

# WALKING AMONG THE SPACE TIME

REGENERATION PINGYAO

CHINA

24/07/2022

---



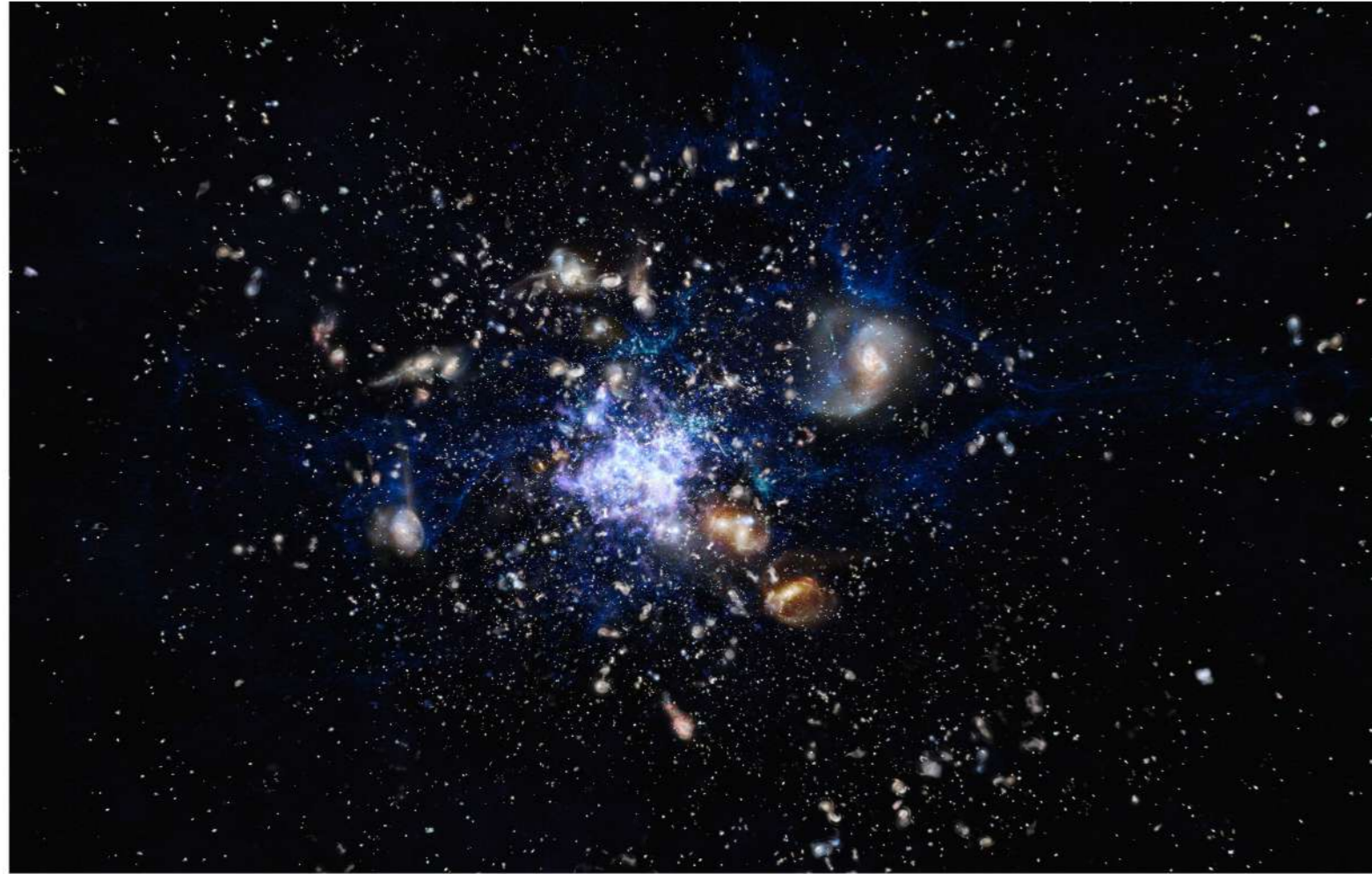
POLITECNICO DI MILIANO

SUSTAINABLE ARCHITECTURE AND LANDSCAPE DESIGN

PROF: Marco Imperadori

Matteo Umberto Poli

Student: Caixiao Hou



In BIBLE,God create galaxy at the first day and mankind at the sixth day.  
And he said:i am the original and the eterno.  
Everything is organized and kept in balance through some power,till...



In ancient China,many things follow the Confusion “天人合一”  
to keep in balance between nature and mankind.



Collage from the thesis proposal

## PREFACE

This 30ECTS thesis is the final project of the Master program of Sustainable architecture and landscape design in the Politecnico di Milano, School of Architecture Urban Planning Construction Engineering.

## ONE DEBATE ABOUT SPACE

There are space being unused and wasted on architecture ,landscape and territory?

How to connect them into whole?

How to make it sustainable?

## ABSTRACT

According to the view of previous local person based on the background during the 21st century , to research how to preserve its special characters and how to make local people continue to live here peacefully like before in Pingyao,where it is listed in the world's heritage,facing the climate change and the hot problems related to heritage in China, the trend of being commercial production.

The project aims at maintaining,reactiving and reconstructing,or in other words,to weave sustainable and balanced space based on the parts of the environment,culture and community, to focus on the spatial coexistence between human and non-humans,to achieve social connection and proximity to the natural landscape.

For me,the importance of preserving heritage is to connect the relationship between the present and the future , rather than simply preserving the past.And the historic city is a LIVING PLACE, it is not only for tourists ,more importantly is to keep the continuity of the historical environment, character and particularity,prevent the city from declining and make the city a high quality home for the local people.

## **CONTENT**

### **Introduction**

Personal motivation

Background

Site introduction

Question, purpose and response

### **Methods**

Site view

Understanding

### **Site analysis**

Climate

History

Mobility

Green and blue analysis

Current building analysis

### **Design process**

Concept

Design motivation

Master plan

General site view

Landscape design

Green corridor

Linear park

Tourist center

Workshop areas

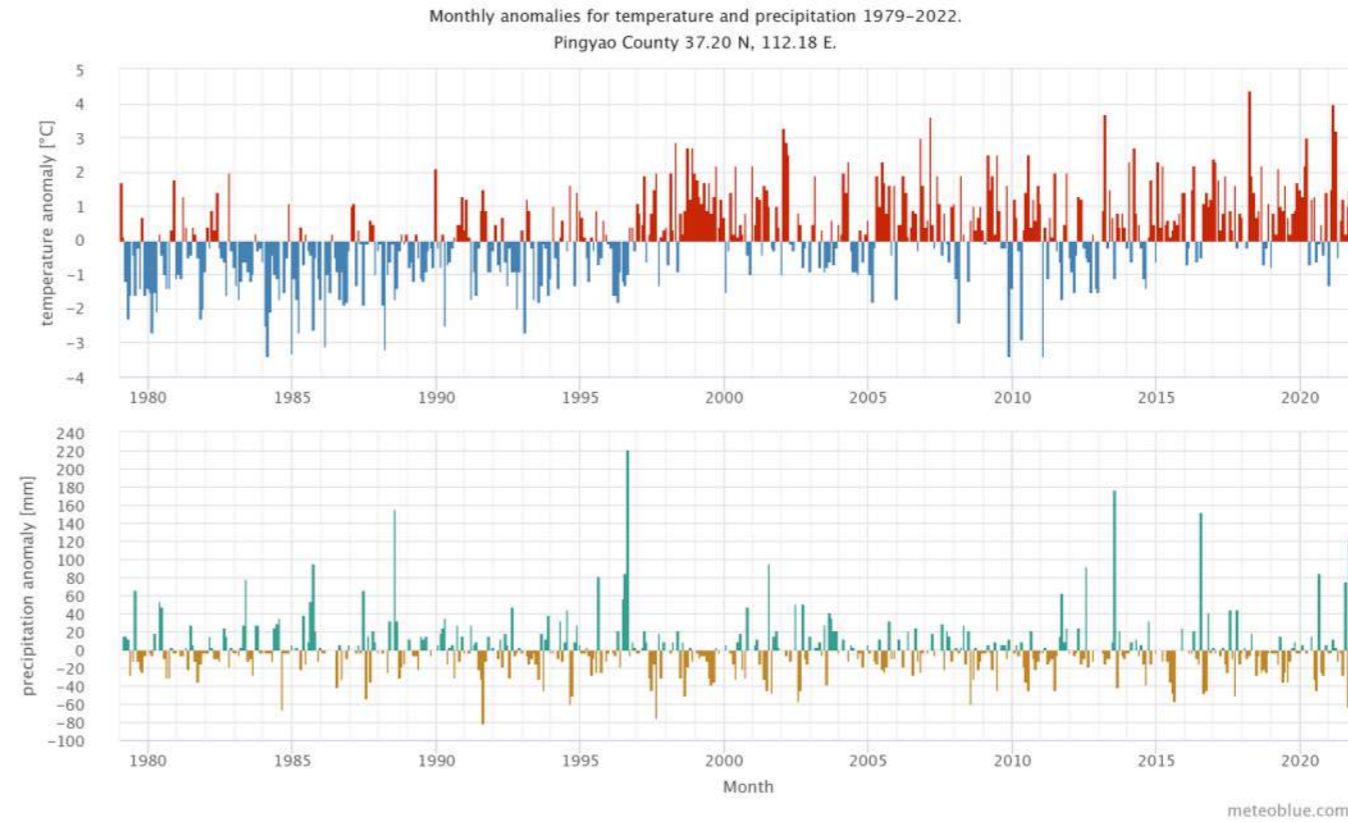
Regeneration of local residential buildings

### **Reference**

## BACKGROUND

### 1:CLIMATE CHANGE

The effects of climate change are already well visible by increasing air temperatures, melting glaciers and decreasing polar ice caps, rising sea levels, increasing desertification, as well as by more frequent extreme weather events such as heat waves, droughts, floods and storms. Climate change is not globally uniform and affects some regions more than others.



The top graph shows the temperature anomaly for every month since 1979 up to now. The anomaly tells you by how much it was warmer or colder than the 30 year climate mean of 1980-2010. Thus, red months were warmer and blue months were colder than normal. In most locations, you will find an increase of warmer months over the years, which reflects the global warming associated with climate change.

The lower graph shows the precipitation anomaly for every month since 1979 up to now. The anomaly tells you if a month had more or less precipitation than the 30 year climate mean of 1980-2010. Thus, green months were wetter and brown months were drier than normal.

The data source used is ERA5, the fifth generation ECMWF atmospheric reanalysis of the global climate, covering with a spatial resolution of 30 km.

## 2: THE CONTRADICTION BETWEEN HERITAGE PROTECTION, TOURIST DEVELOPMENT AND LOCAL RESIDENTIAL LIFE

In China, the concept of Historic Town or Historical Environment is still not well established. Most of them just wanted to make it into commercial tools to attract tourism. If tourism is the only consideration, it will be very dangerous for an ancient city's future development.

In Pingyao, the problem exists, the tendency of preserving the antiquities and restoring, reconstruction, buildings is turning Pingyao into a Tourist Site and only Tourism Site, only for physical preservation. They do not care about the local people, who form and create the actual special culture landscape. The traditional living style is the spirit of a historical city. Moving many residents outside the ancient city wall will destroy the quality of life inside the city, thus breaking the actual principle of everyday life.



### SKATEHOLDER

JI TAIPING (director of the county's urban-rural planning bureau):  
that since the number of local residents emotionally attached to the traditional houses decreased and the number of tourists and newcomers grew the ancient town had begun to slowly lose its vigor and vitality

HOU SHIJUN (head of the tourism bureau of Pingyao County):  
"Some businesses may indeed damage the traditional cultural heritage. The government is currently working on the issue of market access, and we should not allow the ancient town to become a cultural hodgepodge." Unreasonable demographic structure is also a threat to the cultural heritage of Pingyao.

CAO ZHISHENG (the county chief in Pingyao):  
The county has 3,797 traditional dwellings and other historical sites within its 6.4-km-long walls. But only about 400 are well-preserved and the majority are dilapidated due to a lack of adequate protection.

TOURISTS:  
complain that the ancient town is losing its serenity and unique style.

GAO GUIHONG (local resident):  
"It is too humid in the house. There is no big supermarket, school or hospital in the town, and the air is also bad since we still use coal for heating."

JI (local resident):  
The current situation also threatens the protection of traditional structures as this influx of outsiders usually lack any interest in protecting or restoring the houses. The local government should regulate the development of tourism and improve infrastructure and living conditions for local residents, he added.

ZHANG PING (an associate professor of architecture with Tongji University in Shanghai):  
the future of a heritage site should be based on the collective willingness of all interest groups. However, in Pingyao, local residents often feel disenfranchised. The protection of the buildings in this ancient town should develop alongside improvements for the local residents.

## CITY ANALYSIS---ZONE DEVELOPMENT

The designation of Pingyao as one of the first Urban World Heritage Sites in China in 1997 has stimulated tourism.

Government just focus on preserving the physical heritage. some large public ancient architectures are protected,like temples,palaces and famous large residential buildings. And just focus on tourism development,business opportunities afforded by the blossoming of tourism has resulted in the transformation of traditional dwellings along the town's main drag into hostels, souvenir shops, eateries and bars.

And some historial general residential buildings were tored, which especially form historical culture landscape of cites and villages.

Governments hold negative attitudes to local people ,who really formed and created the atmosphere of ancient lifestyle.In results,many local people look forward to move into other new places to live for improving their living conditions.

According to county deputy head Hu Jinliang, in 1997 the population of the 2.25-square-kilometer town was 45,000, yet the density was about 16 times of that of Beijing. In response, the local government has moved many public institutions and enterprises out of town, with the purpose of transforming it from a community to a tourist site. There were more than 50,000 people in the original city. More than 20,000 people moved out from 1997, and the population of the ancient city was reduced to 35,000.

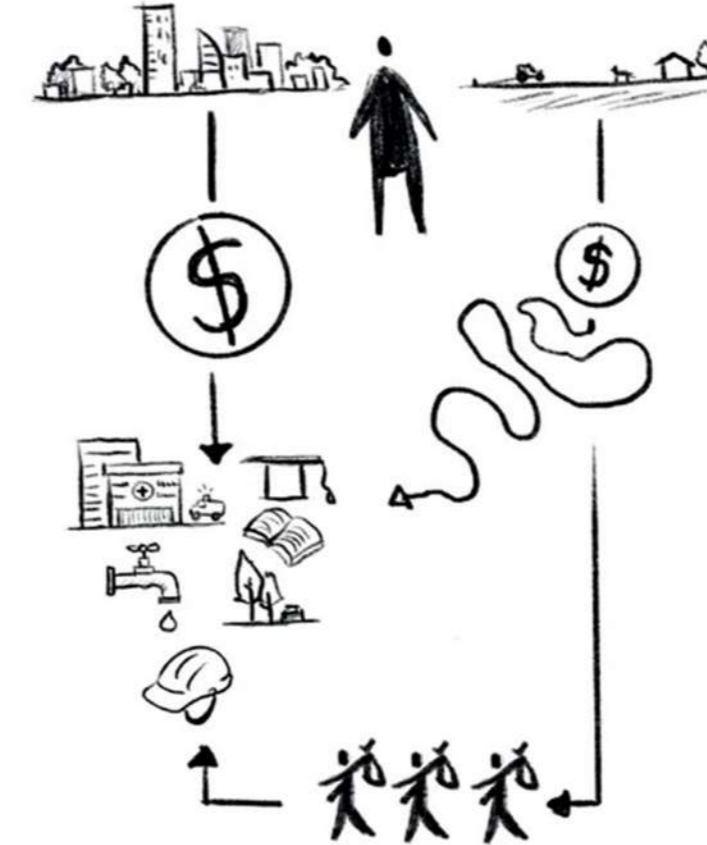
Table 2. Tourism revenue and number of tourists in the Ancient City of Pingyao.

Year	Total tourist arrival	International tourist		Tourism income (CNY)
		Tourist arrival	Percentage	
2001	819,179	13,000	(1.59%)	11,428,725
2002	1,549,150	39,000	(2.52%)	21,457,688
2003	344,120	15,800	(1.18%)	22,892,790
2004	582,133	37,000	(5.51%)	47,299,836
2005	726,994	39,000	(4.94%)	57,493,695
2006	921,718	—	—	73,500,873
2007	981,827	—	—	75,605,133
2008	918,744	—	—	71,217,669
2009	1,126,586	—	—	88,269,241

Source: Based on Bureau of Culture and Tourism1.  
Notes: CNY 1 = US\$0.127 in November 2006. The fee was the same for both international and domestic tourists since 2006.

Table 1. Function of traditional anchor elements in different time periods.

Place	~1912 Qing Dynasty	1912–1948 Republican Revolution	1949–1997 Communism	After 1997 World Heritage Site
City Wall	Defense	Social control	Access control	Tourist destination
City Tower	Watch tower	Watch tower	City symbol	Tourist destination
Temple of Civil Culture	Temple	~1938: temple; 1938--: military barracks	Middle School	Tourist destination
Temple of Warfare	Temple	Temple	Elementary school	n/a
Temple of Taoism	Temple	Temple	Bureau of Food Administration	Tourist destination
Temple of the City-God	Temple	Temple	Workers' club, theater	Tourist destination
Qing Yamen	Administrative offices	Municipal offices	Municipal offices	Tourist destination
Main Streets	Local shopping area	Local shopping area	Local shopping area	Tourist destination



Tourism income is becoming the main income resource of the city. Many tourists complain that the ancient town is losing its serenity and unique style.

Because the real heritage did not protected ,especially culture landscape,because most local people moved out the city wall.

