

# DragonFly

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Portfolio

Zhengyang Chen

- Mr Architect, what is Science and Engineering worth?
  - Nothing ... Everything!

## P0 Prologue --- Why DragonFly ?

Memories of our Fathers  
Historical survey of Ming dynasty ancient village, Gao'an, China  
2015

2015

At this very beginning , let me introduce what I regard as my first 'Architecture' work- a small landscape construction. It was a summer dusk when I came across a flying dragonfly , and I began to realize how elegant the creature is - two pairs of ultra-light fragile wings surprisingly propel this little plane to achieve an outstanding speed.

2015

I analyzed the mechanism of dragonfly body and behavior ,Then I got the inspiration, the fly's wing and feet are a whole system while the wing' s structure of main vein-secondary vein-cell as well as the balancing node at its top enable the stability of dragonfly. So I model the work within an hour in grasshopper, with all my respect and appreciation to those laws of nature, as well as the mutual reaction of motion.

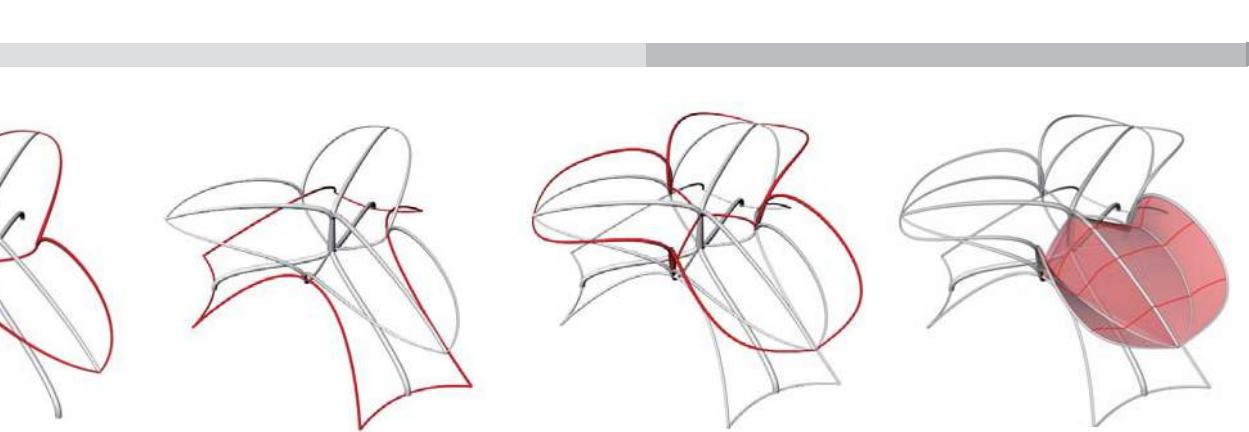
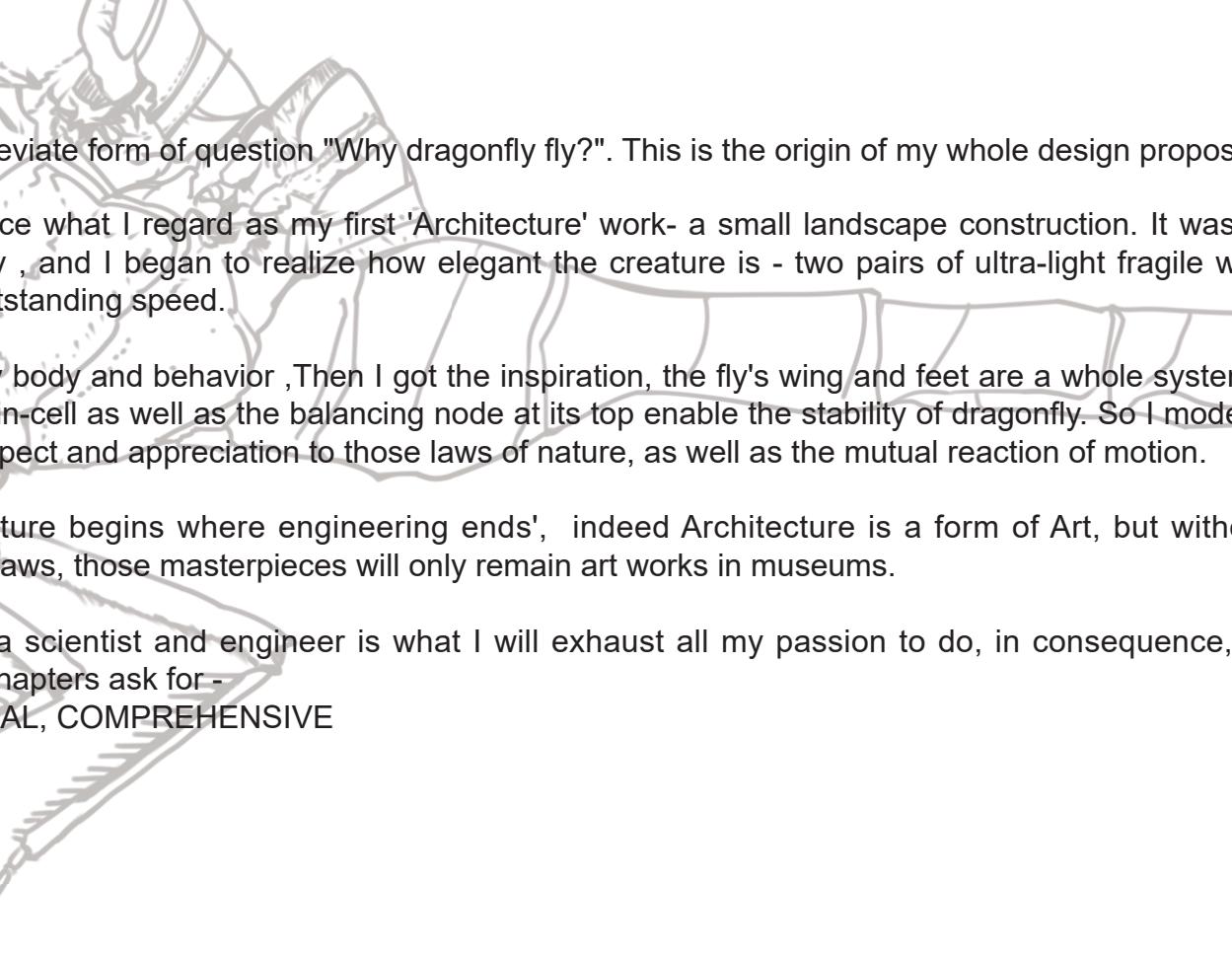
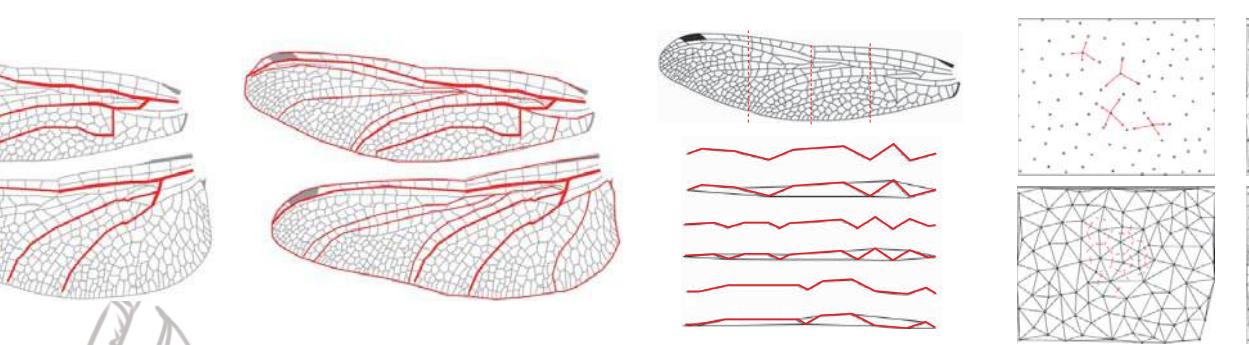
2015

Gropius raised an idea that 'Architecture begins where engineering ends', indeed Architecture is a form of Art, but without Science and Engineering that reveals the objective laws, those masterpieces will only remain art works in museums.

2015

Thus be an architect that thinks like a scientist and engineer is what I will exhaust all my passion to do, in consequence, I shall keep my discipline , as what the titles of these chapters ask for -

PRECISE , GENERATIVE , ANALYTICAL, COMPREHENSIVE



## P1 Craft Precise

Memories of our Fathers  
Historical survey of Ming dynasty ancient village, Gao'an, China  
2015

A Bright Mirror Hung High  
Crafting traditional Chinese Ming & Qing type furniture  
2016

## P2 Design Generative

Spacial Dating  
Student center design work, 2nd year undergrad studio at Tongji  
2013

A Brief History of Time  
Museum design work, 2nd year undergrad studio at Tongji  
2014

Crystalline Rise  
Highrise & complex design, 3rd year undergrad studio at Tongji  
2015

Fliegender Teutonische Rittenorden  
Off shore community design, Adv Studio II at Gatech  
2017



## P3 Design Analytical

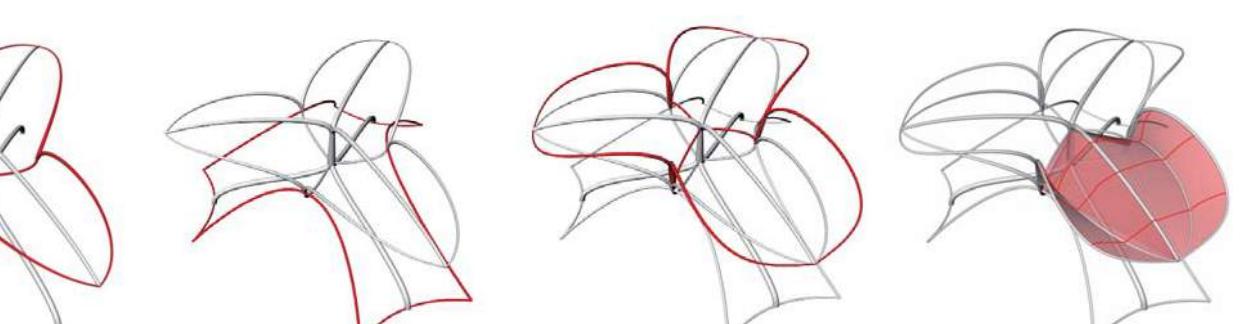
Combnection  
Research project on new urbanism practice in China  
2016

Eye of Harbour  
Urban design project, 4th year undergrad studio at Tongji  
2015

## P4 Practice Comprehensive

Tetris  
Internship residential community project, Kunshan, China  
2016

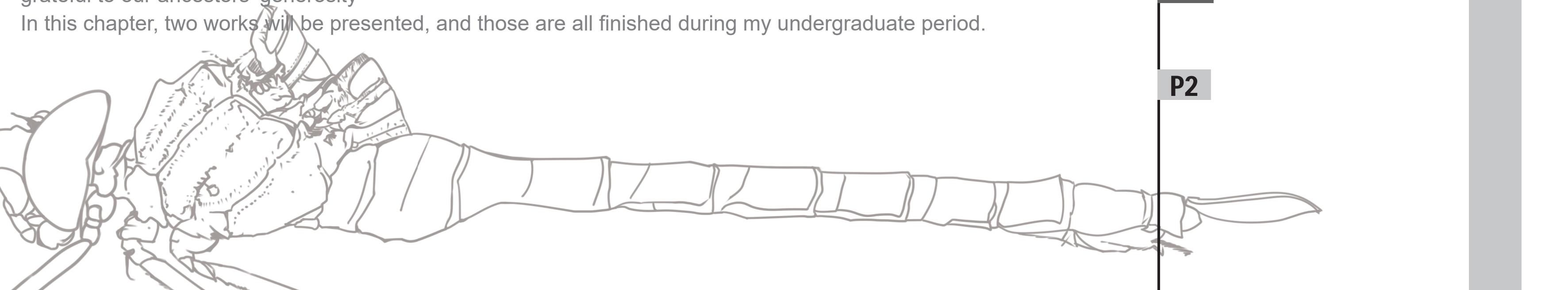
Tetris Plus Plus  
Urban design project concept collaboration, Nanjing, China  
2017



## P1 Craft Precise

Crafting, is what made me excited and ambitious to keep a special bond with my predecessors, and be grateful to our ancestors' generosity

In this chapter, two works will be presented, and those are all finished during my undergraduate period.



**Memories of our Fathers**

Historical survey of Ming dynasty ancient village, Gao'an, China



P1

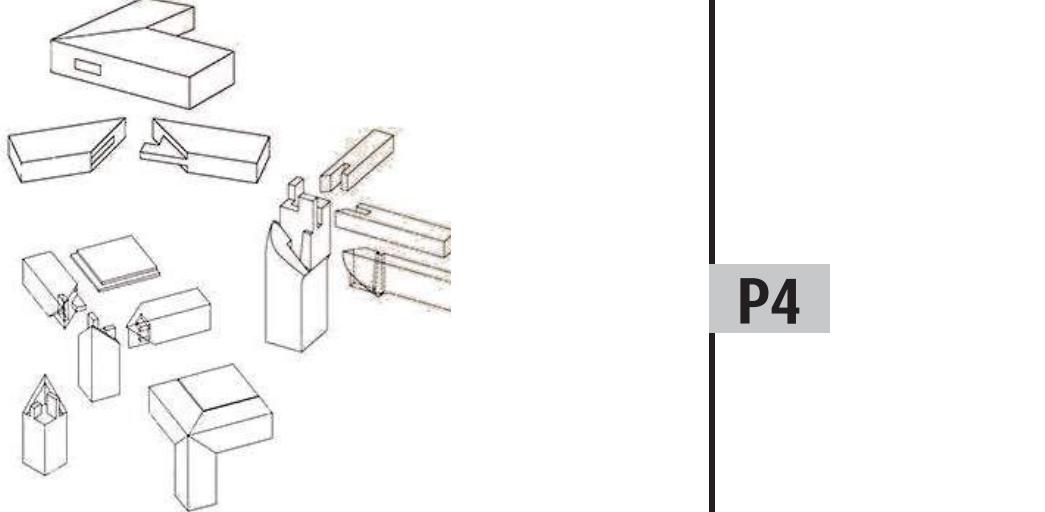
P2

P3

P4

**A Bright Mirror Hung High**

2016  
Crafting traditional Chinese Ming & Qing type furniture



## Memories of our Fathers

Historical survey of Ming dynasty ancient village

Location  
Duration  
Task

Tools

Gao'an , Jiangxi Province, China  
07/20/15-08/31/15  
Precise historical survey of two buildings  
Include current status of wear  
Provide detailed drawings and 3D model  
CAD, rhino/GH, photographs

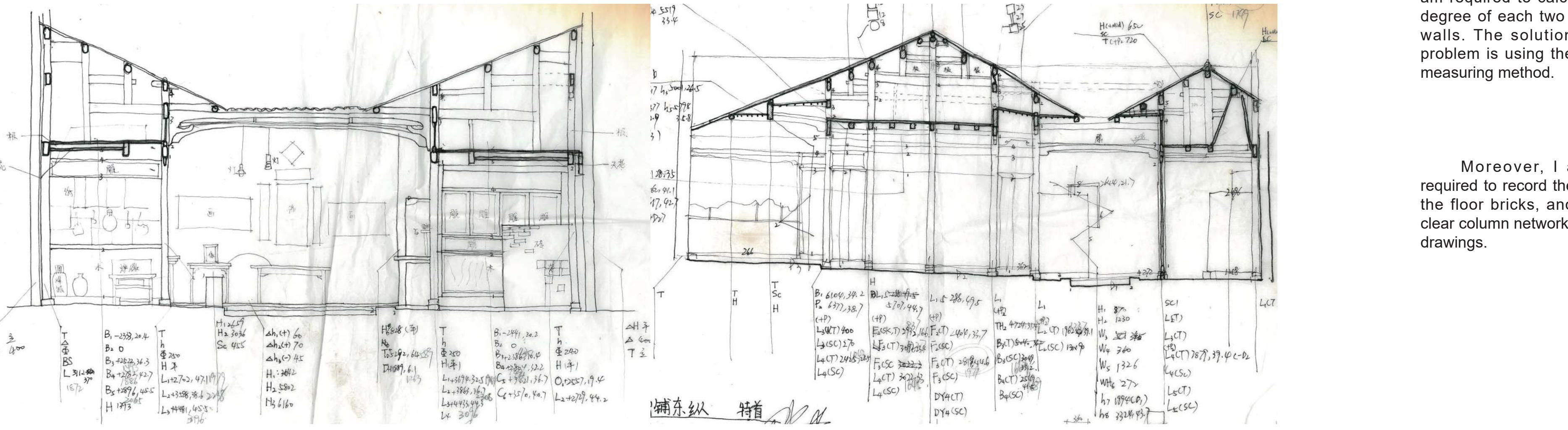




Before we get started, precisely record the current condition is a must and the difficulties in the following works depends on how much efforts I made before I get started

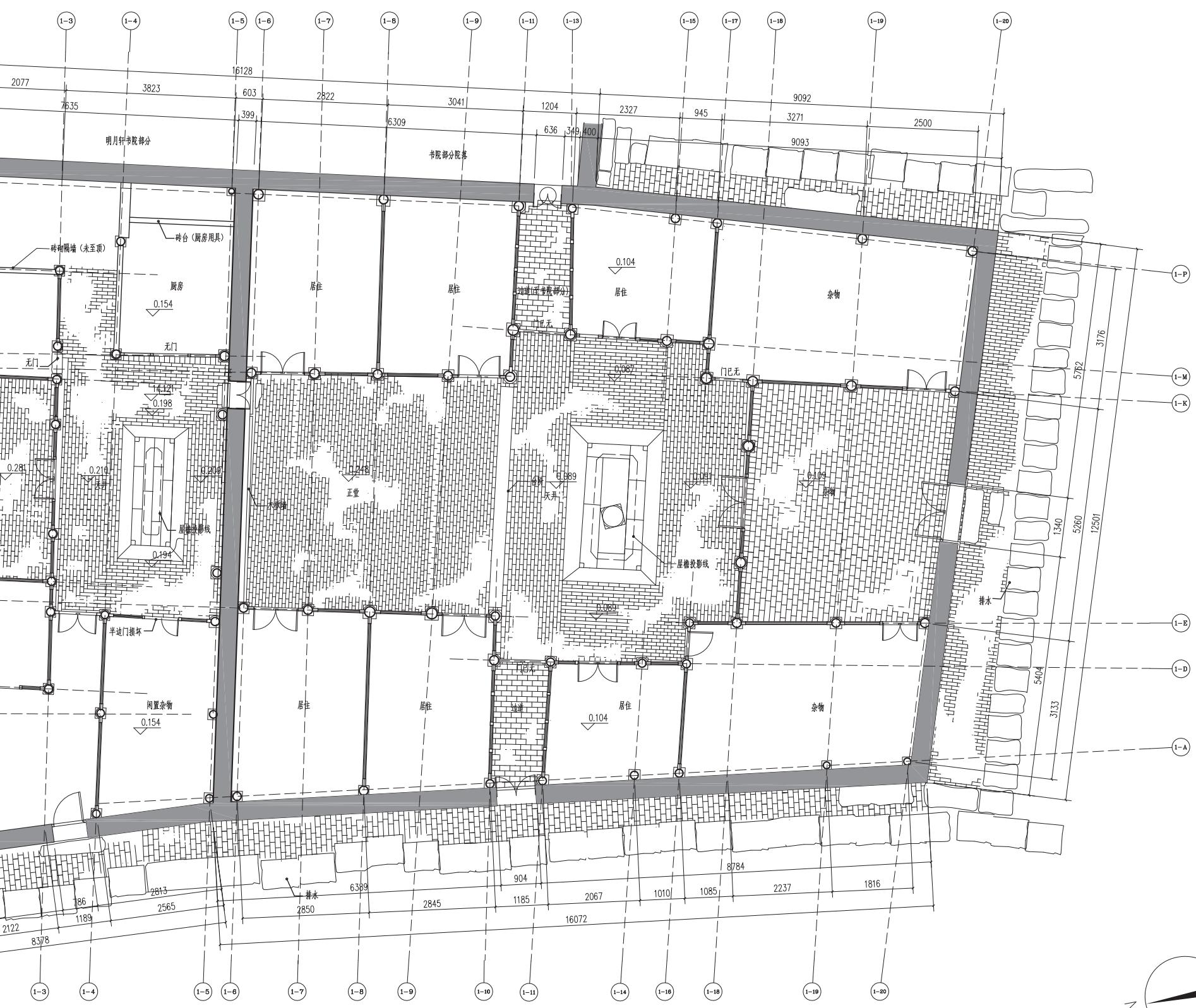
Two method is taken, the photograph and the sketch. Photograph is convenient and efficient but the problem is that the camera cannot make axons. Thus we can not rely only on cameras. Then the sketch is an auxiliary tool to record the current viewport. But the sketches also has limitation on conveying depth of the scene. Thus these two must be taken at the same time.

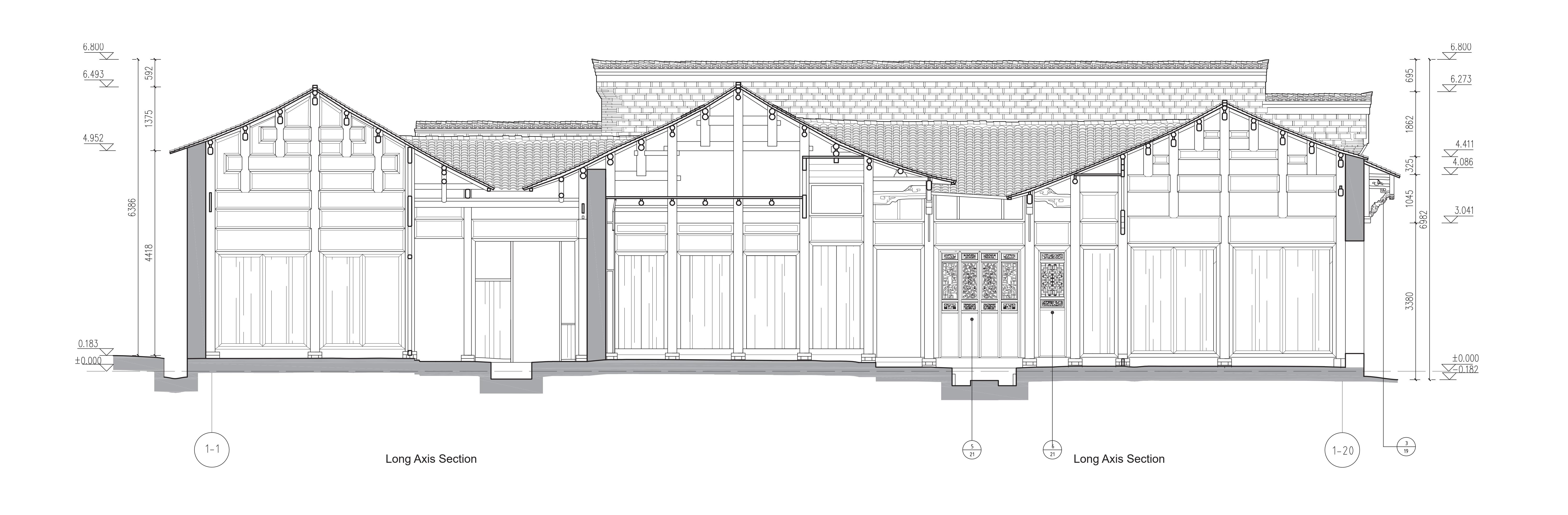
I developed another trick of quick mapping- to photograph the wall that has brick exploded, and the measure of a brick is certain. Then we can easily get the approximate length just to check our results.



To make precise building plan, we need to measure the building and mark the column base in 2 dimension - since the building is constructed by experience rather than modern techniques, thus the consequence is that the boundary of the building is not placed orthogonally. Apart from measuring the length of each wall at the same level, I am required to calculate the degree of each two adjacent walls. The solution to that problem is using the diagonal measuring method.

Moreover, I am also required to record the wear of the floor bricks, and set the clear column network in planar drawings.



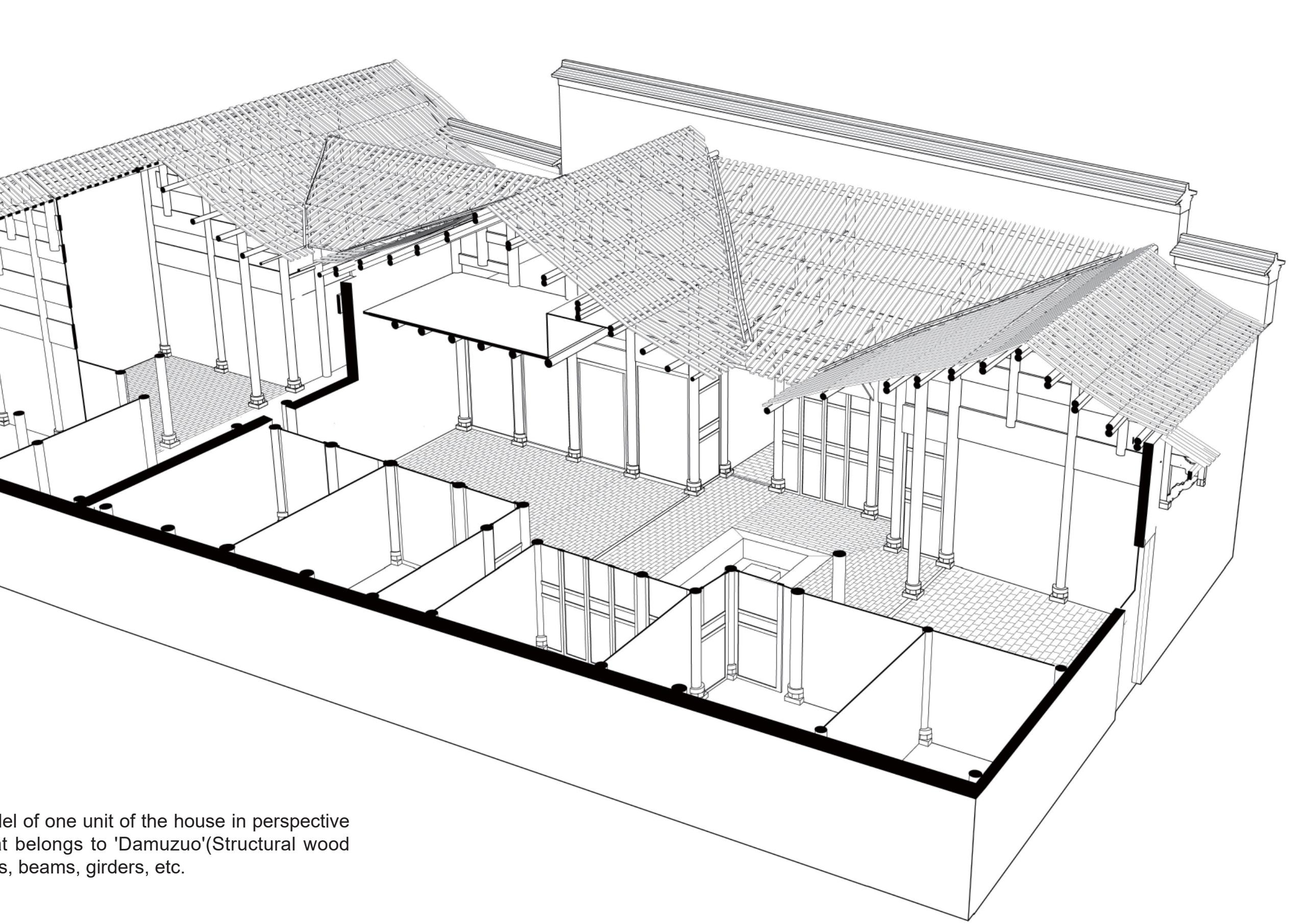
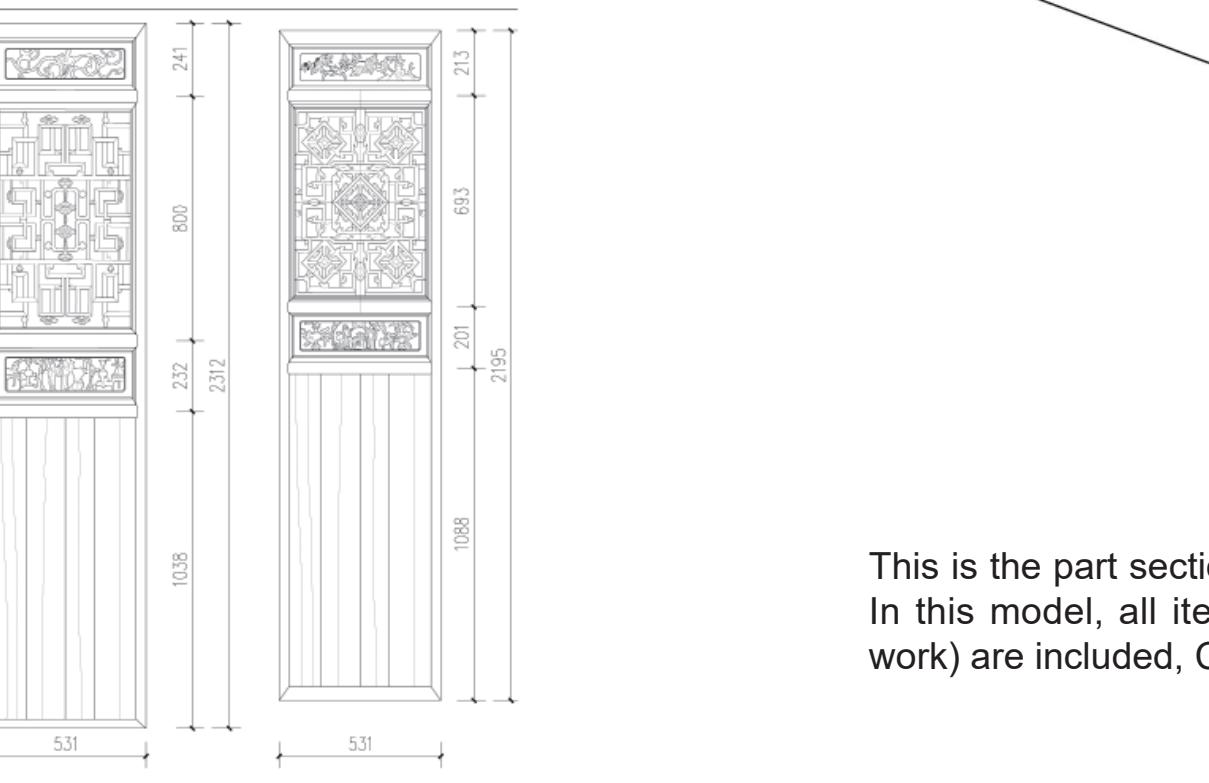
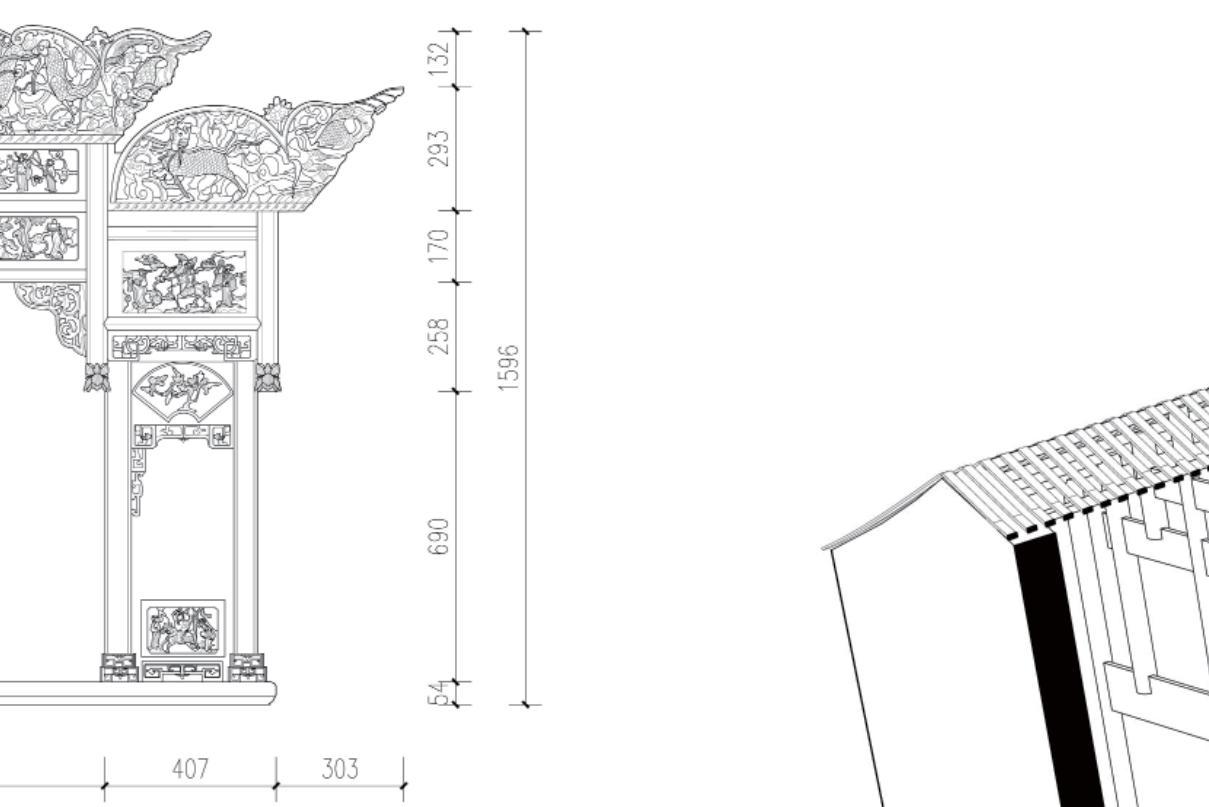




Ancient Chinese architects and works pay great attention to this- the 'Dayangtu', which means the small detail drawing. In the book named 'Yingzao fashi'('Rules for construction standard ) in Song dynasty, most information are provided in detail drawings like this



Like that in the planar drawing, I should also provide broken status of the wood door in the detail drawing. It is a historical survey in all!



