

LIGHTING

An Atrium Core to Reconnect with the Sun

LIGHTING: AN ATRIUM CORE TO RECONNECT WITH THE SUN

A thesis submitted in partial fulfillment of the requirements for the degree Master of Design in Interior Studies
[Adaptive Reuse] in the Department of Interior Architecture of the Rhode Island School of Design

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ABSTRACT

At the Rhode Island School of Design, students work so much that they treat their studio as home; the majority stay in studio past midnight, which leads to lack of sleep. How to improve students' physical and mental health is a question demanding immediate investigation, particularly as relates to rest. According to the scientists at the Lighting Research Center (LRC) in Troy, N.Y, engagement with daylight environments increase occupant productivity and comfort, and provide the mental and visual stimulation necessary to regulate circadian rhythms, encouraging more restful sleep. Students cannot function healthily because their busy schedules remove them from the world.

The Design Center of the Rhode Island School of Design has a complex program, hosting Apparel Design, Graphic Design, the RISD Store, Photography, Liberal Arts, dining and several campus service areas. There are some classrooms without windows in the Design Center, but the Photography Department has need for a darkroom which cannot have any windows; clearly it is necessary to rearrange those rooms and utilize the existing properties of the space. In this complex environment of competing departmental needs, it is necessary to create inspiring spaces to improve those departments' student productivity, physical and mental health. As the original structure of the Design Center blocks vast amounts of potential natural light, this thesis proposes the intervention of several large atriums supported by a new structural system. The atriums not only allow natural light to penetrate deep into this [however many stories the design center is] storey building, they alter circulation throughout. The core of the Design Center is given a sense of the passage of time and the seasons, reconnecting students to the natural world that their busy schedules do not allow them to experience firsthand.

PRECEDENTS

SEONA REID BUILDING /
Steven Holl Architects

VISUAL ARTS BUILDING AT THE UNIVERSITY OF IOWA /
Steven Holl Architects

ACADEMY OF ART & ARCHITECTURE /
Wiel Arets Architects

SENDAI MEDIATHEQUE /
Toyo Ito



Architects: Steven Holl Architects
Location: The Glasgow School of Art
Area: 11250.0 sqm
Project Year: 2014
Photographs: Iwan Baan, Chris McVoy



Mackintosh's amazing manipulation of the building section for light in inventive ways has inspired our approach towards a plan of volumes in different light. The studio/workshop is the basic building block of the building. Spaces have been located not only to reflect their interdependent relationships but also their varying needs for natural light.



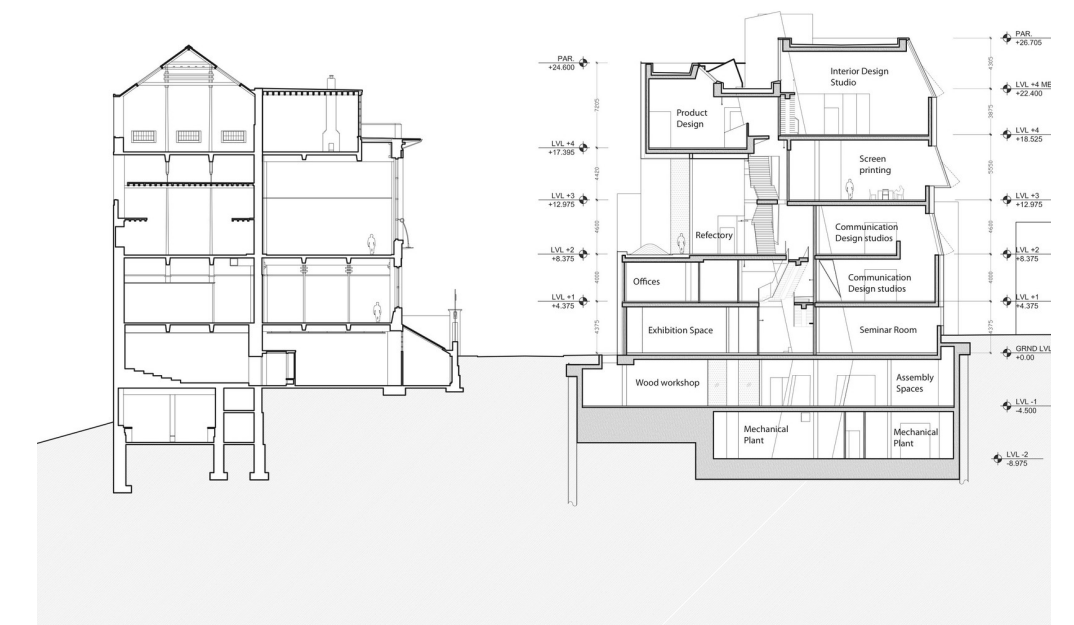
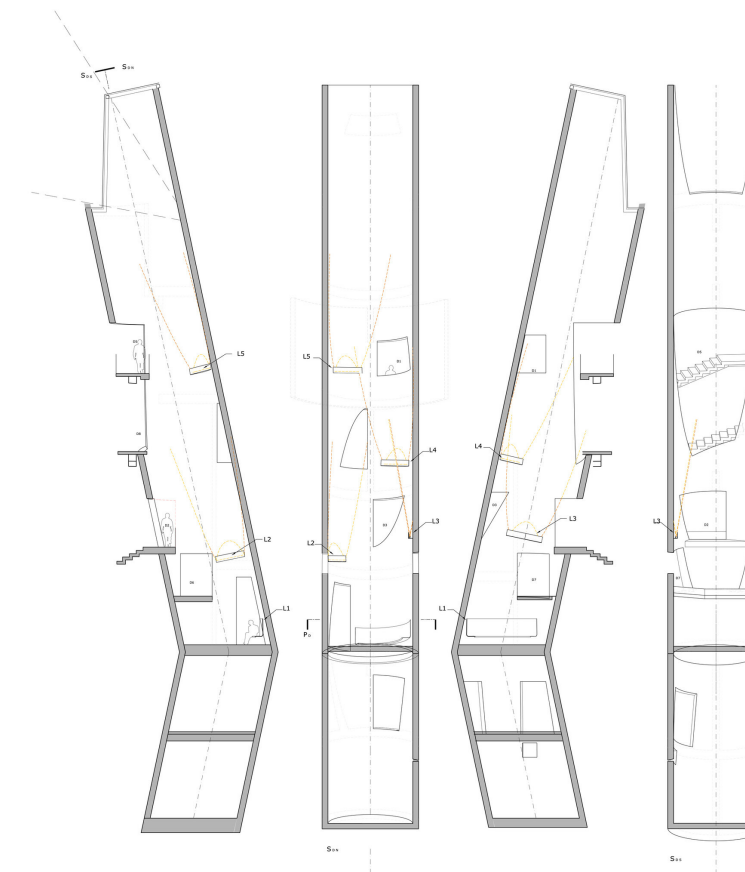
Studios are positioned on the north façade with large inclined north facing glazing to maximize access to the desirable high quality diffuse north light. Spaces that do not have a requirement for the same quality of natural light, such as the refectory and offices, are located on the South façade where access to sunlight can be balanced with the occupants needs and the thermal performance of the space through application of shading.



“Driven voids of light” allow for the integration of structure, spatial modulation and light. The “Driven Void” light shafts deliver natural light through the depth of the building providing direct connectivity with the outside world through the changing intensity and color of the sky. In addition, they provide vertical circulation through the building, eliminating the need for air conditioning.



Along the South elevation, at the same height as the Mackintosh main studios, a landscape loggia in the form of a Machair gives the school an exterior social core open to the city. The natural vegetation with some stone work routes the water into a small recycling water pond which will reflect dappled sunlight onto the ceiling inside.



A 'Circuit of Connection' throughout the new GSA encourages the 'creative abrasion' across and between departments that is central to the workings of the school. The open circuit of stepped ramps links all major spaces – lobby, exhibition space, project spaces, lecture theater, seminar rooms, studios, workshops and green terraces for informal gatherings and exhibitions.



While the 2006 Arts Building West is horizontally porous and of planar composition, the new building is vertically porous and volumetrically composed. The aim of maximum interaction between all departments of the school takes shape in social circulation spaces.

Architects: Steven Holl Architects
Location: Visual Arts Building, Iowa City, IA 52246, United States
Area: 126000.0 ft²
Project Year: 2016
Photographs: Iwan Baan, Eric Dean, Chris McVoy



1. Interconnection: Horizontal Programs, Vertical Porosity

In a school of the arts today, interconnection and crossover, made increasingly possible through digital techniques, are of fundamental importance. Interdisciplinary collaboration between the School's various art departments is facilitated in the vertical carving out of large open floor plates. Students can see activities ongoing across these openings and be encouraged to interact and meet. Further interconnection is facilitated by glass partitions along the studio walls adjacent to internal circulation.



2. Multiple Centers of Light

Natural light and ventilation reach into the core of the building via "centers of light." The seven vertical cutouts are characterized by a language of shifted layers, where one floor plate slides past another. This geometry creates multiple balconies, providing outdoor meeting spaces and informal exterior working space, further encouraging interaction between the building's four levels.



3. Stairs as Vertical Social Condensers: Corridors as Horizontal Meeting Spaces

Stairs are shaped to enable informal meeting, interaction and discussion. Some stairs stop at generous landings with tables and chairs, others open onto lounge spaces with sofas, for informal collaborative work.



4. Campus Space Definition/Porosity

The original grid of the campus breaks up at the Iowa River, becoming organic as it hits the limestone bluff. The Arts West building reflects this irregular geometry in fuzzy edges. The new building picks up the campus grid again in its simple plan, defining the new campus space of the "arts meadow."



