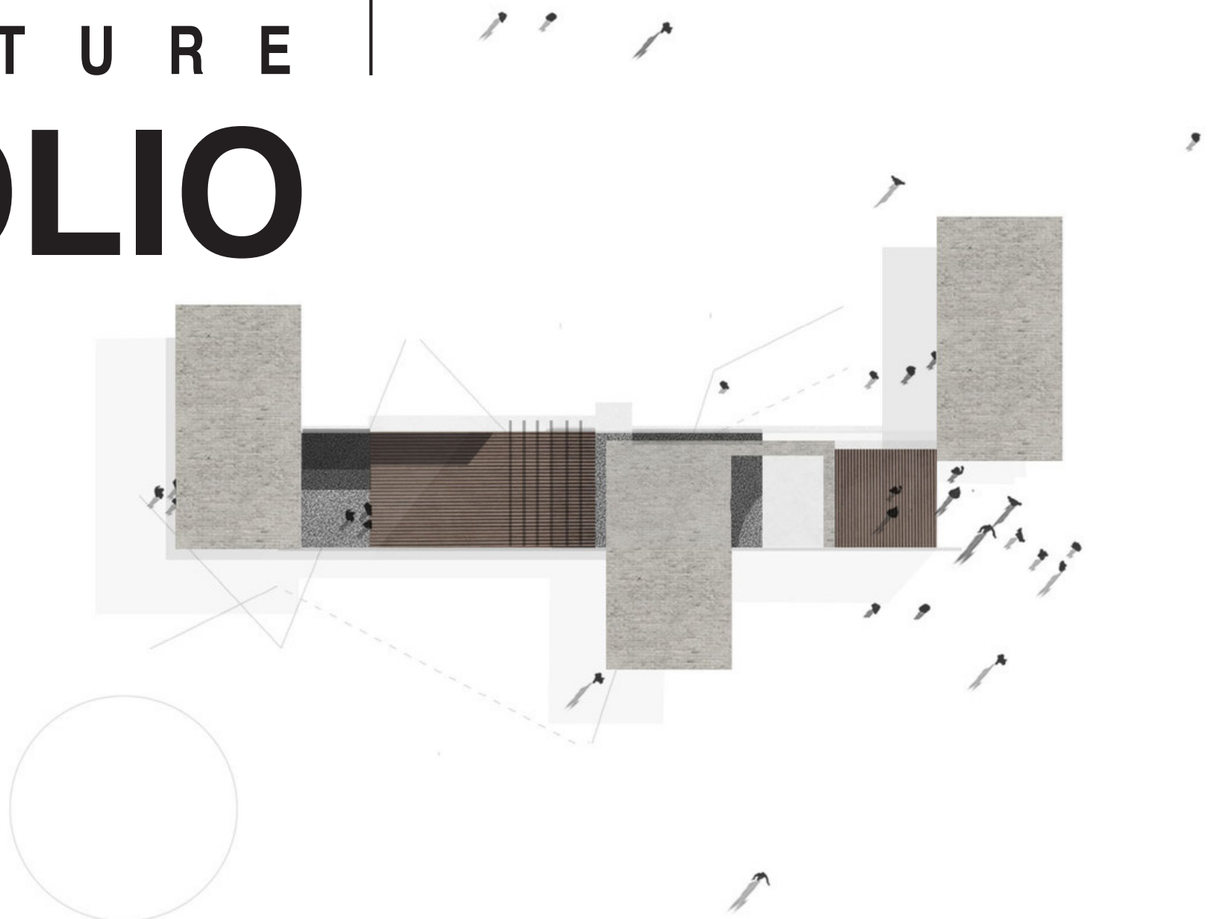
ARCHITECTURE

PORTFOLIO

2019 - 2023

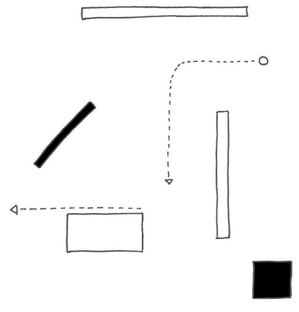


Fang (Frank) Sun
Bachelor of Science (UVA)
Applying for Junior Architect

PROLOGUE

For me, architectural design is a combination of logic, creativity, and passion. I believe architecture has the power to solve social problems. Architecture is never merely a functional mechanism or an emotionless form but a humanistic shelter for people to live safer, healthier, and happier.

This portfolio illustrates designs in a wide range of scales, from a bridge to a city, and design techniques are deployed between practical and futuristic. And all of them are seeking the architectural path to propose solutions to given issues, including urban flooding, spatial separation, traffic problems, and potential challenges of future urban life.



PROJECTS

01 Welcome Center of Columbia University
Visioning Climate Resilience and Sustainability in a High-density Urban Site
Fall 2021

02 “Reborn”: A Mixed-use Building at the University of Virginia (UVA)
Experimenting Architectural Intervention on the Spatial Separation of the Built Environment
Spring 2022

03 A Renovated Bridge in an Old Water Town
Bridging Humans and Vehicles
Summer 2022

04 An Aggregatable Collective for Industrial Settlement
Exploring Architectural Growth with Modular Design
Fall 2022

05 Lightwood House
An Entity Construction for Stay and Rest
Summer 2021

06 Leisure Pavilion
A Parametric Design Test for Light and Tangible Material
Summer 2020

07 Bamboo Valley
A Renovation Project to Find the Beauty in Nanjing Ancient Town by HandSketch
Winter 2020

08 Curriculum Vitae

01

Welcome Center of Columbia University

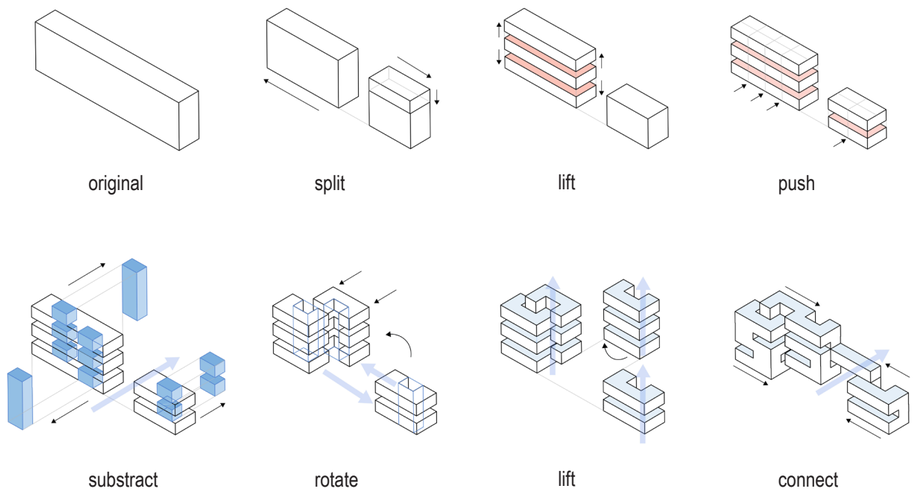
Visioning Climate Resilience and Sustainability in a High-density Urban Site

Studio Work
Instructor: Peter Waldman
Individual Work
Fall 2021

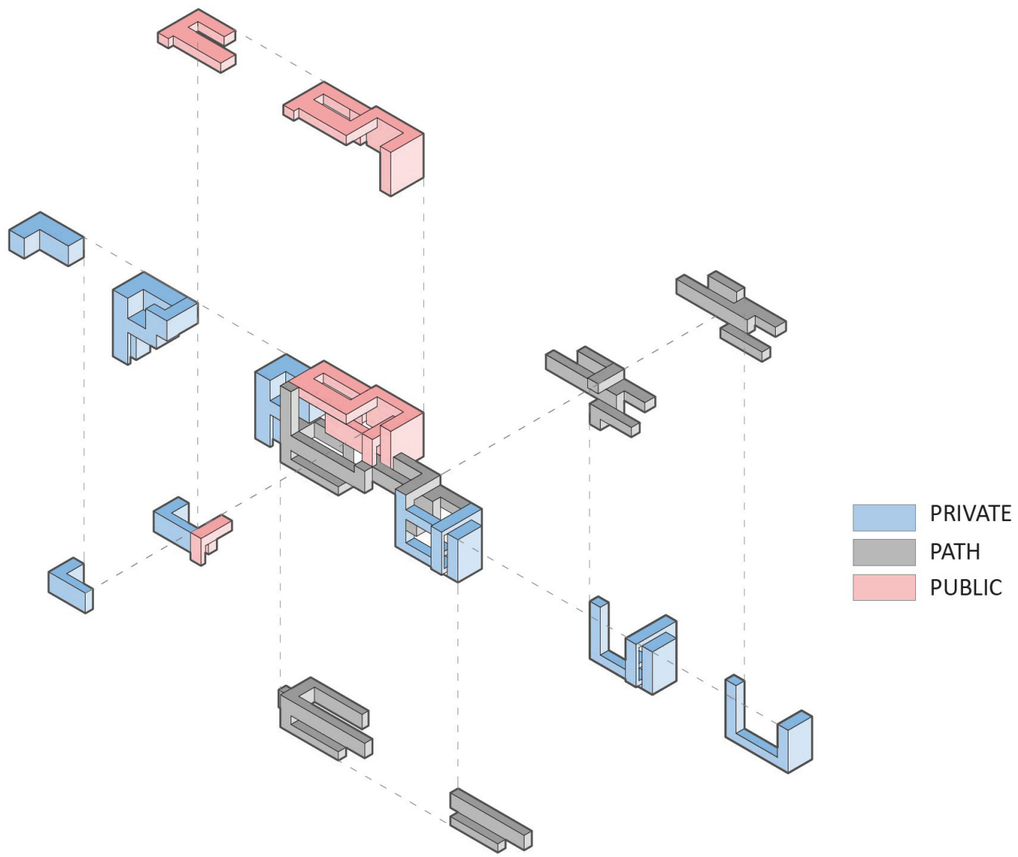
This project aims to explore how to incorporate **sustainable development** into a building located in one of the busiest regions in the world.

Due to climate changes, the Hudson River will overflow its banks and flood in Manhattan within the next twenty to thirty years. Therefore, the Welcome Center is designed with a higher base level to reduce flooding vulnerability. In order to improve **space efficiency and lower energy waste**, meeting rooms, study rooms, libraries, auditoriums and exhibition galleries are incorporated into this building to fulfill different visitors' needs.

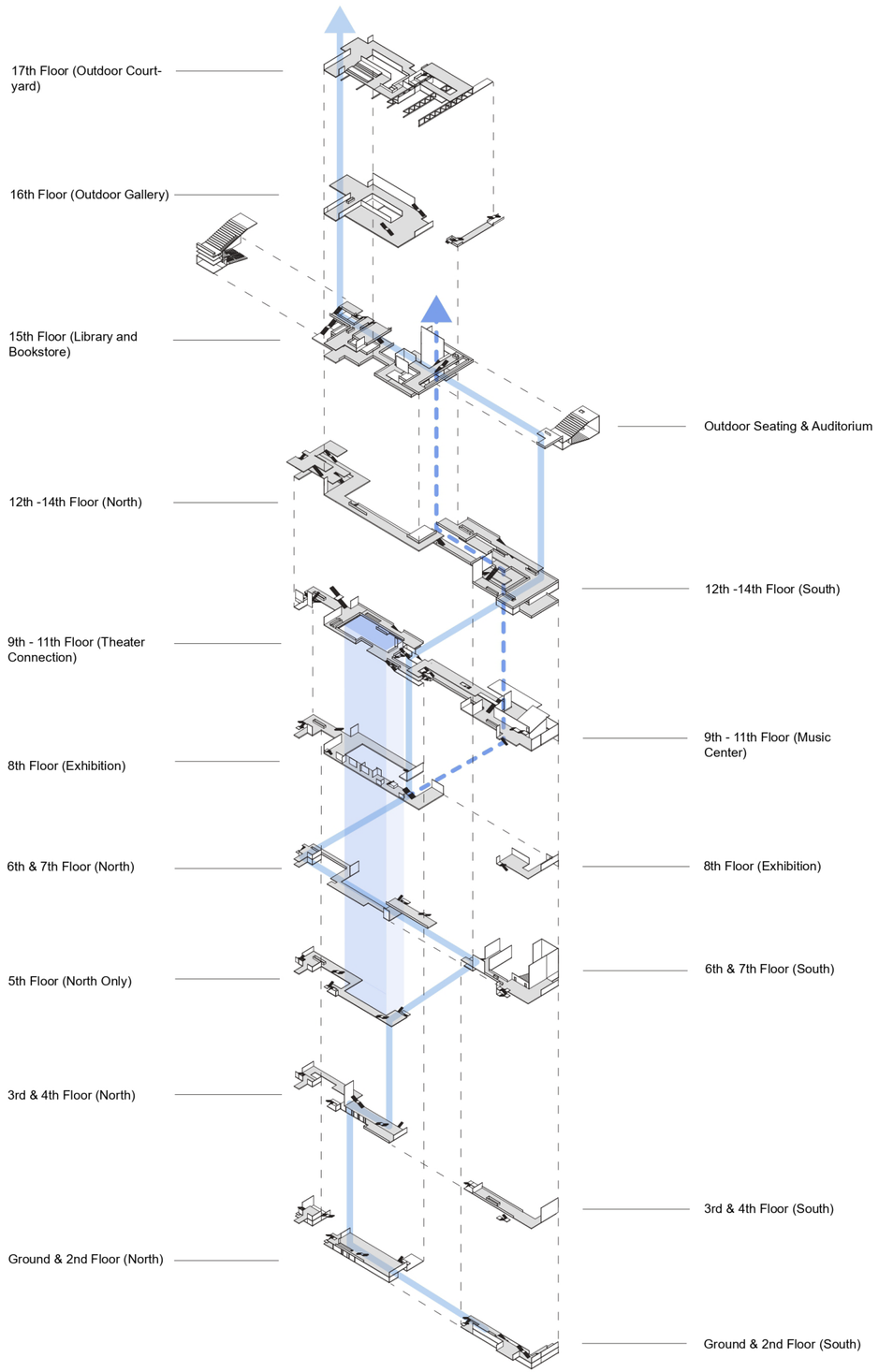
This design first splits the module into two pieces, and then alters the shape by using **interlocking in both two and three dimensions**, which enables the building to expand from the Columbia University site to W 125th Street and connect with the park in the south end. The elongation of the building implies architecture's potential to grow and ultimately solve environmental problems by reducing unnecessary waste of space.



