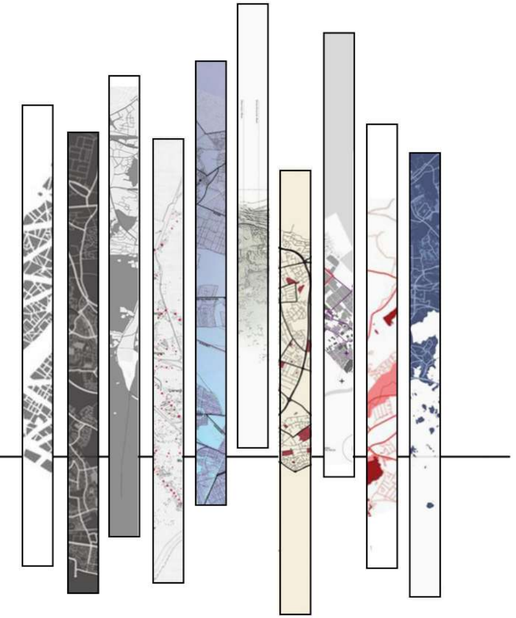
SPATIAL DATA SCIENCE

URBAN PLANNING

Data Science
Urban Analytics
Academic Research
Urban Regeneration
Urban Design
Architecture

# 孙佩锦 个人作品集

# PORTFOLIO OF SUN PEIJIN



# Geospatial Data Science in Academic Research

## Multimodal Data Mining & Cognitive Computing

**Data collection**

**Physical activity**
**Public sentiment**
- Sina weibos

**Built environment**
- Road networks from Open street map
- Street view images from Tencent online map
- POIs from Baidu online map
- Residential units from Lianjia website
- Remote sensing image from landsat 8
- Archival data

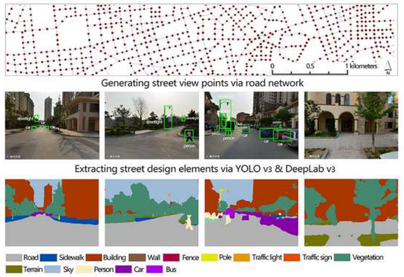
**Data processing**

**Physical activity**
**Public sentiment**
- Web crawler technology
- Natural language processing
- Text feature extraction

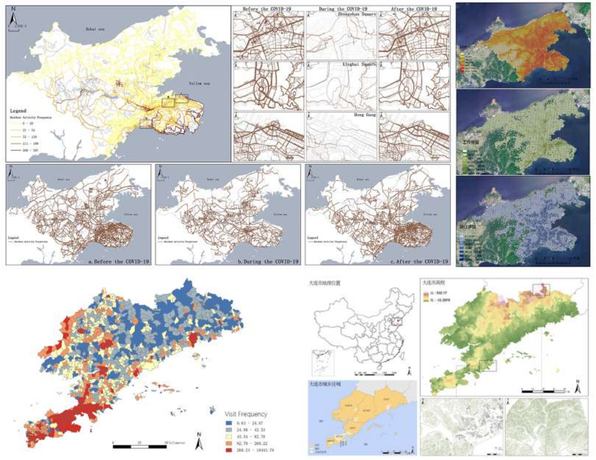
**Built environment**
- Semantic segmentation
- Instance segmentation
- Full convolution neural network
- Spectral band calculation
- Function calculation
- Spatial statistic
- Data fusion