SIGN

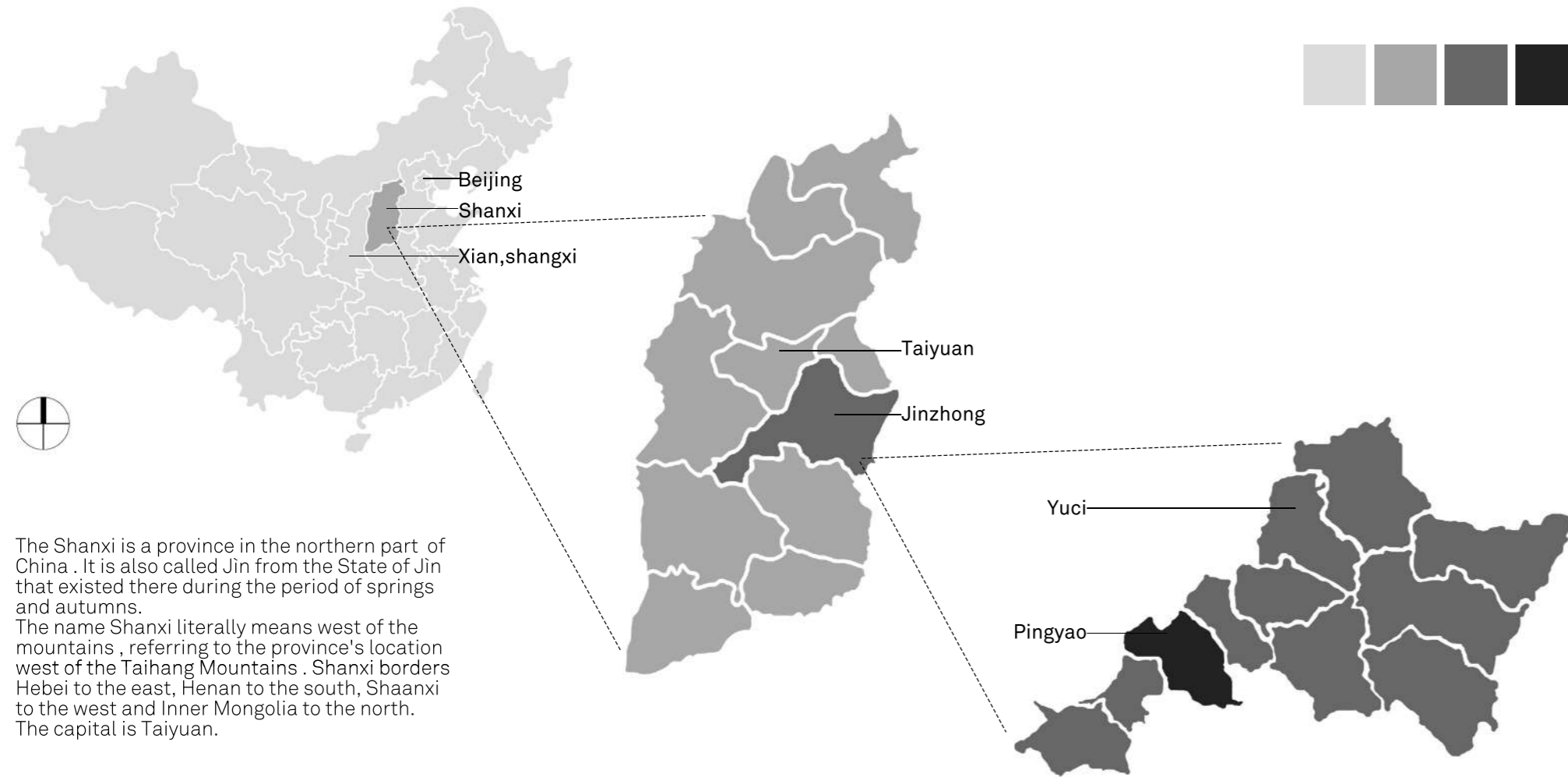
<i>PING YAO</i> 平遥		<i>INTERACTION</i>			
<i>SUSTAINABLE DEVELOPMENT</i>		<i>CULTURE</i>		<i>SOCIAL</i>	
	<i>HERITAGE TANGIBLE &amp; INTANGIBLE</i>		<i>URBAN SETTLEMENT</i>		
<i>ADAPTIVE REUSE</i>		<i>LANDSCAPE</i>		<i>TOLERANCE</i>	
	<i>REACTIVE</i>		<i>ECONOMY</i>		

## WALKING AMONG THE SPACE-TIME



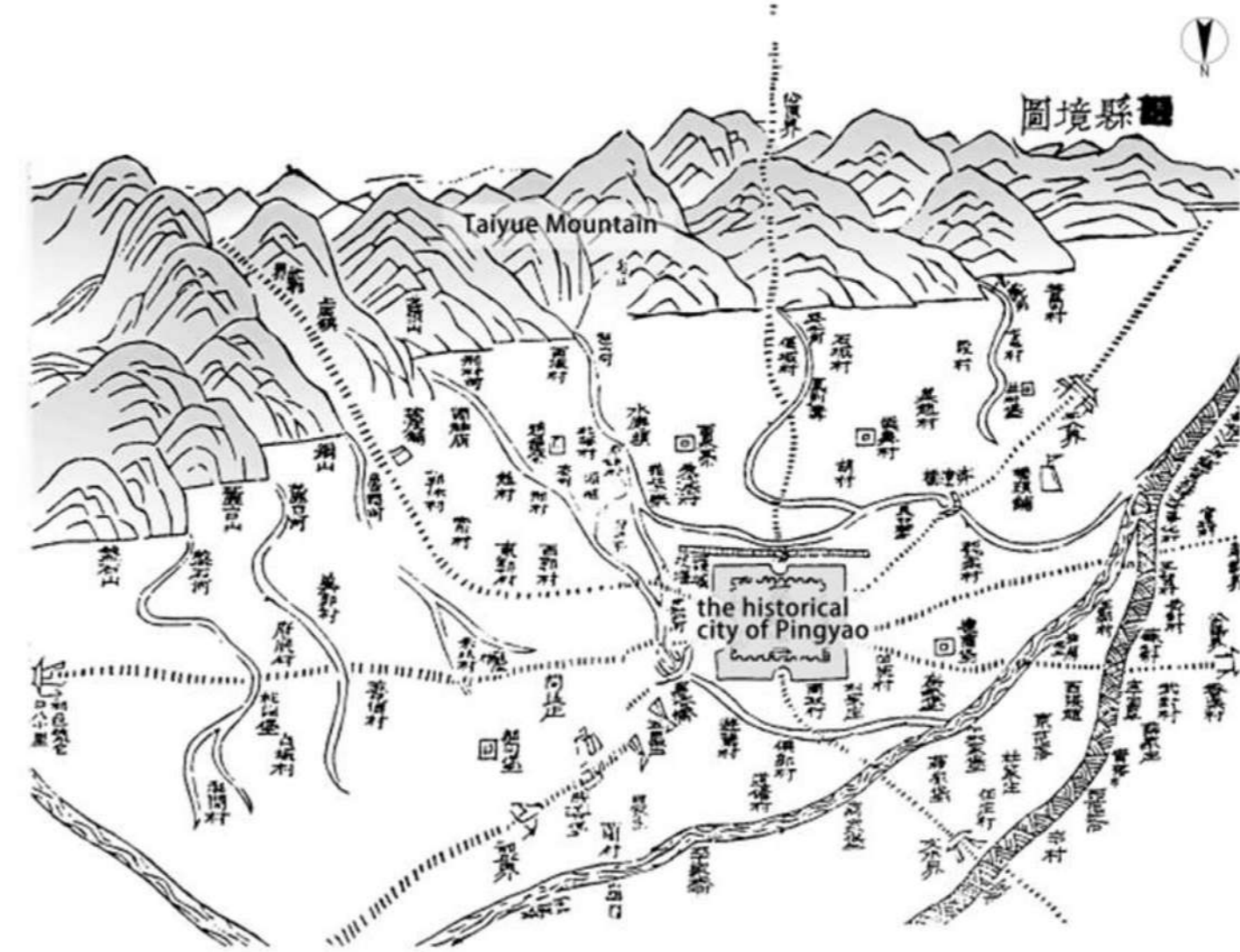
SOCIAL SUSTAINABILITY  
ENVIRONMENT SUSTAINABILITY





The Shanxi is a province in the northern part of China . It is also called Jin from the State of Jin that existed there during the period of springs and autumns.  
The name Shanxi literally means west of the mountains , referring to the province's location west of the Taihang Mountains . Shanxi borders Hebei to the east, Henan to the south, Shaanxi to the west and Inner Mongolia to the north.  
The capital is Taiyuan.

Pingyao or Ping Yao (in Chinese :平遥, Píngyáo) is a county located in the province of Shanxi , in China , about 700 kilometers from Beijing and 80 from Taiyuan . During the Qing dynasty, the old city of Pingyao was the financial center of China. It is famous for its well-preserved walls ; also it has been included in the list of World Heritage Sites of ' UNESCO .



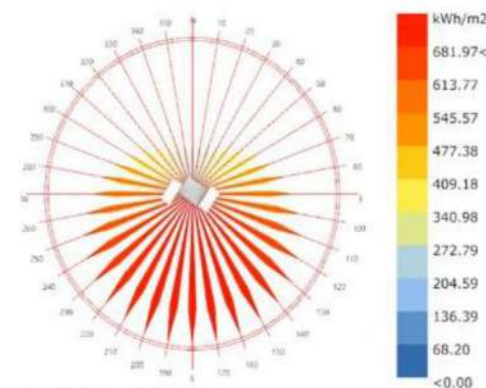
## CITY SCALE ANALYSIS

help us to know about the contradiction in Pingyao, to know its special spirit, to figure out the general direction

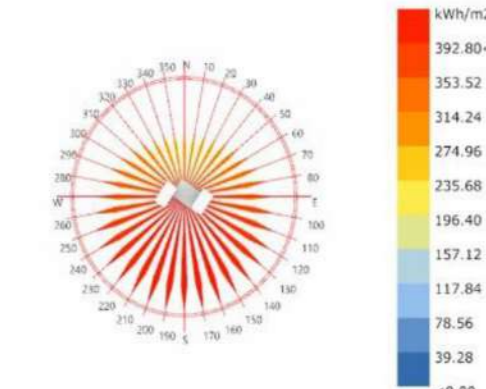
## CITY ANALYSIS---CLIMATE

The city of Pingyao is located halfway along the Fen River on the east bank, which runs through the south of Shanxi province, which in turn is located in the northern part of China. Shanxi has a rather homogeneous territory composed of a narrow plateau between high mountains both to the east ( Taihang Mountains ) and to the west ( Lüliang Mountains). With a continental monsoon climate, Shanxi is quite arid. The climate of Pingyao is temperate. It is cold in winter, often having northwestern winds with little snow and severe fog. In the spring, the temperature varies greatly between day and night, with a little rain and some winds. Summertime is often hot, humid and rainy. Autumn days have falling temperatures with little rain and are cool and clear with abundant sunshine.

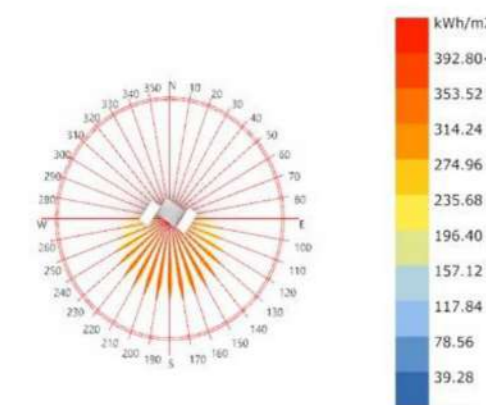




Total Radiation(kWh/m2)  
Pingyao-China 2005  
1 JAN 1:00 - 31 DEC 24:00



Diffuse Radiation(kWh/m2)  
Pingyao-China 2005  
1 JAN 1:00 - 31 DEC 24:00

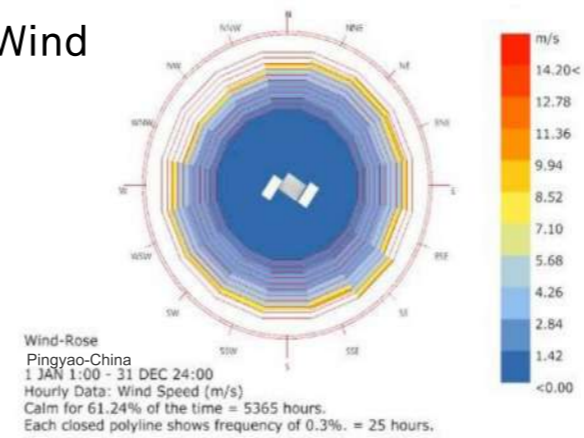


Direct Radiation(kWh/m2)  
Pingyao-China 2005  
1 JAN 1:00 - 31 DEC 24:00

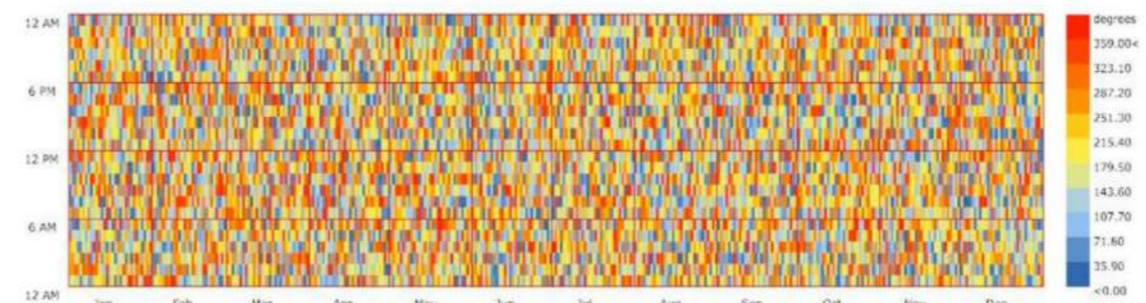
## Solar radiation

The hot season lasts for 4.1 months, from May 8 to September 13, with an average daily high temperature above 76°F. The hottest month of the year in Gutao is July, with an average high of 86°F and low of 67°F. The cold season lasts for 3.0 months, from November 24 to February 23, with an average daily high temperature below 46°F. The coldest month of the year in Gutao is January, with an average low of 14°F and high of 36°F.

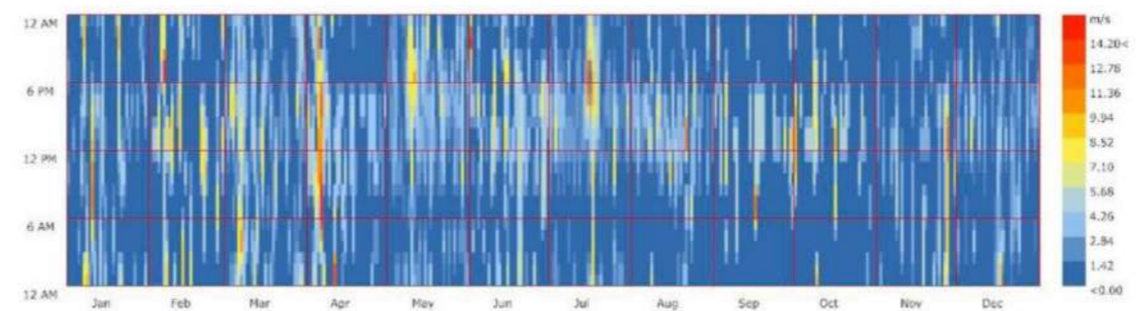
## Wind



Wind-Rose  
Pingyao-China  
1 JAN 1:00 - 31 DEC 24:00  
Hourly Data: Wind Speed (m/s)  
Calm for 61.24% of the time = 5365 hours.  
Each closed polyline shows frequency of 0.3% = 25 hours.



Wind Direction (degrees) - Hourly  
Pingyao-China  
1 JAN 1:00 - 31 DEC 24:00



Wind Speed (m/s) - Hourly  
Pingyao-China  
1 JAN 1:00 - 31 DEC 24:00

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed in Gutao experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 3.7 months, from February 11 to June 3, with average wind speeds of more than 7.7 miles per hour. The windiest month of the year in Gutao is April, with an average hourly wind speed of 9.4 miles per hour. The calmer time of year lasts for 8.3 months, from June 3 to February 11. The calmest month of the year in Gutao is August, with an average hourly wind speed of 6.0 miles per hour.

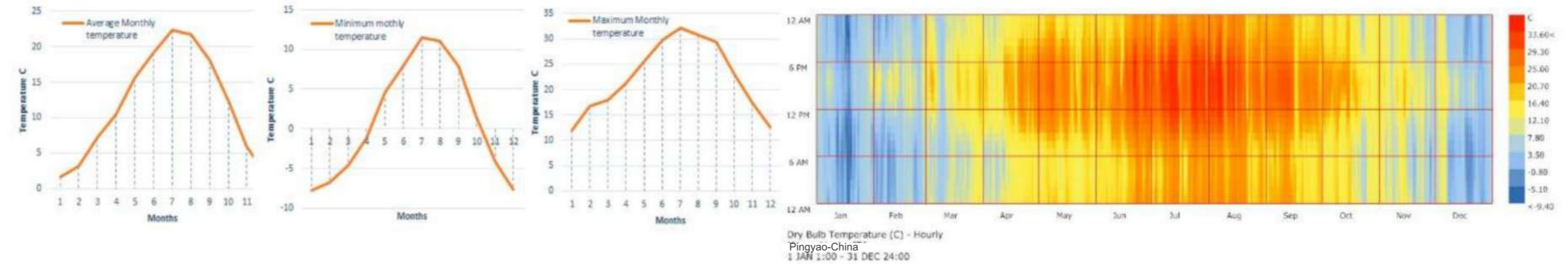
## Humidity

In Pingyao, the average percentage of the sky covered by clouds experiences mild seasonal variation over the course of the year. The clearer part of the year in Pingyao begins around October 13 and lasts for 3.9 months, ending around February 11.

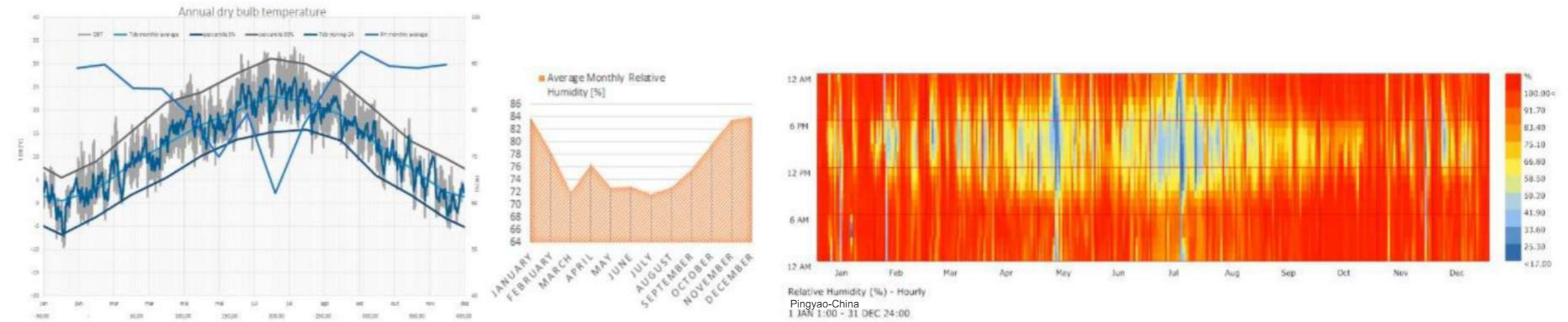
The clearest month of the year in Pingyao is December, during which on average the sky is clear, mostly clear, or partly cloudy 74% of the time.

The cloudier part of the year begins around February 11 and lasts for 8.1 months, ending around October 13.

The cloudiest month of the year in Pingyao is June, during which on average the sky is overcast or mostly cloudy 42% of the time.



Gutao experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 2.2 months, from June 23 to August 31, during which time the comfort level is muggy, oppressive, or miserable at least 13% of the time. The month with the most muggy days in Gutao is July, with 13.1 days that are muggy or worse. The least muggy day of the year is February 22, when muggy conditions are essentially unheard of.





## HISTORY

According to historical documents, the history of Pingyao can be tracked back to 700 B.C when China was in Chou Dynasity with the captial of Gao. The capital city of Gao was often threated by army of the Hun. King Xuan sent General Jipu Ying to fight the Hun. After the enemy retreated to north of Shani, General Jipu Ying quartered his army at the place where is now Pingyao and built a fortress. This was the beginning of the old city. However, the most important part of Pingyao's history began in 1369 A.D when China was in the Ming Dynasty. The importance of its location began to draw more attention from people.

it was one part of the Zhao (state) kingdom according to Pingyao County records, it was the manor of Yao, the king of a tribe in ancient China.

**Warring States period (827-874 BC)**



**Spring and Autumn period**

the city belonged to the Jin State called Ancient Tao

it had the name of Zhongdu Han Dynasty



**Qin Dynasty**  
the city was known as Pingtao

Founded as Pingyao and covering an area of 225 hectares, with a complete building complex including ancient walls, streets and lanes, shops, dwellings and temples. Its layout reflects perfectly the developments in architectural style and urban planning of the Han cities over more than five centuries

**14th Century(Ming Dynasty: Yuanzhan Zhu 1370)**

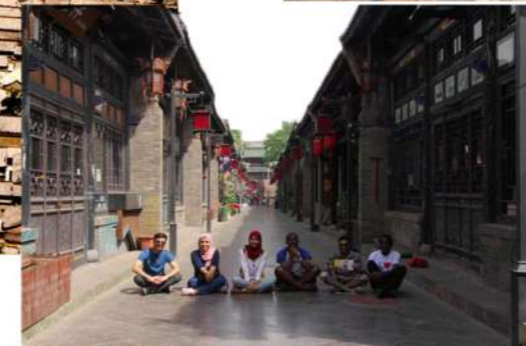


**Ming and Qing Dynasty**

Pingyao was the financial center of China: during the time, the city was home to at least 20 financial institutions, more than half of the entire country. Among them was the " Rishengchang ", considered the first bank of China.