Form Analysis Diagram

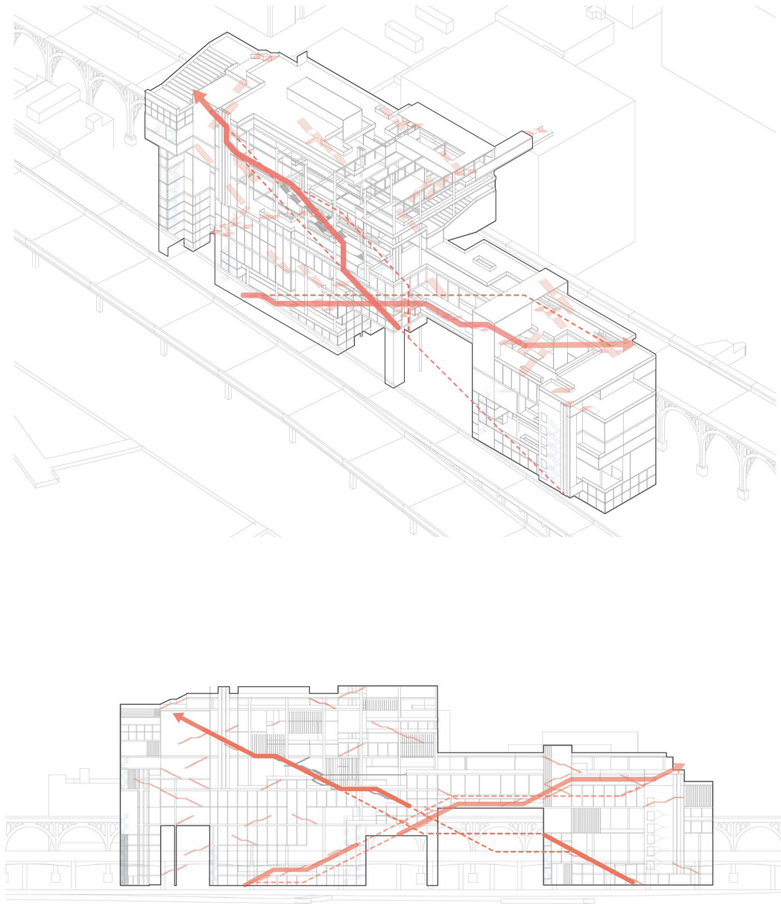


Function Analysis Diagram

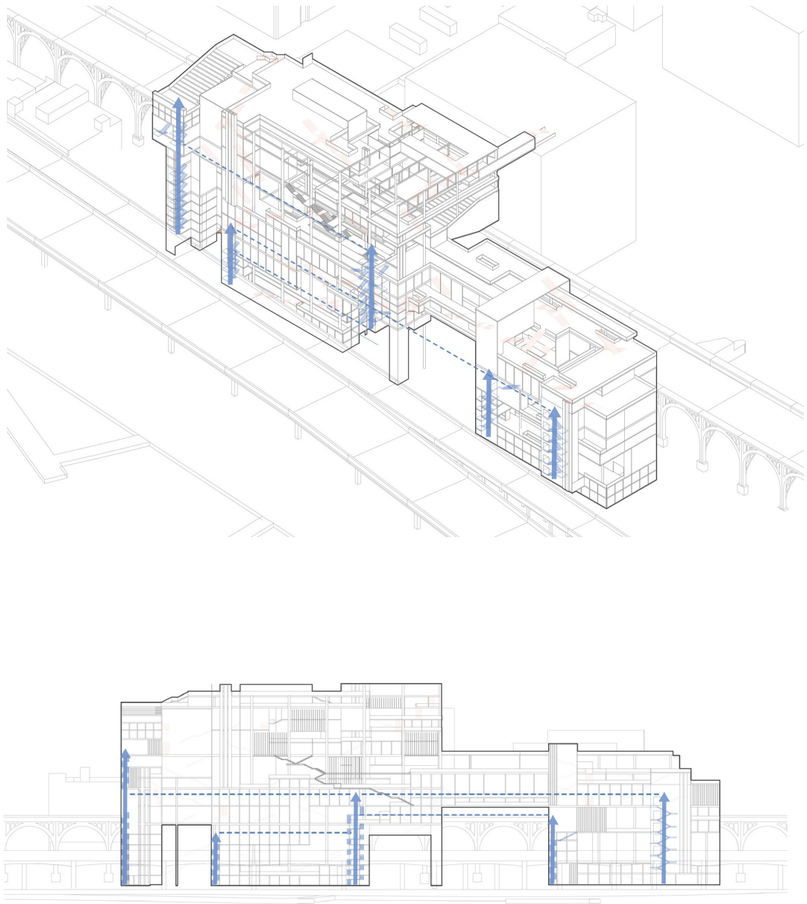


Exploded Axonometric Drawing

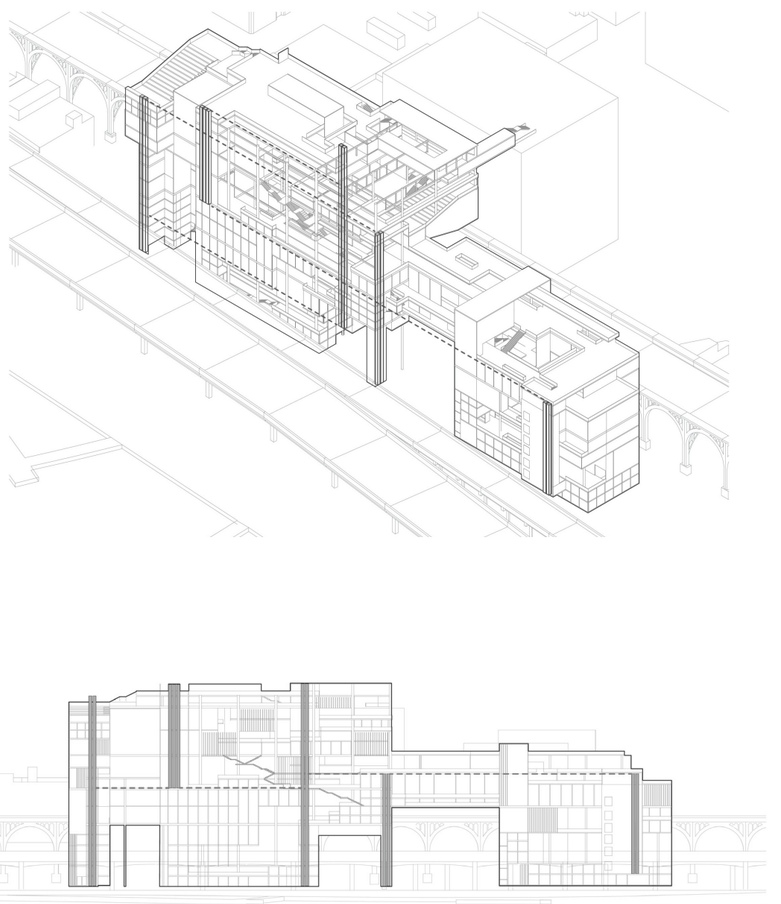
Circulation Analysis Diagrams



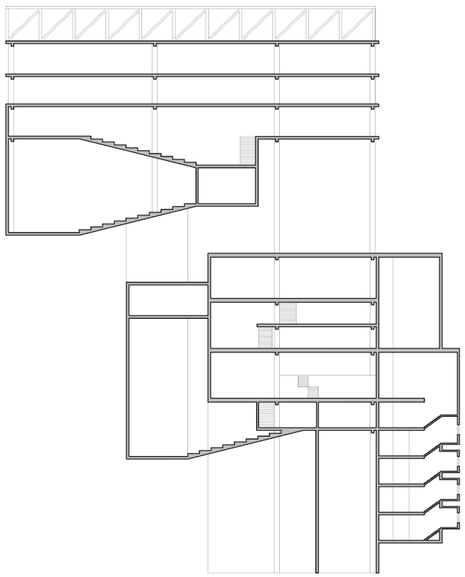
Primary Circulation with Straight Stairs



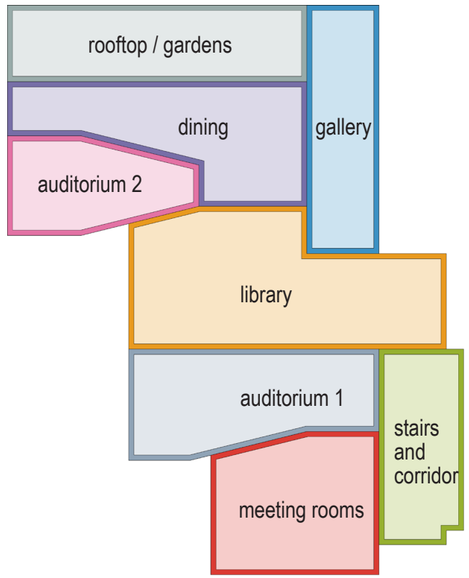
Secondary Circulation with U-Shaped Firestairs



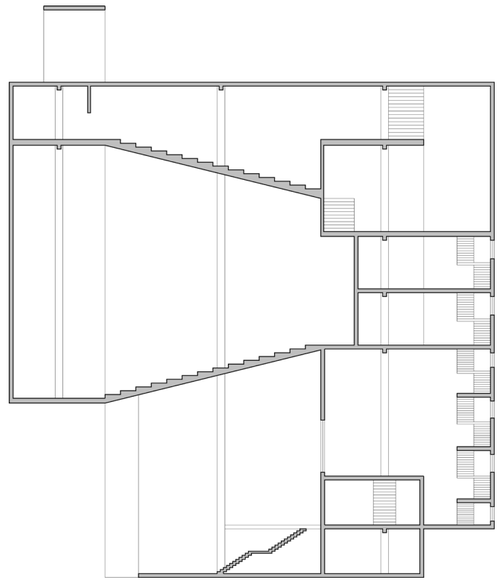
Teritary Circulation with Elevators



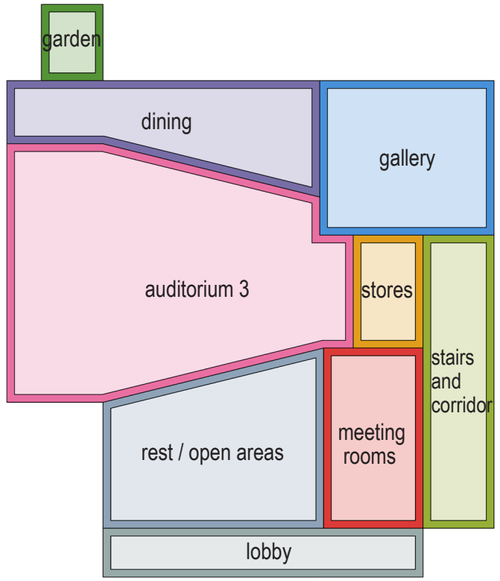
short section 1



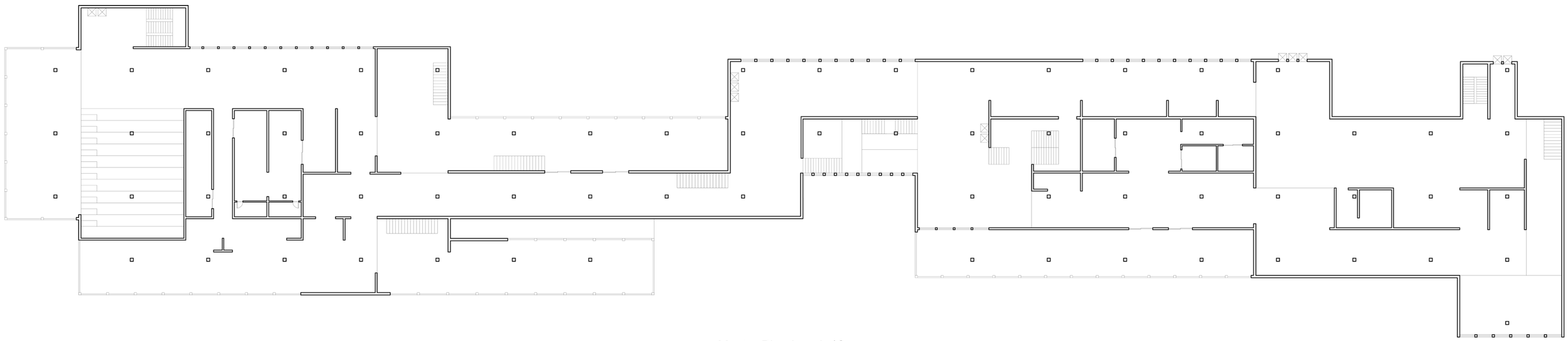
function diagram 1



short section 2

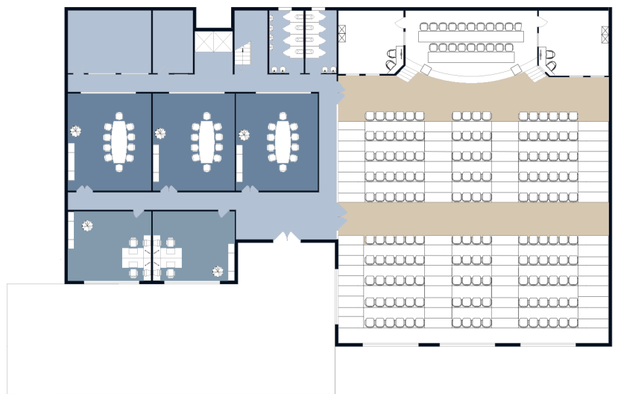


function diagram 2

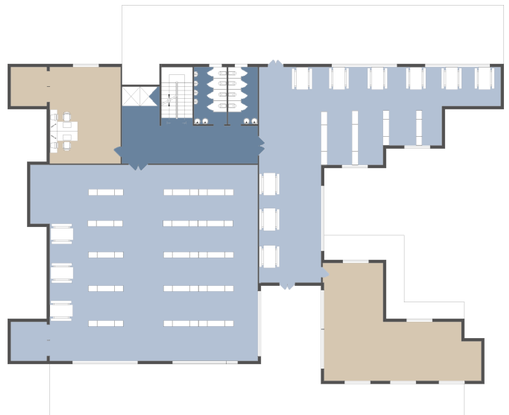


Master Plan Level 12

Detailed Plans (1"=20')



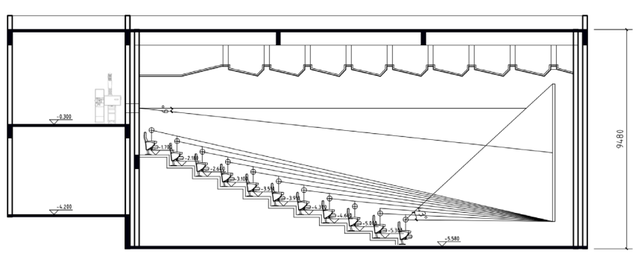
Auditorium 3



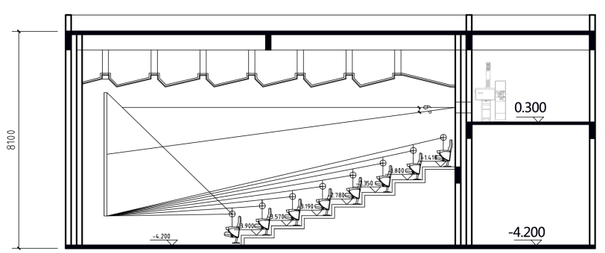
Library

Dining Area

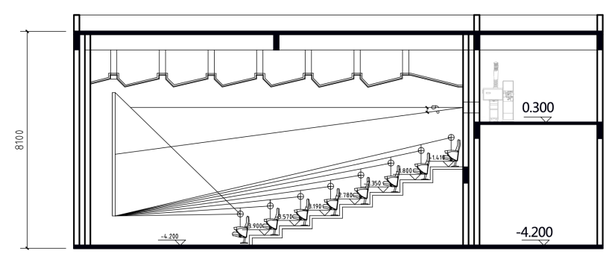
Auditorium Type Analysis (1"=16')



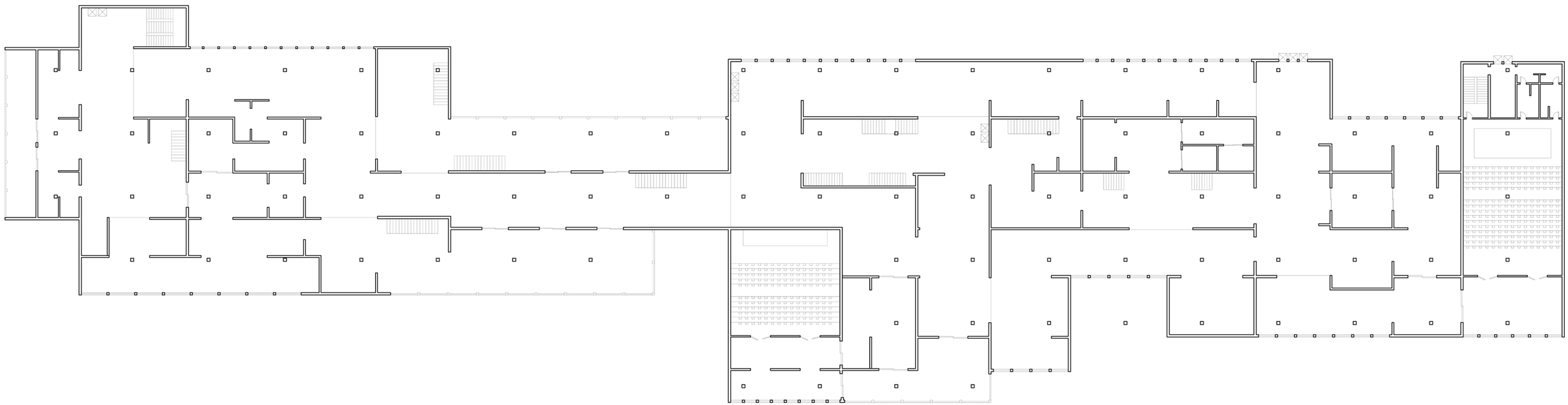
auditorium 3 or 2



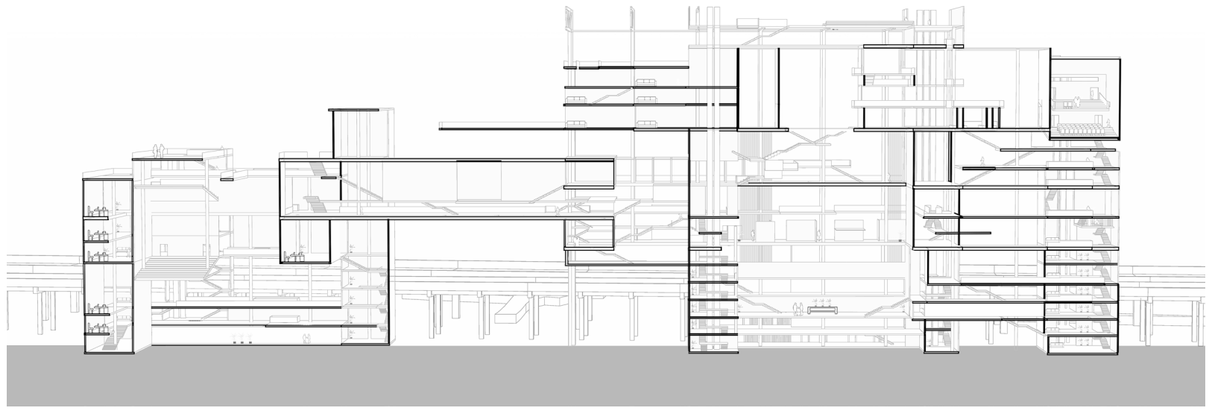
auditorium 3 or 1



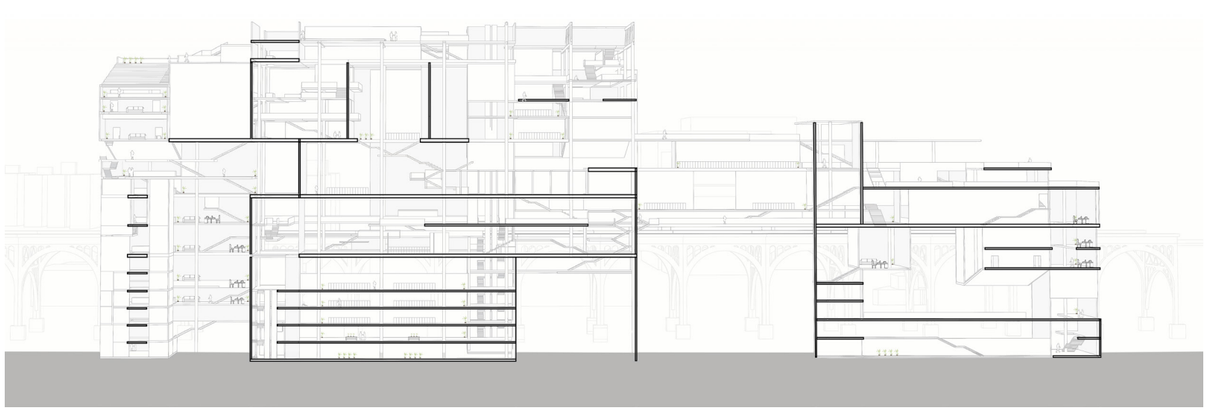
auditorium 2 or 1



Master Plan Level 06



Linear Section from Campus



Linear Section from the Hudson River

View from the Hudson River

View from Drivers on Highway

02

“Reborn”: A Mixed-use Building at the University of Virginia

Experimenting Architectural Intervention on the Spatial Separation of the Built Environment

Studio Work

Instructor: Schaeffer Somers

Individual Work

Fall 2021

The active railway cutting through UVA’s campus **weakens the connections** between the North and South grounds of UVA. This project, designed to be located at Lambeth (North Grounds), is dedicated to changing this situation.

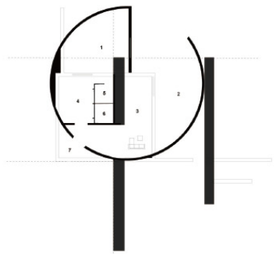
To restore the connections for the grounds, a **skyline walkway over the rail** is used to connect the main campus, Carr's Hill Field and Nameless Field. The building includes **collective commons** on the base section (1-4 floors) and **student-faculty housing** on the top section (5-7 floors). The form and shape are generated to ensure potential entrances on the site.

On each floor, a **half-floor** is added to allow people to look down and enjoy the beauty of “flows” inside the building. The central courtyard **introduces water** from Dell to Lambeth, which will flow around the railway and finally gather at the center and become **the major supply** for people living in the dorms of the building.

