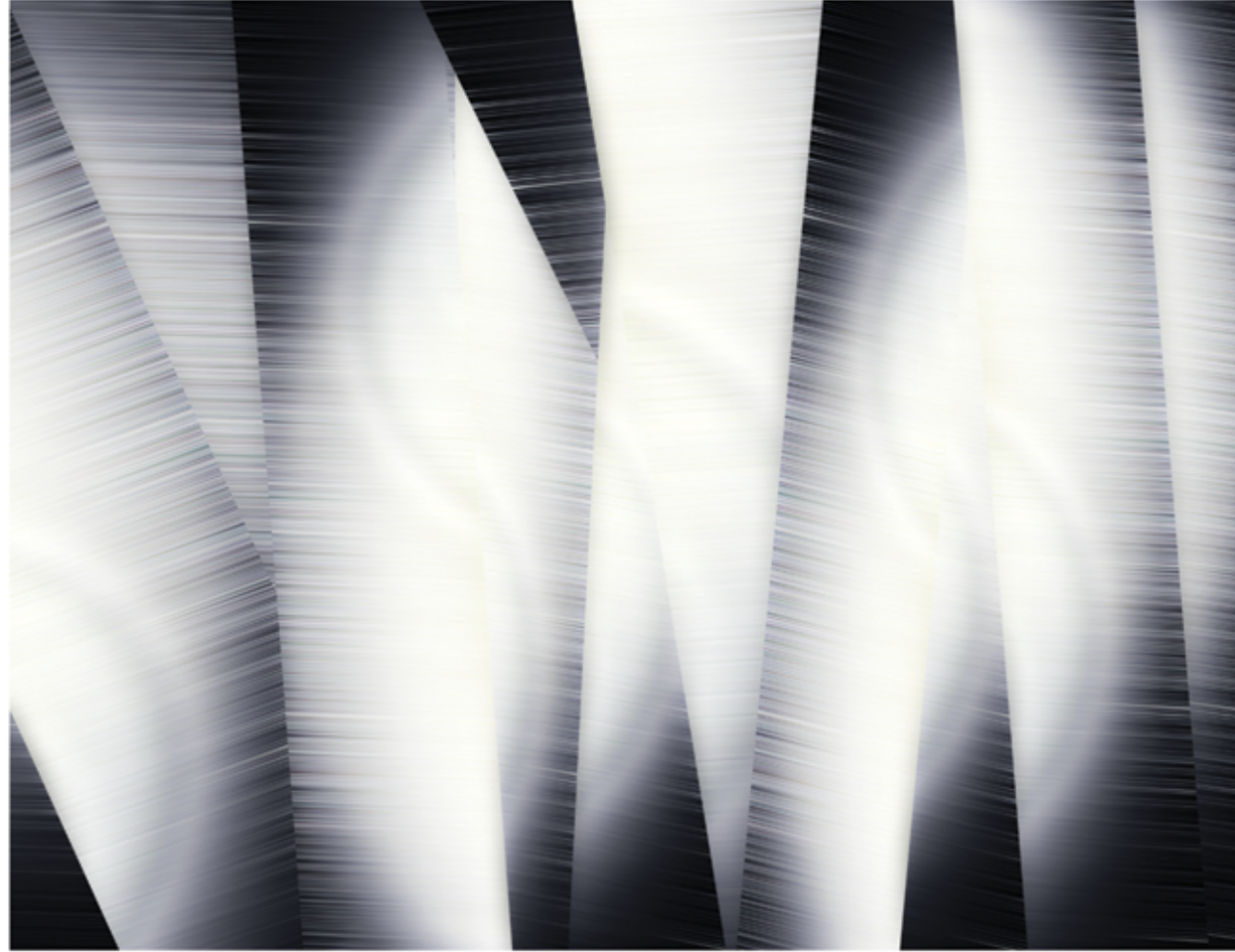
Noise: Graphic Static



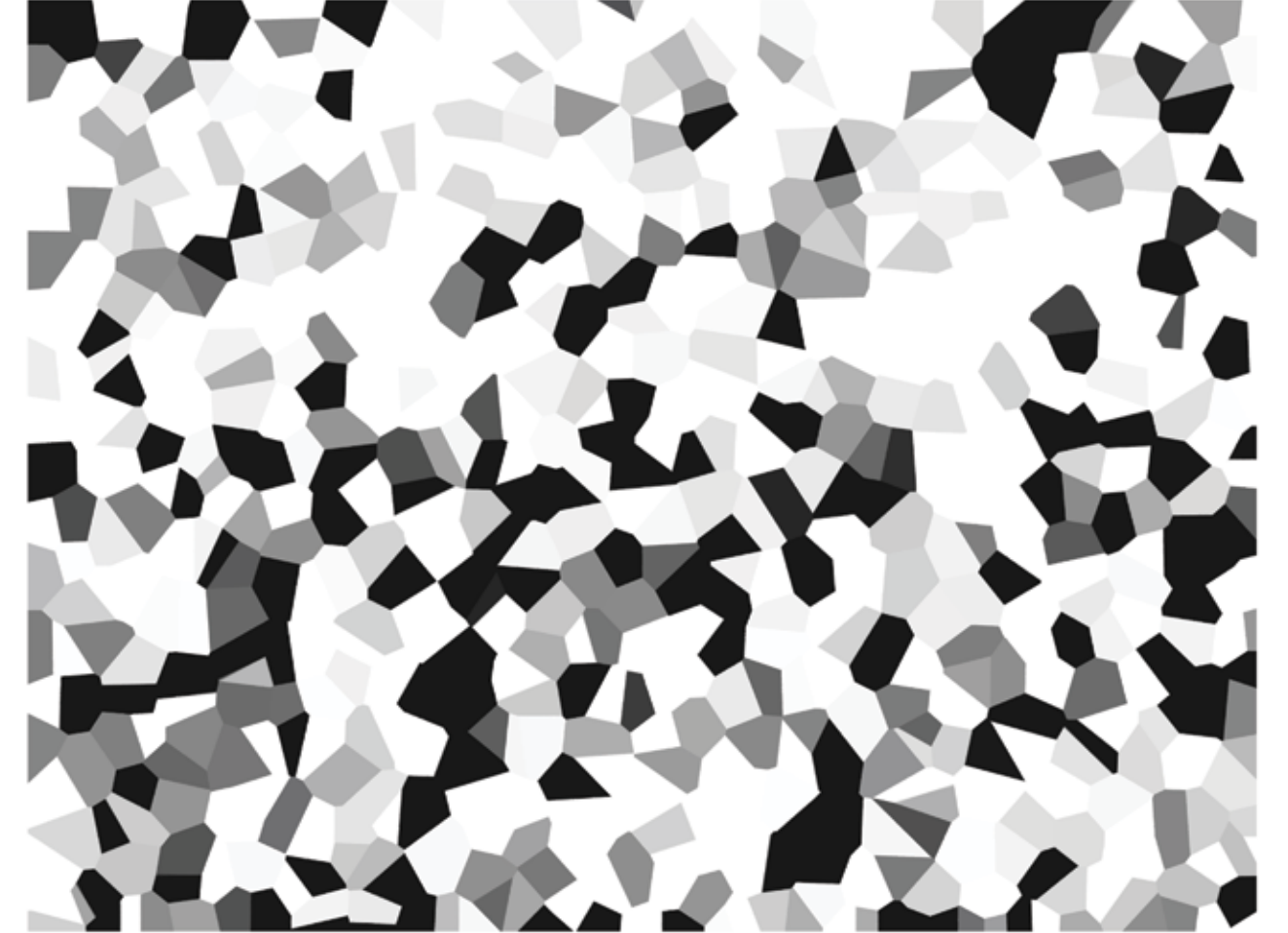