Ancient City of Pingyao was designated a National Historical and Cultural City by the State Council in 1986. It is introduced on the World Heritage List by the World Heritage Committee at its 21st session, meeting in Naples, Italy, 1-6 December, 1997.

**1997-Now**



taken by professor Marco Imperadori in 2017

## CITY WALL

### 1045-256 BC

According to historical records, during the Western Zhou Dynasty the king of Xuan sent his general Yin Jifu to fight invaders from other kingdoms. General Yin placed his troops in Ancient Tao and built defense walls there.

### 1370

The city walls of Pingyao were built in Ming Dynasty by the emperor Hongwu, equipped with six doors with barbican that develop for about 6 km in length with an average height of 10 m. The doors were one on the northern and southern sides, two on the eastern and western sides. This arrangement earned the city the nickname of "turtle city", since the structure of the doors recalls the animal (a head, a tail and four legs). The walls are 12 meters high and have a perimeter of about six kilometers. Outside they are defended by a moat 4 meters deep and as many wide. The walls are equipped with 76 observation towers (including 4 at the corners) and over 3,000 merlons. It represents the 72 outstanding students and 3000 students of Kong Qiu.

### NOW

The part of the southern walls collapsed, but were immediately rebuilt. The city walls are still largely intact and are considered among the best examples of medieval walls.



North gate and gate tower



Southeast corner and platform and turret



Horse face and enemy building

The **brick-and-wood** tower is a lookout, the headquarters of the generals defending the city, and an extremely important place to be as desired shooting base.

The corner platform is a pier that protrudes from the four corners of the city wall and is integrated with the wall. The orientation of the turret is 135 degree to the big wall. Its height and volume of the tower are between the tower and the enemy tower.

Brick and wood structure two-story building Court. The plan of the building is square, covering an area of 27 square meters. The front facade is provided with an arched coupon door and there are brick steps inside. It can lead to the second floor. The second floor has round observation windows on all sides. The building is made of brick, with wooden floor and roof. Xiешan style, five ridges and six beasts. Traditional architectural art is integrated into the military fortress.

The "horse face" is an attached pier in the city wall that protrudes outwards, which not only enhances the firmness of the wall, but also protects the city during battles can eliminate the dead ends of the battlefield. For every 60 meters to 100 meters of Pingyao city wall, there is a horse face. The plane of the enemy building is square, double-layered, with four walls of bricks and a hard top.

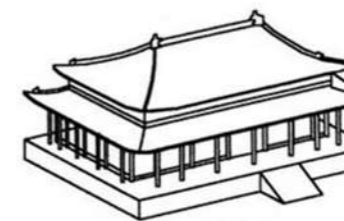
## DIFFERENT ROOF II THE HISTORICAL BUILDINGS



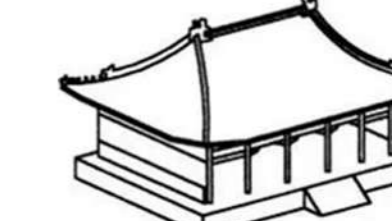
Double-eave hilltop



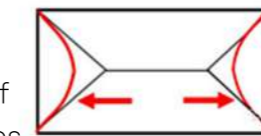
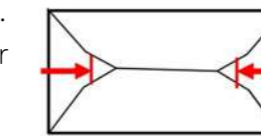
Single-eave hilltop



Double Eaves Hall



Single Eaves Hall



Hard mountain roll shed



Hard mountain ridge



Suspended mountain roll shed



Suspended mountain ridge

## SOCIAL STRUCTURE & TRADITIONAL INDUSTRY

Confucianism has had a powerful influence on Chinese behavior and social structure, providing guidance on the ethical principles of social and political life.

**ACTIVITY LAYER**: contains everyday life, commercial religion and folk-custom of people in this city, which is shaped by the physical structure and natural environment.

**RELIGION LAYER**: contains ideological part of religion, which is shaped by the activity layer.

**RELIGIOUS** power never overcame the civil power, which made the religious culture was always subject to the civil culture. However, this hierarchy played an important part of the everyday life in the city. Religious made their own contribution to Pingyao's traditional culture.

The traditional living style is the spirit of a historic city, so understanding the everyday life and the meeting the requirements of the residents is always the first thing to do.



taken by professor Marco Imperadori 2017

**Paper cutting** played a very important role in the decoration of birth, marriage, funeral and all kinds of folk festivals in Pingyao. There are no school or special places to learn this craft, daughters learned it from their mothers or aunts during the everyday life.



**She huo** is a kind of popular titivating pageants in north China. In Pingyao, it has its unique character, which has a strong local relationship through this kind of parade. It has been an annual event for many years and is the most exciting time for all the local residents. It will be kept alive with ease. Along with it are the arts and crafts of custom making and all the acrobatics shows.



**Pingyao beef**, a local cate of unique beef roasting methods is a perfect chain to close the intangible heritage circle of Pingyao.





## CONFUCIAN TEMPLE(文庙)

Pingyao Confucian Temple is located at No. 120, Chenghuang Temple Street, in the southeast corner of Pingyao Ancient City. It was built in the early years of Tang Dynasty and is the earliest existing Confucian temple in China. The only Jin Dynasty building. The Confucian Temple is attached to the Shaoshan Academy. The late Qing thinker Xu Jiyu once served as the head of the mountain and taught for ten years.

In 1997, Pingyao Confucian Temple, Pingyao Ancient City and Pingyao Shuanglin Temple were included in the World Cultural Heritage. Pingyao Confucian Temple is now a national key cultural relics protection unit and a national 4A-level tourist attraction in China.

The Dacheng Hall of Pingyao Confucian Temple has a rare independent structure in China.

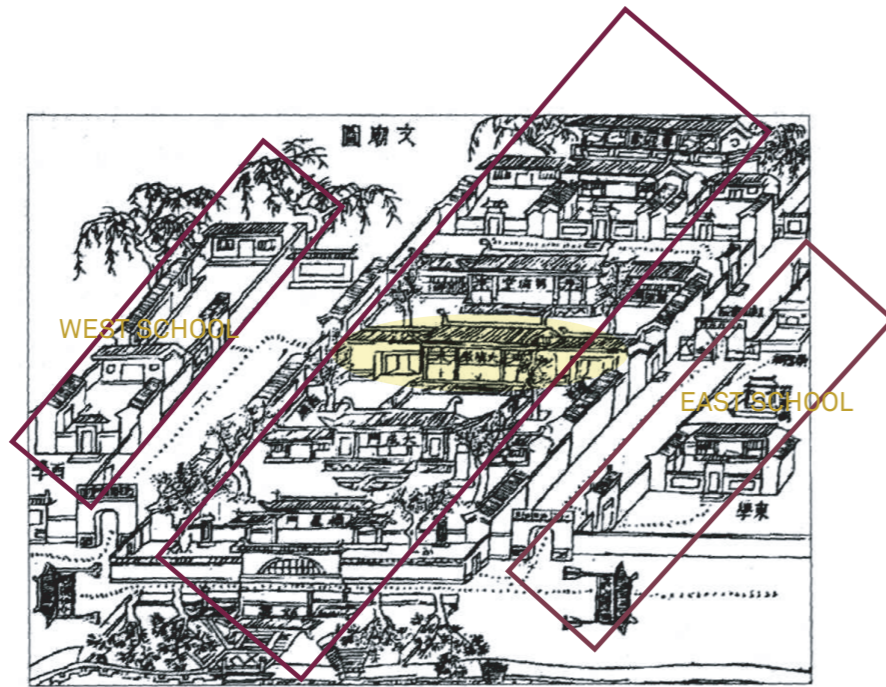
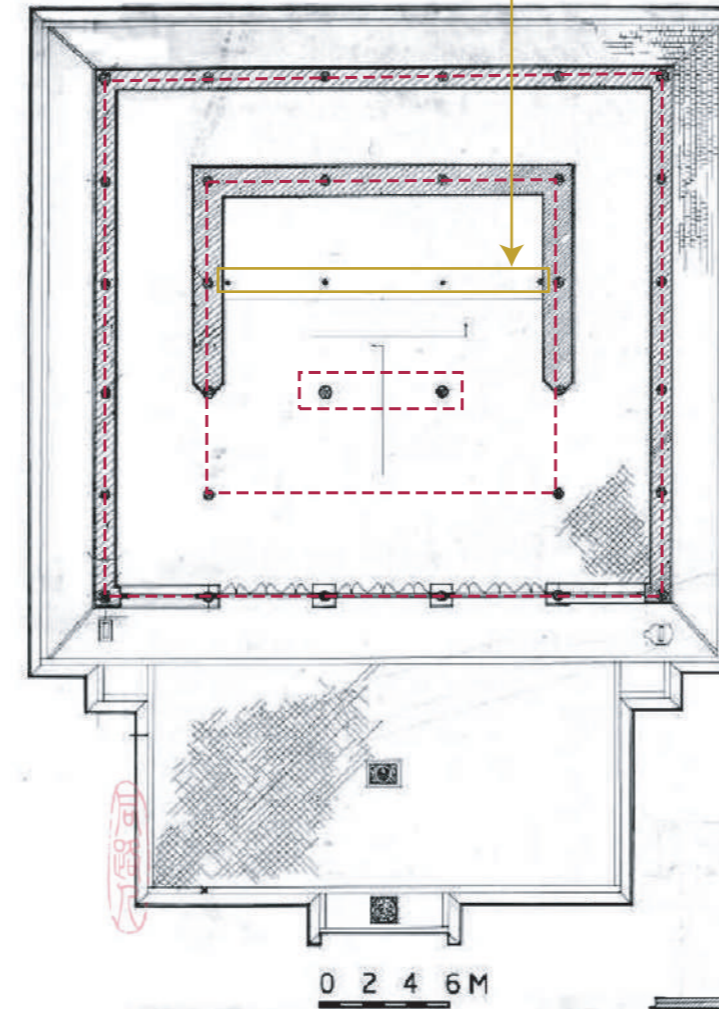
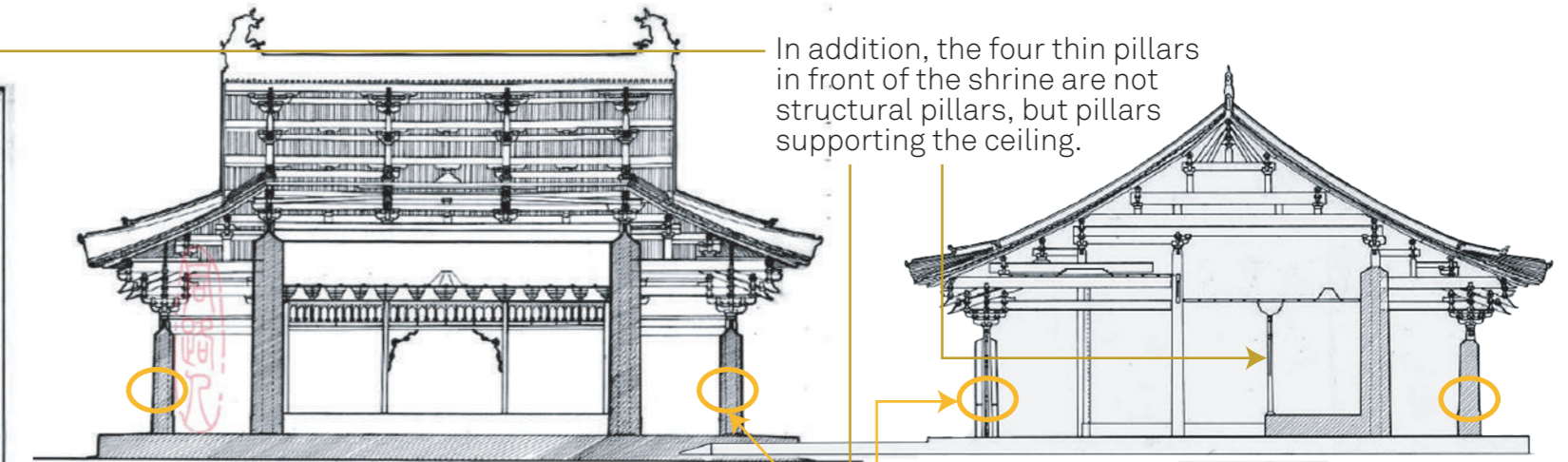


图 11 文廟圖  
(清光緒八年《平遙縣志》版)  
source: 《Pingyao ancient city record》

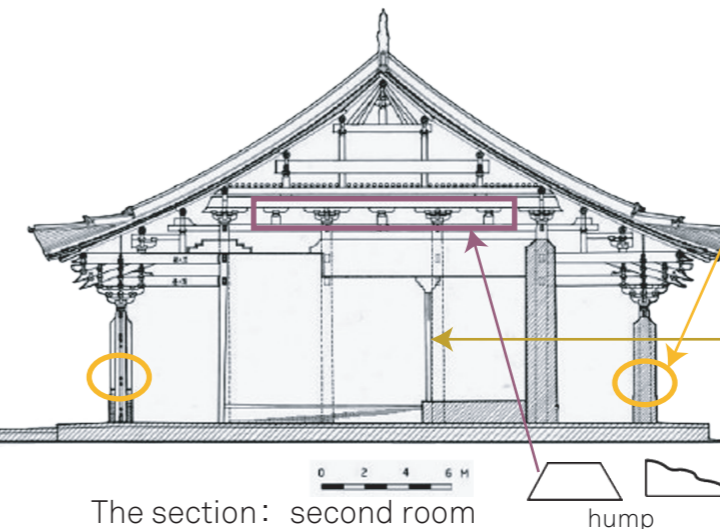
The overall layout of the Confucian Temple shows the unique regulations of the Confucian Temple architecture since the Yuan and Ming Dynasties in China. And it is composed of three buildings side by side.



The column network structure of Dacheng Hall has 20 eaves columns in the outer ring and 12 gold columns in the inner ring. The prototype should be the typical "Hui"-shaped gold box and bucket bottom groove form, but it adopts subtractive column method to extend the space.



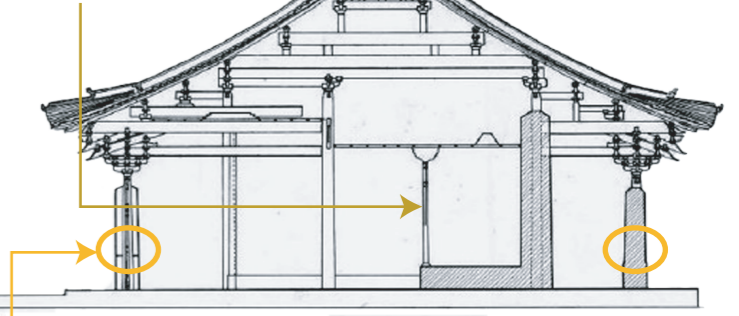
The front section of the Dacheng Hall  
(source: the manuscript of Mr. Zuo Baoguo)



The section: second room  
hump

It can see the double-column system of the outer groove, and it can also be seen that the beam compartment above the ceiling did not use the popular hump at that time, only used the non-belt joint. Step on the big bucket of Shu pillar to reduce the pressure on stigma.

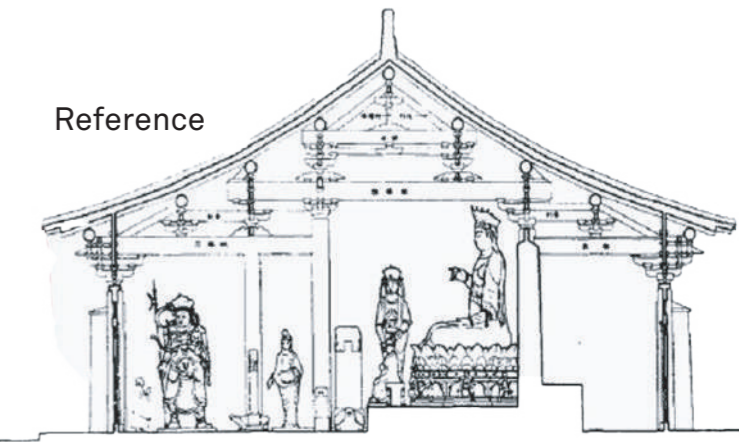
In addition, the four thin pillars in front of the shrine are not structural pillars, but pillars supporting the ceiling.



Section: the Ming Room in the Dacheng Hall

The golden pillars in the Ming Room are displaced inward by two rafters. Like the Three Great Hall of Fame, it can also be seen that the six rafters in the Ming Room are thickened double rafters to solve the problem of large span.

## Reference



Section: the Ming room of the three main halls of Guangji Temple in Baodi

(source: Liang Sicheng's "History of Chinese Architecture")

the golden pillars of the Ming room are shifted inward by one rafter to expand the worship area.

## RESIDENTIAL BUILDINGS

Residents are closely related to people's lives. Traditional residents are a frozen history. The prosperity of the urban economy has contributed to the development of the construction industry and the continuous improvement of the level of construction technology. Emerging businesses need to build new competitive stores with new functions, and residents who have made their fortunes build large-scale construction projects.

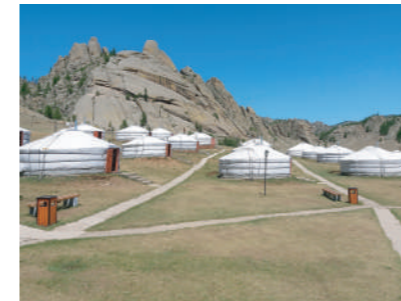
Under the shackles of feudal ethics and under the control of the philosophical concept of "harmony between man and nature", the ancient residents inherited the construction methods of early buildings, coupled with many factors such as climatic conditions, geographical environment, lifestyle for long history and natural resources, showing a strong local specialties, mainly categorized into five parts, like Courtyard houses in North of China (Beijing, Pingyao), cave dwellings on the Loess Plateau in the northwest, ancient dwellings in Anhui, Halla tulou in Fujian and Guangdong, and Mongolian yurts, etc.