This is the part section model of one unit of the house in perspective. In this model, all items that belongs to 'Damuzuo'(Structural wood work) are included, Columns, beams, girders, etc.

# A Bright Mirror Hung High

Crafting traditional Chinese Ming & Qing type furniture

Course

Traditional Chinese Furniture

Location

Tongji University , Shanghai, China

Duration

Final 2 weeks

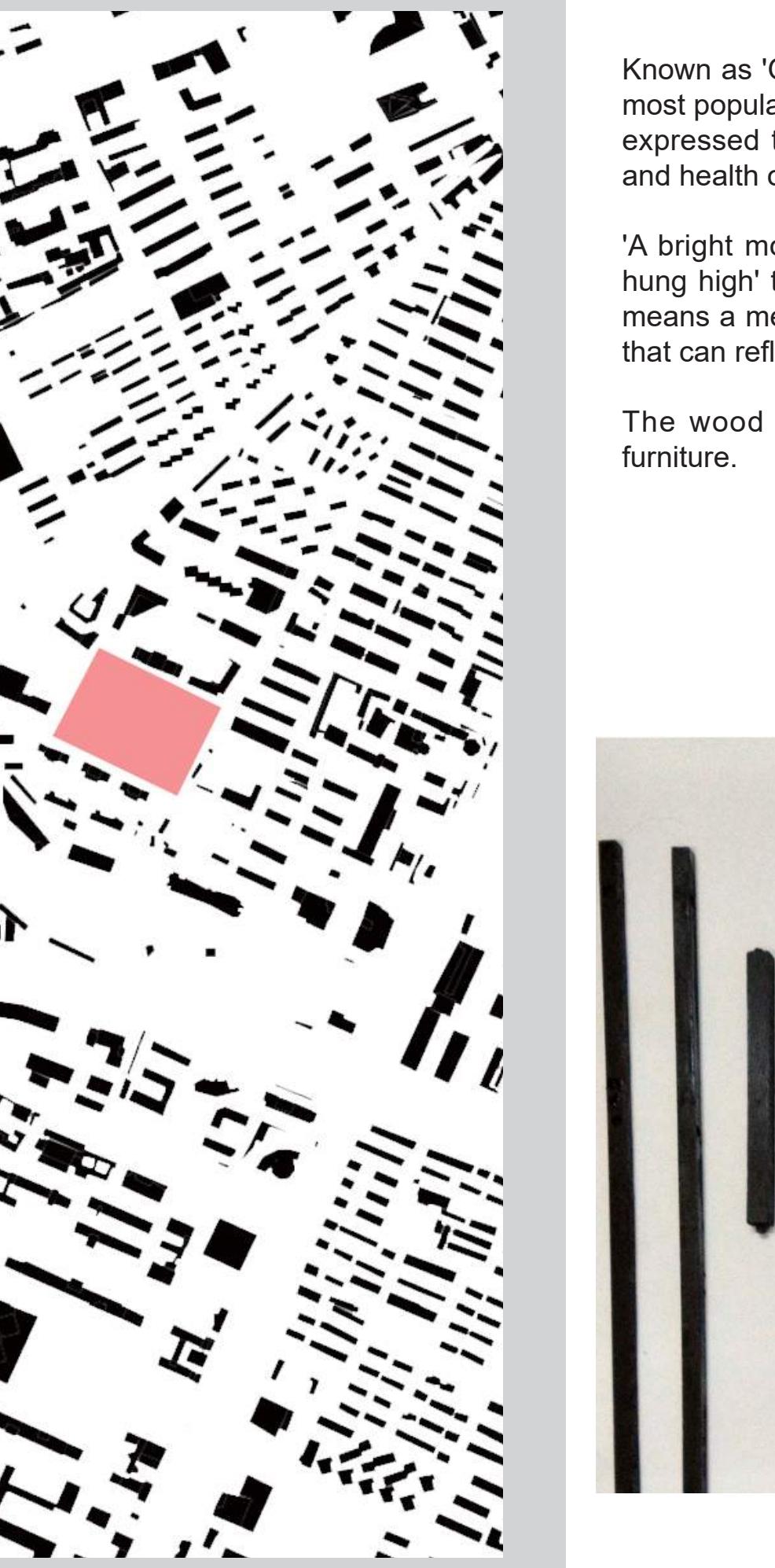
Description

This is the final assignment of course and counts to 40% of final score. We are required to build a model of Chair in traditional Chinese way, thus extra coherent tool like nails and glue is not allowed

digital modeling, hand crafting  
1:10(1mm=10mm)

Method

Scale



Known as 'Guanmaoyi'(chair of bureau's hat), This type of chair is of most popularity in Ming and Qing dynasty(15th-19th century), Its form expressed the idea of sit up straight, so as to convey the strength and health of an upstanding person.

'A bright moon hung high' is taken from the phase 'A bright mirror hung high' that used to be the dictum in Chinese officialdom, which means a men should remain upright as the moonlight is like a mirror that can reflect every behavior of him.

The wood material is red pear, a popular material in Chinese furniture.



## P2 Design Generative

In this chapter are the designs that is 'generative'. Each project will start from a 'Rule', and then I utilize the algorithm to generate the form - space, flows, structures, etc. The outcome is not the only solution, but one of the possible solutions if the input parameter varies.

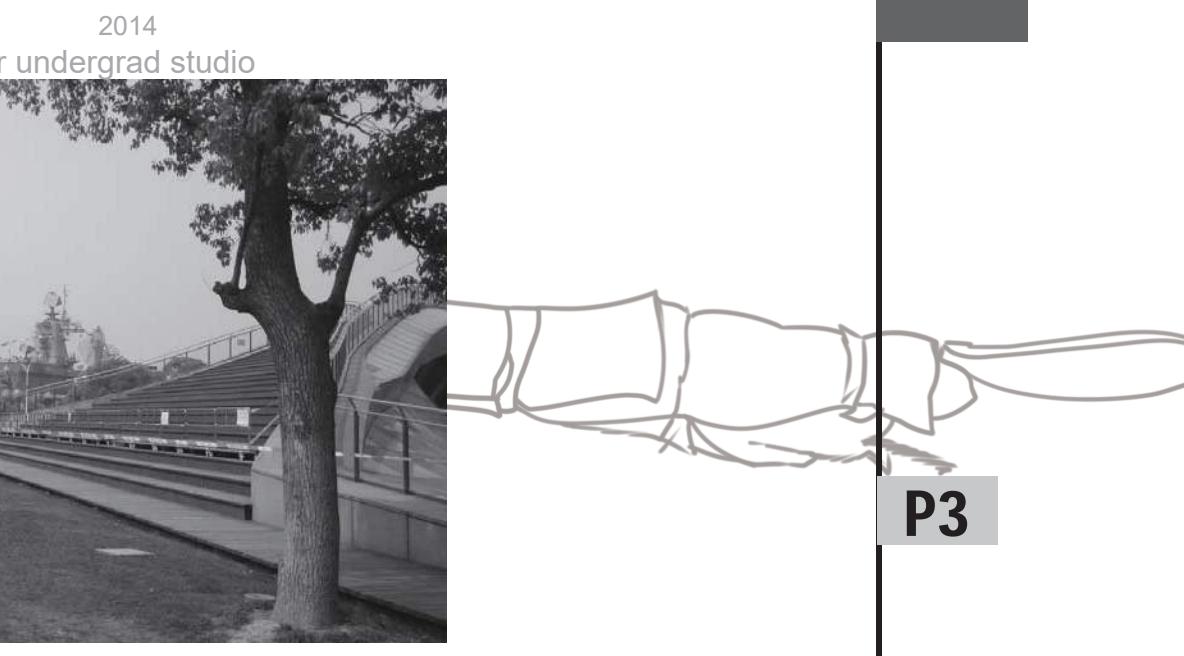
Inspirations are gain from science- chemistry, mathematics, physics, etc. And they will also be the prototype, or the start point of the project



Spacial Dating  
Student center design work, 2nd year undergrad studio  
2013



Crystalline Rise  
Highrise & complex design, 3rd year undergrad studio  
2018



A Brief History of Time  
Museum design work, 2nd year undergrad studio  
2014



Fliegender Teutonische Ritterorden  
Off shore community design, Adv Studio II at Gatech  
2017

P1

P2

P3

P4

## Spacial Dating

Course

Site Location

Site Area

Duration

Description

Method

Tools

Architectural Generating, Studio II, CAUP Tongji

Mid Tongji Campus, Shanghai, China

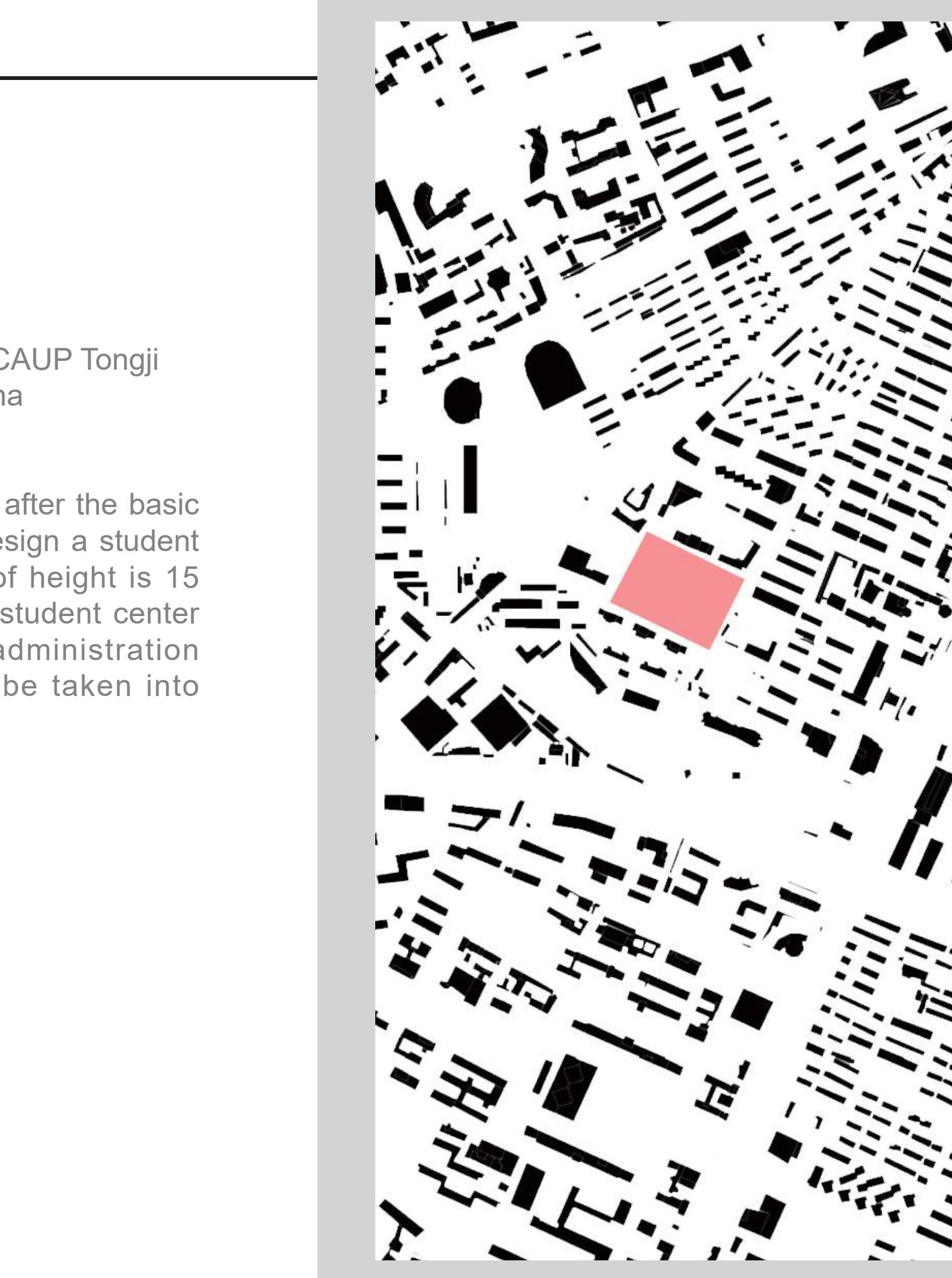
2400 m<sup>2</sup>

6 weeks

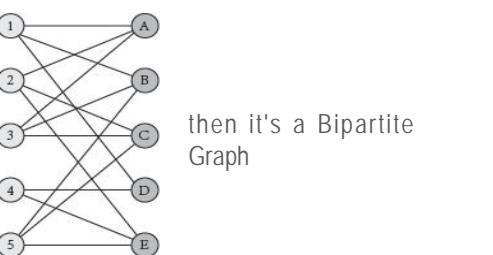
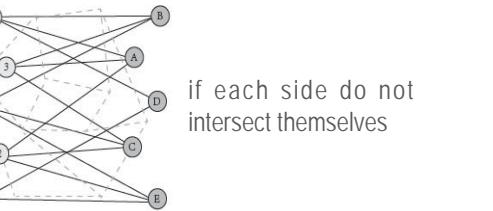
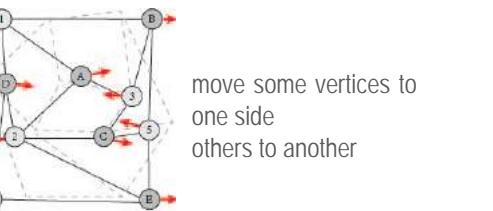
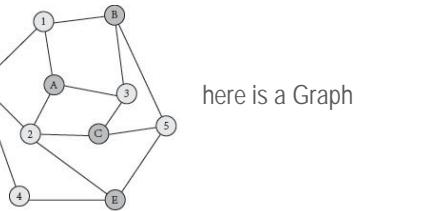
This is the 2nd year studio course, after the basic training students are required to design a student center in mid campus. The limit of height is 15 m no more than 4 floors, and the student center should serve for 28 clubs and administration and meeting space should also be taken into consideration

Parameter controlled generating

CAD, Grasshopper



## Prototype



## Concept of 'Match'

Define one side of BiGraph as space unit , another side as prefered location then there's a 'match'



need a port near the bank

need a newsland near the pavement

need a busstop along the road

need a statue in the park

Single Match

Match

Conflict Match (disputed match)

Max Match (everyone pleased)

To understand the generate mechanism, we must understand the concept of 'Match'. In mathematics and the graph theory, the concept of 'match' happens in what we called Bipartite Graph. For instance, a group of 5 boys and 5 girls are to shake hands with each other, if one boy successfully shake hand with one girl, we say there's a 'match'. If 2 boys shake hands with one girl, there's a risk of ... whatever, but in concept of match, it is 'conflict match'. If all boys successfully shake hands with all girls and no two boys are with one girl, then it is a satisfactory, which is 'Max match'.

Similarly, in this project, every club has their space of preference, if a club find it's content place, then it is a 'match'. So for all 28 clubs in this project, the intention of the design is to generate a space solution that will satisfy as much of clubs as we can, and the goal is to find the 'Max match'

## Space Generating

We need a place of excellent sight!

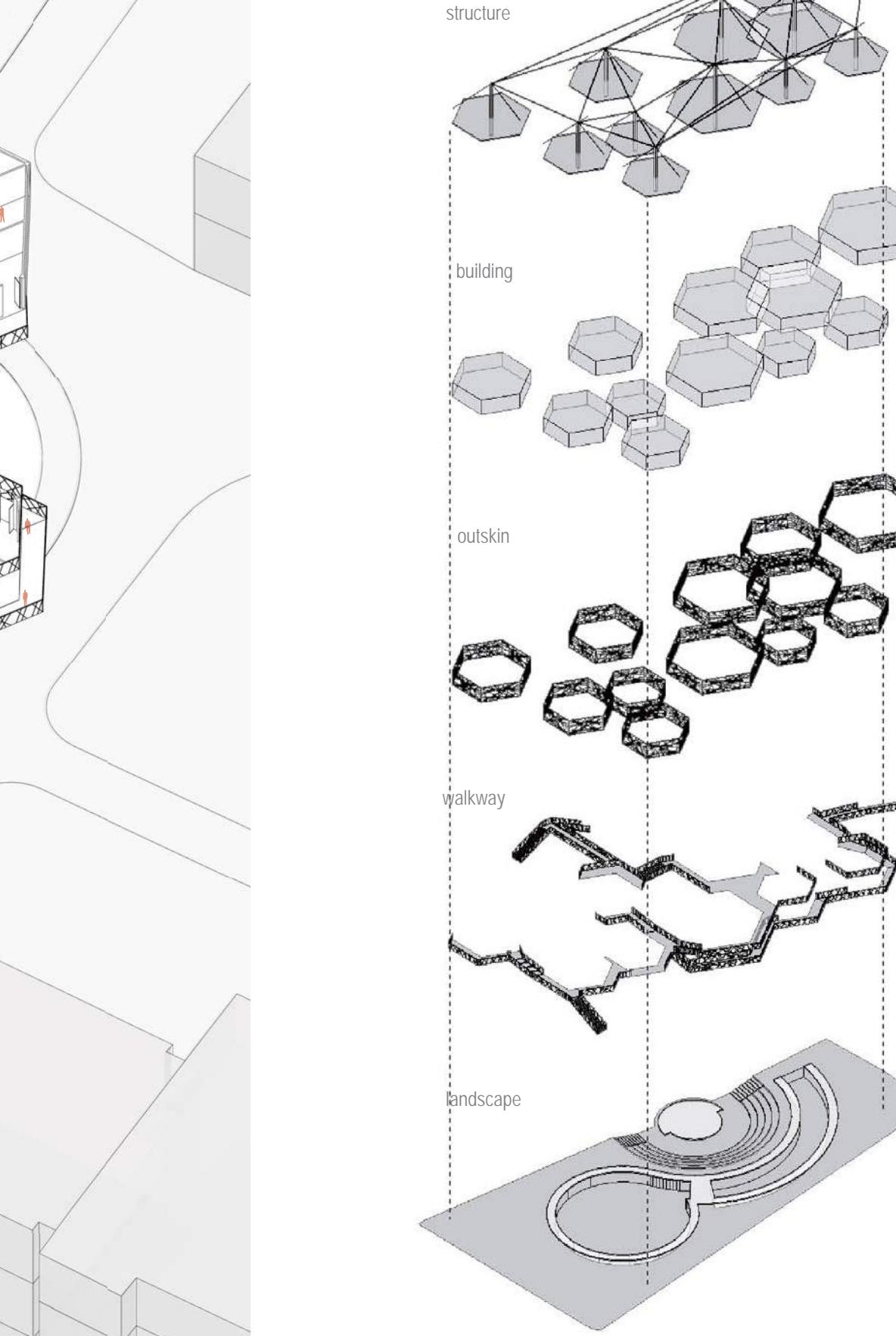
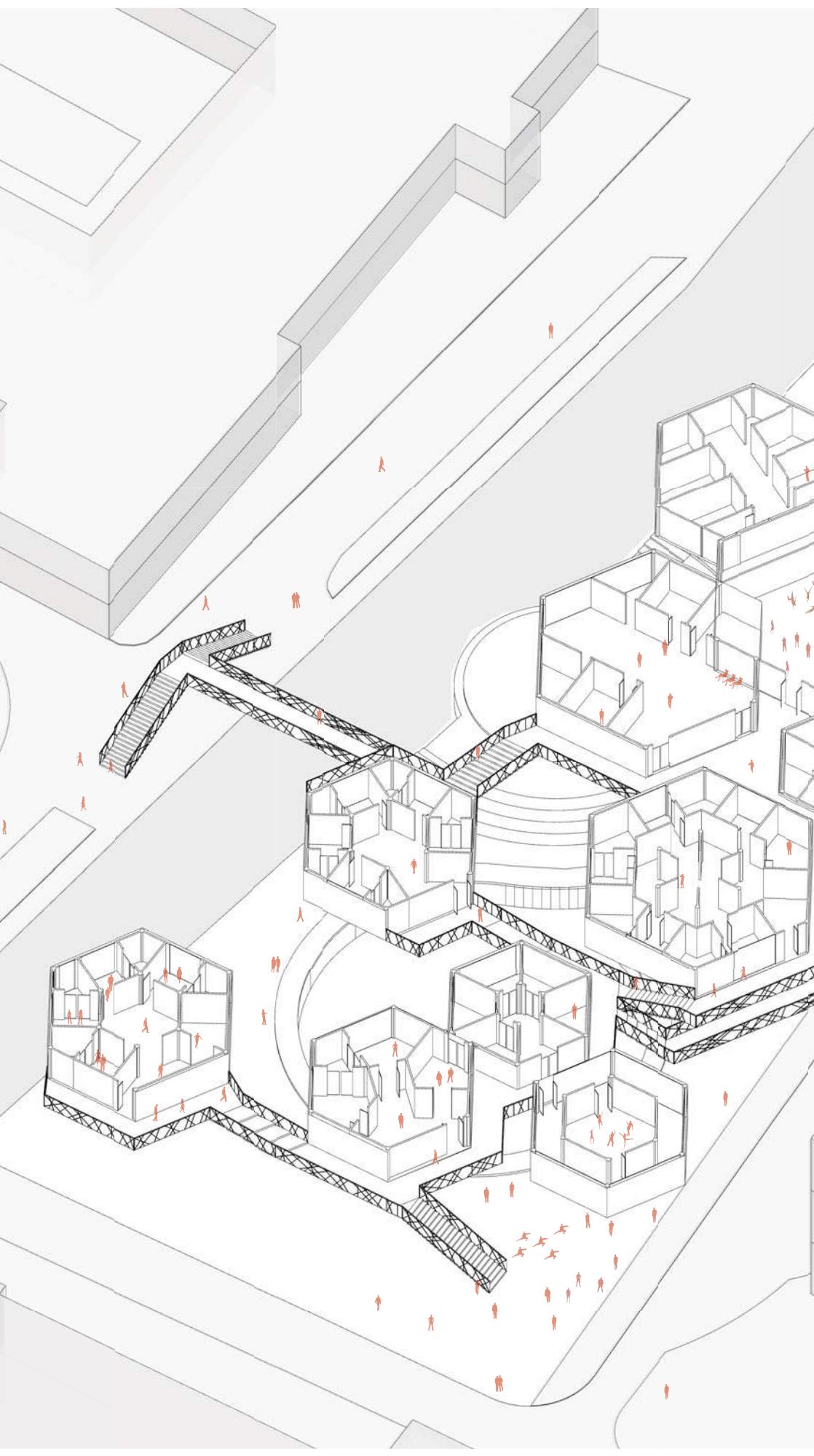
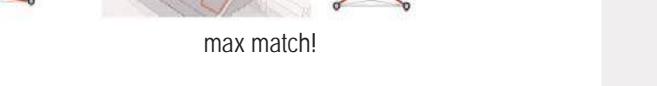
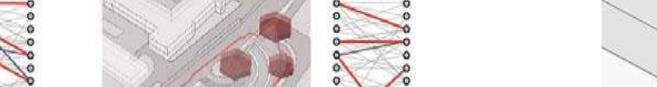
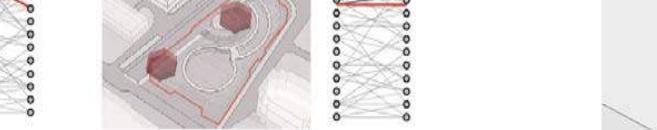
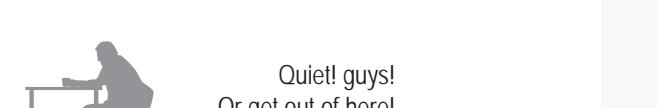
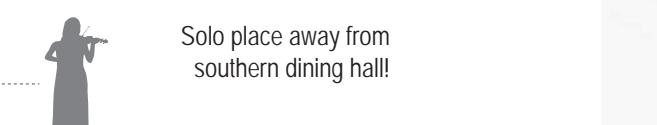
Photograph Club

Gym! along the water!

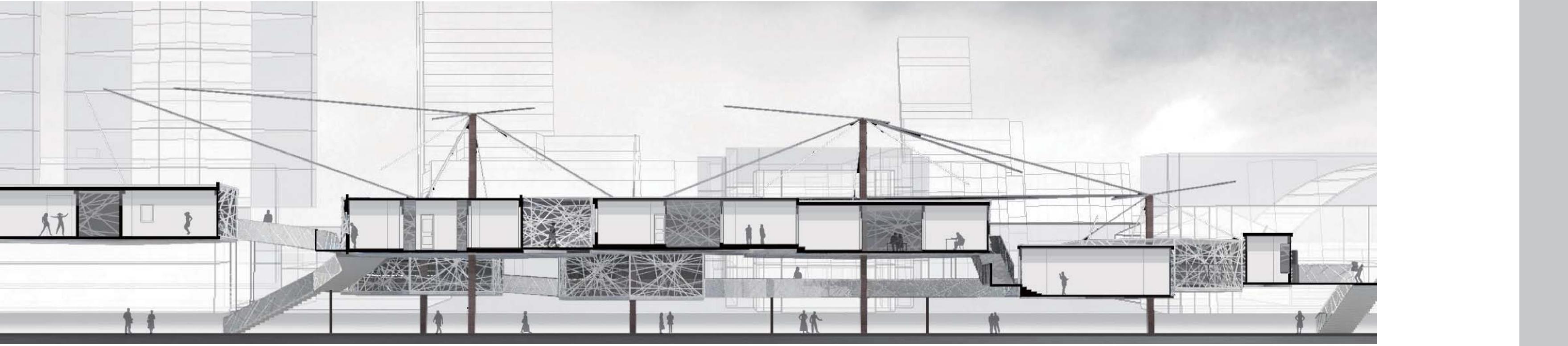
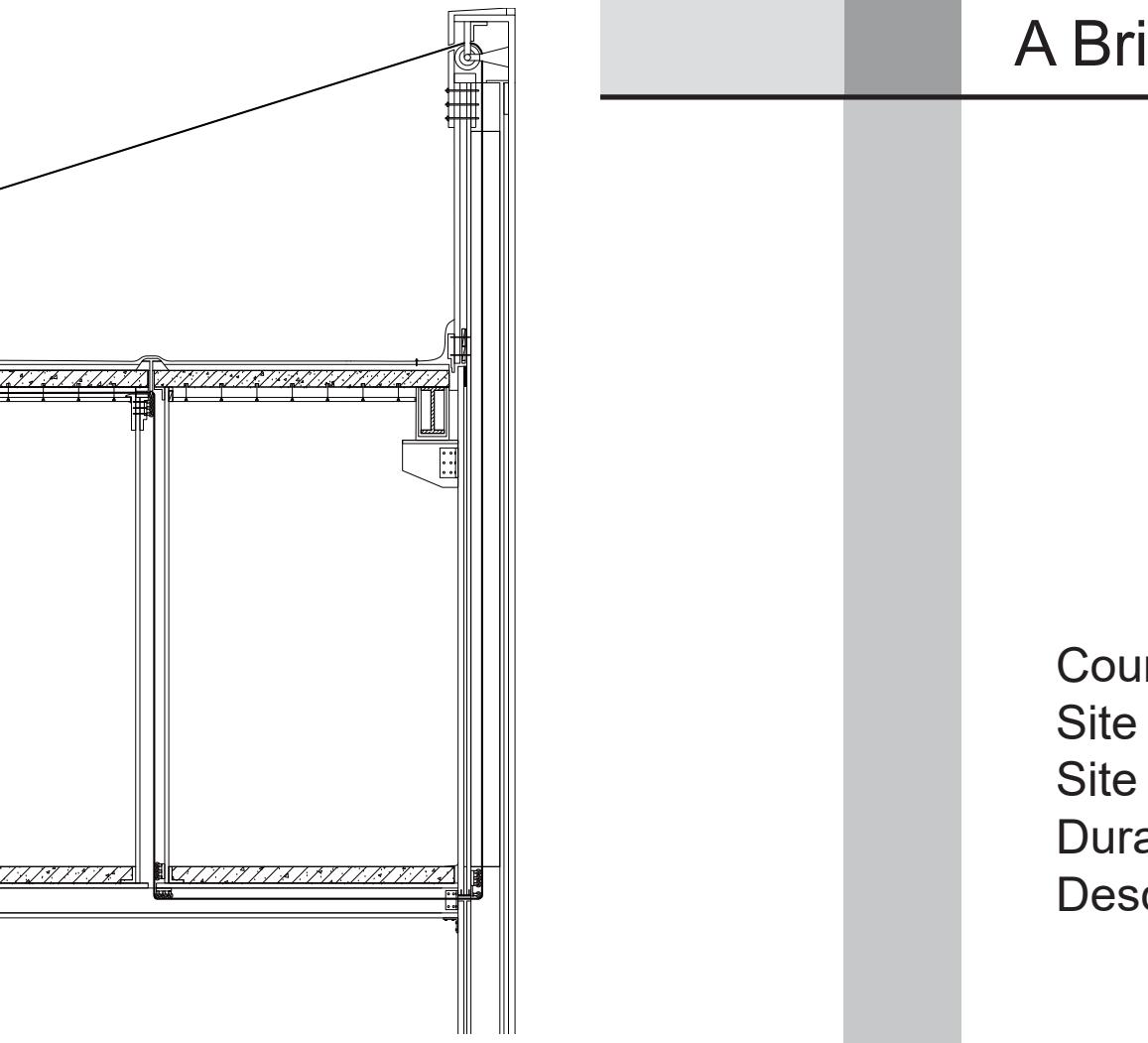
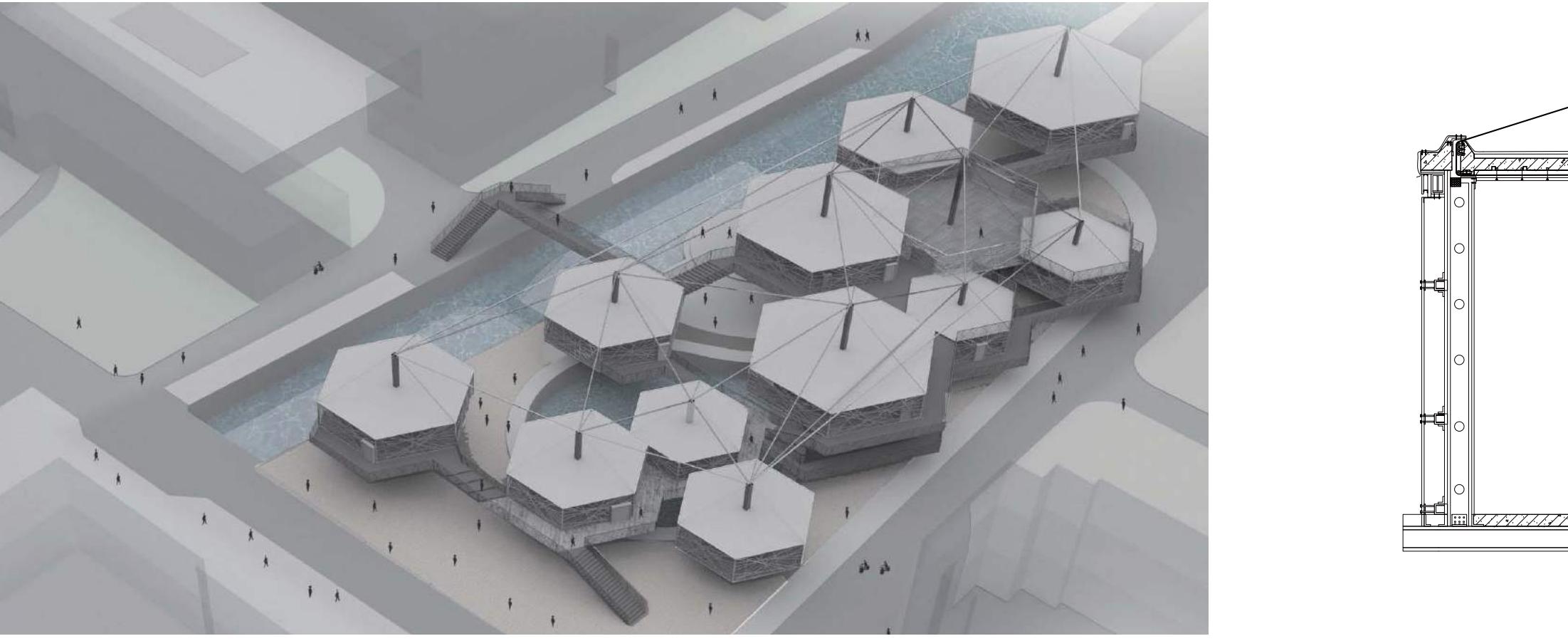
Music Club

Around the plaza to perform!