Matrix: Tick Weave



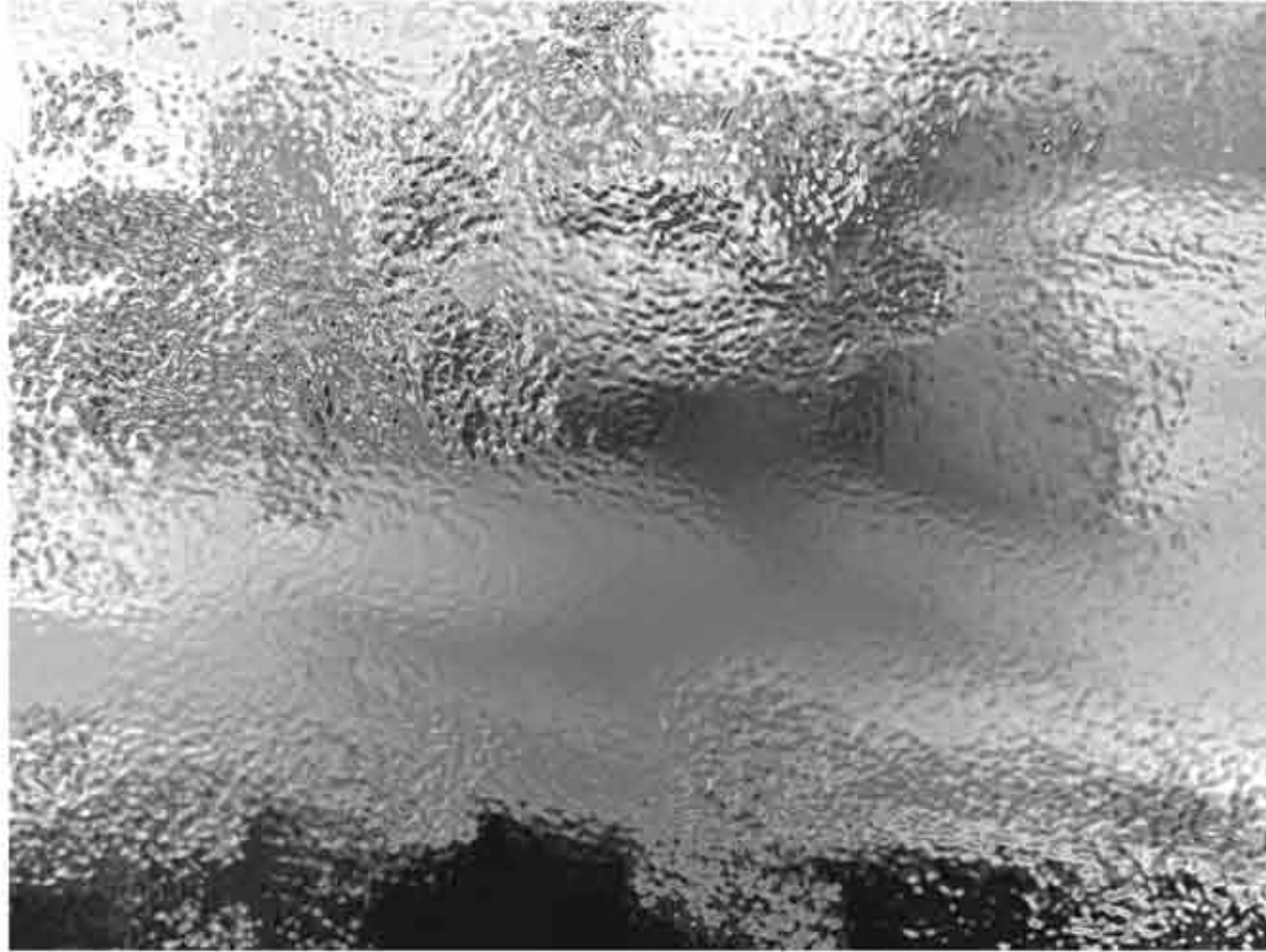
Morph: Man's Creation



Mirror: Light Vortex