5. Material Resonance, Ecological Innovation

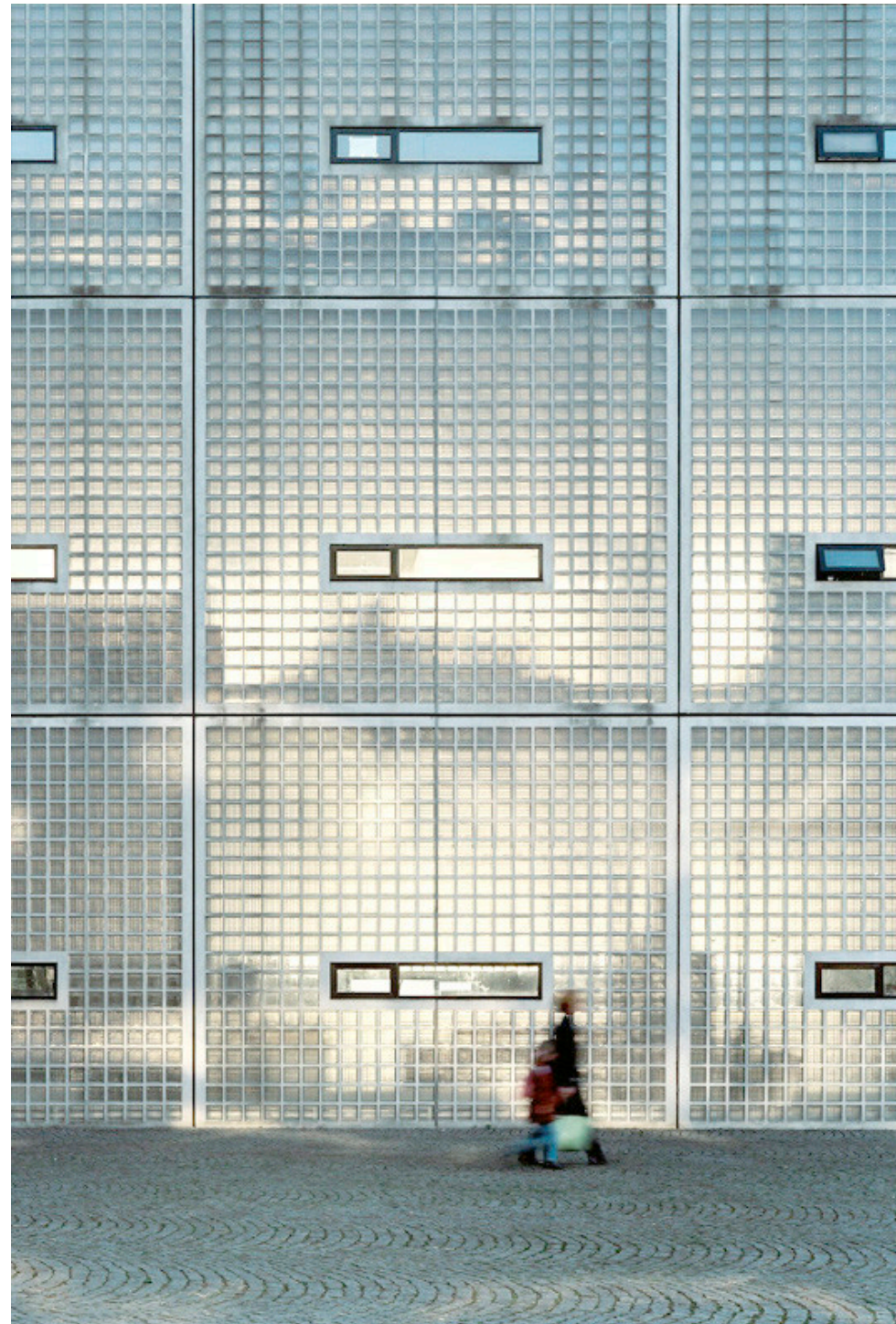
Natural ventilation is achieved via operable windows and skylights. A punched concrete frame structure provides thermal mass at the exterior while "bubble" slabs provide radiant cooling and heating. A Rheinzink skin in weathering



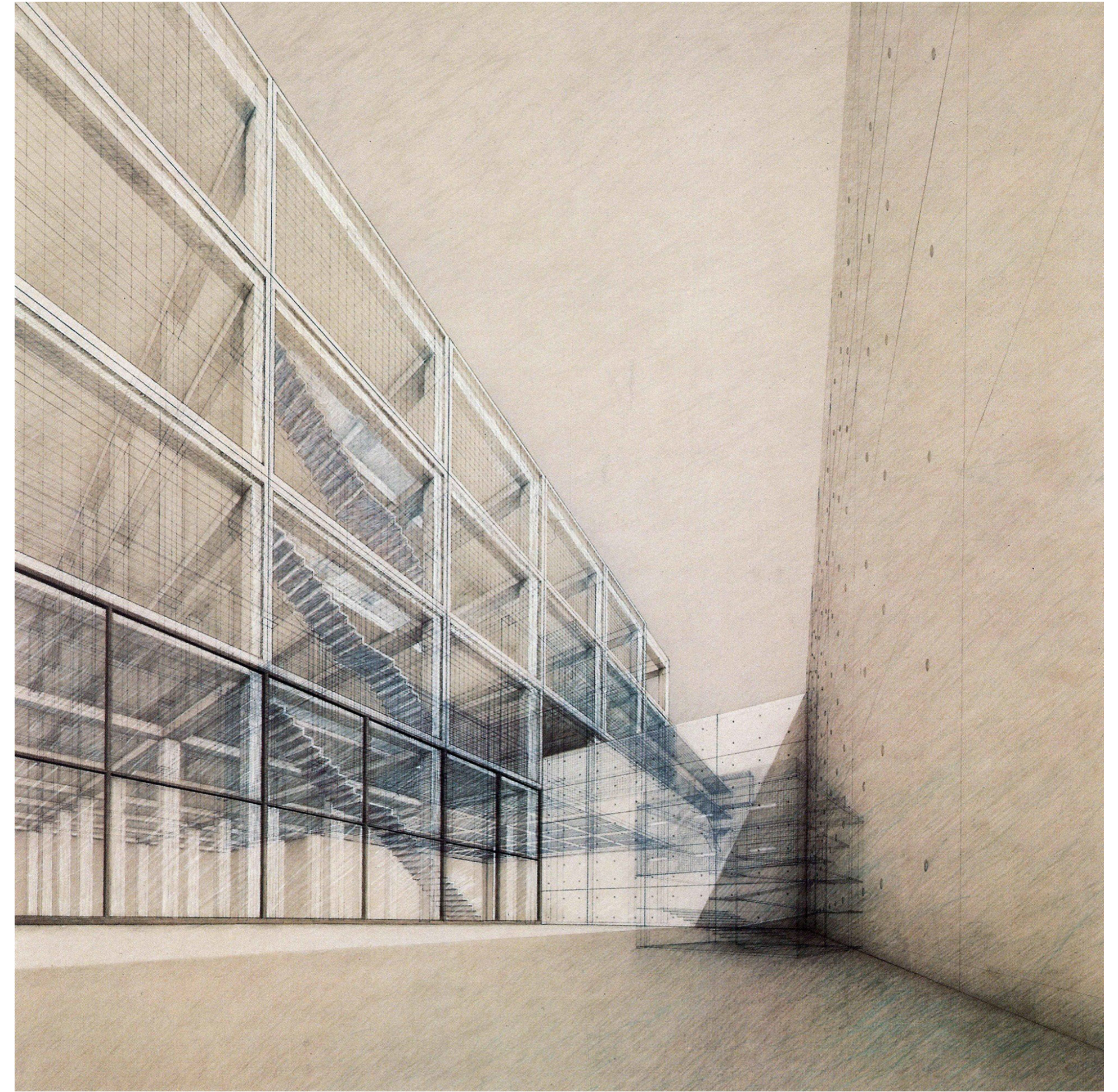
Architects: Wiel Arets Architects
Location: Maastricht, The Netherlands
Project Year: 1993
Photographs: Jan Bitter



The project includes the renewal of the existing Academy for the Arts, together with the extension of two buildings. Adjacent to the old building is the new structure that contains the auditorium, the library, an exhibition room, a bar and a roof garden. The connecting footbridge, with its translucent glass block floor and ceiling, leads one through the treetops and into the building that accommodates wood and steel workshops.



To encourage a continuous dialogue, the design dwelled on creating an environment that would be conducive to social interaction among the building's users. This is achieved by the circulation system, which dominates the plan. There is only one entrance to the entire complex, and only one ramp leading into the newly constructed auditorium, library and bar. The aerial bridge through the treetops is also the only link to the other portion of the extension. The adjoining patio is designed as a sculpture garden. Both students and professors are made to walk along the same route through the different faculties: Architecture, Fashion, Painting and Sculpture. The entire complex becomes an environment for continuous communication, between students and professors.

