

THESIS SUBMITTED TO THE FACULTY OF THE VIRGINIA  
POLYTECHNIC INSTITUTE AND STATE UNIVERSITY IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE  
DEGREE OF

MASTER OF ARCHITECTURE

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HEINRICH SCHNOEDT CHAIR

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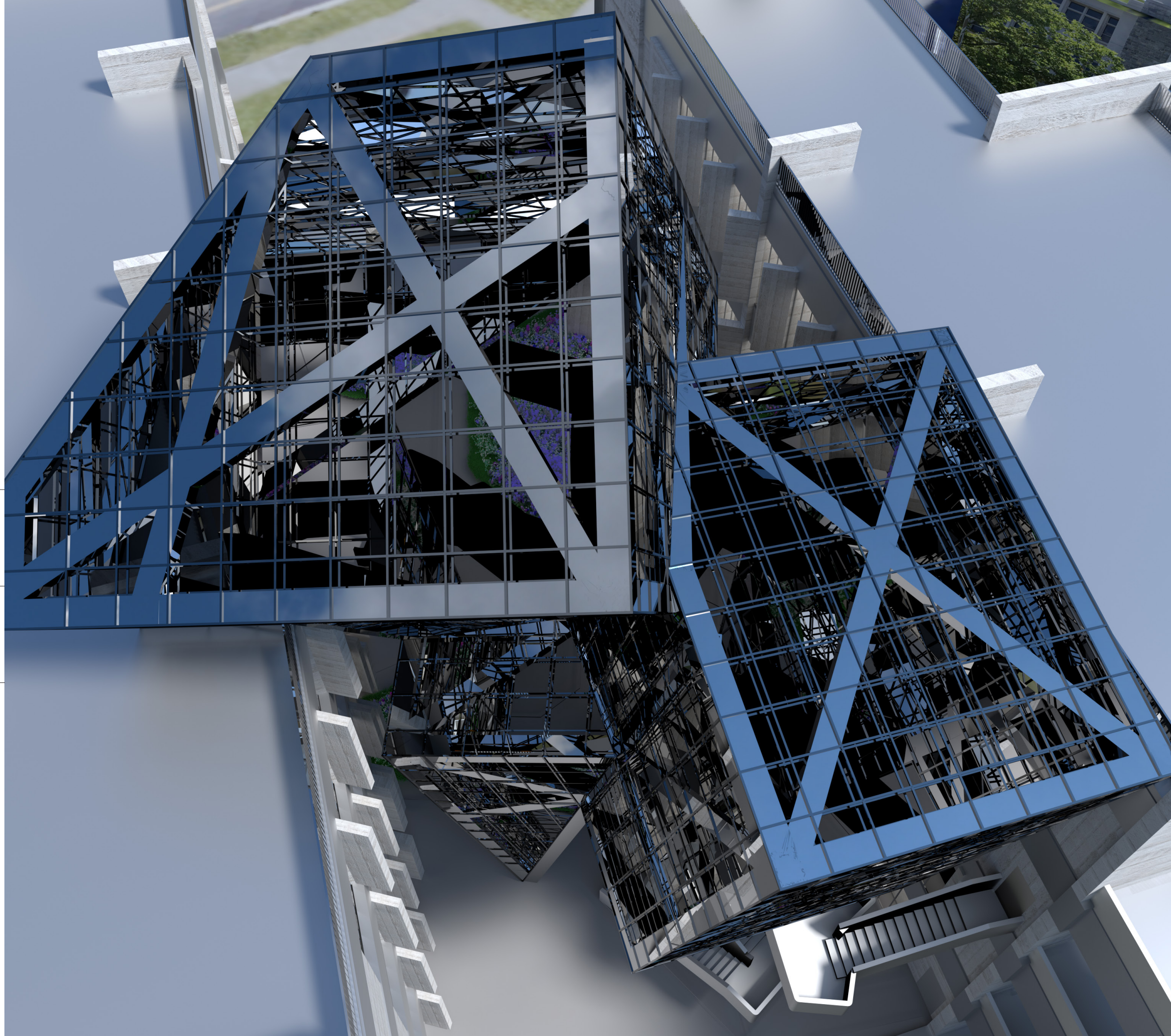
WILLIAM GALLOWAY

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JAMES JONES

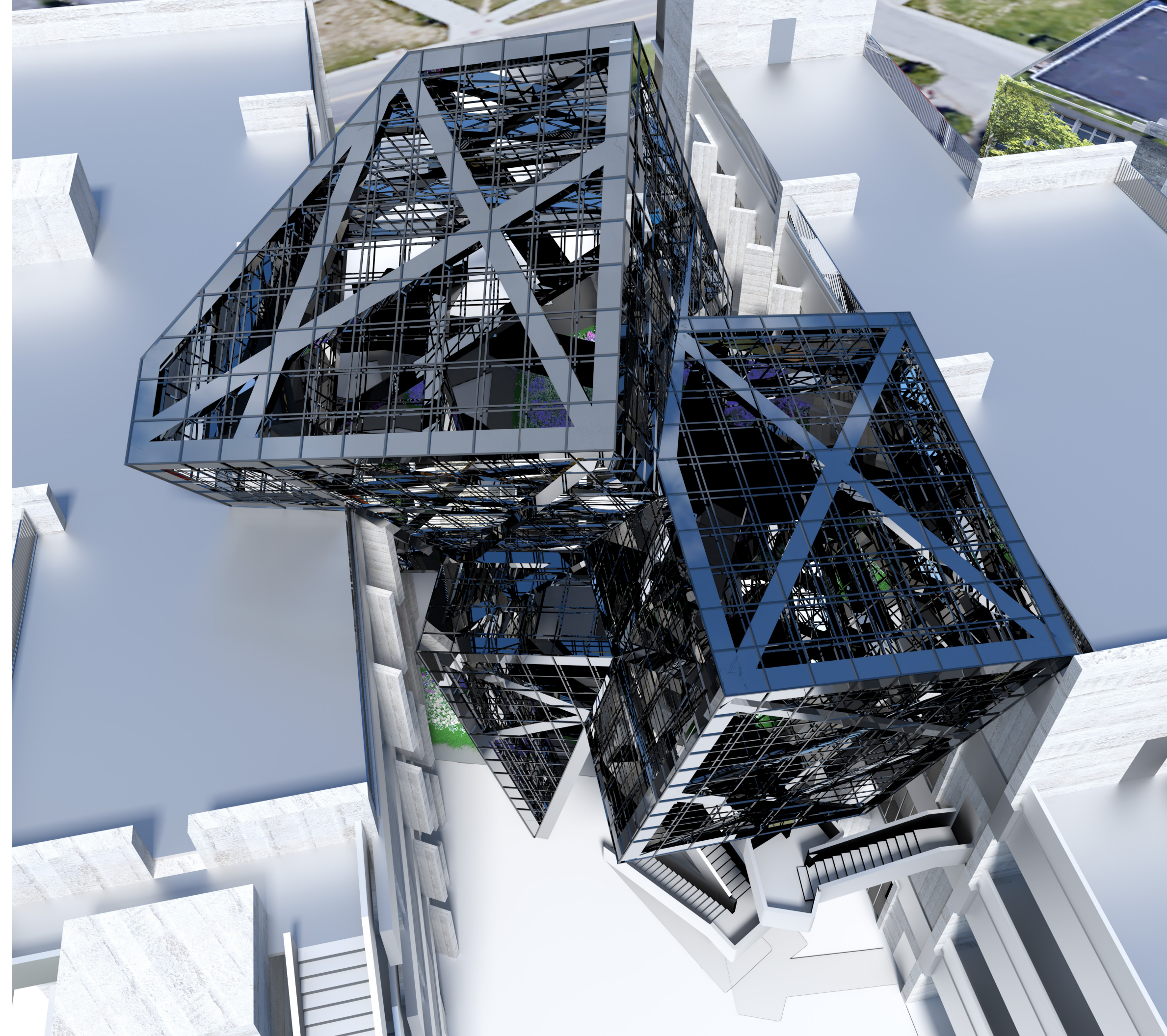
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LABORATORY



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LABORATORY



## Abstract

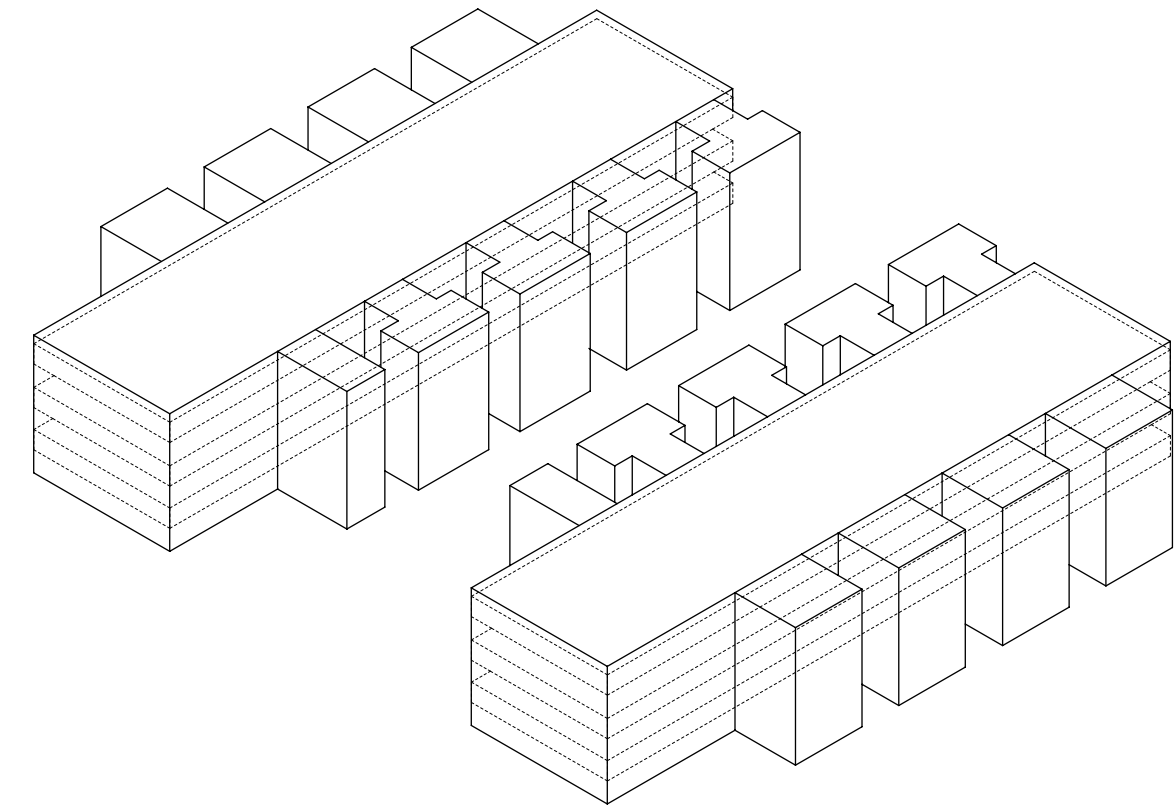
As an institutional building, especially in the context of a university, the architecture of a chemistry building can aim for expression of objectivity and functionalism. Space dedicated to research is a part of a basic desire for new insights and can contribute through its form to an understanding of the role of research. Conversations with chemistry students suggest that both space layout and quantity of laboratories can be improved. Perhaps the architecture can provide an additional stimulus beyond the basic needs of students and researchers. The proposed chemistry building focuses primarily on architectural sensory and experiential qualities inspired by architects Louis Kahn and Peter Zumthor. The project proposes more laboratories with a better academic research environment combined with more public space for enjoyment beyond the research life.

Located at an important strategic site on campus, the building serves both as campus infrastructure and chemistry laboratories. The facade is intended as an assembly of grey precast concrete elements. The complex is divided into two main functional wings connected by a sculptural steel-glass stair object. The two wings serve as laboratories and offices, while the central glass stair offers a strong identity with a memorable space. The form offers a conversation between tradition and the future. The research part utilizes regular concrete structure with glass between the divisional walls, while the sculptural stair with its striking external form provokes a dialogue between art and science.

|                            |    |
|----------------------------|----|
| Reference                  | 02 |
| Orthogonal representations | 04 |
| Space representations      | 08 |
| Develop                    | 20 |
| Further                    | 28 |
| Partial                    | 32 |
| End                        | 34 |

# Reference 01

Salk Institute for Biological Studies, 1965  
La Jolla, San Diego, California, United States  
Louis Kahn



Cross-sectional view depicting column-free laboratories.

Laboratory space

Interstitial space with Vierendeel trusses

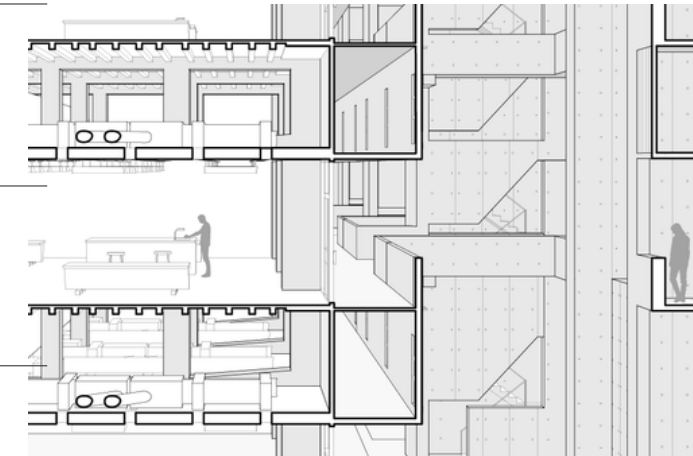


Image Resource: [tamara-yurovsky.squarespace.com/lt-architects-manual-of-cuts/w9pvxycubkjzvtjijge5ogyawcah](http://tamara-yurovsky.squarespace.com/lt-architects-manual-of-cuts/w9pvxycubkjzvtjijge5ogyawcah)

# Reference 02

41 Cooper Square, 2009  
New York, United States  
Morphosis Architects

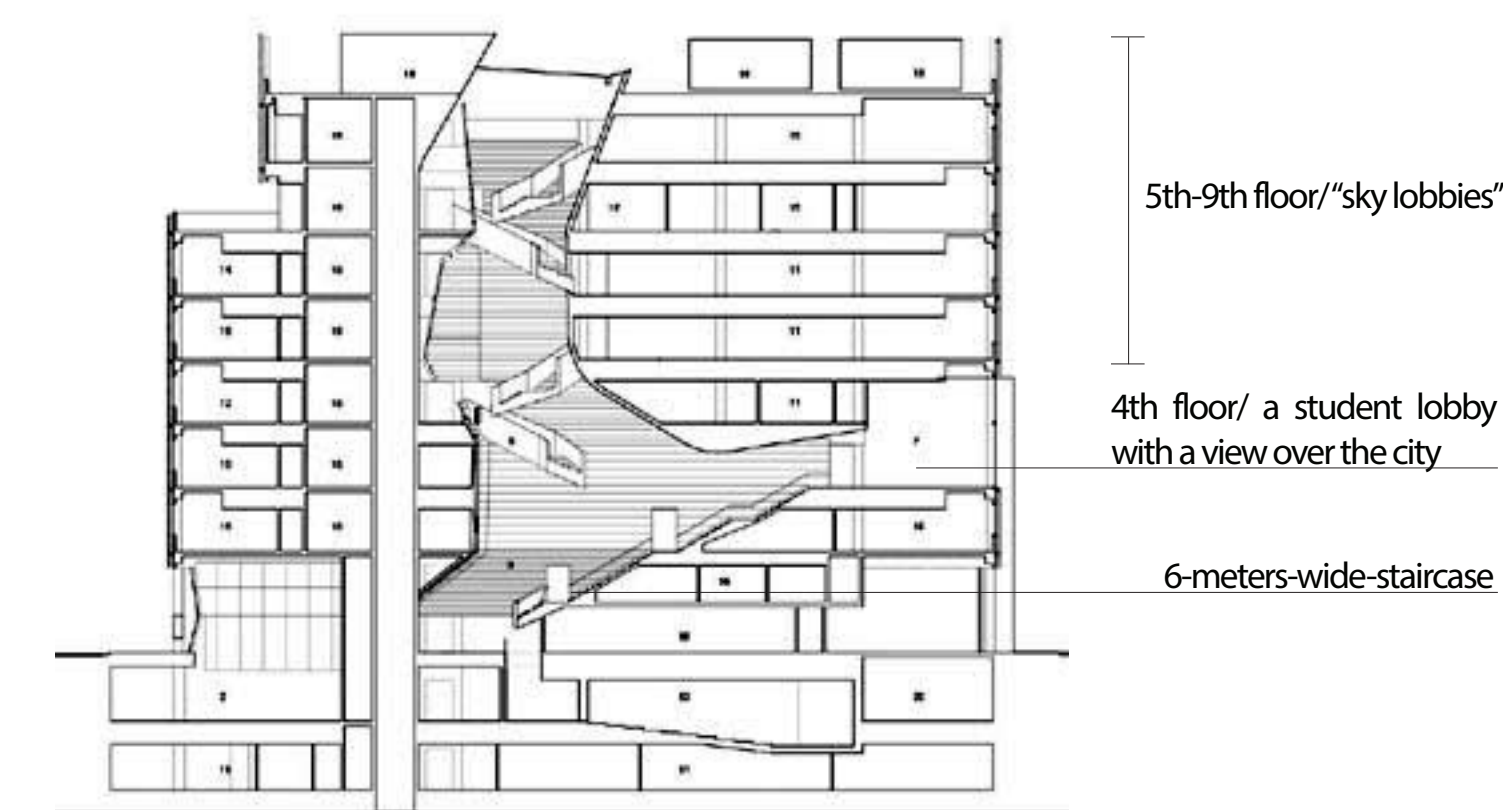


Image Resource: [archdialog.com/tag/sciences-building-of-cooper-union-college/](http://archdialog.com/tag/sciences-building-of-cooper-union-college/)