Drama Club



## A Brief History of Time



Course  
Site Location  
Site Area  
Duration  
Description

Method  
Tools

Architectural Studio II (Parametric), CAUP Tongji  
Qinghuangdao Road, Yangpu, Shanghai, China  
65000 m<sup>2</sup>

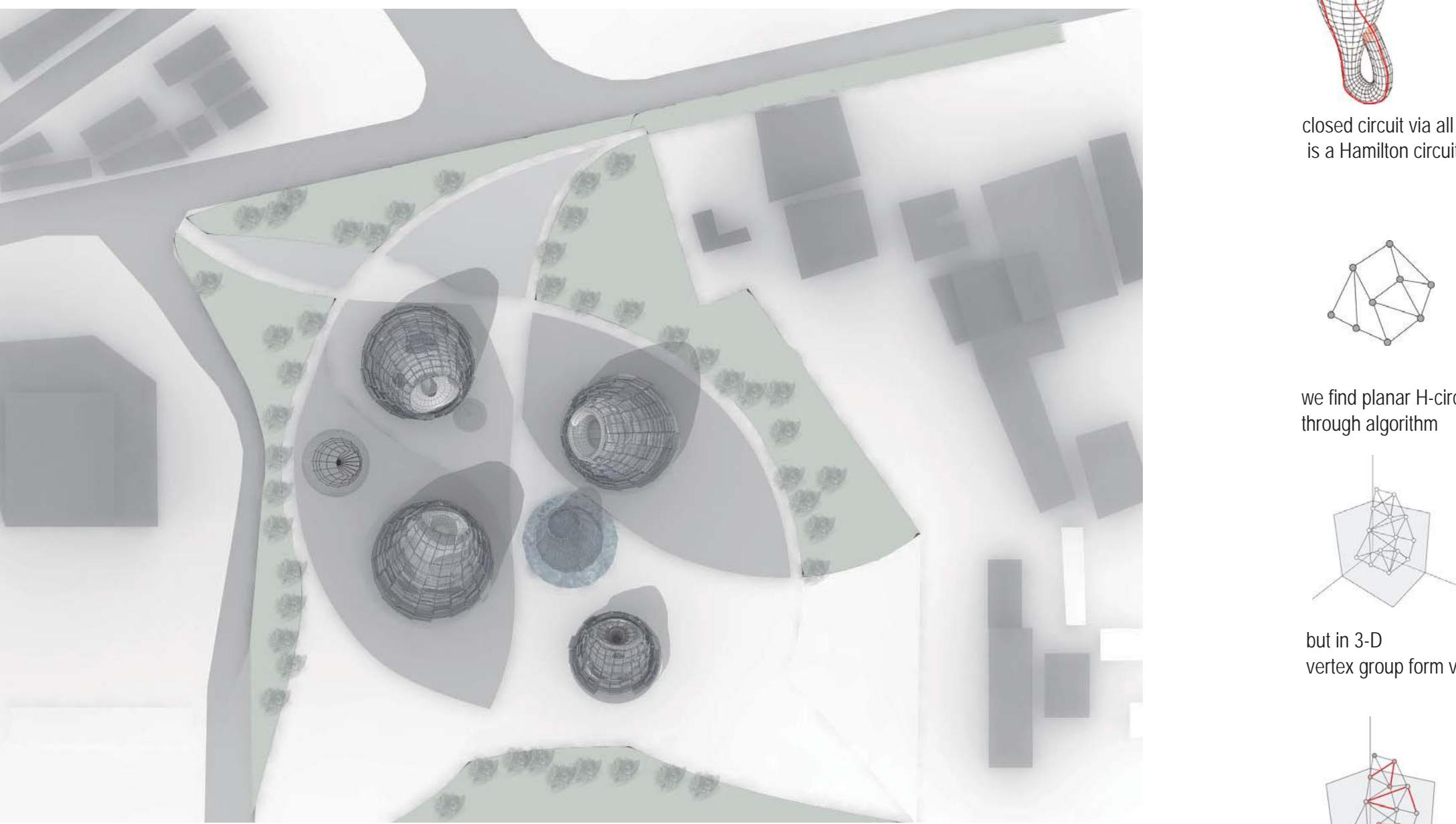
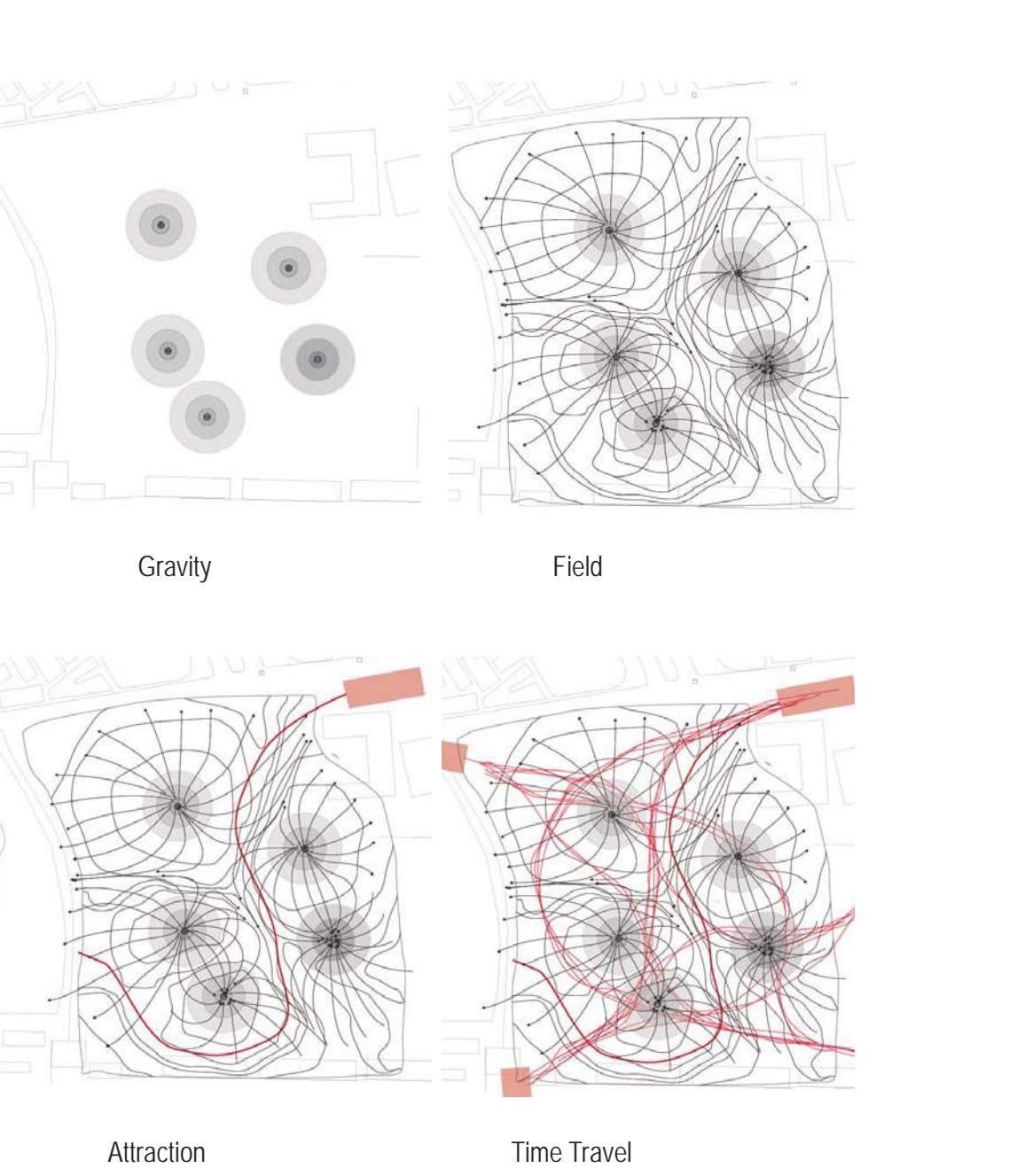
10 weeks

This is the 2nd year parametric studio course. This project is to build a museum and the theme is self-defined. This is the option studio of parametric direction, So the use of parametric tool is a must.

Flow generative

Maya, Rhino/GH, Illustrator. CAD is not allowed

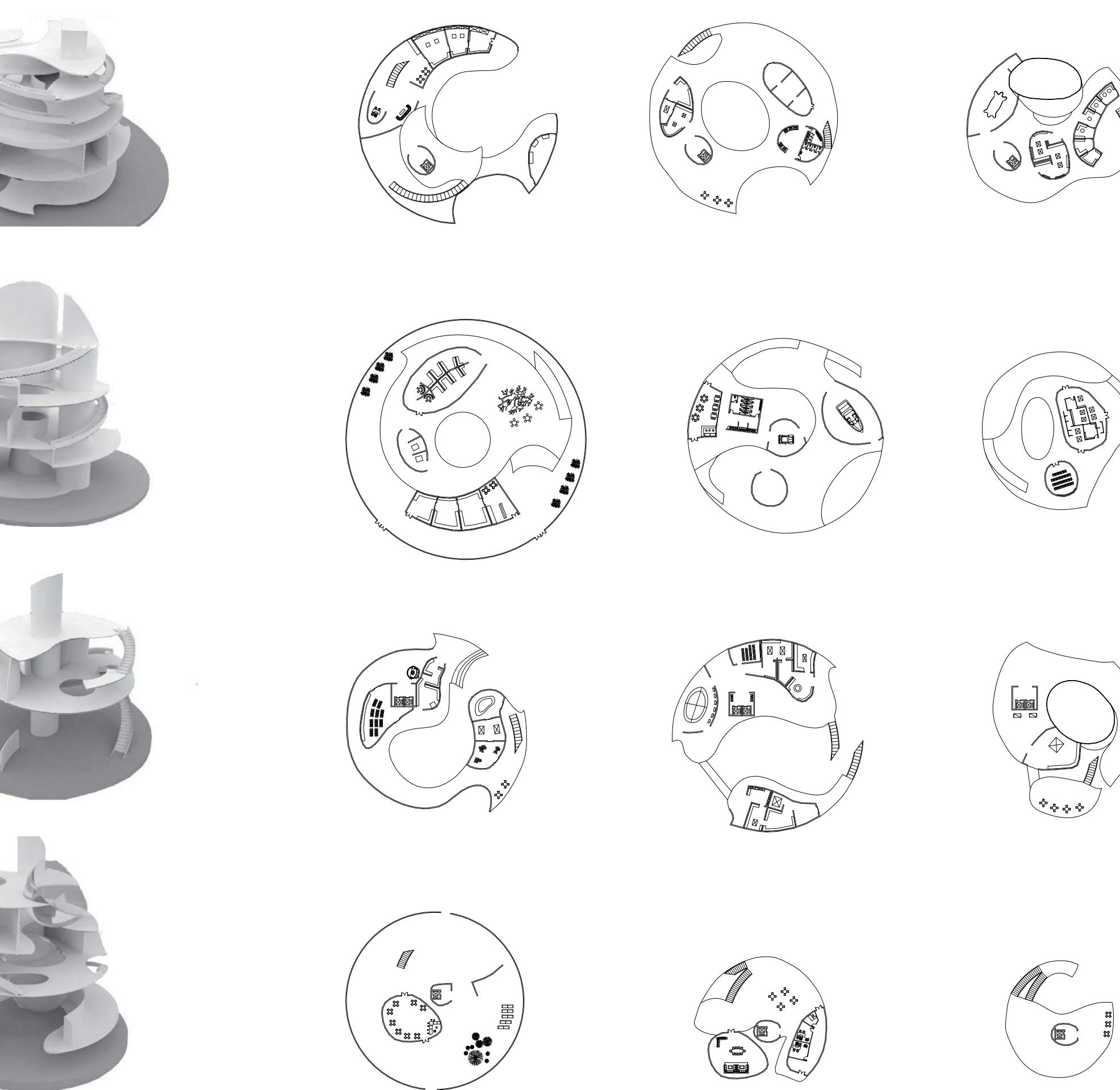
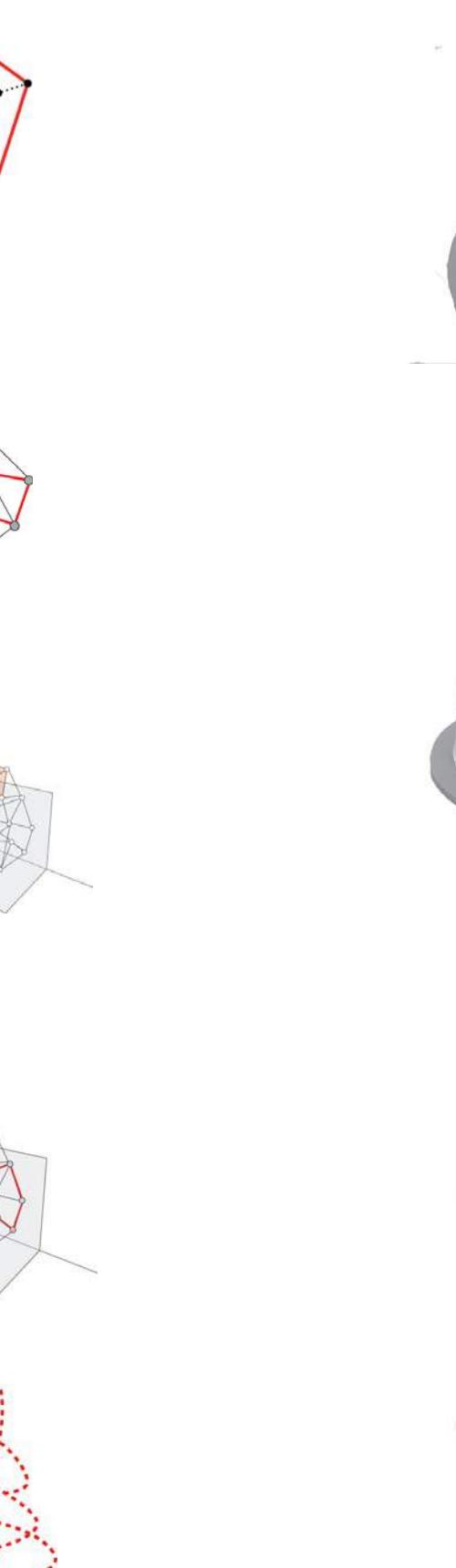


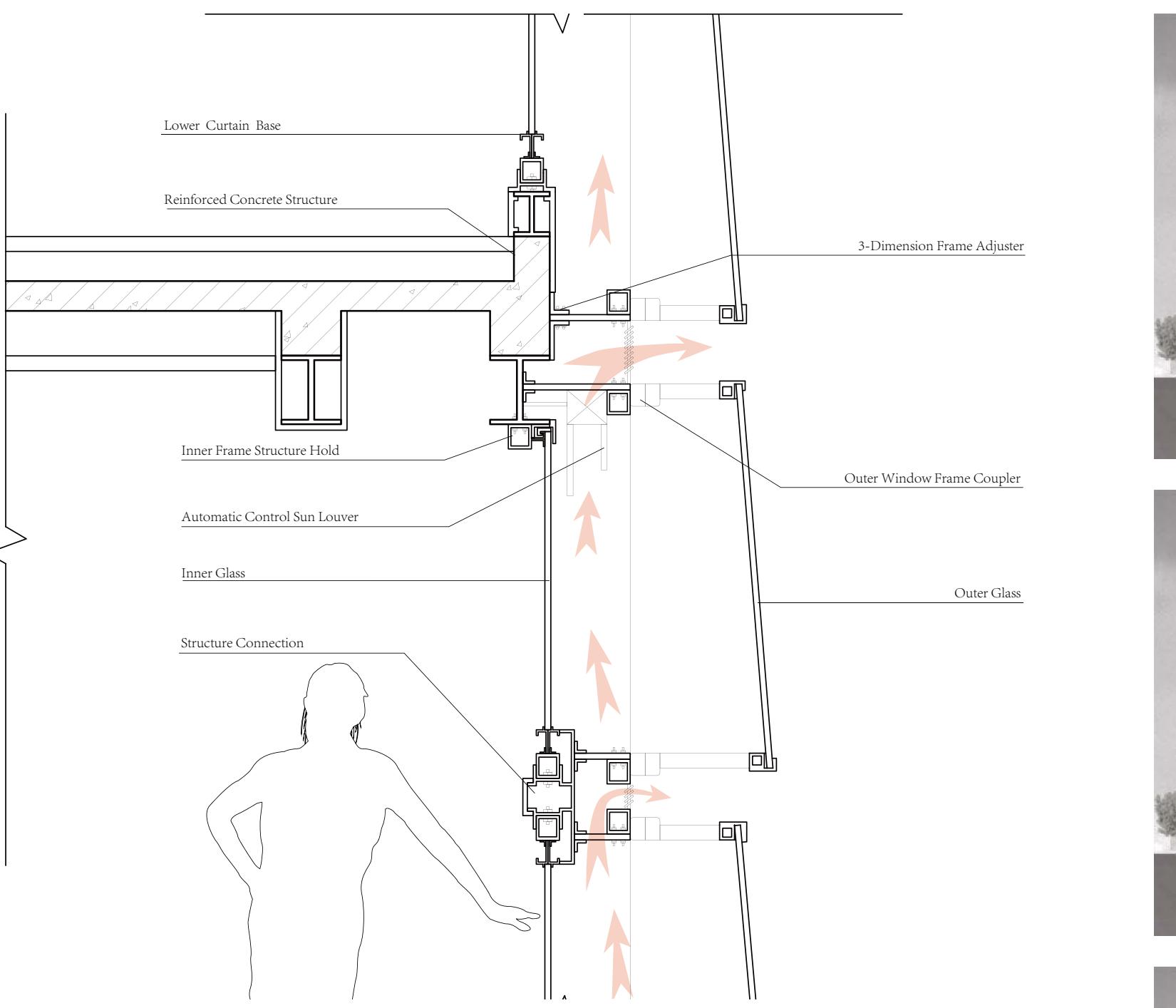


The intention of this project is to show respect to physics, every generative result is based on theory of object motion in curves.

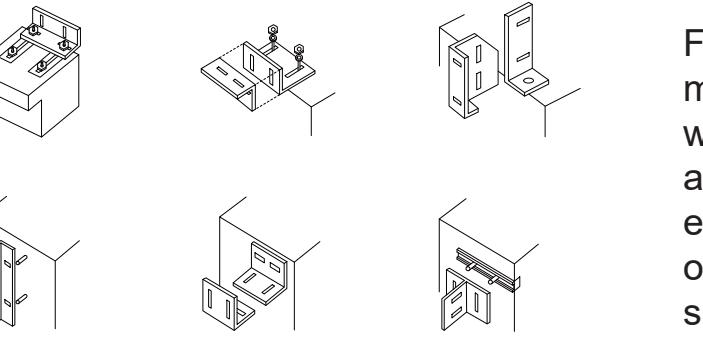
For the site, we define the original predicted gather point as the gravity center and base for the museum unit, and introduce the flow into the gravity field, based on the flow we create path, and for each building, the curve motion is continued by calculating the route with defined space vertex and find the path that will traverse those points - a spacial Hamilton circuit.

Based on the flows we define the building form, and generate the building shape with that.



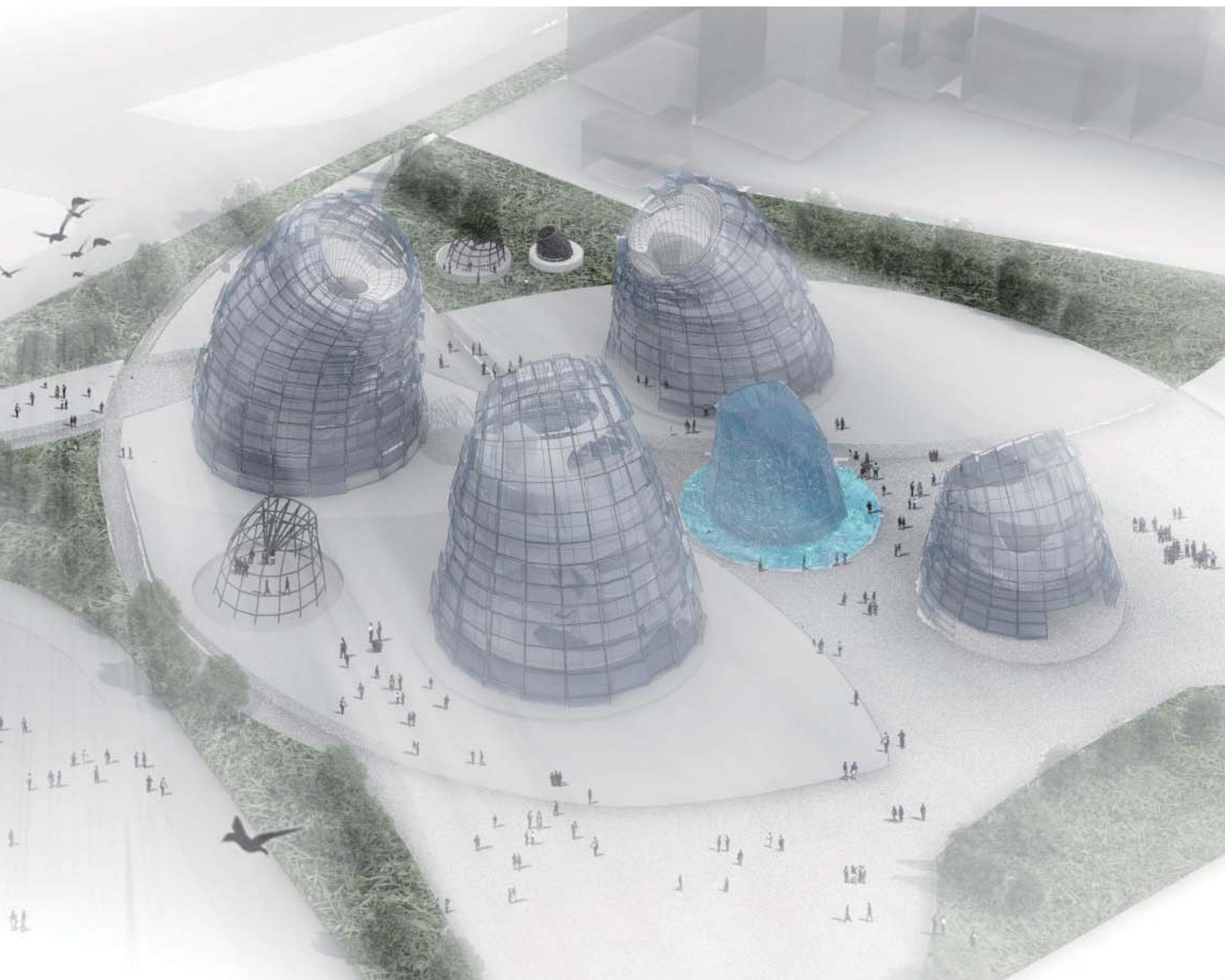
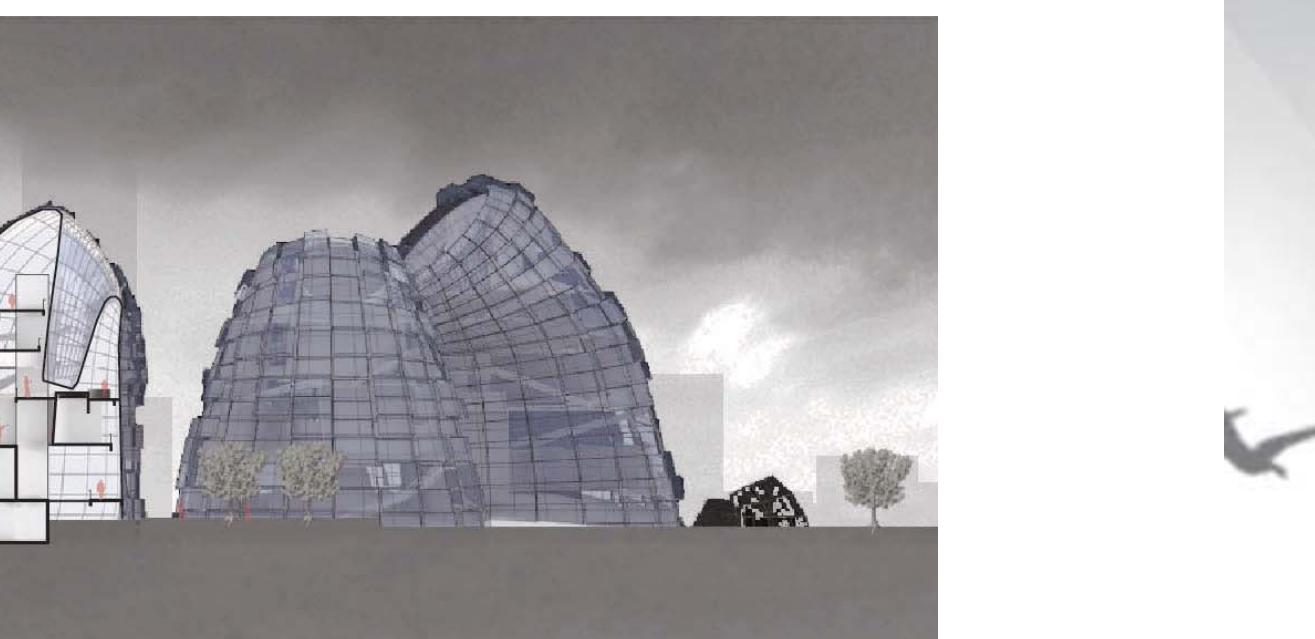
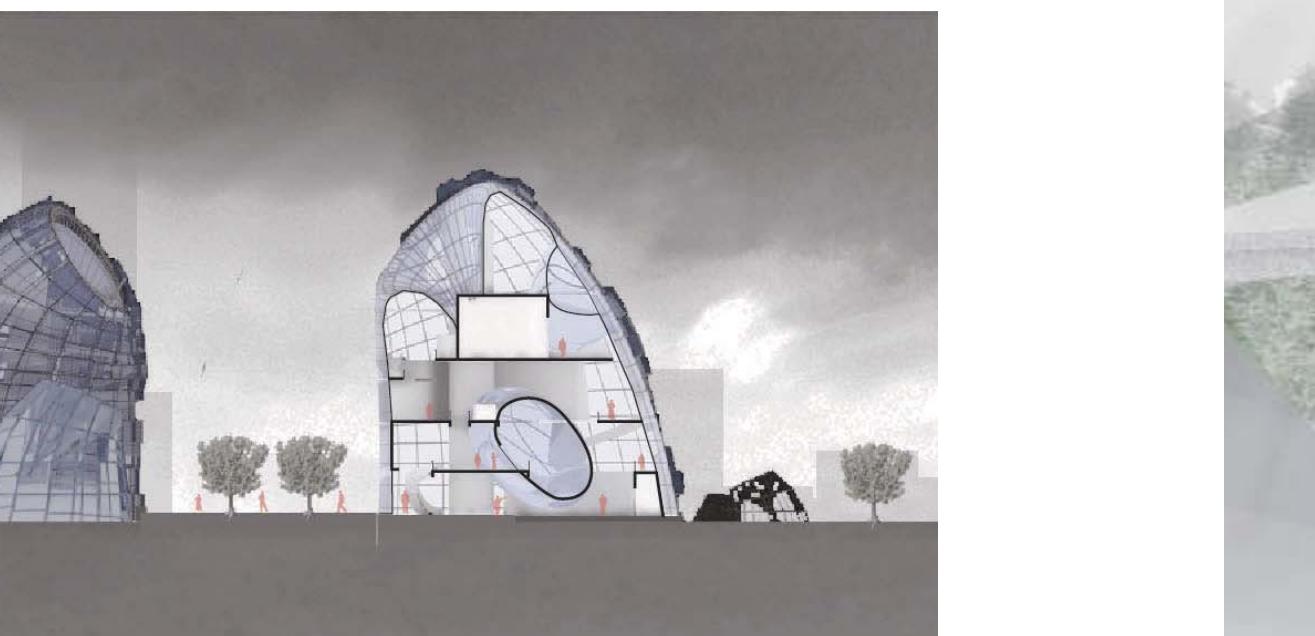
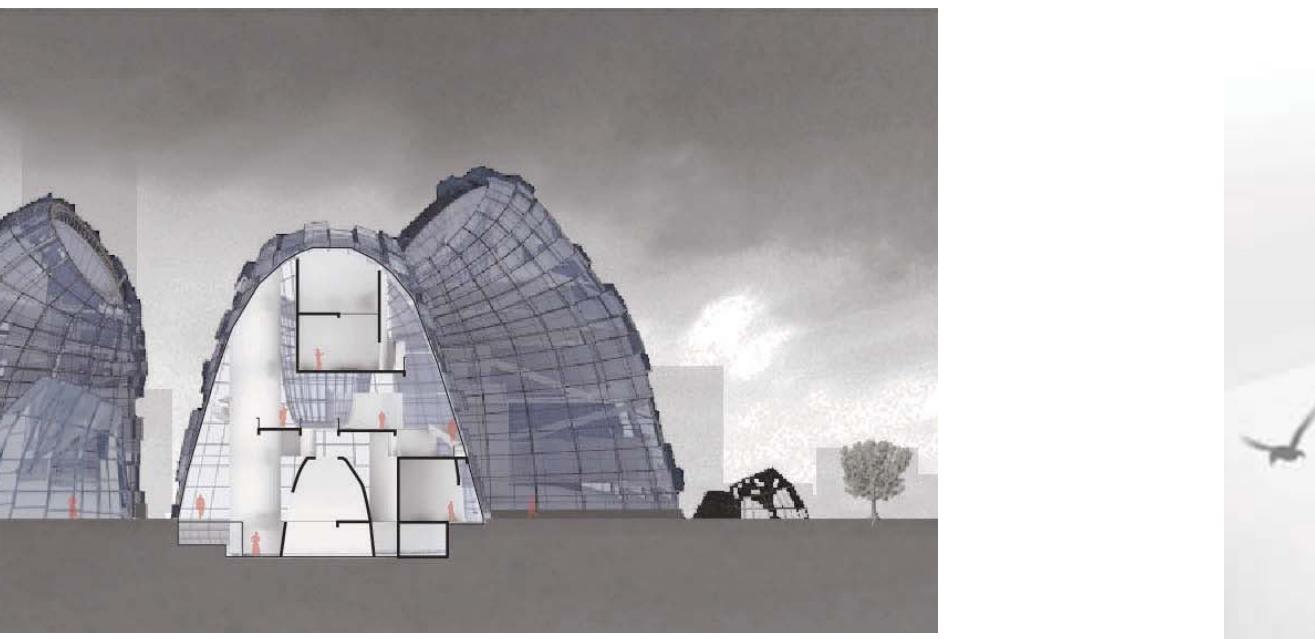


Construction



different types of frame adjuster

For visualization, we use glass as the exterior material of building unit. Each building unit will have exterior glass that can change color according to the angle of sunlight, and for energy saving concerns, we have another layer of interior glass to form the double layer curtain wall system, which can fit in the environmental condition in Shanghai well.