**Cognitive computing framework**

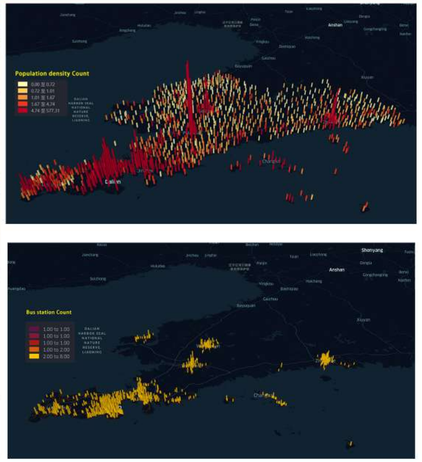

## Image Recognition via Deep Learning




## Mobility Data Mining from Smartphone Trajectories

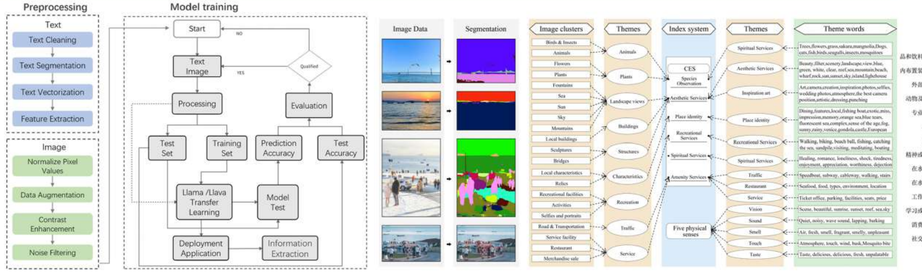



## Visualization

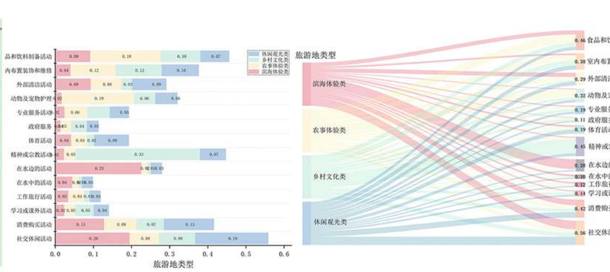



# Geospatial Data Science in Academic Research

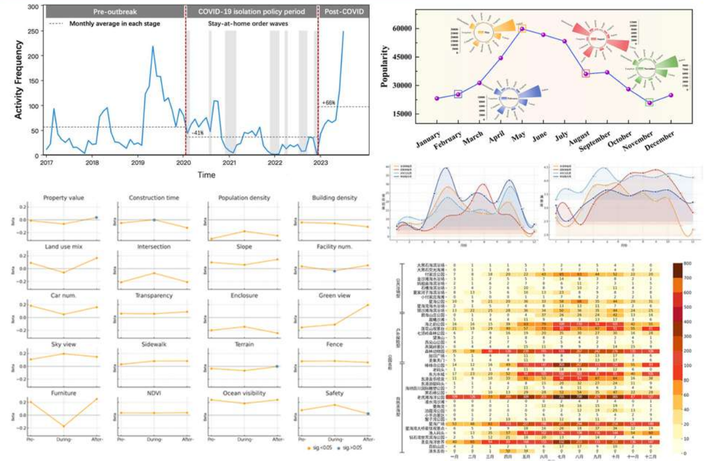
## Task-Oriented Multimodal Large Language Model Applications