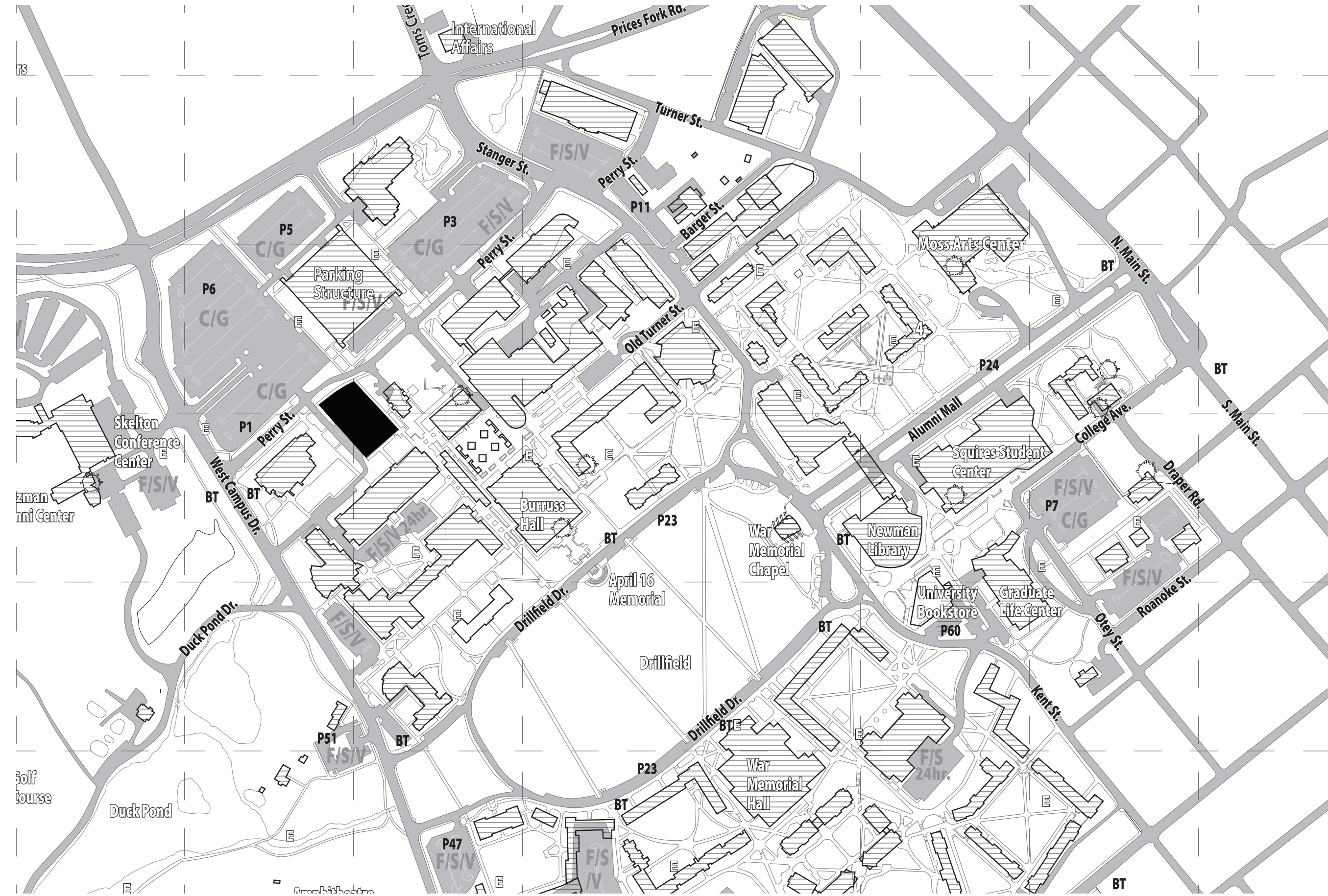
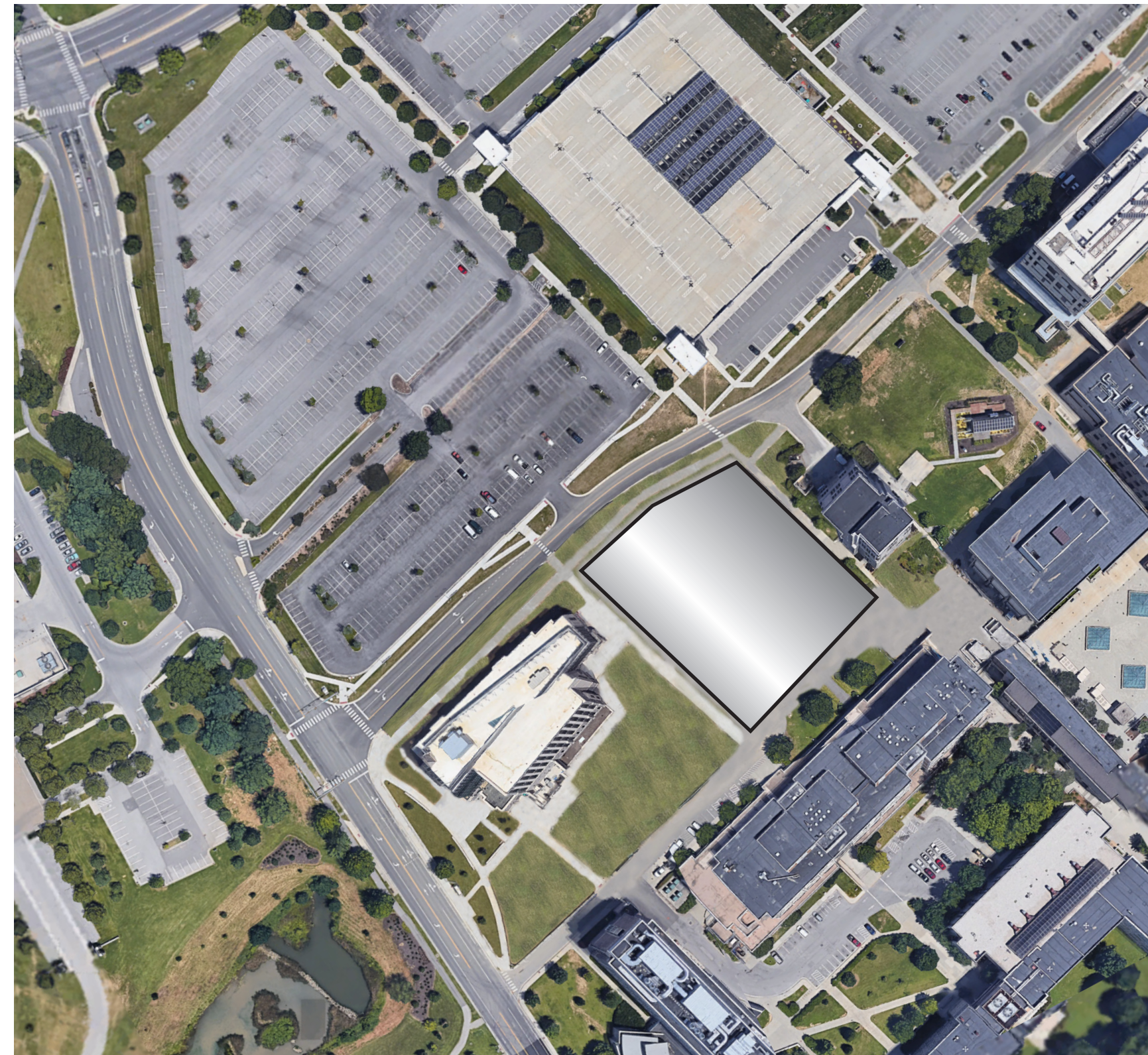
"Vertical Piazza"  
a visual incision in the facade between the exterior public and the central atrium.



Image Resource: [www.nytimes.com/2013/02/16/nyregion/cooper-unions-tradition-of-free-tuition-may-be-near-end.html](http://www.nytimes.com/2013/02/16/nyregion/cooper-unions-tradition-of-free-tuition-may-be-near-end.html)

# Description of the Site

The site of the chemistry building is located on the campus of Virginia Tech. It stands in the center of the western part of the university, surrounded by Cowgill Hall, Derring Hall, the New Classroom Building, the Perry Street Parking Garage and Bishop Favro Hall. Because of the close proximity to the parking garage, the proposed Chemistry Building is highly visible. With the planned important future transportation node of the campus, the new Chemistry Building seeks to frame one of the important entrances to campus.



# Site photographs



# Surrounding buildings

Classroom Building



Perry Street Parking Structure



Derring Hall



Bishop-Favrao Hall

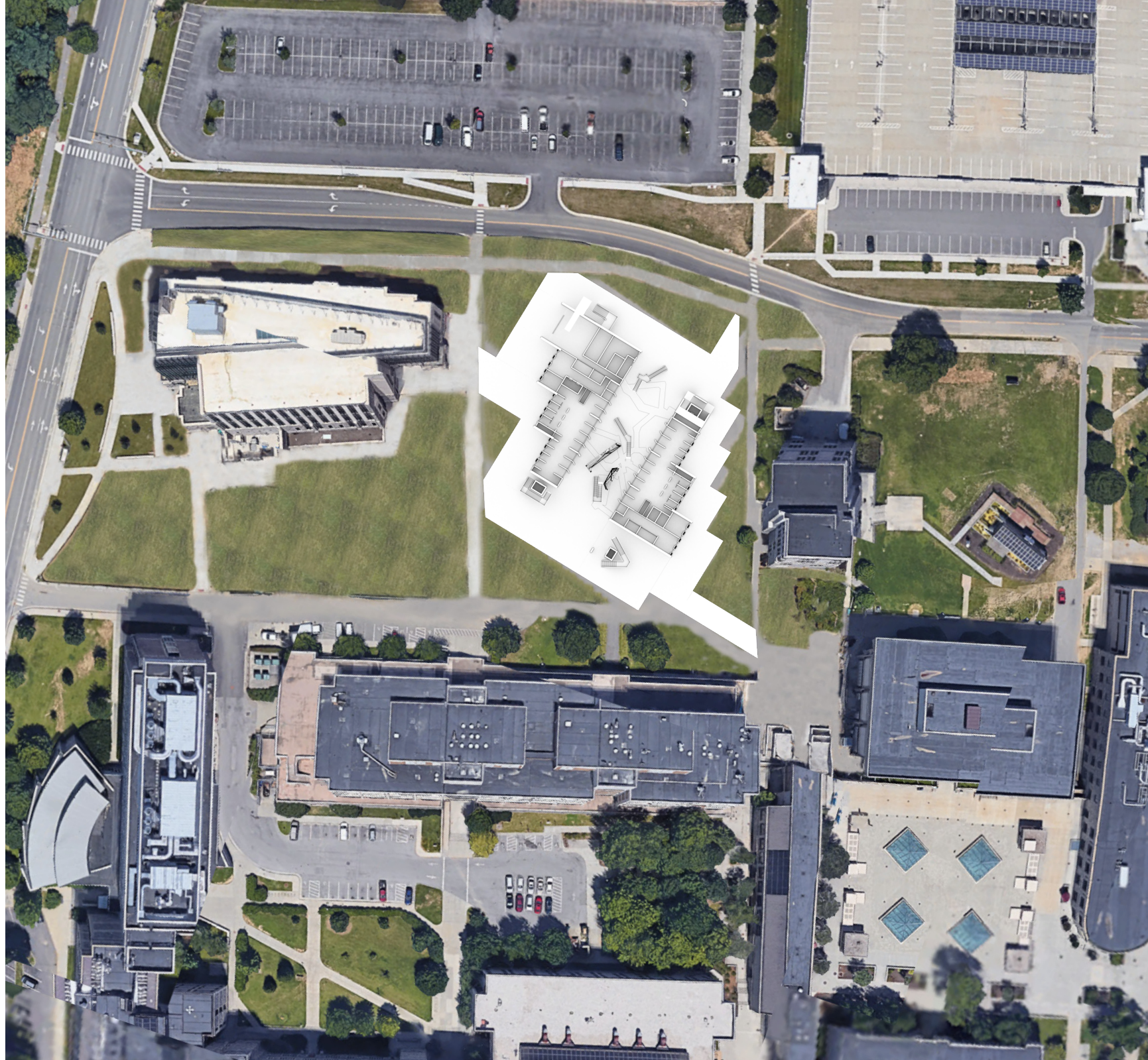


Cowgill Hall

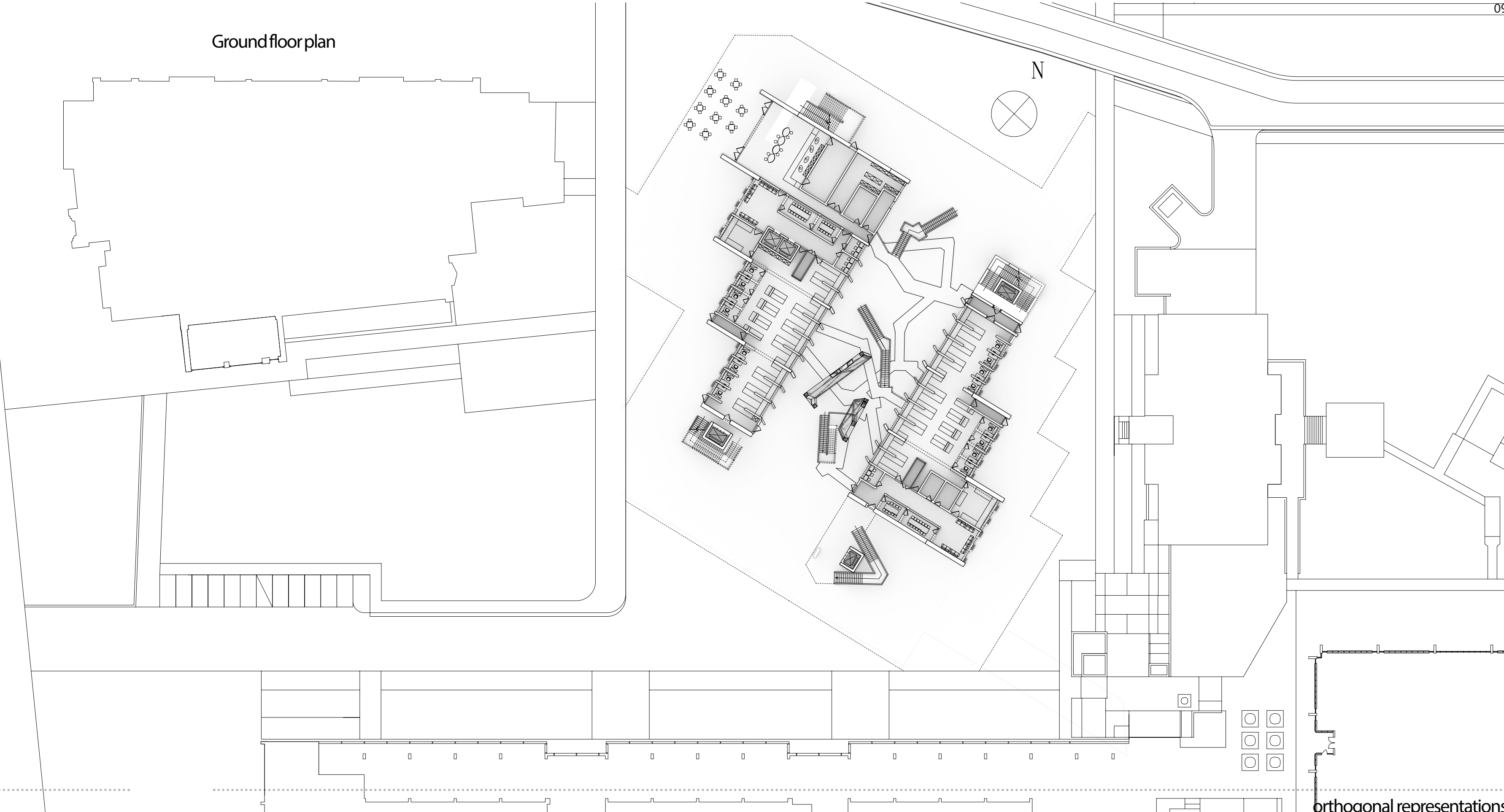


# Floor plans

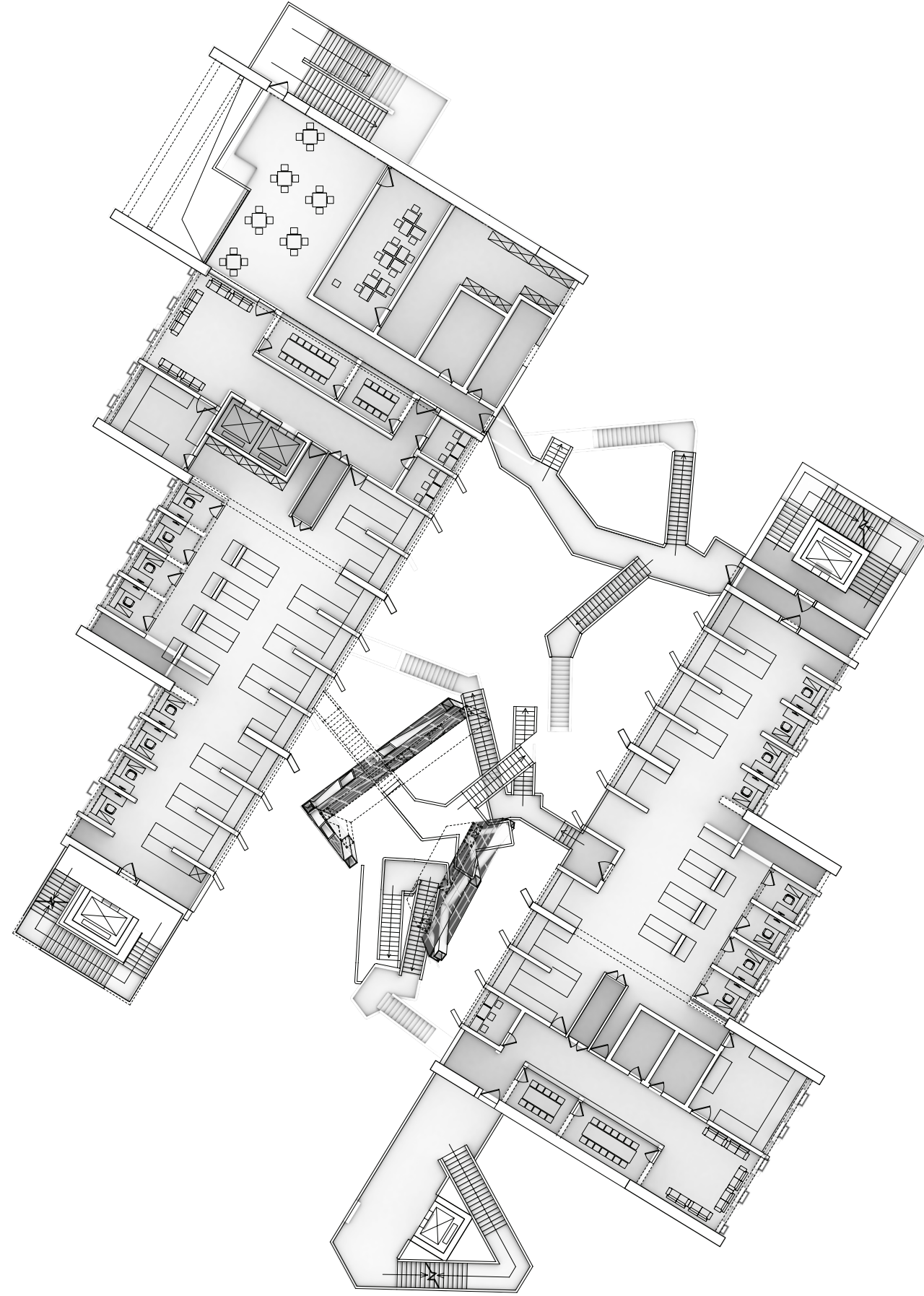
The functional wings are connected by the a steel and glass stair. The wings' floor plans offer mainly laboratories and small offices. Laboratories are mainly concentrated along the perimeter to receive diffused natural light. The layout is based on a parallelogram with a diagonal line and positioning a glass stair in the center.