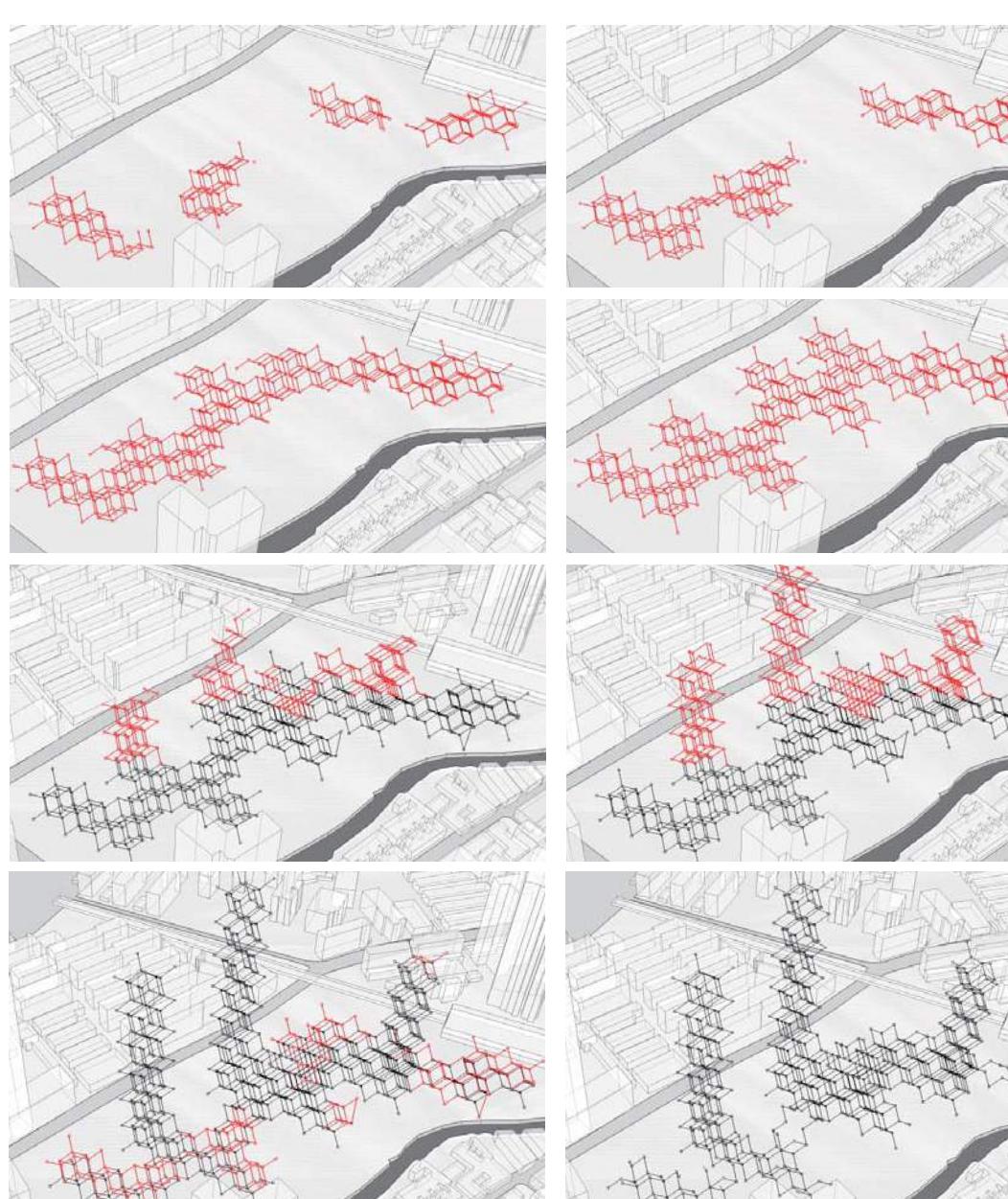
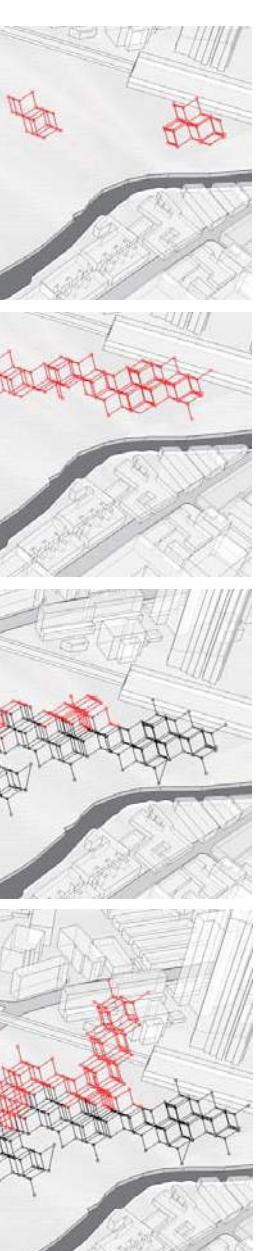
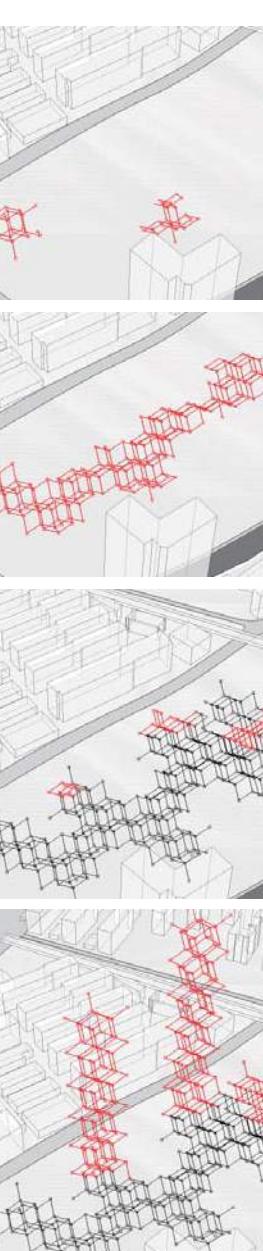
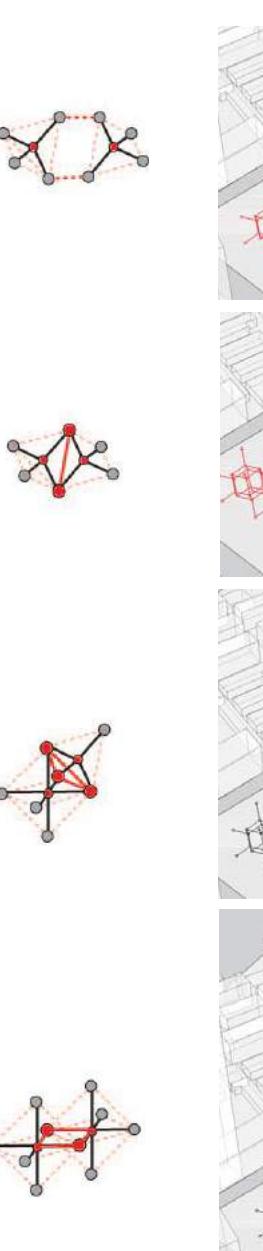
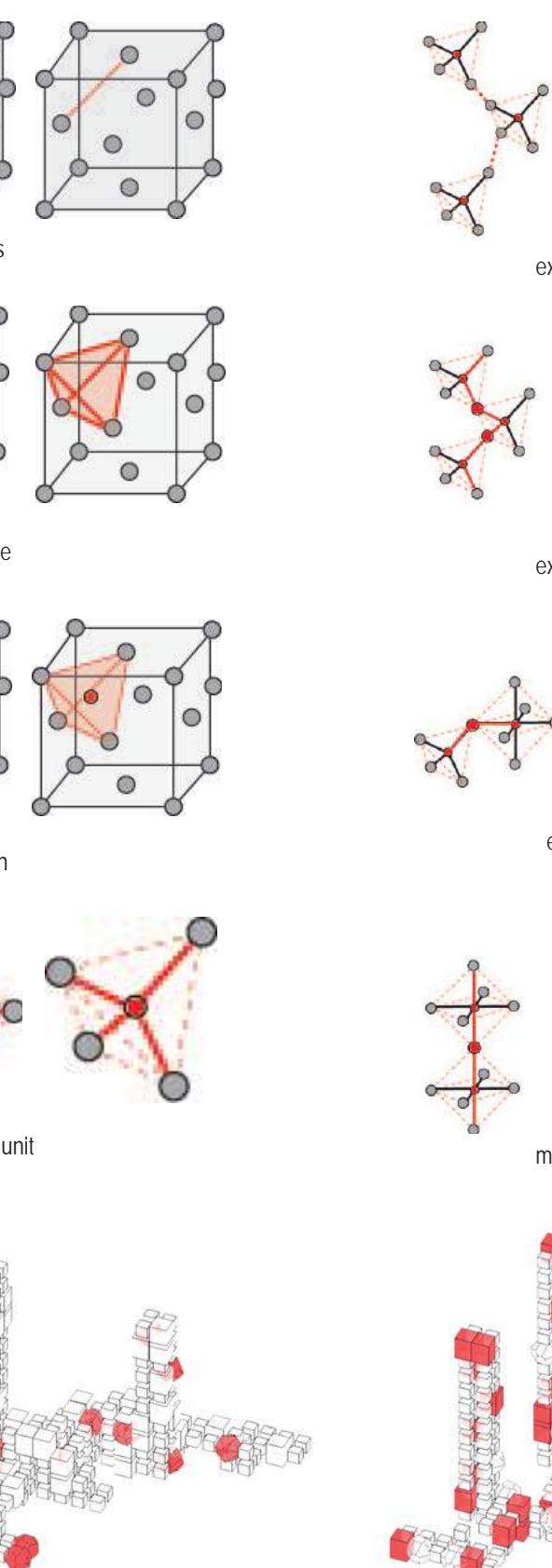
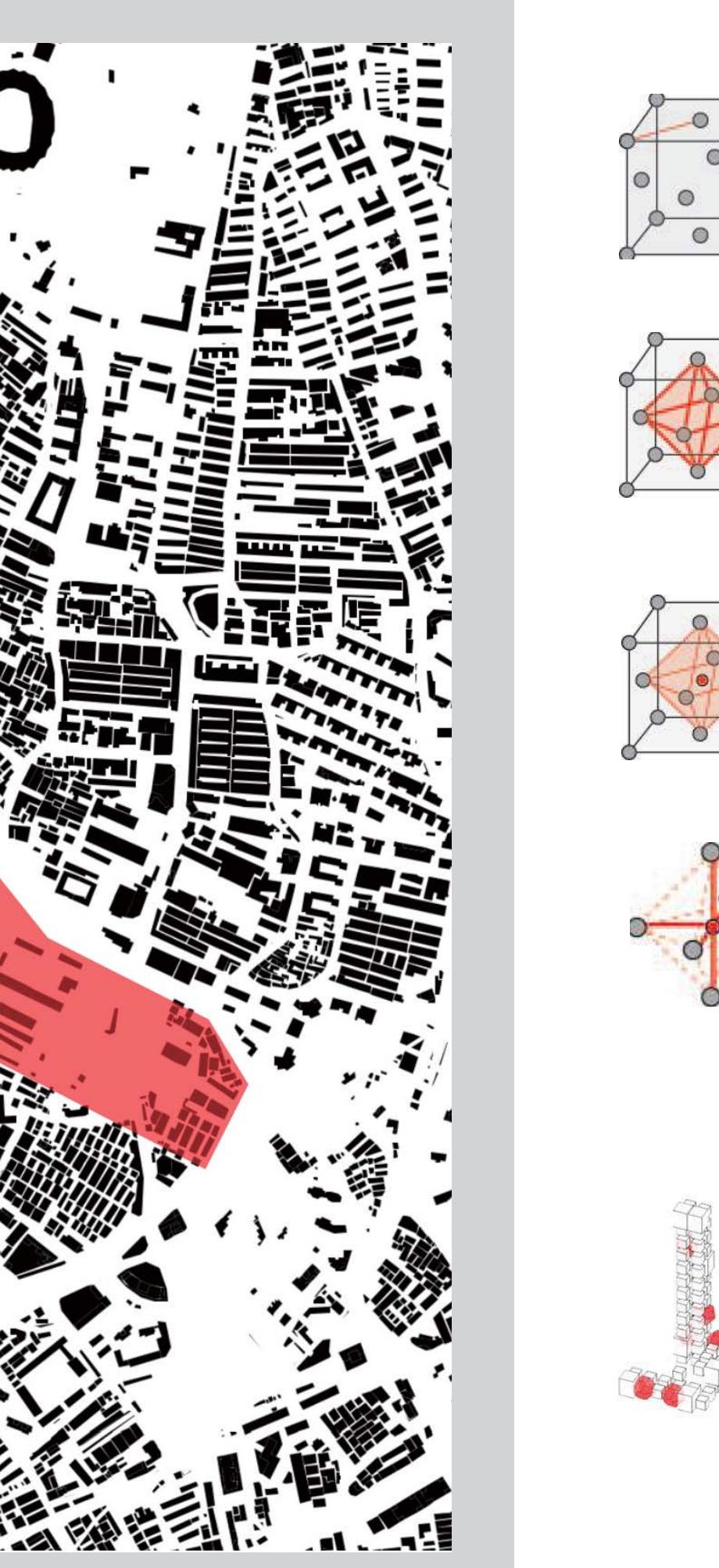


# Crystalline Rise

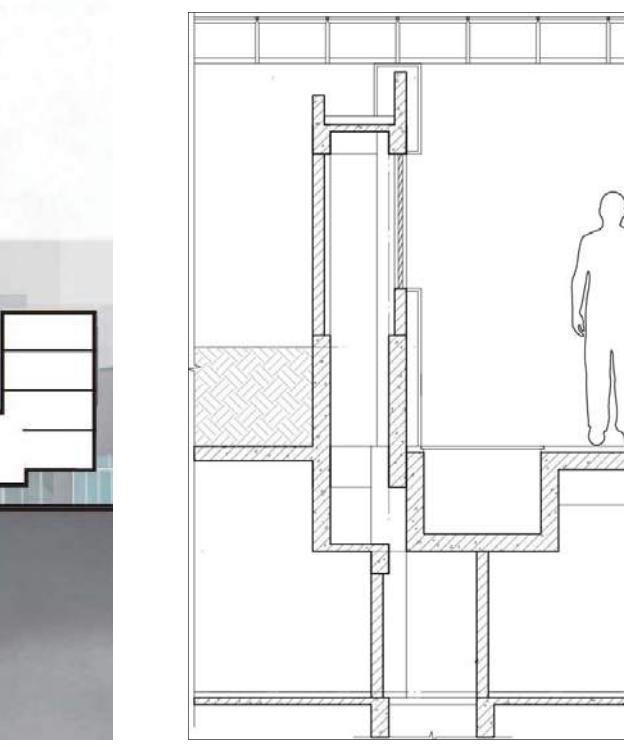
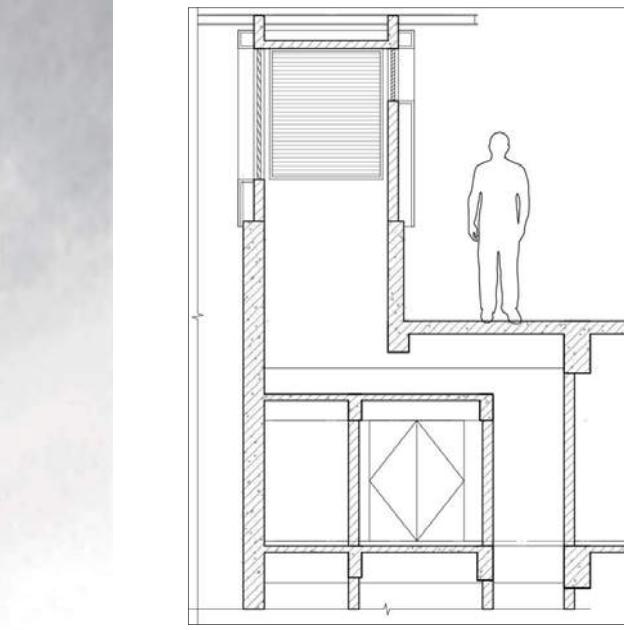
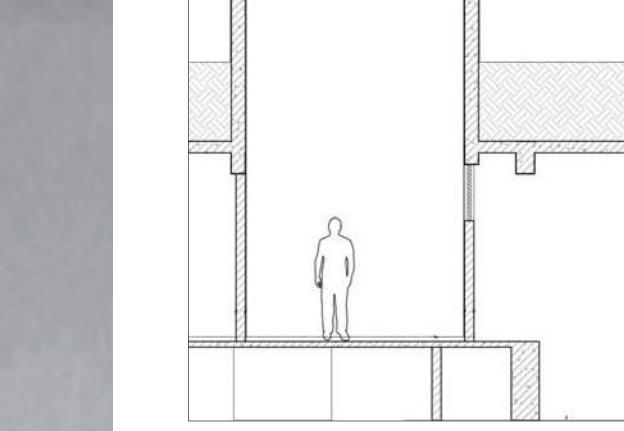
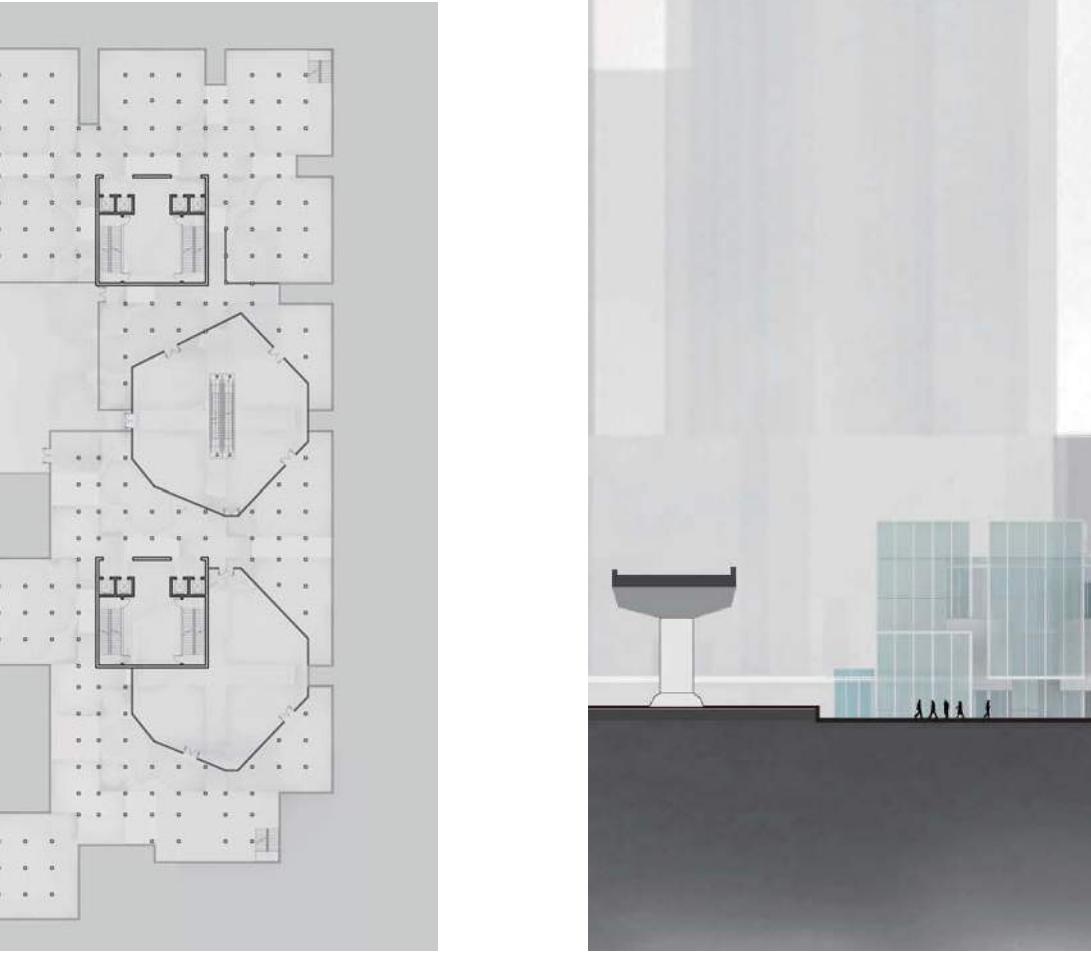
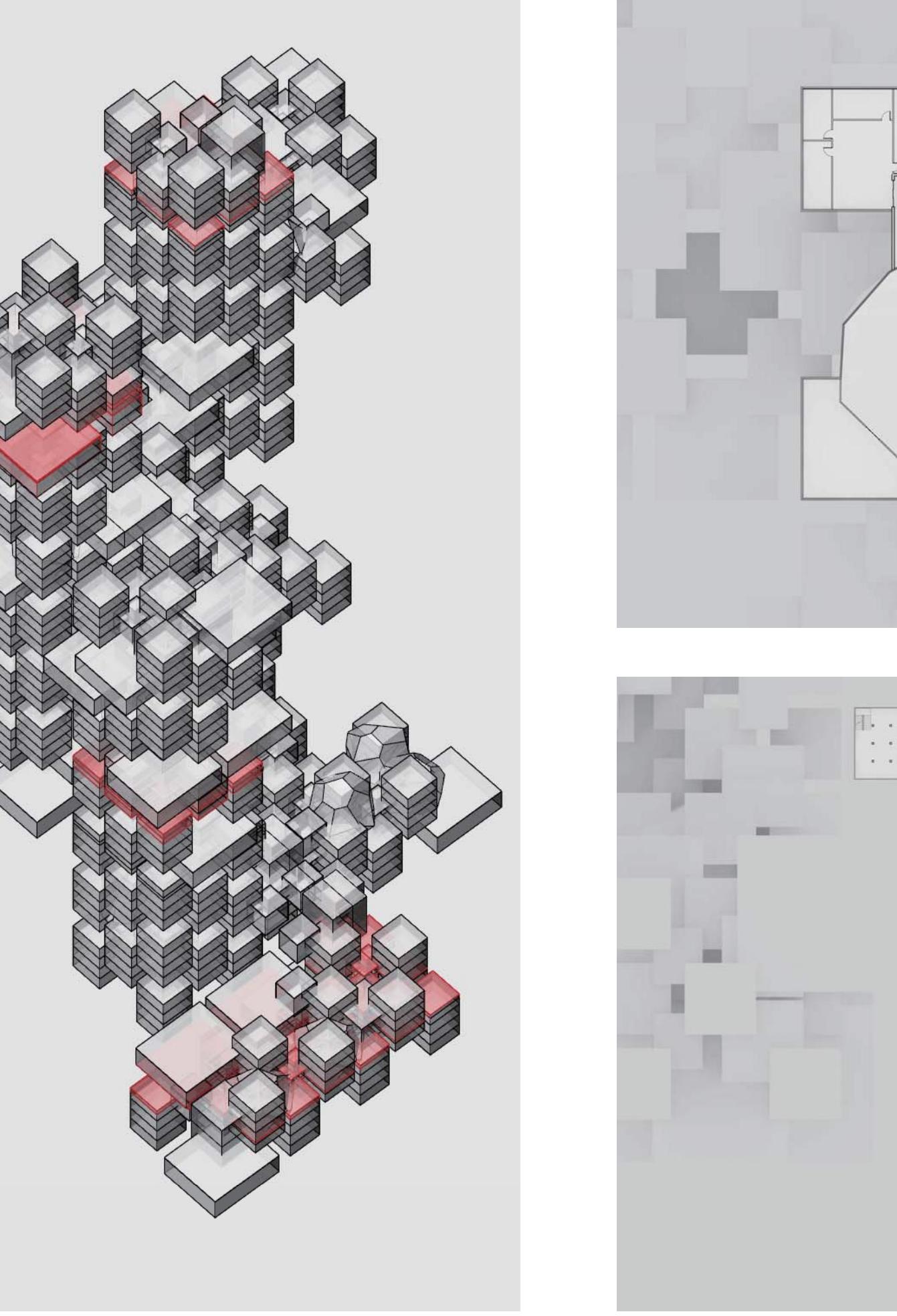
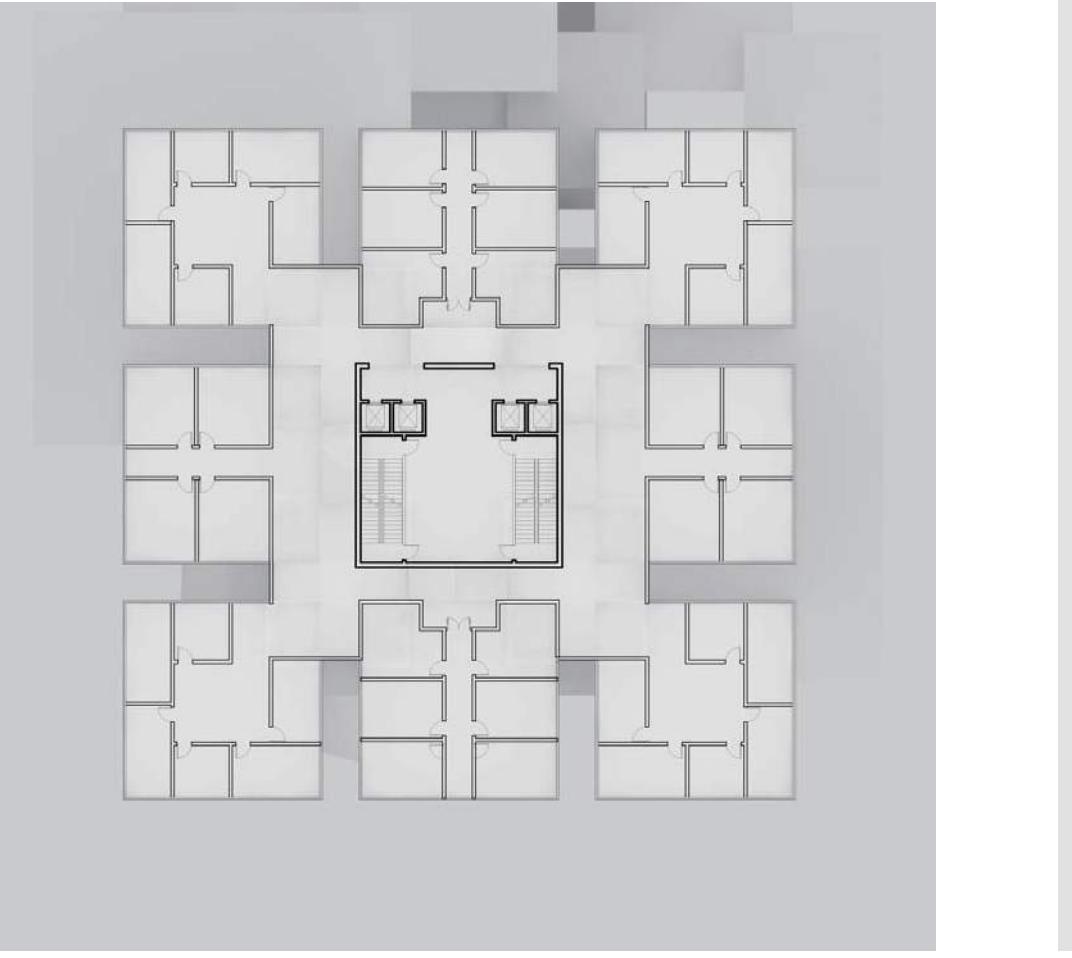
Course  
Site Location  
Site Area  
Duration  
Description

Highrise and Complex Studio, CAUP Tongji  
North Sichuan Road, Hongkou, Shanghai, China  
33000 m<sup>2</sup> (include metro station boundary)  
12 weeks  
This is the specific studio work for complex and highrise, in this project students have three options of base, and for diversity concern , The site with a metro station is chosen.  
Space Generating  
GH/Rhino whole process

Method  
Tools



The idea of this project is from Calciumfluoride Mineral Cell, the mineral cell has two types of minimal unit, and the combination and extention of unit can cause unpredictable outcome. Also, the dehydrate and flaw of the mineral cell extension is considered, just as what the true situation did.



# Fliegenden Teutonische Rittenorden

Course  
Site Location  
Duration  
Description

Method  
Tools

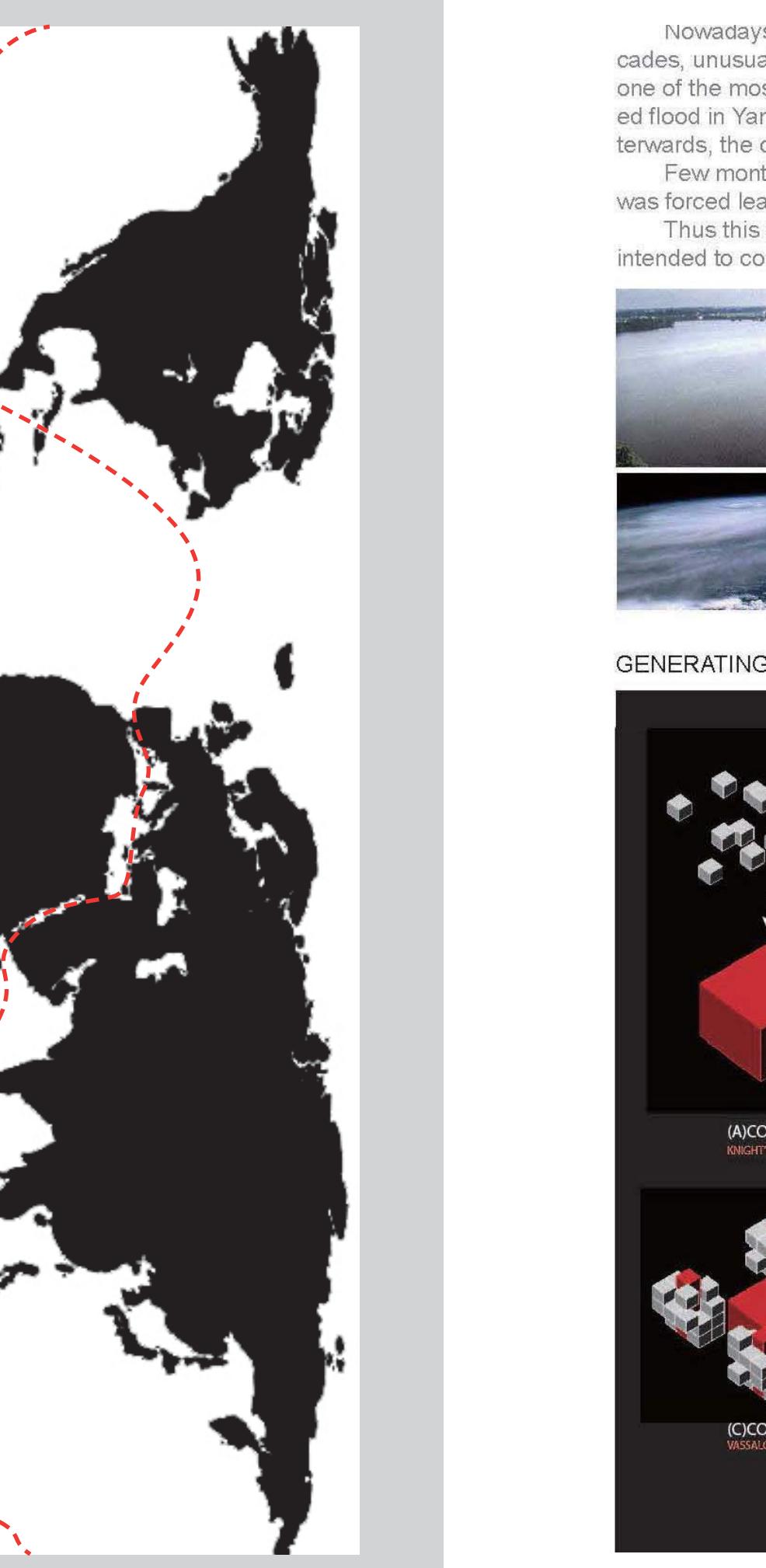
Adv II studio, CoA Gatech

Ocean

12 weeks

This is the 2nd studio work at Gatech, the purpose of the studio is to build a community for the science researchers, the project must react to the concern of climate changes

Space Generating, Prefabricated elements  
GH/Rhino



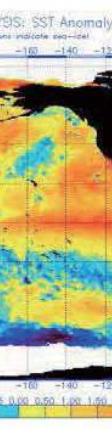
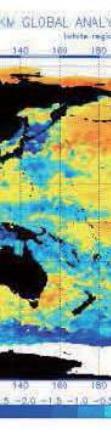
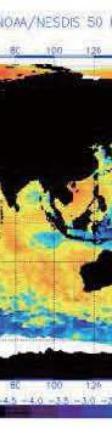
Nowadays we've witnessed the severe climate change. During the past few decades, unusual ocean climate had caused numerous natural disasters. The EL NINO, is one of the most famous phenomenon. In 1998, China came across an unprecedented flood in Yangtze Valley, and suffered great losses. According to the investigation afterwards, the cause of the flood was believed to be the consequence of EL NINO.

Few months ago, Florida was also affected by Hurricane Irma, thousands of people were forced leaving their home.