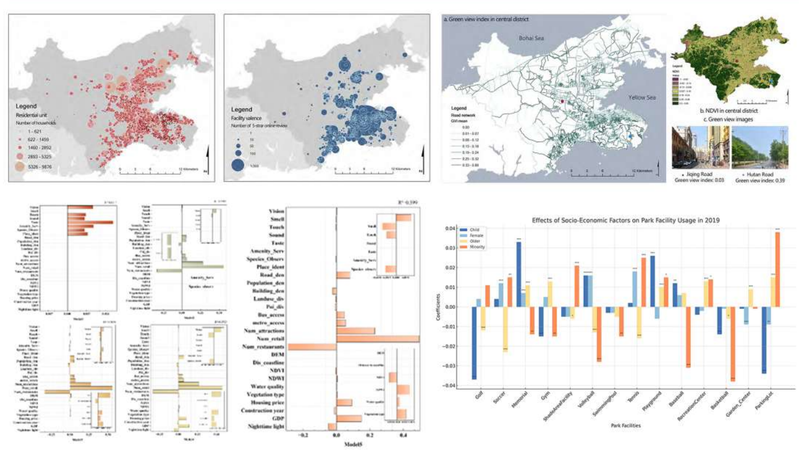

## Behavioral Pattern Mining from Social Media Content



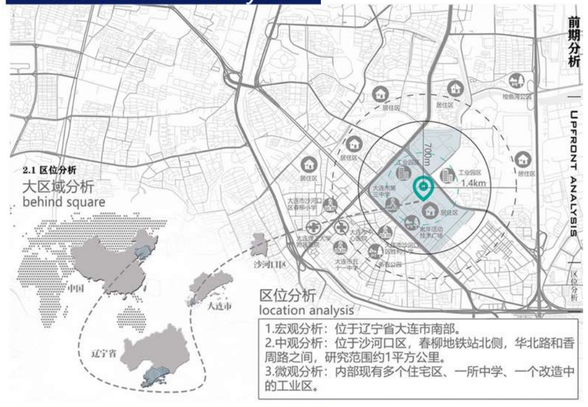

## Time-Series Analysis & Visualization




## Spatial and Statistical Data Visualization

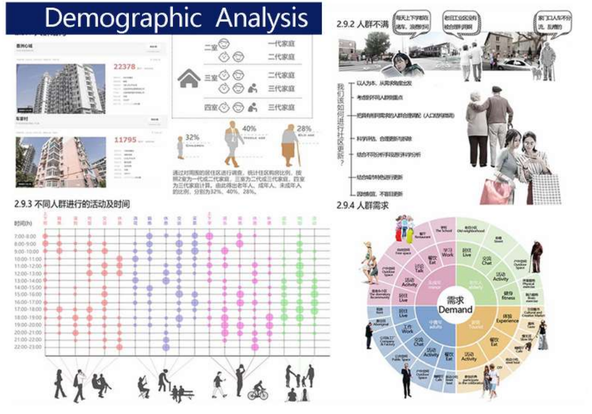


## Site Context Analysis

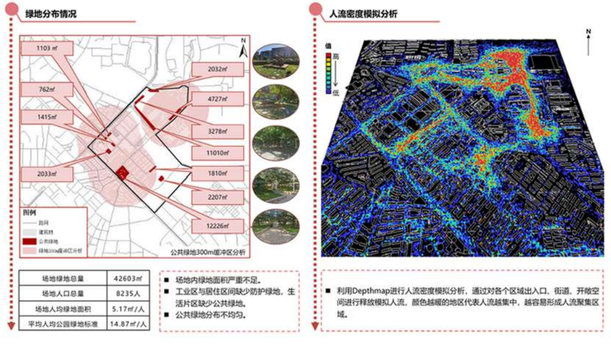



## Policy & Regulatory Review


## Demographic Analysis

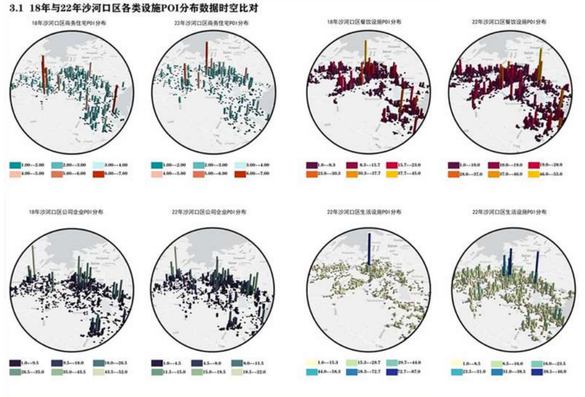



## Pedestrian Flow Forecasting

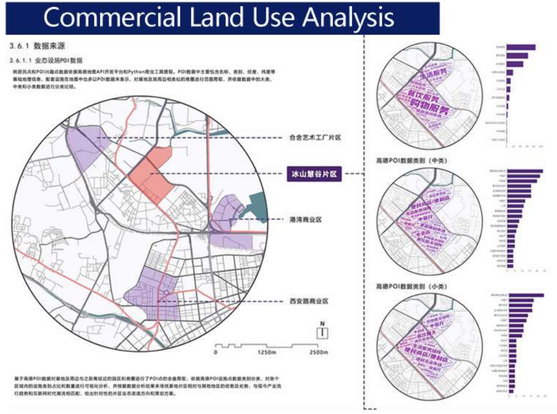




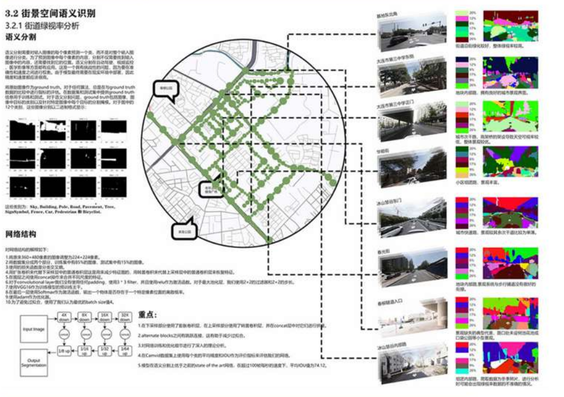

## Facility Location Trends Over Time



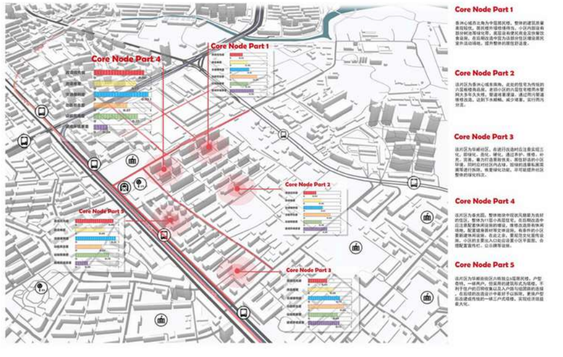

## Commercial Land Use Analysis




## Streetscape Assessment




## Impact Evaluation of Redevelopment



## URBAN DESIGN

Urban design is an important part of urban planning education courses. This project located near Malan River, a landmark of Dalian.

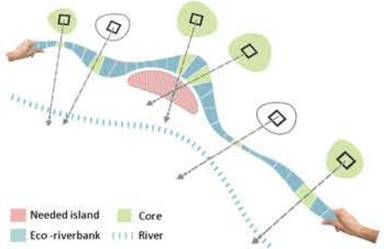


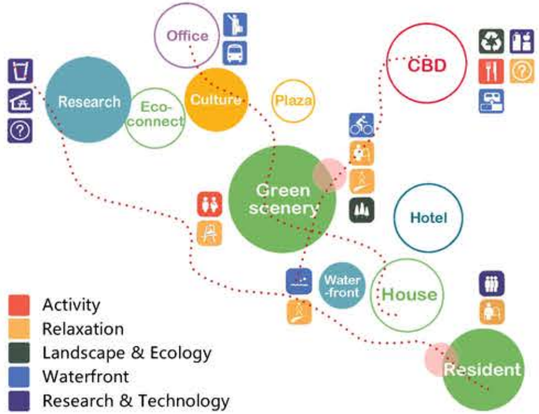
## MODEL PLAN

Before we begin urban design,we build up mo -del and system first.

We decided to add an island to integrate the site.Then the model pl -an is completed with river , banks and island connection together.

Here is our preliminary plan and the further.



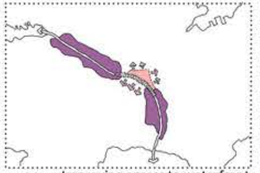

## PRE-ANALYSIS

### ECOLOGICAL RENEWAL

How can our work on the Malan River addresses the environmental imperatives of our generation?Specially, what can we do on the riverfront and in the surrounding communities to rebuid a healthy ecosystem for its productive potential?How can we discover a new aesthetic that Interact, Interknit and interpenetrate the contract between human, urban and natu -ral environment?


### SOCIAL EQUITY

The communities,especially between the Upper Riverfront and West hill Reservoir , are dramatically underserved interm of ac -cess to ecosystem of urban natural environment. How can the landscape resource that belongs to the communities become a destination for the whole city to acheive the social equity?

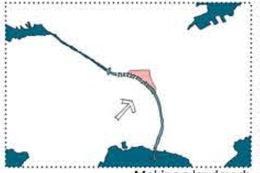



### IMPROVING VALUE

The Malan River connect the Xian Road CBD and the Peace Sq uare , which are two of the most valuable economy districts ; there is the largest square in Asia----XingHai Square.How can we foster new tourist and economies in a resurgent river corr -idor? How can investments ov- er River catalyze broader eco -nomic activity and attract the businesses of the future?


### CULTURAL IDENTITY

As a important cultural and economic metropoli in the Nort -heast in China, Dalian will become the leading role holding most international exhibitions of the northeast of China in the near future. Malan River will be a main City River. How can it provide the residents a kind of cultural atmosphere ? How can it become the authentic "City of the River"? These sociocultural questions together with others in three topics above, may be the four main entry points throughout.