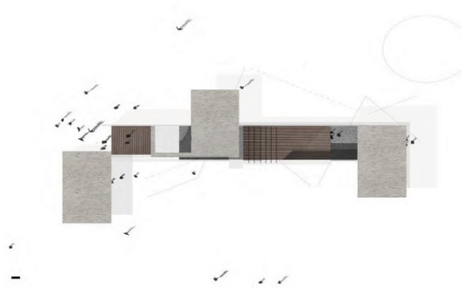
Last but not least, this building is named “Reborn” because it is “reborn-able”. For every level above, the future constructor can **follow the similar pattern** as what it has for now, so when there are more residents, no extra design or new materials will be considered.

Form Analysis (Collages)

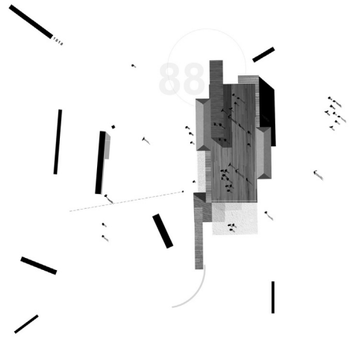
drone image



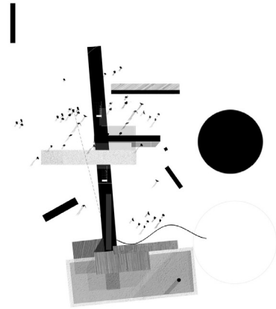
circle analysis



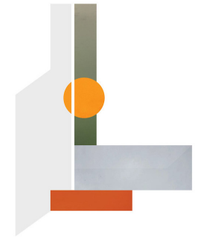
block analysis (straight line)



line combination analysis 1

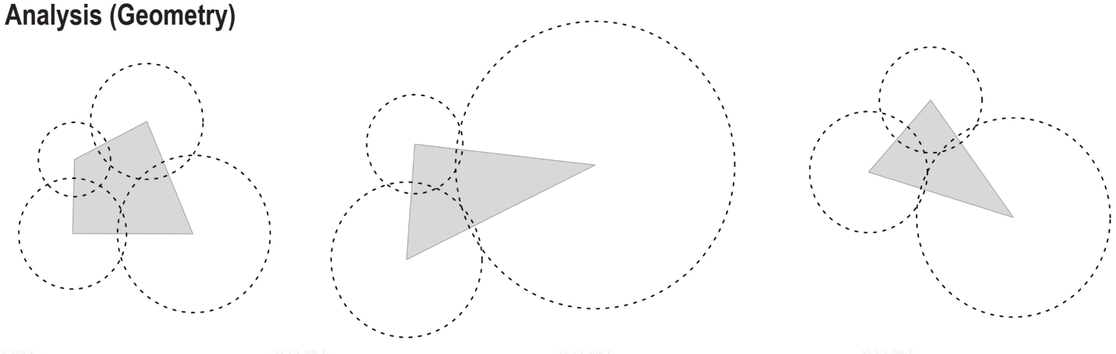


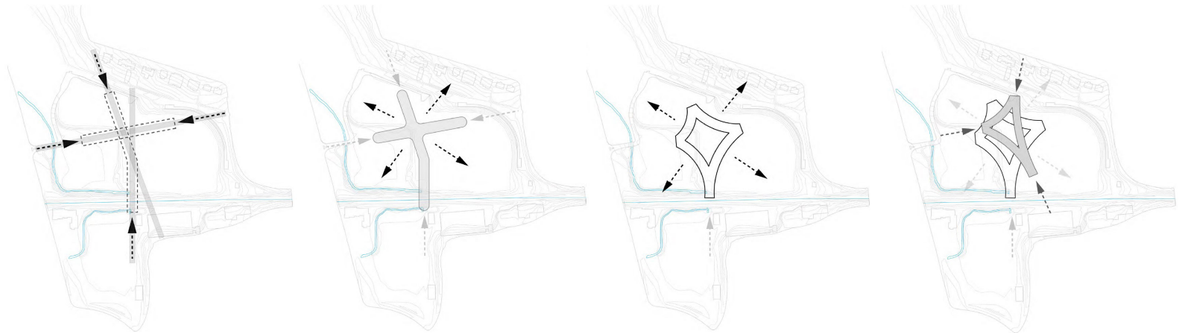
line combination analysis 2



geometry analysis
(extract ideas from previous steps)

Form Analysis (Geometry)