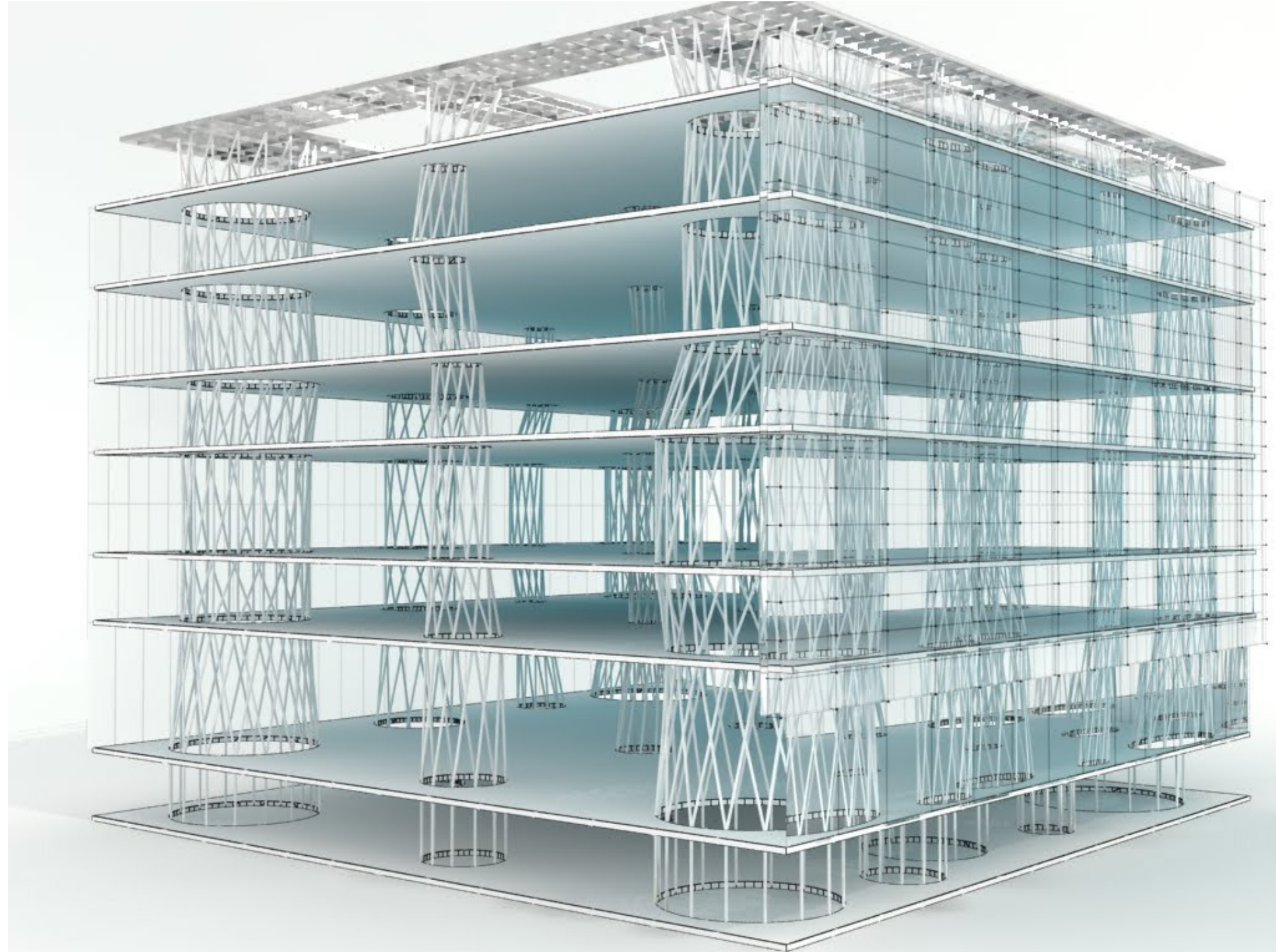




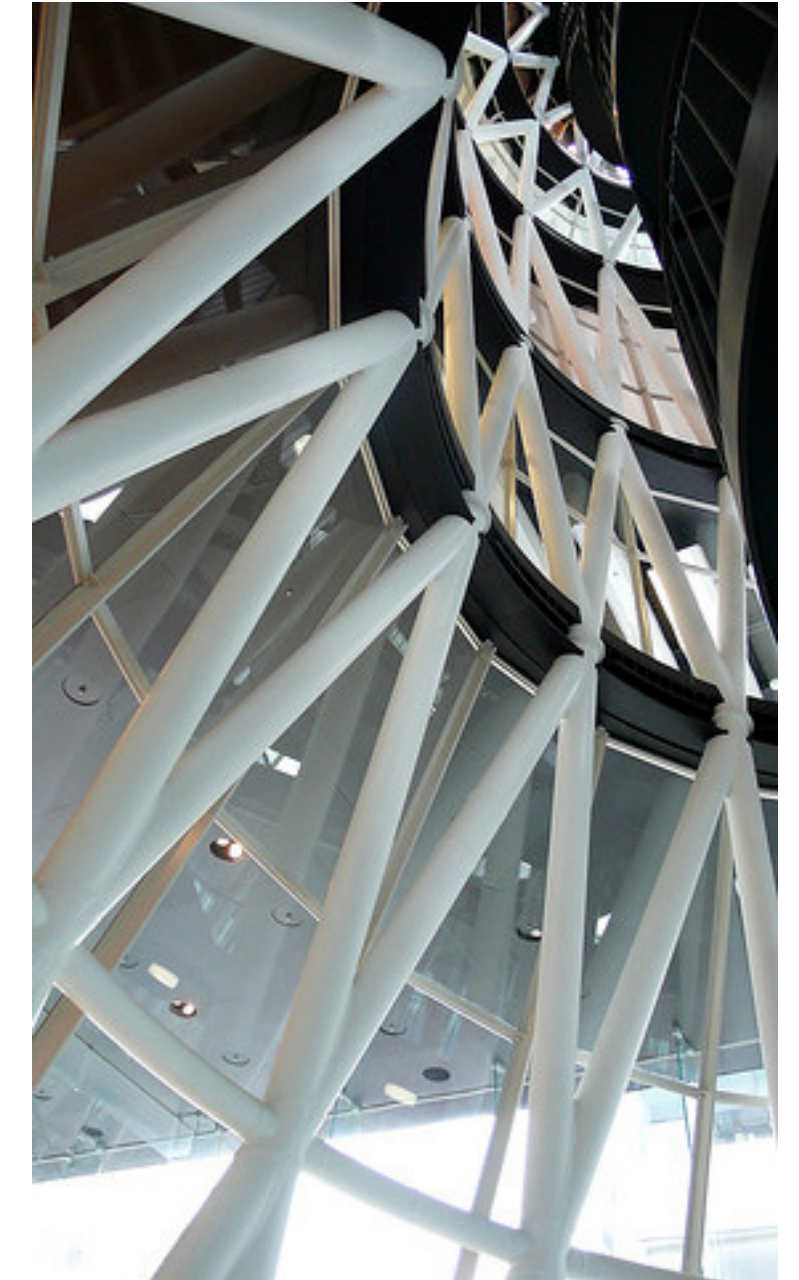
Architects: Toyo Ito
Location: Sendai-shi, Japan
Project Year: 2001
Photographs: Courtesy of RIBA, Courtesy of Toyo Ito, Archienviroment



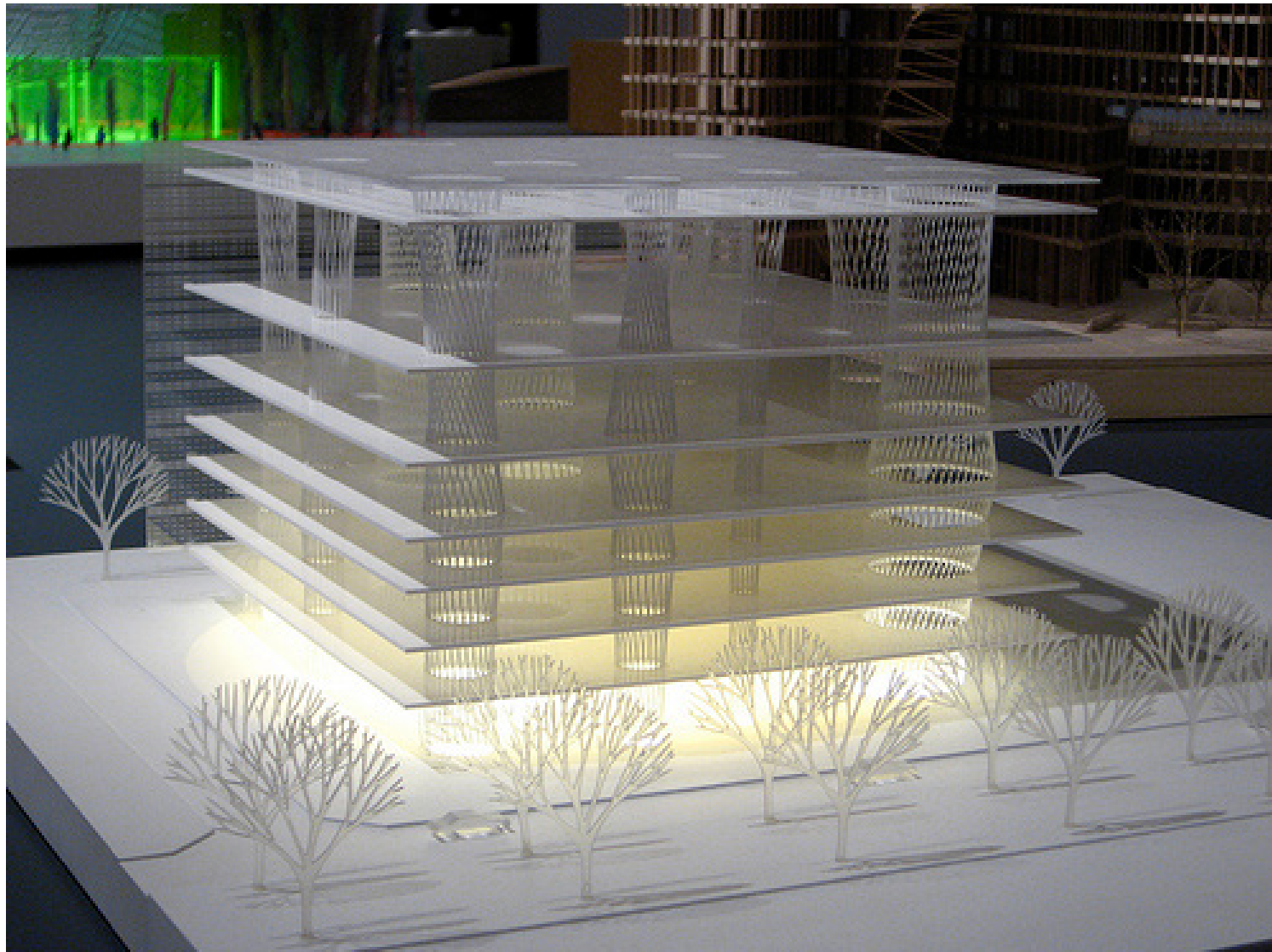
From the architect. With the intentions of designing a transparent cultural media center that is supported by a unique system to allow complete visibility and transparency to the surrounding community, the Sendai Mediatheque by Toyo Ito is revolutionary in its engineering and aesthetic.



Each plan is free form, as the structural column lattices are independent of the facade and fluctuate in diameter as they stretch from floor to floor.



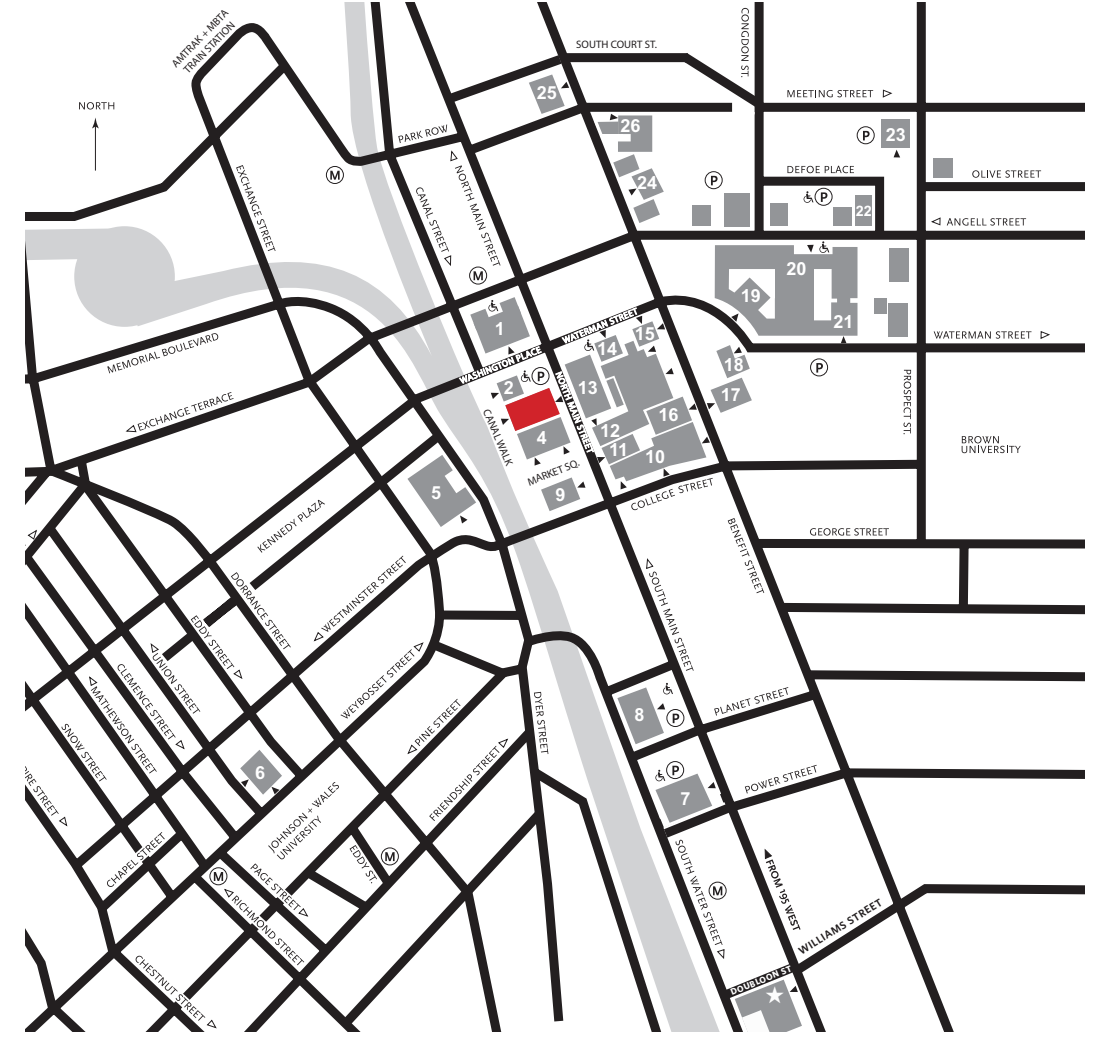
Six steel-ribbed slabs, each 15-3/4" thick, appear to float from the street, supported by only thirteen vertical steel lattice columns that stretch from ground plane to the roof. This striking visual quality that is one of the most identifiable characteristics of the project is comparable to large trees in a forest, and function as light shafts as well as storage for all of the utilities, networks and systems.