## MASTER PLAN


### ECONOMIC REQUIREMENTS

| | |
|---|---|
| SITE AREA | 52.8ha |
| RESEARCH AREA | 4.4ha |
| CULTURE AREA | 10.1ha |
| COMMERCIAL AREA | 14.6ha |
| RESIDENTIAL AREA | 16.6ha |
| VOLUME FRACTION | 0.23 |

Distribution of Tourist Attractions

Distribution of Apartments

Distribution of Research Facilities

Distribution of Workforce

Distribution of Hotels



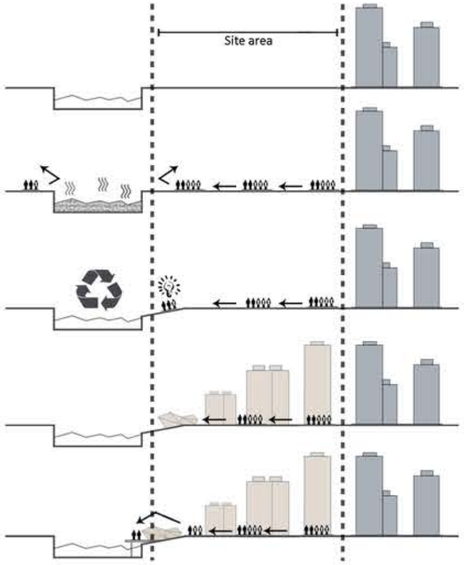
## ELEVATION

## SITE ANALYSIS

The site is near the turning point of the northeast railway network.

The mountains provide Dalian with a unique landscape.

The site lies in a plain that far from mountains and hills.




Originally,the Malan River serves as landmark in the city. It is a natural river that was renovated in 1990s.

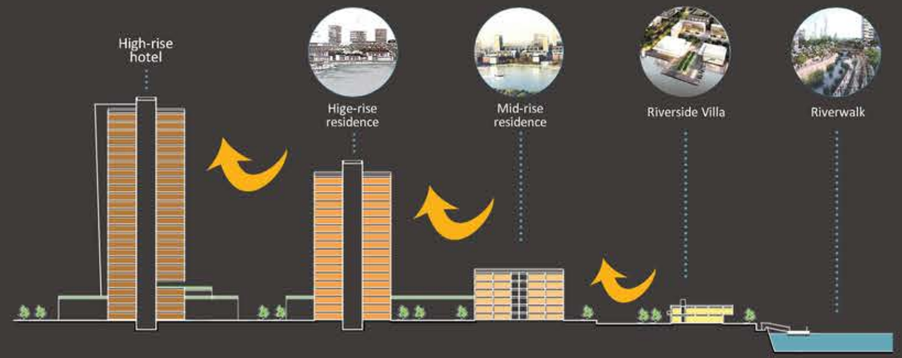
Unfortunately, after renovation, Malan River had concrete bank and lost all self-purification ability. Then only a few years later, the river became no--life backwater.The bad smell keeps resident and visitors away.

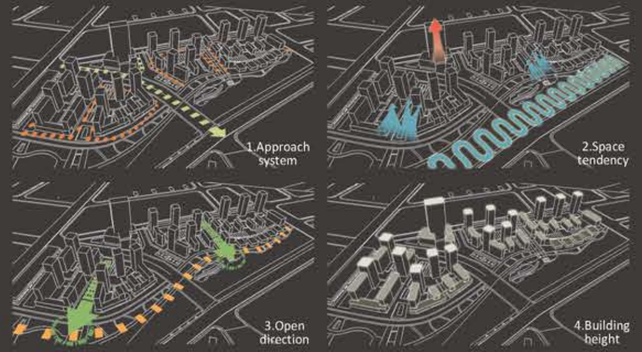
Therefore,before construction, we should address the riverbank first. The first step is to design the riverbank.

According to the skyline of existing buildings, new cultural buildings are built in a terrace-like structure.

In addition, on the edge of the culture area we design platforms, which can play a role in attracting tourists and enriching the lives of residents.

## RESIDENT AREA




1.The approach system of the residential area is centering on the light railway cro -ssing over the site, then forms the inner ring.

2.The riverbank is penetrating to the resi -dential area with high-rise hotel as the center.

3.The axis of the landscape of residential area is pointing to the landscape of river -bank.

4.The building height is increasing gradu -ally as farther away from the river bank. High-rise hotel is the highest point and the center.



## LANDSCAPE MODEL



Riverside pedestrian area

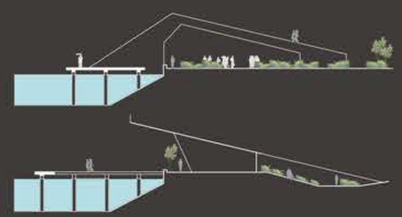

Open square


Wooden footway

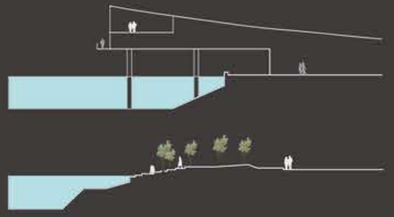

Riverside fishing platform


Riverside square


Recreational greening



In this program,the height of the buildings are becomeing shorter and shorter,and meantime,more and more green space,thus at the end of the site, forming a littoral park. In this park, there are a lot of greens space, and the decks for closing water . We also design a flyer here, it not only will satisfy the longings of visitors to know about the whole city, but also rich the skyline.



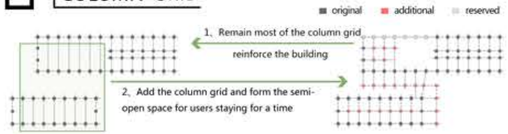
Continuous north to south riverside landscape with the formation of a combination of natural and urban public space, riverside landscape in the form of scattered high and low active at the same time makes the whole base, to a greater extent to enhance the value.

There will be a new community that will integrate nature along with city living to form a better balance.

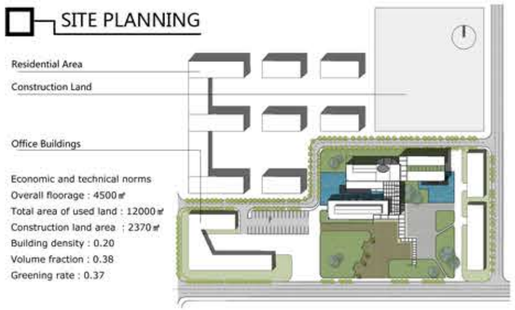
## LOCATIONAL ANALYSIS

The base is situated at the famous manufacturing district----Shenyang Tiexi District. The new Shenyang Tiexi District consists of Shenyang Tiexi District and Shenyang Technology development zone. It faces Huanggu District to the north, YuHong District to the west and HePing District to the east. The district is well traffic developed strong industry culture and beautiful environment. The design comes from culture and greens environmental protection in order to recovery plant vigor for creating a ecological exhibition center.