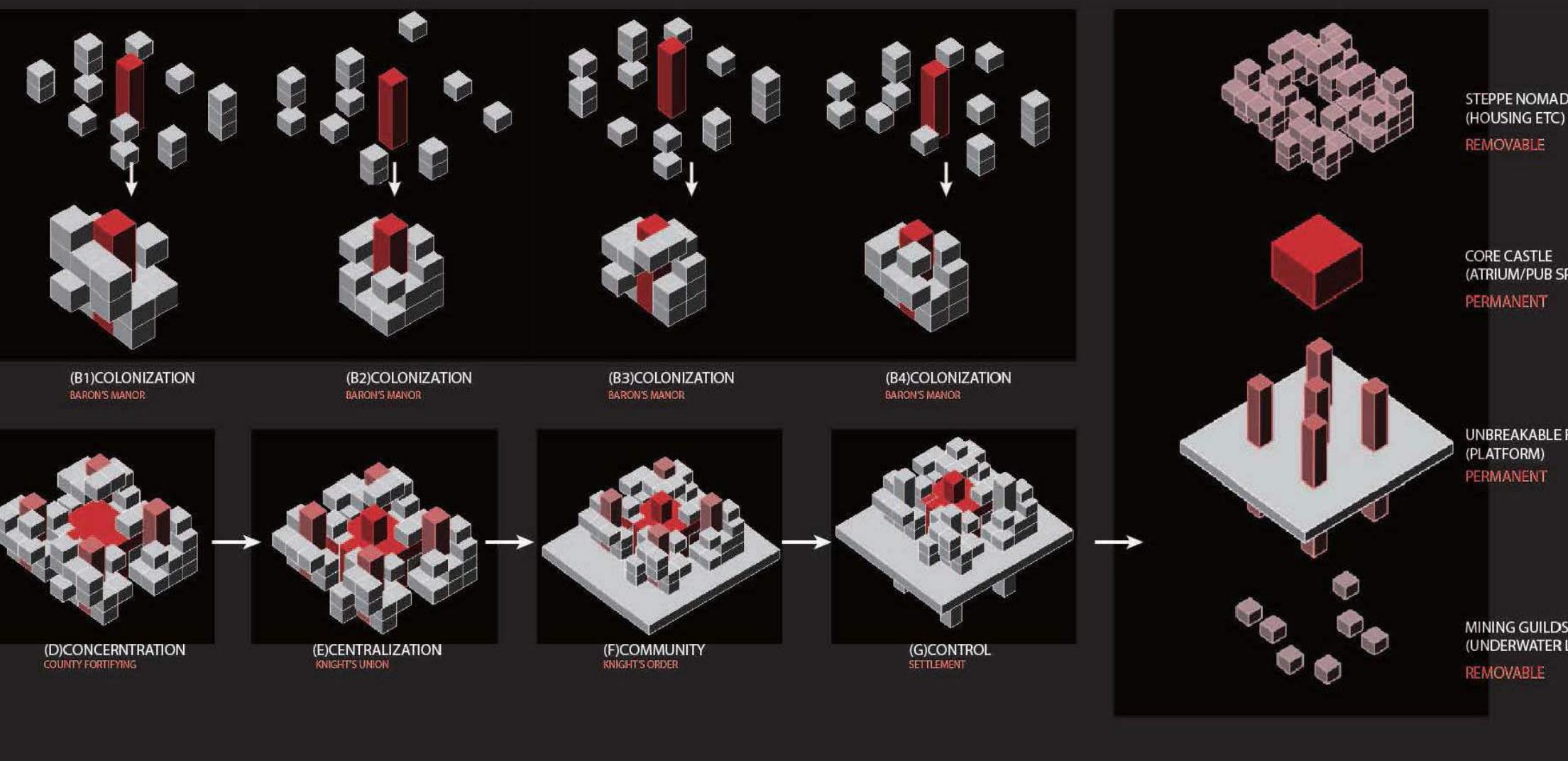
Thus this design project was based on the focus on the ocean climate change, and intended to construct a multi-functional community on the ocean

## IDEA

- 1) The name of the community-'Flying Teutonic Order Brothers', in memorial of the indomitable Medieval knight order as well as their fortress- Marienburg.
- 2) Use the idea of prefabricated clusters with centralized core to achieve flexibility when confronting different options.
- 3) The clusters of minor private spaces were modular, of 5\*5-meters in dimension.
- 4) For option 1, the minor clusters acts as labs as well as living spaces. For option 2, the minor clusters acts as living spaces and storages while the public atrium acts as project/command center and emergency shelter. For option 3, the clusters can be abandoned and the public atrium acts as exhibition center



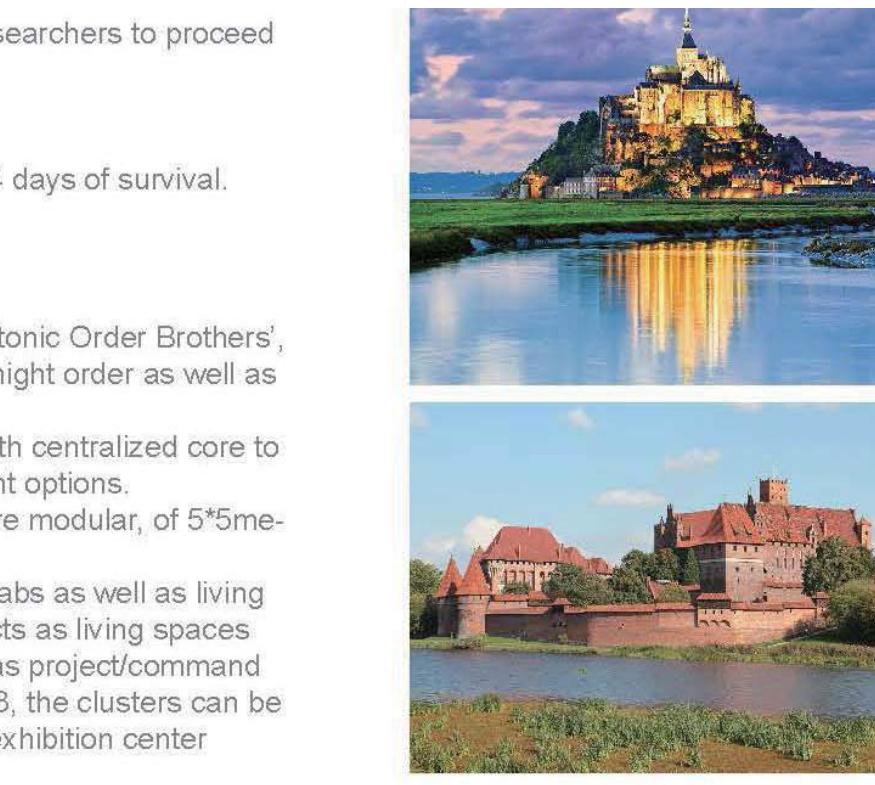
## GENERATING DIAGRAM

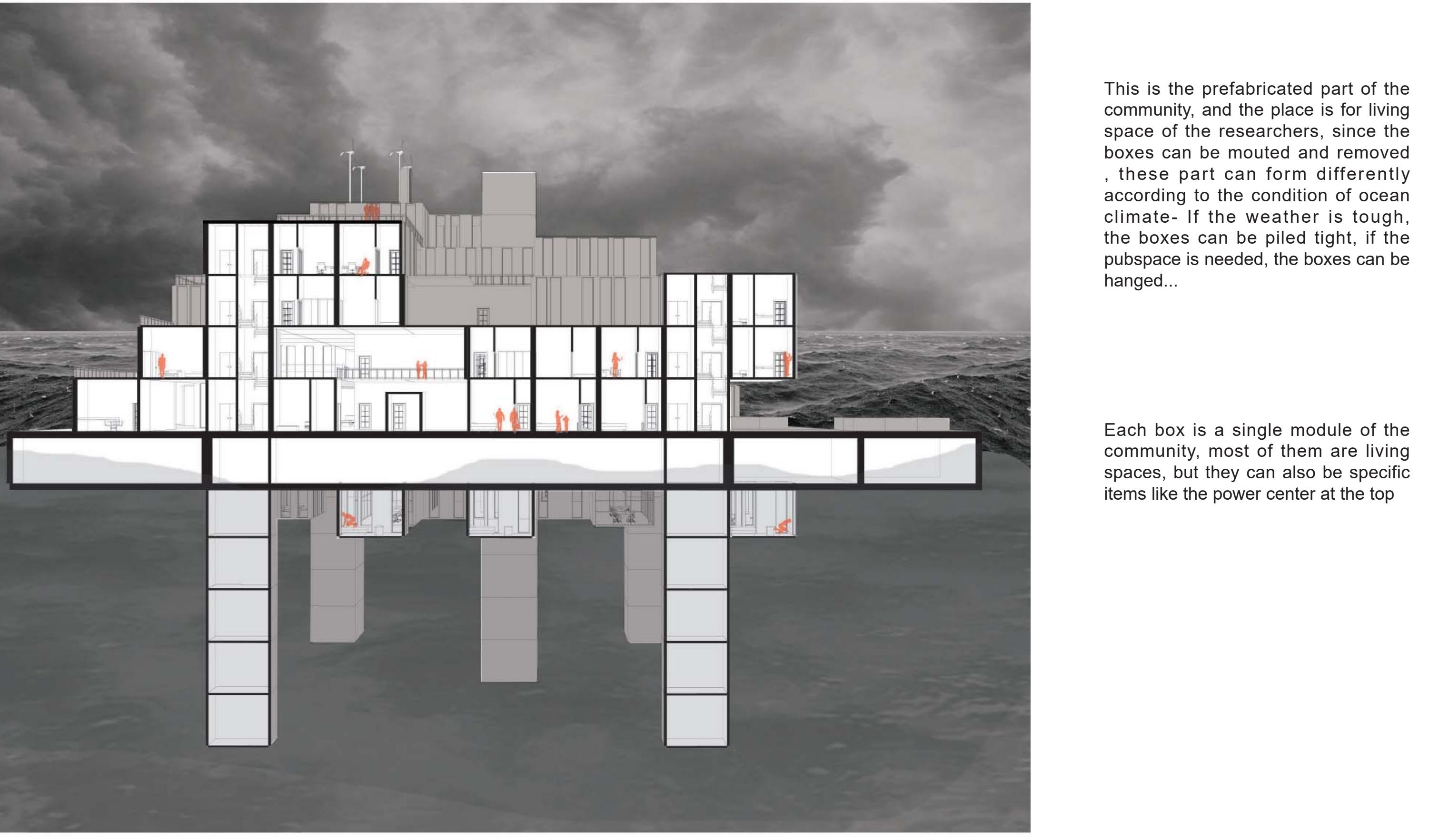


A multi-function building that allows the researchers to proceed scientific progress.

The least options are:

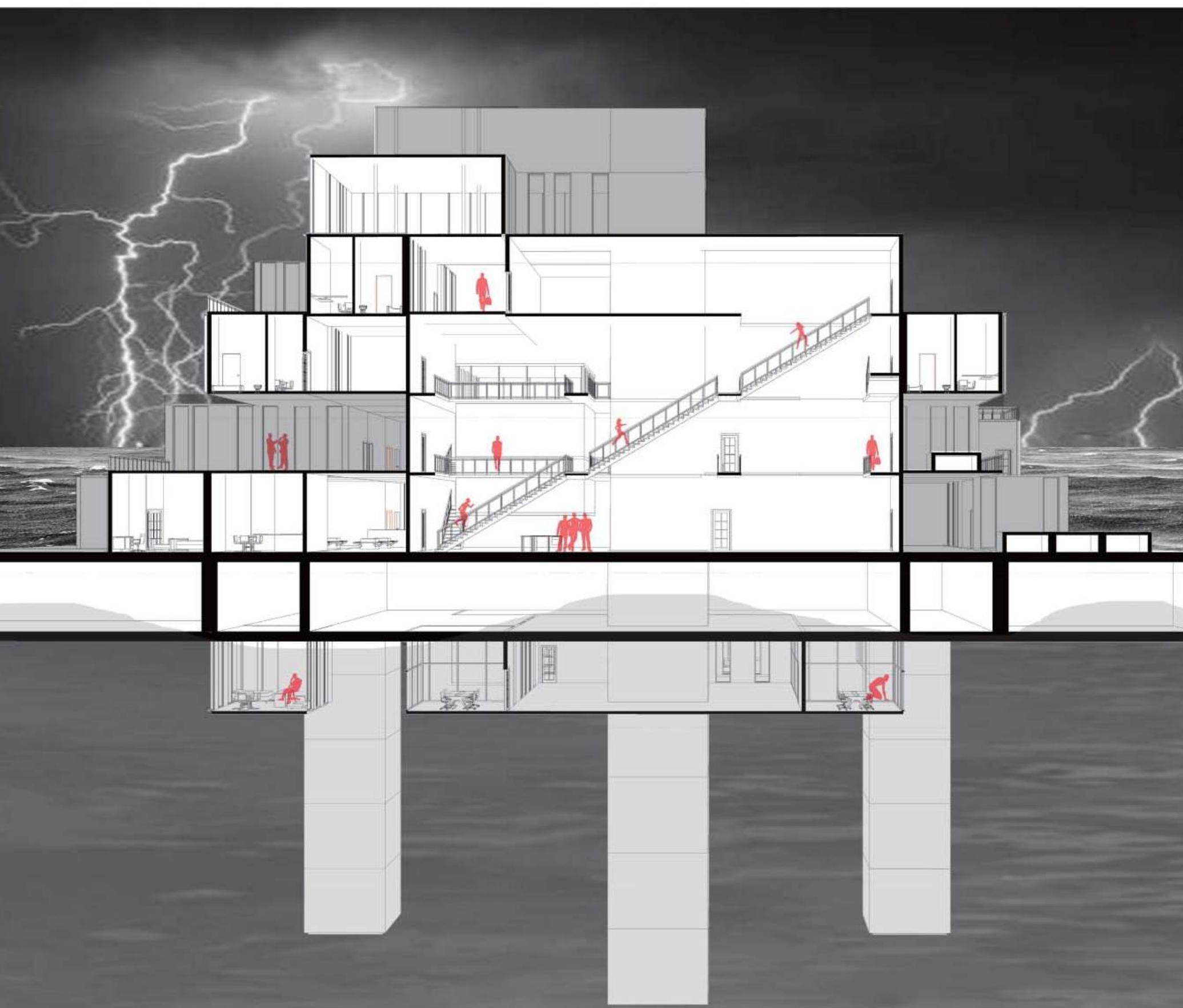
- 1) Research station offshore
- 2) Travel platform which at least support 14 days of survival.
- 3) Scientific Education center



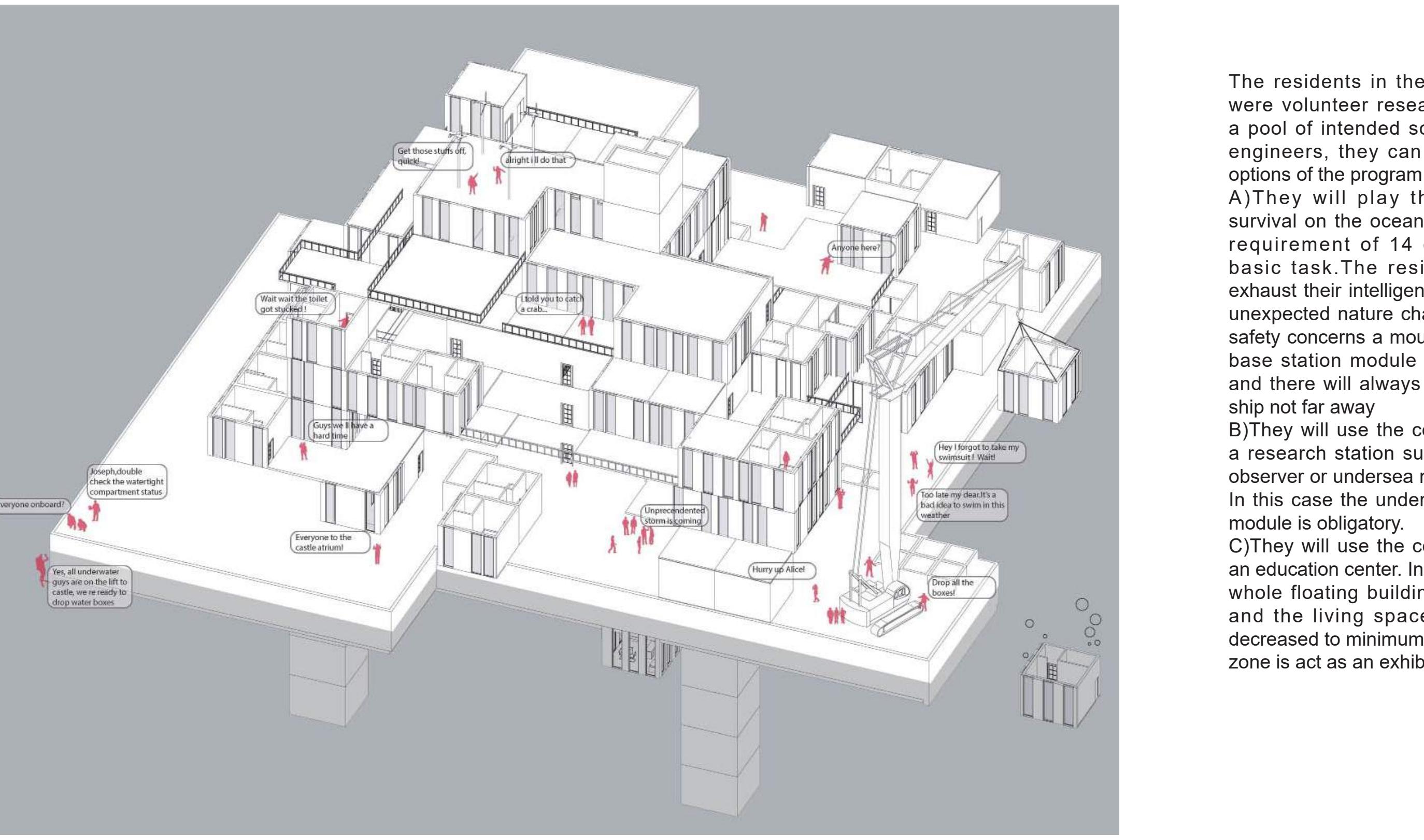


This is the prefabricated part of the community, and the place is for living space of the researchers, since the boxes can be mounted and removed , these part can form differently according to the condition of ocean climate- If the weather is tough, the boxes can be piled tight, if the pubspace is needed, the boxes can be hanged...

Each box is a single module of the community, most of them are living spaces, but they can also be specific items like the power center at the top



The core zone of the community is permanent, unmovable space in the center. It is constructed together with the base platform with watertight compartments. It acts as the public space and civil center of the community, and in emergency situation, it acts as the shelter when other parts were abandoned.

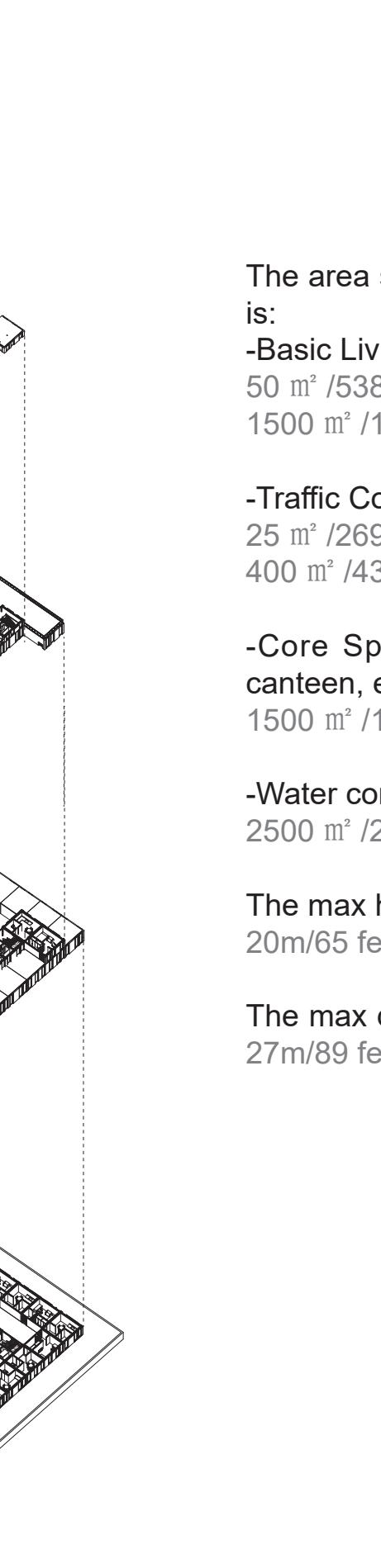


The residents in the community were volunteer researchers from a pool of intended scientists and engineers, they can choose the options of the program on it:

A)They will play the game of survival on the ocean. A minimum requirement of 14 days is the basic task.The residents shall exhaust their intelligence to sustain unexpected nature challenges. For safety concerns a mounted satellite base station module is obligatory and there will always be a rescue ship not far away

B)They will use the community as a research station such as ocean observer or undersea mining probe. In this case the underwater atrium module is obligatory.

C)They will use the community as an education center. In this case the whole floating building is docked and the living space should be decreased to minimum and the core zone is act as an exhibition center.



The area summary of the community is:

-Basic Living Space:  
50 m<sup>2</sup> /538sqf each, sum up to 1500 m<sup>2</sup> /16145sqf in total

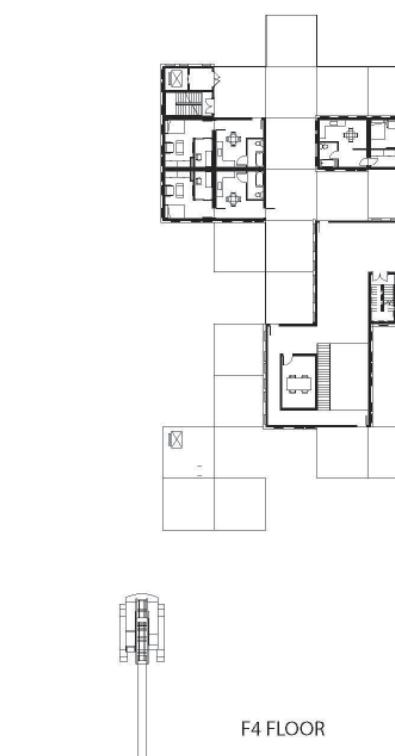
-Traffic Core:  
25 m<sup>2</sup> /269sqf each, sum up to 400 m<sup>2</sup> /4305sqf in total

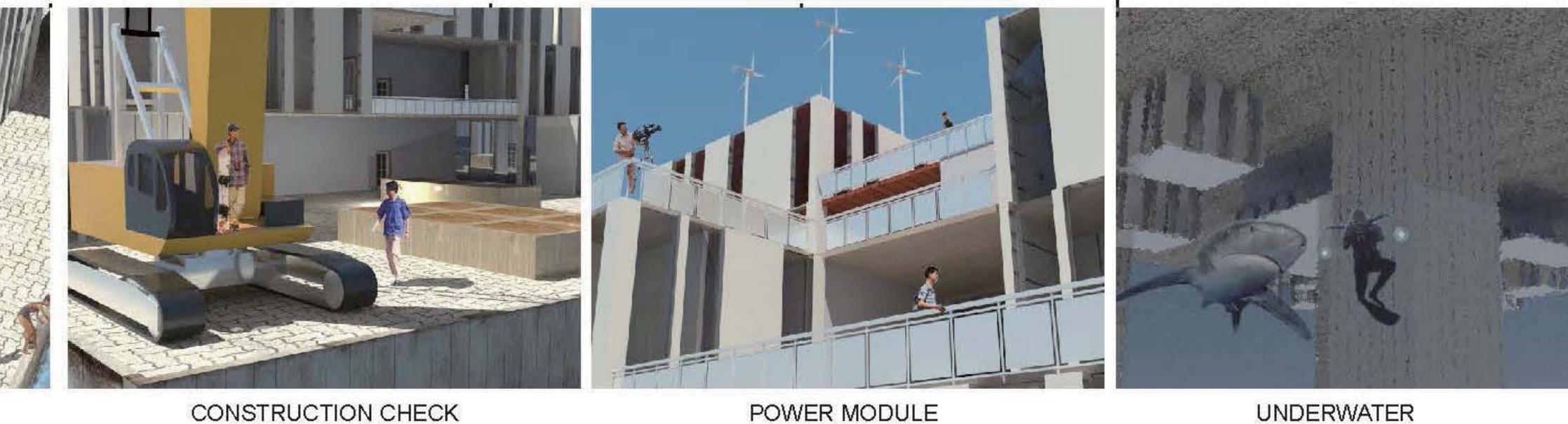
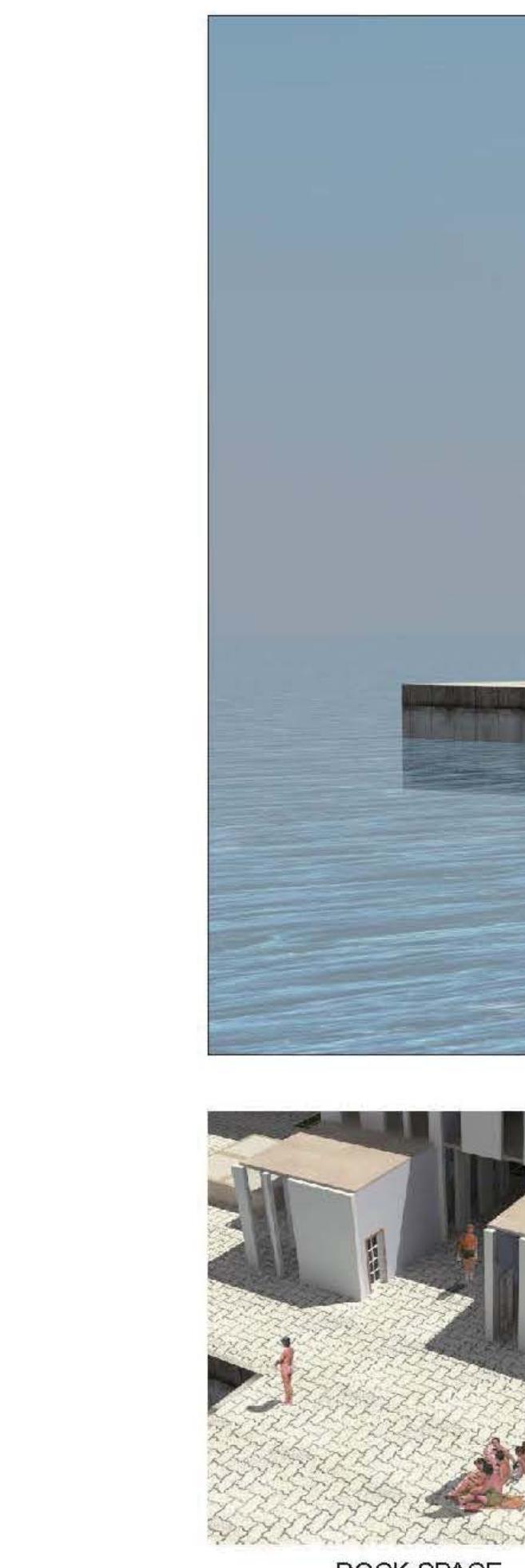
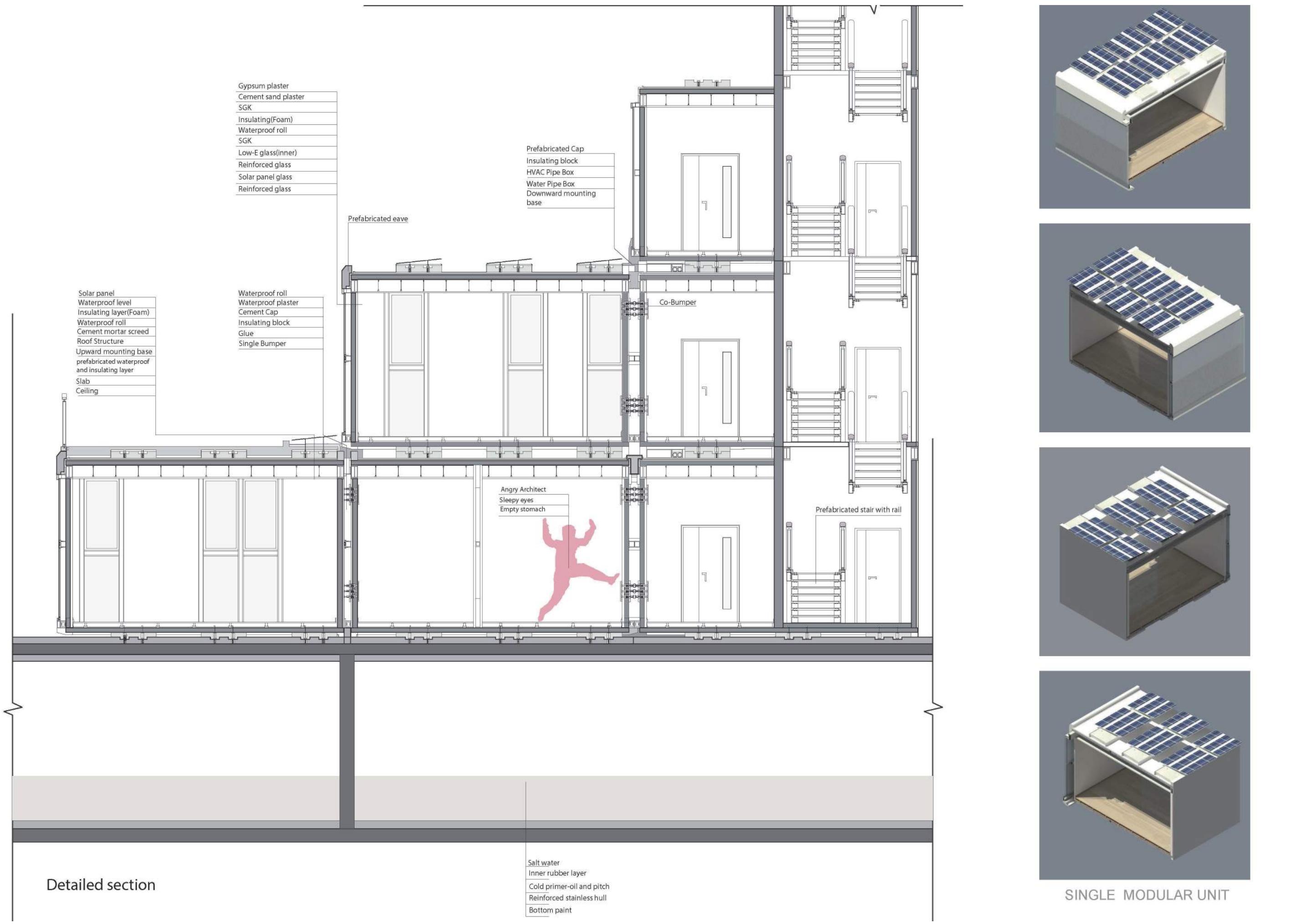
-Core Space(maker's, classroom, canteen, exhibition, etc):  
1500 m<sup>2</sup> /16145sqf in total

-Water compartment and floats:  
2500 m<sup>2</sup> /26909sqf in total

The max height of the community is :  
20m/65 feet

The max depth of the community is :  
27m/89 feet

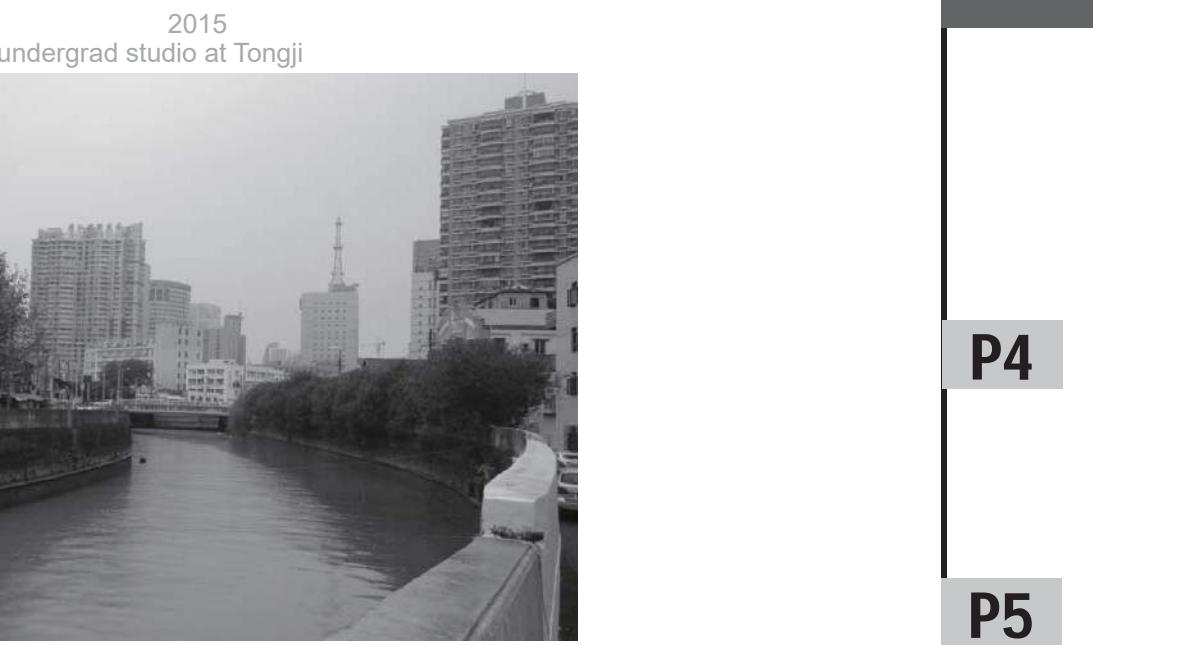
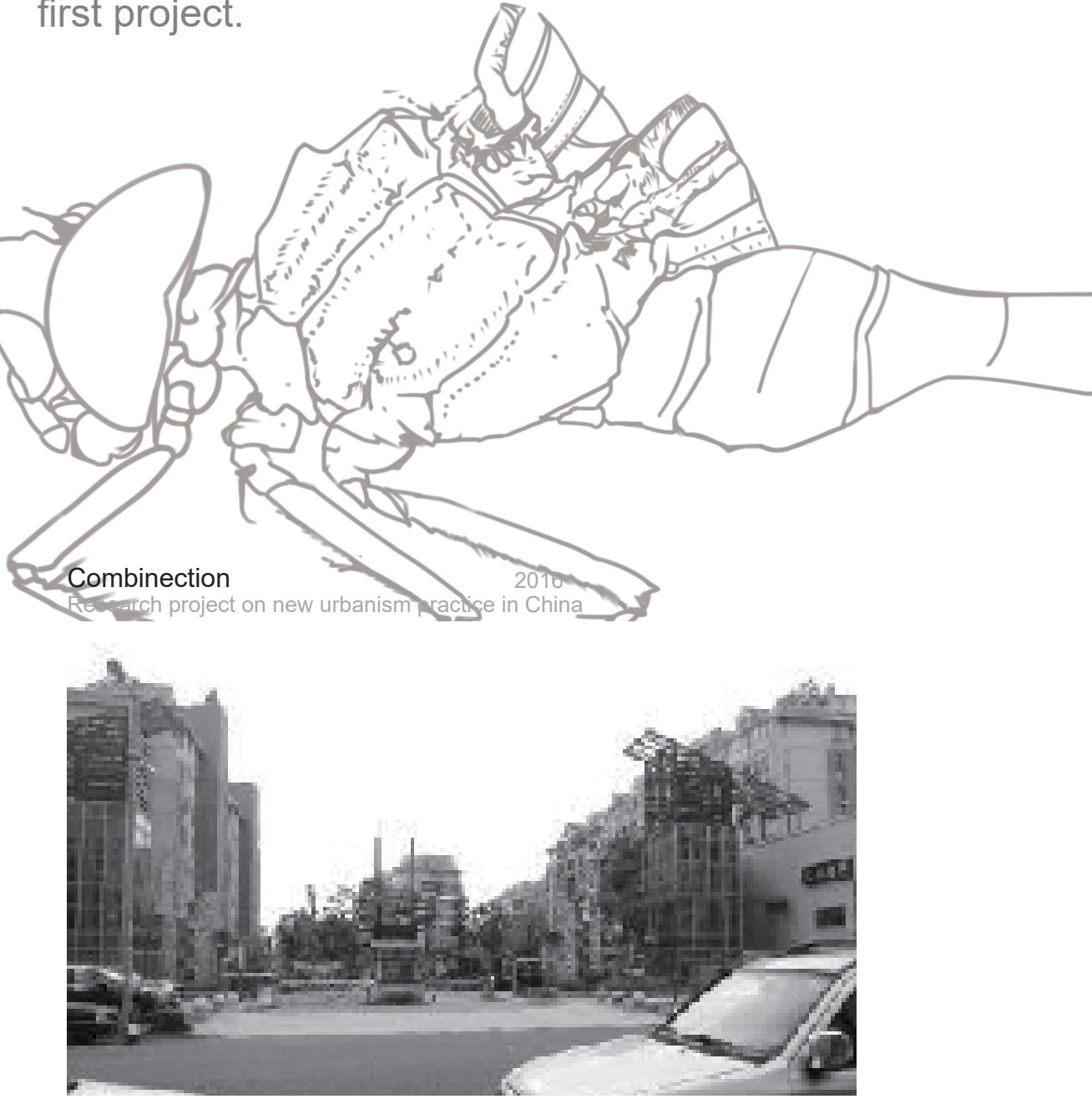




### P3 Design Analytical

In this chapter are the designs that is 'Analytical', includes 2 urban projects, the intention of the projects is to deal with the circumstance of complexity and find the best solution. Each project starts from the site and developing process lead to final outcome.