SITE: EXISTING BUILDING
DOCUMENTATION AND ANALYSIS

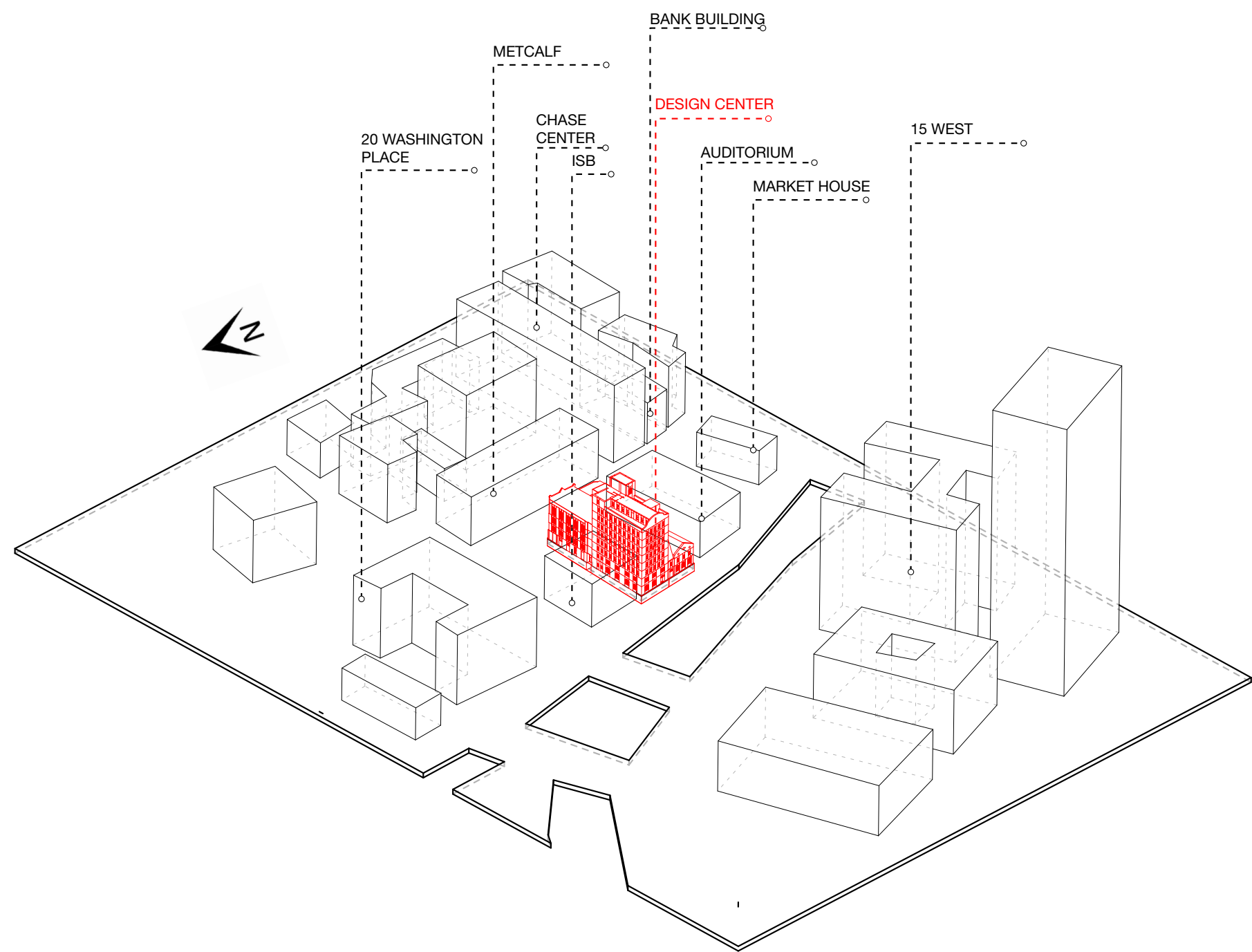
The simplest intentions of focusing on plates (floors), tubes (columns), and skin (facade/ exterior walls) allows for a poetic and visually intriguing design, as well as a complex system of activities and informational systems.

The four largest tubes are situated at the corners of the plates, which serve as the principle means of support and bracing. Five of the nine smaller tubes are straight and contain elevators, while the other four are more crooked and carry the ducts and wires.



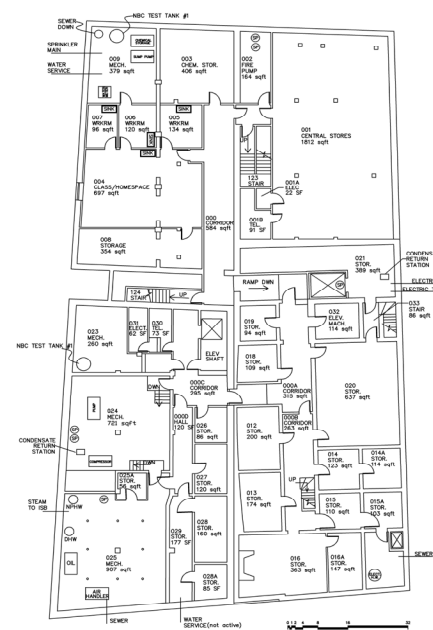
DESIGN CENTER
30 N Main St, Providence, RI

- Apparel Design Department
- Continuing Education
- Dining & Catering
- Graphic Design Department
- Information Technology
- Photography Department
- Liberal Arts