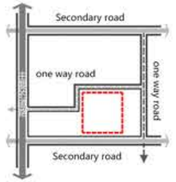
## COLUMN GRID




## SITE PLANNING

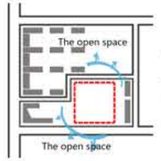



## SURROUNDING ANALYSIS




The west side is the main road. The south side is the secondary road. The east and west side are one way road.

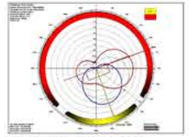
Peripheral Traffic




The northwest side is residential architecture. The west side is office building. The northeast side is open space.

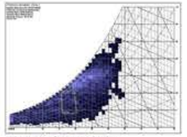
Open Spaces

## CLIMATE ANALYSIS



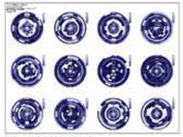
The best towards analysis

The best is south and 20 degrees east in Shenyang. This little deflection can be ignored. So the project is adopted the due south for the original plant.



The comfort analysis

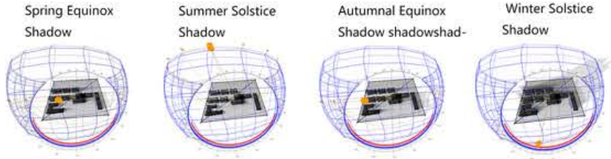
The rain capacity is 600-800mm in Shenyang. The water shortage is this city is affected by the monsoon climate. Rainfall concentrates in hot summer, dry winter. The effective temperature adjustment will increase the comfort experience.



The wind analysis

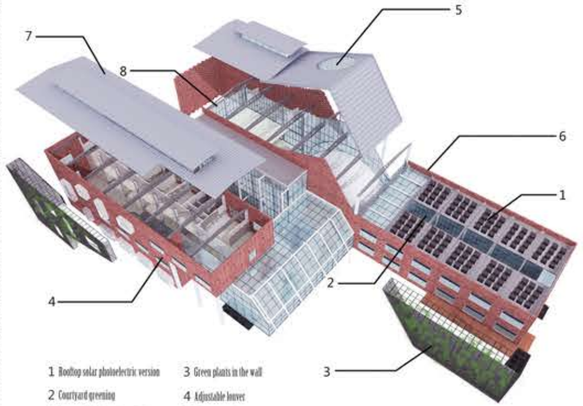
Monsoon changes significantly in Shenyang, southeast wind in summer and northwest wind in winter. So, we put the effective use of ventilation and cooling into consideration for the heat loss of winter monsoon wind.

Shadow

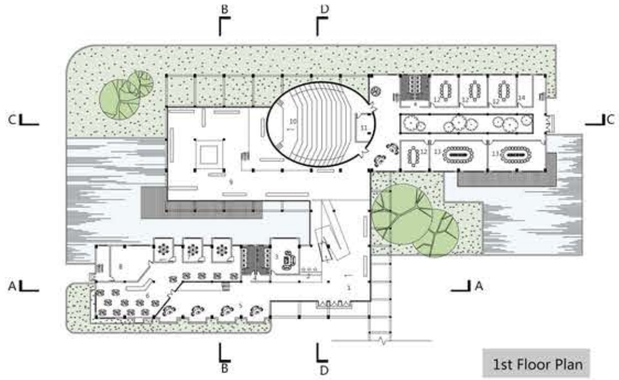


# Wake Up Factory Culture In An Environmental Way

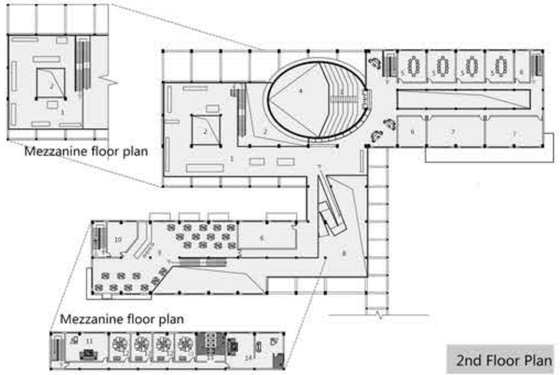
## ANALYSIS OF GREEN DESIGN




1 Rooftop solar photoelectric version
2 Courtyard greening
3 Green plants in the wall
4 Adjustable louver
5 Sun roof for light and ventilation
6 Energy saving brick wall
7 Rainwater collection
8 Double deck glass



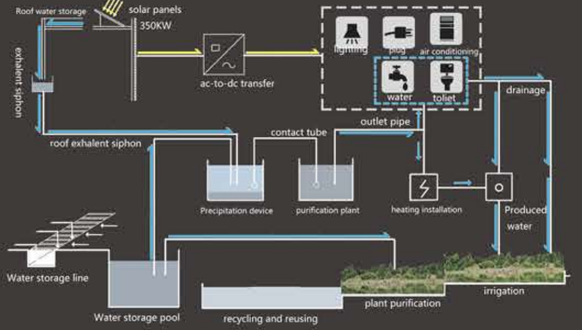

1st Floor Plan




2nd Floor Plan

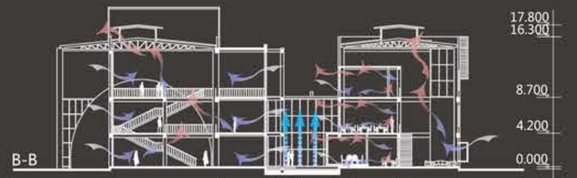
## WALL PLANTING


We put vertical greening into consideration. We can plant climbing plant for environmental purposes and overshadow, such as, lilac clematis, honey suckle, celastrus orbiculatus, and boston ivy etc.