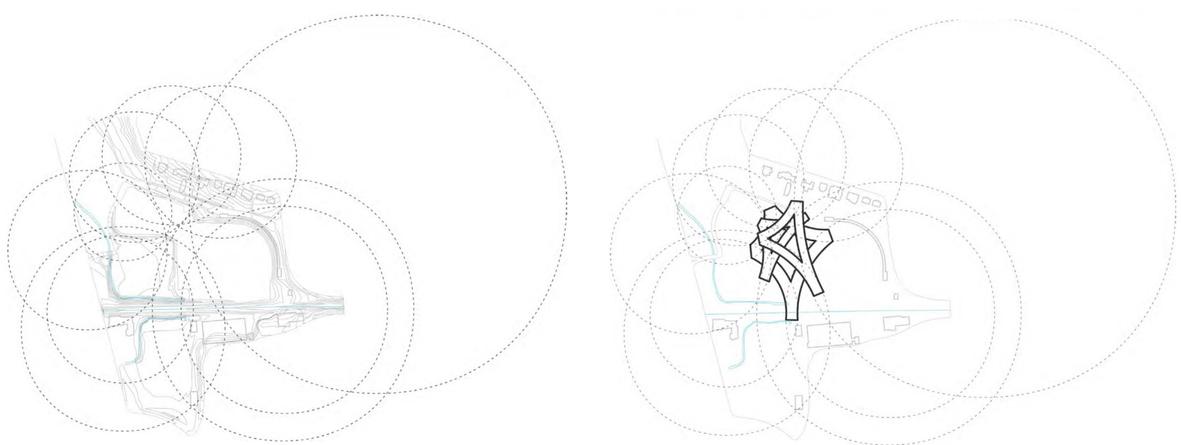


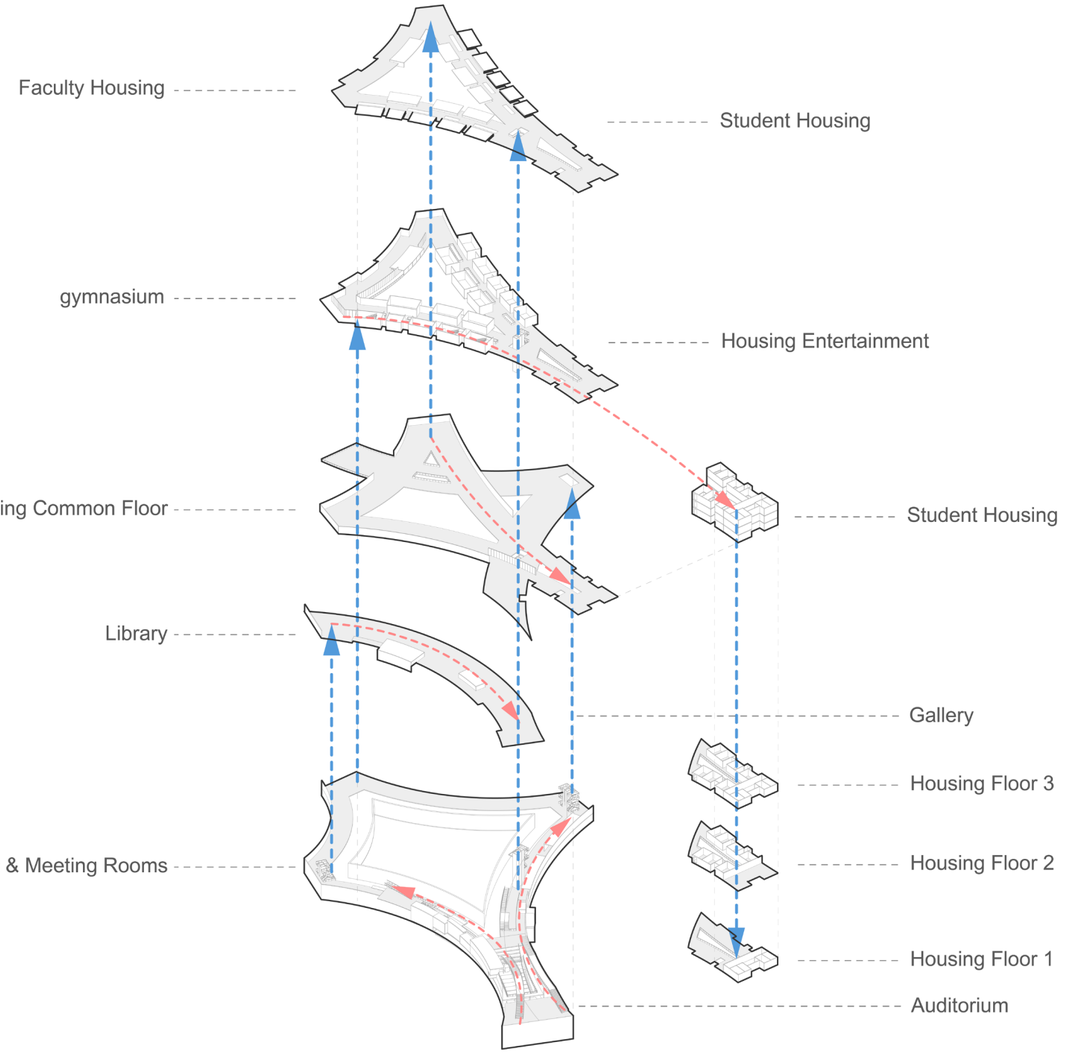
push

pull

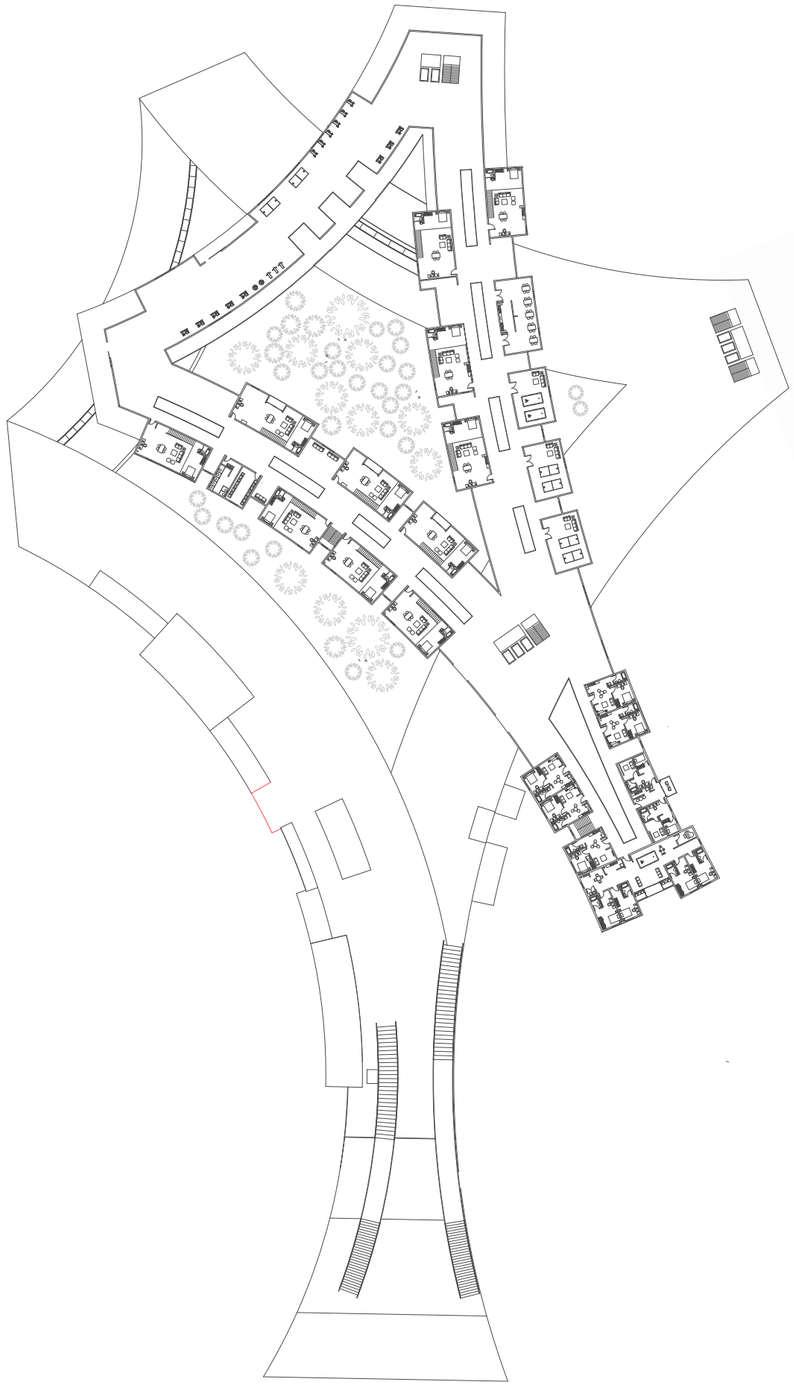
drag

push and shear



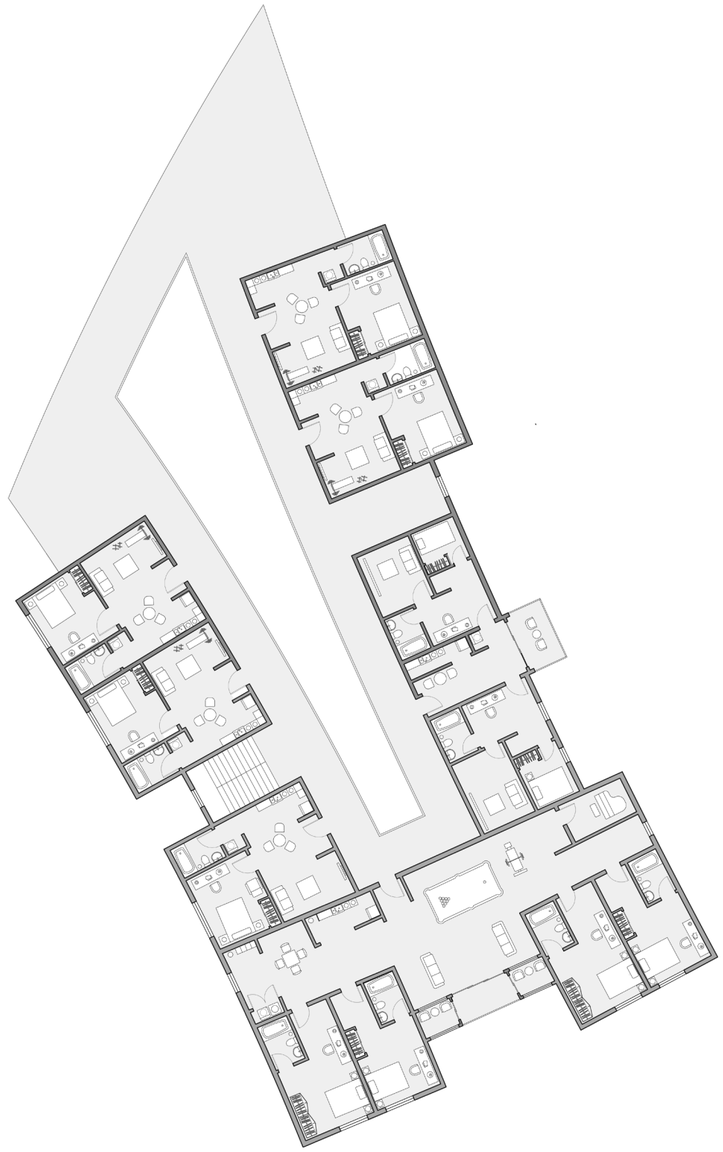


Exploded Axonometric Drawing



Master Plan on the Third Level

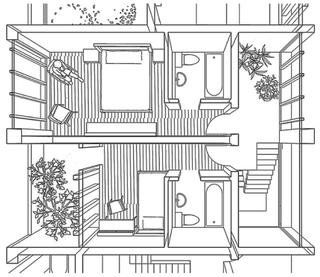
Plan for the Northeast Wing



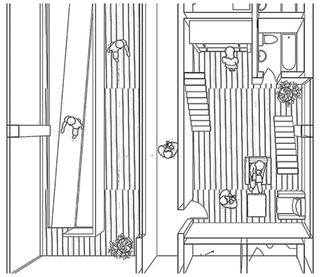
Plan for the Faculty Housing Floor

Detailed Housing Plans

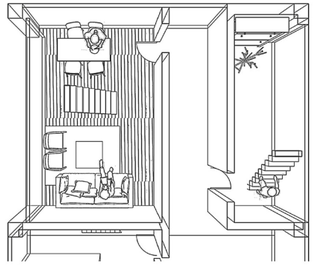
student housing



type 1



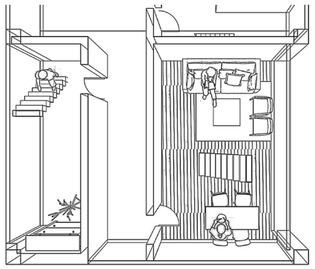
type 2

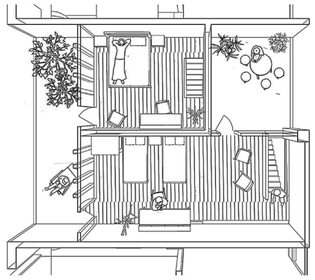


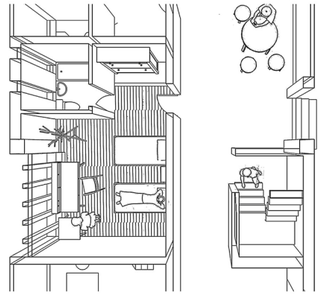
type 3

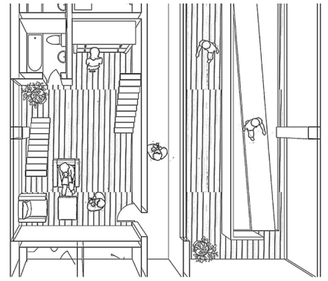
type 4

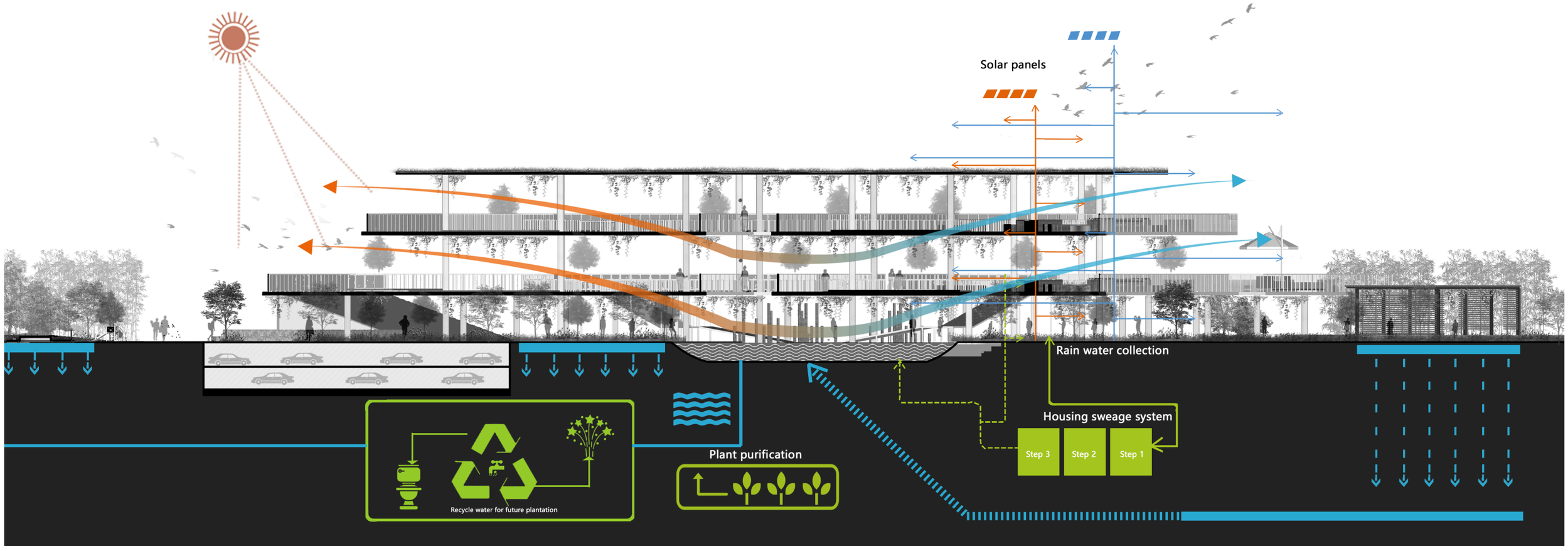
faculty housing











Elevation with Ecological Analysis

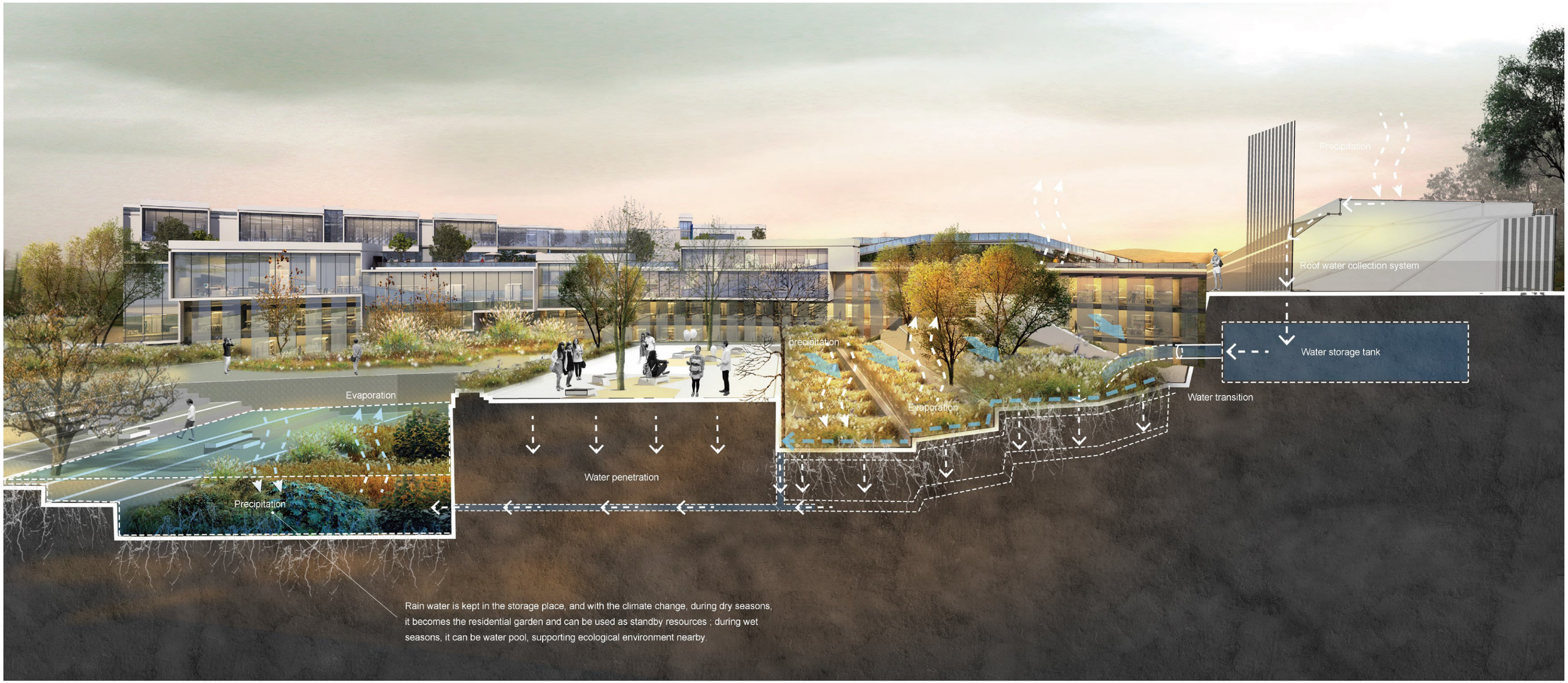
Rendered Images

Central Courtyard

Birdeye View

Entrance to the Second Level

Fitness Center



Long Section With Designed Water Storage and Reuse System

03

A Renovated Bridge in an Old Water Town

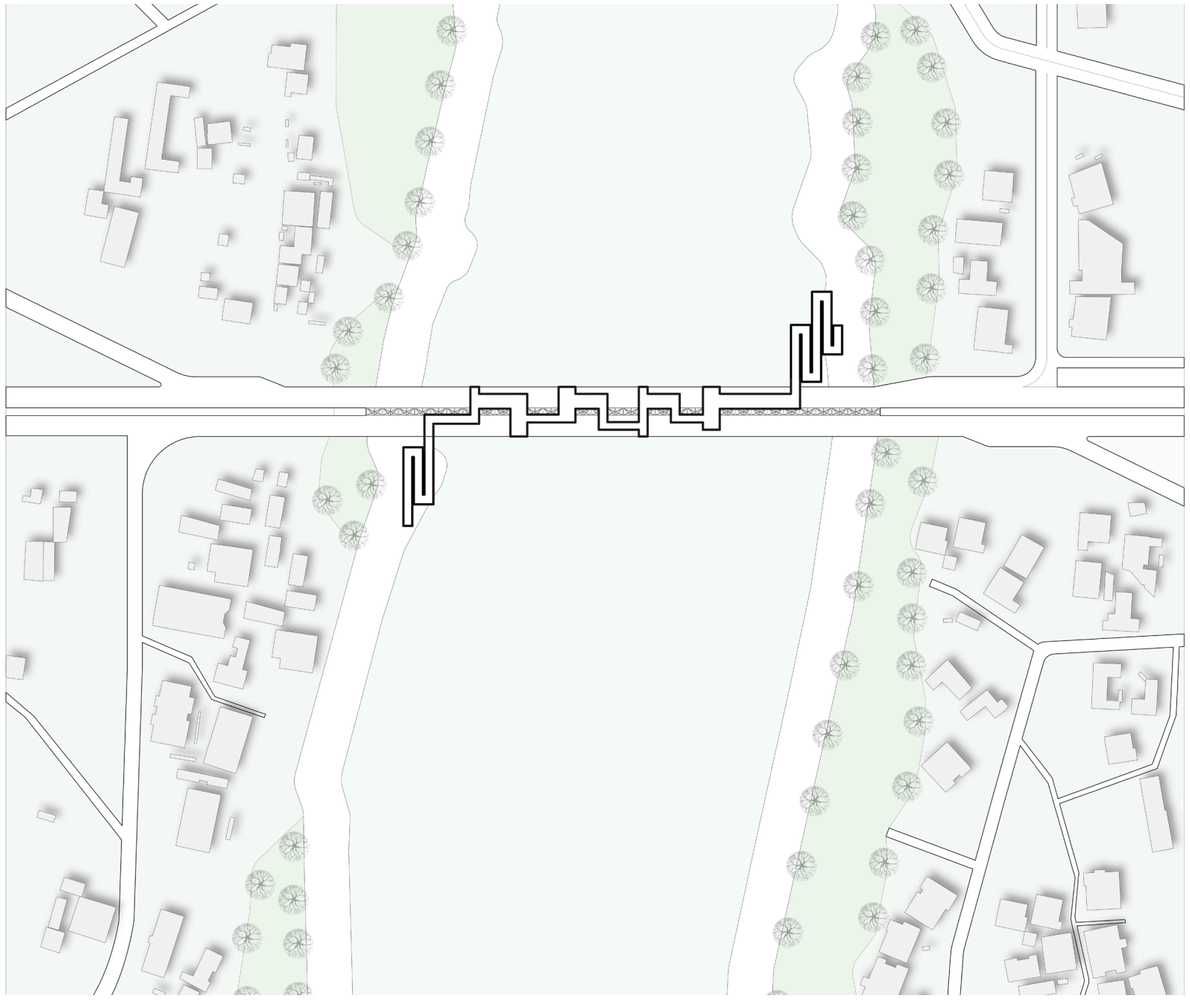
Bridging Humans and Vehicles

Instructor: Lifeng Lin
Individual Work
Fall 2022

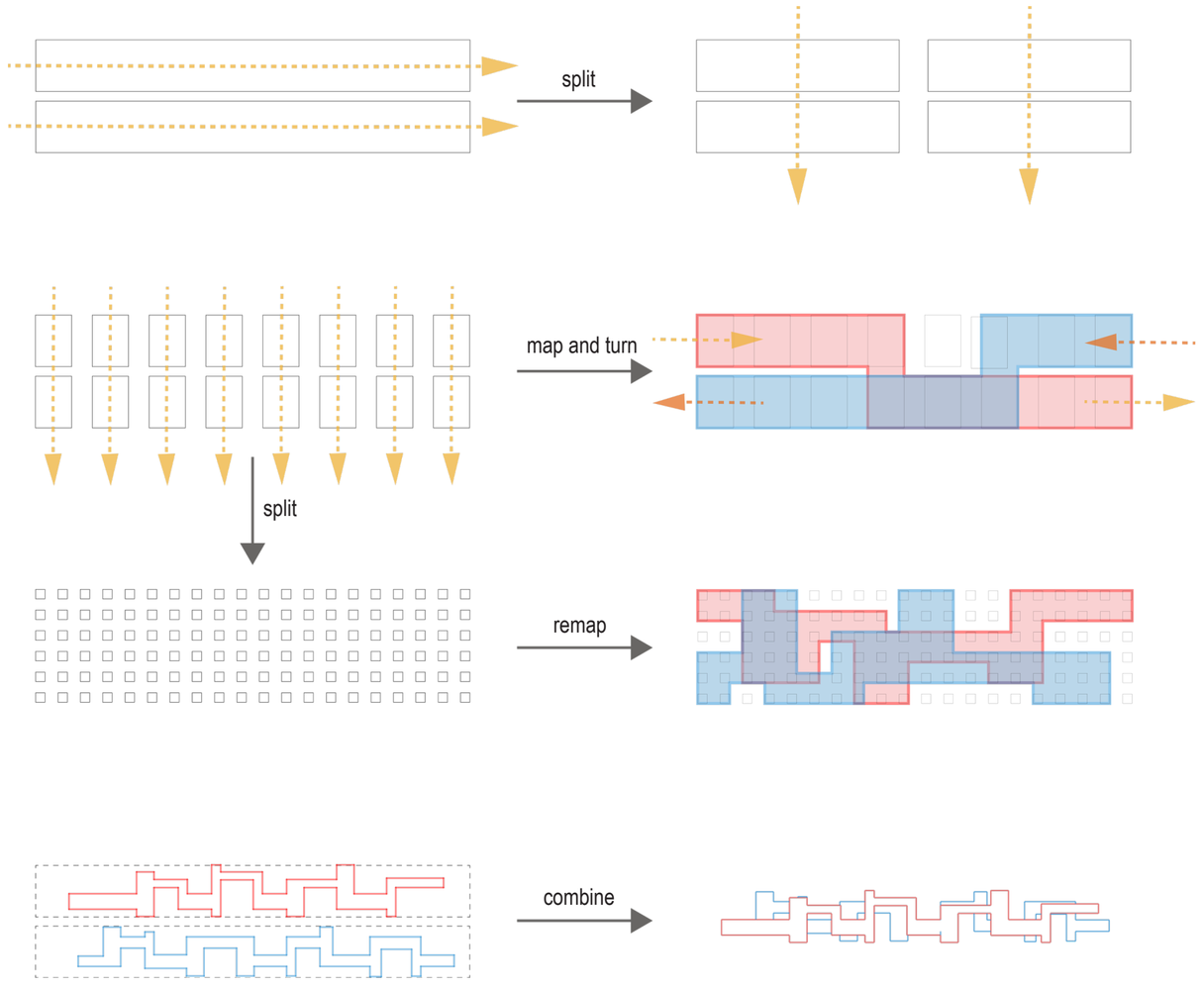
Traditionally, a bridge is **a simple connection system** to make two sides meet. However, a modern bridge can be more sophisticated.

Spanning over the Yongxin River , the 150-meter bridge takes the shape of a zipper to allow both vehicles and pedestrians to pass conveniently and thus **ease traffic pressure**. The walkable aisles are above and below the driveway, and **pedestrians can go up and down** through connected stairs. The lower aisle is mainly for passing, while the upper aisle is designed to accommodate small shops. At both ends of the bridge, there are **ramps, stairs and elevators** so that pedestrians can directly go up to the aisles from the shore.

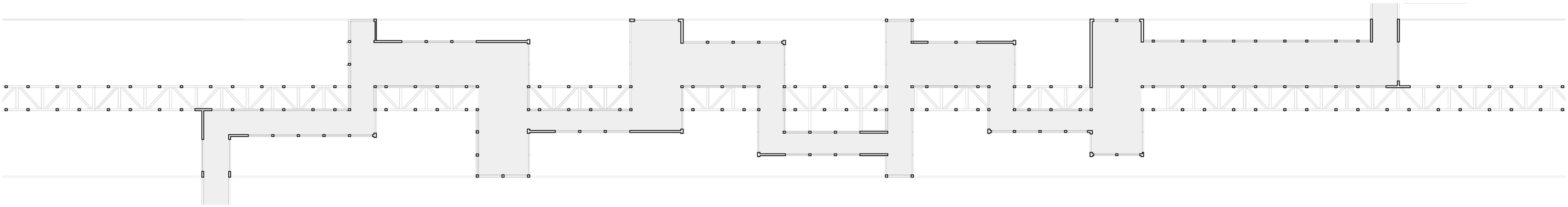
The entire bridge is supported by **a mesh steel frame structure**. The middle part of the structure can carry the vertical force of the three floors, and extend the beam from the center to **achieve the effect of horizontal support** at the same time.