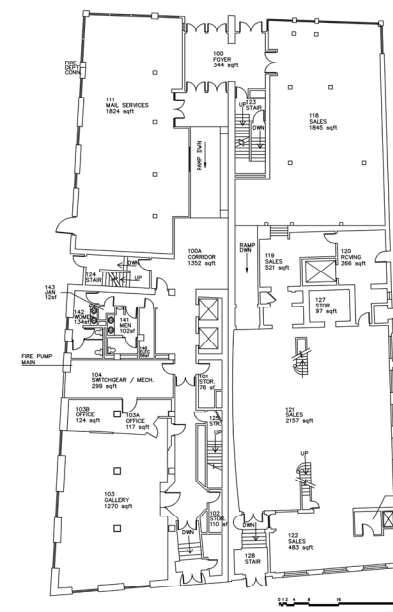


CONTEXT

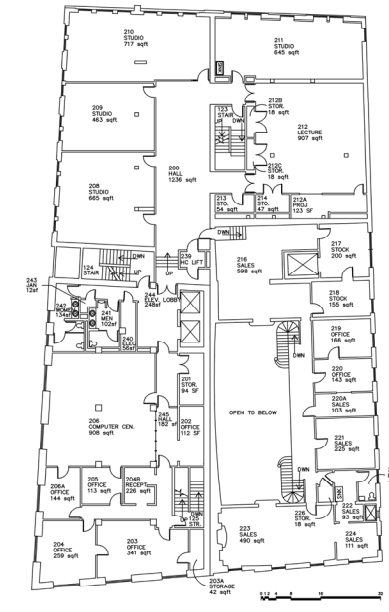
ORIGINAL PLAN



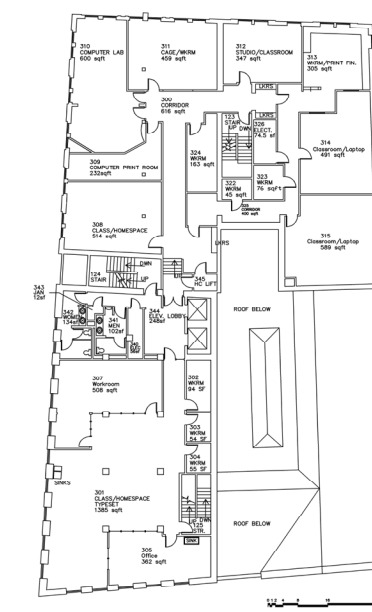
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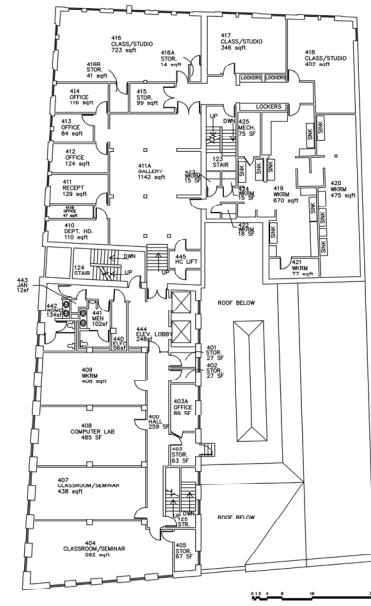
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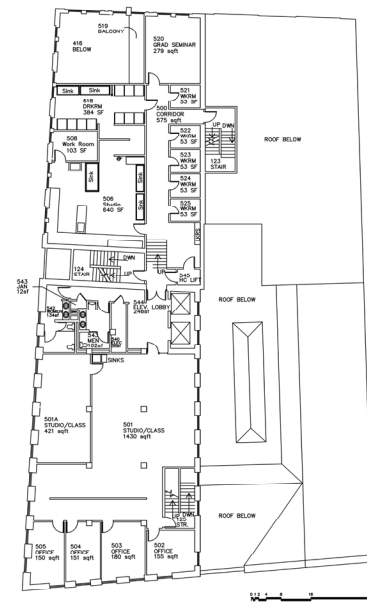
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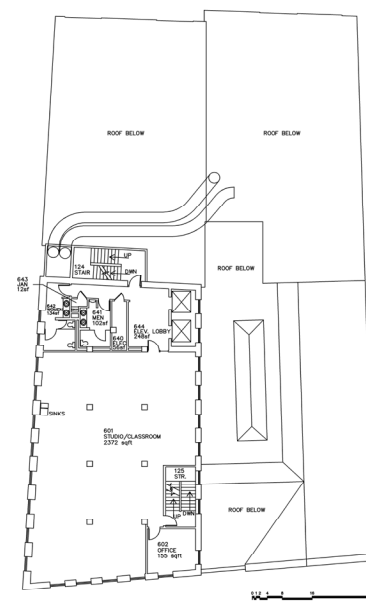
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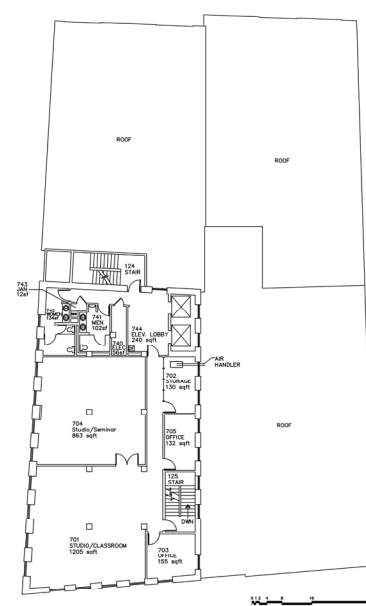
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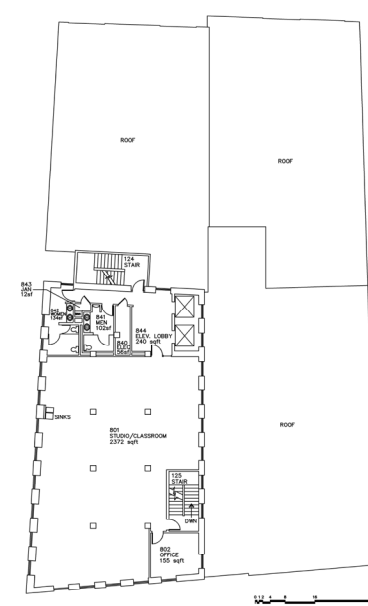
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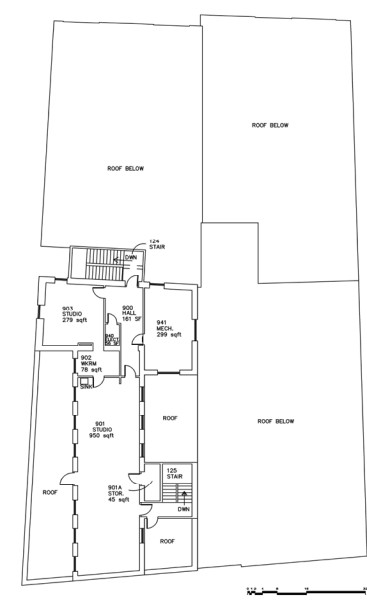
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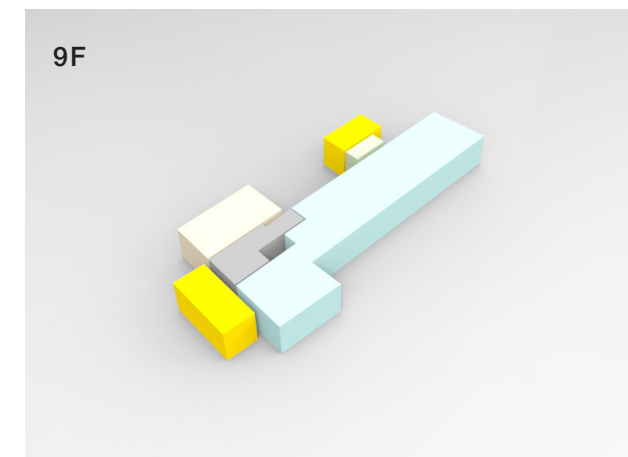
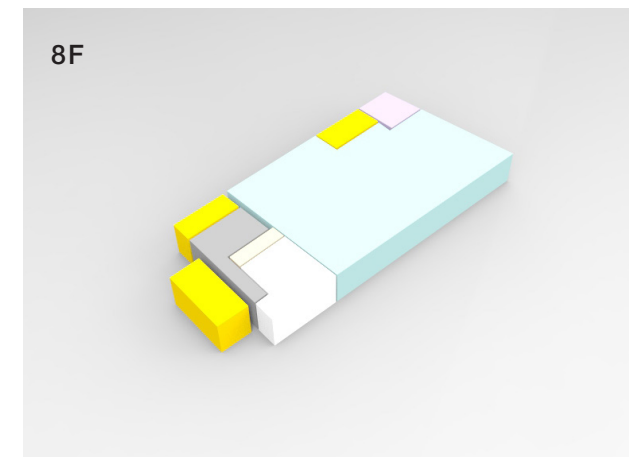
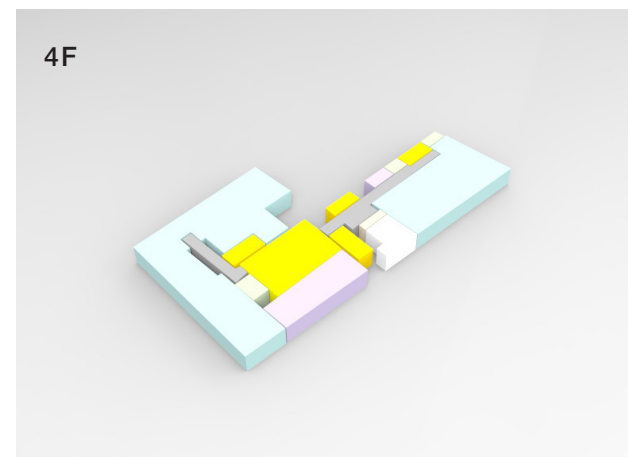
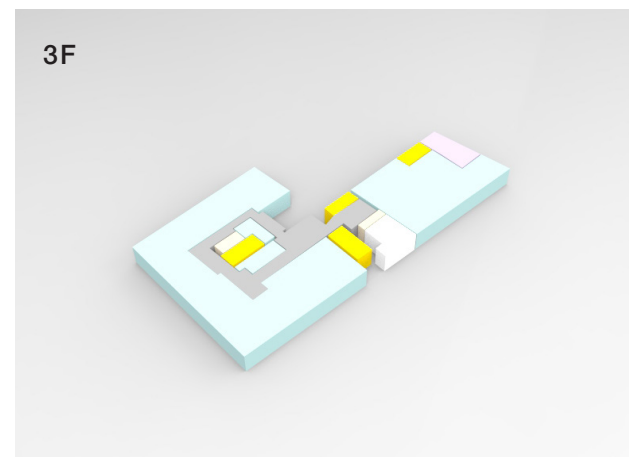
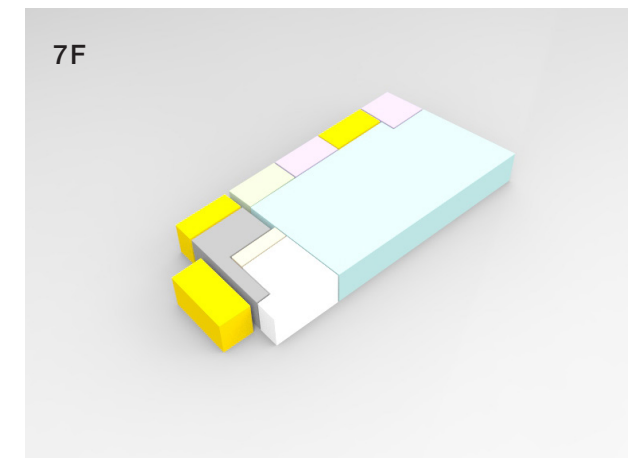
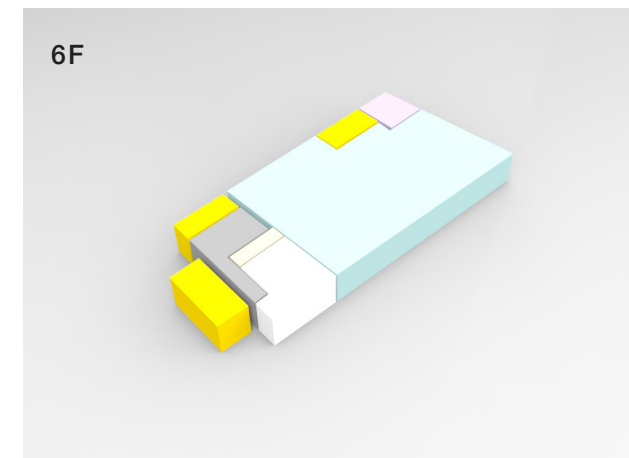
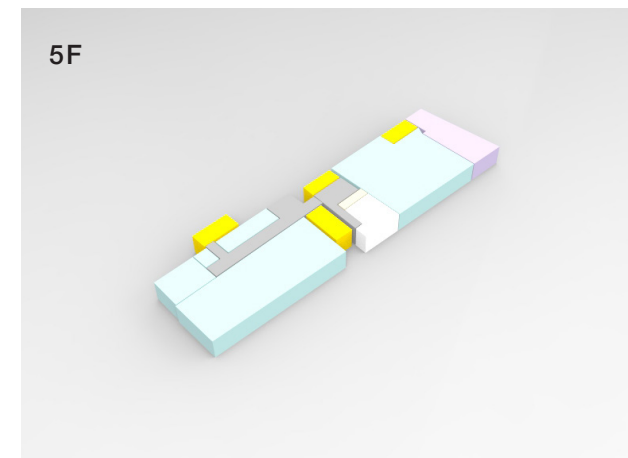
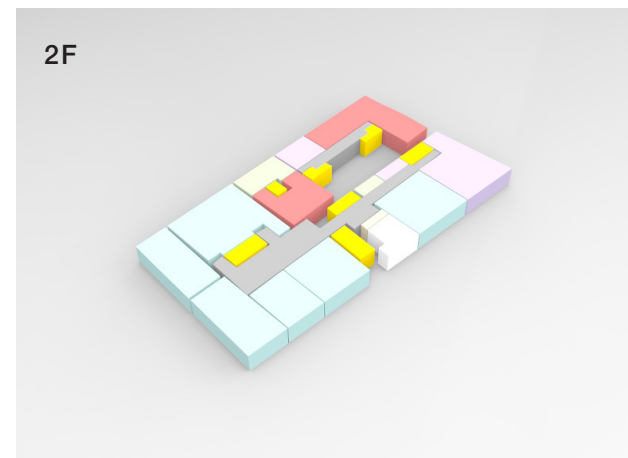
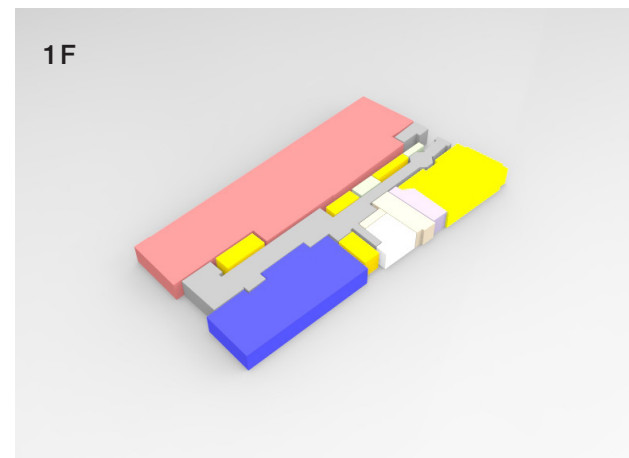
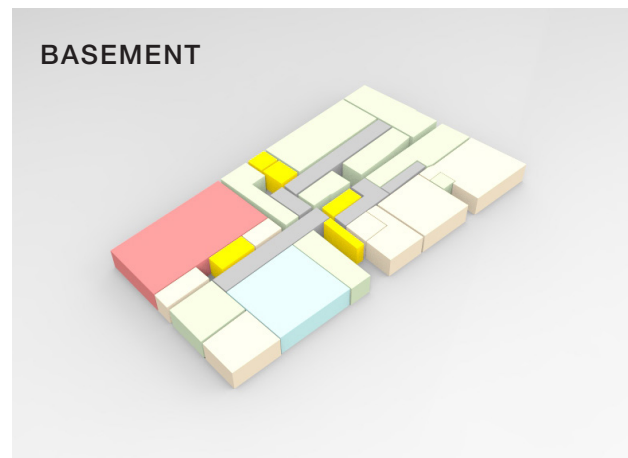
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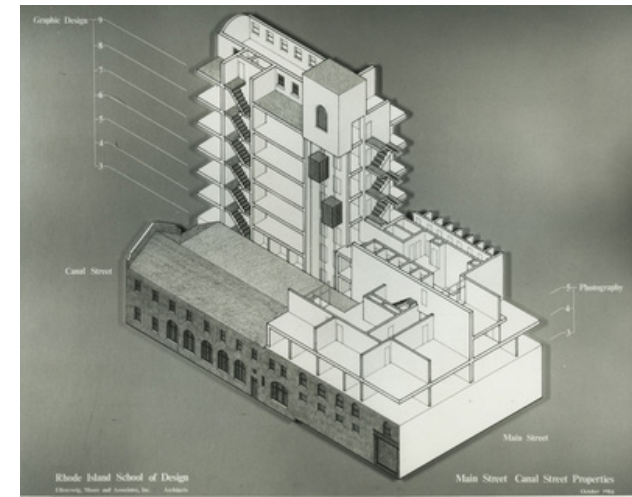
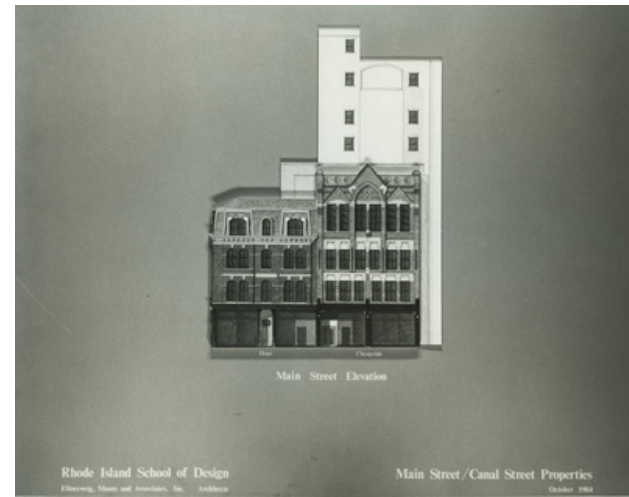
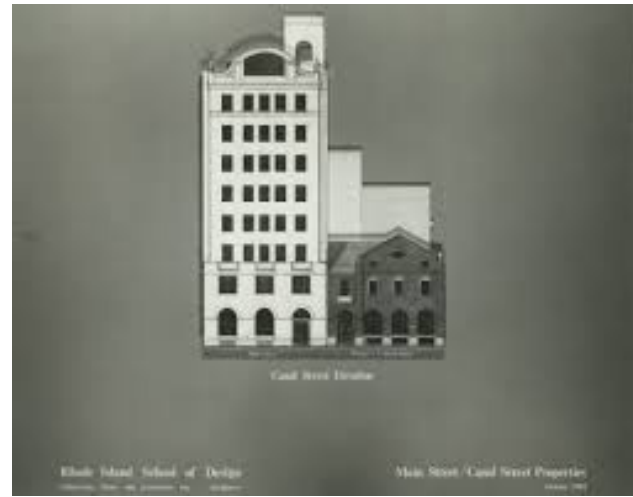