Method of other fields like mathematical modeling, computation, are taken into application especially in the first project.



P1

P2

P3

P4

P5

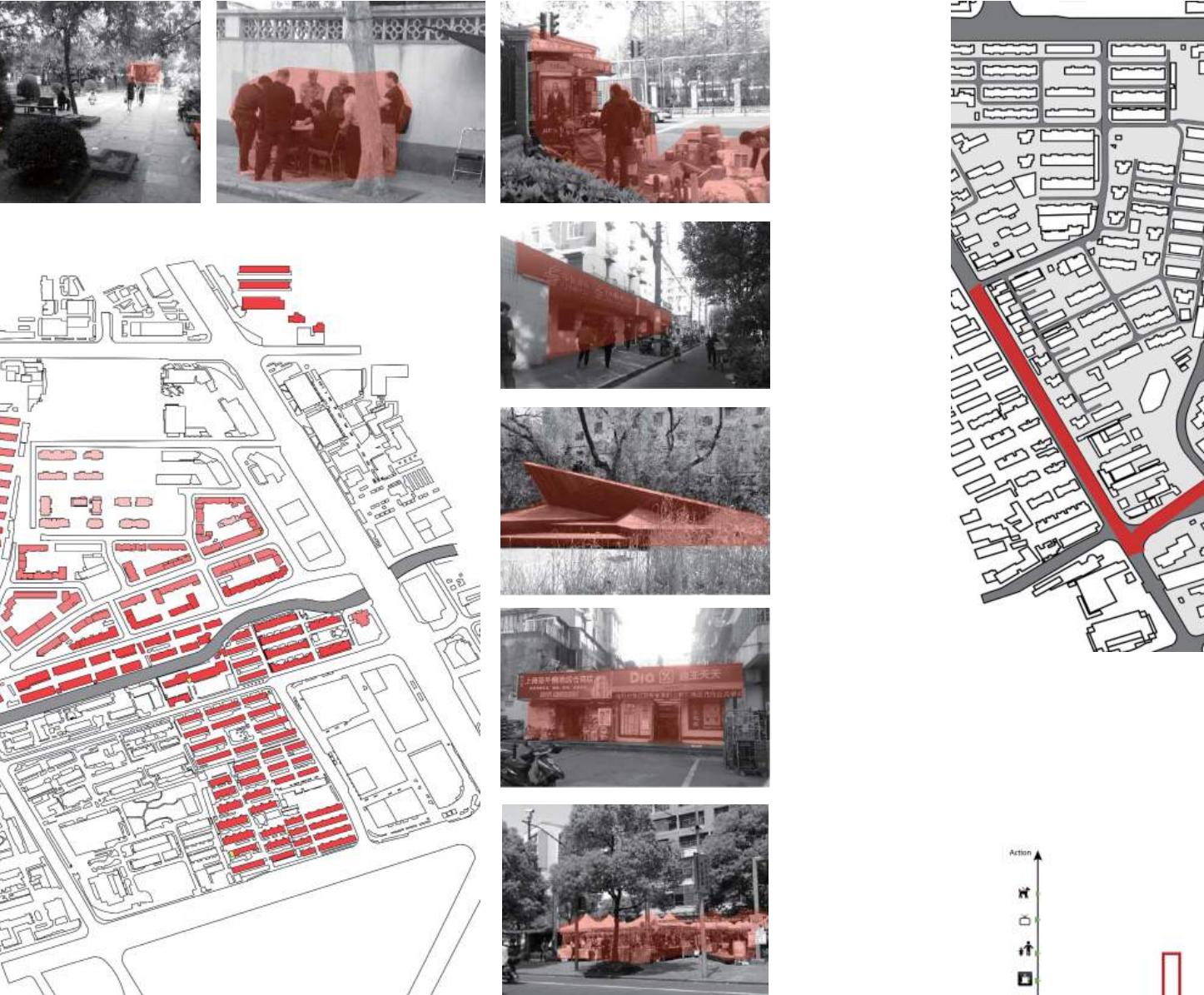
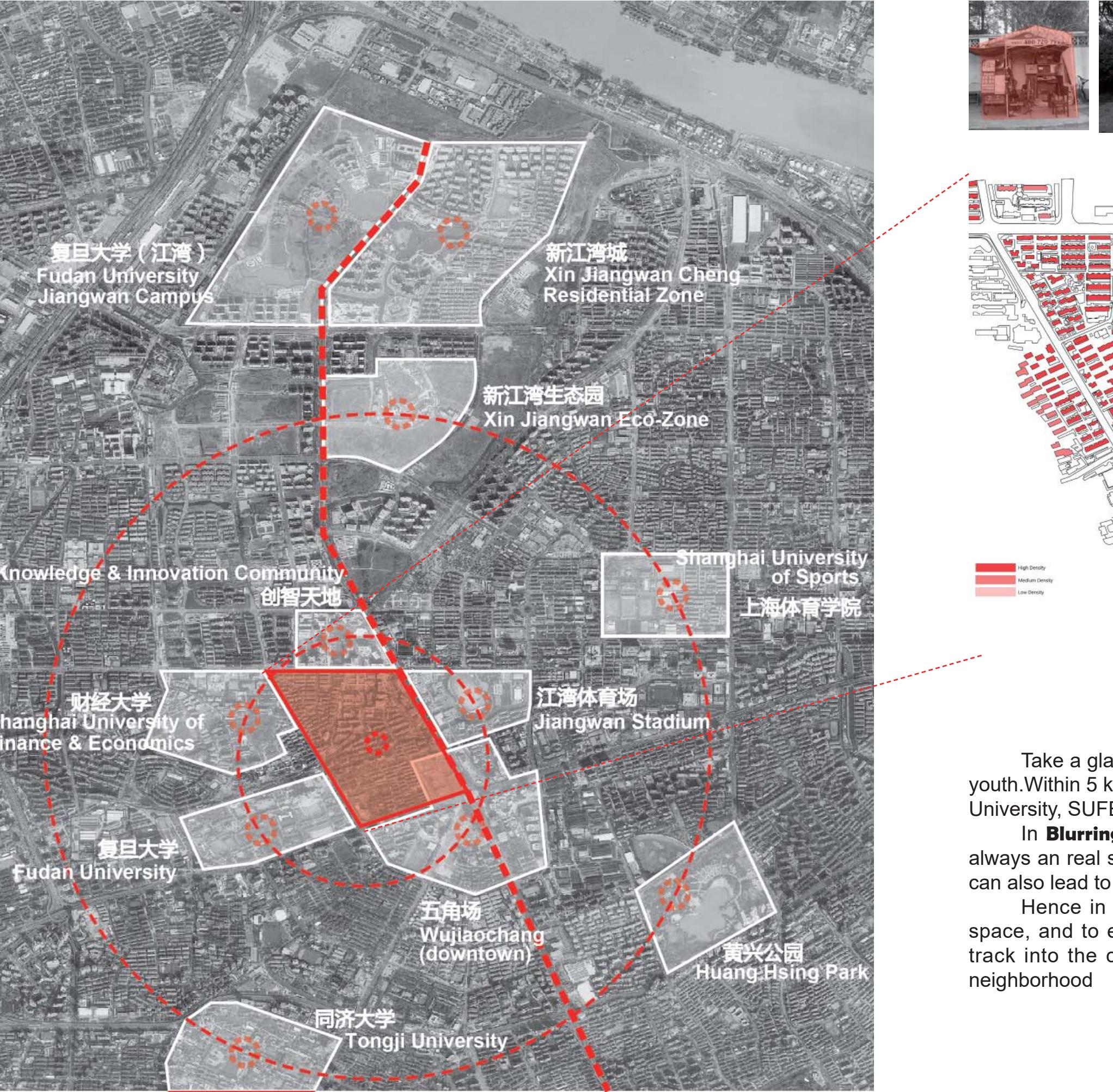
### Combinection

Course  
Site Location  
Duration  
Description

Method  
Tools  
Site Area

Special Topics, CAUP Tongji  
Wujiaochang Area, Yangpu District, Shanghai  
12 weeks  
This is a research focused design work in the 4th year and the task is to develop a public transportation friendly community of mixed use. After analysis process we find a best solution of introducing a tramway into the neighborhood.  
Mathematical modeling, Graph theory  
Sketchup  
480,000 m<sup>2</sup>

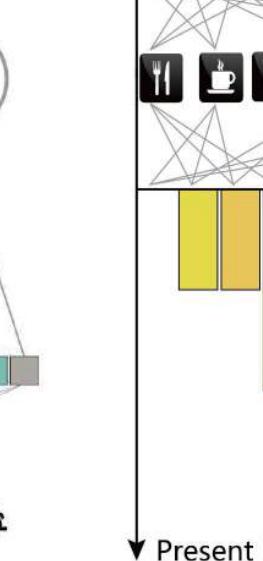
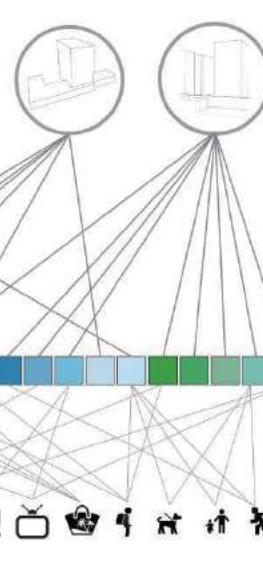
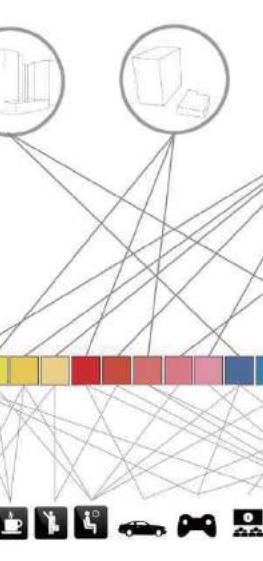
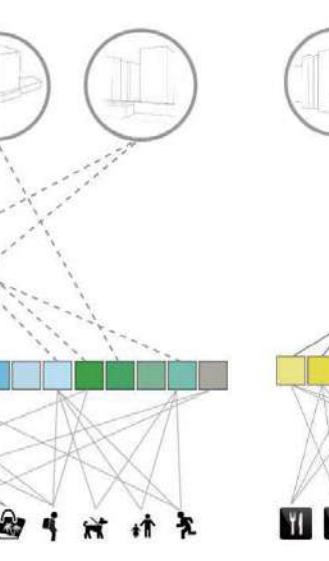
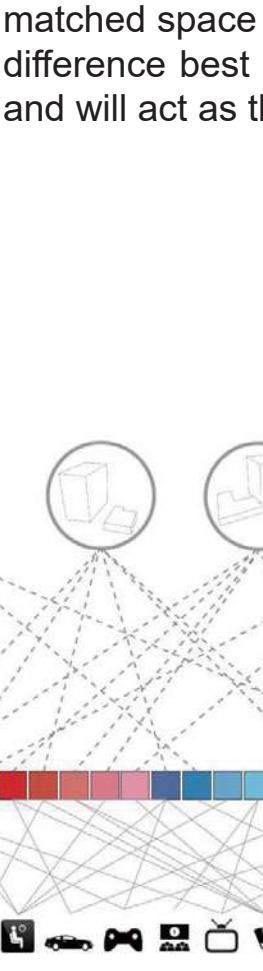
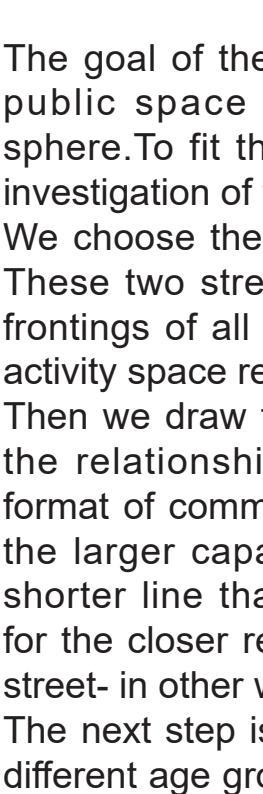




Take a glance at the site, the open community is located at a district of youth. Within 5 km's reach the site has the access to Fudan University, Tongji University, SUFE, and SUS.

In **Blurring Boundaries**, Crawford states that the public space is not always an real space reserved for public activities, instead the everyday life can also lead to public atmosphere that accidentally create a space.

Hence in this site we can explore different types of existing public space, and to enhance the public sphere, my aim is to introduce a tram track into the community, and let the public transportation activate the neighborhood



The goal of the tramway is to connect the existing public space and combine them into a public sphere.

To fit the demands of the public space, an investigation of the current situation is needed

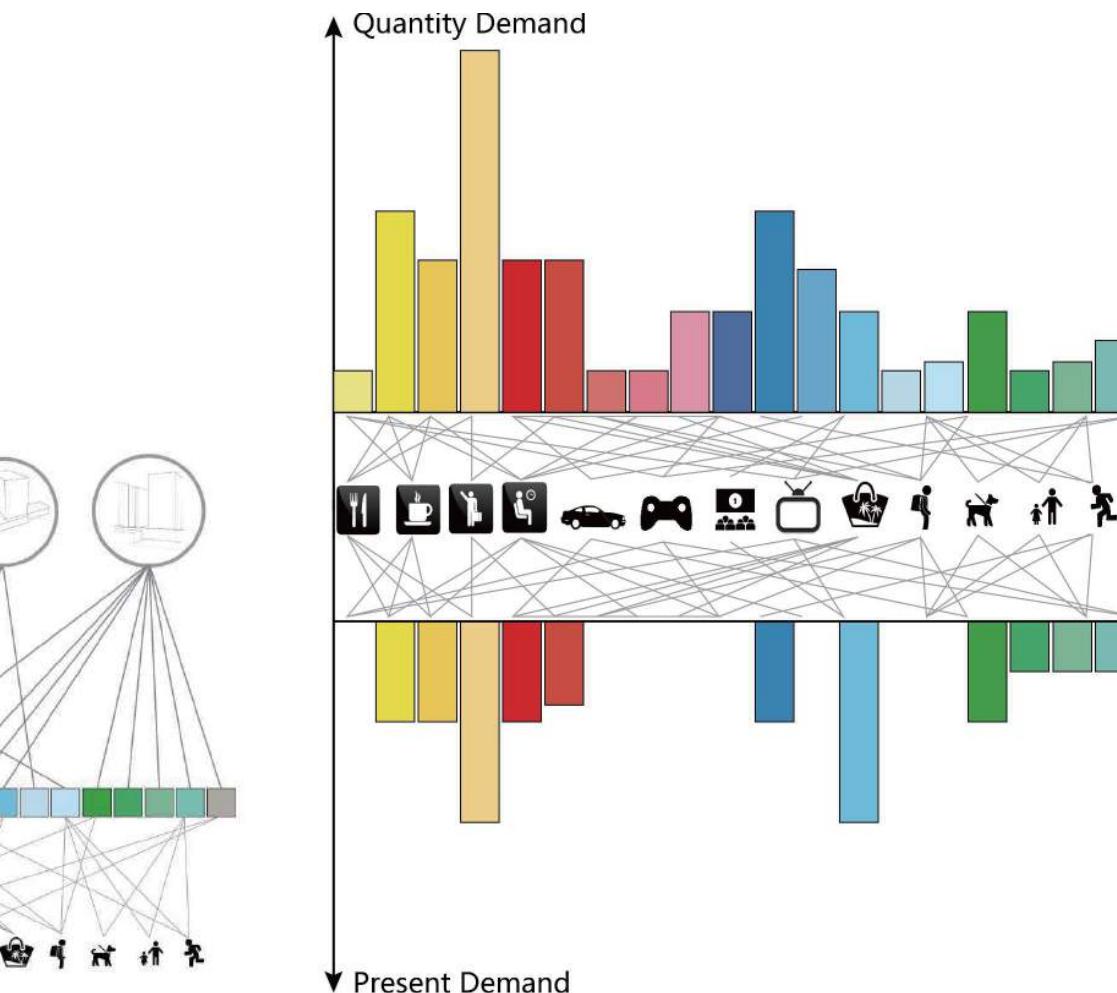
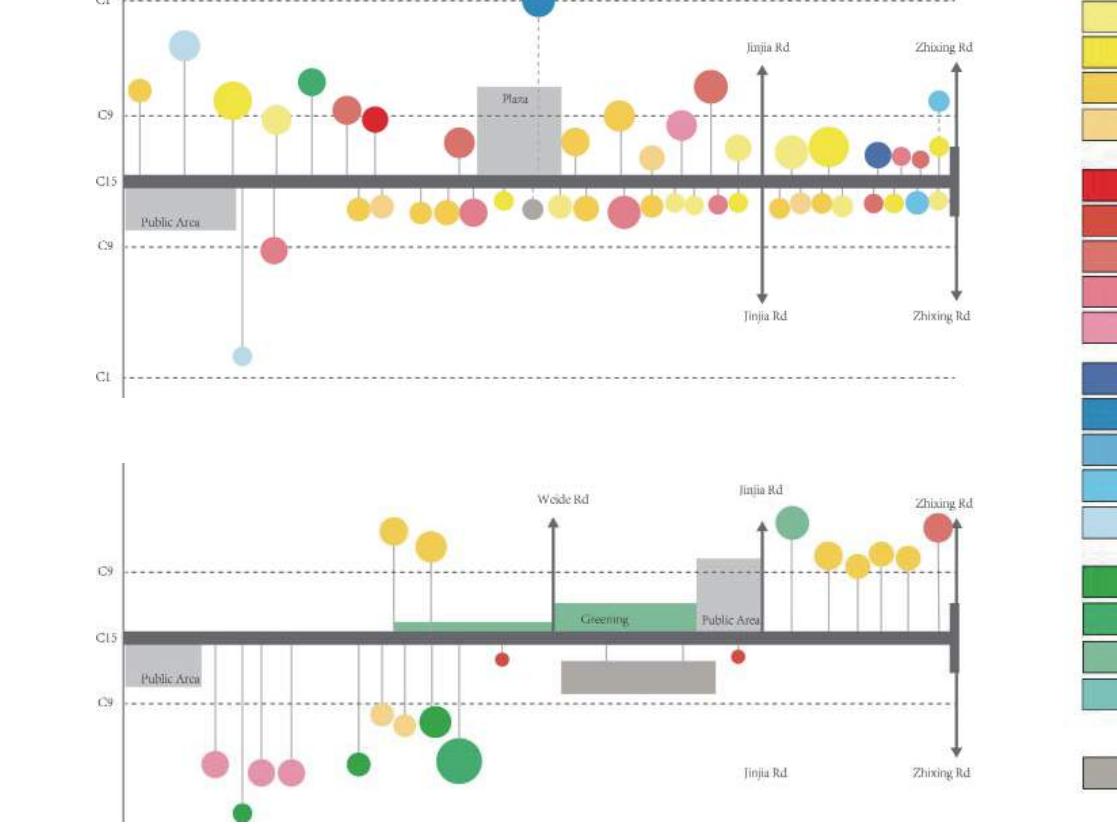
We choose the two typical street in the community, These two streets are of the most complexity with frontings of all needs, and consume the most daily activity space requirements.

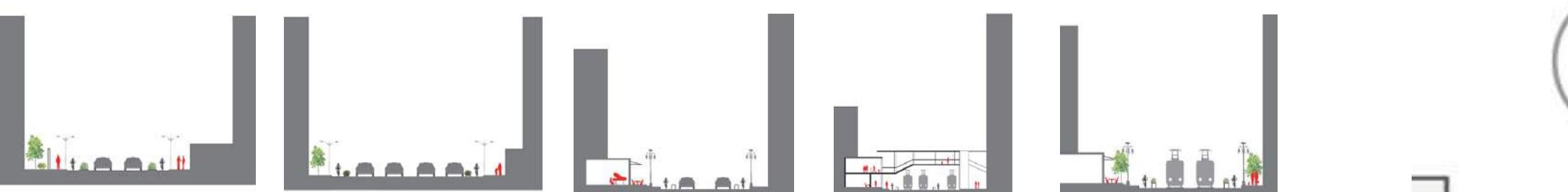
Then we draw the abstract diagram which indicates the relationship between street and the existing format of commercial types.

The bigger circle means the larger capacity the space can afford, and the shorter line that links the circle and street stands for the closer relation between individual space and street- in other words, the efficiency of fronting.

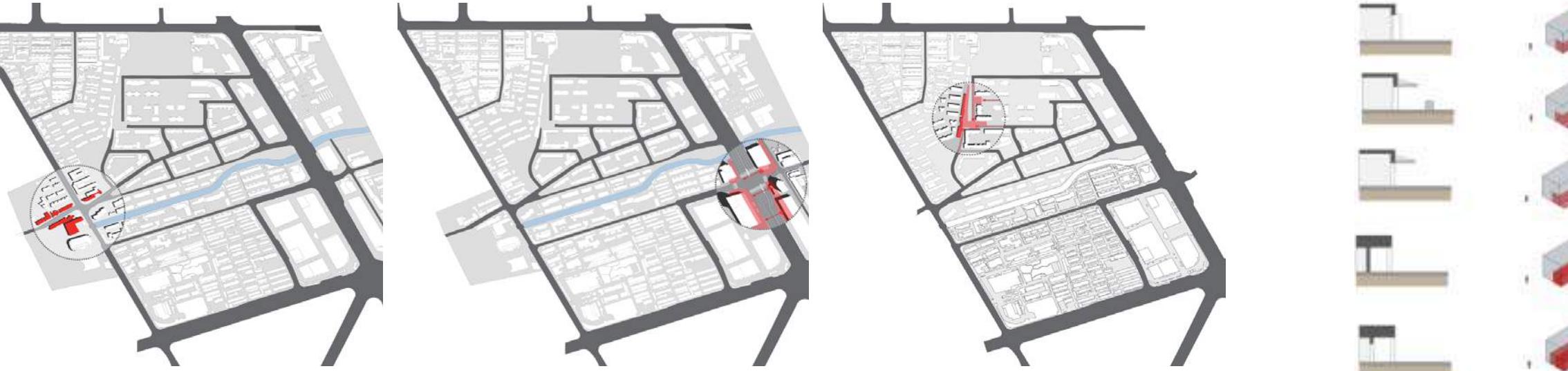
The next step is the observation of daily activities of different age groups, and each activity has the space preference, thus we can make a match the activity to the space needed.

We make calculation of current space existing along the two streets, and make subtraction with the matched space which stands for the needed. And the difference best describe the demand of public space and will act as the 'space potential' in the community.

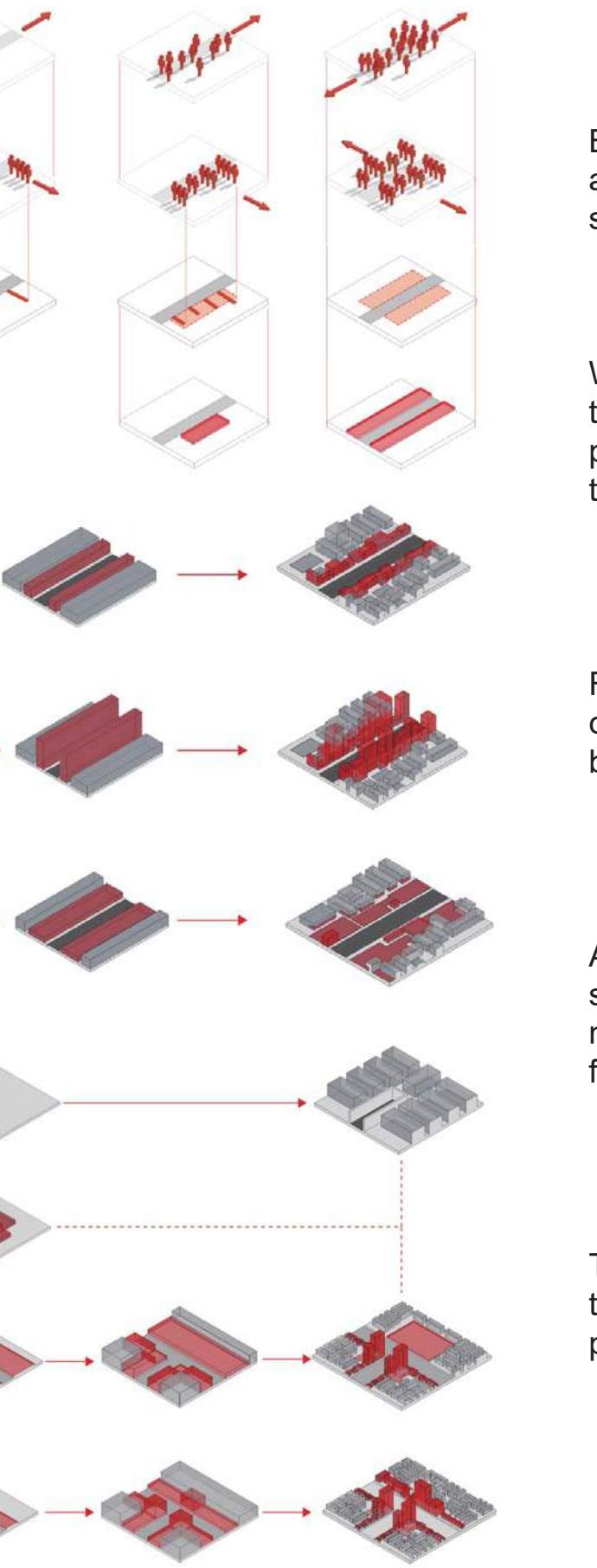
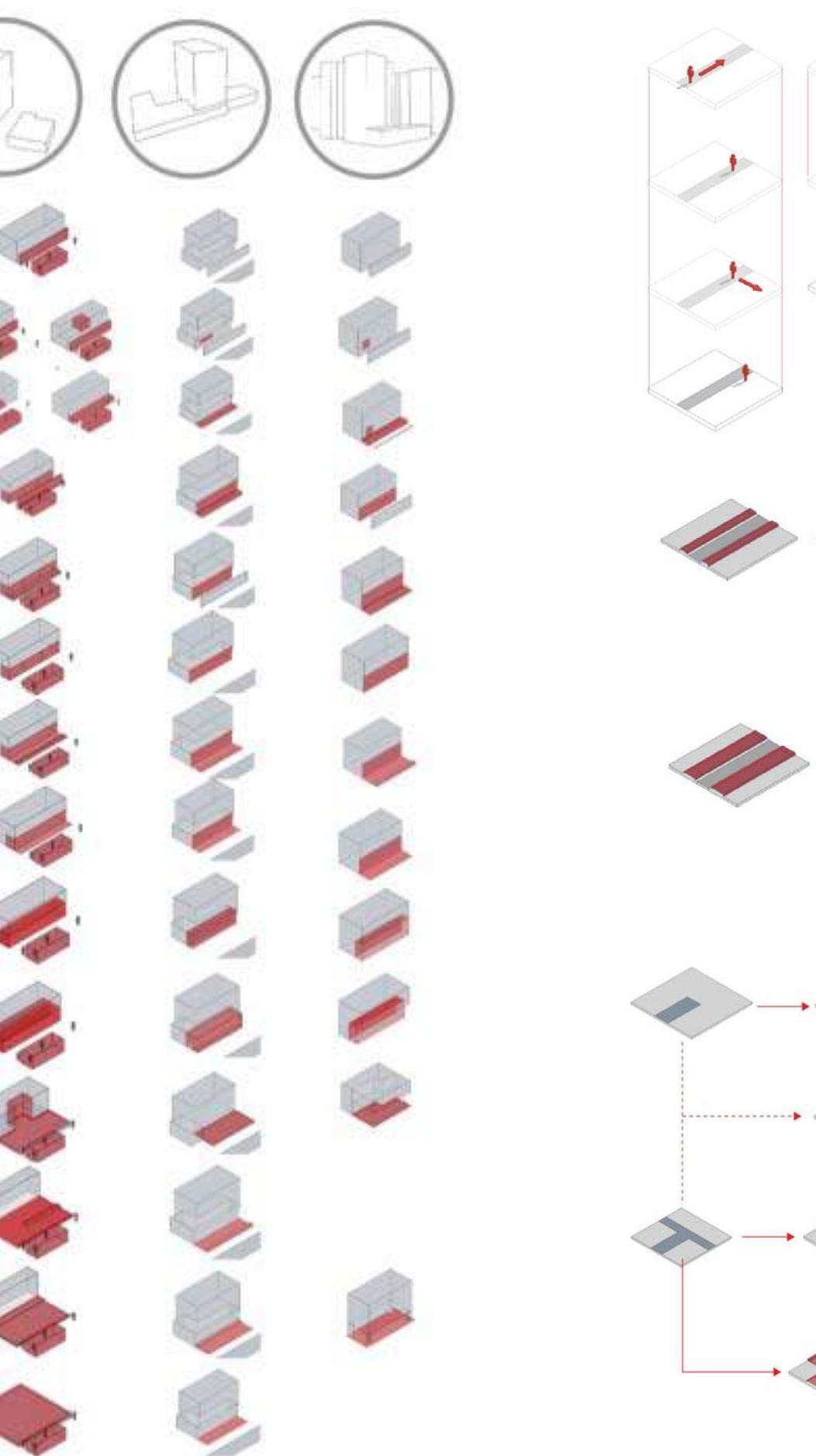




Then we take a look at the public intersection nodes and road sections to find out the possibility that we can add pubspace into .



Once we can describe the condition and relationship of fronting systematically we can make them into a matrix, and define parameters and value by mathematical modeling to evaluate the public potential.