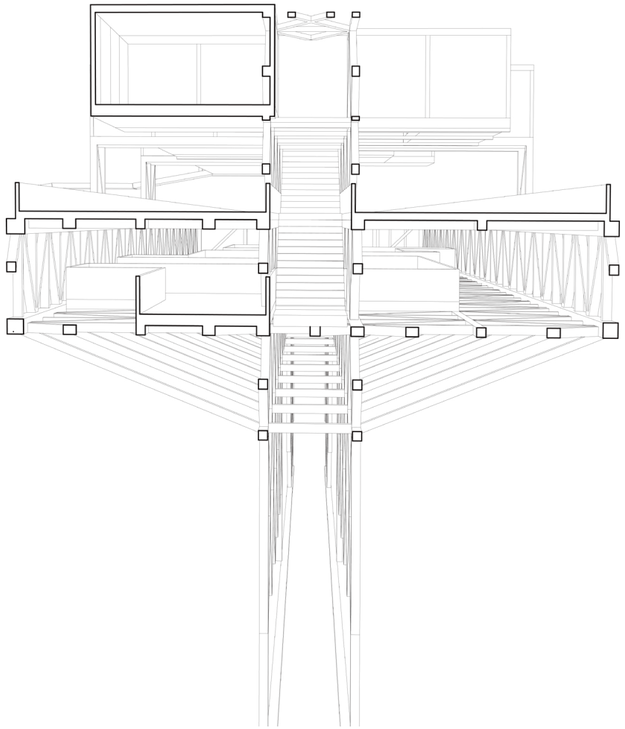
Site Plan



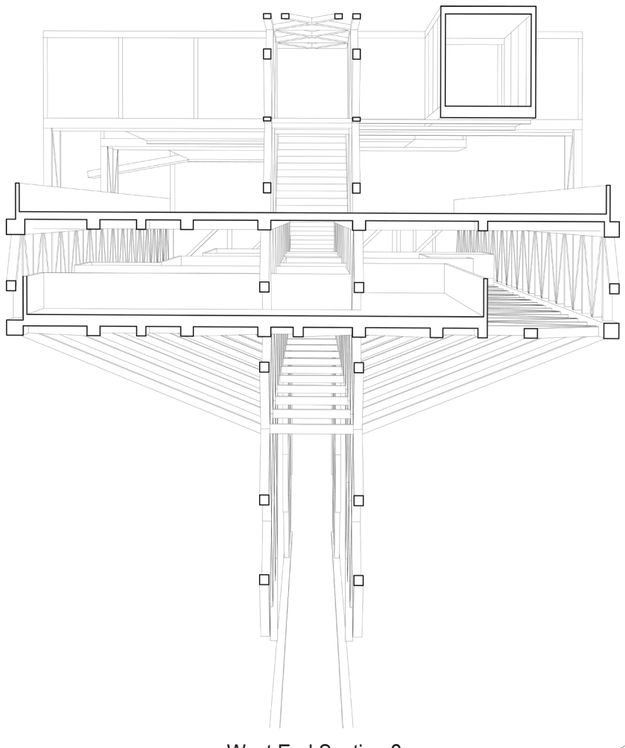
Form Analysis



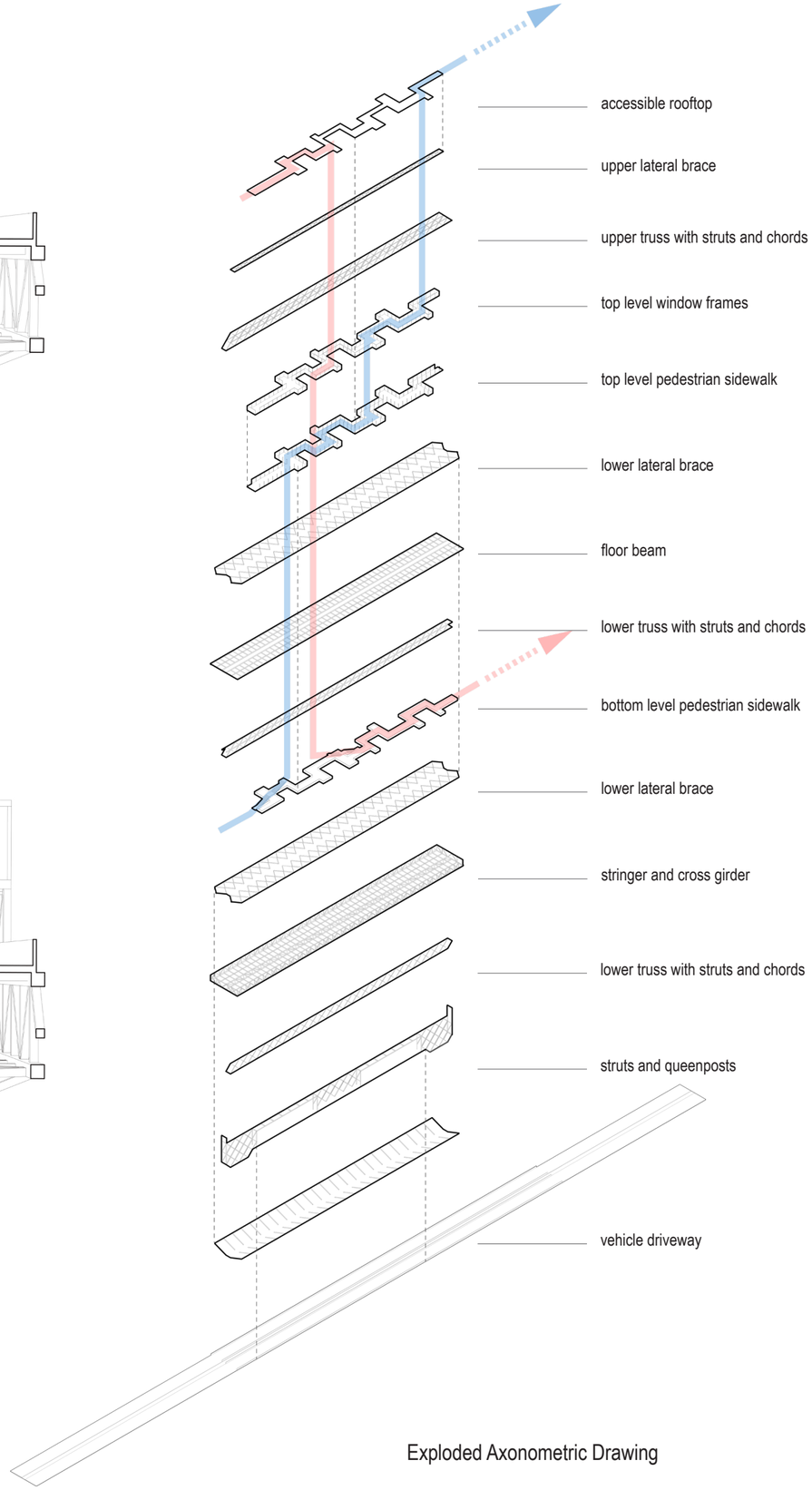
Master Plan on the Top Sidewalk Level



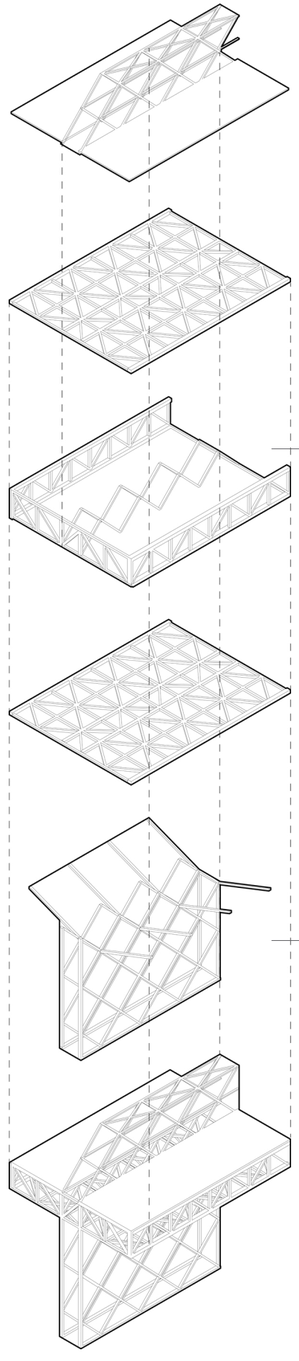
West End Section 1



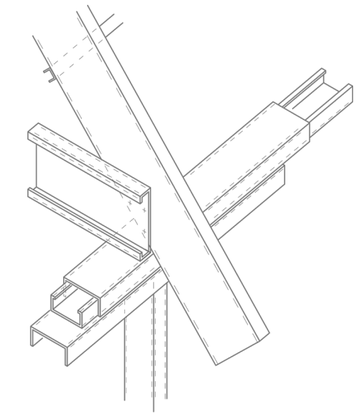
West End Section 2

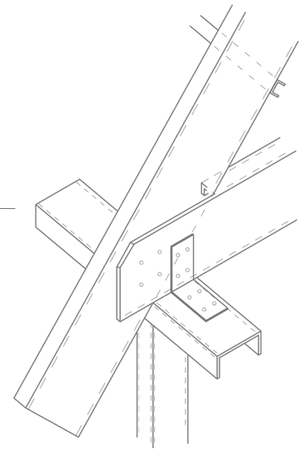


Exploded Axonometric Drawing

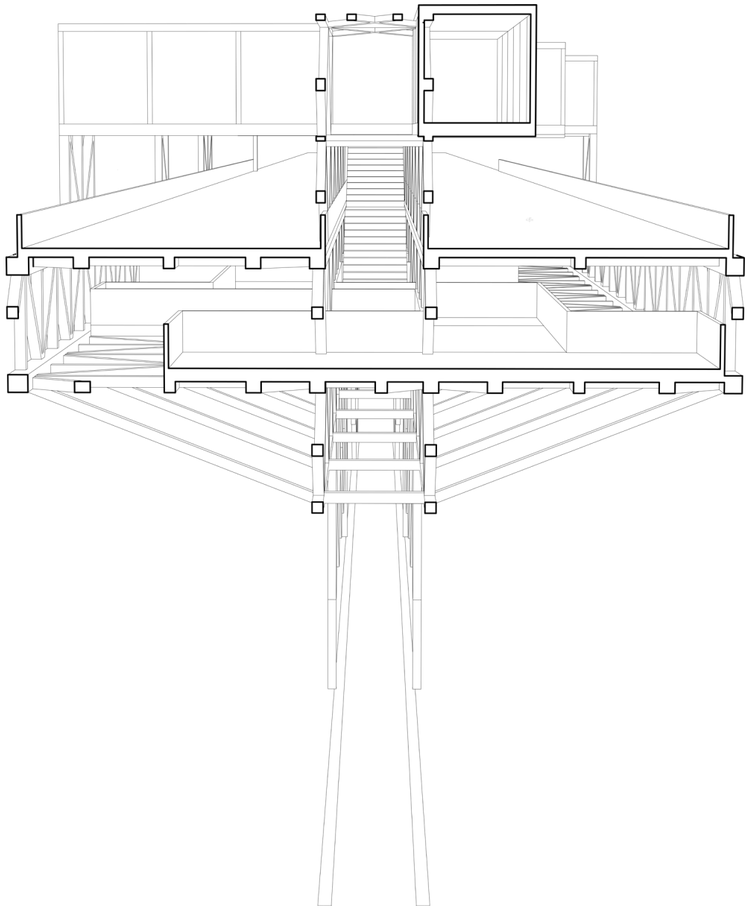


Exploded Structure Analysis

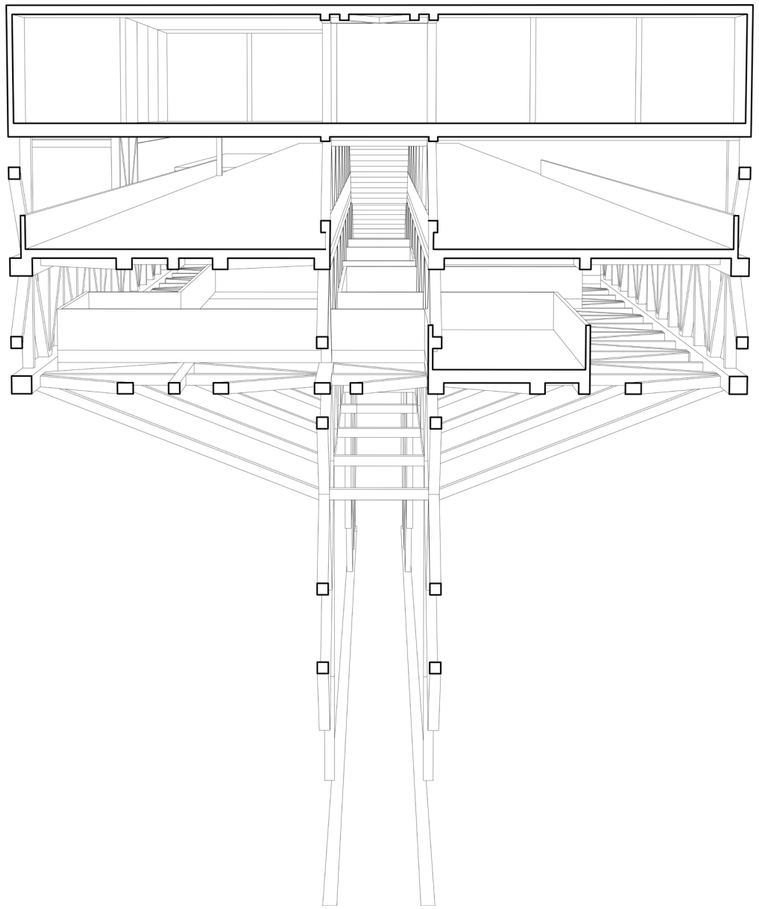




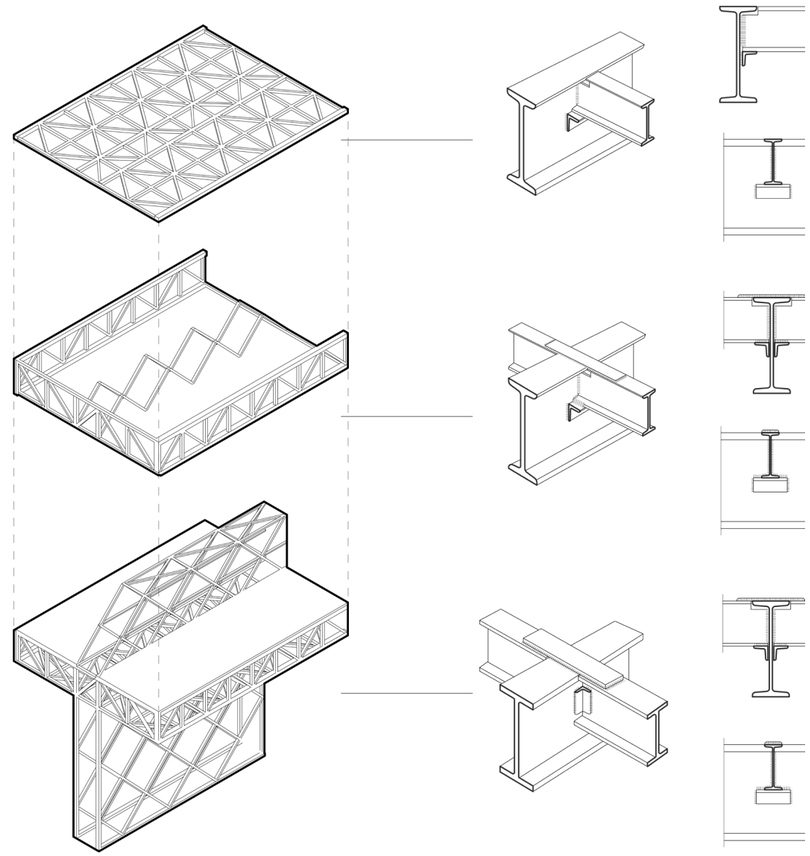
Connector Prototypes



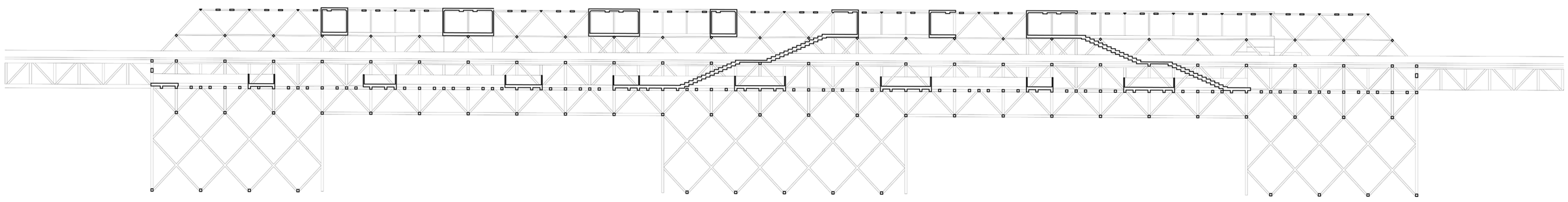
East End Section 1



East End Section 2



I-Beam Structure Prototypes



Linear Section

Rendered Images

Traffic Lane View (a)

Traffic Lane View (b)

Overall Structure View

Commercial Space in Sidewalk


TRITON
TRITON
TRITON

04

An Aggregable Collective for Industrial Settlement

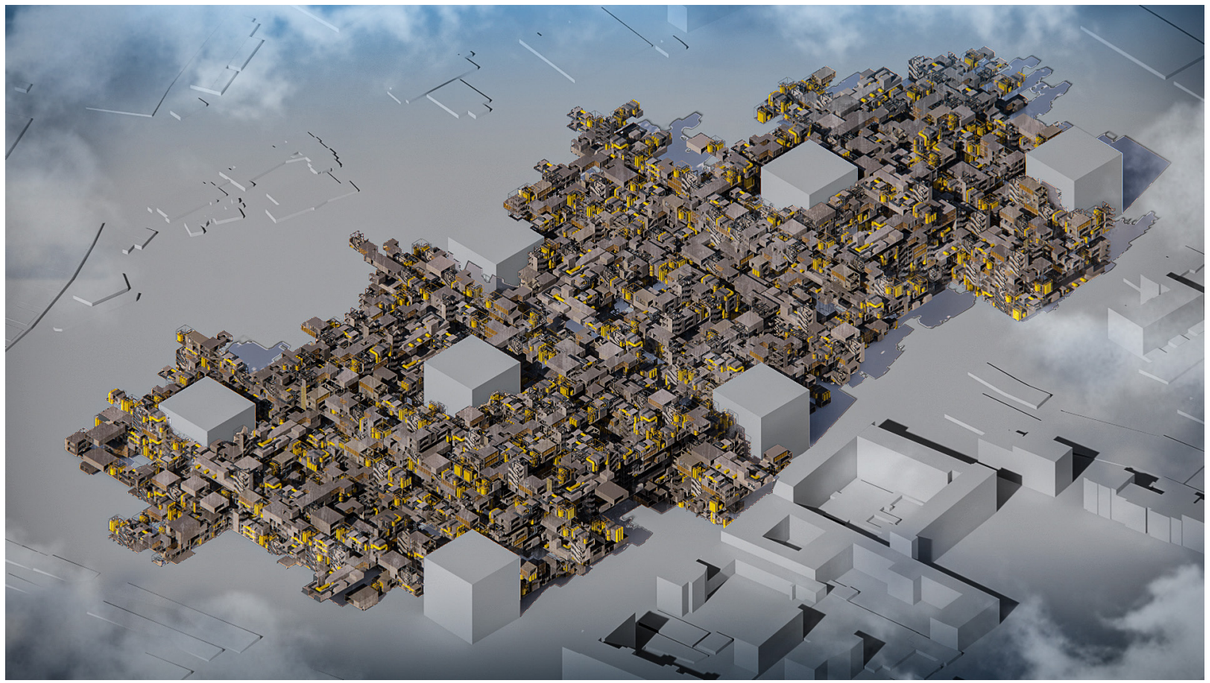
Exploring Architectural Growth with Discrete Design

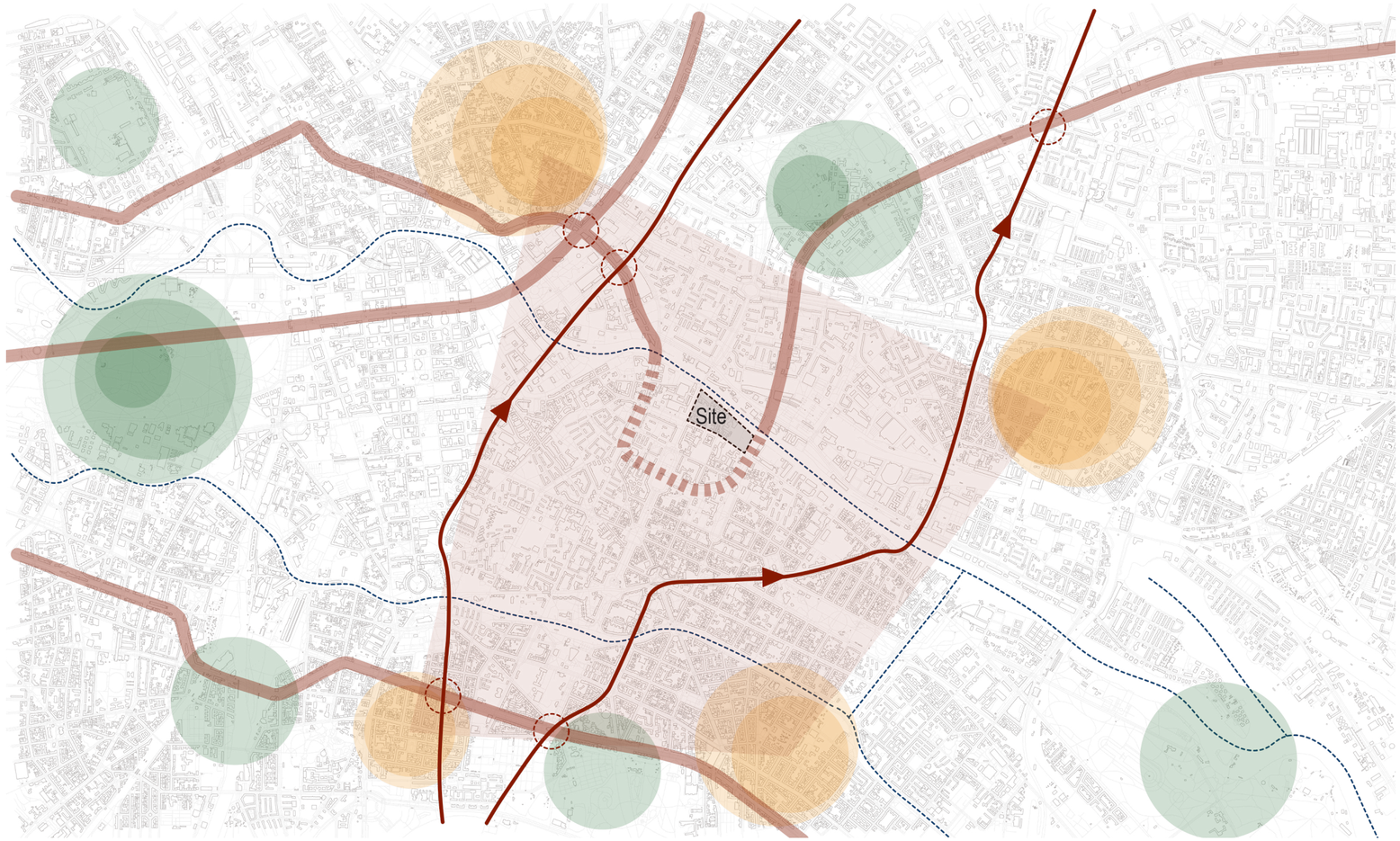
Instructor: Meizi Li
Individual Work
Fall 2022

As a wall is constructed by bricks, an architecture/community could be **aggregated by parts**.