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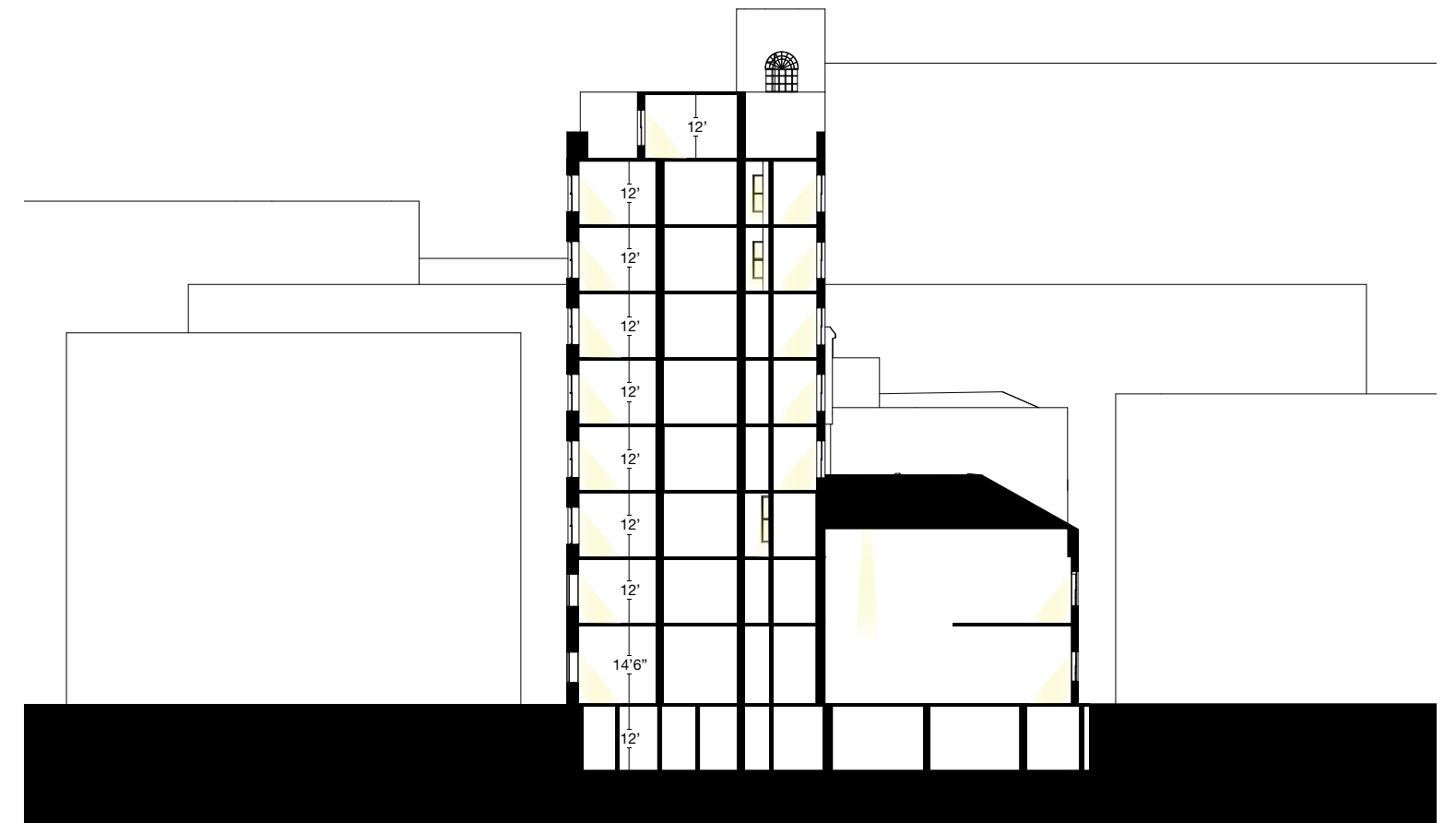