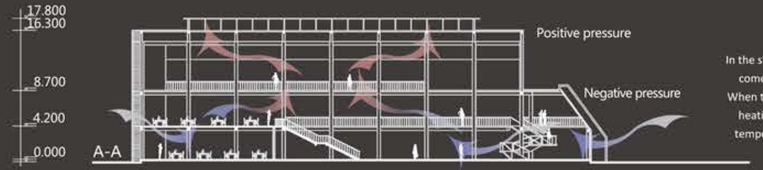



## VENTILATION

Separate air circulation is formed between each layer. The cold air enters from the side window and the hot air discharges from the side window and discharges from the sun roof. We would like to meet the requirements of different function spaces on the wind and to reduce building energy consumption for energy conservation.




Evaporation from water surface

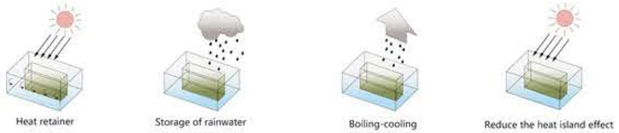


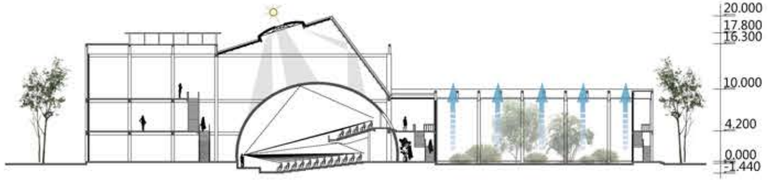

In the shadow of the trees, the wind speed becomes smaller on both sides of the building. When the wind enters the building body, after heating, the middle part of the block rises in temperature. Through the sun roof, we complete the ventilation cycle.

## C-C SECTION GREEN ENERGY-SAVING

### Courtyard greening and energy saving analysis

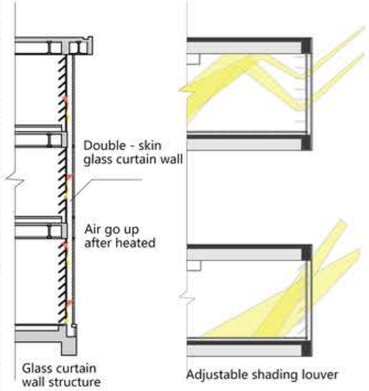
Design a skylight in the profile. According to the sunlight intensity and angle, it can adjust by itself. When the light comes into inside from the baffle plate, light becomes softness. In addition, the method of interior design of plants can adjust room temperature and clean the air.



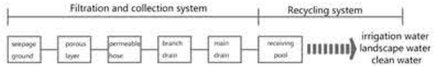




## GLASS CURTAIN WALL

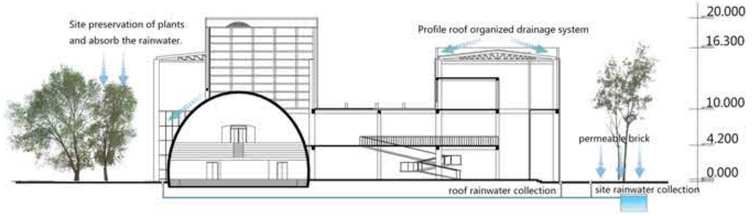
We install controlled blinds on the form to adjust light. At the same time, through the refraction principle, it can influence the effect of light. The blinds can automatic control by the temperature.