This design site is located around an industrial park in Berlin, Germany. The location is chosen to incorporate the industrial park into a more **compact, multi-functional** building cluster that can “grow.” In this design, basic discrete spaces include apartments, offices, power plants and laboratories, and shared discrete spaces include learning areas and transportation areas.

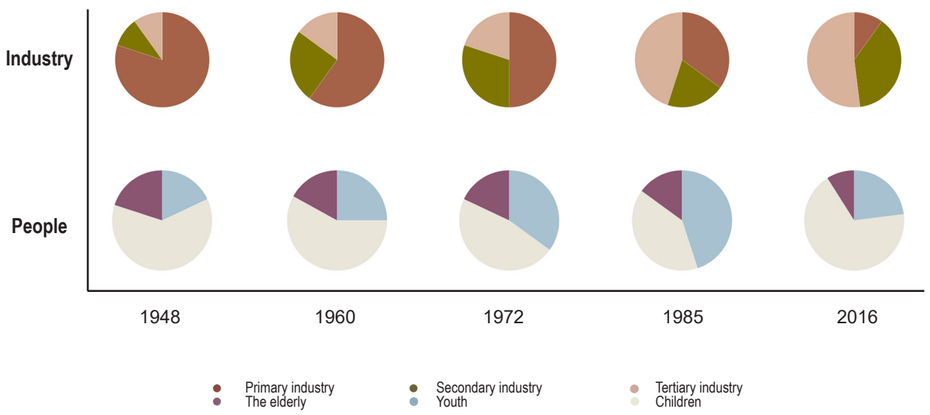
The prototype of this project can be **extracted, arranged, and augmented** through **parametric operation** to generate a whole city as well as an innovative urban life mode. Their flexibility and inclusiveness allow them to fit into **different city vibes** and promote social interactions.



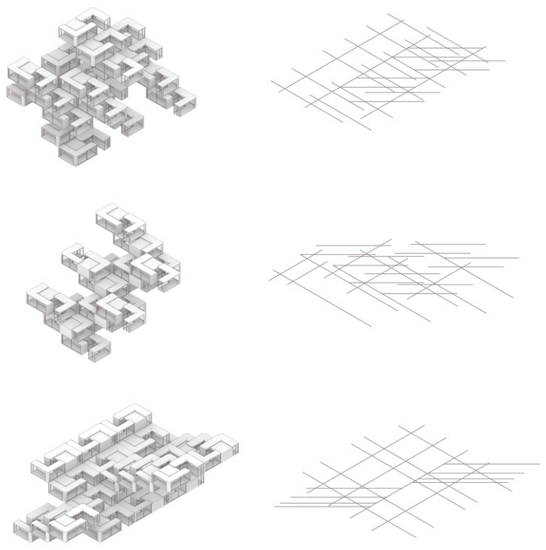


Site Analysis

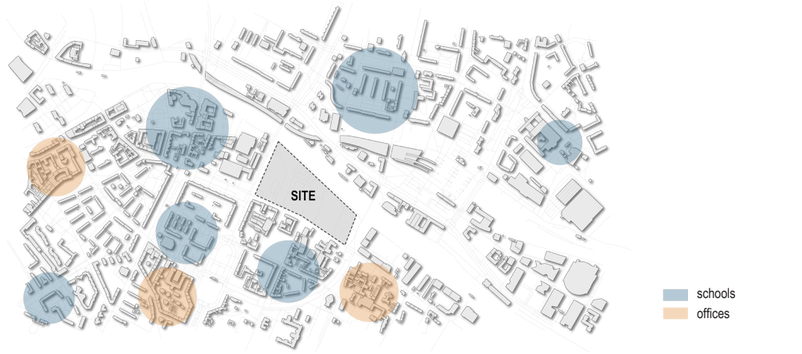
With the continuous development of the German economy and industry, the industrial form is slowly transforming, and more young people are moving in and settling in, creating different residential zones.



People and Industry Analysis

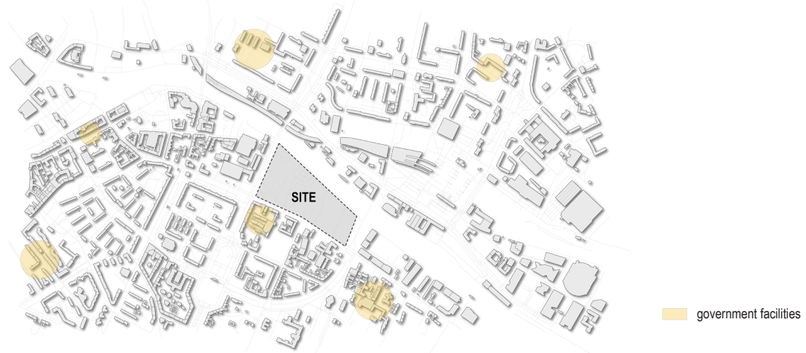


Spatial Arrangement Generated by Lines



Analysis of Peripheral Functions

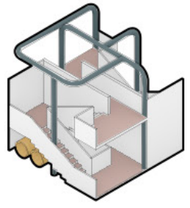
Analysis of Green Space vs Industrial Area



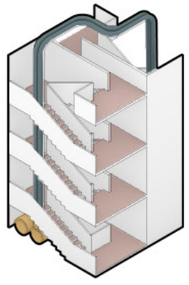
Analysis of Government Space

Transportation System

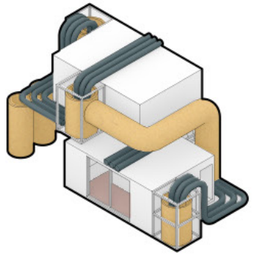
Prototype Analysis



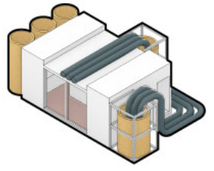
Vertical Transportation I
20'x20'x20'



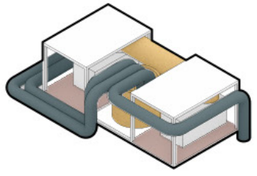
Vertical Transportation II
20'x20'x40'



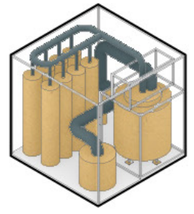
Housing Unit I
20'x40'x20'



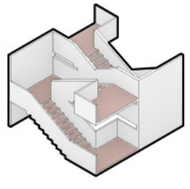
Housing Unit II
20'x30'x10'



Electrical Room
20'x40'x10'



Mechanical Room
20'x20'x20'



Vertical Transportation I
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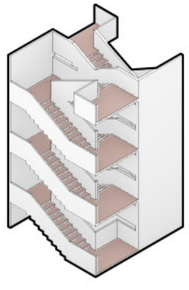
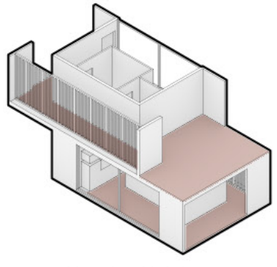
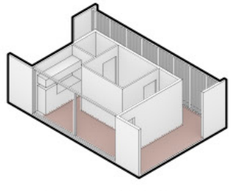


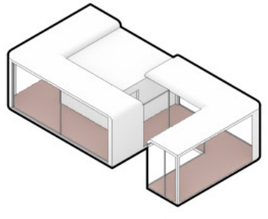
Vertical Transportation II
20'x20'x40'



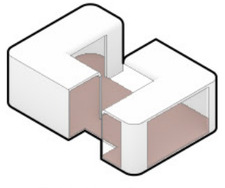
Housing Unit I
20'x40'x20'



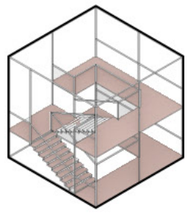
Housing Unit II
20'x30'x10'



Electrical Room
20'x40'x10'



Exhibition Space
20'x30'x10'



Vertical Transportation I
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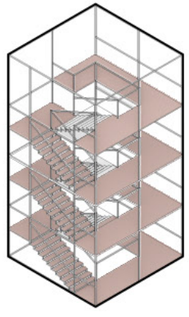

Vertical Transportation II
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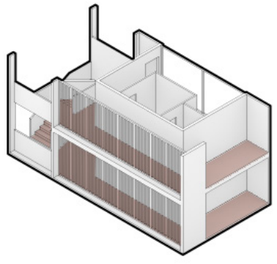

Housing Unit I
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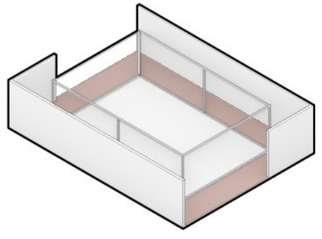
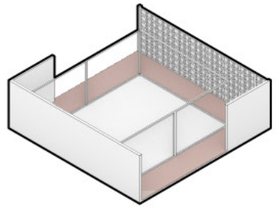
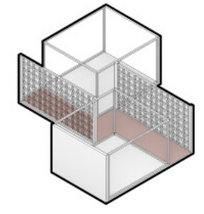


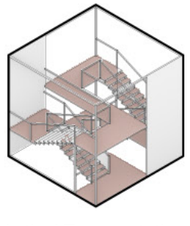
Lab
30'x40'x10'



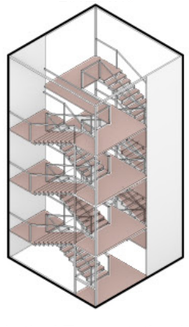
Discussion Room
30'x30'x10'



Exhibition Space
20'x30'x10'



Vertical Transportation I
20'x20'x20'



Vertical Transortation II
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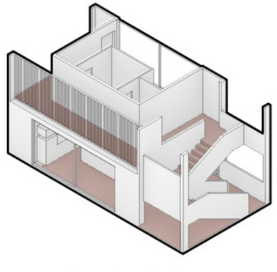
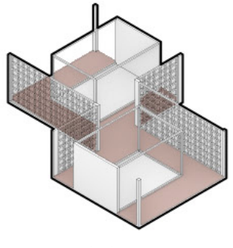
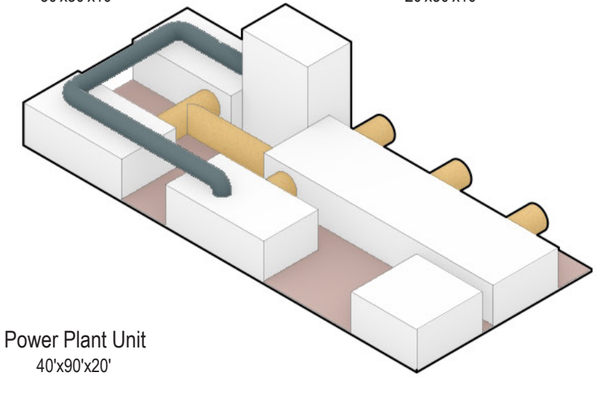


Housing Unit I
20'x40'x20'



Lab
30'x40'x10'



Power Plant Unit
40'x90'x20'

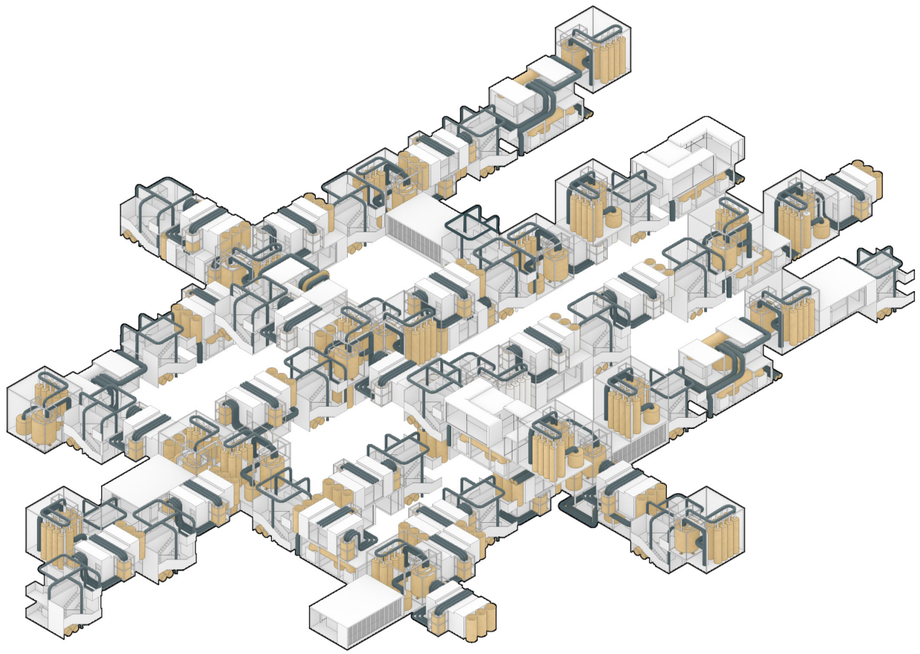
Assembly 1 (100 units)

Connection: 25

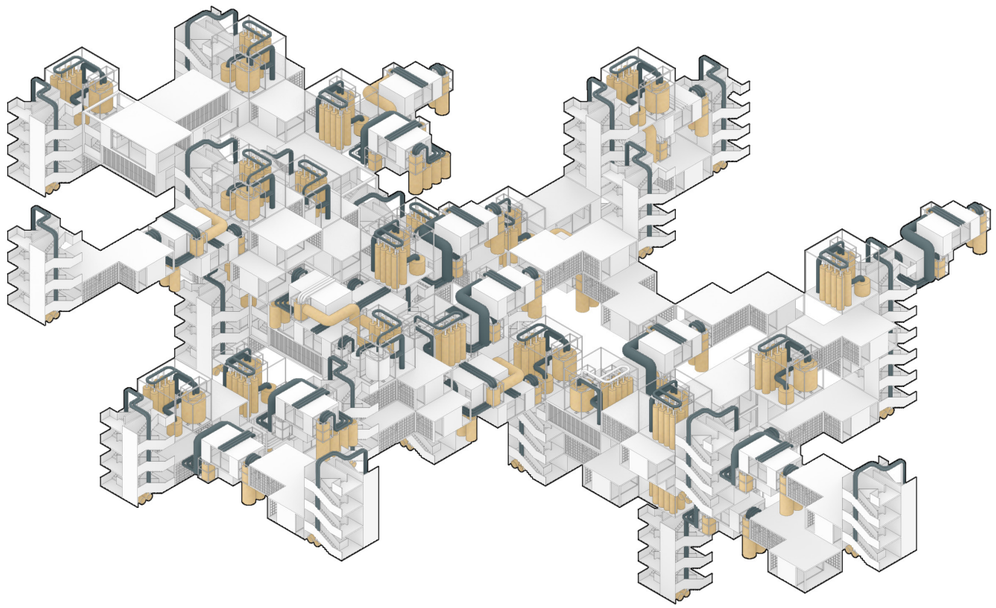
Private: 18

Public: 19

Public: 18

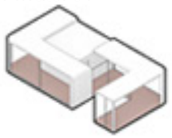


Assembly 2 (100 units)



Connection: 22

Private: 31



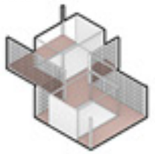
Public: 25

Public: 22

Assembly 3 (100 units)