EXISTING PROGRAM

- CLASSROOM
- STAIRCASE & ELEVATOR
- RESTROOM
- OFFICE
- STORE
- MAILING SERVICE
- CORRIDOR
- MECH
- STORAGE



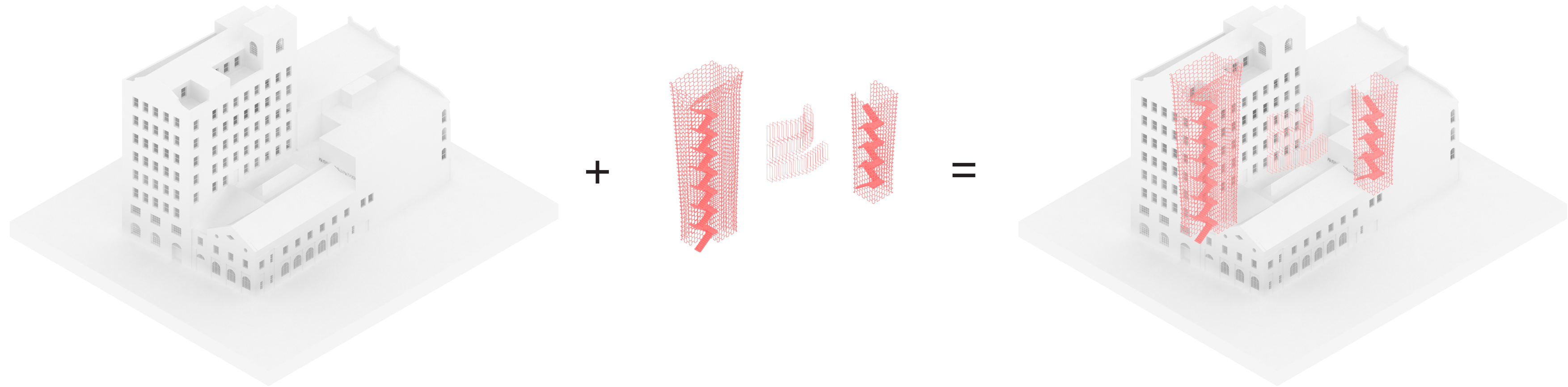
SECTION & ELEVATION



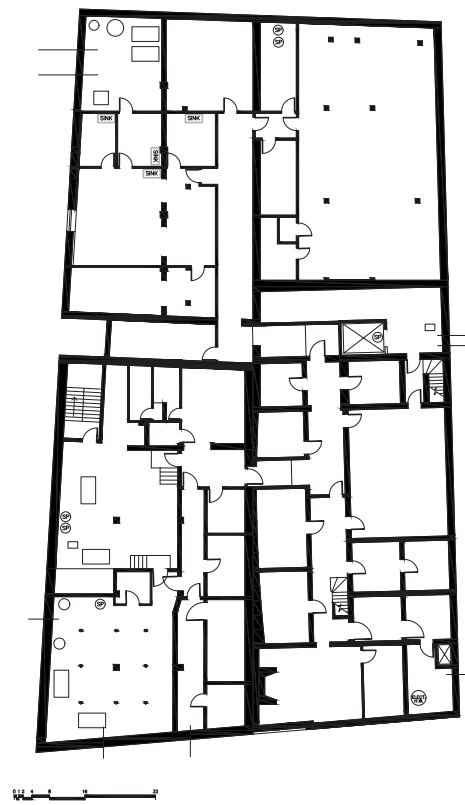
ORIGINAL LIGHTING SECTION

**DESIGN CONCEPT & FRAMEWORK
FOR INTERVENTION TO HOST BUILDING**

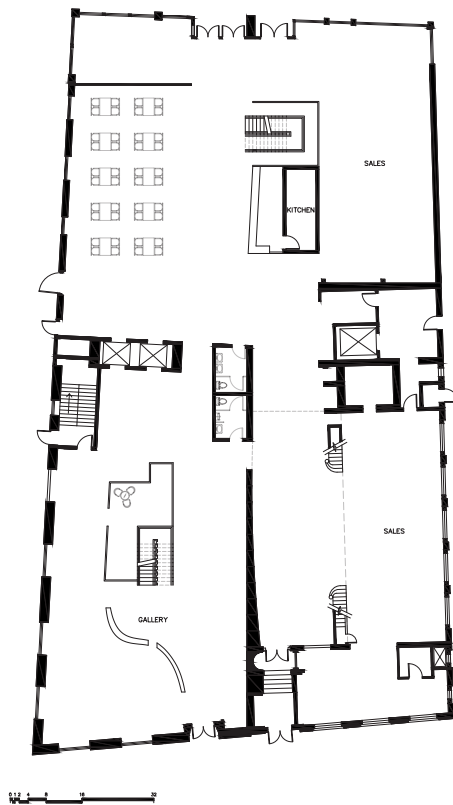
DESIGN CONCEPT - ATRIUM



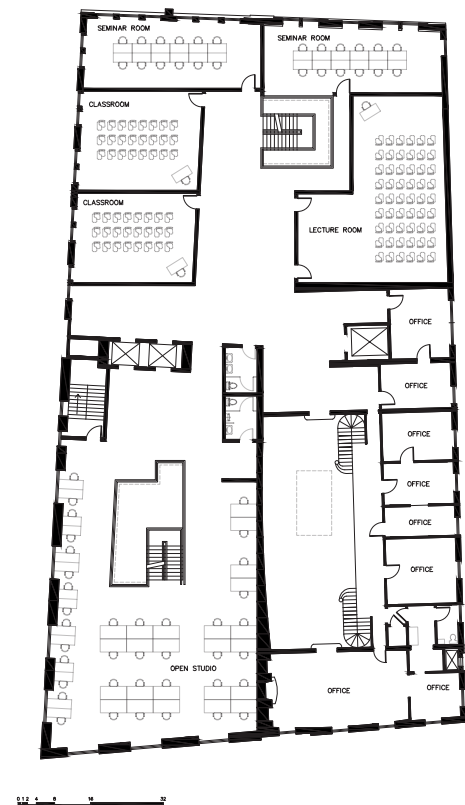
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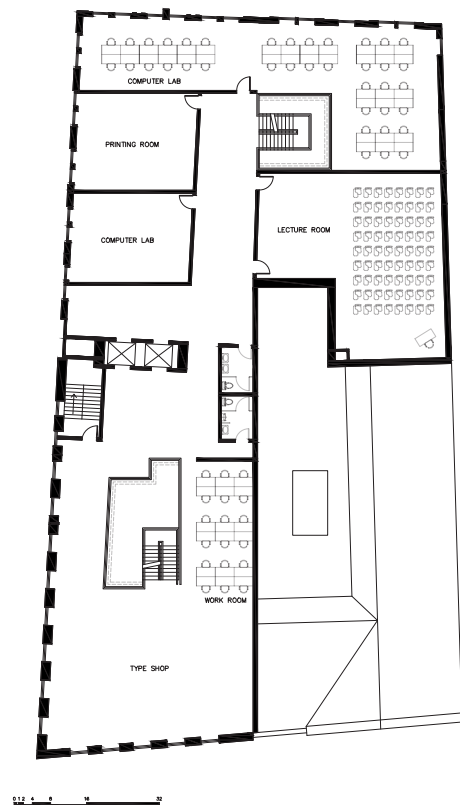
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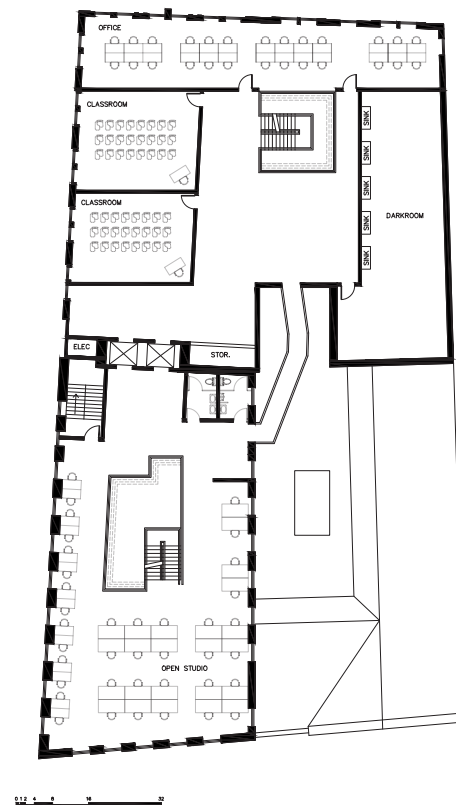
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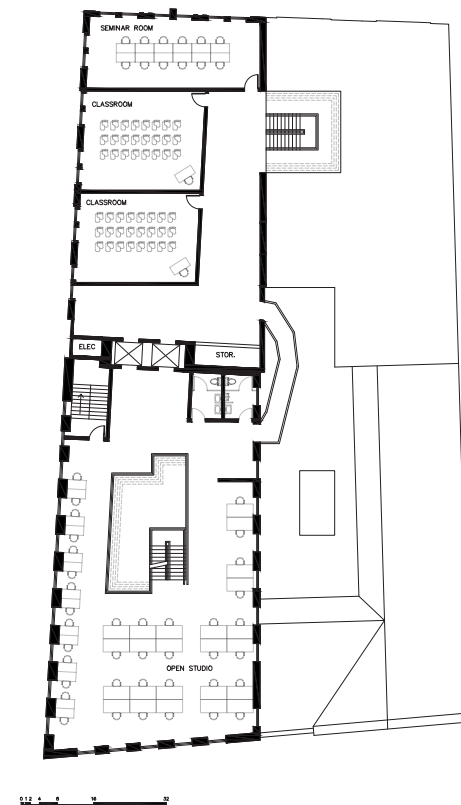
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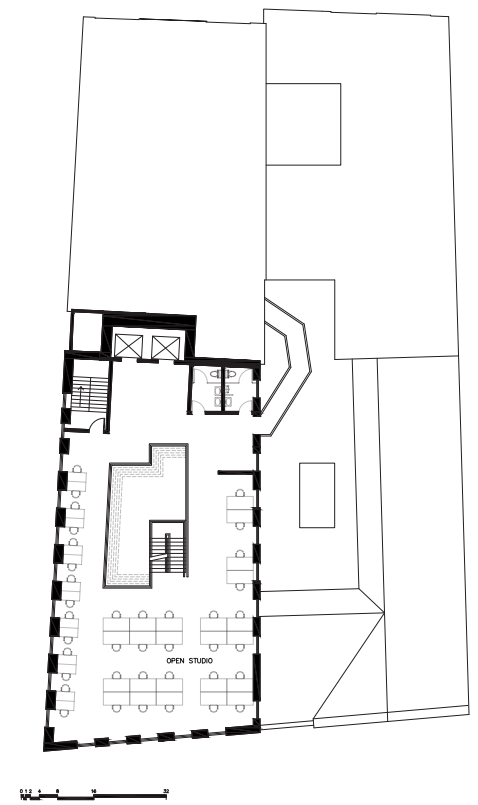
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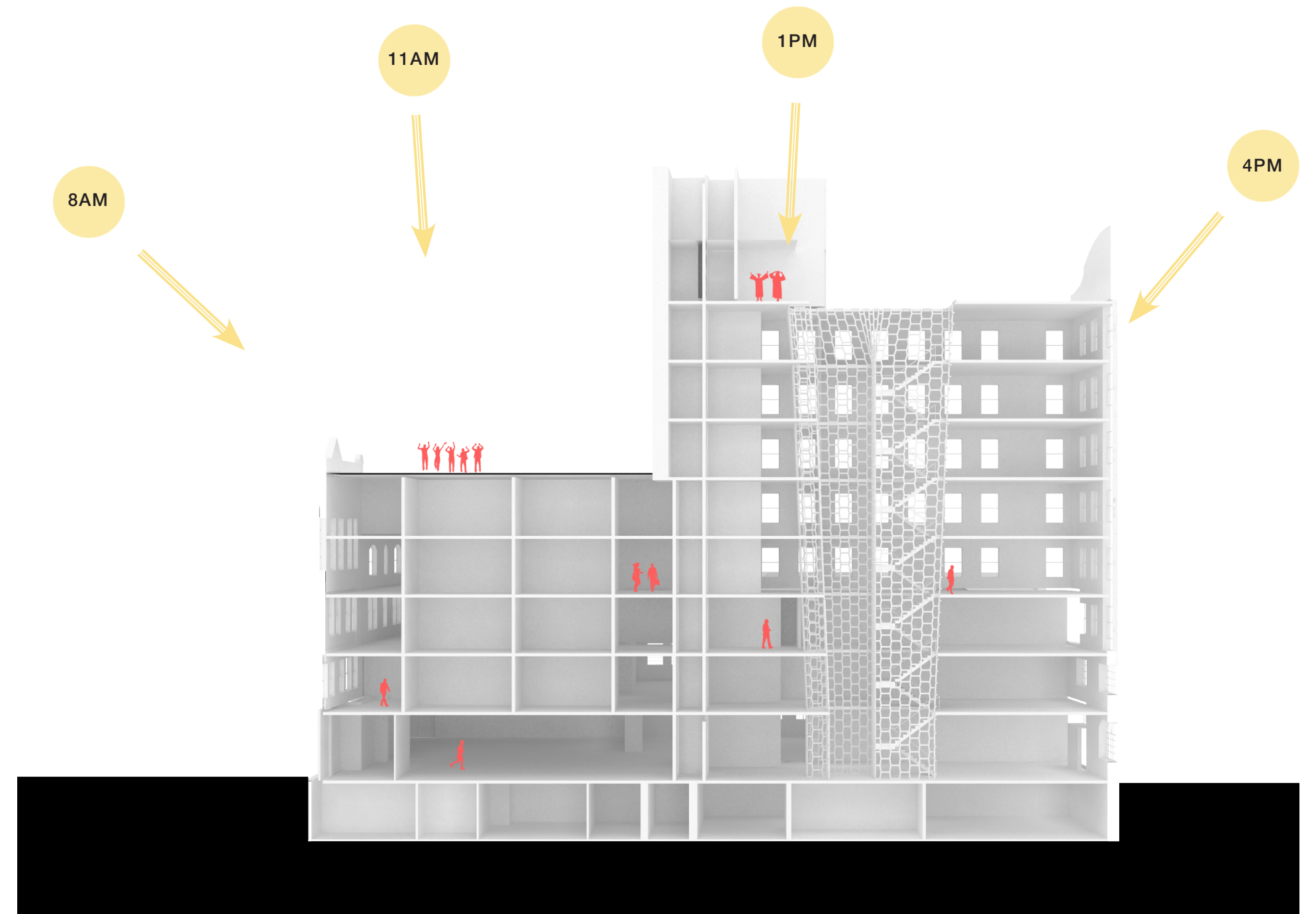