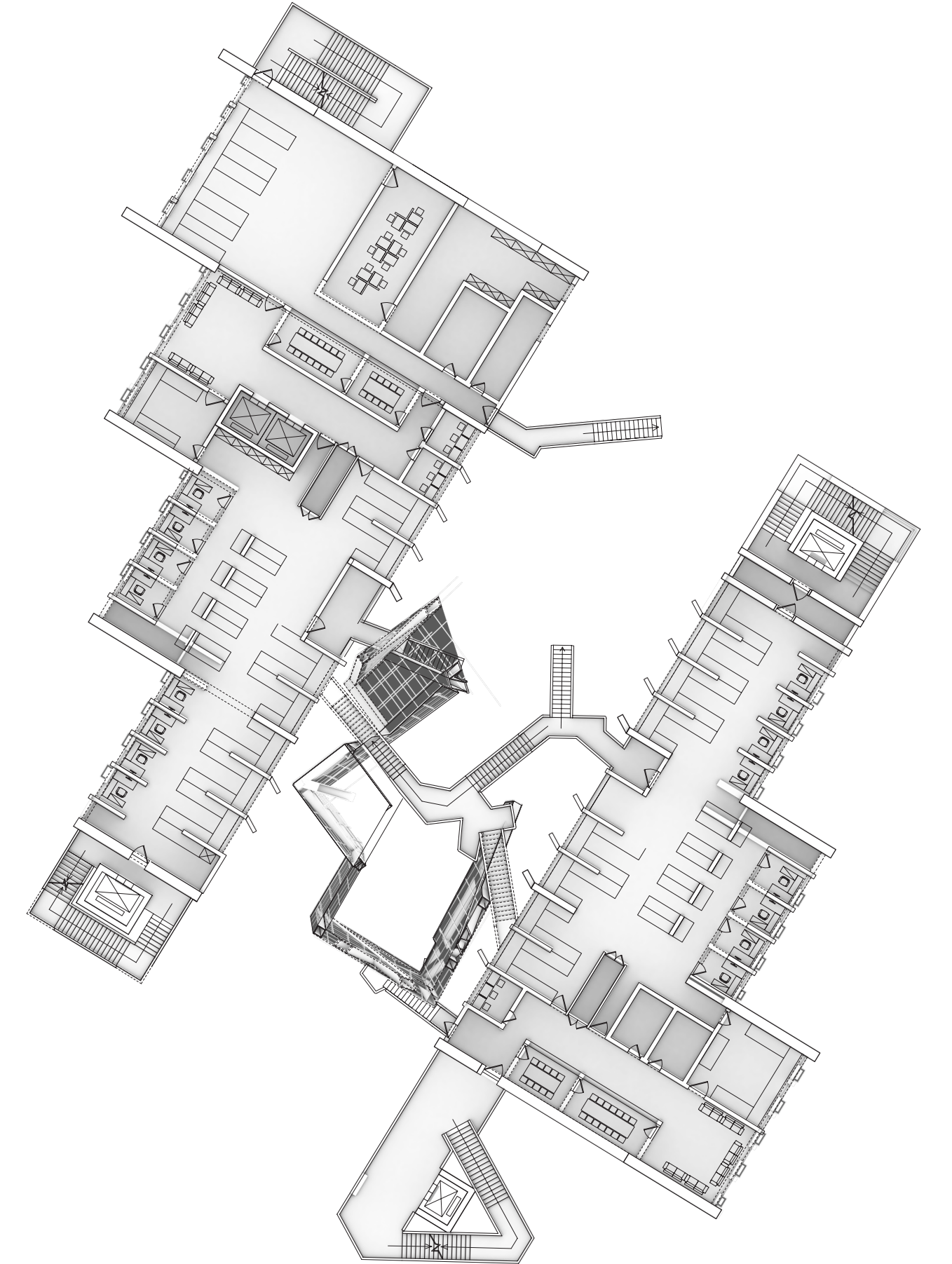
## Ground floor plan



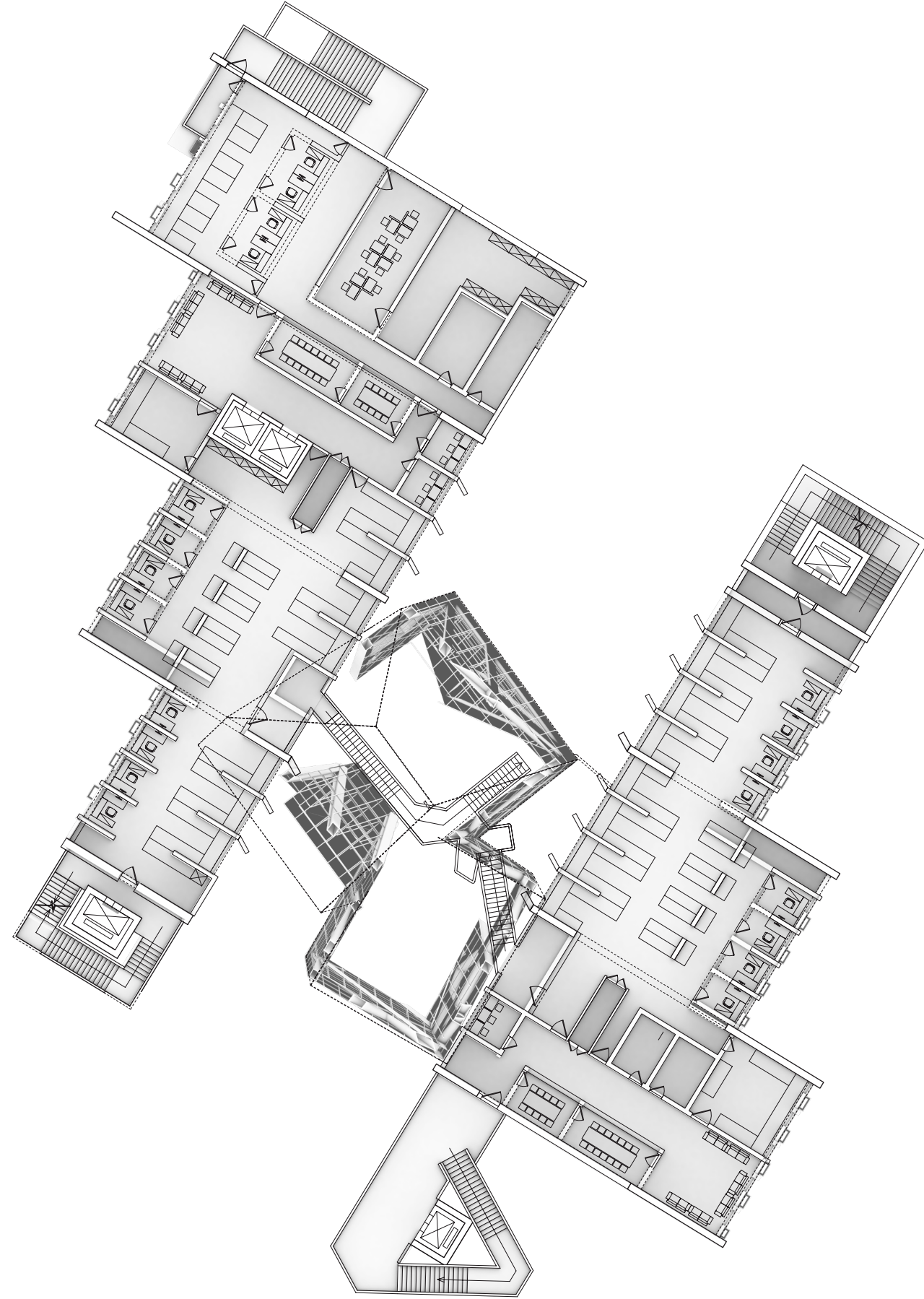
Second floor plan



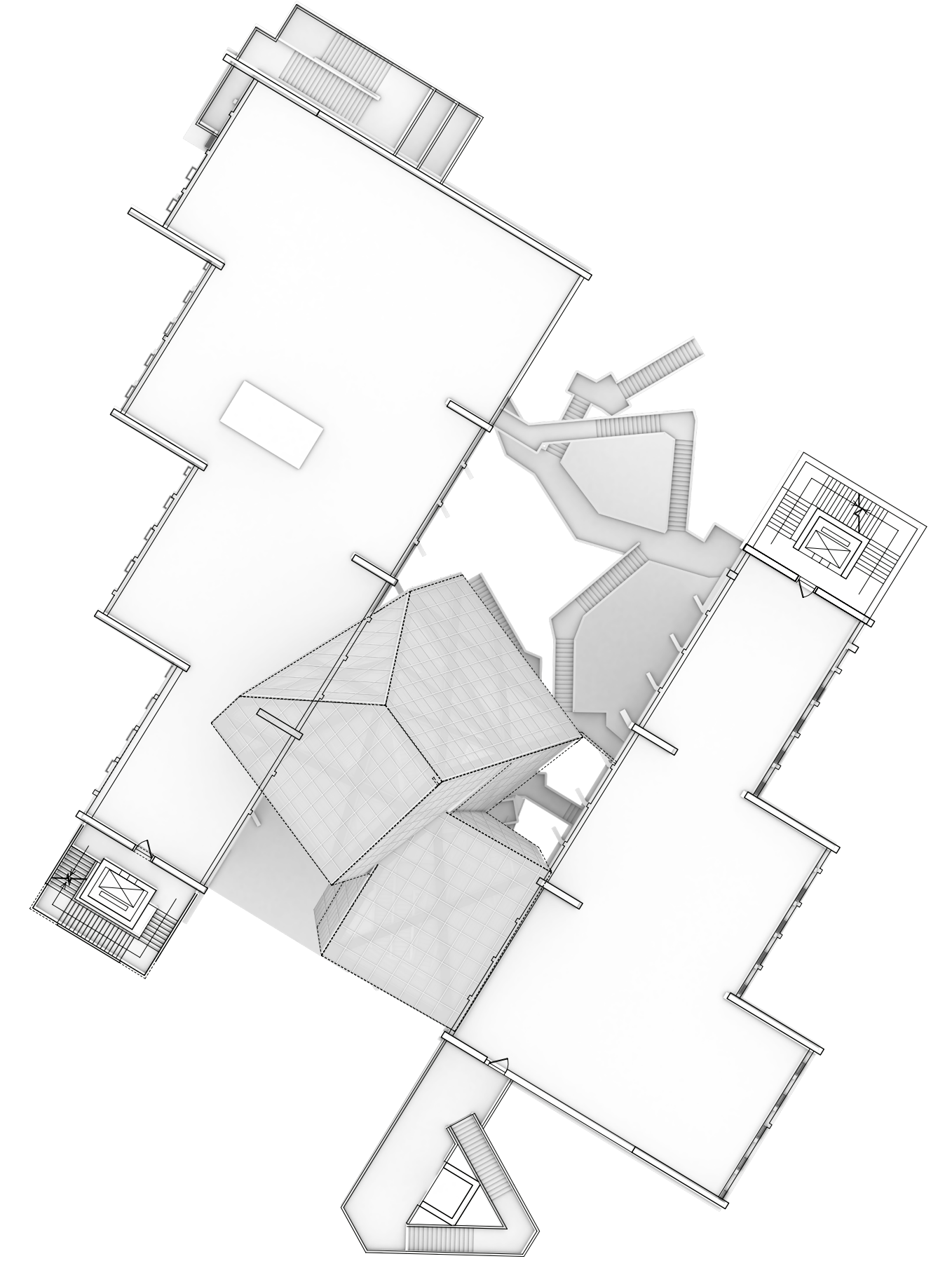
Third floor plan

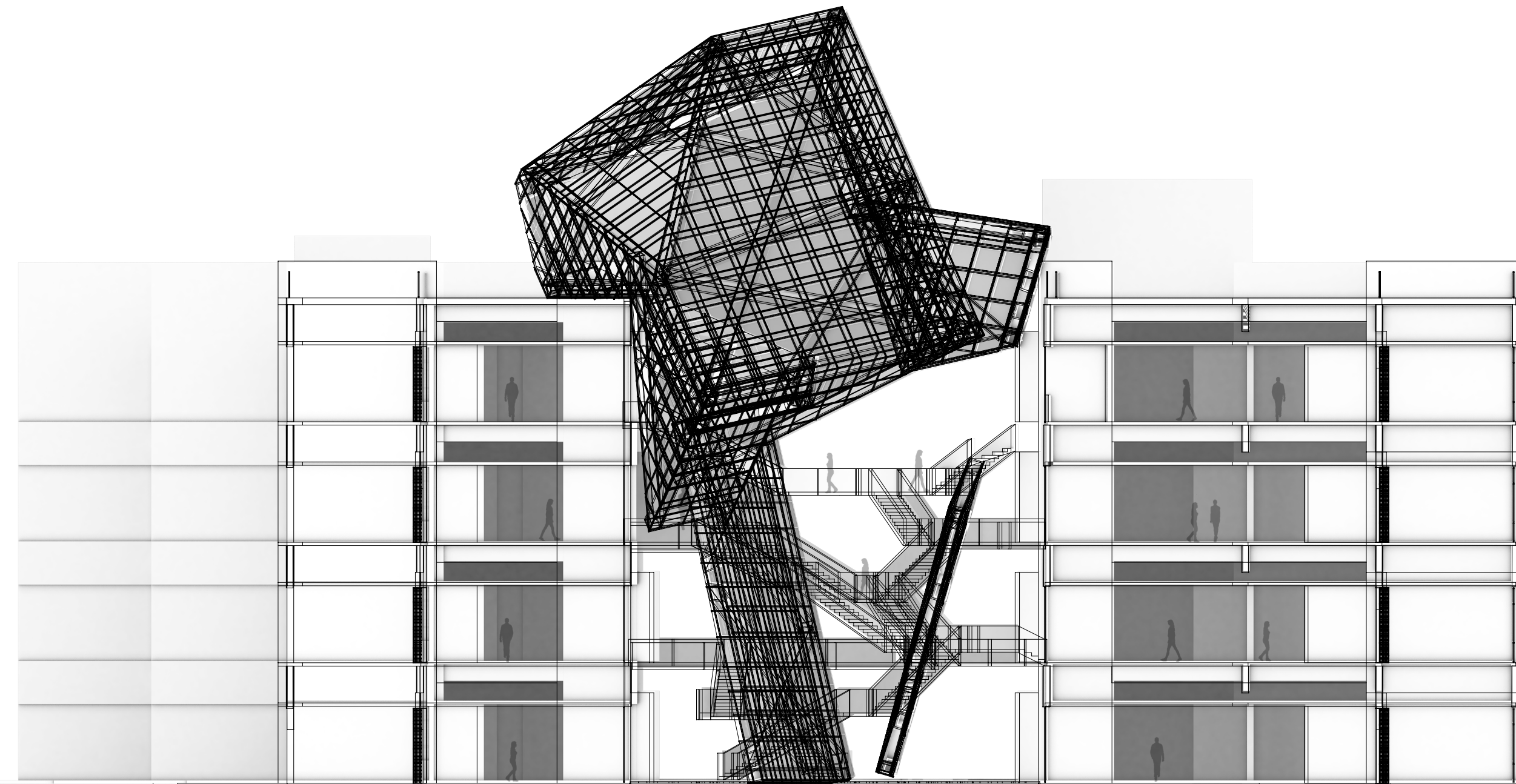
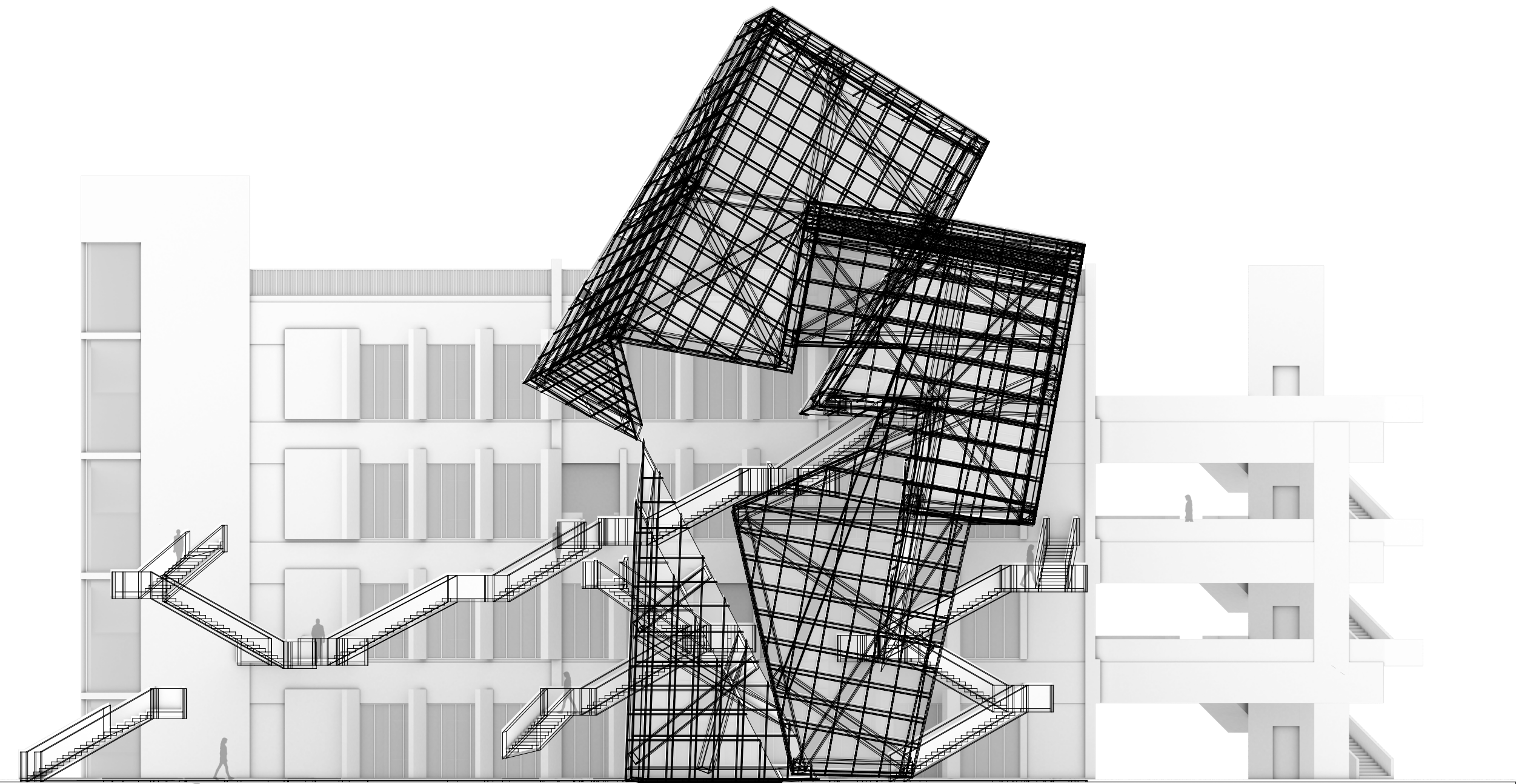
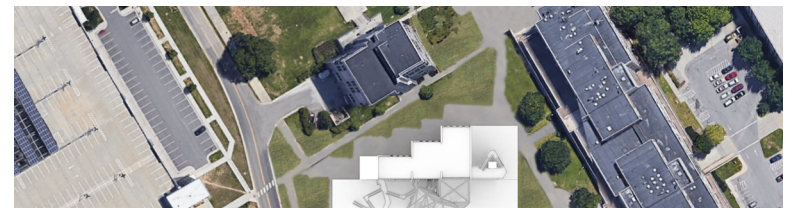