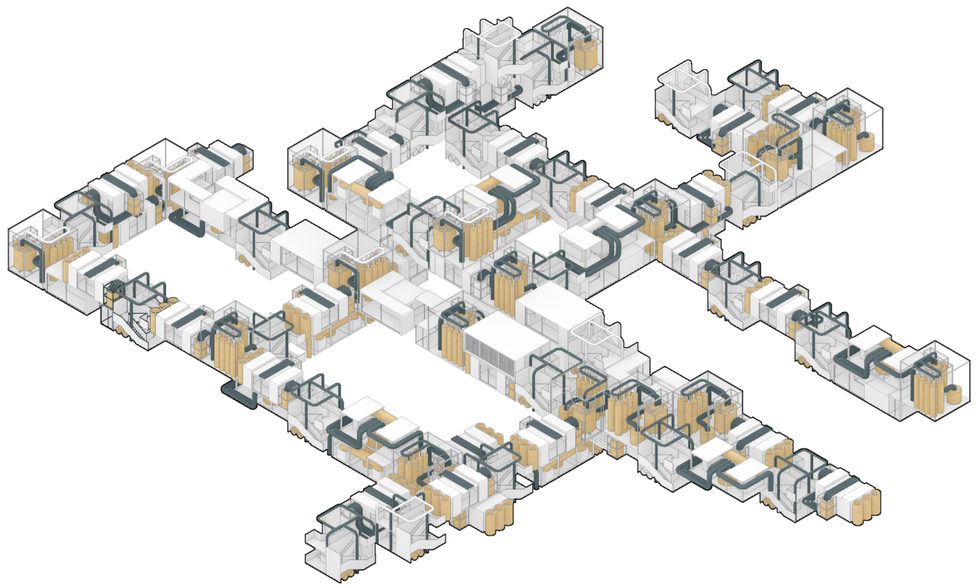
Connection: 23

Private: 17

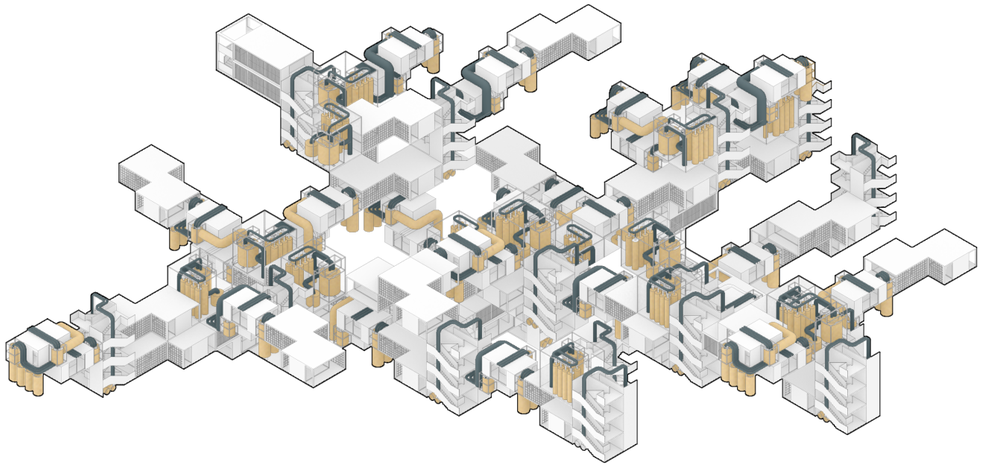


Public: 29

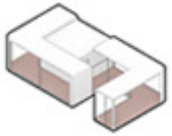
Public: 31



Assembly 4 (100 units)

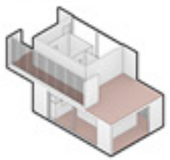


Connection: 16



Public: 23

Public: 27



Private: 34

05

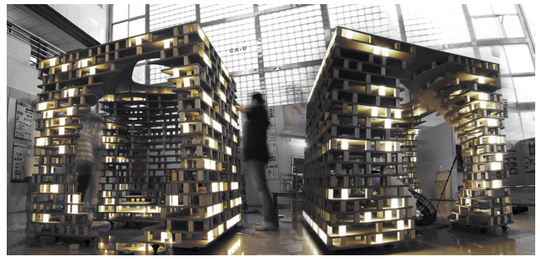
Lightwood House

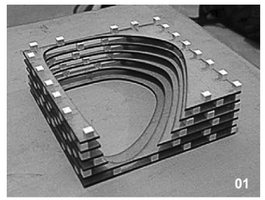
An Entity Construction for Stay and Rest

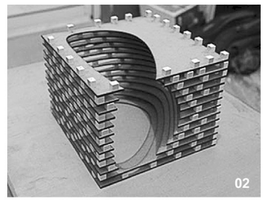
Instructor: Hua Wu, Lei Zhang

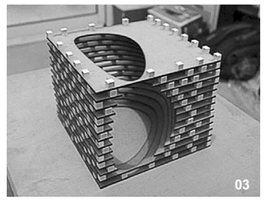
Internship Group Project (*My Contributions: designed and programmed the scripts for model, and assembled the model*)

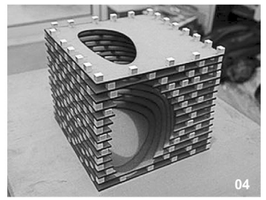
Summer 2021

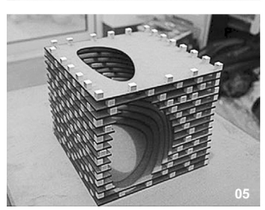


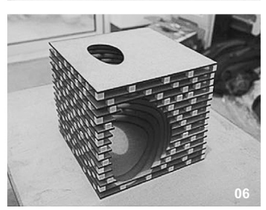


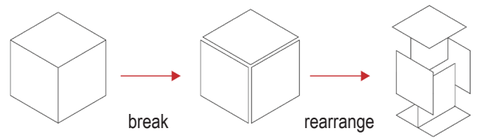


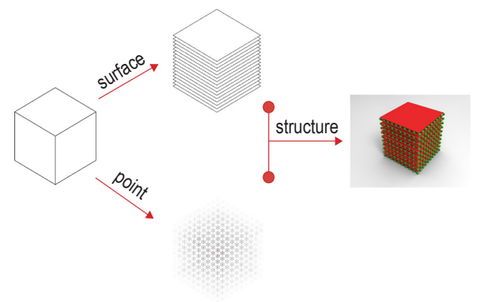


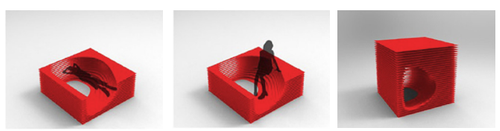


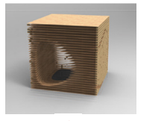


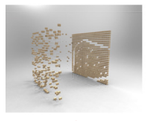


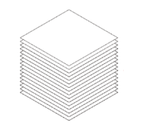




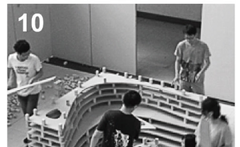


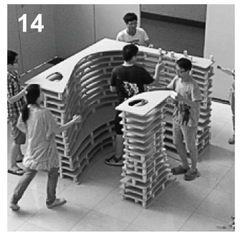


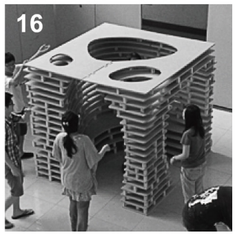


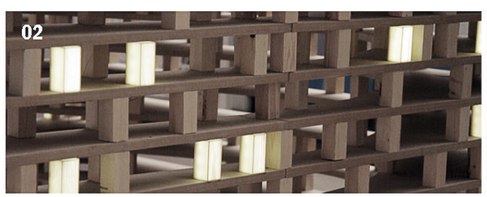


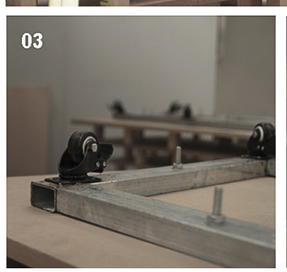
form logic











06

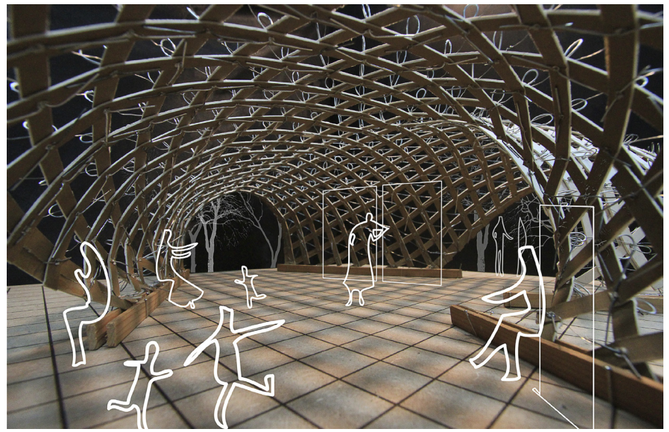
Leisure Pavilion

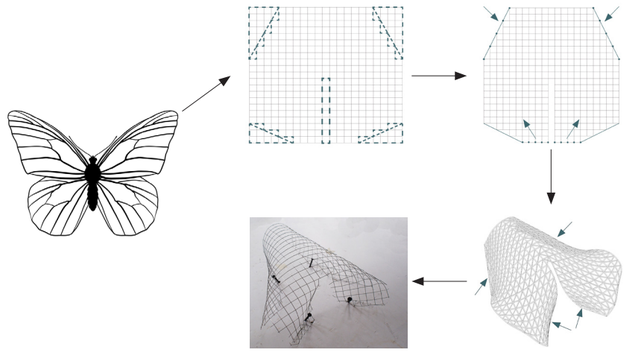
A Parametric Design Test for Light and Tangible Material

Instructor: Li Chen, Niya Jones

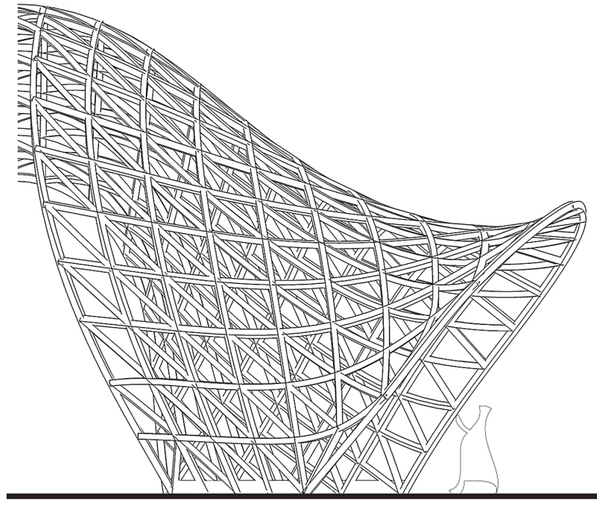
Individual Work

Summer 2020



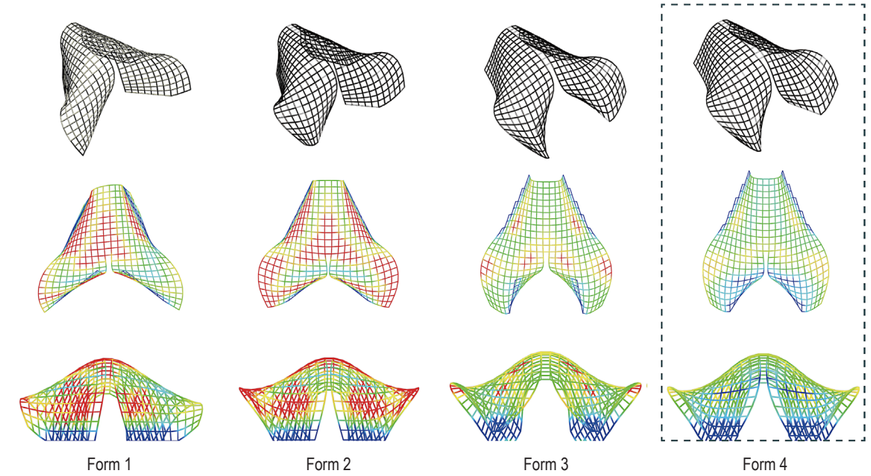


Form Analysis



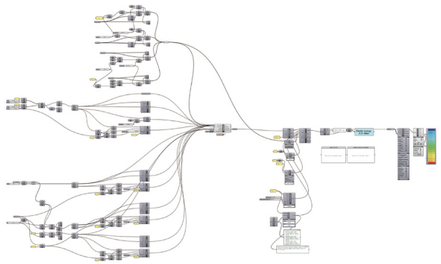
Zoom in Elevation

Mechanical Analysis 1

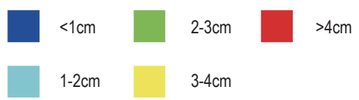


Form 1 | Form 2 | Form 3 | Form 4

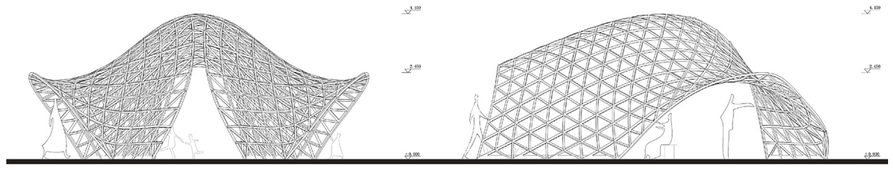
Grasshopper Scripts



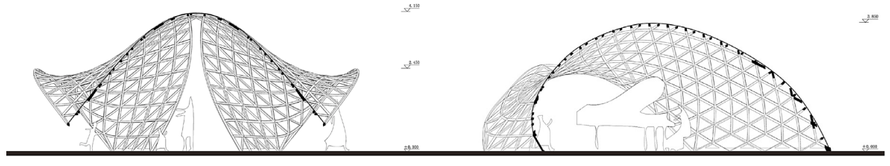
Display Legend



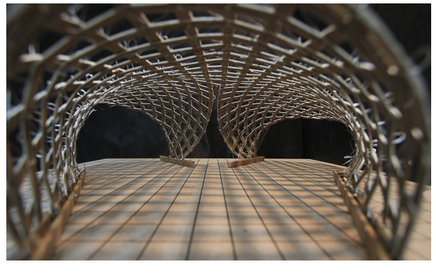
Fitness: Displacement (cm)
Loads: Gravity & Line= 1KN/m
Support Points: 4 Choosen Lines around with 5,5,5,5 points.
Material Selection: Wood E:1050 [kN/cm2]
Beam Cross Section: Square 5*6cm
Bracing Cross Section: Square 5*4cm



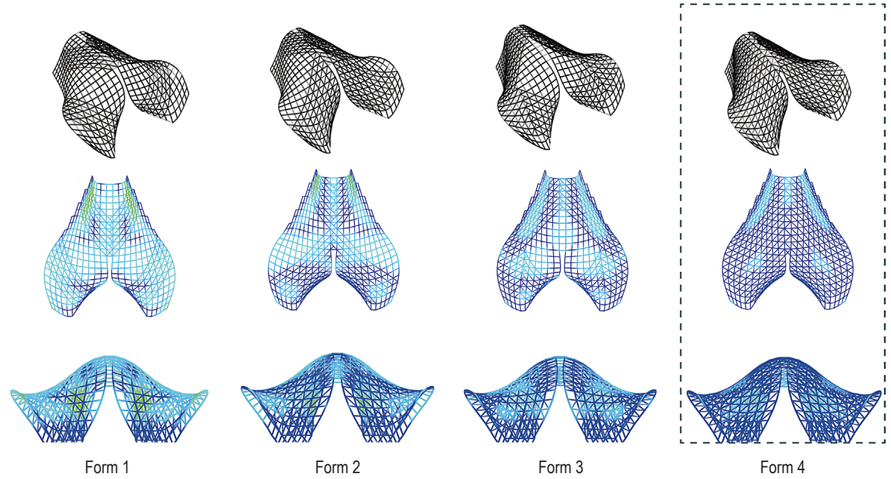
North Elevation | East Elevation



North Section | West Section

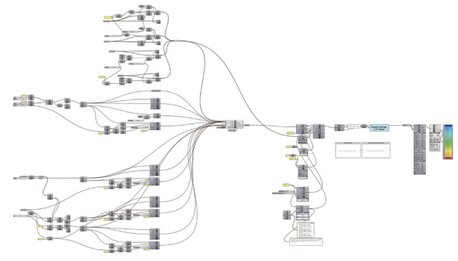


Mechanical Analysis 2

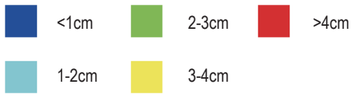


Form 1 | Form 2 | Form 3 | Form 4

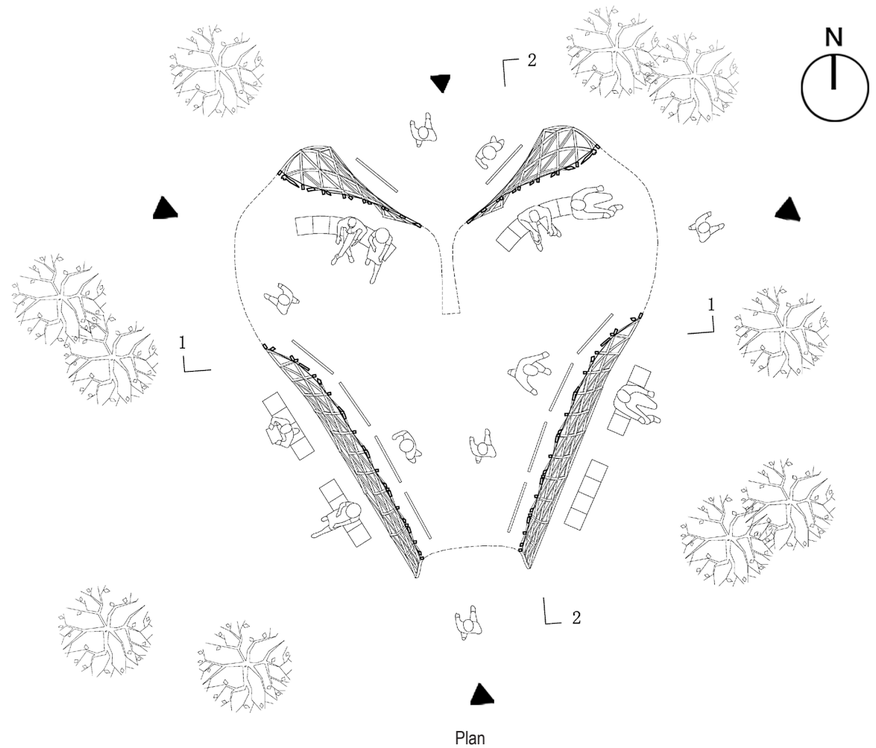
Grasshopper Scripts



Display Legend



Fitness: Displacement (cm)
Loads: Gravity & Line= 1KN/m
Support Points: 4 Choosen Lines around with 5,5,5,5 points.
Material Selection: Wood E:1050 [kN/cm2]
Beam Cross Section: Square 5*6cm
Bracing Cross Section: Square 5*4cm