Beijing

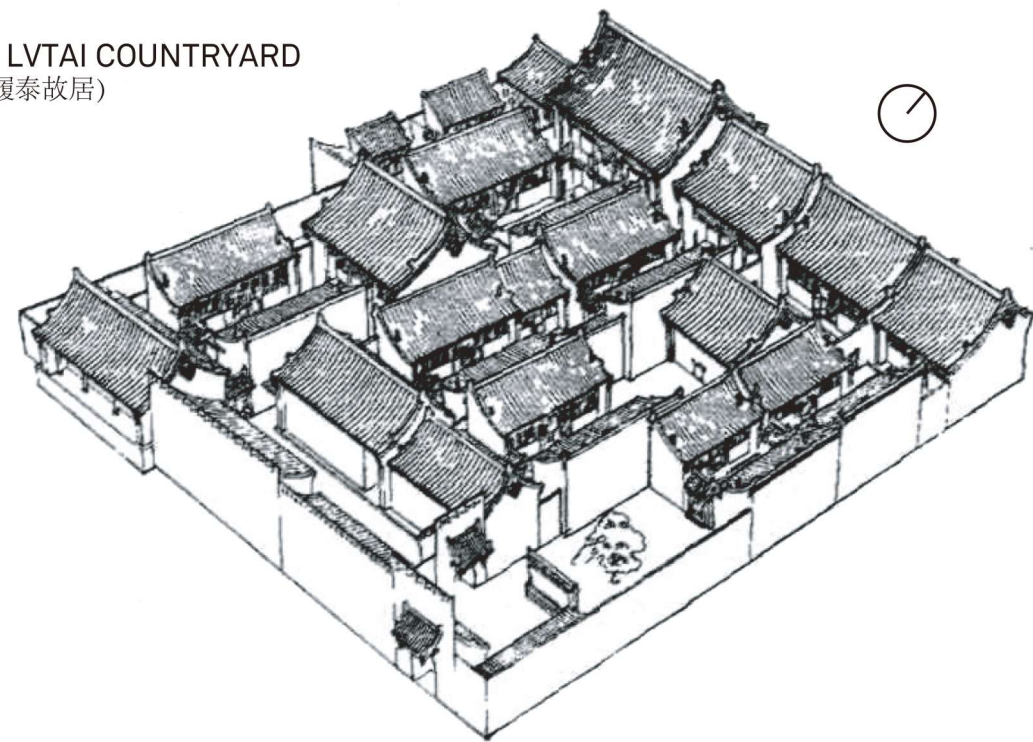


Anhui



Mongolian

LEI LVTAI COUNTRYARD  
(雷履泰故居)



RESIDENTIAL BUILDINGS(Pingyao)

The ancient residents of Pingyao, which originated under the ancient patriarchal and ritual system, were based on "ceremony", emphasized squareness, strong vertical and horizontal, and balanced and symmetrical. In the configuration of the house, the elders and the younger are in an orderly manner, and there is a distinction between the seniors and the juniors. All the residents are the closed courtyards, quadrangle courtyards and their groups.

And the location, orientation, layout, regulation, building configuration and architectural sketches of residential buildings reflect the concept of Feng Shui that has been passed down from feudal society to the present. In the folk architecture of Pingyao Ancient City, the concept of Yixue is far from an addition but the soul of architecture.

It is located at No. 11 Shuyuan Street, facing south, and it is condensing. It was established during the reign of Daoguang in the Qing Dynasty, covering an area of 3888 square meters. The founder of Rishengchang, the first bank account in China in the Qing Dynasty. The former residence consists of four self-contained and interconnected courtyards, namely the East Courtyard, the Middle Courtyard (commonly known as the West Courtyard), the East Side West Courtyard, and the West Side Courtyard. The Central Plains is the main part of it, which is magnificent and belongs to the typical "Three Ridges and Two Court Halls" style in Pingyao. The east and west wing rooms of the inner and outer courtyards correspond to each other in threes and threes, and are in good order. The building materials of this yard are huge, the style is rough, and the auxiliary facilities are decorated with bricks, wood and stone. The four sides of the courtyard were originally made of iron skynets with copper bells on them to prevent thieves.



## CURRENT SITUATION FOR UNPROTECTED RESIDENTIAL BUILDINGS

Pingyao City has a flat terrain, regular streets, and good geographical conditions for horizontal integration or vertical expansion of courtyards. A variety of courtyard groups provide space for residents to live together. The layout of traditional courtyards is divided into four types: **single-entry triplex or quadrangle, series type, parallel type and hybrid type.**

Residents are mainly in wooden frame houses with beams. Every house has a platform foundation and the courtyard is enclosed by several single buildings.

The courtyard is surrounded by clear-water brick walls, and the roof is a single-slope tile roof that is inclined to the courtyard. The walls facing the street are not open with windows.

The local temperature difference is large, and thick walls are built on the hillside and rear eaves of each single building to keep out the cold and heat. The inner wall is made of adobe bricks, and the outer wall is made of blue bricks. The local area is rich in bituminous coal but lacks anthracite coal. In traditional living rooms, a heated kang is built on the side by the window. The heated kang has the dual function of a bed and a flue. The stove on the kang is used for heating in winter and cooking for small families.

The roof is overlaid, the grass-mud are thick, the simple tiles are combined with tiles, hooks, dripping water, and ridge decorations are all available.

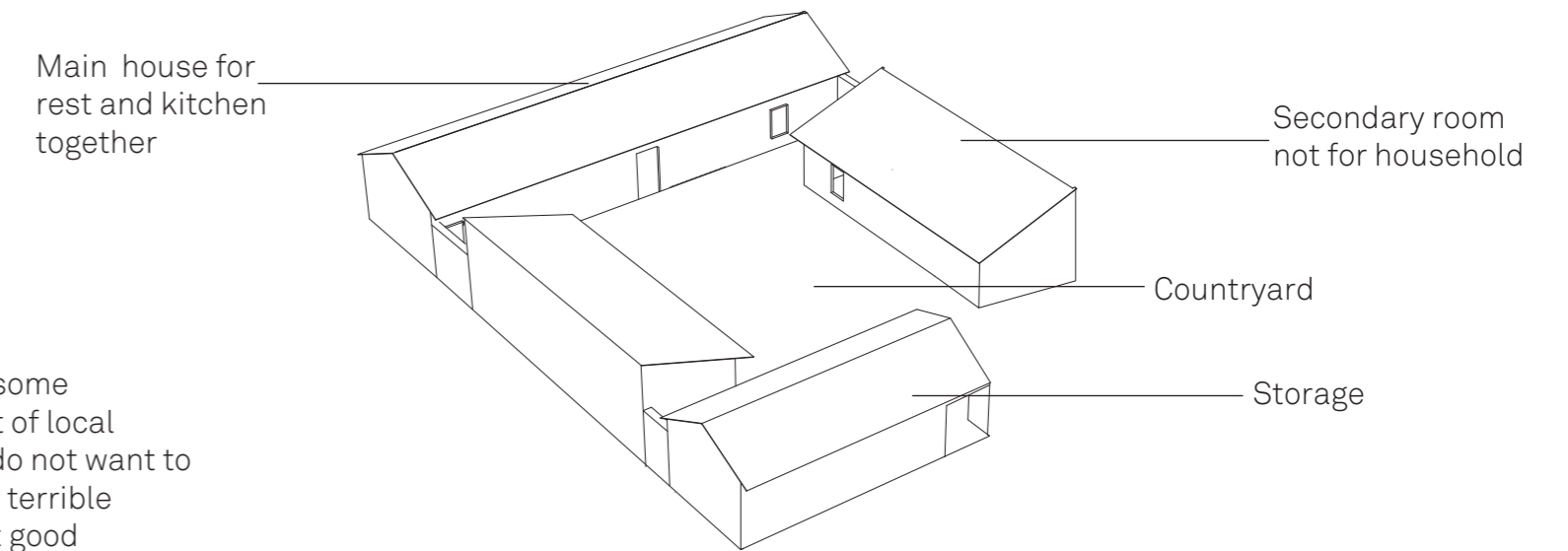


taken by Professor Marco Imperadori

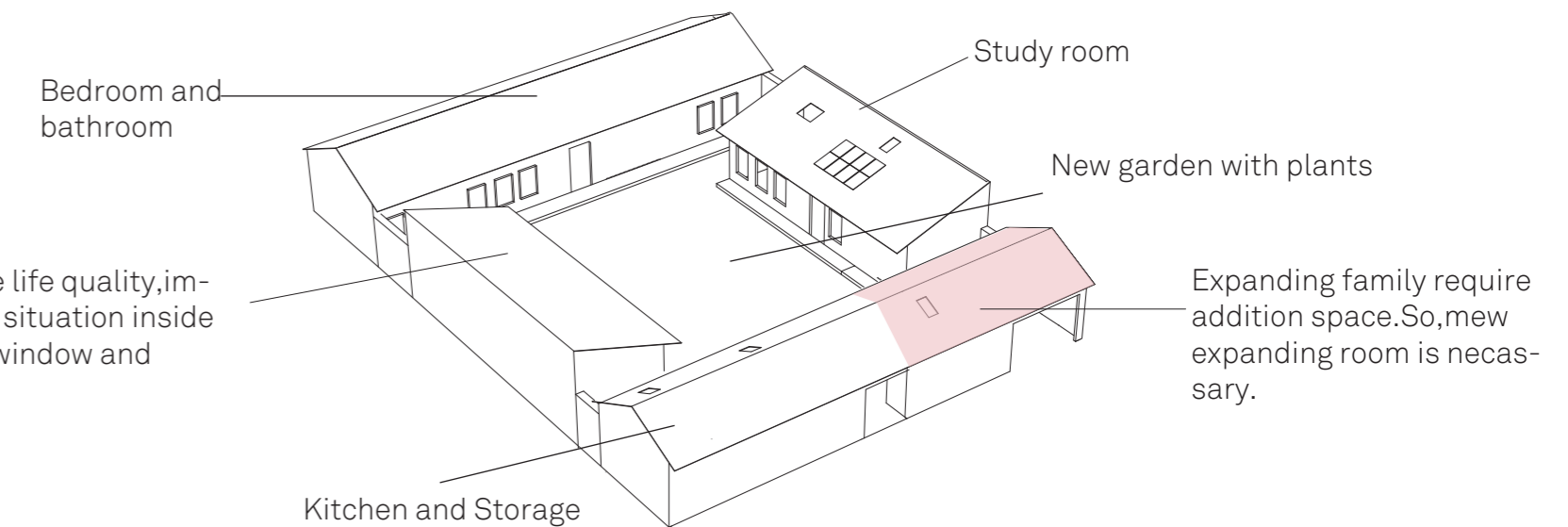


## ARCHITECTURE CHANGE

Based on the city view because of some heating system is broken and most of local residential people moved out and do not want to continue to live here because of its terrible physical situation, like wetness, not good daylight and functions in the courtyard is not good, where the public and private space is not separated.

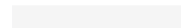









In order to improve life quality, improve the physical situation inside room, enlarge the window and open skylight



## ACCESSIBILITY ANALYSIS

### Legend

-  Building area
-  Blue
-  Limited area
-  Railway
-  Main-road
-  Second-road
-  Pedestrian/  
Bicycle
-  Stop points/  
parking



From this map, it shows that it is convenient to arrive in Pingyao, the infrastructure is good. And there are some parking in the north, south and west, but on the east part, there are not parking and it is not cultivated, which is close to river. And in the city center, there are not specific parts for Bicycle especially.

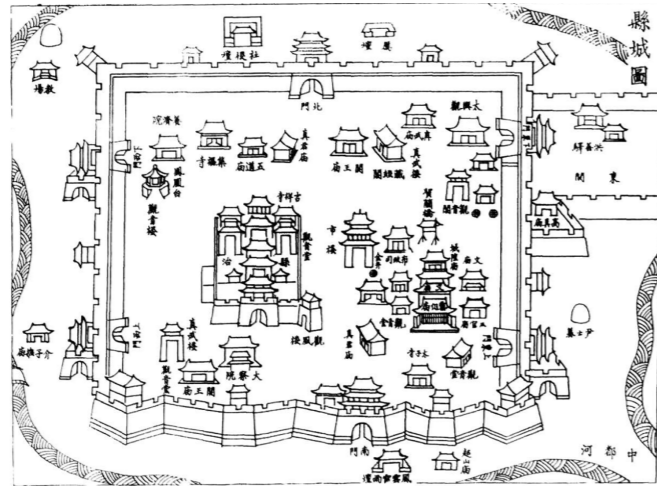


## CITY FABRIC

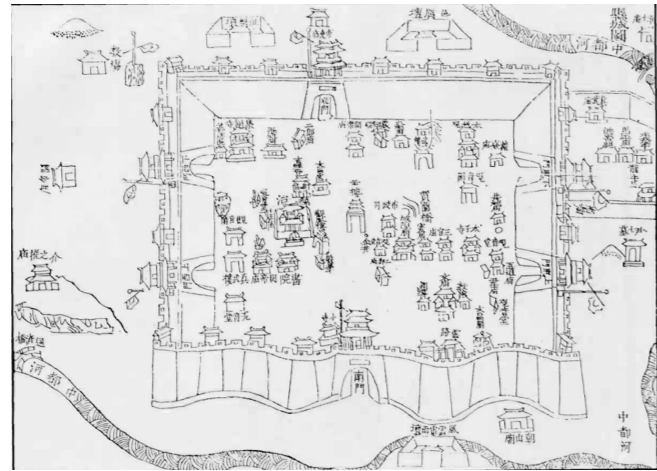
The whole city is located in the southeast in 15 degree,like cramping turtle,so it called “龟前戏水，山水朝阳，城之攸建，依此为胜”，it is built with mountains and water ,which reflects Taoist thought in a Yin-yang system to show that ancient city designers already respect the nature.

Inside the city,the layout is according to the specific principle of ancient Chinese city design,the north and south is organized straightly,and other two sides are facing to each other,following the unique psychological and moral ideas---Confucian thought ,which once underpinned behavioral rules,was projectd onto the built environment in China.

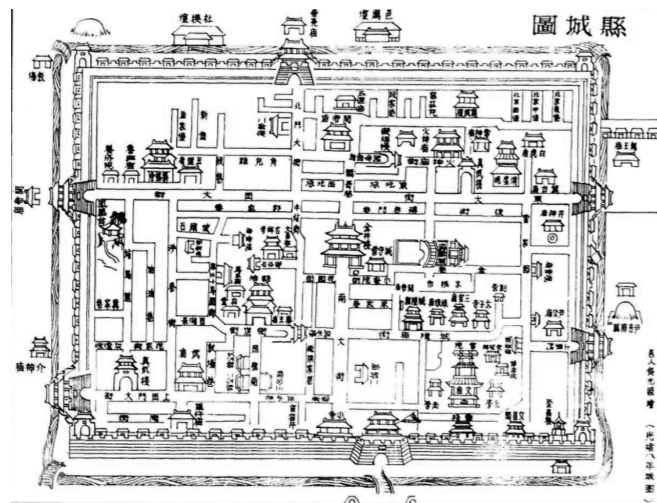
“左祖右社，文武相遥” to show that ancient people already respect the “天地” “阴阳” ,It totally reflects the Chinese traditional feudal hierarchy thoughts and the orthodox ritual system,like ideals for the city rules “筑城以卫君，造郭以为民” ,the whole layout shows ancient Chinese thoughts, which follows the principle of organization and the system of property and ceremony.



Ming dynasty



Qing dynasty Kang Xi



Qing dynasty Guang Xu

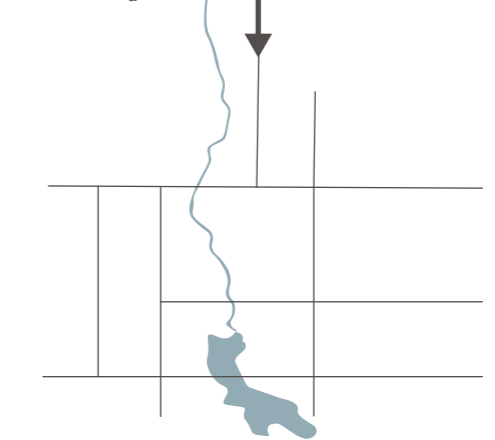


An understanding of the cosmic principles through the five elements of wood,fire,earth,metal and water is used to express the essence of the Yin-Yang system.

From the map,the city is viewed as a mini-cosmos,with the five elements representing the four cardinal points and the center (east for spring,wood,dark blue; west for autumn,metal, white; north for winter,water,black; south for summer,fire ,red; center for late summer,earth,yellow) The Confucius temple is located in the east,respecting sunrise,spring,green and wood;while the Warfare temple is situred in the west,symbolizing the sunset,autumn,white and metal.



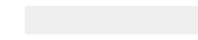








City fabric is formed by the road and river.



From the shape of ancient city,Pingyao,the plan fabric shows the layout of the roads,it really follow the construction geomancy of ancient China,like ‘土’ or ‘王’ , which is the main traditional ideans,reflecting the emperor’s thoughts vividly. And the fabric mainly is in retangular.

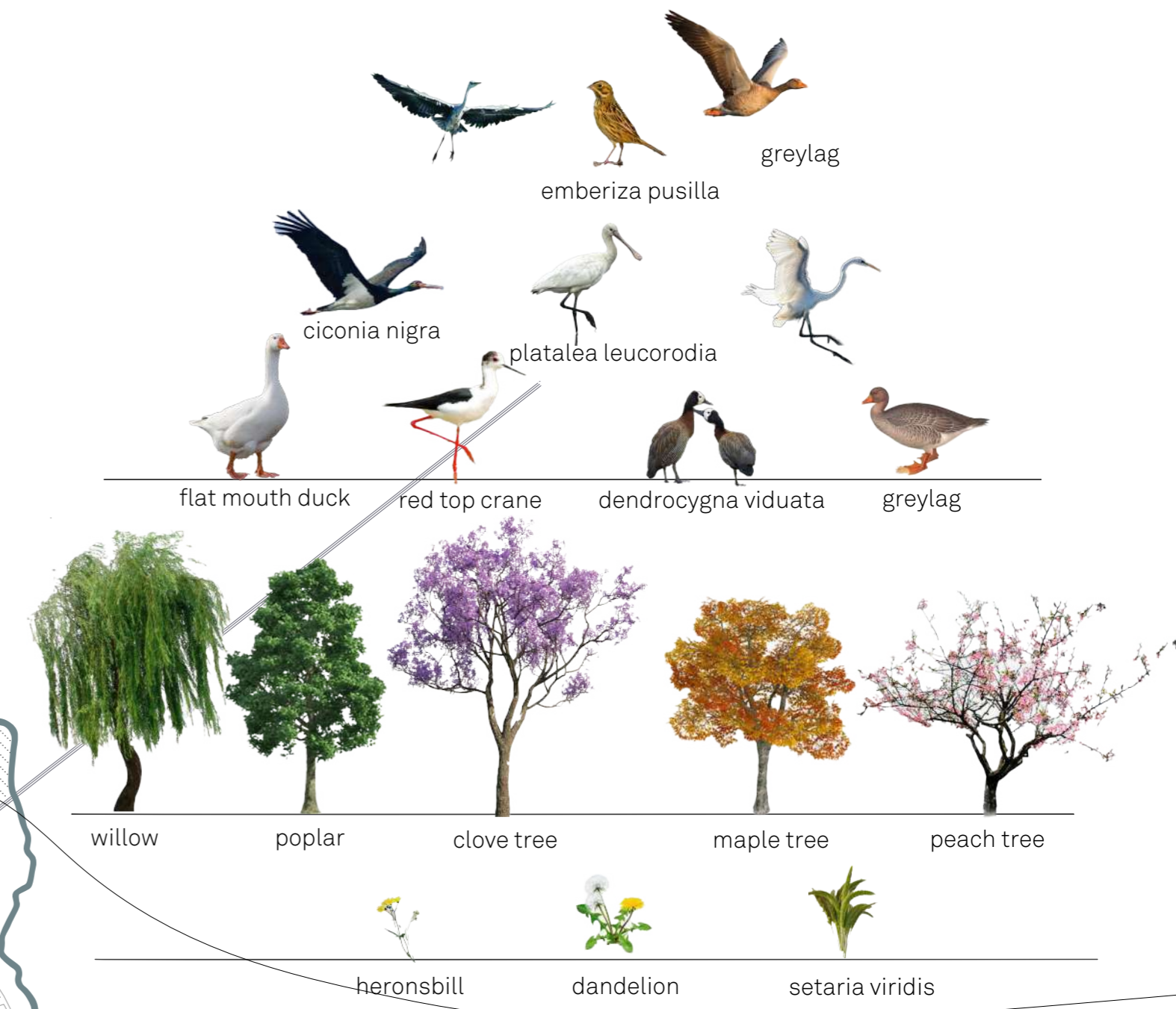
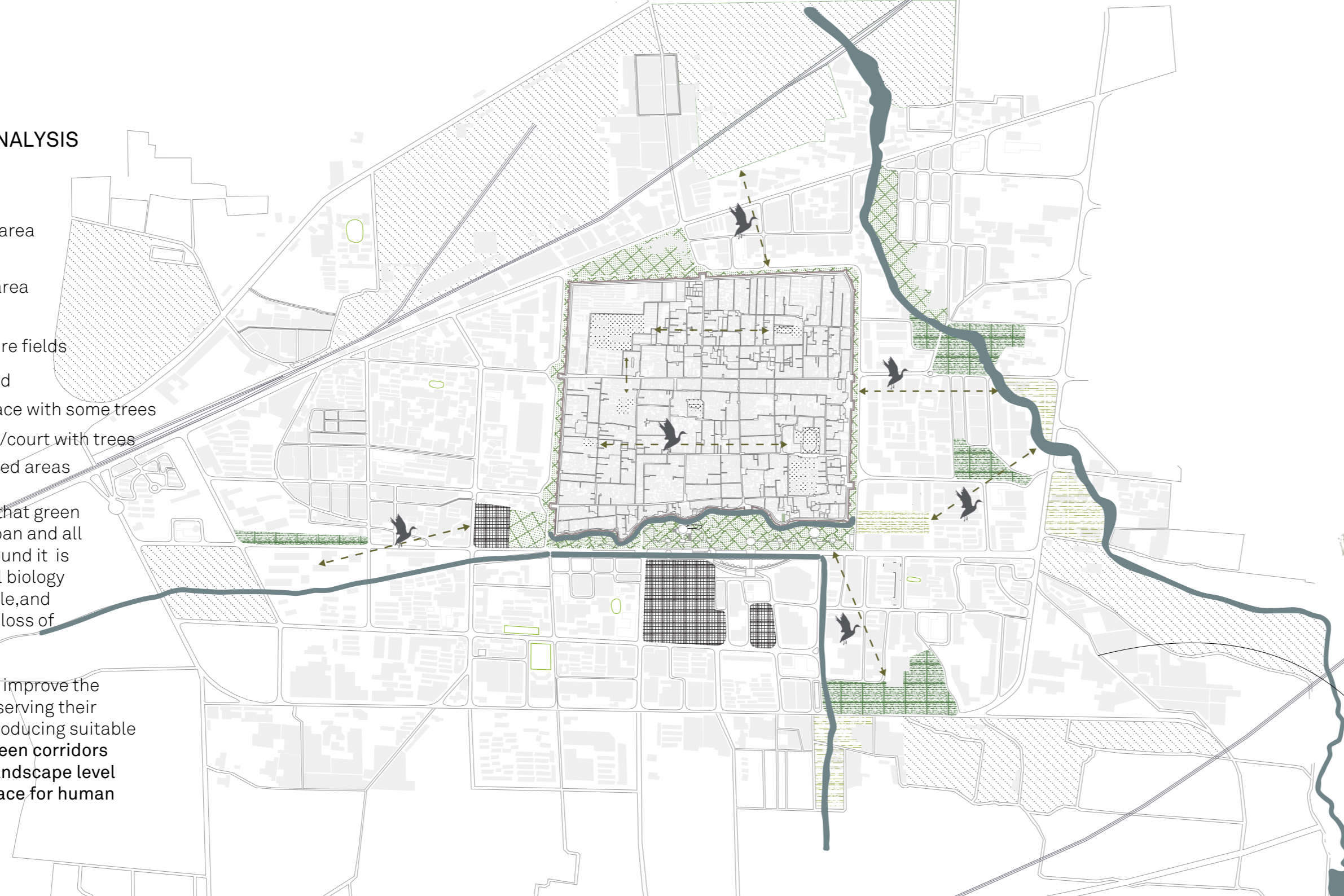
## GREEN AND BLUE ANALYSIS