Forth floor plan

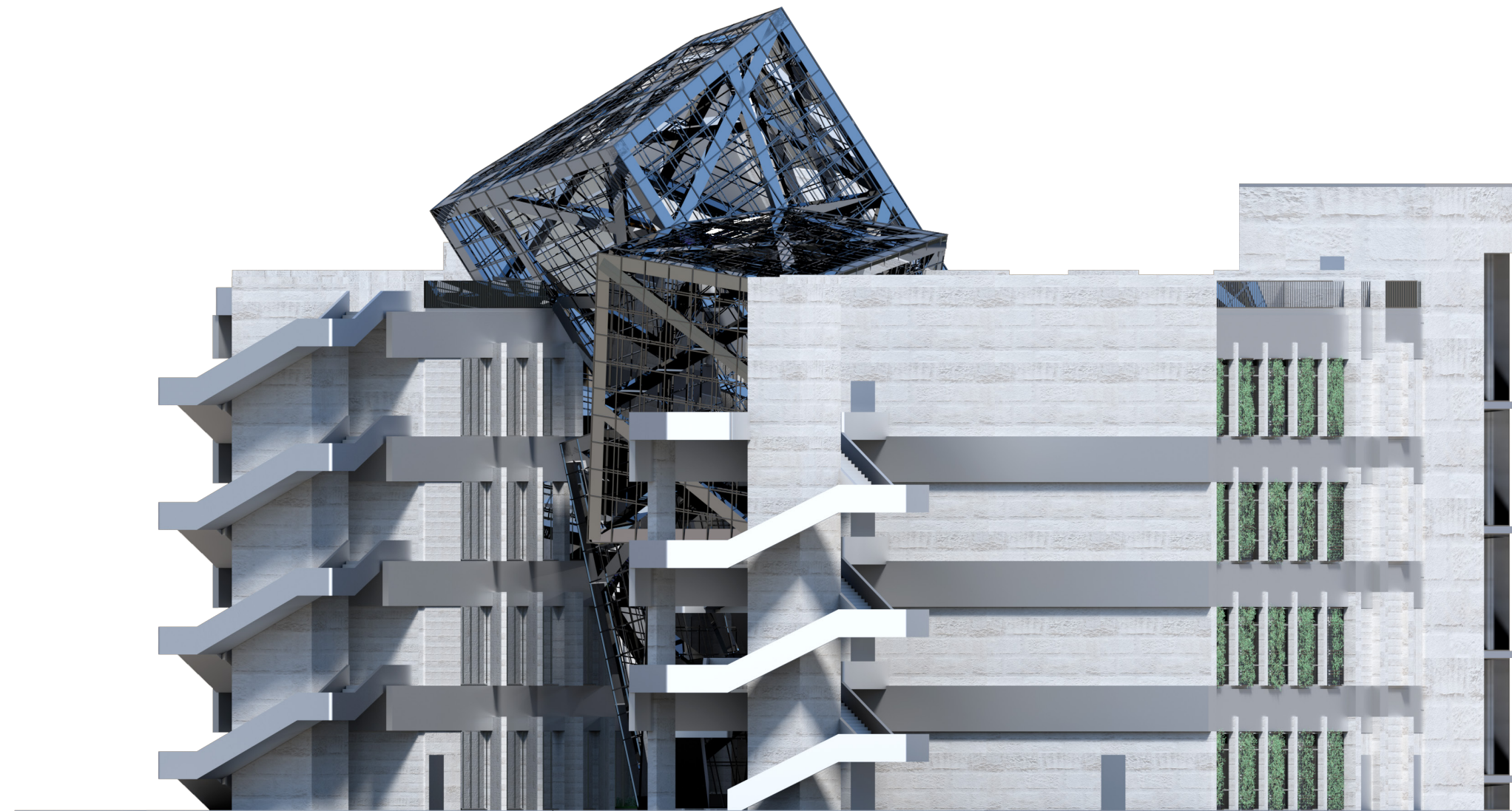


Roof plan

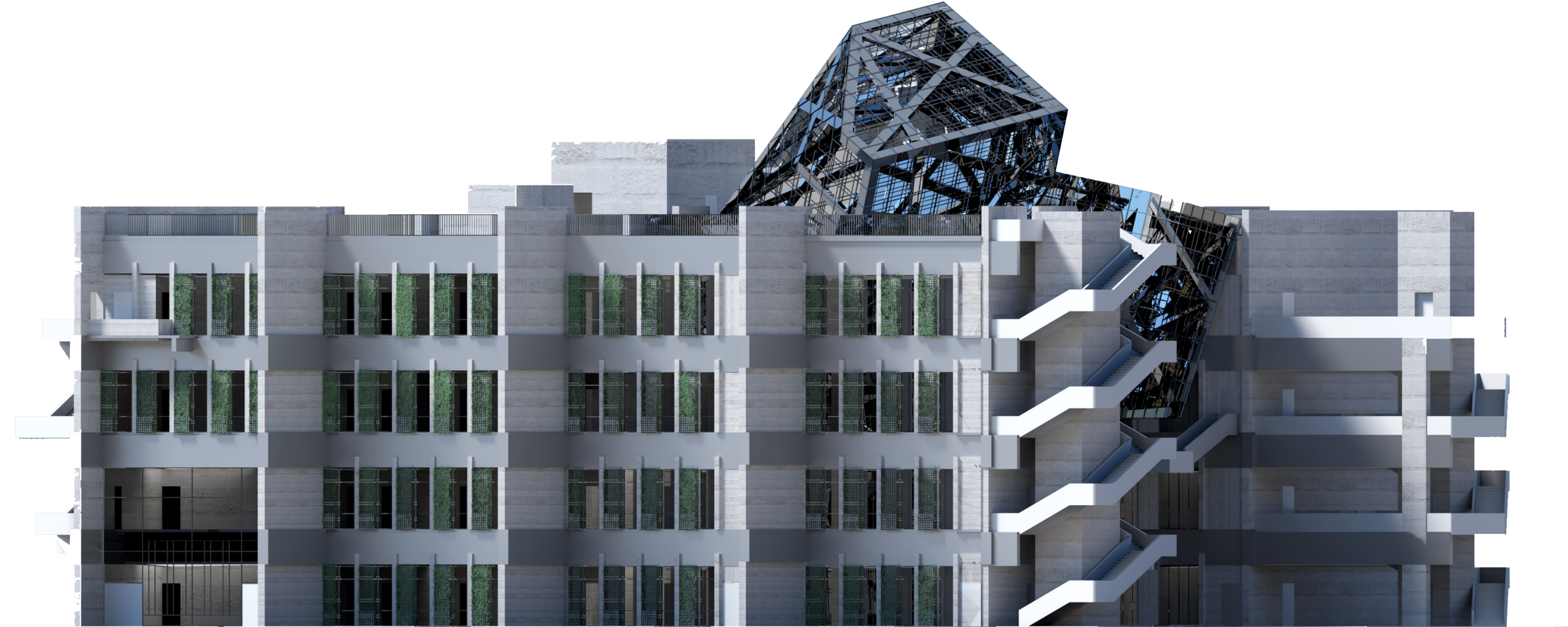




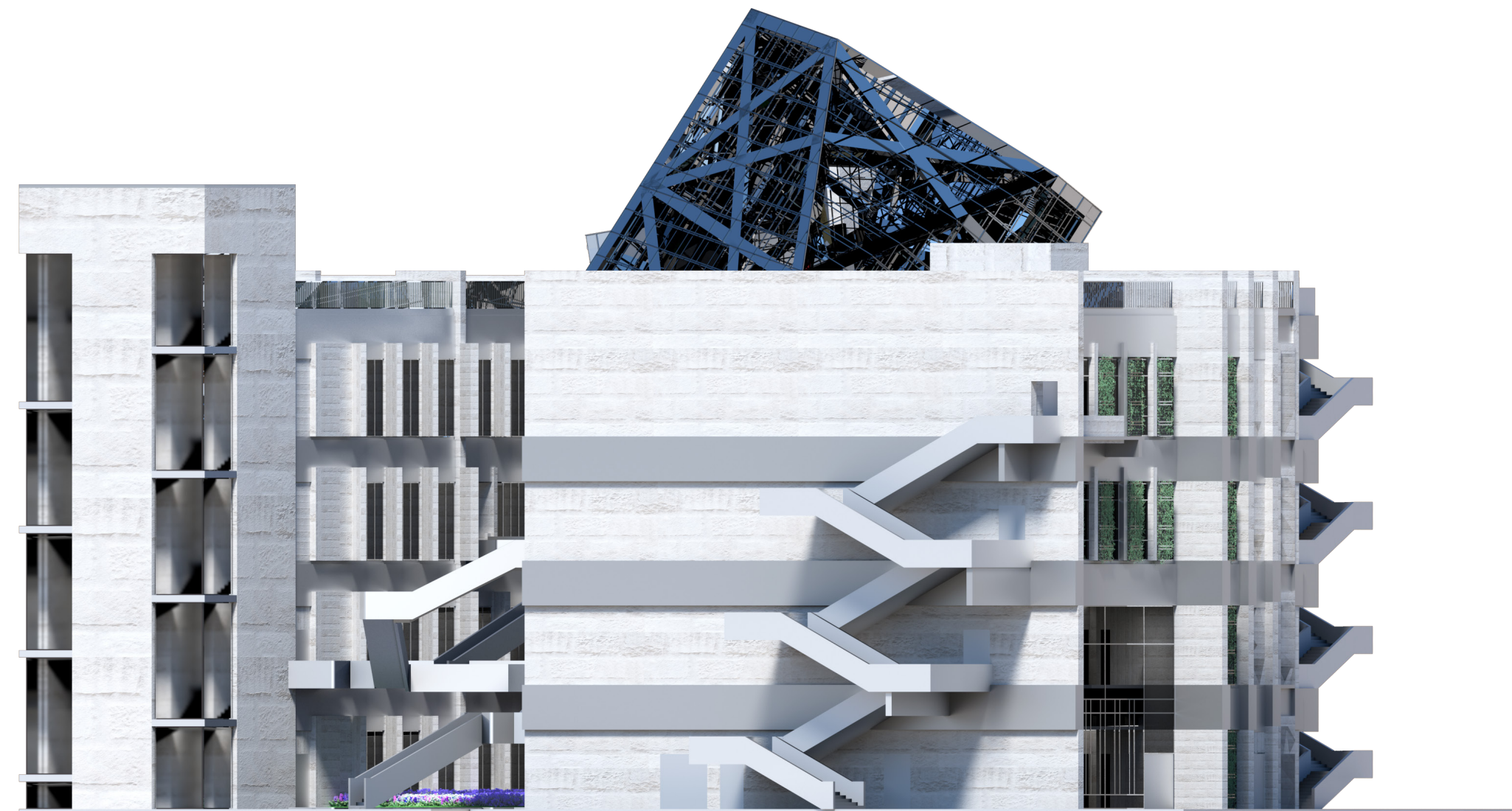
South elevation



West elevation



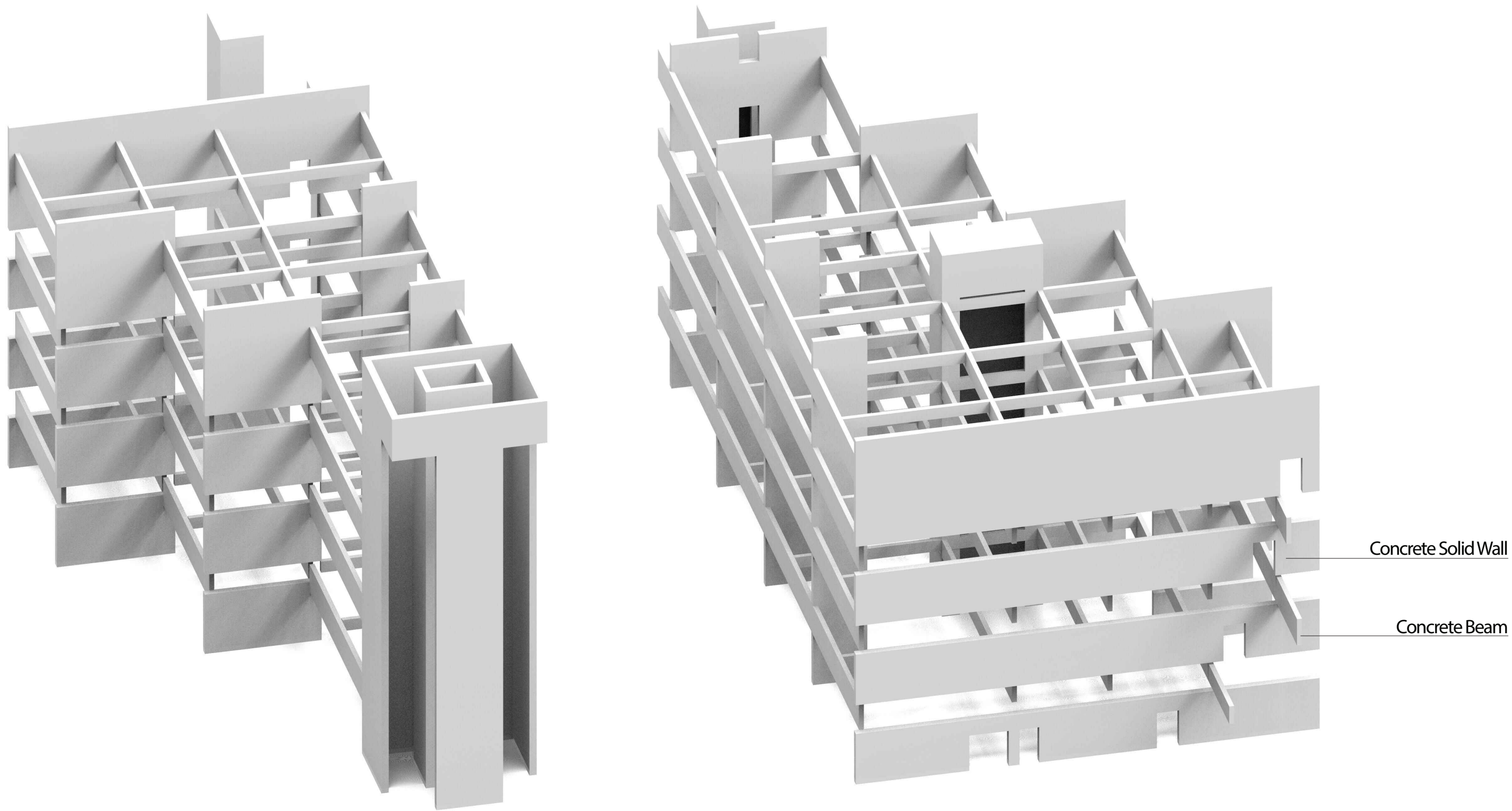
North elevation



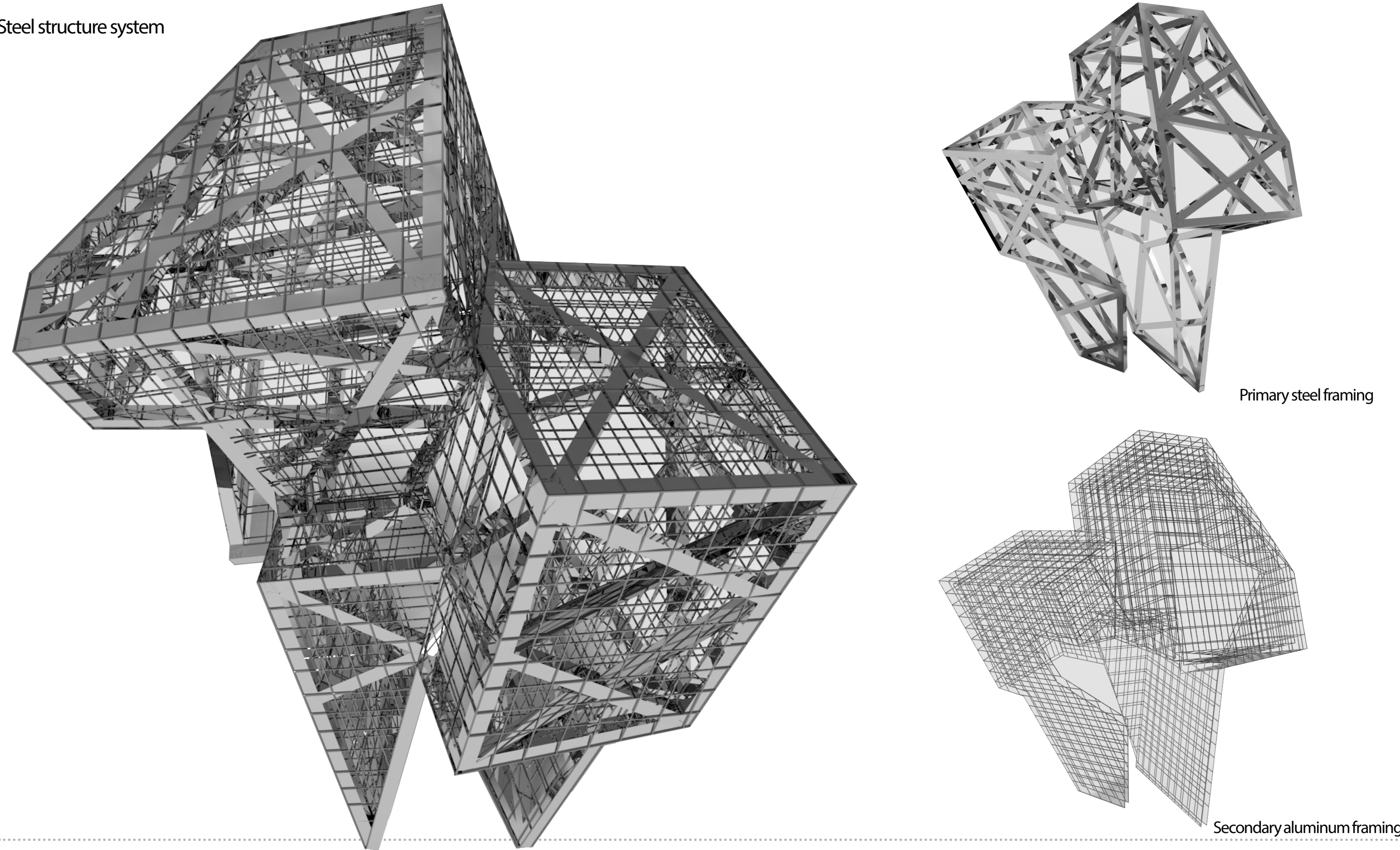
East elevation