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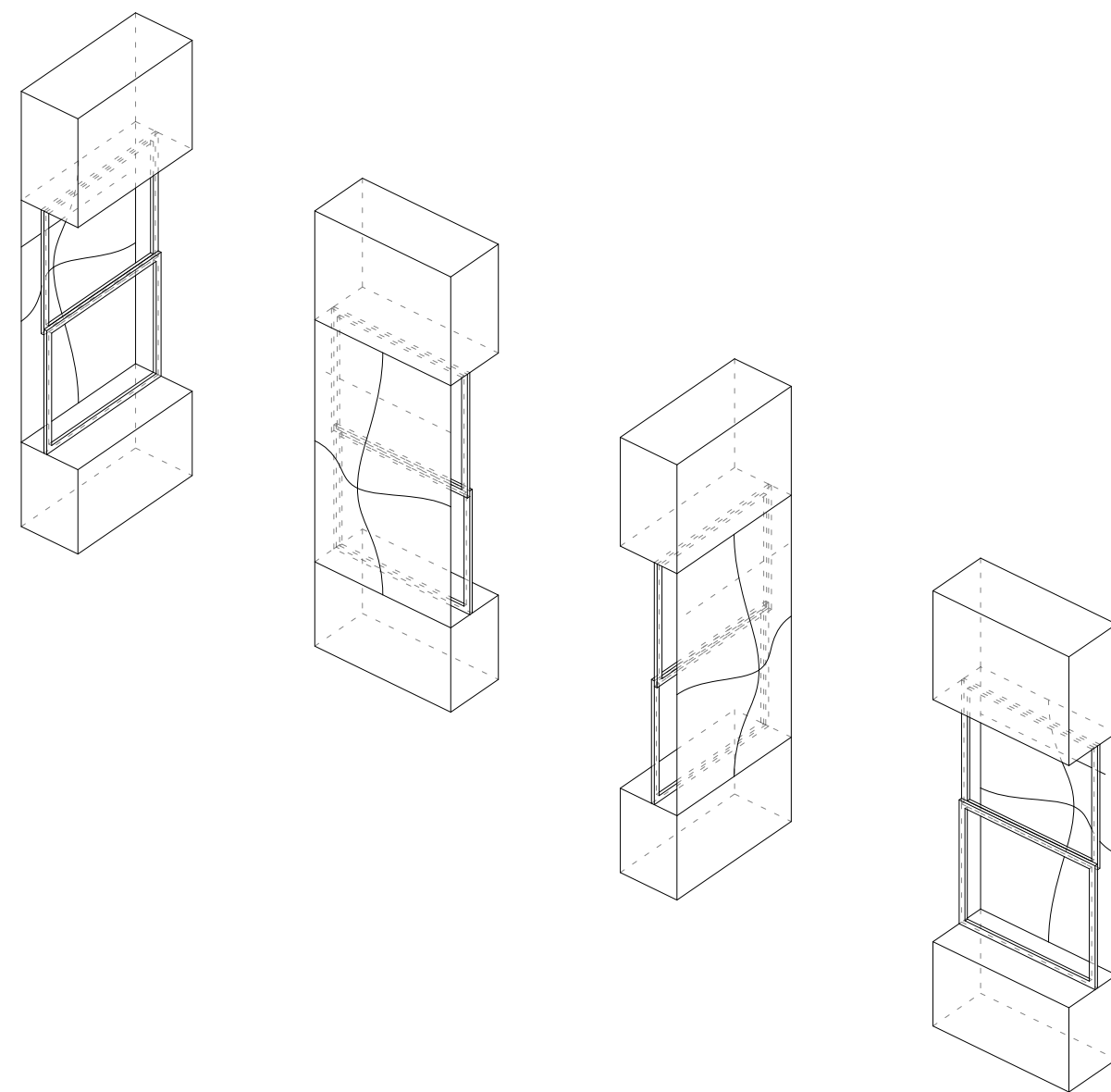
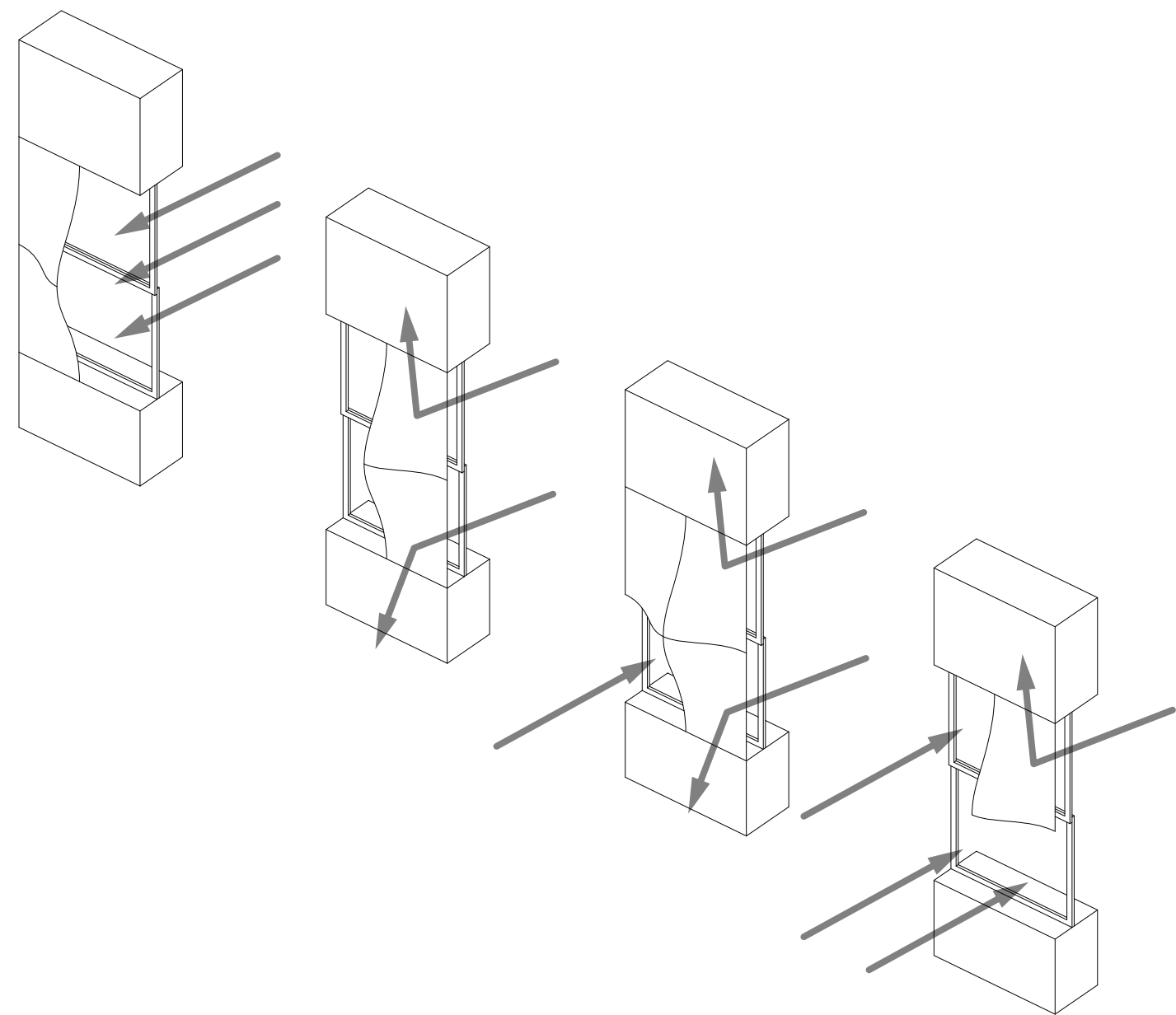
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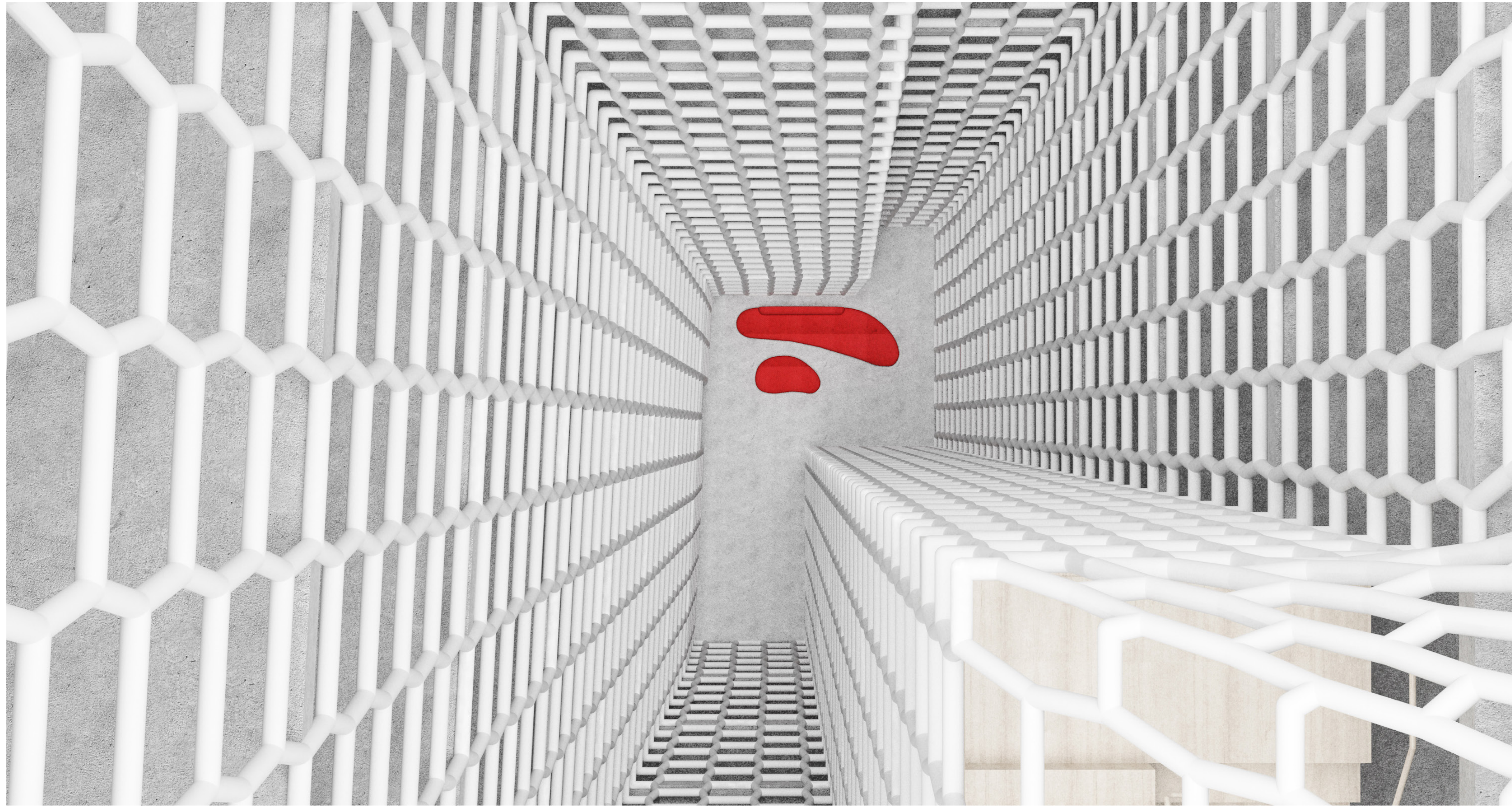
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SECTION 01



DESIGN CONCEPT - WINDOW





ANNOTATED BIBLIOGRAPHY

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This report is a culmination and written documentation of the campus facilities assessment process. The assumptions and exclusions are as important as the recommendations and conclusions in the future use of this document and database. This assessment is a composite of the available data, assumptions about visual observation, concealed conditions, recognition that design issues are beyond the scope of the assessment, and inherent pricing volatility

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