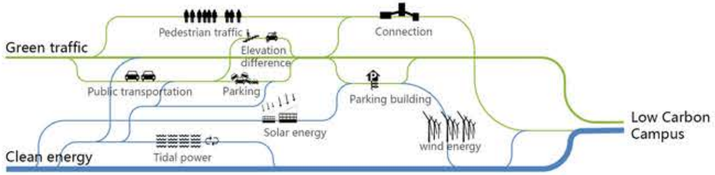

## D-D Section Rainwater Collection

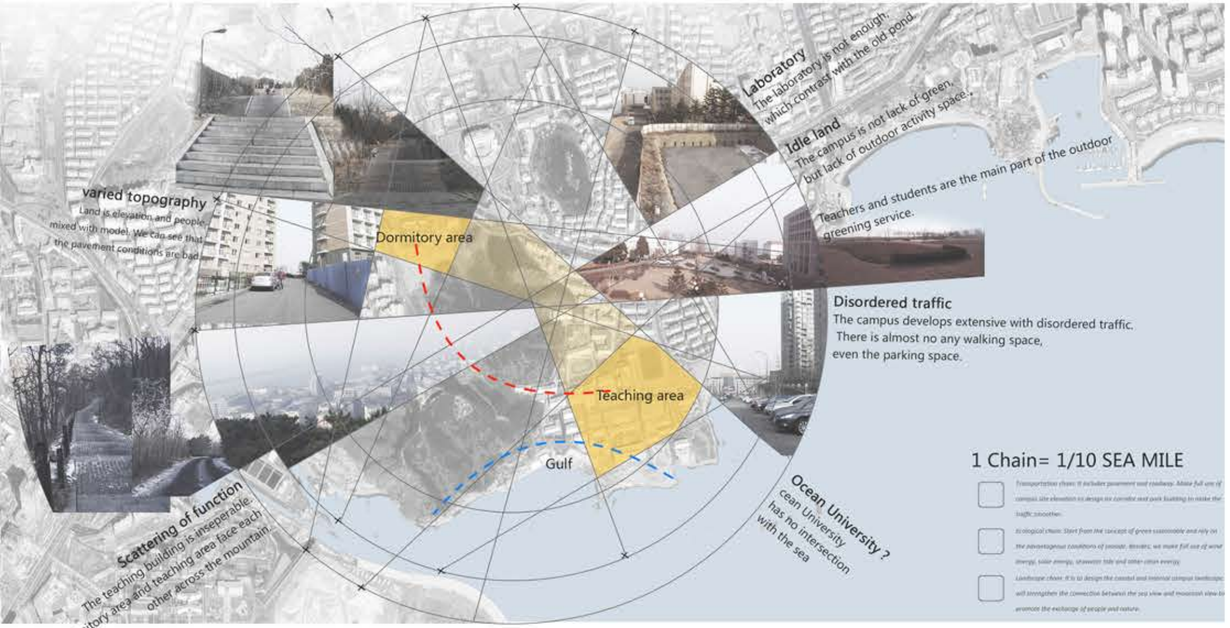



Field permeability structure material can be classified into permeable bricks and explicit pervious concrete. The cushion materials are sand-gravel material and non-fine concrete. The rainfall will finally come down from the main collecting ditch to the water gathering tank.



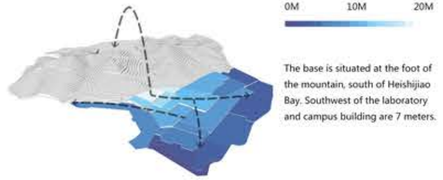
## GREEN TRANSFORMATION OF CAMPUS PARKING



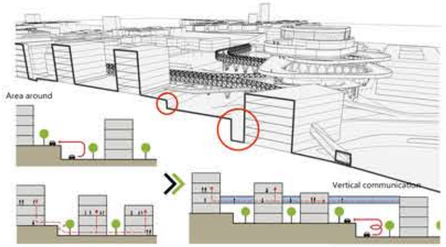



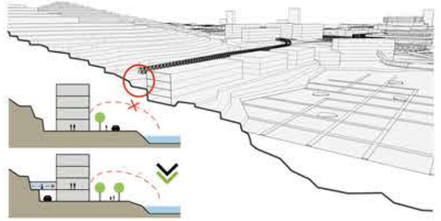



## TERRAIN ANALYSIS

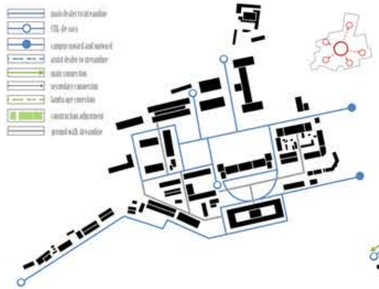


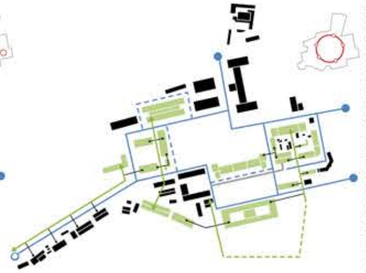

The base is situated at the foot of the mountain, south of Heishijiao Bay. Southwest of the laboratory and campus building are 7 meters.



## CAMPUS TRAFFIC

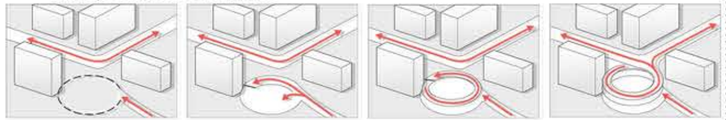




Due to space height difference, the campus roads are located at different heights. Some of the regional have fault scarp, with extension transport mode, showing coexistence of people and vehicles.

After the upgrading, we expand the inner ring through reducing the site traffic area. We should use the campus building height effectively by the connection of air corridor for separation of pedestrian and vehicles.

### Transportation Streamline



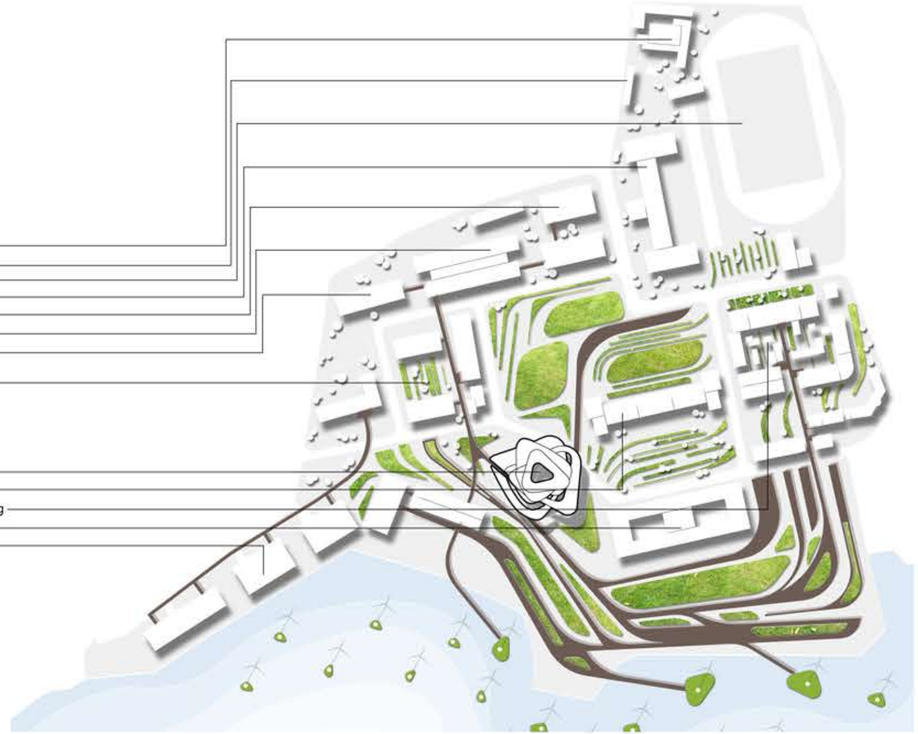
Public transportation node (Pictured above)

Through the campus traffic planning, in the large height traffic node, we solve the problem by vertical transportation design, which will make the vehicle go smoothly.