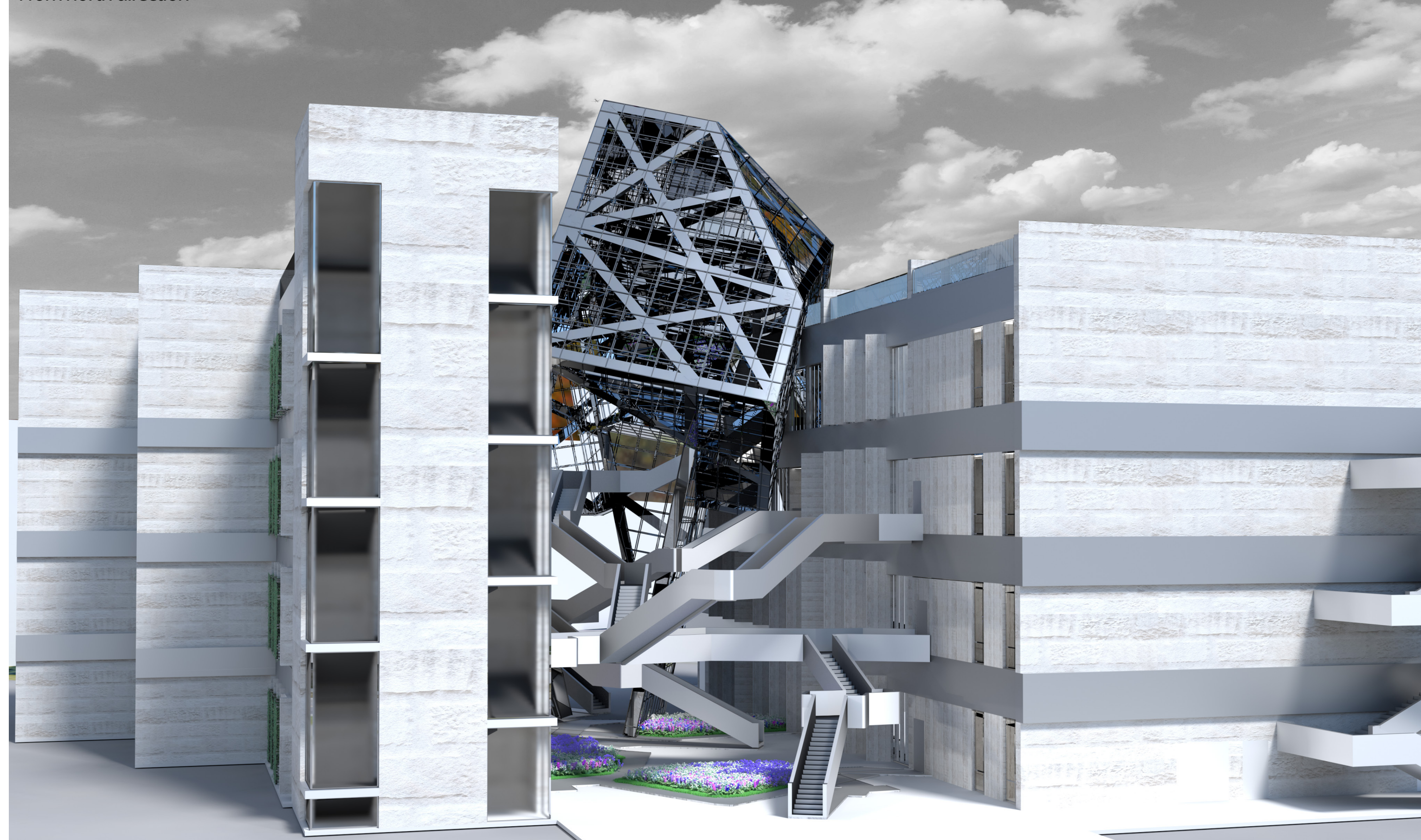
Concrete structure system



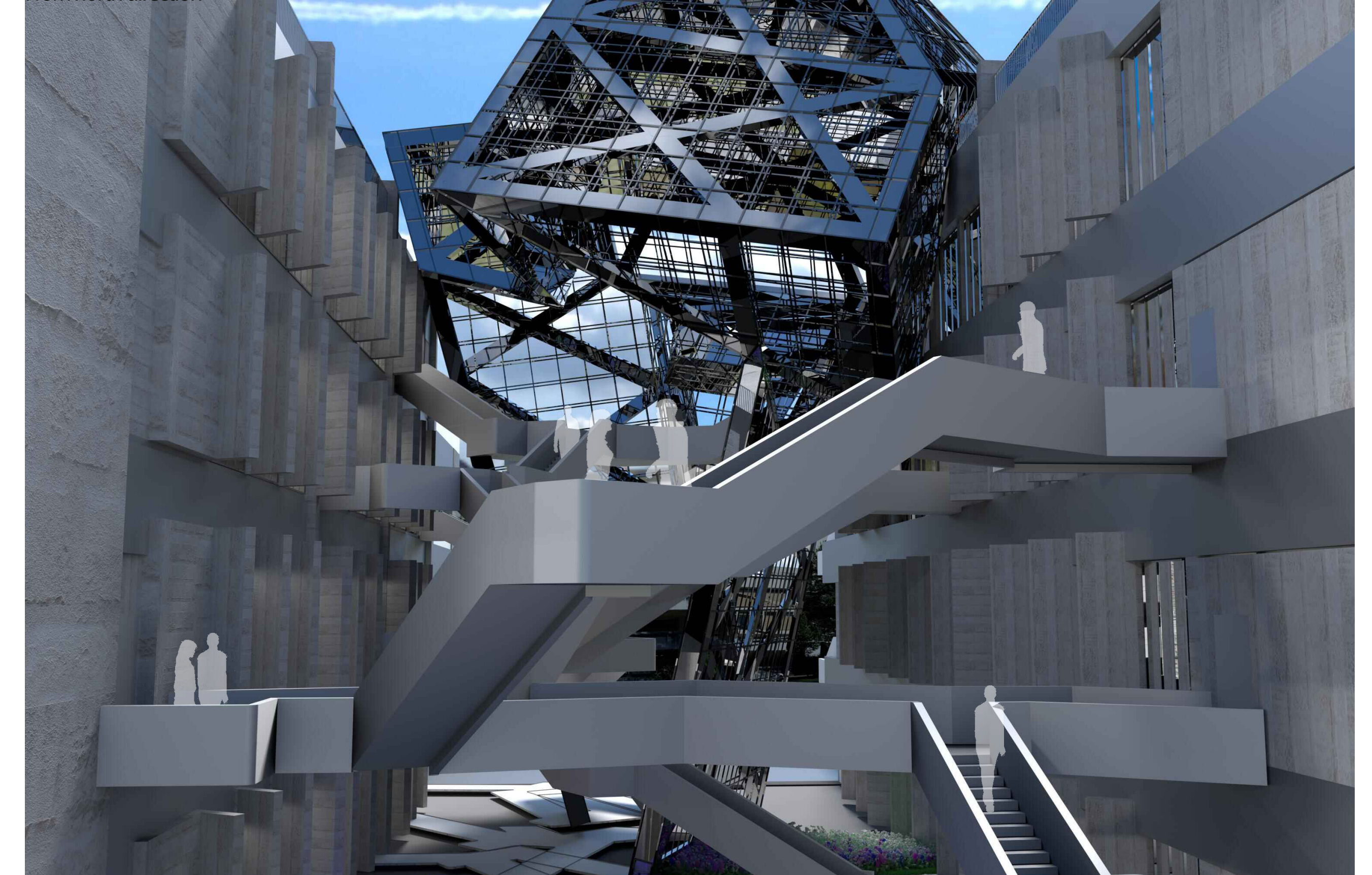
Steel structure system



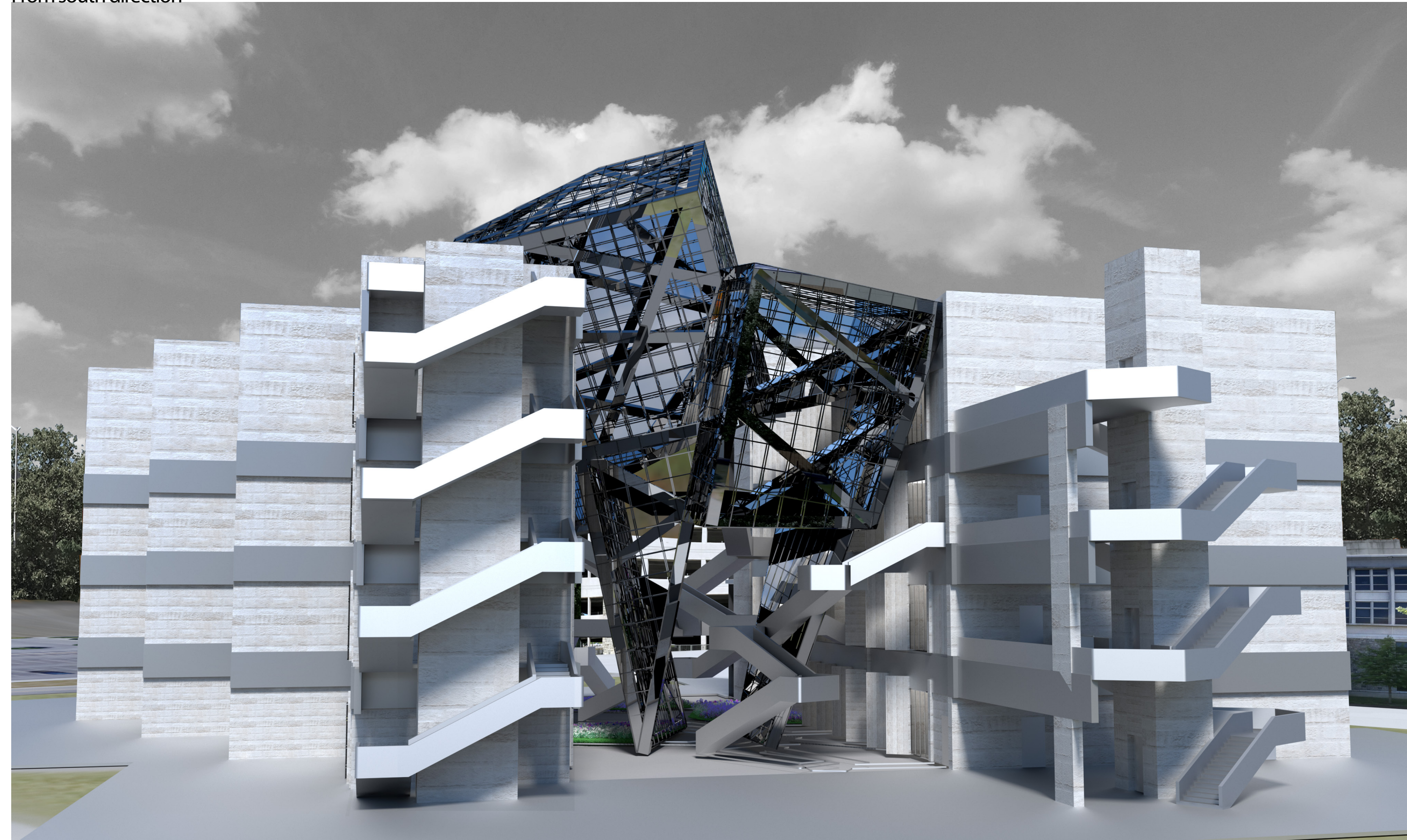
From north direction



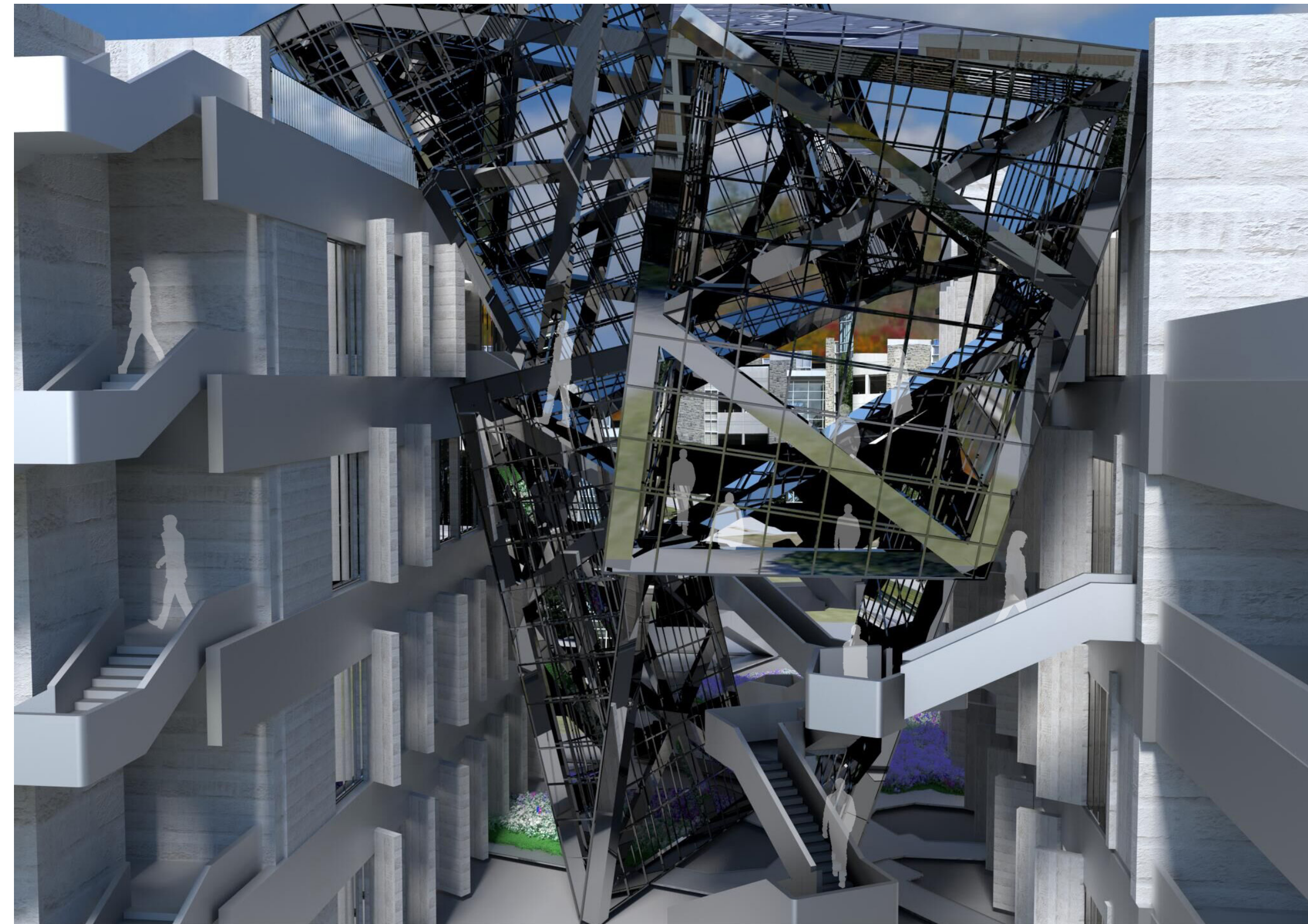
From north direction



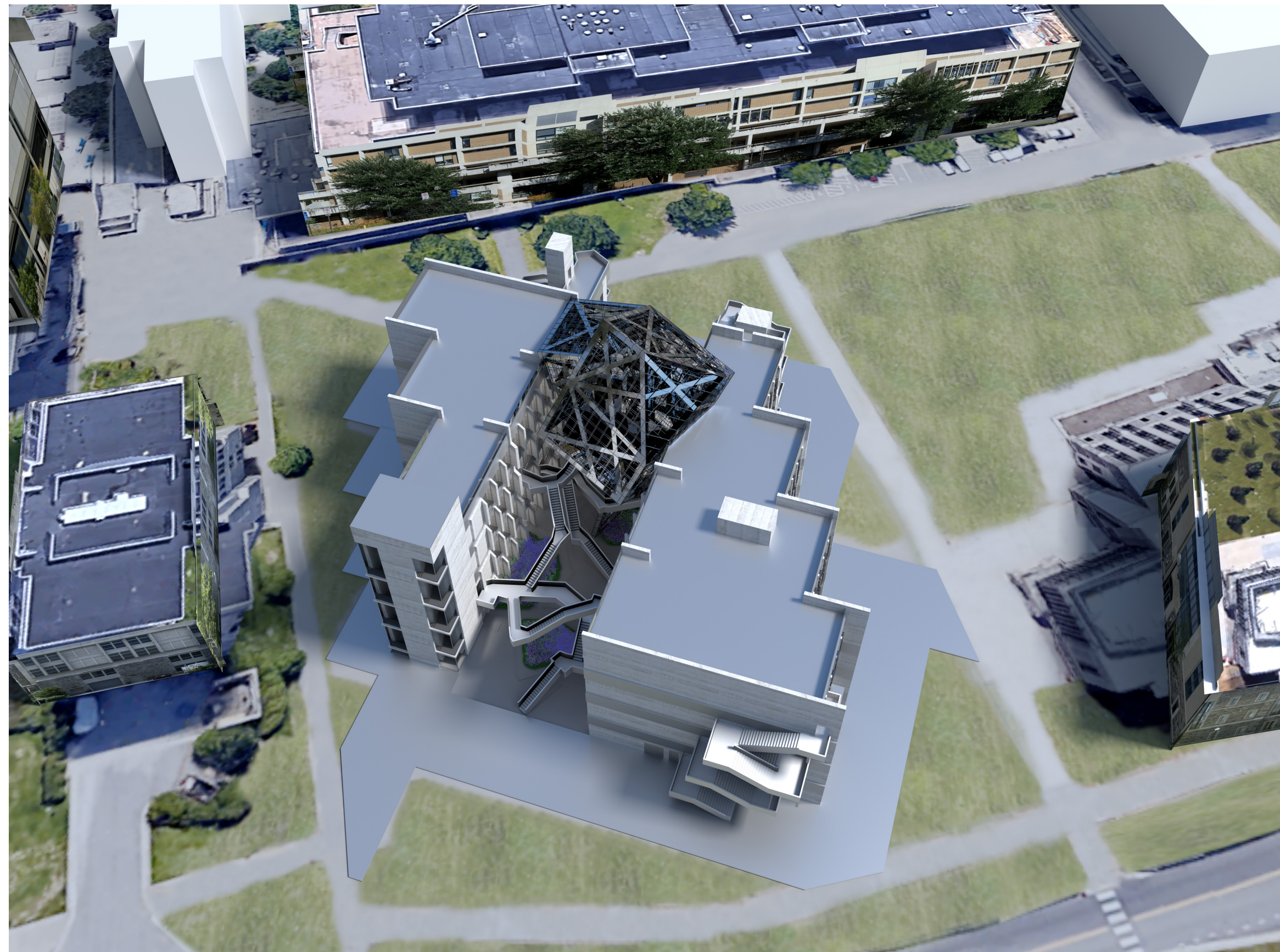