### Legend

-  Building area
-  Blue
-  Limited area
-  Park
-  Agriculture fields
-  Grassland
-  Open space with some trees
-  Sole tree/court with trees
-  Abandoned areas

From this map, it shows that green density is little in the urban and all of these green space around it is interrupted, so the total biology system is not in one whole, and soil erosion because of loss of vegetation,

So it is very important to improve the biodiversity through preserving their life habitats through introducing suitable plants, like **introducing green corridors and linear park** in the landscape level to create interaction space for human being and nature.



flat mouth duck    ciconia nigra    red top crane    platatea leucorodia    emberiza pusilla    dendrocygna viduata    greylag

willow    poplar    clove tree    maple tree    peach tree

heronsbill    dandelion    setaria viridis

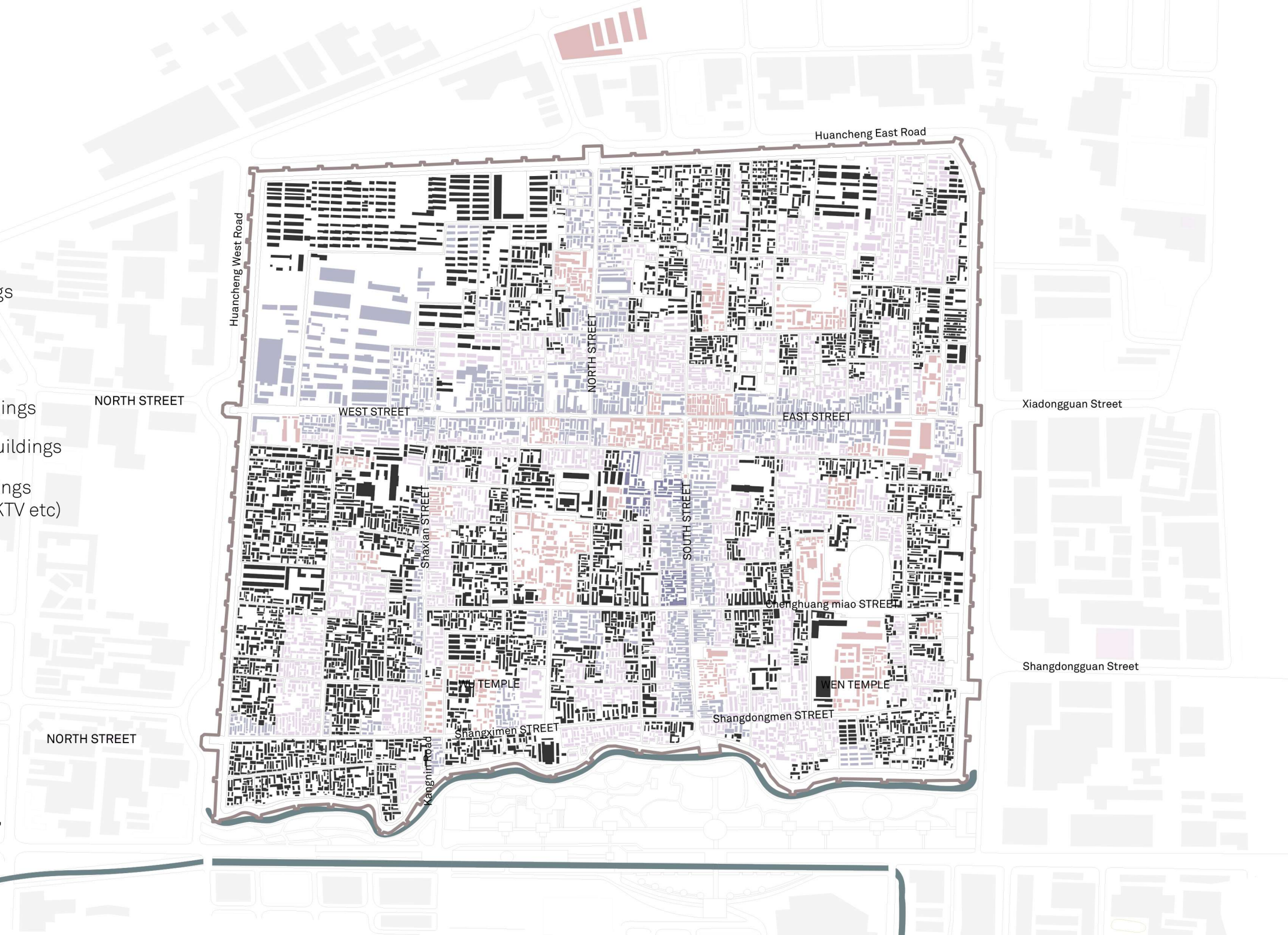
## BUILDING SITUATION ANALYSIS

### Legend

- First-protected city wall
- First-protected Cultural buildings
- Important commercial buildings
- Normal commercial buildings
- First-protected residential buildings
- Second-protected residential buildings
- Non-protected residential buildings (most of them are as hotel,bar,KTV etc)
- Other new-built buildings

According to the book《Record of Pingyao》, these buildings are categorized into 6 levels to be protected.

From this map, it shows the urban densification phenomenon, NO space for community or leisure, and there are a lot of normal residential buildings, which are not protected and some of them destroyed and need to be regenerated. And there are a lot of previous residential buildings are transformed into hotel, bar or KFC, which some of them need to be recovered into residential buildings.



There are 15 cultural buildings as the first-protected heritages, like City, Wen Temple, Wu Temple and others.



There are 5 commercial buildings as the second-protected heritages, like, 日升昌票号旧址, 协同庆钱庄, 长泰永绸缎庄旧址 and others.



There are 12 famous residential buildings as the second-protected heritages, like Lei Futai, Ji, Hou Dianyua and others.



There are 376 normal residential buildings as the second or third protected heritages.

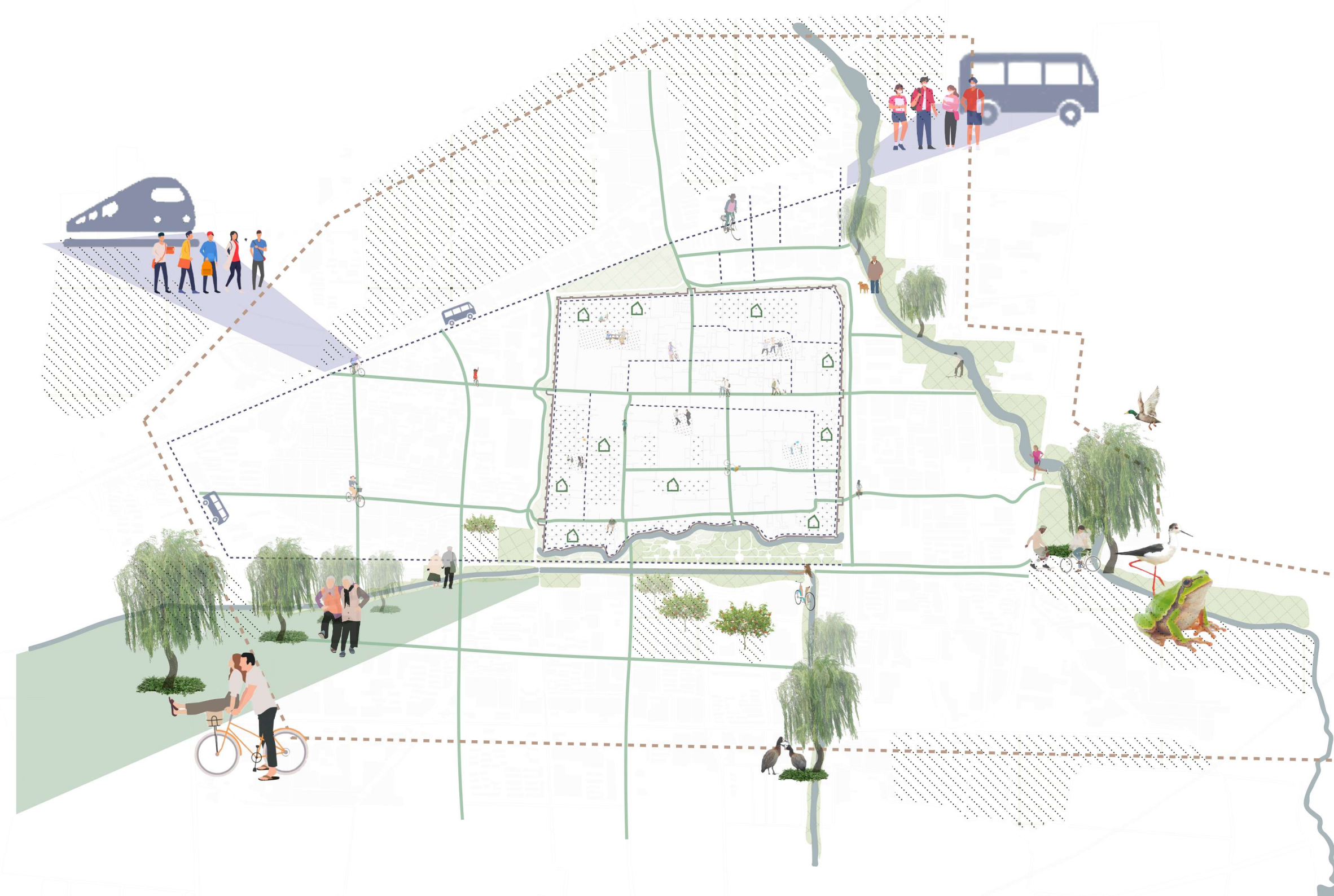


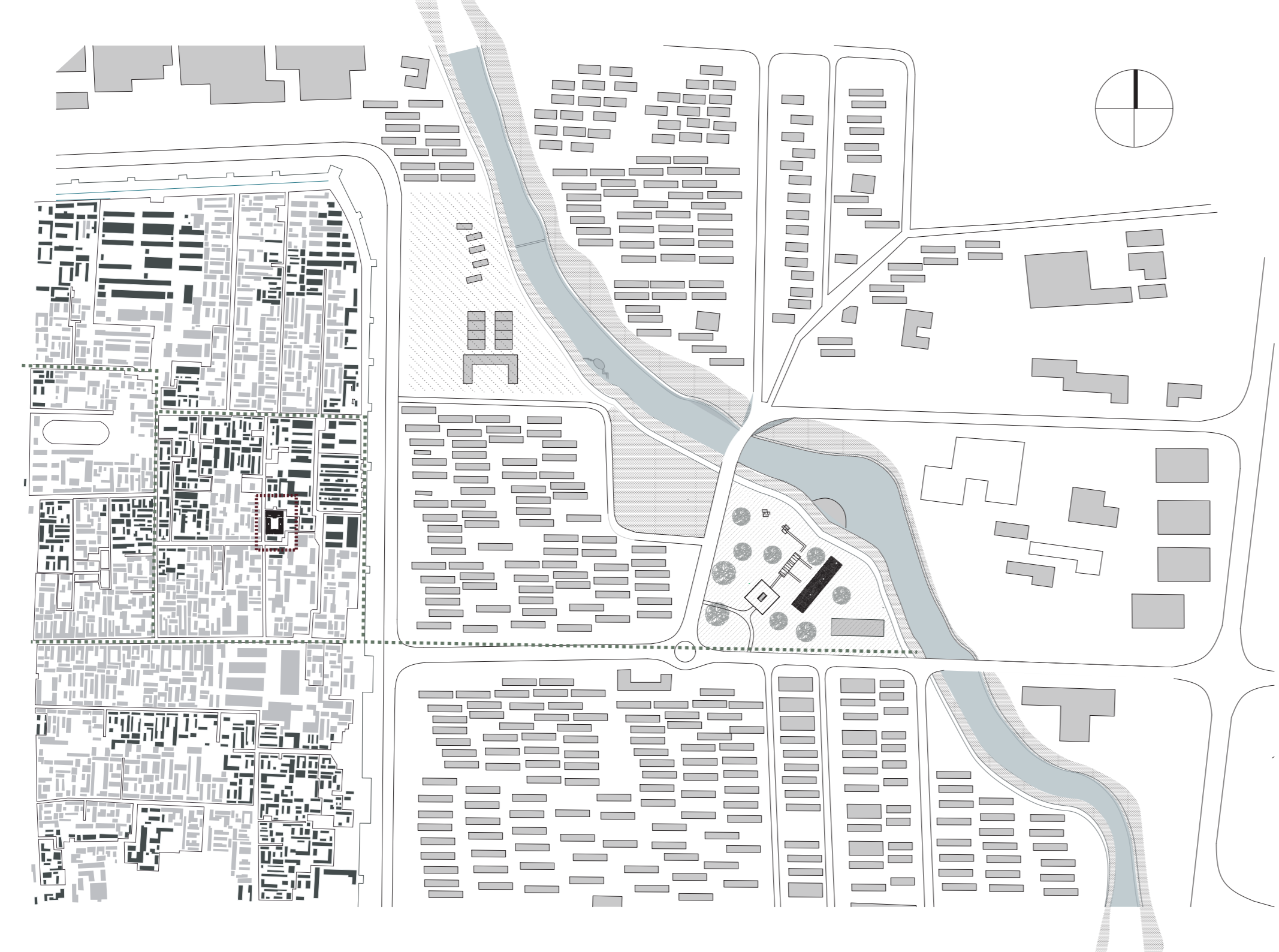
## ACTIVING THE CITY DEEPLY

Investigations before revealed the city as a complex adaptive system had areas that could be improved. The study of the accessibility and transportation revealed the disconnected between the supply and demand for transportation. And, the effects of climate change and the study of the green and blue showed the whole biosystem around the city is disconnected. In addition to this, in the context of the city, there is nearly not public space for local community.








Through further study of SUSTAINABILITY themes in relation to the city hinted at major prototypes projects that could enhance the city as whole. These strategies while improving on the sustainability of the city would seek to address the major identified problems of the city.

The concept diagram explores the lives of this city for local people and tourists. All of these actions would benefit from the activeness of connecting the city. The prototype take into account the Historical values and bicycling culture of the city. From the philosophy of space of Chinese history to be sustainability to interact human and nature to return BALANCE(“天人合一”)  
With these as basic bones of the concept masterplan, the lives of local habitats are intertwined and nourished.