Pedestrian traffic frequency (picture On the left )

By analysis of campus building, pedestrian flow line and the frequency of use, we confirm the main road and the traffic is convenient through corridor design.

## OPTIMIZATION OF CAMPUS PARKING

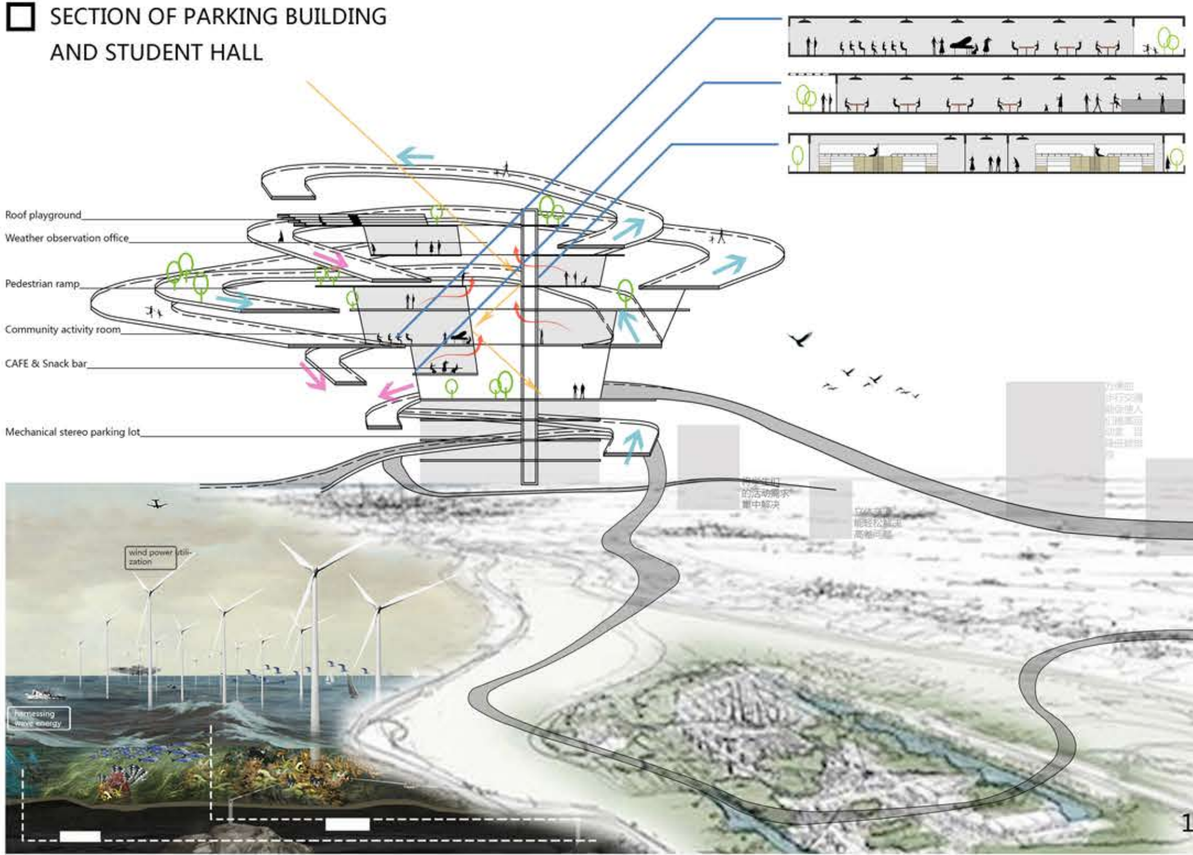



### Technical and economic target

overall floorage : 118300㎡
land Area : 167000㎡
building area : 39900㎡
building density : 0.238
the volume of construction : 0.708



## SECTION OF PARKING BUILDING AND STUDENT HALL



## URBAN COMPREHENSIVE PLANNING


URBAN LAND USE EVALUATION

SPATIAL REGULATION

LAND RESERVATION



## URBAN LAND USE


STAGE PLANNING

SHORT-TERM PLAN

LONG-TERM PLAN

## URBAN PUBLIC FACILITIES PLANNING


HEALTH SERVICE RADIUS

COMMERCE SERVICE RADIUS

PARK SERVICE RADIUS



## URBAN INFRASTRUCTURE PLANNING


WATER SUPPLY


SEWAGE ENGINEERING


STORM-WATER ENGINEERING


COMMUNICATION SYSTEM

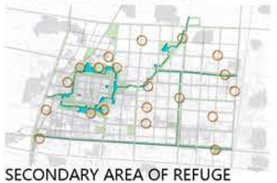

HEATING SYSTEM


GAS SUPPLY SYSTEM

## COMPREHENSIVE DISASTER PREVENTION

In the present situation, we should increase the green area in residential land of old city. At the same time, we should also add green areas on both side of river to form a climate of landscape, which provides a casual and comfortable place as the main refuge in the way of integrating into other green areas and parking spaces.


PRIMARY AREA OF REFUGE



SECONDARY AREA OF REFUGE

RESCUE PATH

ESCAPE PATH



## TRAFFIC PLANNING

Processing scheme one:
*The intersection is situated at roundabout in order to control the direction of the traffic effectively. It makes the pedestrians more convenient and safe.*

Processing scheme two:
*The roundabout can slow down the traffic and make them go to the same direction, which will cut down the accident.*

Fracture solution:
*The parking is set at the road separator. So, it can make the street has a better walking space. The city has become to a higher degree of hommization.*