From south direction



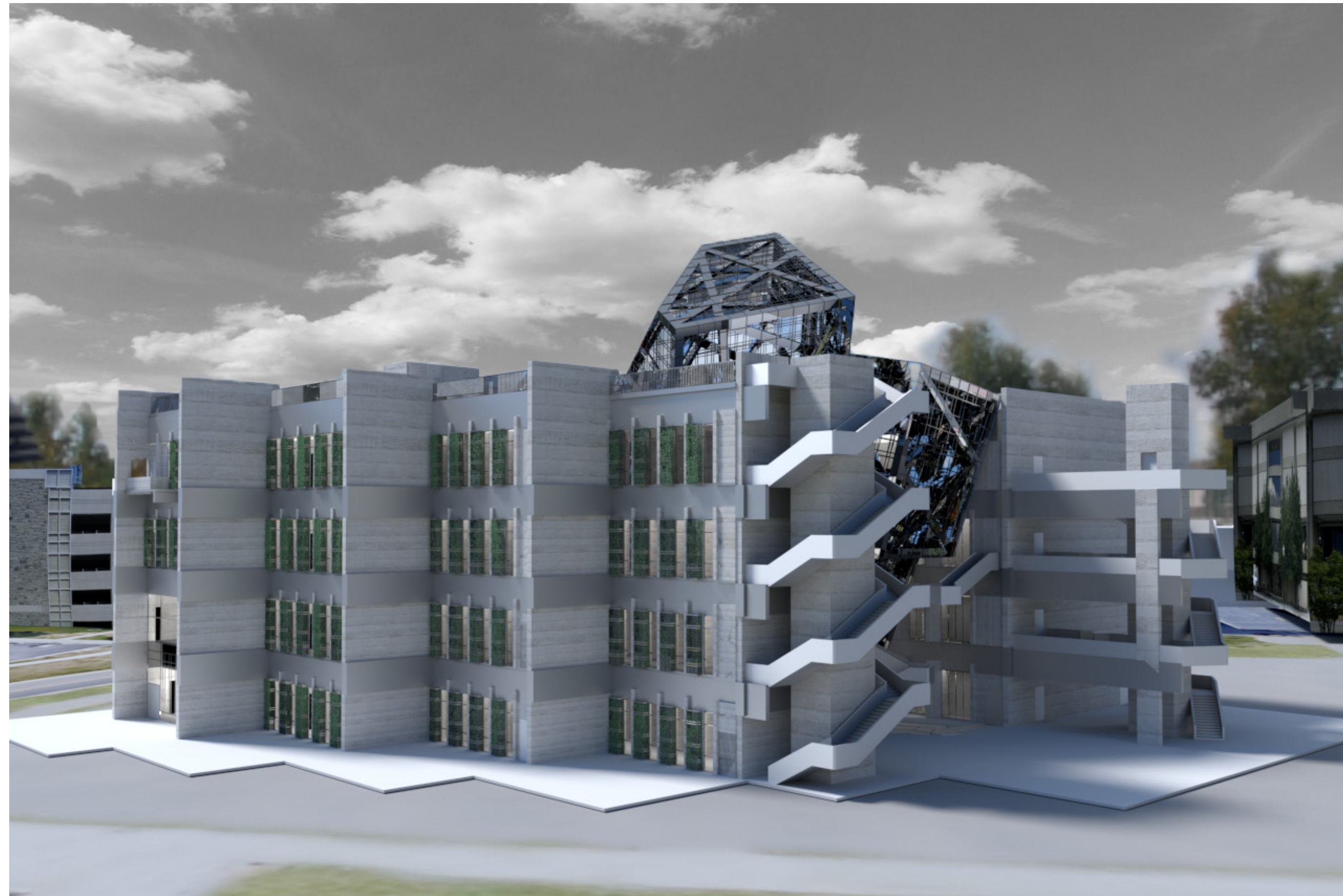
From south direction



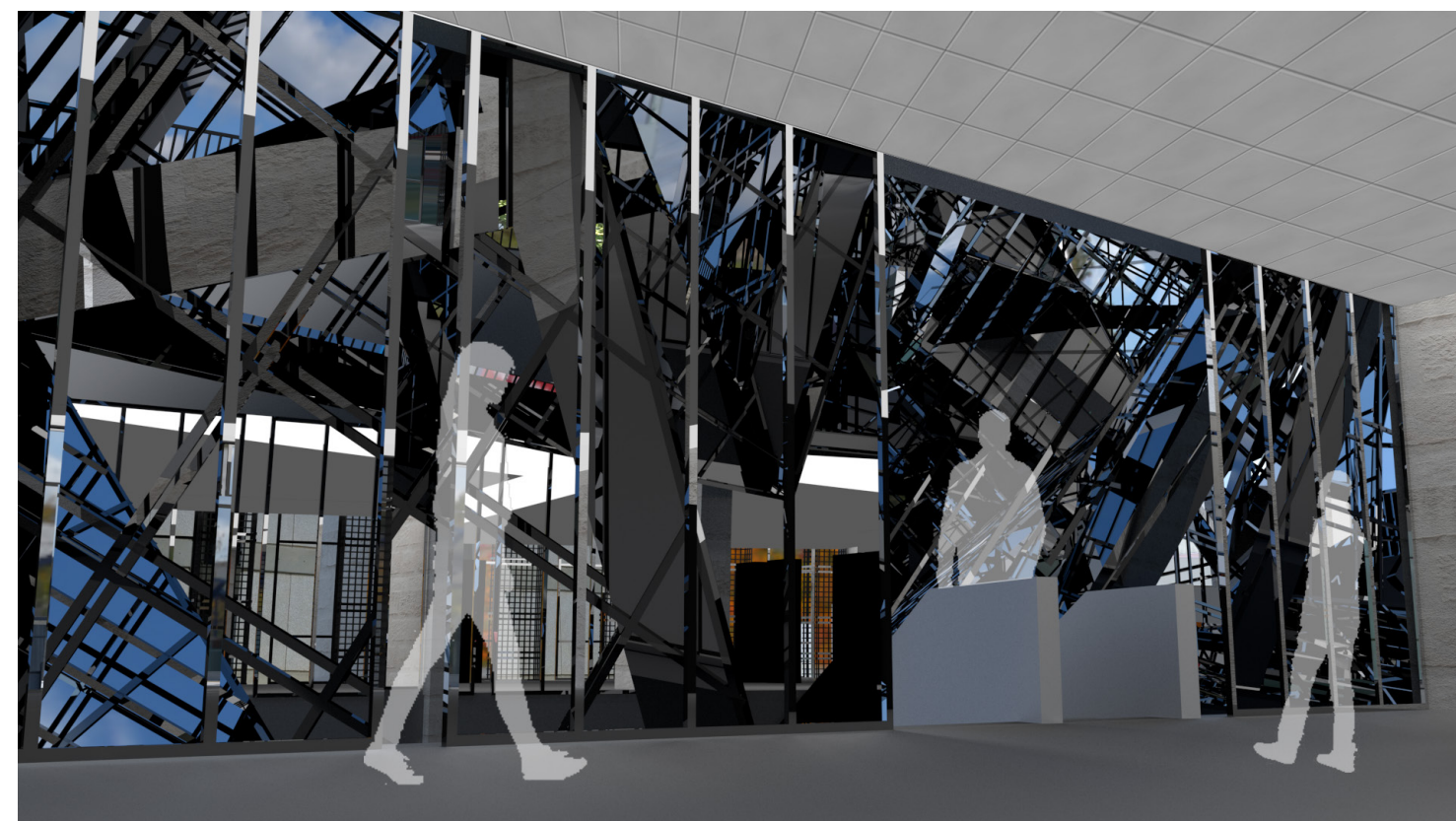
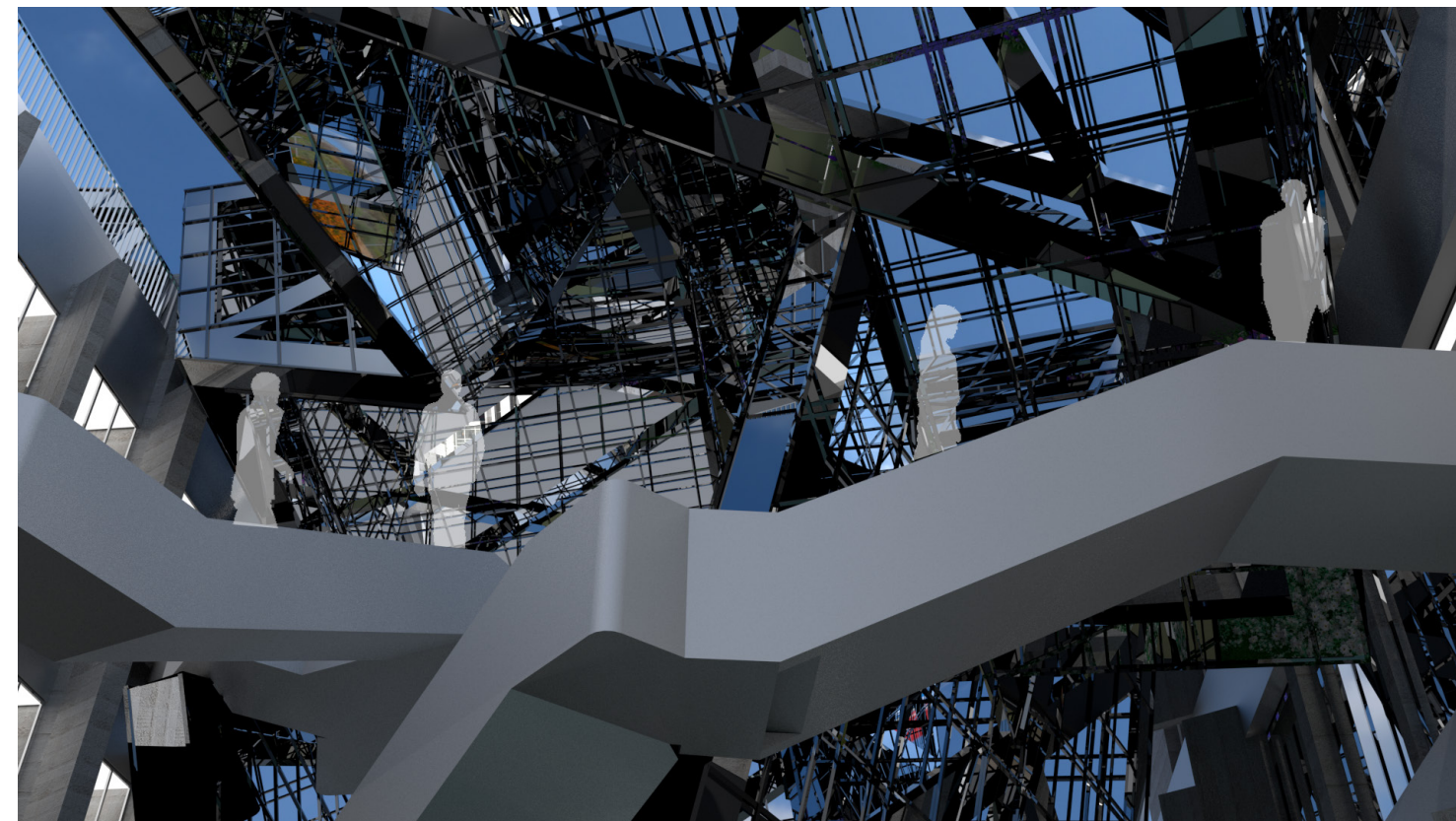
Bird view from north direction



West-south perspective view

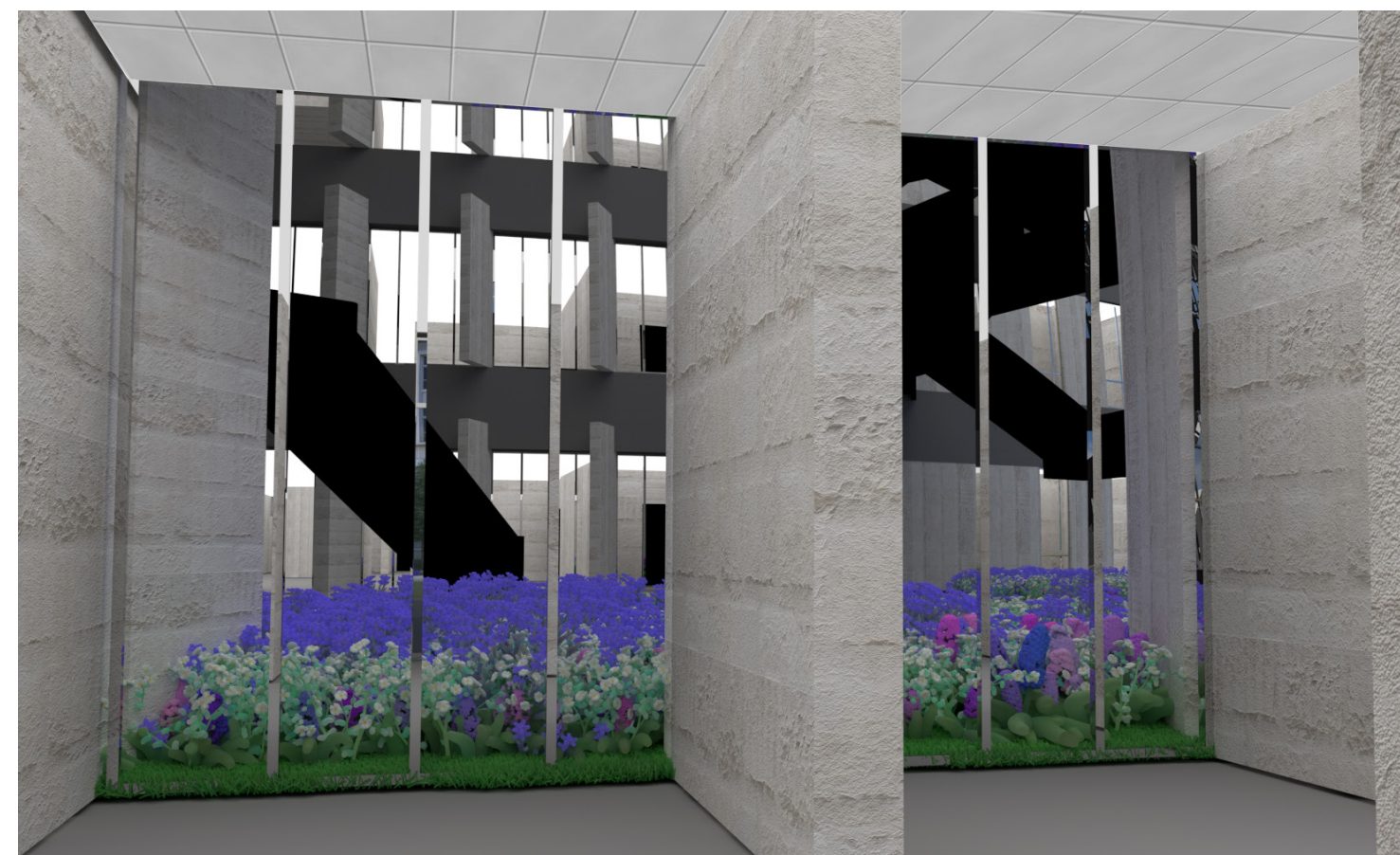
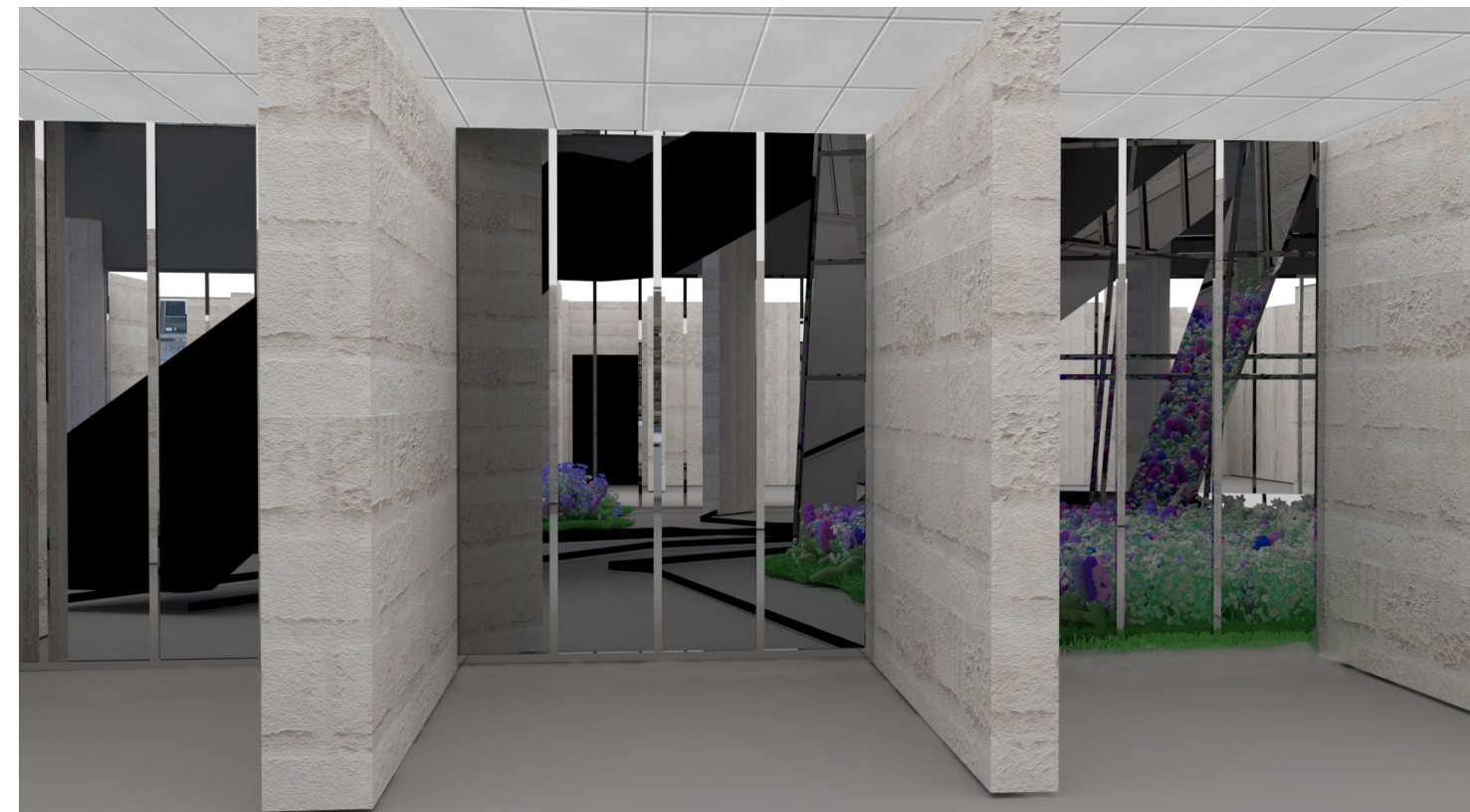