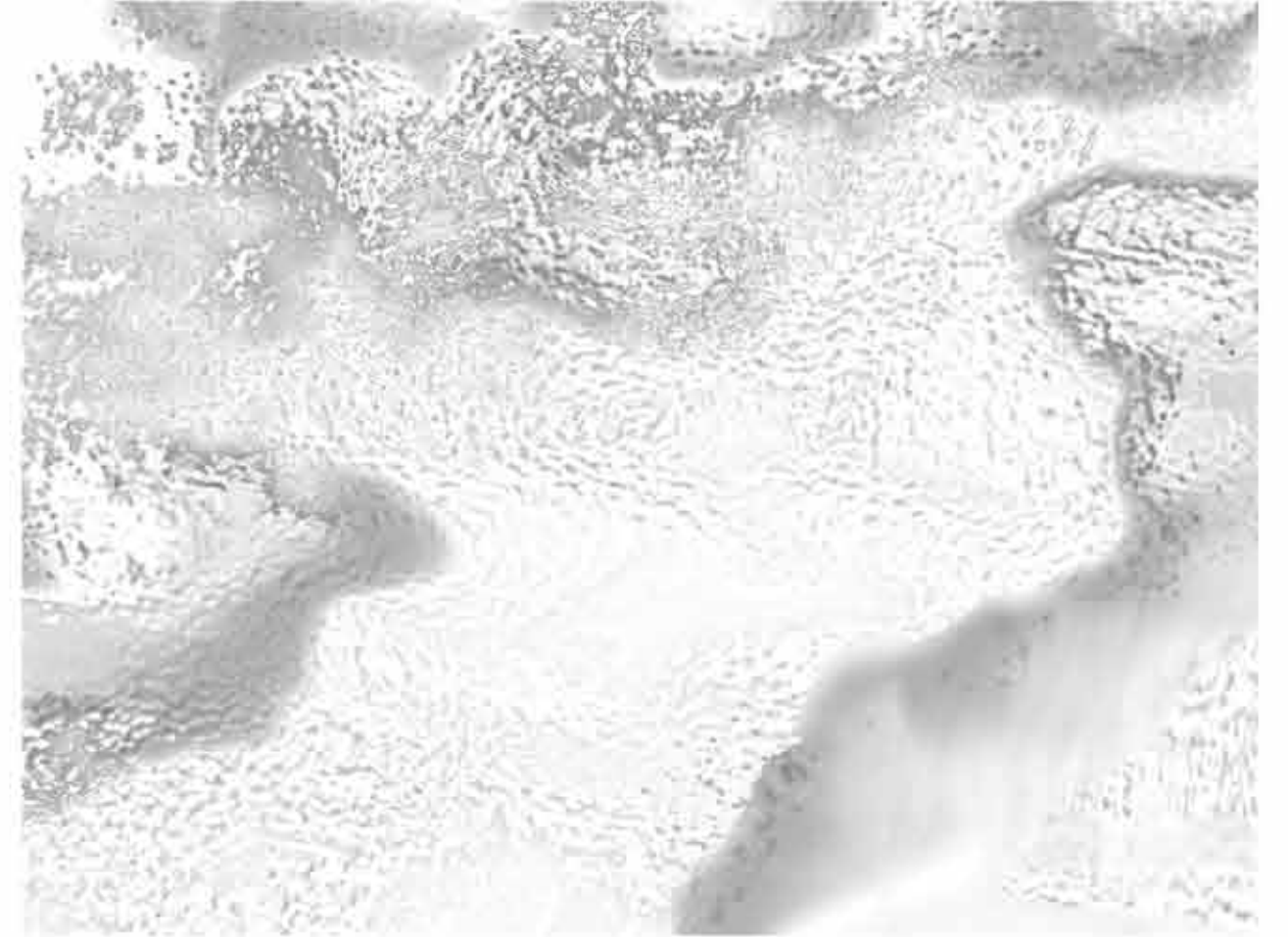
Fragment: Salt and Pepper



Diffusion: Contrast Current



Fracture: Broken Abyss



Photokeratitis: Snow River

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