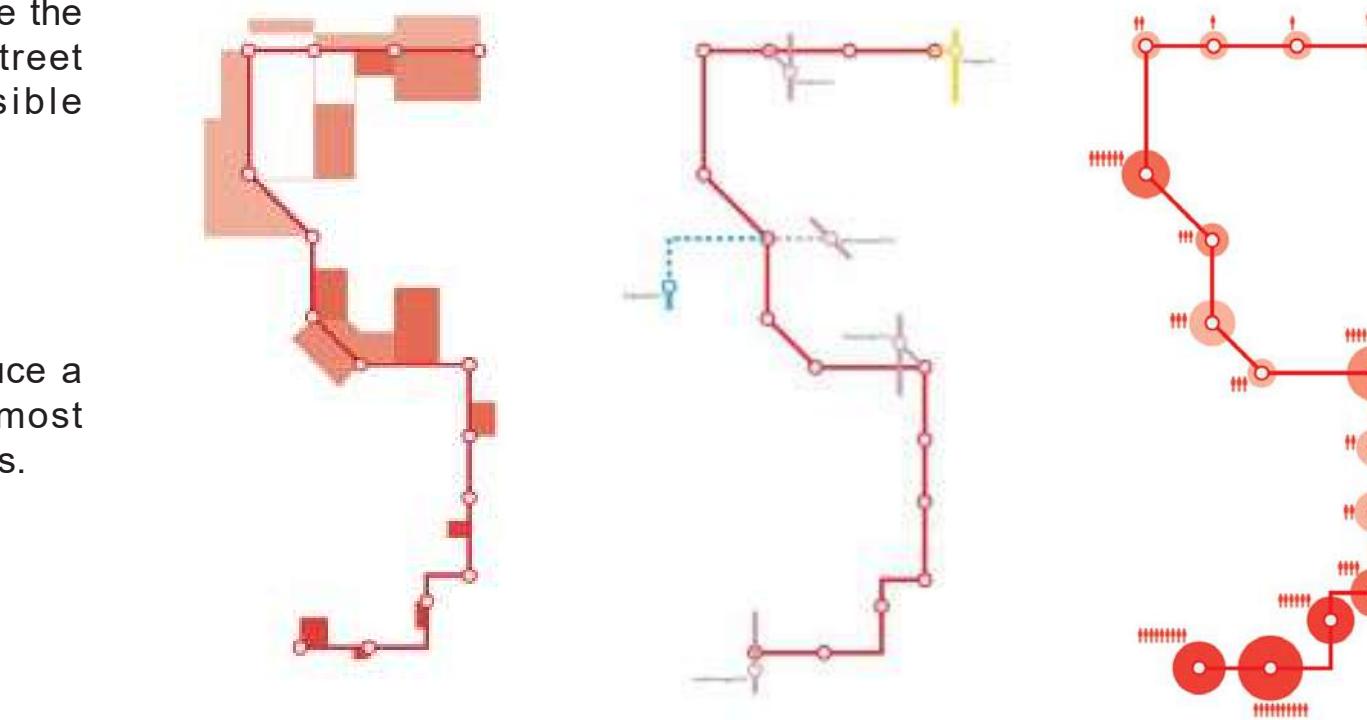
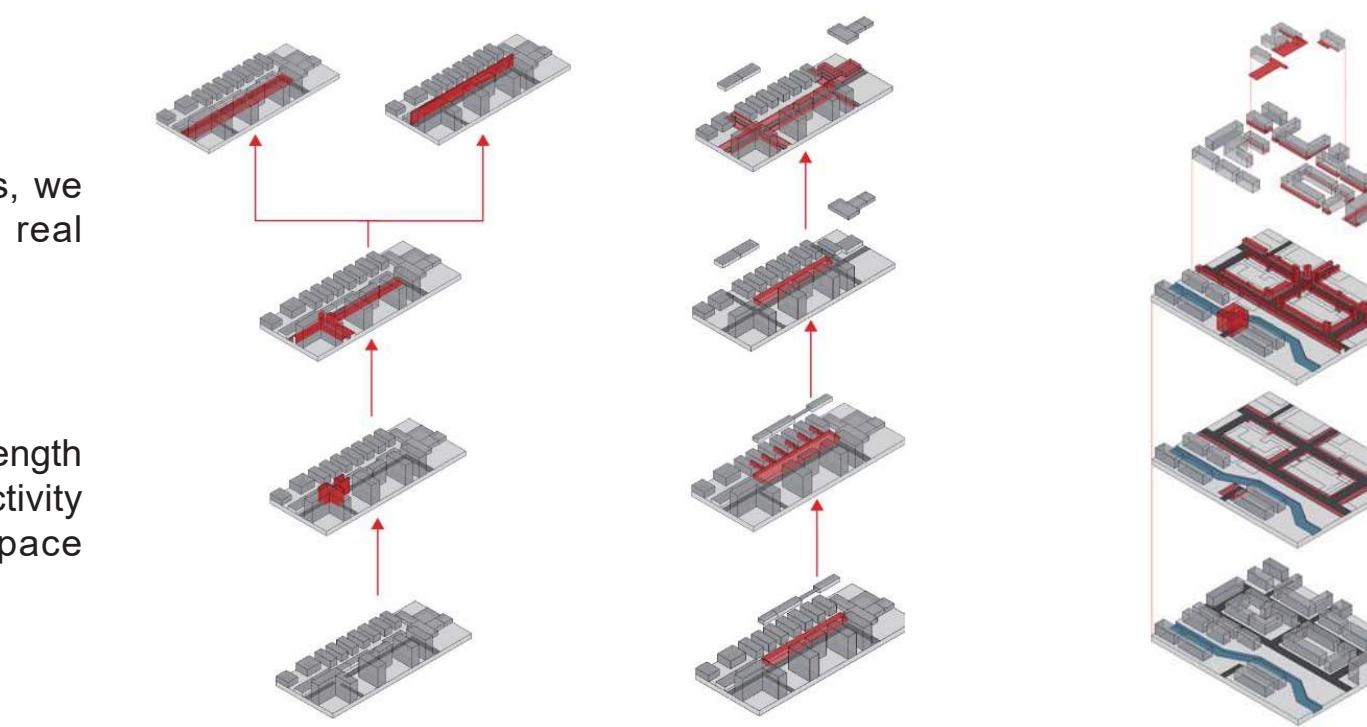
By adding other coefficients, we adjust the model to fit the real situation.

We can analyse the flow strength to calculate the potential activity possibility and then the space they ll need.

From those space pressure we can form space types, frontings, buildings, plaza, etc.

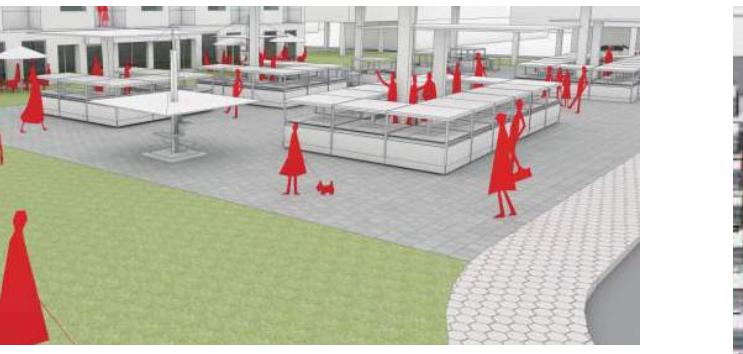
And then we can summarize the spatial demands in the street network and gave possible format of space type

The fiinal step is to introduce a tramway to connect the most potential pub space elements.



## Eye of Harbour

The final step is to create the tramway link and add public objects into the community, and by connecting and combining the isolated public spaces we create a continuous, integral public sphere. Finally make the visualization process.



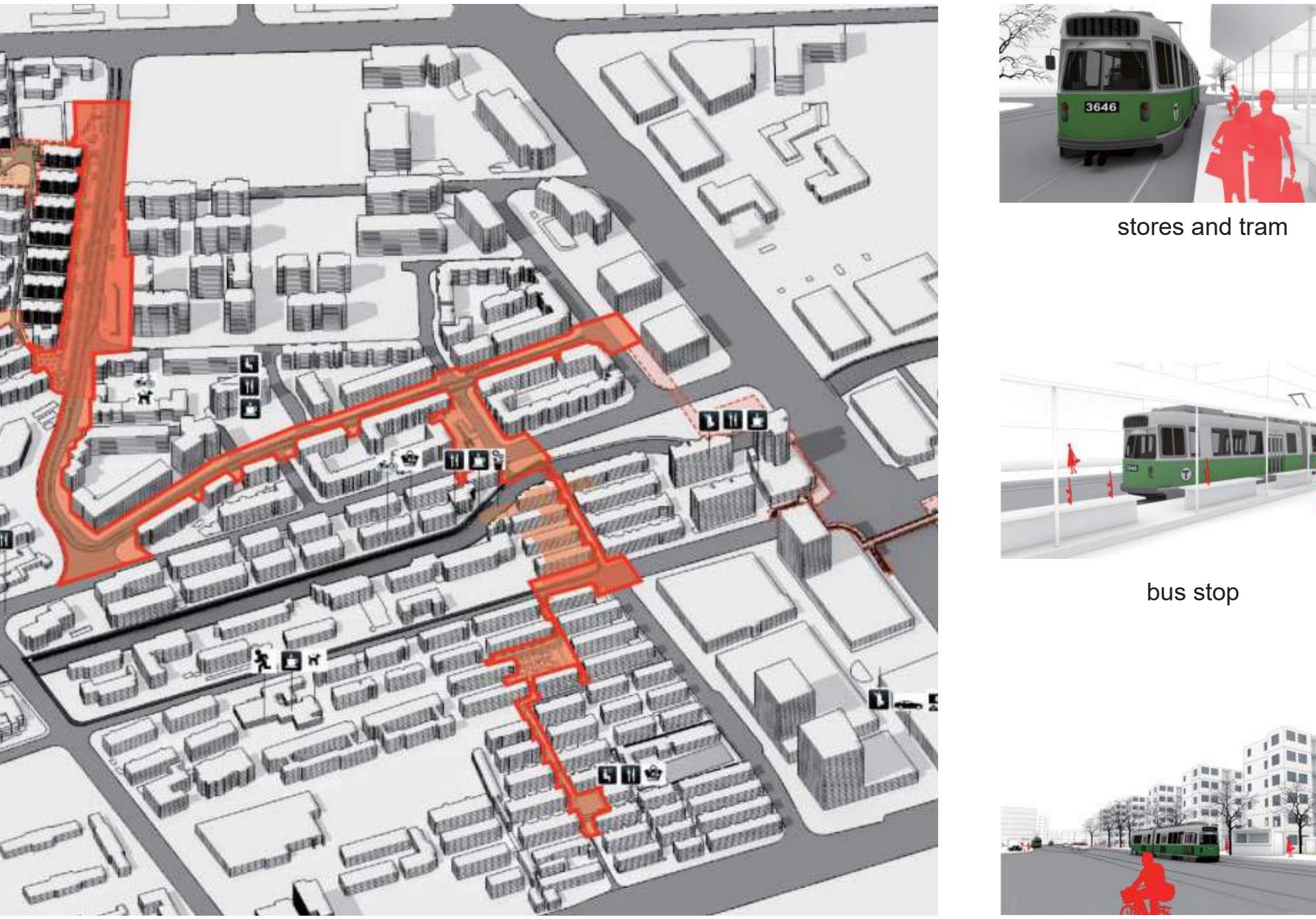
residential bazaar



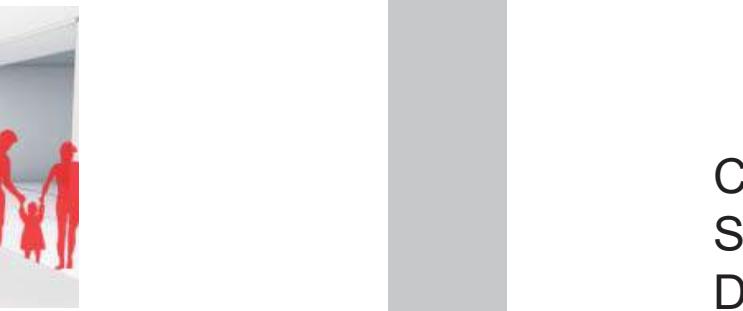
sports corner



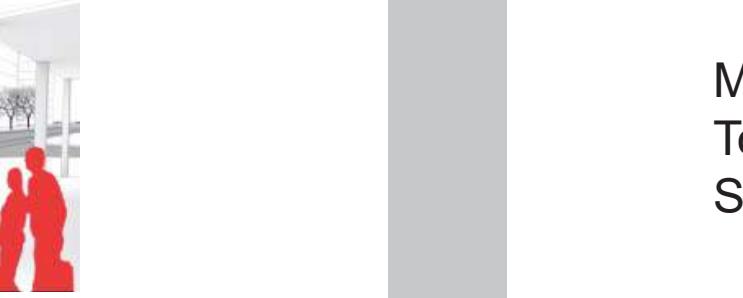
streetside with tramway



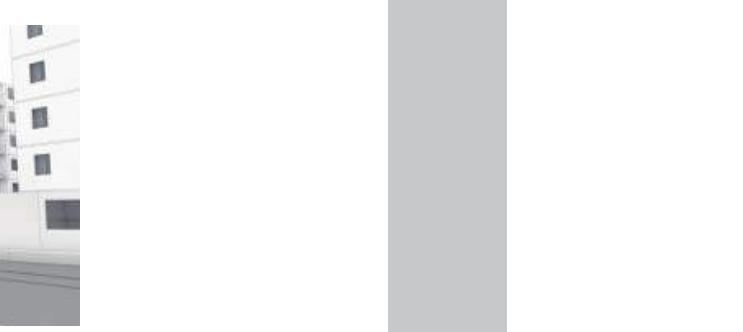
Tram-connected-combined pub belt



stores and tram



bus stop

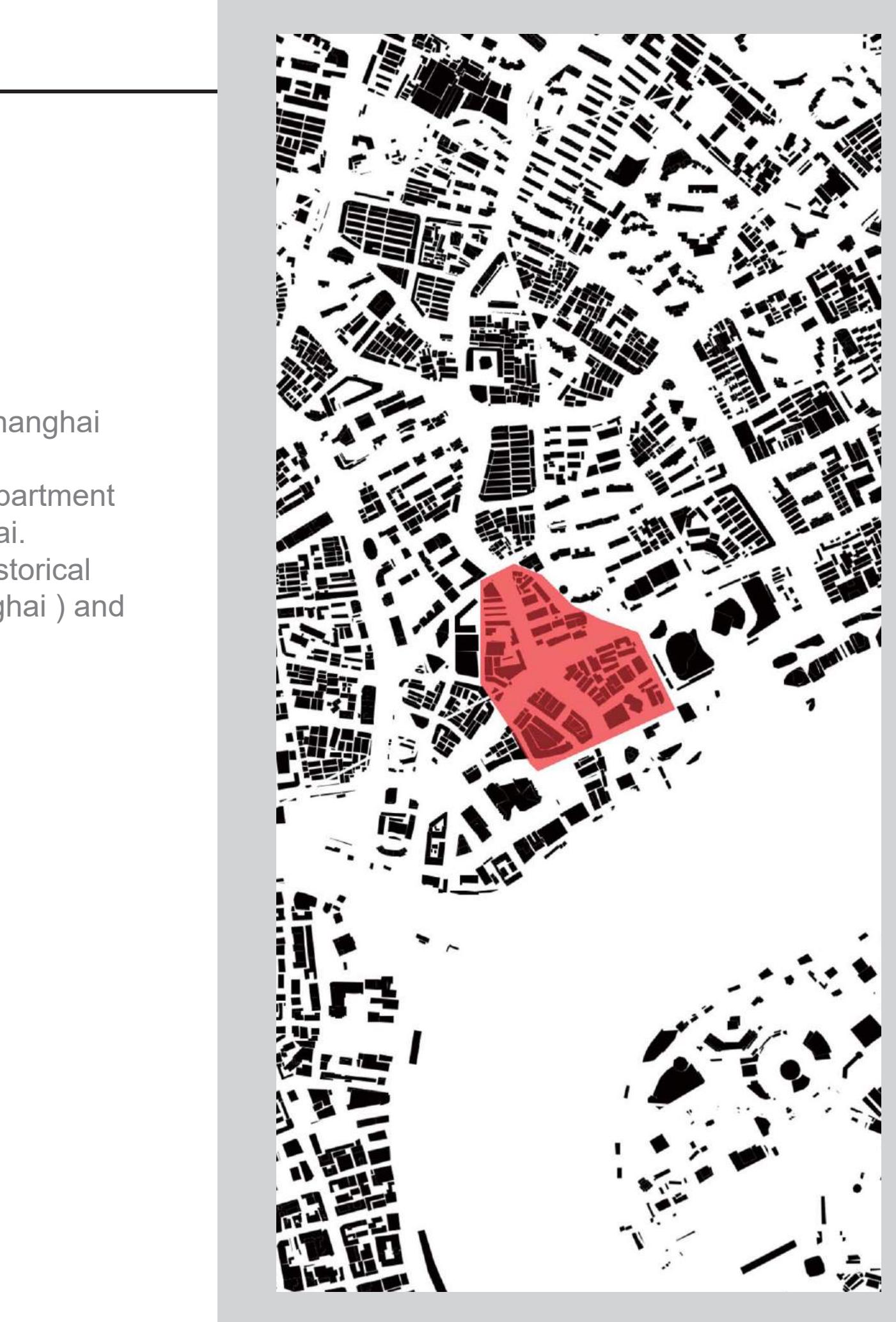


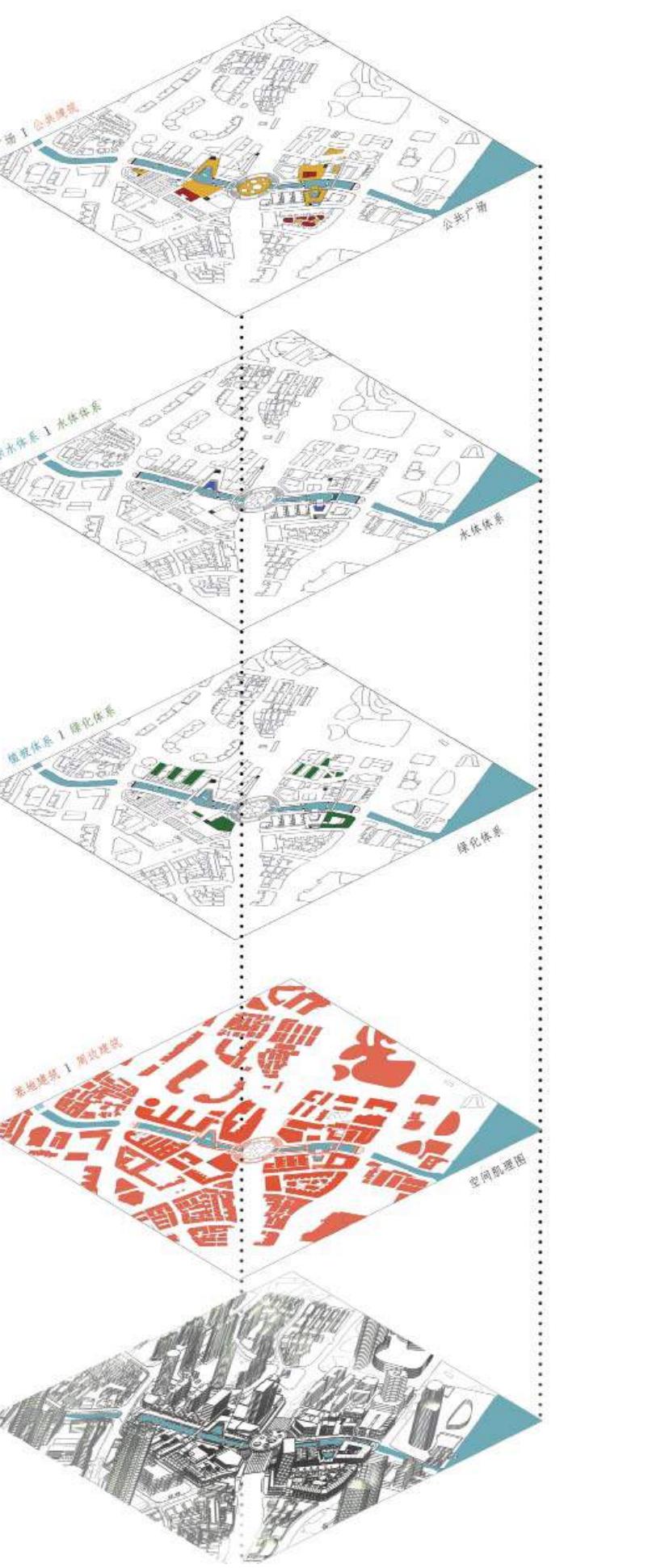
eyelevel view

Course  
Site Location  
Duration  
Description

Method  
Tools  
Site Area

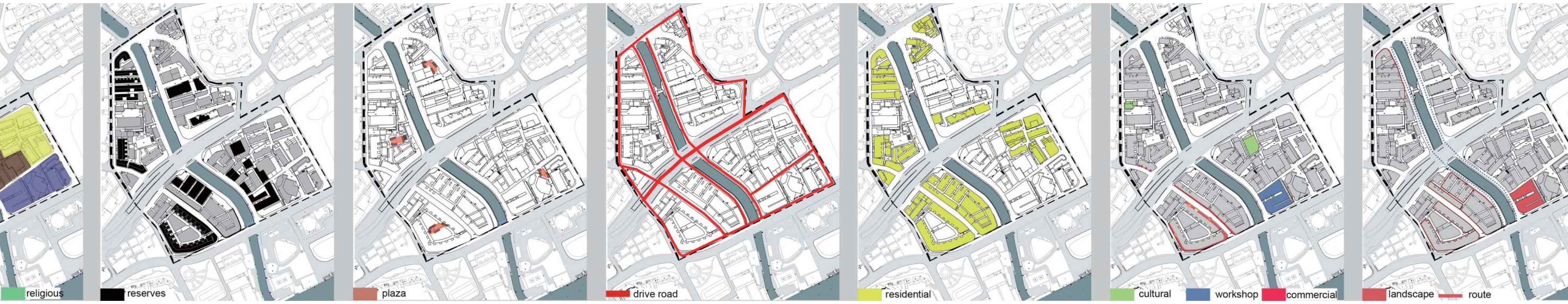
Urban design studio, CAUP Tongji  
North Hongkou Area, Yangpu District, Shanghai  
6 weeks  
This is a design studio funded by the department of planning of Hongkou District, Shanghai.  
The goal is to make a regeneration of historical mixed Lilong (typical living zone in Shanghai) and this is a competition work  
Dynamic programming  
Rhino / Sketchup  
123,000 m<sup>2</sup>





Hongkou harbor, the river of history of Hongkou District, is the axis of importance that witness the transformation from villages of southern China watery region into modern metropolis of commercial and industry. It still possess the relics of Lilong, warehouse, factories and old streetside stores, and is also the only riverside region of tiny dimension at downtown Shanghai. The historical remainings provide non-replacable natural and humanity value.

However, the poor condition of renewing construction and the shift of trasportation format lead to the recession of residential circumstance, the integral appearance does not fit the development pace of commercial society in Shanghai city. Thus the explore of value of the historical building and the renaissance of the block to tranfer the zone into a creative spot will be the core intention of this design



DIVERSIFY THE FUNTIONAL LAYOUT

FIX THE TEXTURE OF BLOCKS

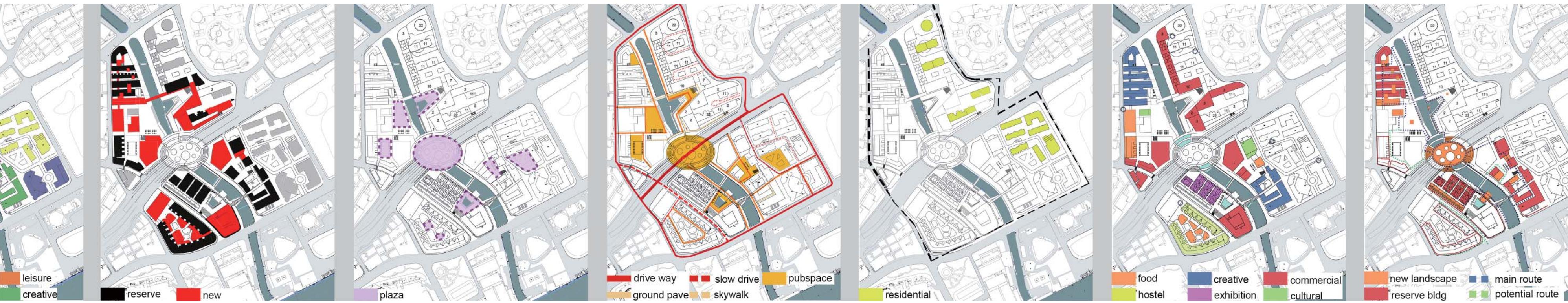
ORGANIZE THE PEDESTRIAN PLAZA

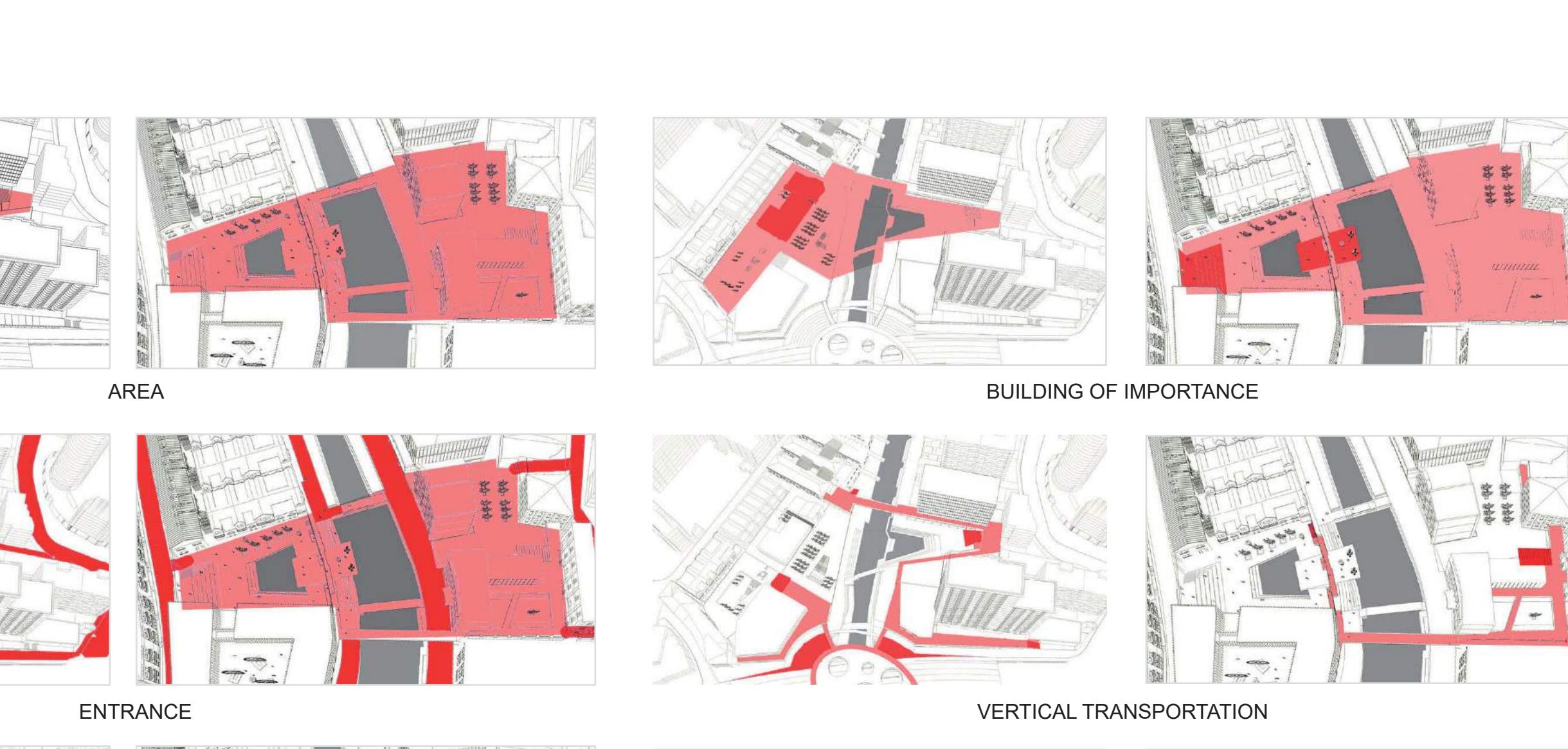
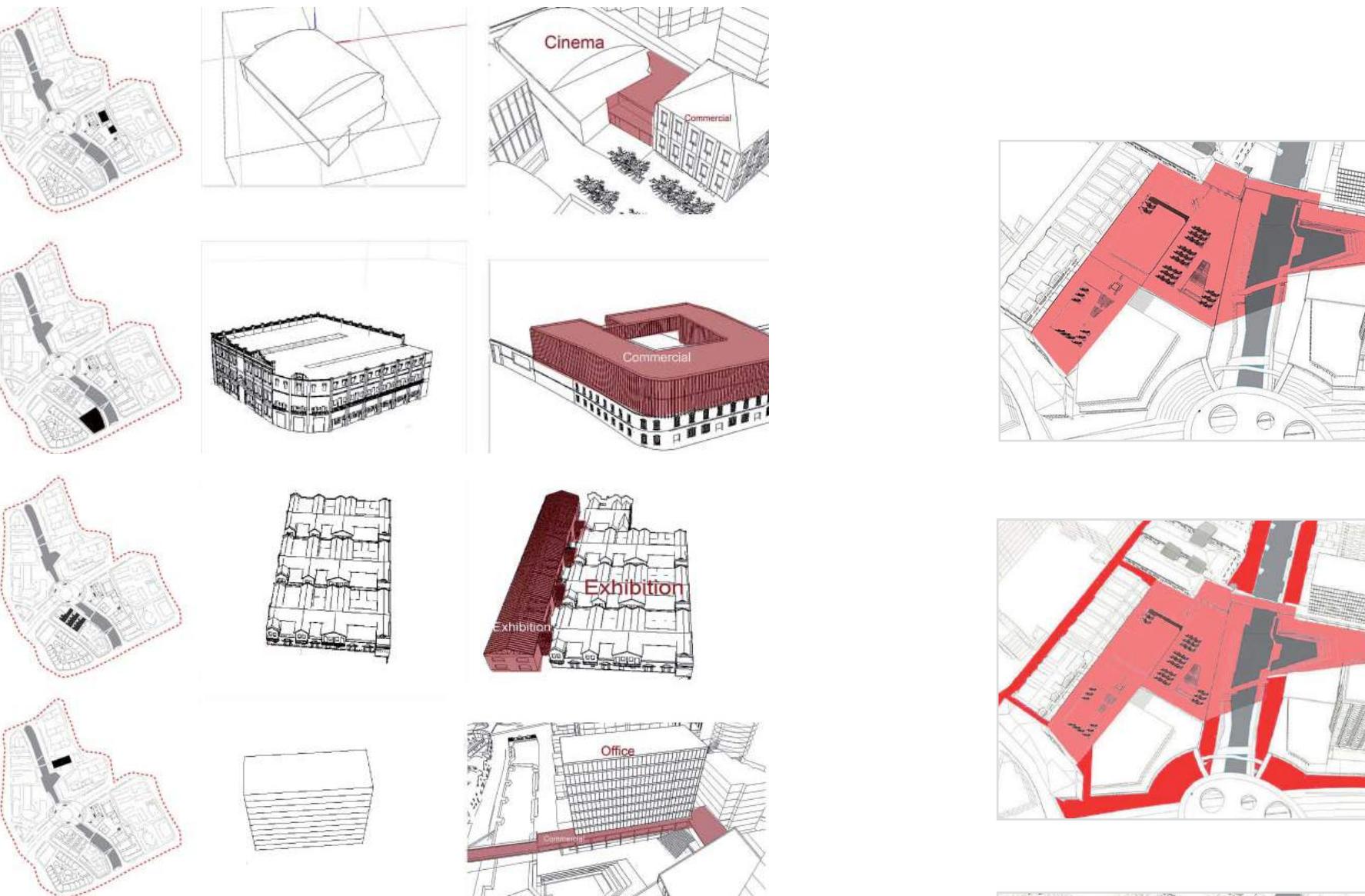
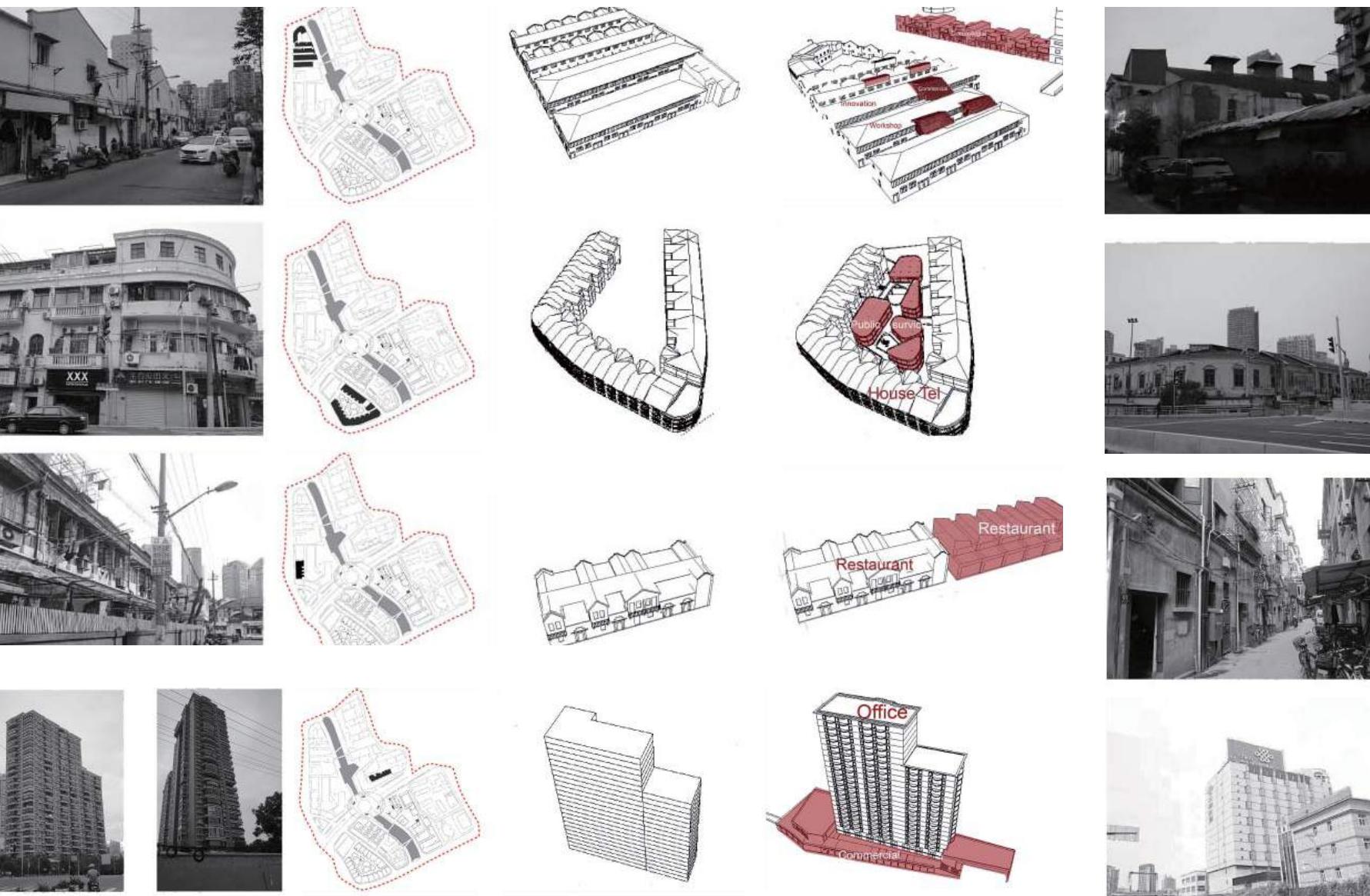
SLOW DOWN THE TRASIT SPEED