**GENERAL MASTERPLAN  
1:5000**

-  Pro-Regenerated residential buildings
-  Example of Pro-Regenerated residential buildings
-  Tourist center
-  Green corridor
-  Linear park
-  Community garden(farm market )
-  Other buildings

**CONCEPT**

From the space level, to be sustainability to interacte human and nature to return BALANCE.(“天人合一” )

**1---HOW TO ACHIEVE SOCIAL SUSTAINABILITY ?**

connection among human being?  
 To make local people stay here rather than making it into one isolated  
 ---building is solid  
 ---atmosphere is virtuality  
 community (adding Public space to hold some traditional activities inheritages culture to active their memory about the culture

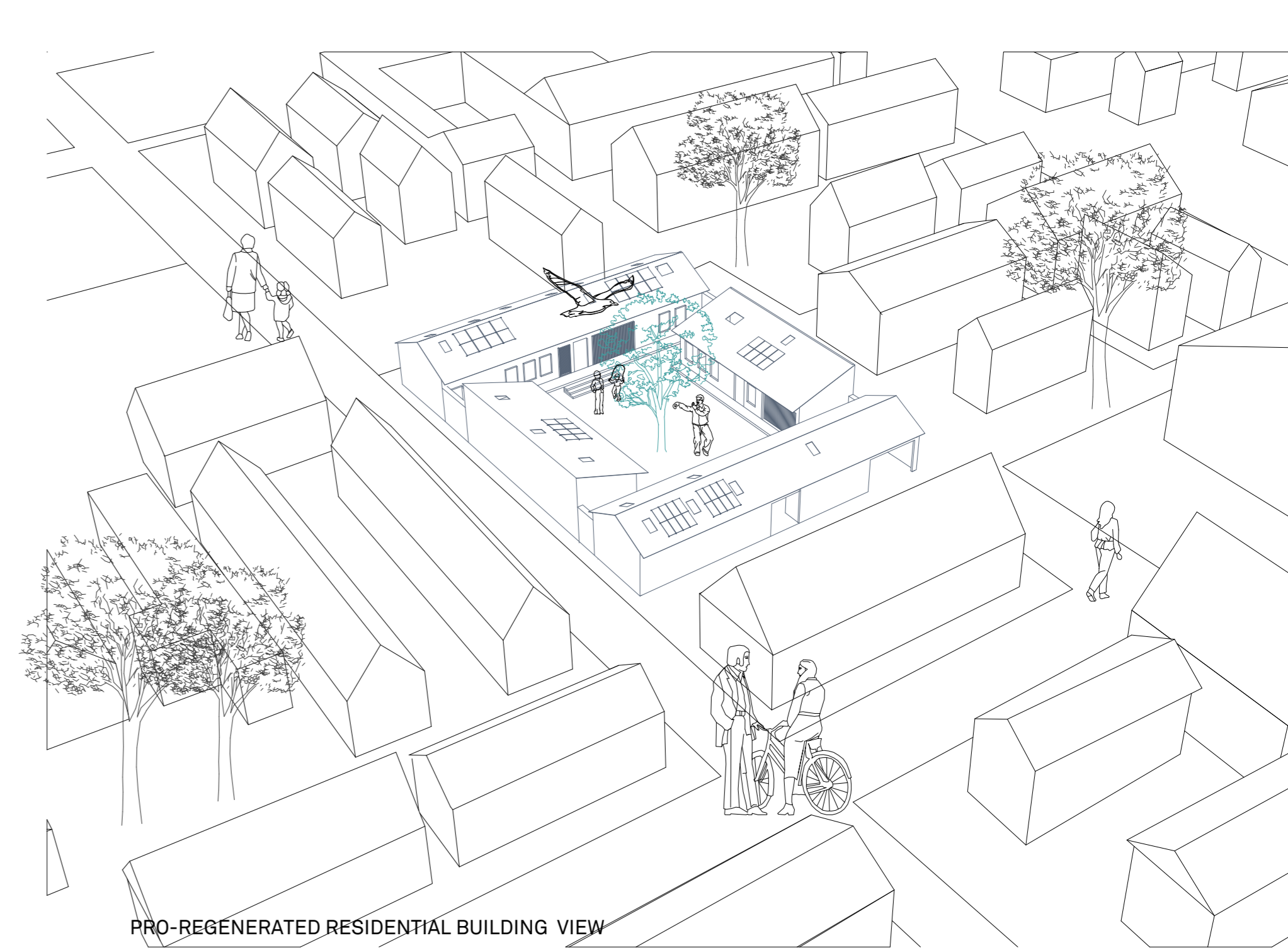
**2---HOW TO ACHIEVE ENVIRONMENT SUSTAINABILITY?**

connection between human being with nature?  
 landscape level:1---green corridor (to connect and provide the living habitat for local species to return flexible biodiversity to reduce the FLOODING?)  
 To show the natural power  
 2---linear park around river

architecture level:green roof on some buildings



PROJECT VIEW



PRO-REGENERATED RESIDENTIAL BUILDING VIEW

## LINKING THE CITY

### GREEN CORRIDOR

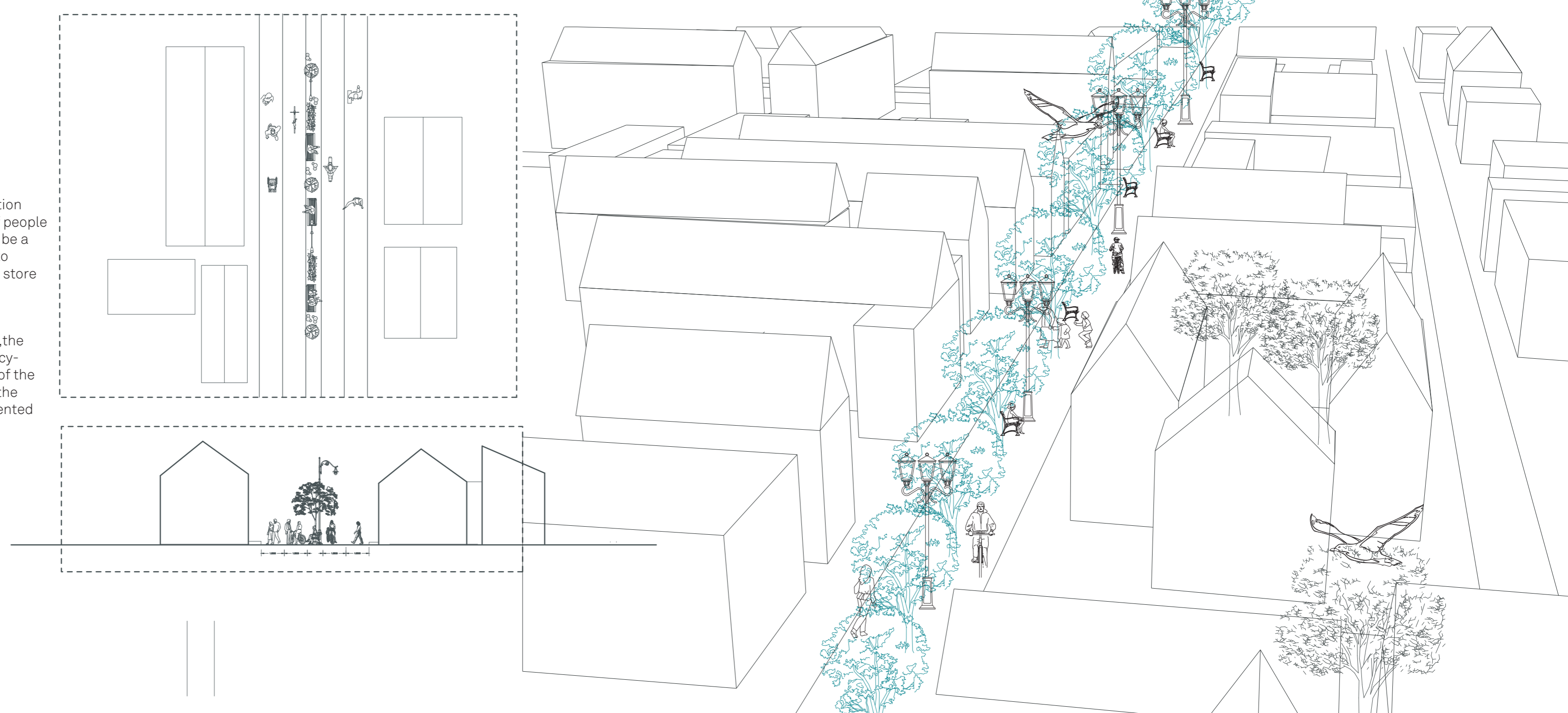
Green corridors were introduced within the city. This location was considered best as it has high possible volumes of people congregating on a regular basis. The green corridors would be a system on one-way traffic that give higher importance to pedestrians, cycling, and also foster the introduction of store fronts and connection to the nature.

### SOFT GREEN CORRIDORS

While the CCRT looks at linking humans using transport, the green corridors seek to look at the alternative, walking, cycling, and nature. This option is explored in the vicinities of the city center. The green corridors are brought alive due to the introduction of store fronts and plants. This is complemented by the seating and tree canopies.

### Multilayered Green corridors

The green corridors combine multiple uses layered and juxtaposed. Side by side, resting spaces in the form of seats and tree canopies complement the busy active streets. The busy streets are further juxtaposed by the store fronts that provide the reason for stops. The introduction of shops within these sections of the city also give the streets a secondary life when actual neighborhood residents are away.



## LINKING THE CITY

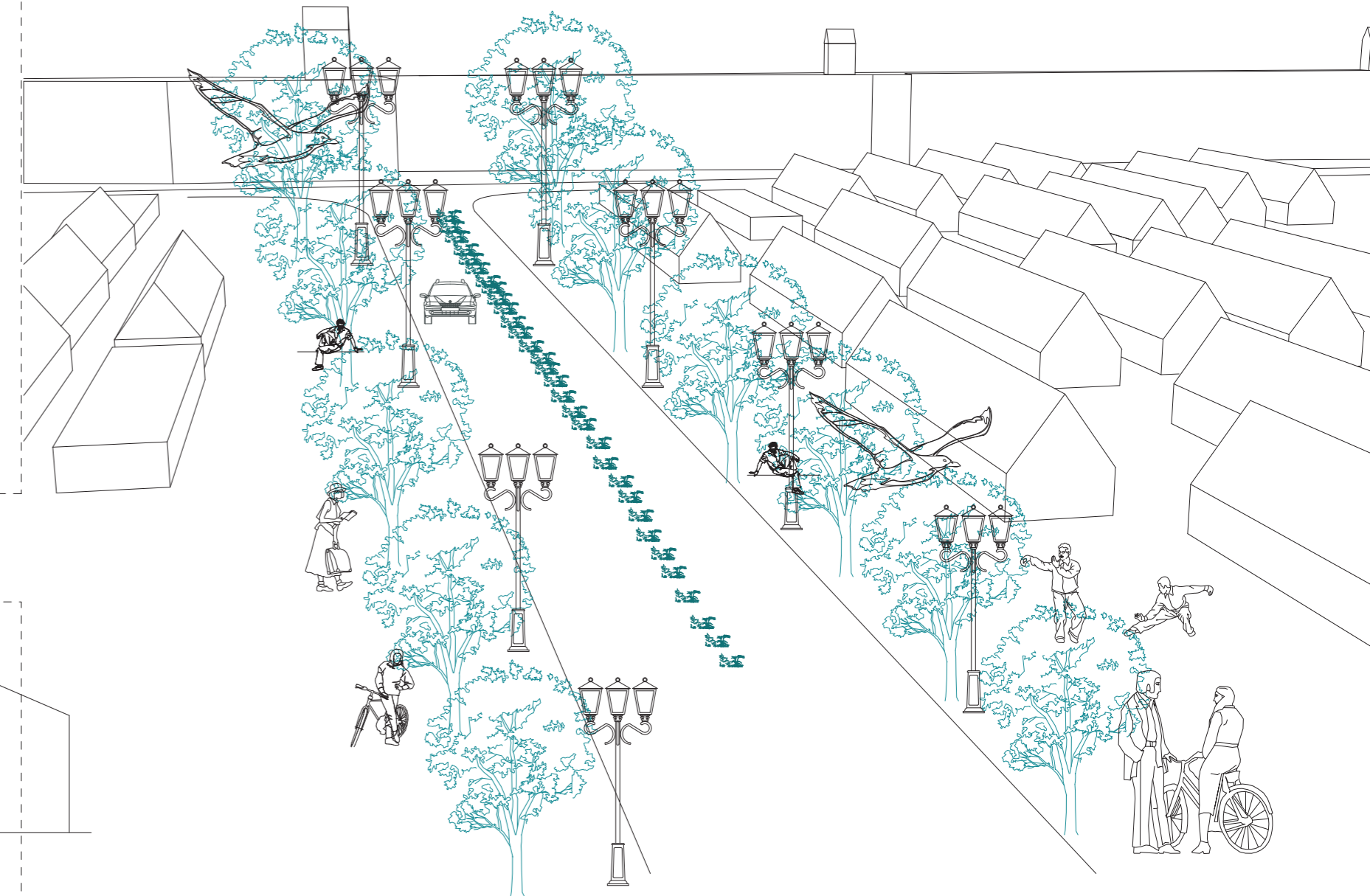
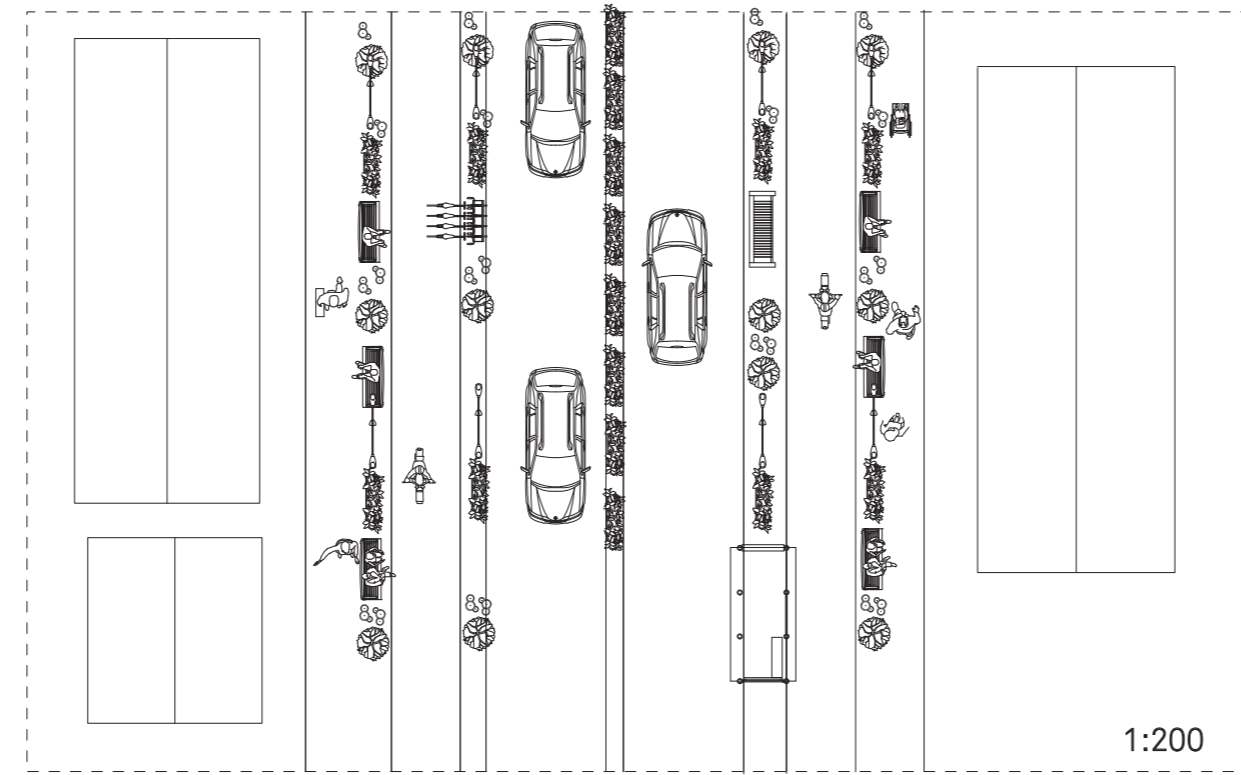
## GREEN CORRIDOR

And the streets accommodate vehicles and bike activities. This creates a so-called shared road. This decision is to allow shops and the local residents to move goods and people during the rush hours. Traffic is also further slowed due to the mix of transport modes.

The green corridors within the city strengthen the biodiversity, pedestrian flow and the sustainability of bike usage through the flowing approaches.

First the introduction of rain gardens on the side of the streets are used to drain the run-off water from the streets. Planting of trees within them also helps in the maintenance of biodiversity within the city context and connects river to make the biosystem around this city into whole. Furthermore, the trees tend to provide shade and also reduce the urban heat island effect characterized by city centers. Within this pedestrian activity would be encouraged and increased.

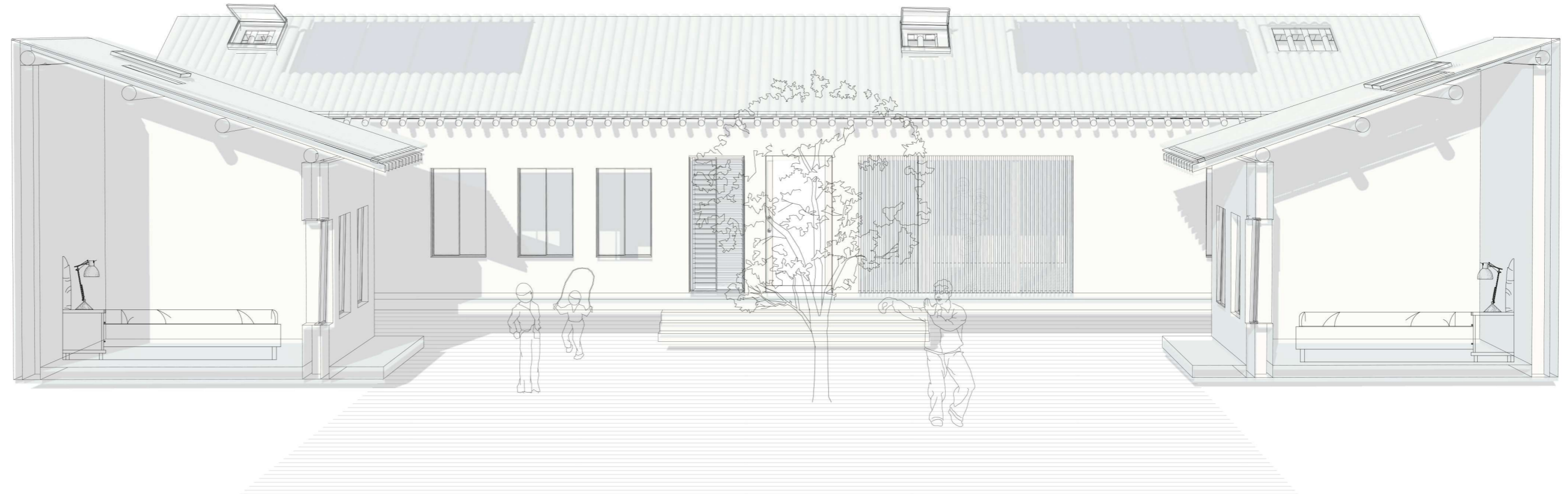
The conversion of intermittent parking spots into bike parking would serve as an incentive for the use of bikes within the city. This would in the long run maintain and boost the cycling.



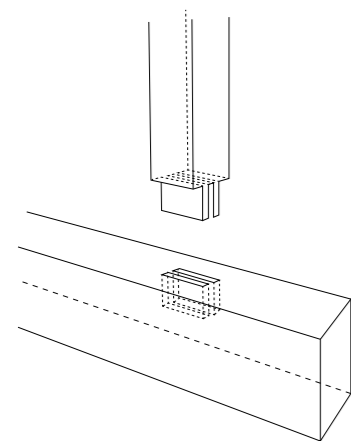
## QUADRANGLE COUNTRYARD

one example of pro-regerated residential yard

Based on the analysis before, the daylight and ventilation because of the wetness are main issues for these residents. In this section, the two important technological intergration are the PV panels and skylight, heat pump. The roof design was purposly slanted to be compatiabile with intergration of solar panels. Electricity produced by solar cells is also clean and silent instead of the channels. Because they do not use fuel, just through sunshine. And PV systems do not release any harmful air or water pollution into the enviroment, deplete natural resources, or endanger animal and human being. During the design process, various architectural components have been carefully studied and developed to achieve a comfortable and efficient result. By using digital tools to simulate and together with the habdmade traditional crafts to analysis its effects after introducing theses passive technologies.