Plan

07

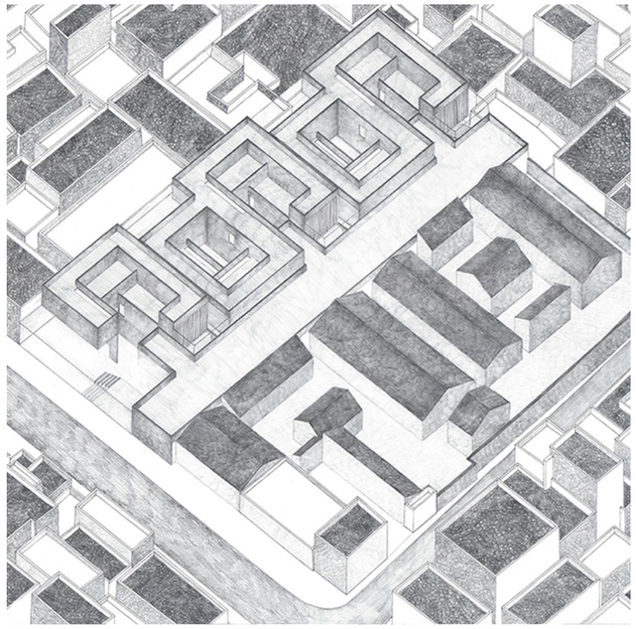
Bamboo Valley

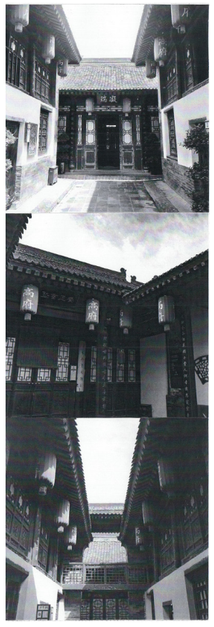
A Renovation Project to Find the Beauty in Nanjing Ancient Town by HandSketch

Instructor: Huan Sun

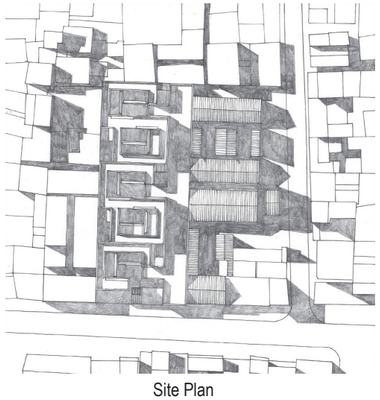
Individual Work

Winter 2020

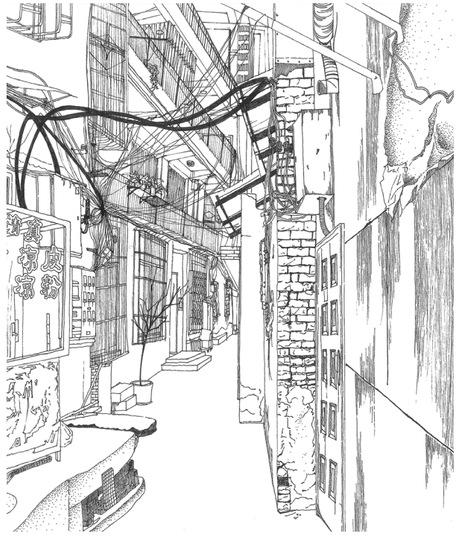


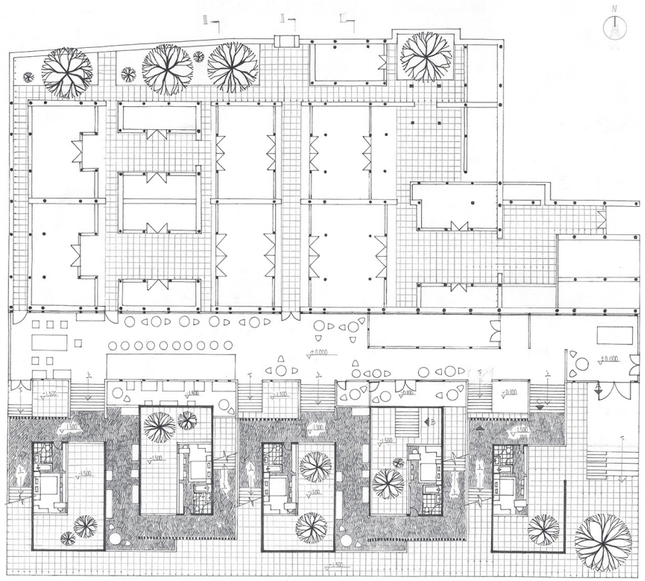


Preliminary Design Sketch

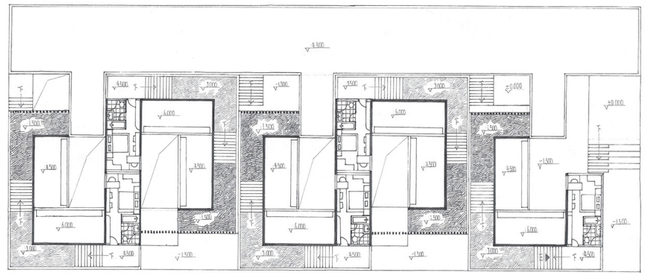


Site Plan

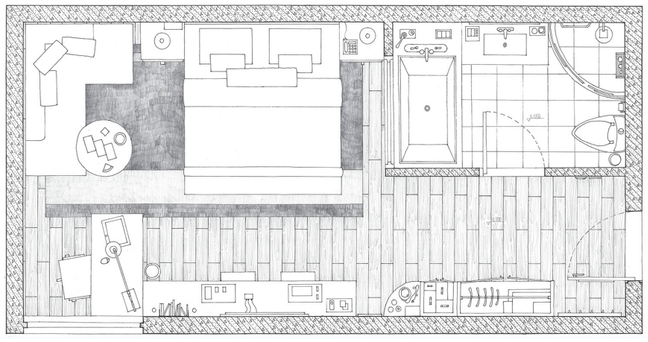




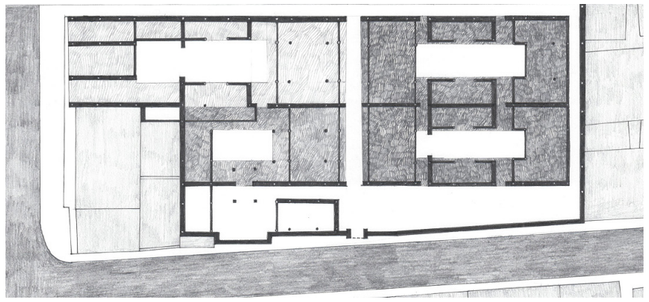
First Floor Plan

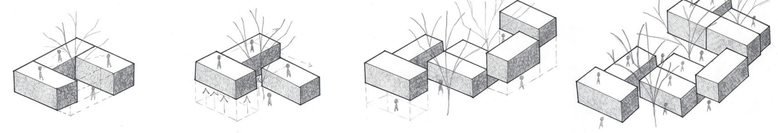


Second Floor Plan

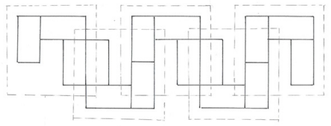


Guest Room Plan

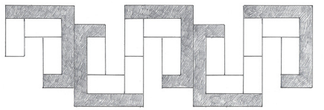




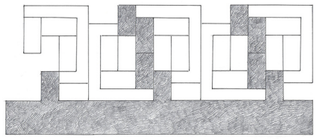
Form Analysis



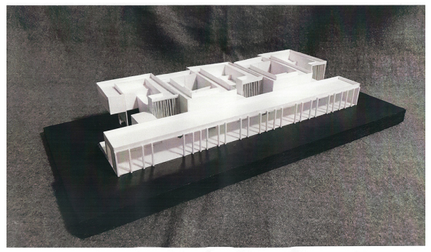
Guest Room Layout



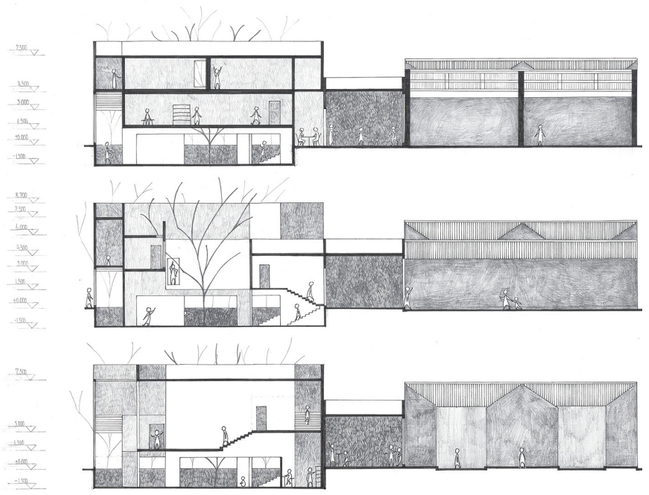
Corridor Layout



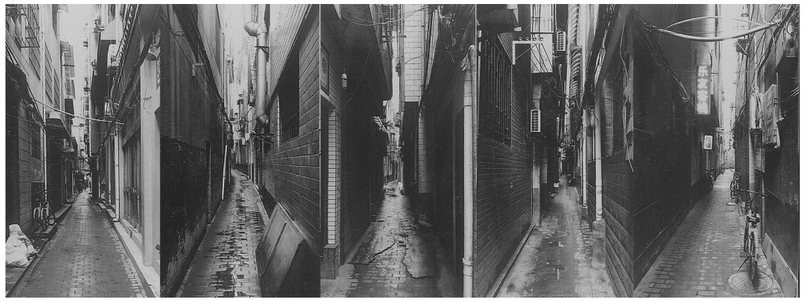
Public Space Layout



Section Analysis 1-4



Sections 1-3



Fang (Frank) Sun
fang.sun@virginia.edu | +1 4342423564 | 121 Carrollton Terrace, Apt 5, Virginia, 22903
https://resume.fangfranksun.com

EDUCATION

University of Virginia — **Charlottesville, VA**
Bachelor of Science, major in Architecture, minor in Computer Science — *May 2023 (Expected)*
- Teaching Assistant of *ARCH 1010: Lessons of the Lawn* (undergraduate level, 20 students) — *2022.08 - 2022.12*
  Led discussion sessions; provided feedback and grading on weekly assignments about architectural history
- Teaching Assistant of *PLAC 4010: Neighborhood Planning Studio* (graduate level, 16 students) — *2021.09 – 2022.05*
  Conducted weekly workshops on ArcGIS, Rhino and Illustrator skill development, organized meetings with architecture firms

Summer Research on Architecture Criticism — **Online**
A 6-week program, mentored by Rhode Island School of Design Prof. Markus Berger — *2020.06 – 2020.08*

PROFESSIONAL EXPERIENCE IN ARCHITECTURE

Studios Architecture — **Washington D.C.**
Design Intern — *2022.12 – 2023.01*
- Modeled physical building and site models with 3D printing and lasering cutting for two ongoing health institution projects
- Created 6 Grasshopper script tests to present the proof of concept of automatic plan generator and parking space formation

Perkins&Will — **Washington D.C.**
Design Intern — *2022.05 - 2022.08*
- Benchmarked UVA Gilmer Hall and Chemistry Building Renovation projects and created Revit templates
- Designed the loading dock and back entrance for Omega Building & Key West Building in Rockville and rendered images with Photoshop and Enscape
- Proposed 8 logo-inspired iterations of parametric shelf for Perkins&Will DC office with Rhino, Grasshopper, and Dynamo

HDR Inc. — **Arlington, VA**
Design Intern — *2021.12 - 2022.01*
- Drew analysis diagrams and recreated unit models for a children's hospital with AutoCAD, Rhino, Revit, and Photoshop
- Designed 10 parametric façade iterations for a Schematic Design project with Rhino, Grasshopper, Revit, and Dynamo
- Created 2 Grasshopper plugins (via Python) for employees to conveniently generate solids only using curves

AZL Architects — **Nanjing, China**
Research Assistant — *2021.01 – 2021.03*
- Made 7 iterations of entrance design for Lei House (a traditional Chinese townhouse) renovation project with Rhino and AutoCAD
- Refined rendered plans and sections for Ruralation Museum Hotel (a hot spring resort hotel) for media publication with AutoCAD, Photoshop, and Lumion
- Digitalized the hand drawings of sections and plans of a 2011 project (China International Practical Exhibition of Architecture No.4 House) with AutoCAD

MAD Architects — **Beijing, China**
Design Intern — *2020.07 - 2020.12*
- Helped develop the circulation plan & created sections and rendered images for 2 floors of Jiaxing Civic Center
- Produced rendered drawings of the public courtyard and urban context and proposed 3 iterations for Pingtan Art Museum
- Improved the UI design of the firm's website (http://www.i-mad.com)

Roboticsplus.AI (Shanghai) Co., Ltd — **Shanghai, China**
Project Assistant — *2020.05 - 2020.08*
- Programmed robotic arm movements for intelligent construction and assisted in developing CNC routers with C++ and Java
- Designed outdoor installations for the Jindi Office Building project and formulated models for 3D printing

Tongji Architectural Design (Group) Co., Ltd. — **Shanghai, China**
Design Intern — *2020.02 - 2020.05*
- Helped develop the ground space of Pinghe Secondary School in Suzhou and drew the plans and perspective sections of the building to present to the clients
- Drew processing diagrams with AutoCAD; helped design external façades of Tongji University Creative Research Institute

OTHER EXPERIENCES

Alibaba Group Holding Limited — **Hangzhou, China**
Java Developer Intern — *2021.06 – 2021.09*
- Co-established the online Internet of Things (IoT) system for Xi'niu's On-demand Production Factory
- Co-developed an automated customer management system for Xi'niu Factory to improve efficiency
- Reprogrammed label printers and embroidery machines with Java and ZPL to allow remote operations

Beijing ByteDance Technology Co., Ltd — **Shanghai, China**
Lark Frontend Technical Services — *2021.03 – 2021.06*
- Provided debug and customization services for users of Lark Open Platform (workplace apps developer)
- Fixed Lark interface compatibility issues and reviewed a part of Lark 4.0 updates before it went online
- Co-initiated Lark Knowledge Base and used Java & Python to encode and categorize previous solutions

Hummer Education — **Shanghai, China**
Founder & CEO — *2019.04 – Now*
- Expanded the company's target customers from children to chess lovers of all ages
- Produced and published 270+ tutorial videos on YouTube, TikTok, and Bilibili (more than 300,000 subscribers in total)
- Devised chess-playing website and WeChat mini-program with Node.js and React

APPLE Inc. — **Shanghai, China**
System Test Design Lead — *2017.04 - 2018.10*
- Debugged 20 issues in macOS 10.14, including 3 severe security alerts with privacy and message missing
- Collected and provided feedback on the user experience of the iOS 11 Application Program Interface

Aparkers (Smart Parking Development) — **Shanghai, China**
Initiator & Leader — *2016.10 - 2018.03*
- Led a team of 8 to identify the causes of parking problems in Shanghai
- Crafted a smart parking plan and visualized the parking space design with Rhino and BIM
- Developed and installed signal detection devices in existing parking lots to shorten waiting time
- Created an app providing parking guidance and promoted it in AppStore and Google Play
- Received the patent (**201721325329.0**); the project was acquired by ETCP, a leading company in intelligent parking.

Publications

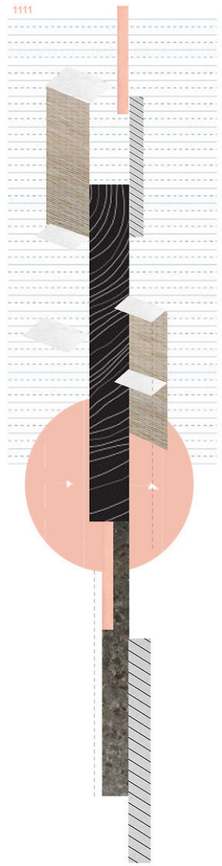
- Sun, F. (2022). Zhouzhuang, Suzhou: The Change of Residential Space in Jiangnan Water Ancient Towns due to the Continuously Rising Commercialization. *Journal of Planning Education and Research*. **(in press)**
- Sun, F. (2022). "Metabolism Tragedy" – The Deconstruction of Nakagin Tower. *Journal of Architectural Education*. (under review)
- Sun, F. (2022). How to Modify the Time of Yellow Traffic Lights in order to Improve Traffic Efficiency? *International Journal of Mathematics*. (submitted)
- Sun, F. (2022). Doppler Effect in a Circular Motion – Relationship Between Frequency Received and the Corresponding Angle. *American Journal of Physics*. (submitted)

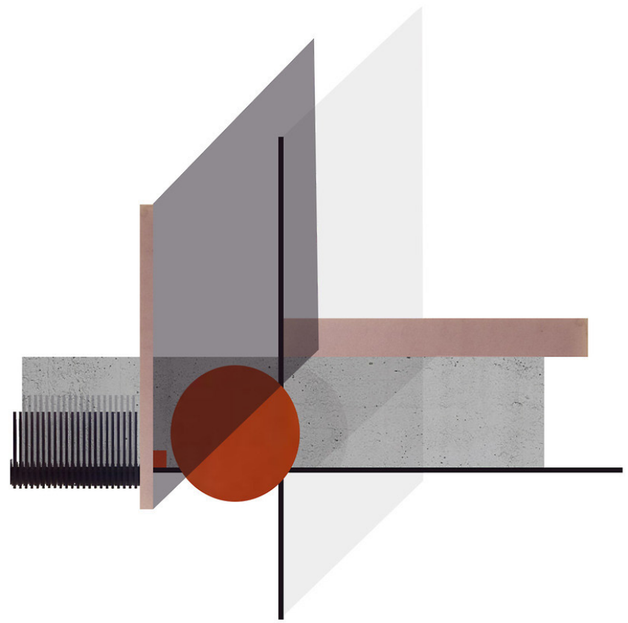
Fellowship & Awards

- 2022 Erwin-Ramsey Fellowship (awarded to 1 undergraduate student at UVA School of Architecture each year)
- 2022 Perkins&Will Summer Internship Design Competition, 2nd Prize
- 2022 Competition to Renovate Historical Buildings in Nanjing, 2nd Prize

Skills

Programming Languages: Java, Python, MATLAB, HTML
Visualization Software: Photoshop, Illustrator, InDesign, V-ray, Lumion, Enscape, Keyshot
Drafting and Modeling Software: Rhinoceros, Grasshopper, Sketchup, AutoCAD, ArcGIS, Revit, BIM
Prototyping Tools: 3-D Printing, Laser Cutting, CNC Printing, Wood/Bamboo cutting
Interests: chess (National Master), tennis, Rubik's cube, biking, photography, drawing





Fang (Frank) Sun

Selected Works from 2019 - 2023