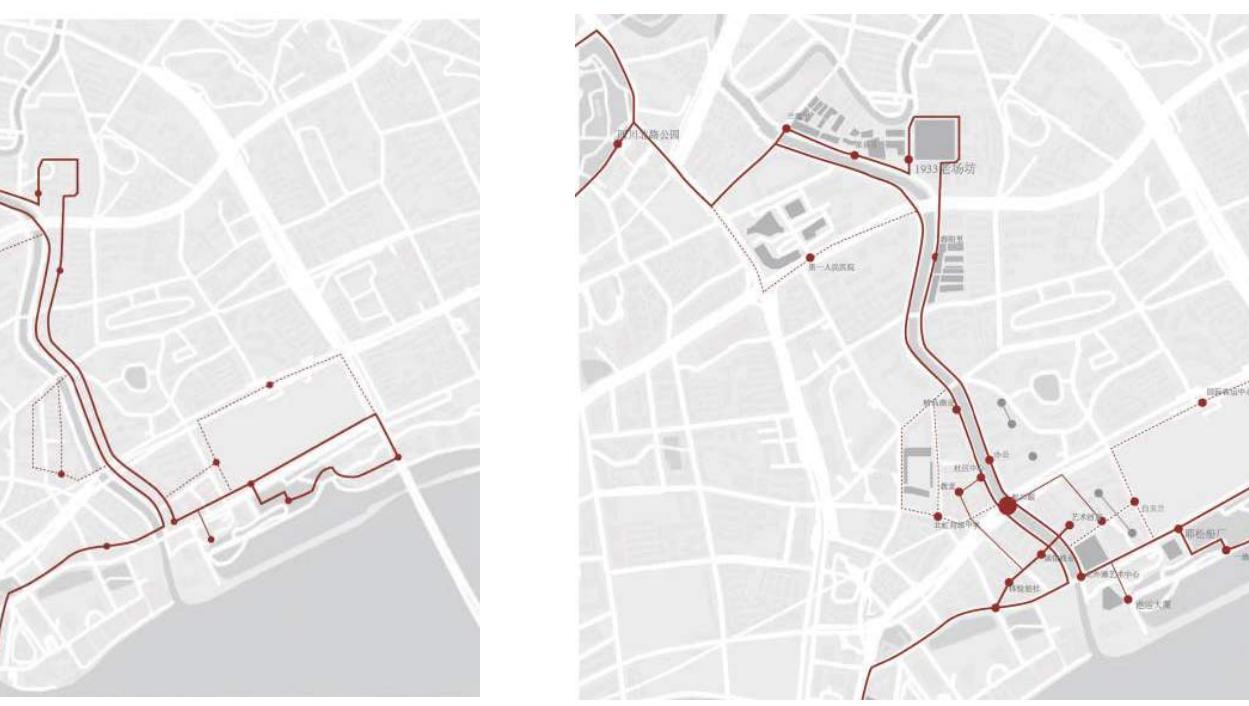
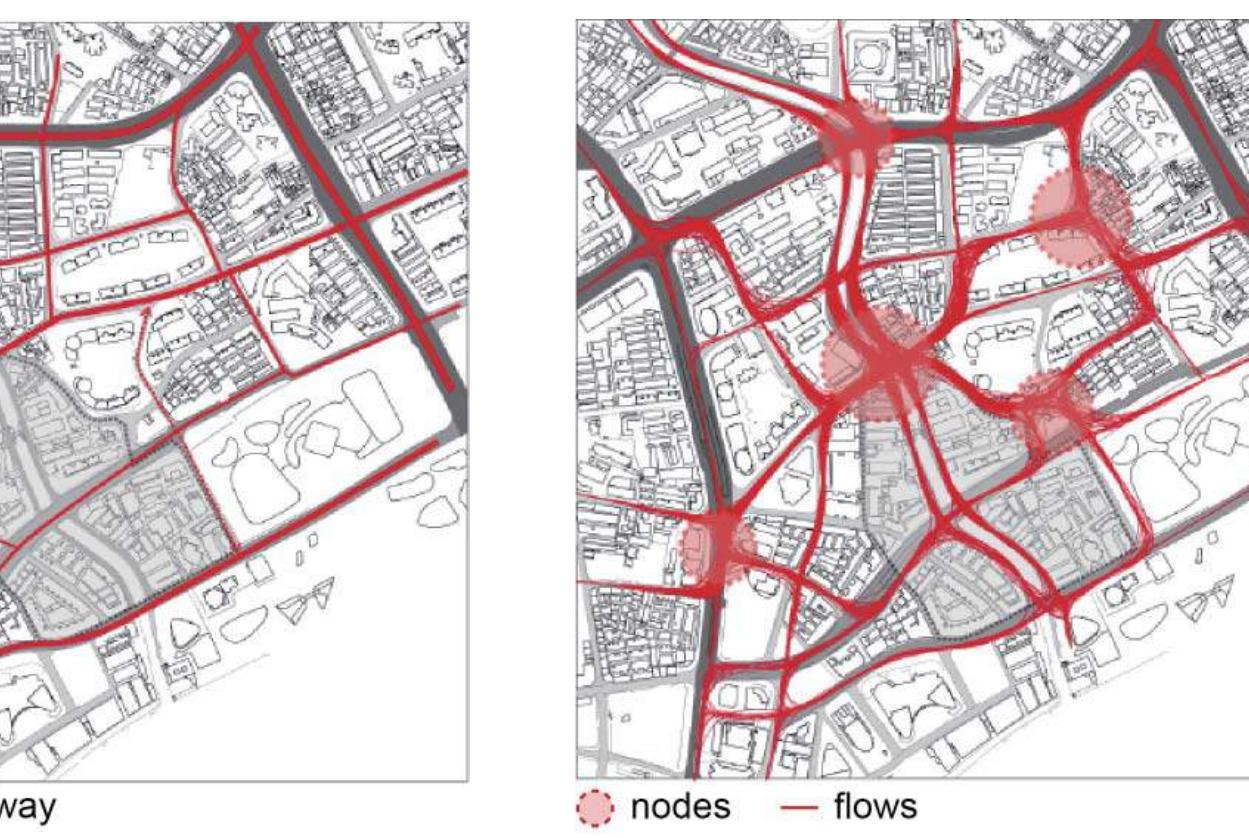
ADVANCE THE LIVING QUALITY

EXPLORE TOURISM POTENTION

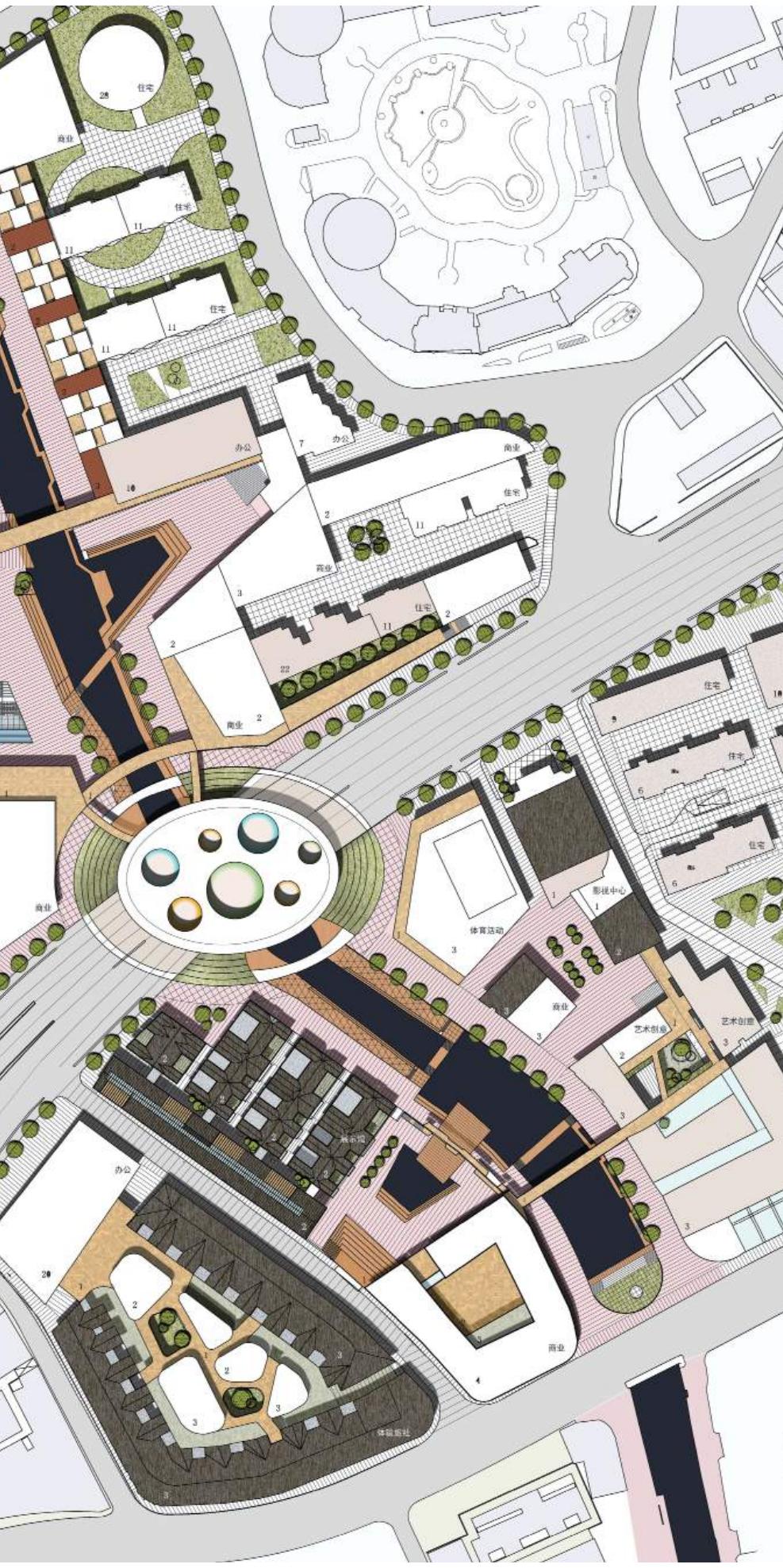
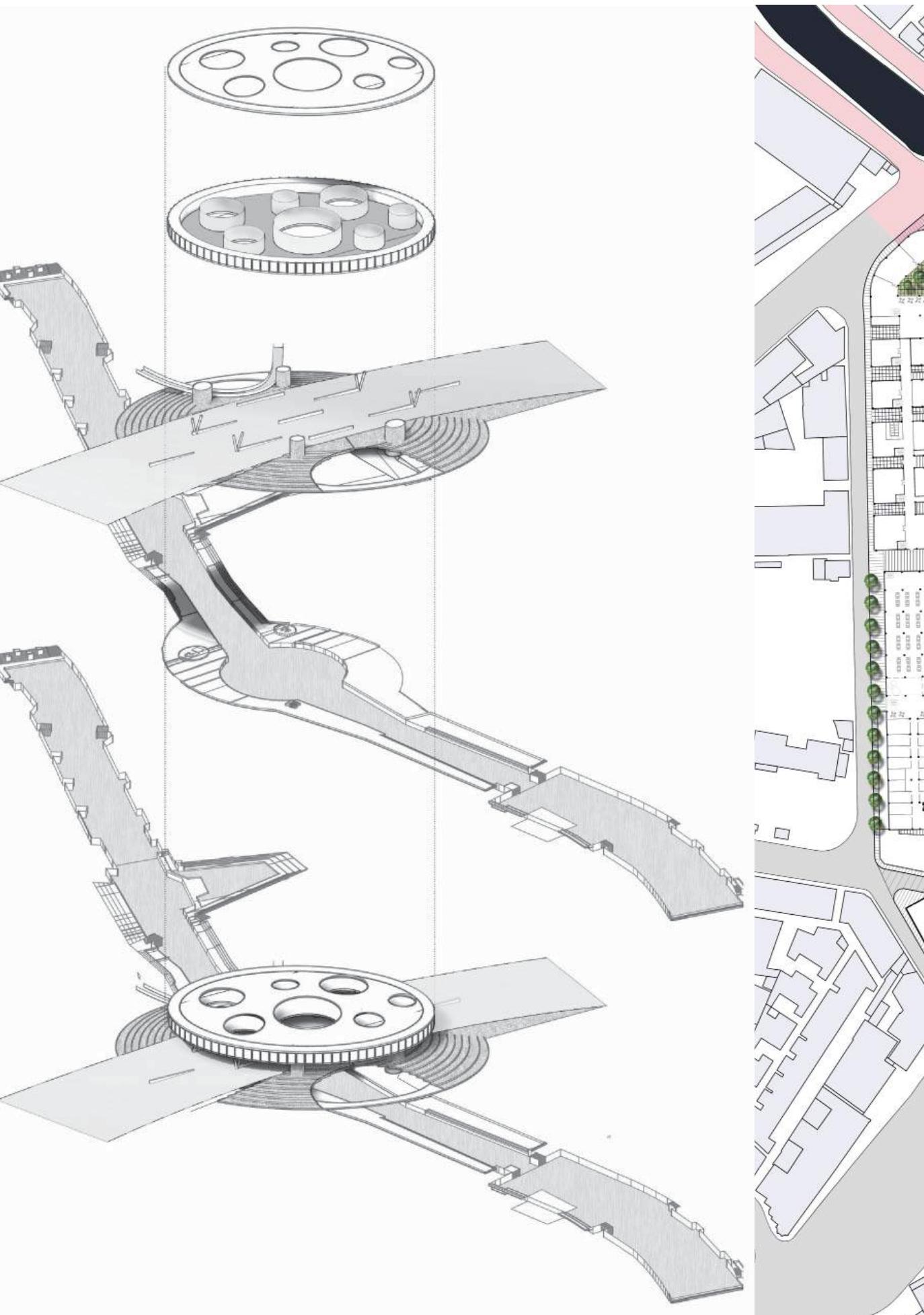
SET UP SPECIFIC VIEWSPOT





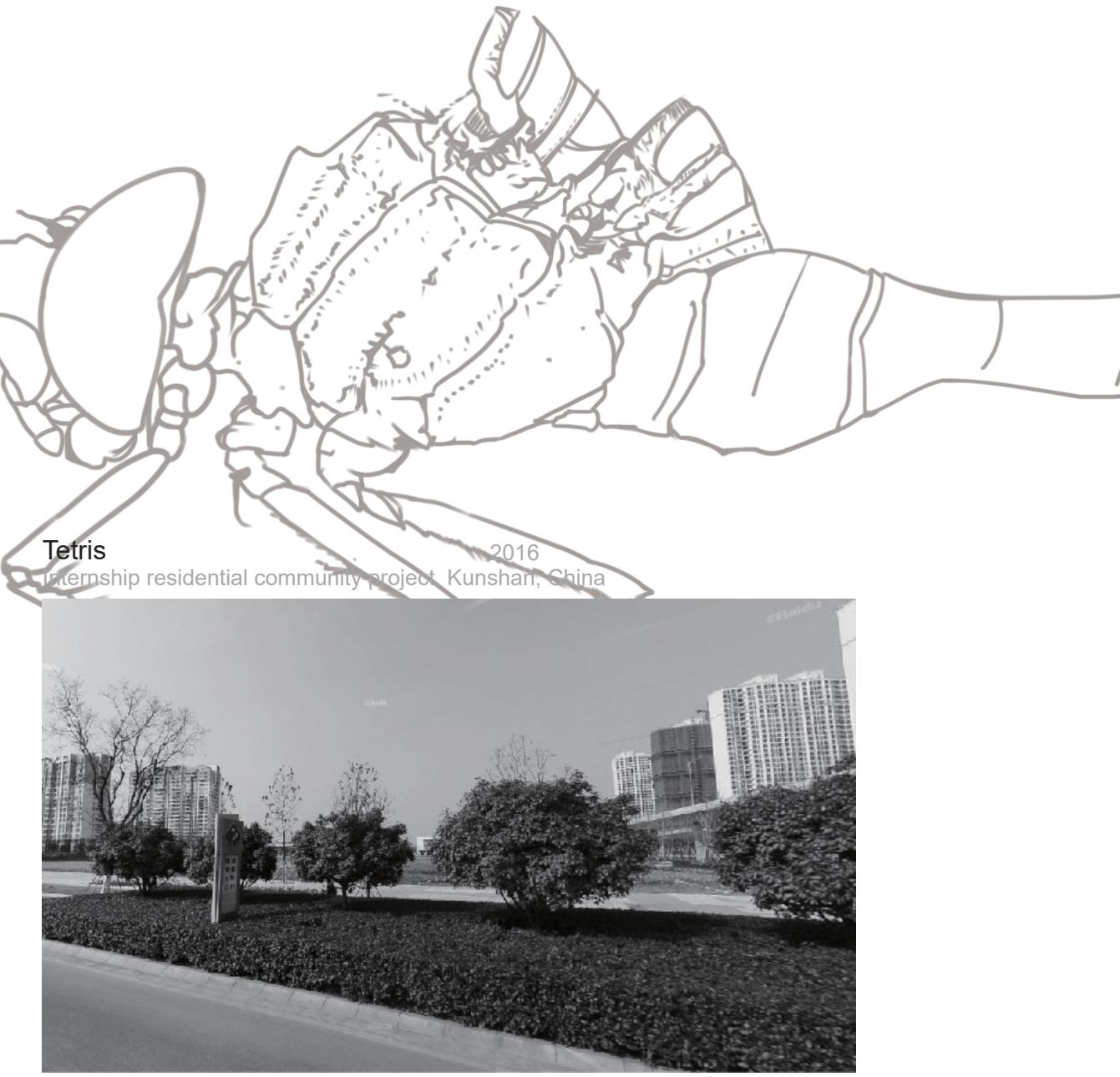


FLOW SIMULATION AND PEDESTRIAN ROUTE ARRANGEMENT



## P4 Practice Comprehensive

This chapter includes my specific practical work, from my internship as an assistant architect and a sponsored urban design project. The media was in dynamo and even python script, instead of common 3d modeling tools. As an architect, it is always good sense to keep professional in work, moreover, the interdisciplinary mind is to keep creative thinking.



Tetris  
Internship residential community project, Kunshan, China



Tetris Plus Plus  
Urban design project concept collaboration, Nanjing, China



P1

P2

P3

P4

P5

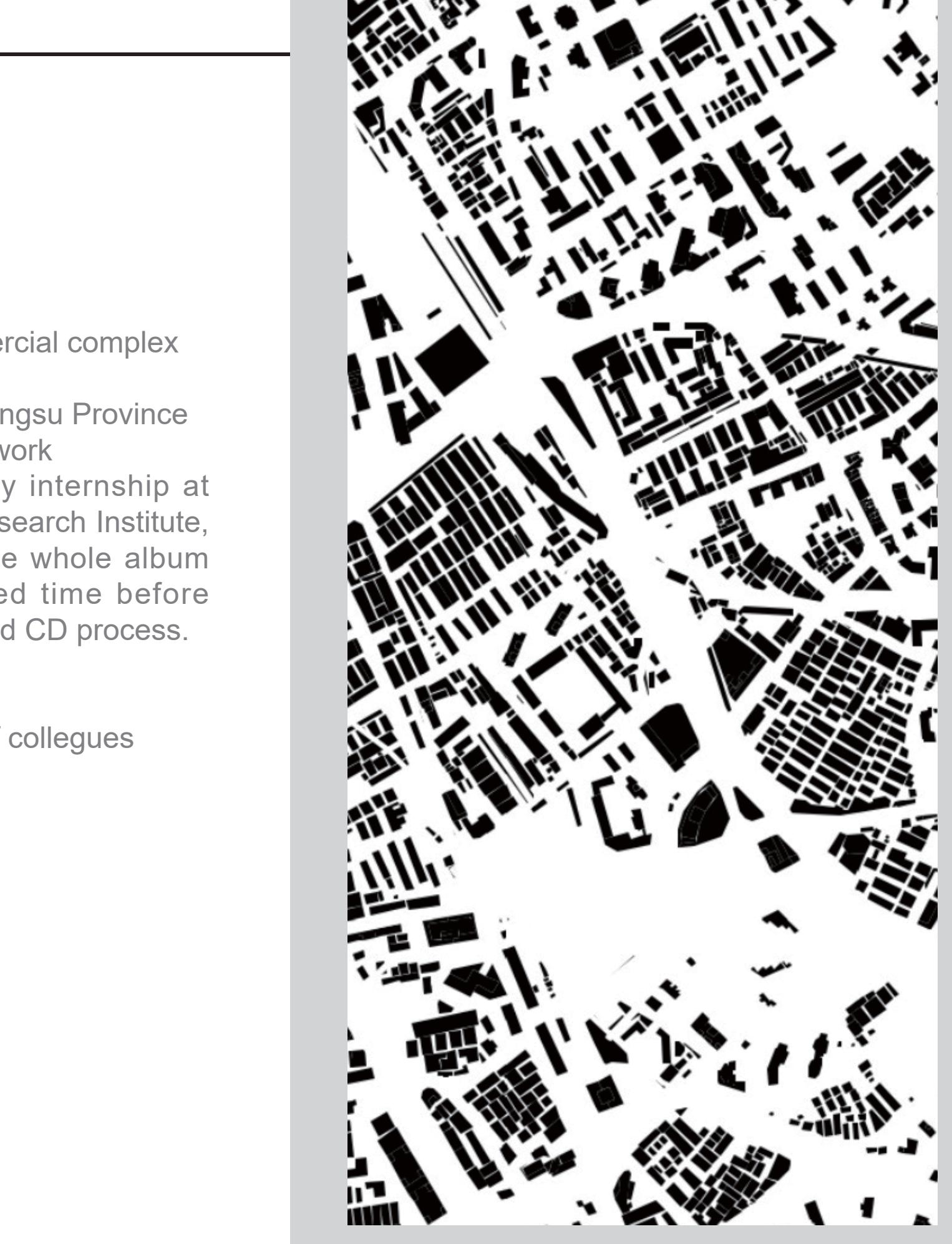
## Tetris

Project  
Phase  
Site Location  
Duration  
Description

Residential community with commercial complex  
Schematic Design  
West side downtown, Kunshan, Jiangsu Province  
24 days of continuous, full energy work  
The project completed during my internship at Tongji Architectural Design and Research Institute, my part contributed to 40% of the whole album of the SD process. Due to limited time before graduation I didn't follow the DD and CD process.

Method  
Tools  
SiteArea  
FAR Limit

Script Generating  
Model entirely by coding in python  
Render in MAX/Vray with the aid of colleagues  
36,000 m<sup>2</sup>  
4.5

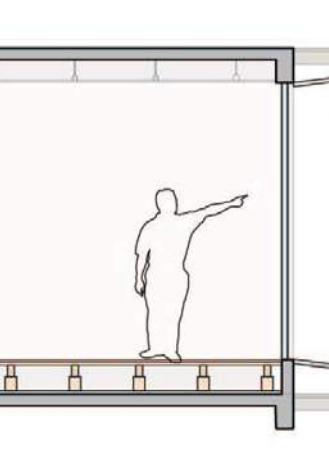
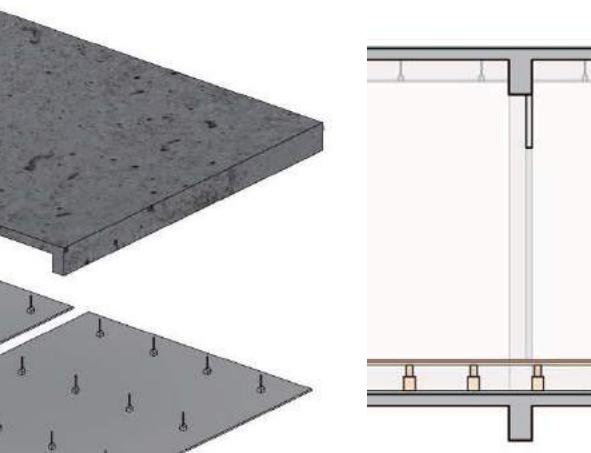
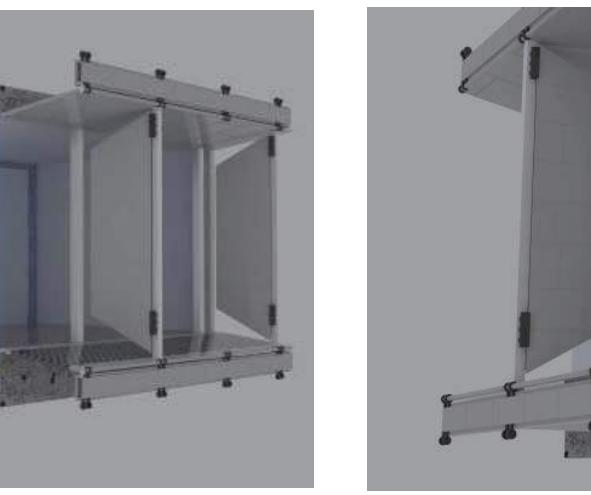
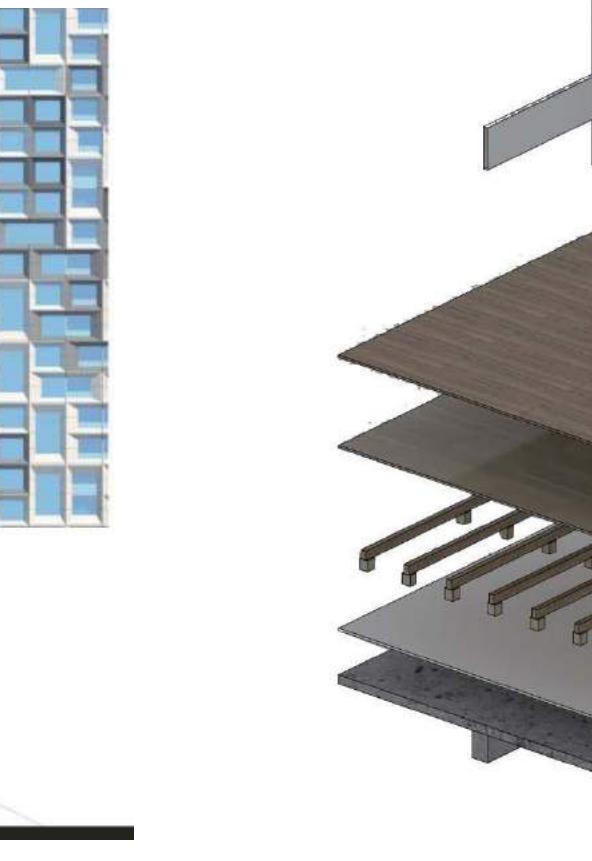
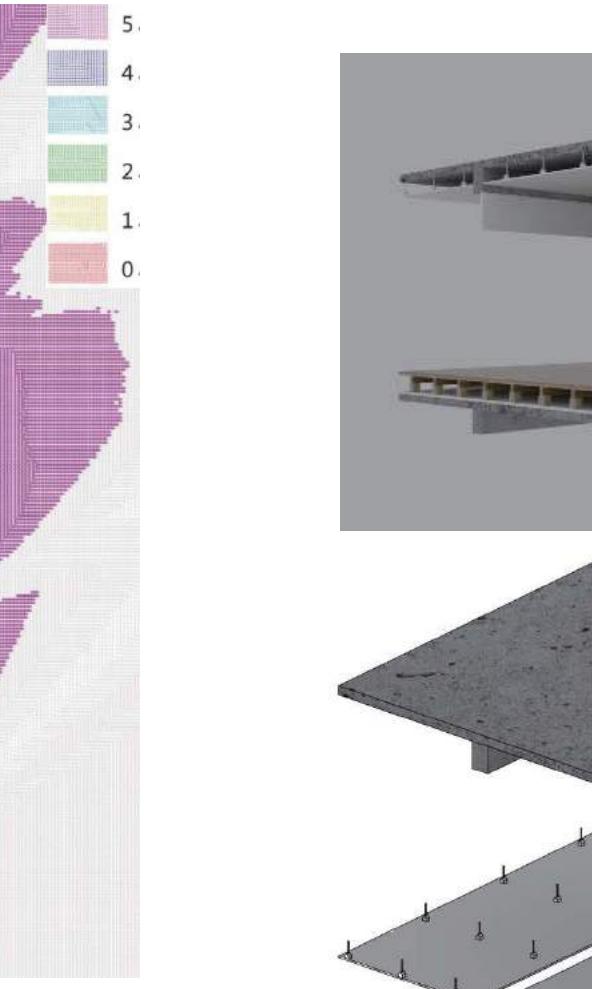
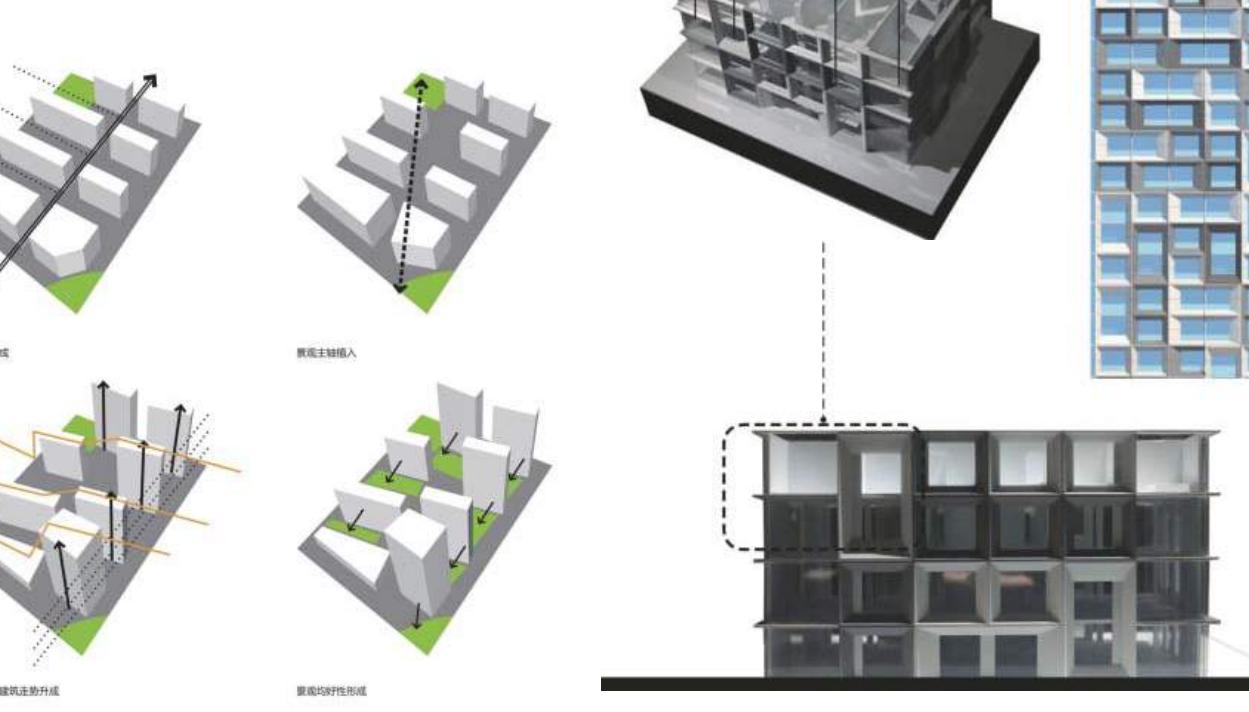




West town Kunshan, the outstanding position next to the downtown area, was the ancient culture crossing of Shanghai culture of western style and traditional watery region south China. Nowadays it have seen the expanding of Shanghai city, the lightrail metro line 11 of Shanghai connects the satellite city Kunshan and downtown Shanghai, thus this town own the position of great potential of commercial circumstance and modern high standard living style.

The targeted residents are those of high income at Kunshan city, hence high quality commercial complex is attached to the south part of the site. Moreover, the building must fit the requirement and limitation of FAR and minimum daylighting requirements.

The building is totally modelled in python script with an algorithm of Tetris gaming, hence the facade was of different groups and each unit's construction should be considered.



# Tetris Plus Plus

Project  
Phase  
Site Location  
Duration  
Description

Funded Urban Design Project  
Planning/ Schematic Design  
Zhonghuamen Area, Nanjing, Jiangsu Province  
5 months  
The project is a candidate design project co-funded by Yuexiu Tiancheng real-estate developer and Nanjing government with a total site area of 0.32k m<sup>2</sup>, project appointed 2 professor from Tongji as advisors, and is completed by 3 participates. My part is the east part of the site.  
Dynamic programming  
mass generated in dynamo  
render in Revit cloud  
96,000 m<sup>2</sup> (my part)/0.32 square kilometers(group)  
1.5-2.0 total site



Start from the east part of the site, this project's intention is to create a Chinese super pedestrian block. After planning process my part's target is to set up a mixed-used region for living, education, soho workplace, special commerce and office. This project is an advanced version of Tetris programming game from before, and the building starts from the 8 data structure relationship defined by theory of discrete Mathematics. From relationship we can generate columns, and from columns to space, then finally from space to real constructions.

ELEMENT

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE

ASSEMBLE

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE

LINEARLIST

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE

LINKLIST

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE

QUEUE

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE

STACK

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE

TREE

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE

GRAPH

DATASTRUCTURE

VOLUMN

SPACE

DATASTRUCTURE

VOLUMN

SPACE