Interior view



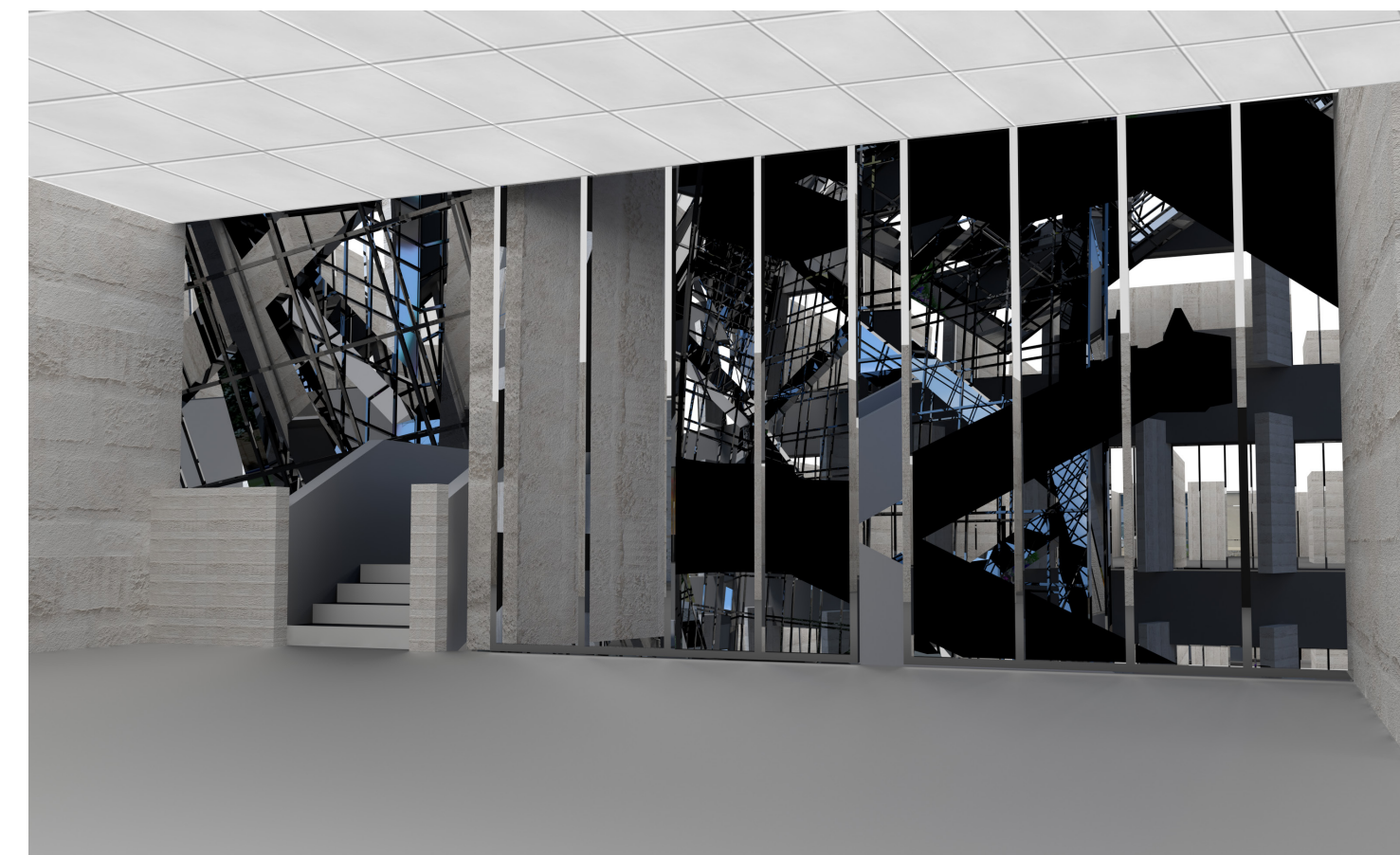
further

Looking from the interior space in the ground floor



further

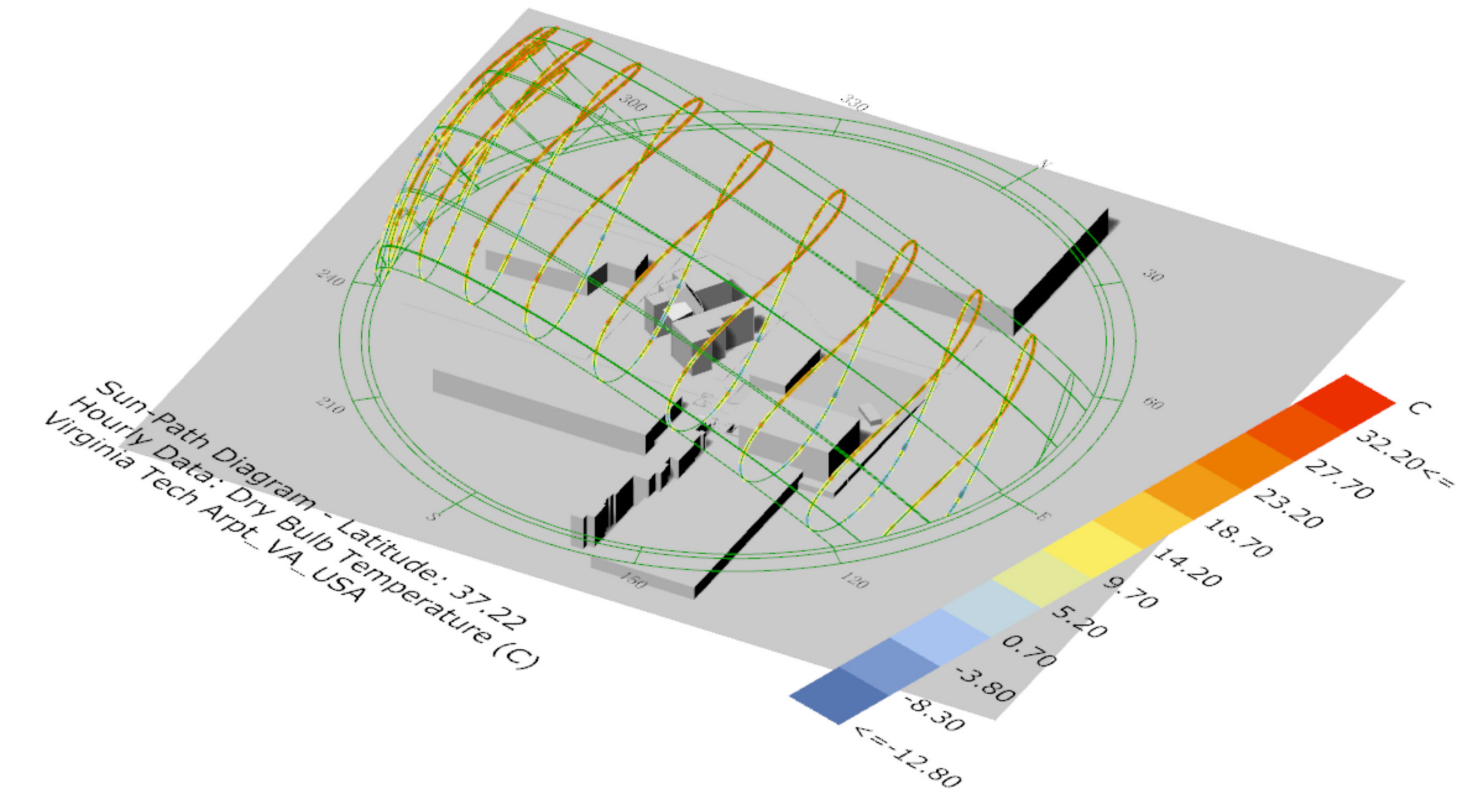
Looking from the interior space in the second floor



further

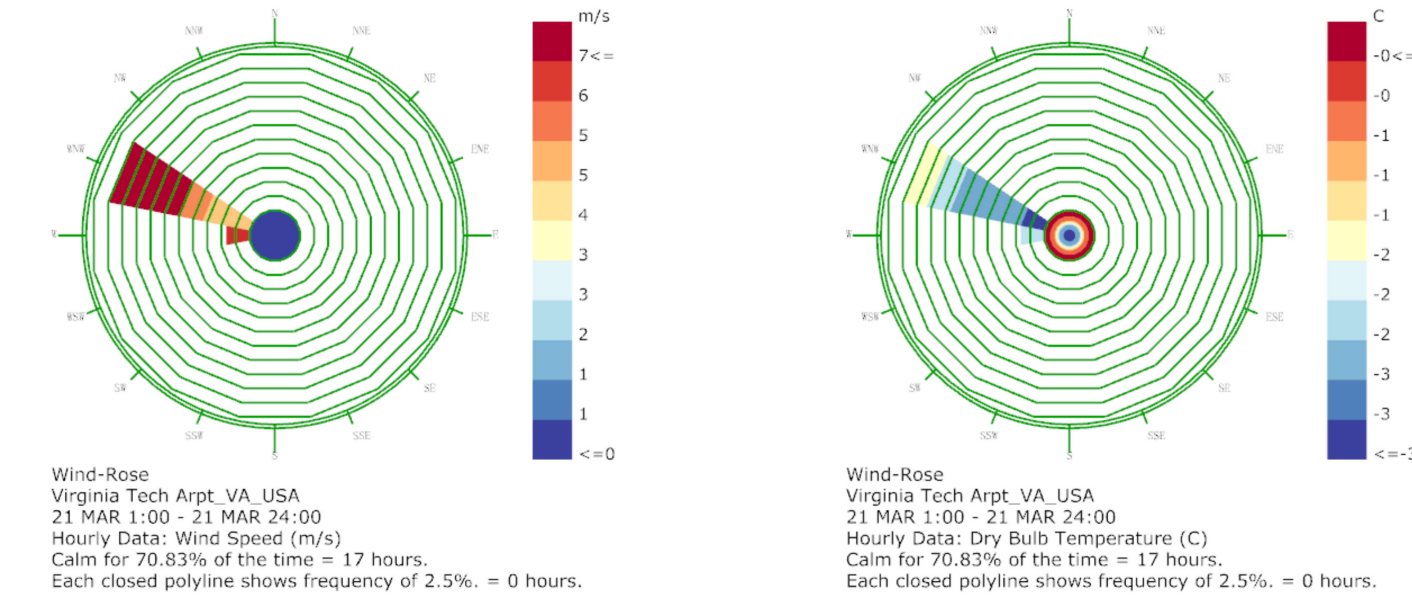
Environmental Studies: Solar + Wind Path

Sun Path Diagram/ 7:00-19:00/ JAN 21- DEC 21

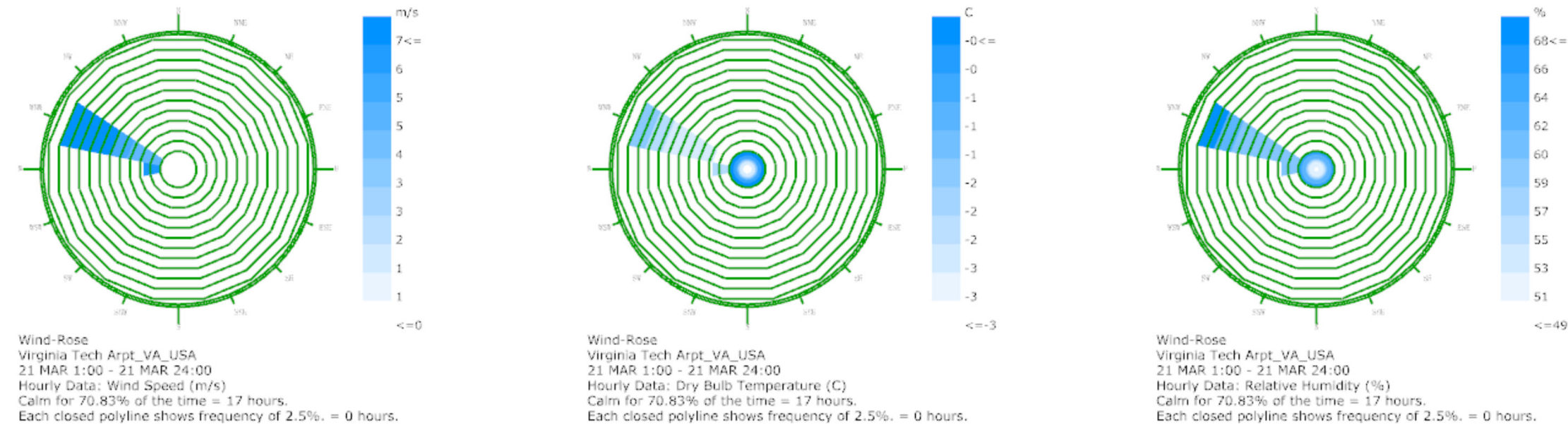


Location: Virginia Tech\_VA\_USA  
Latitude: 37.22

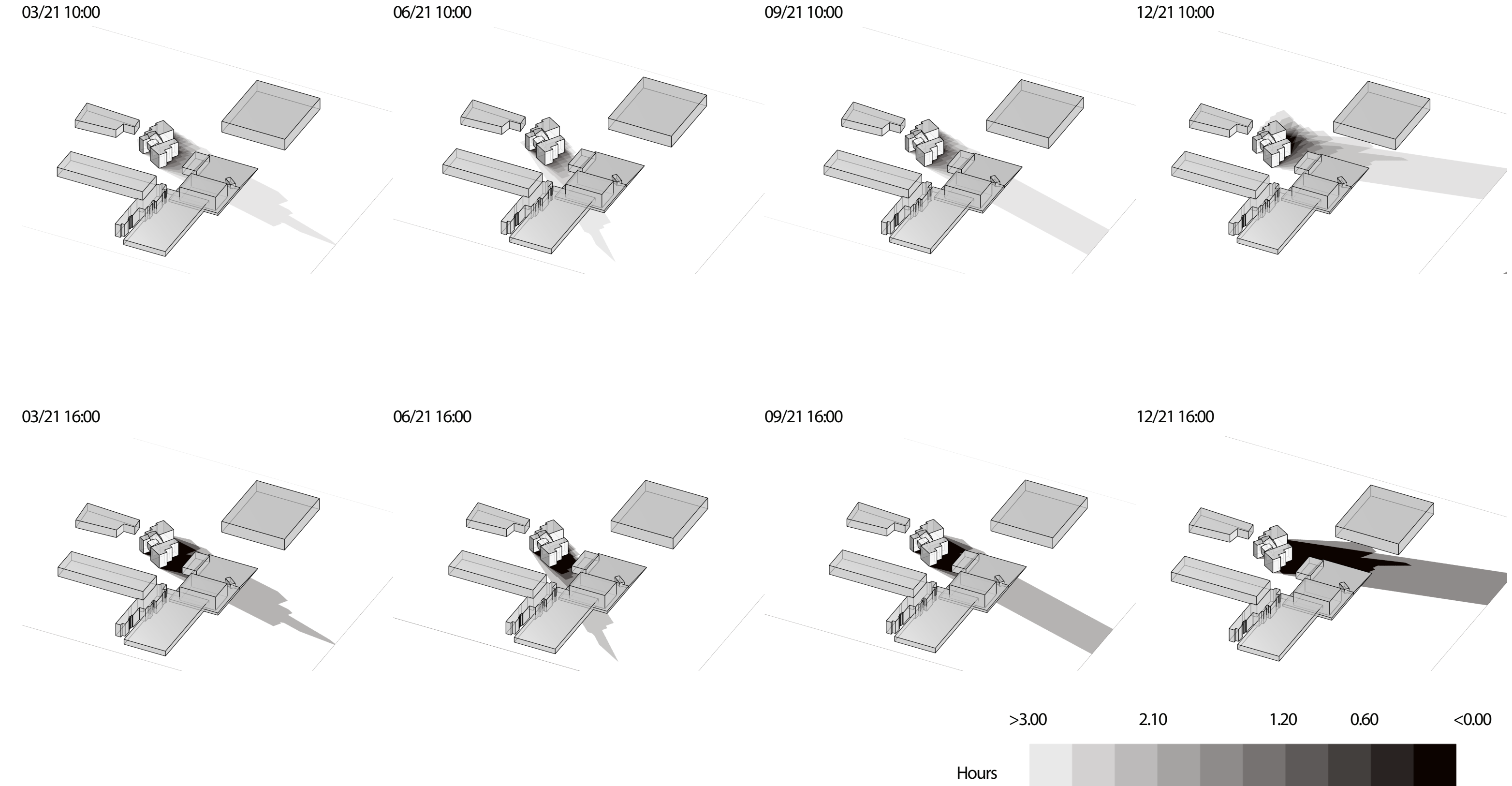
Wind Rose Diagram/Dry Bulb Temperature/ 21 MAR 1:00 - 21 MAR 24:00