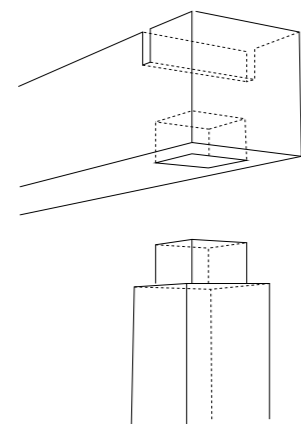


**CURRENT STRUCTURE  
(WOOD POST AND BEAM)**



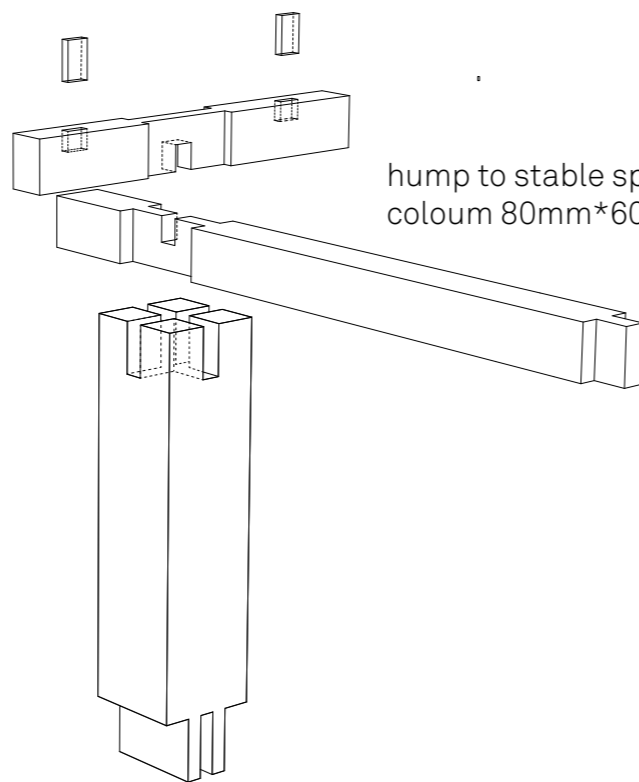
rabbet on the spine coloumn  
44mm\*100mm\*24mm

**CONNECTION BETWEEN BEAM AND  
SPINE COLOUMN**



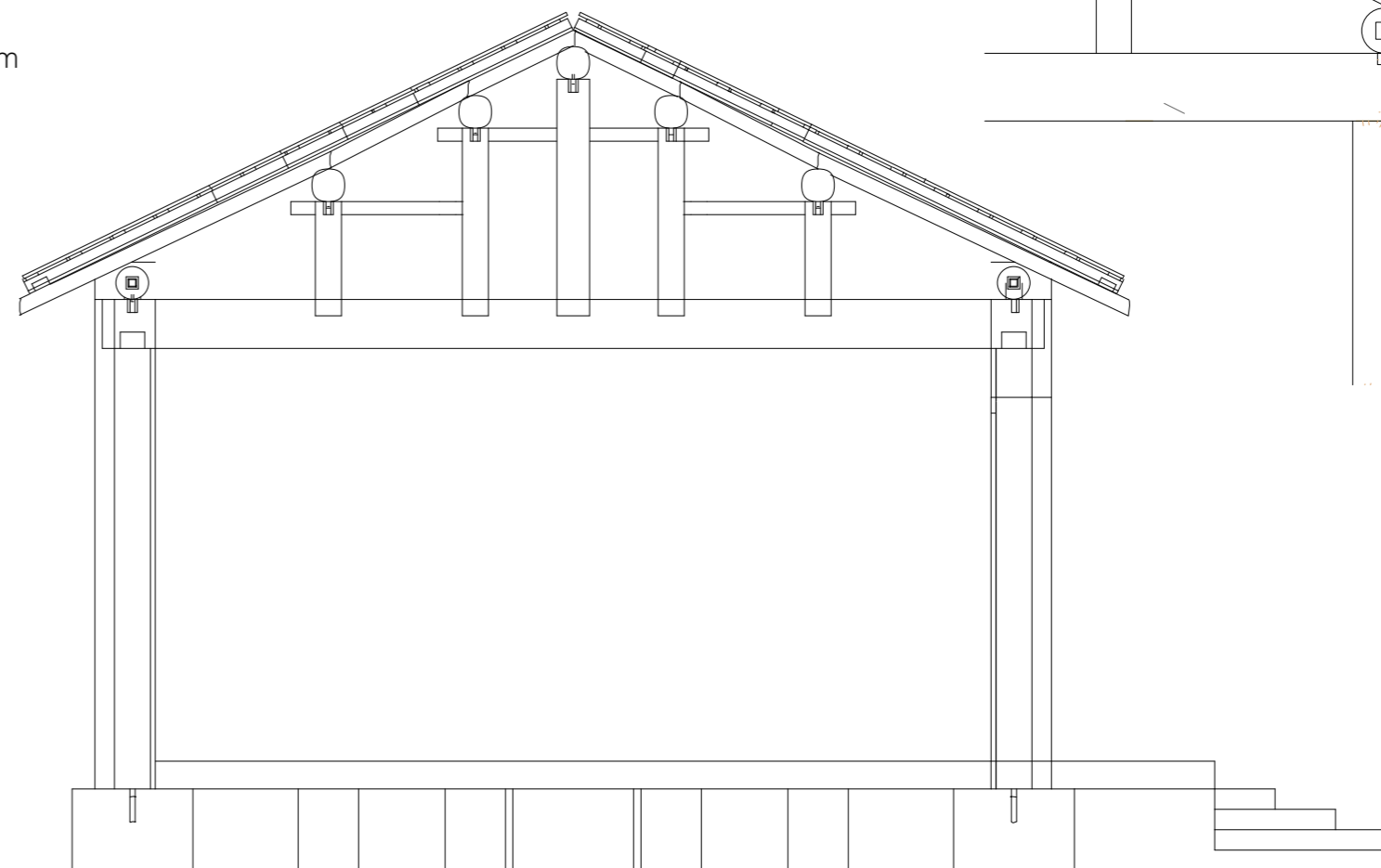
rabbet on the coloumn  
150mm\*100mm\*150mm

**CONECTION BETWEEN COLOUMN AND BEAM**

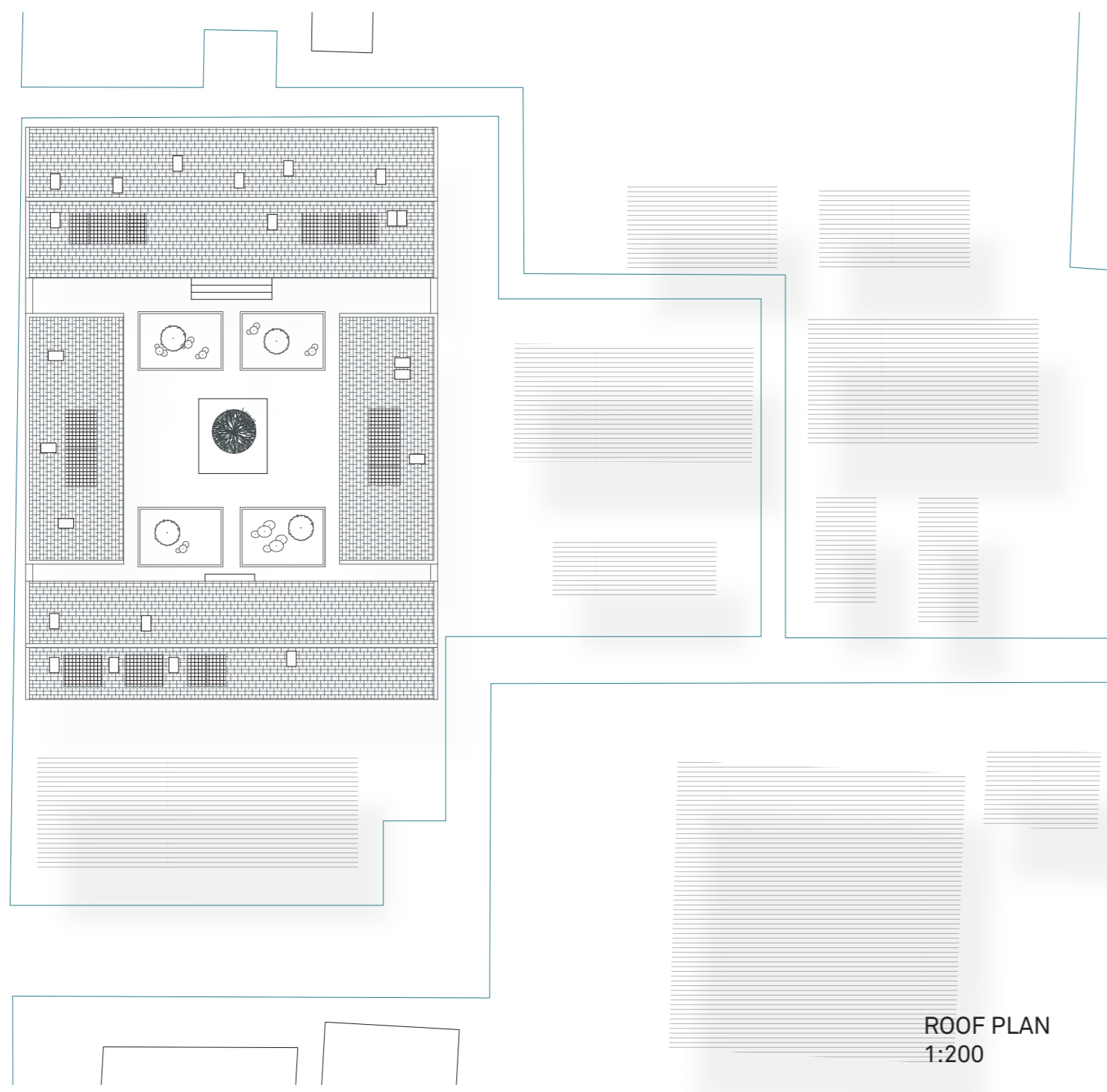


hump to stable spine  
coloum 80mm\*60mm\*640mm

**CONNECTION BETWEEN PURLIN AND SPINE COLOUMN**



- Special tiles to rain land (usually with special carvings)
- Wooden curtain eaves to stick plug-in 4mm\*3mm
- Wooden boarding 20mm
- Woode curtain eaves to stick citrons 5mm\*10mm\*20mm
- Plug-in 4mm\*4mm\*40mm
- Combination tiles 90mm
- Mud and grass 50mm
- Wooden boarding 50mm
- Wooden citron 100mm



ROOF PLAN  
1:200

**SPACE**

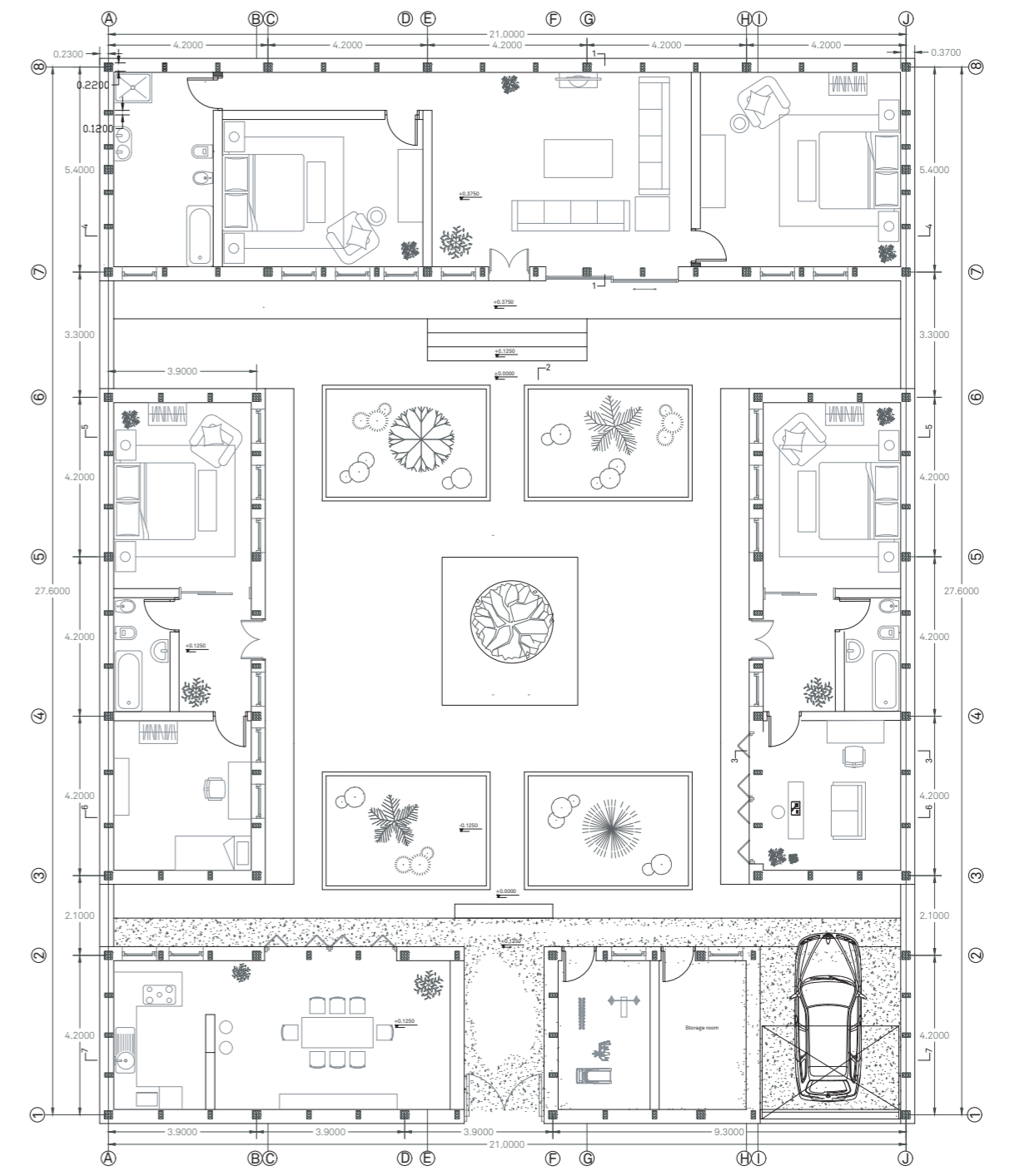
for courtyard features versatility or multi-purpose space design: neat small yard, encircled space around some trees(cherry-apple,----)

Active house---Natural daylight and natural ventilation to combine with environment is the key concept in the courtyard design, not only for functional purpose, but also aesthetically appealing from different seasons.

**How to remodel it?**

It is integrated the ancient existing Post and Column timber structure in Northern China and passive house energy-saving technology in Western world. Its significance lies in that by using a traditional - structural bay for reference (with master bedroom and living room located in the north receiving DAYLIGHT) this project set up parameters for other similar projects in general, by adopting the (Western)principle of Passive sunroom with low energy consumption to achieve the "warm-in-winter&cool-in-summer"effect on constant temperature and constant humidity.

As analysis did before, The courtyard is reorganized for its functions, private parts public parts are seperated .



GROUND PLAN 1:150

- bedroom 4
- living room 2
- bathroom 3
- kitchen 1
- dining room 2
- studio for painting and art 1
- study room 2
- storage room 1
- parking 1
- gym





## LINEAR PARK

Linear park is introduced into this Prototype around the river. From the analysis, it was observed that the open space and covered green spaces existed little and there are many heavy rain result in flooding because of climate change and the loss of plants result in the reduced number of permeable land. This has been done to reintroduce sustainable measures to reduce flood risk.

The linear park is introduced to provide space to do daily activities, enjoy time with their family for local residents and to reduce floods and to improve the soil situation. And these linear parks are also connected by green corridors to make biosystem into whole. They would thus realize its sustainability. While achieving this main goal of draining the city.

## SOFT LINEAR PARK

The linear park is located around the river and in close proximity to major services that attract higher volumes of people. These include the bus terminal and neighbors.

The softness of the park is further experienced as one moves through the axis of the park. It gradually connects the local residents and informal settlements (tourists). Tourist center and workshop is the main entrance of this linear park. We provide hope of more inclusion and connections.

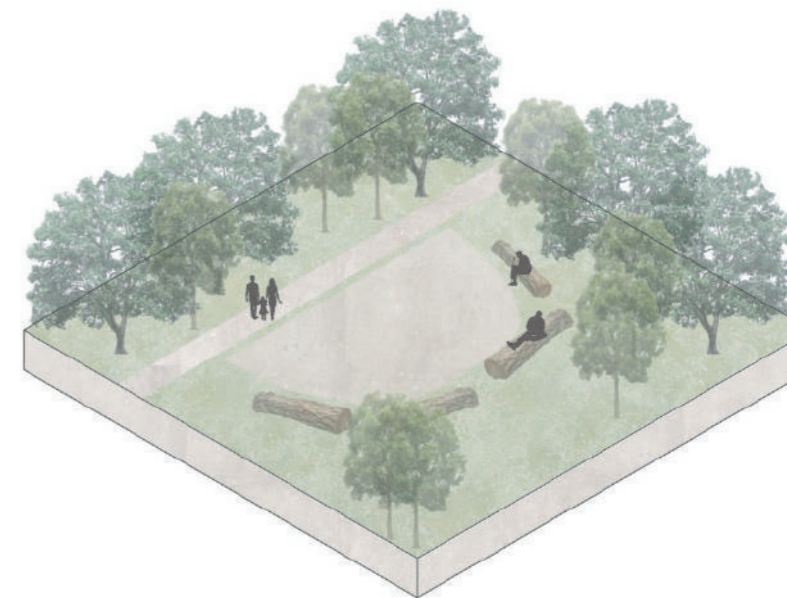
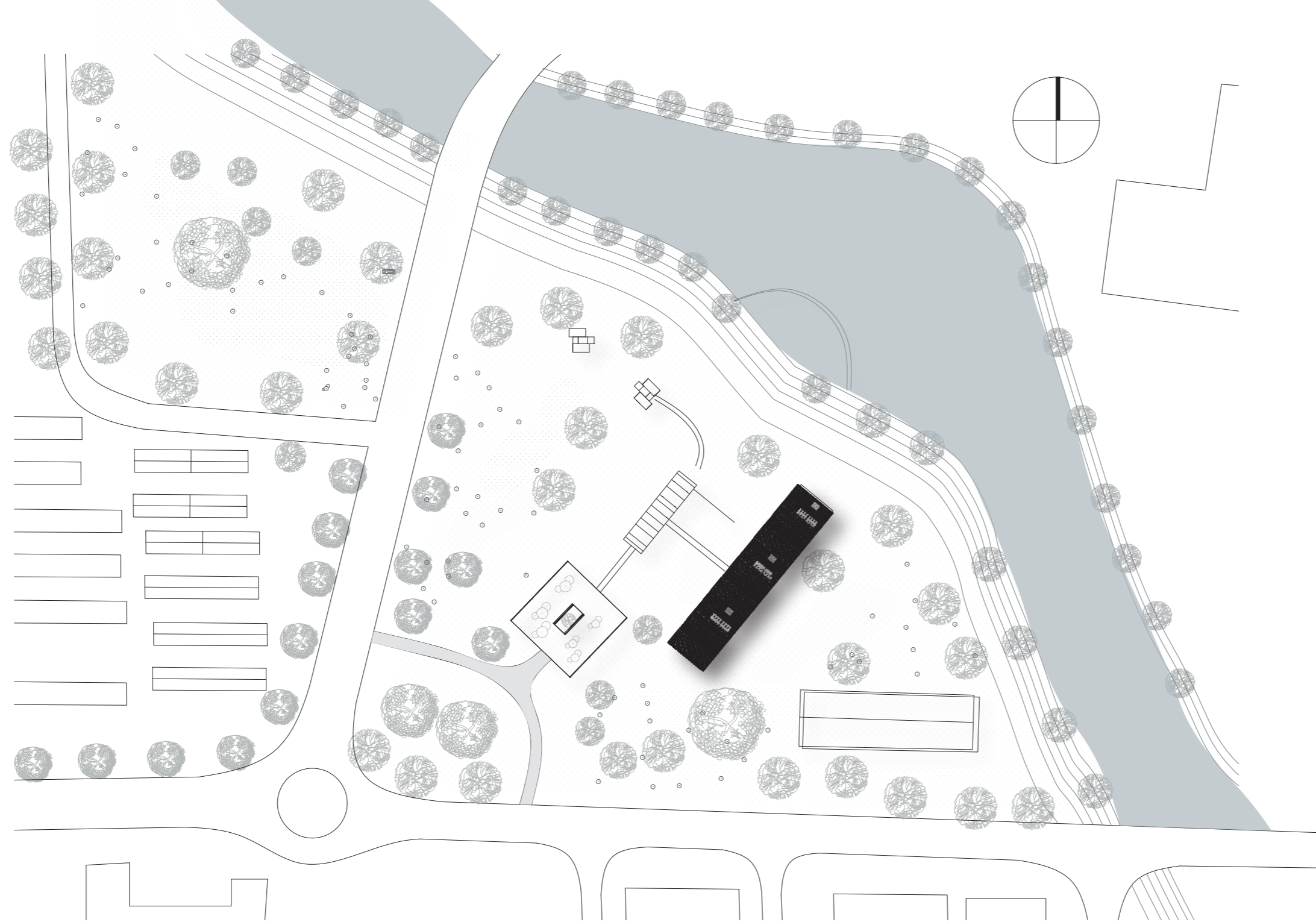
## Multilayered park

Considering its relationship with the neighboring communities and functions. This initial consideration pointed towards major functions related to the environment level and formal settlements. With these in mind, then contemplated on layers of activities related to the community level for the local people and tourists. These include diversity of outdoor exercise, festival plazas to advocate the city's culture and sponge parks.