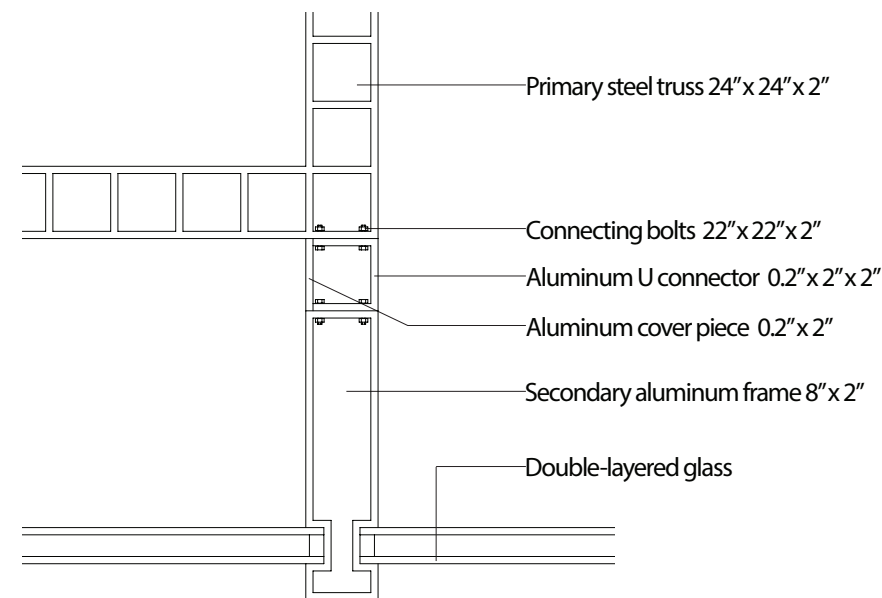
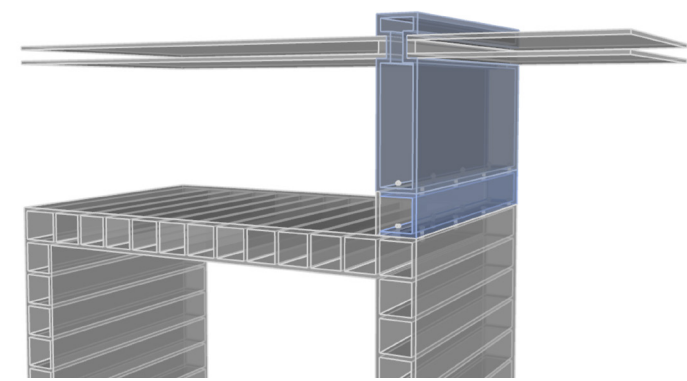
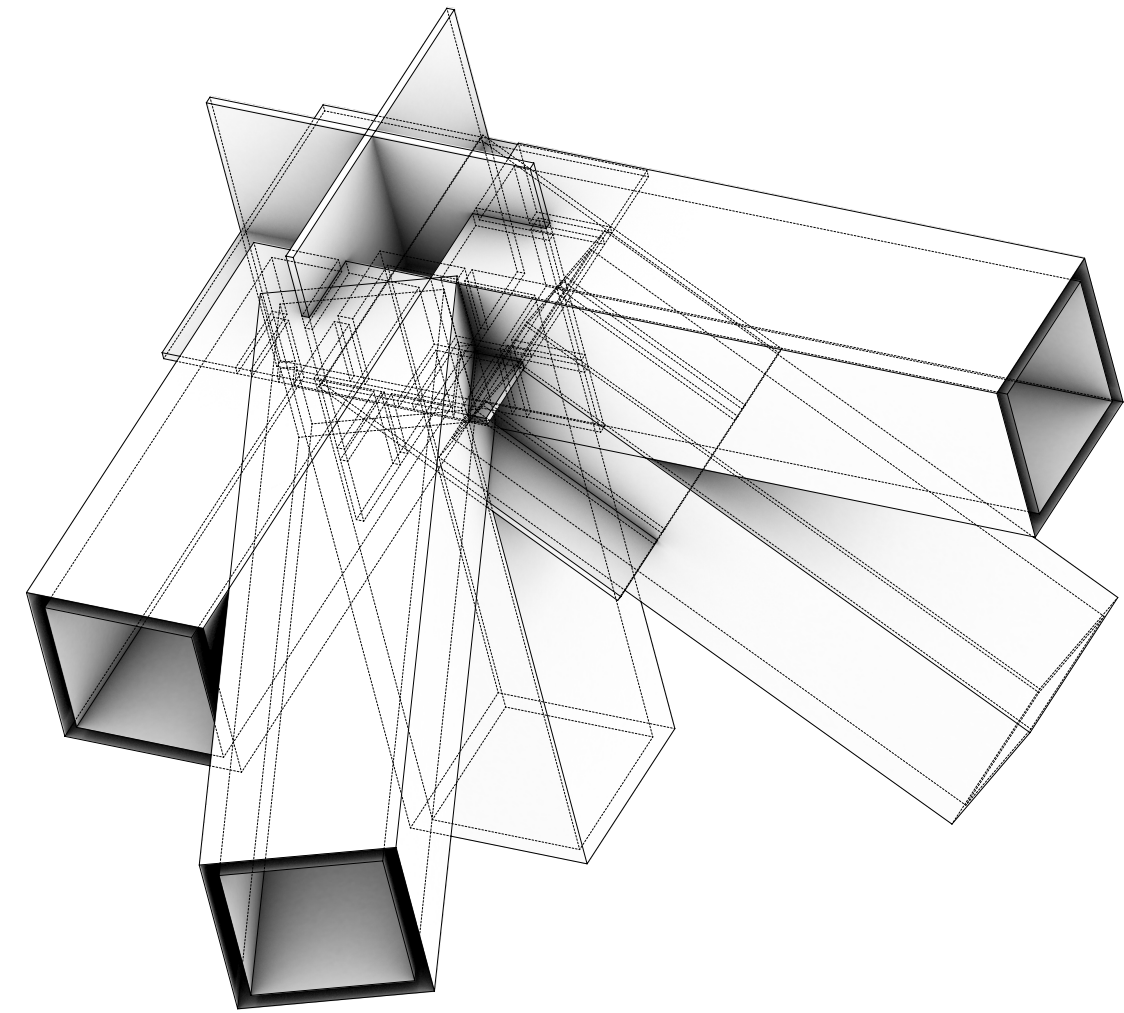
Wind Rose Diagram/Dry Bulb Temperature/ Relative Humidity/ 21 MAR 1:00 - 21 MAR 24:00



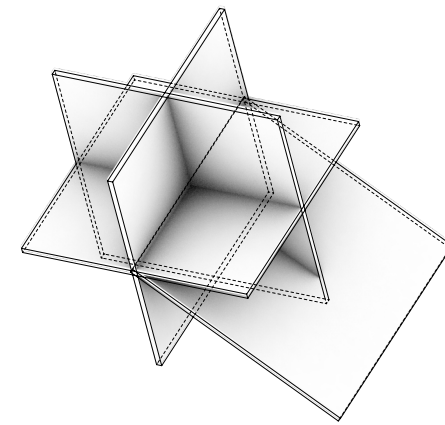
Environmental Studies: Sunlight Hours Analysis



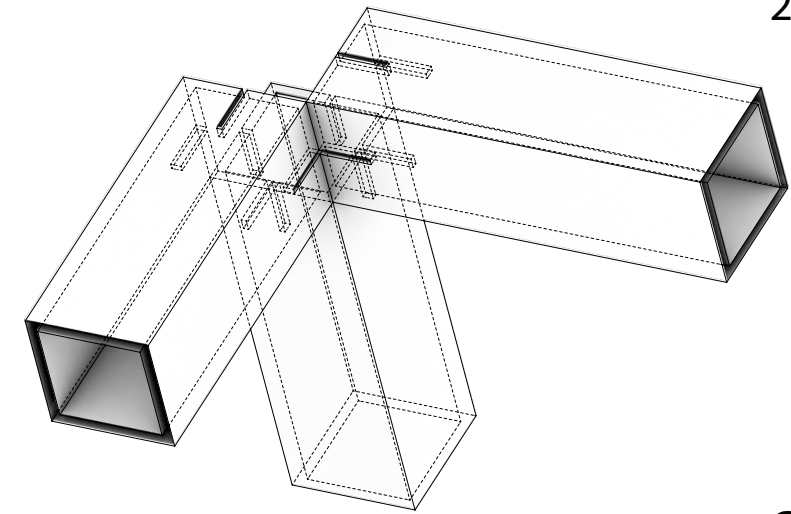
Primary steel truss detail



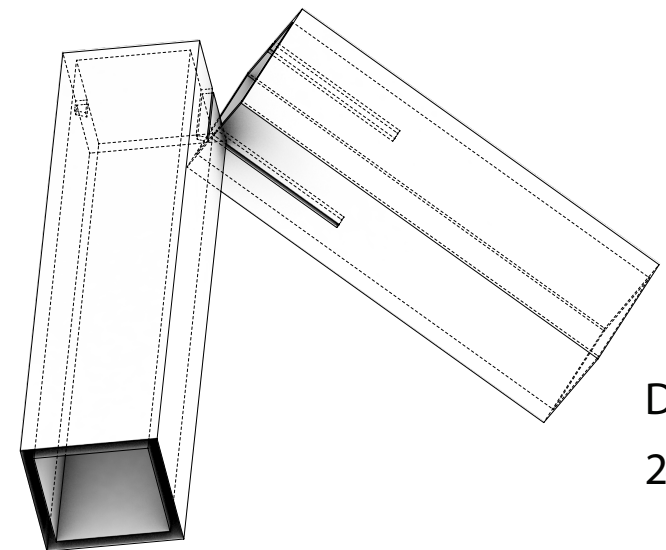
Secondary steel truss detail



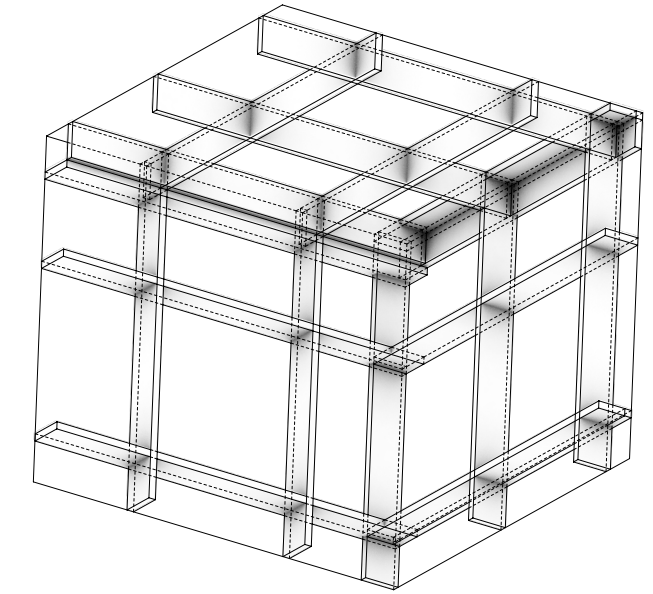
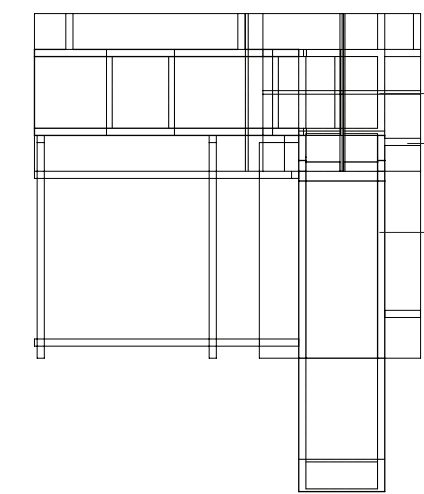
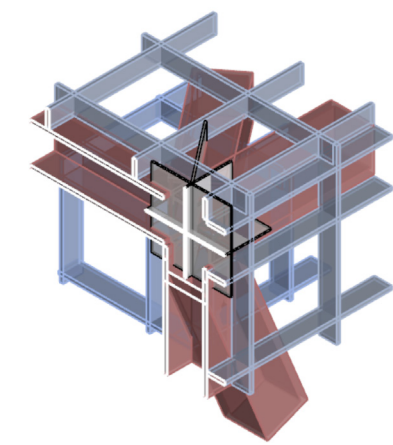
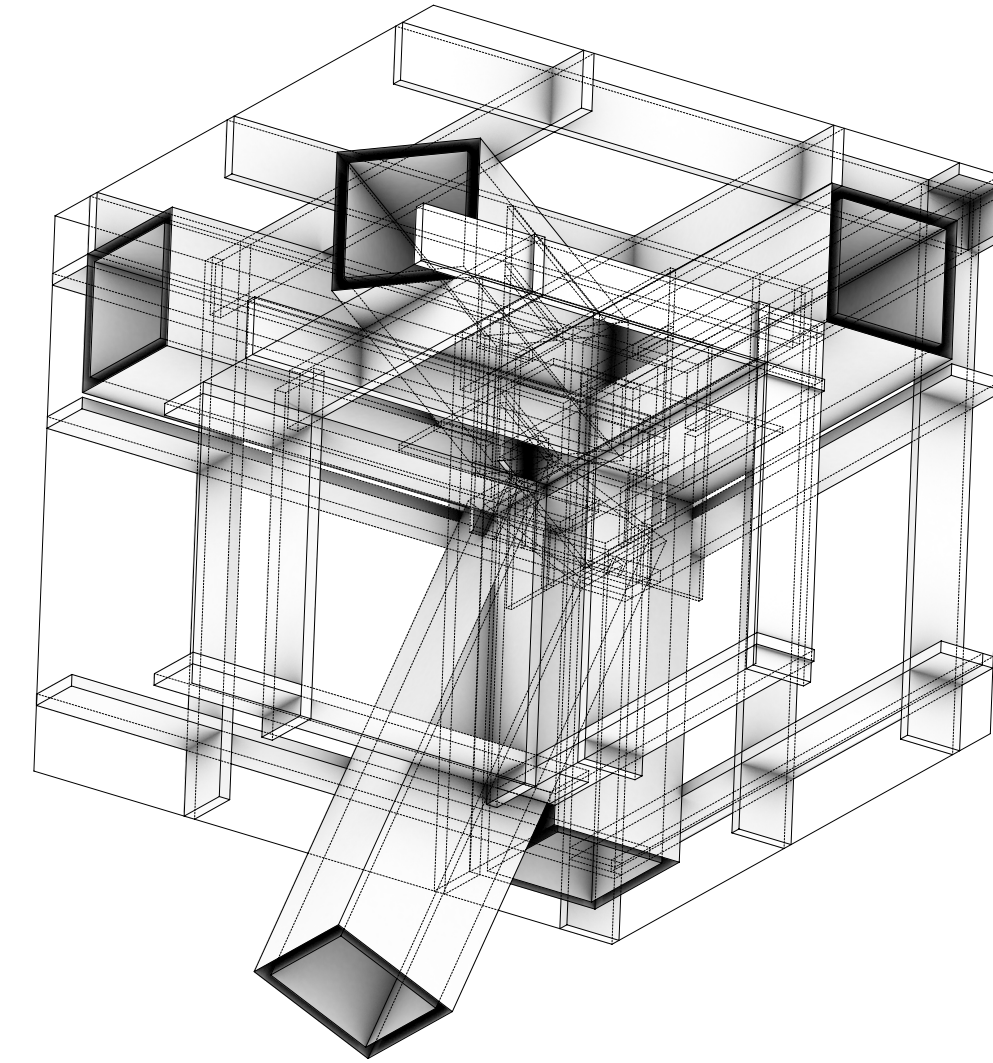
Connecting joint  
22" x 22" x 2"



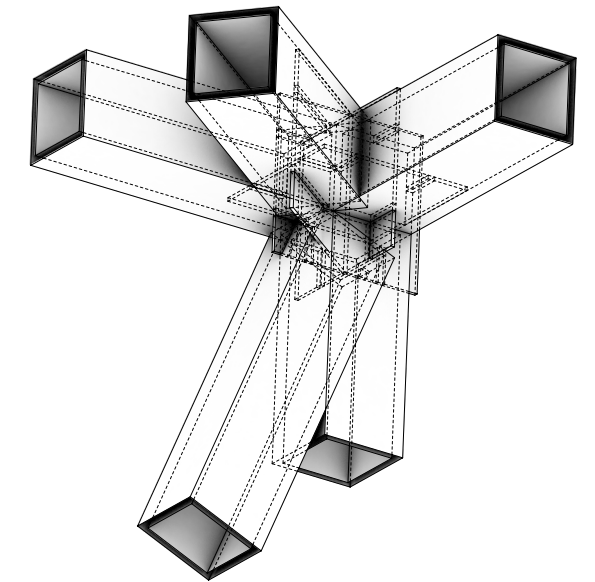
Corner steel truss  
24" x 24" x 2"



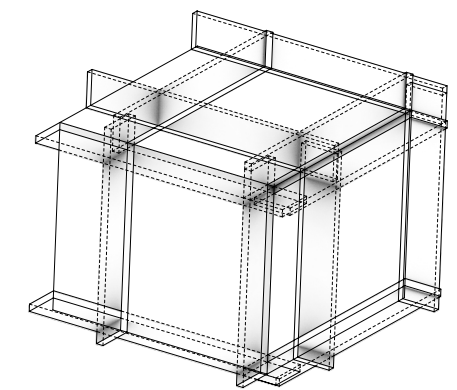
Diagonal steel truss  
24" x 24" x 2"



Insulated exterior glass  
Secondary aluminum framing  
10" x 2"



Primary steel truss  
24" x 24" x 2"



Secondary aluminum framing  
10" x 2"  
Insulated exterior glass

## Conclusion

In architecture, a conversation is possible between art and science, manifested in concrete and steel, between the enclosed and the open. A vivid public space inhabits the gap between the calm functional wings. The insertion is indicative of an attitude towards a spatial relationship.

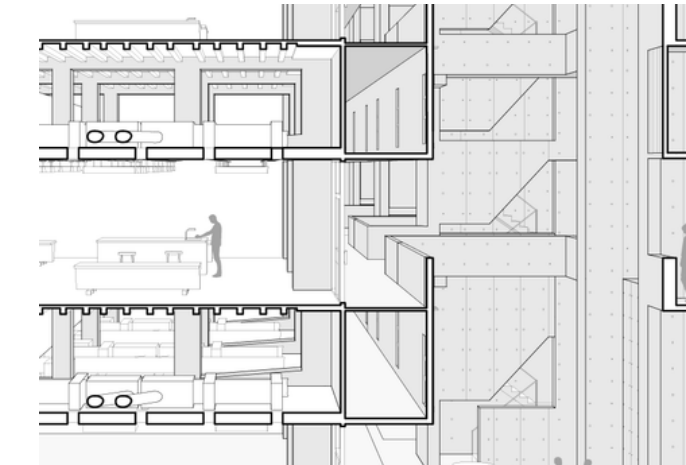


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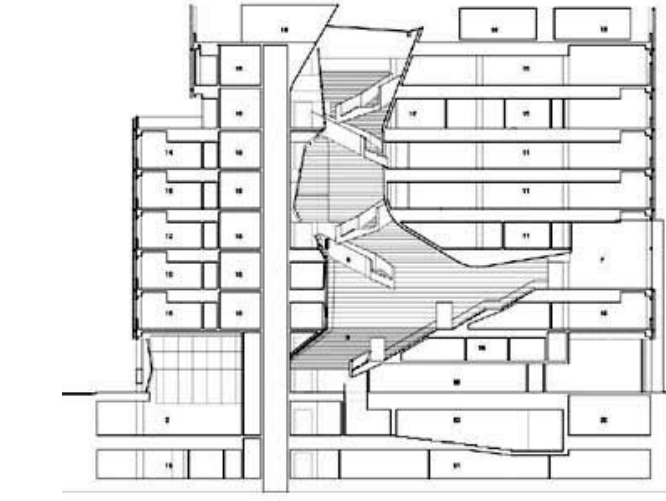


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