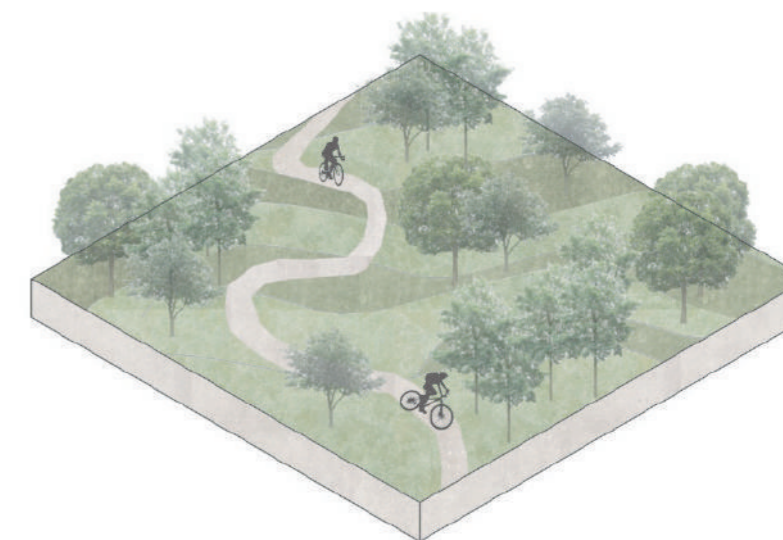
These layers of activities are overlapped and juxtaposed over the linear park as three themes; sponge spaces, farming spaces and recreational spaces. The overlap of activities provides the opportunity to maximize the land use and weaken the erosion of soil.

**LINEAR PARK MASTERPLAN**  
1:1500

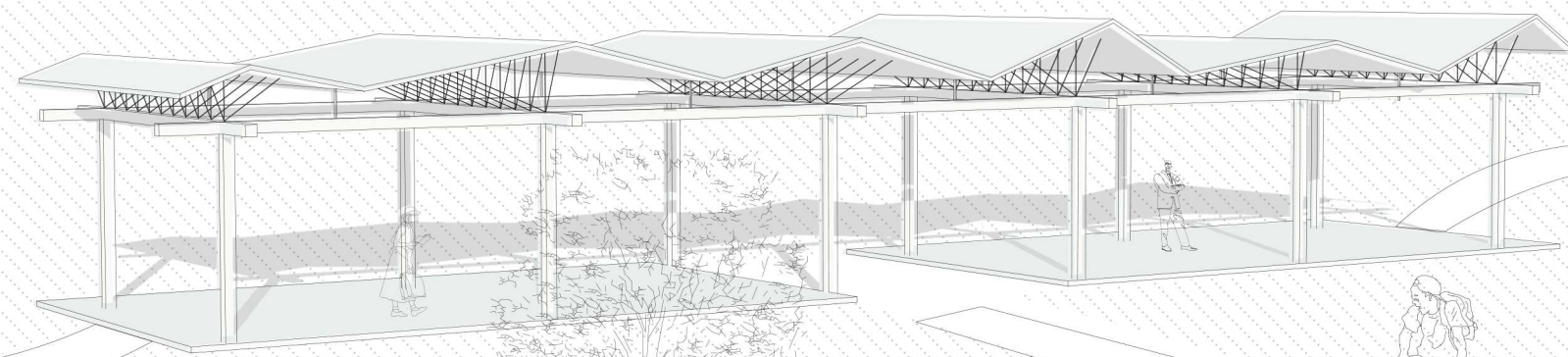
Since this city hosts different carnivals and events, the linear park design included a carval plaza. This makes it accessible by most of the residents and adds a flavour to the character of the city, and to show their real life to tourists.



Use of fallen logs as urban furniture

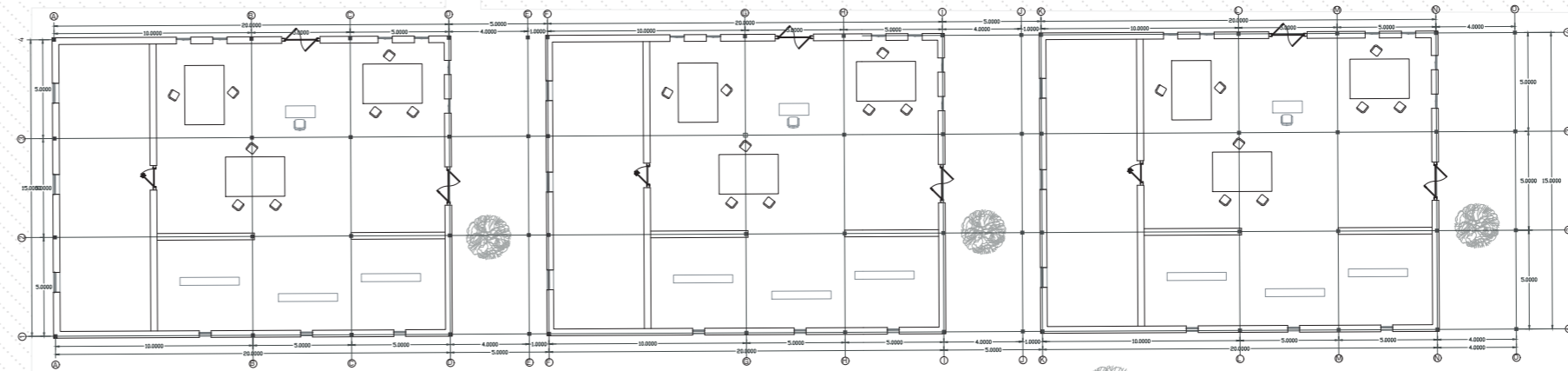
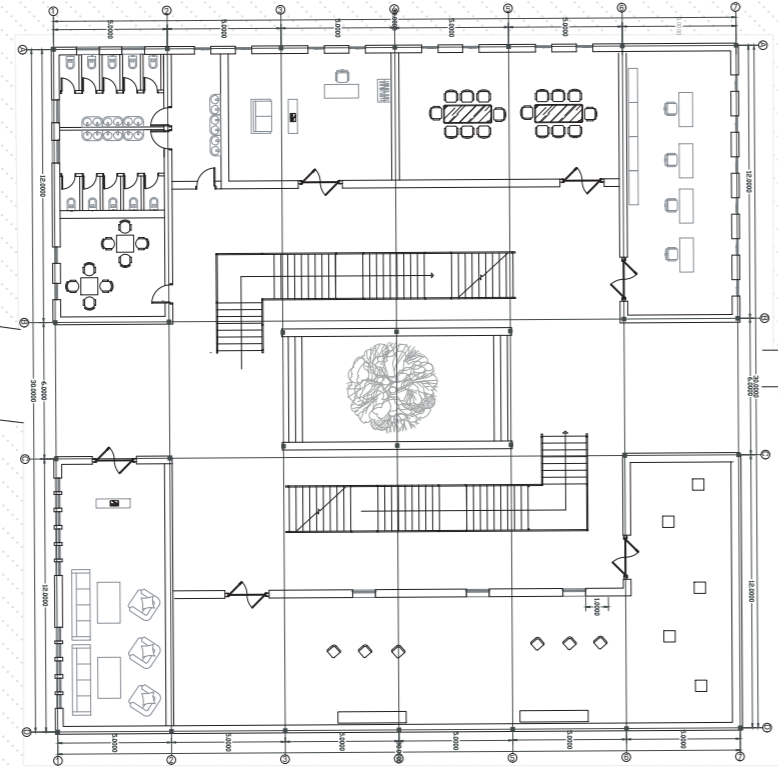


Bicycle path

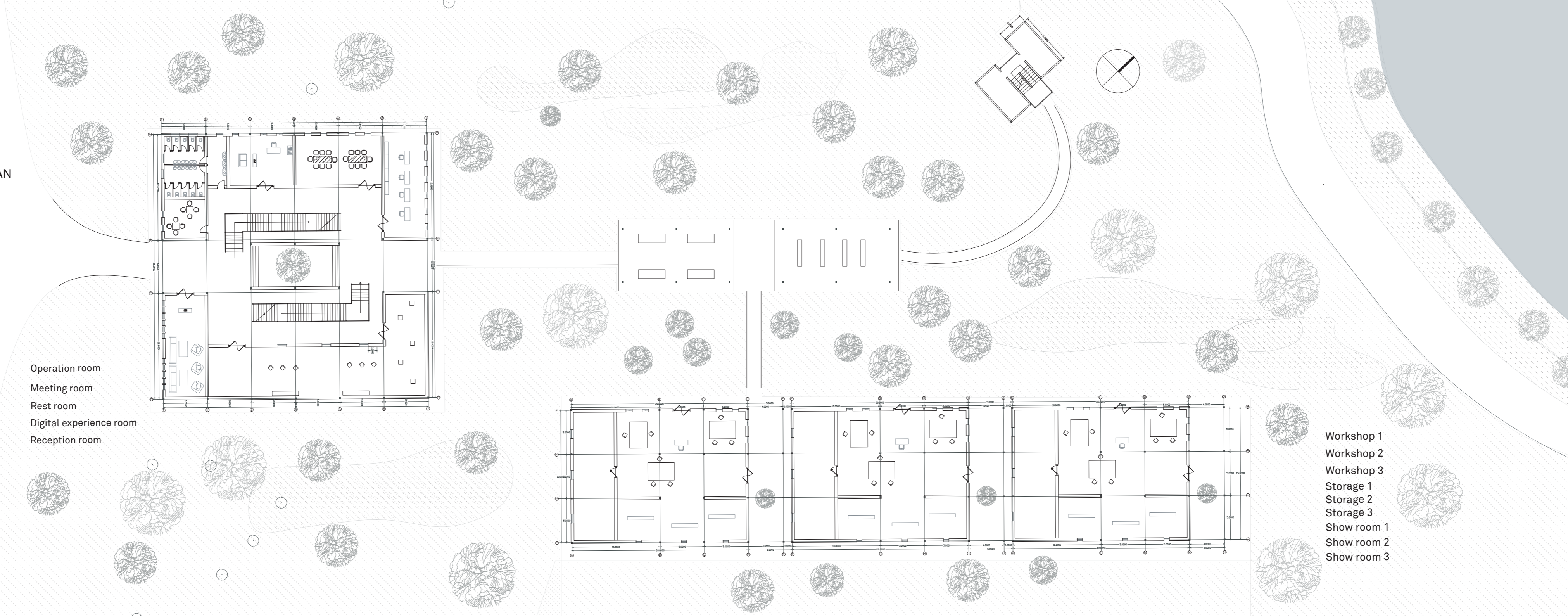


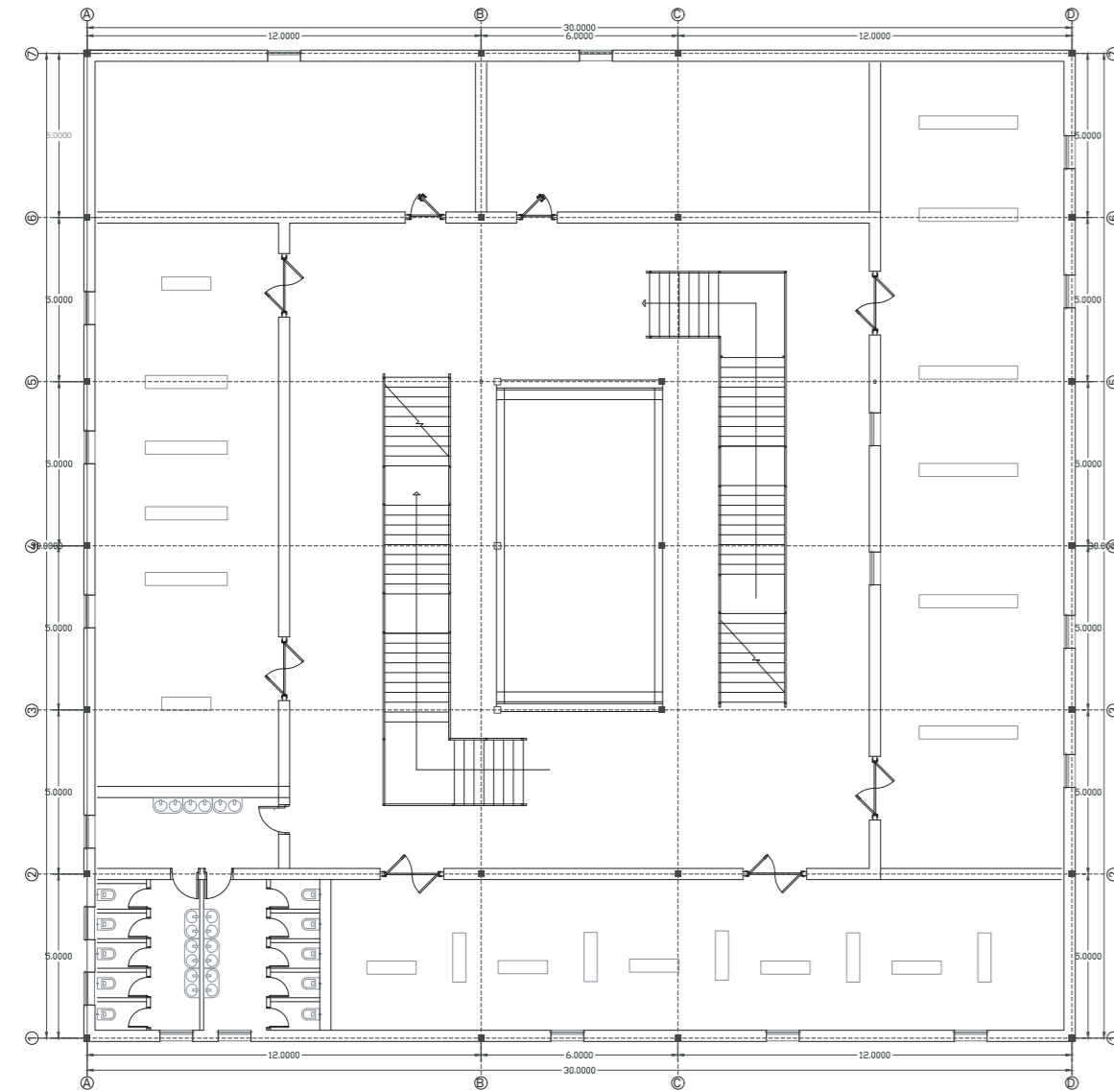
GROUND FLOOR PLAN  
1:300

- Operation room
- Meeting room
- Rest room
- Digital experience room
- Reception room



- Workshop 1
- Workshop 2
- Workshop 3
- Storage 1
- Storage 2
- Storage 3
- Show room 1
- Show room 2
- Show room 3





Exhibition room 1  
 Exhibition room 3  
 Exhibition room 2  
 Storage room 1  
 Storage room 2

1:200

## TOURISST CENTER

The complex is built mainly for serving tourists to rest and especially there are exhibitions and one digital experience room ,which people can use the camera to watch and appearance the history in Pingyao.

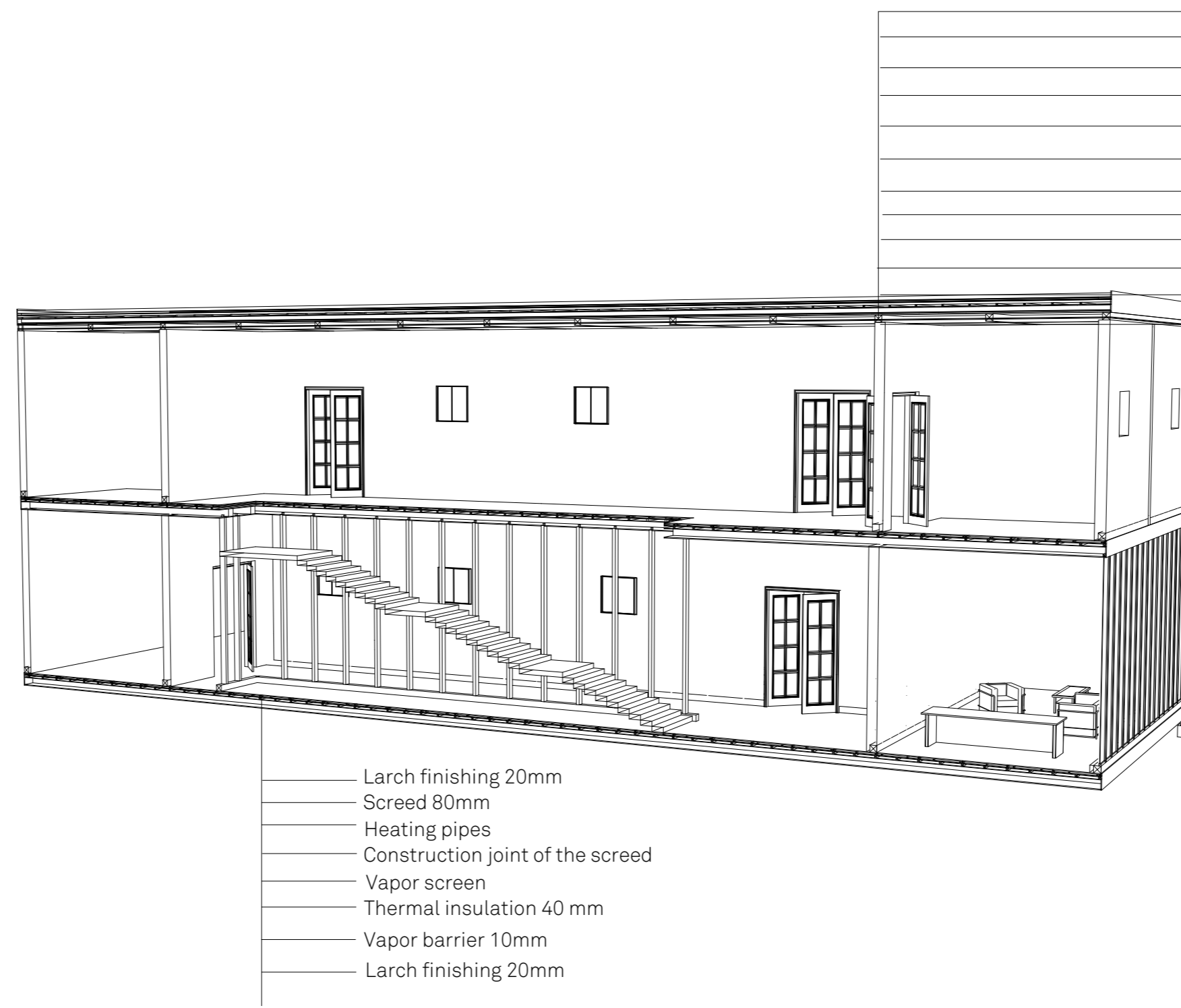
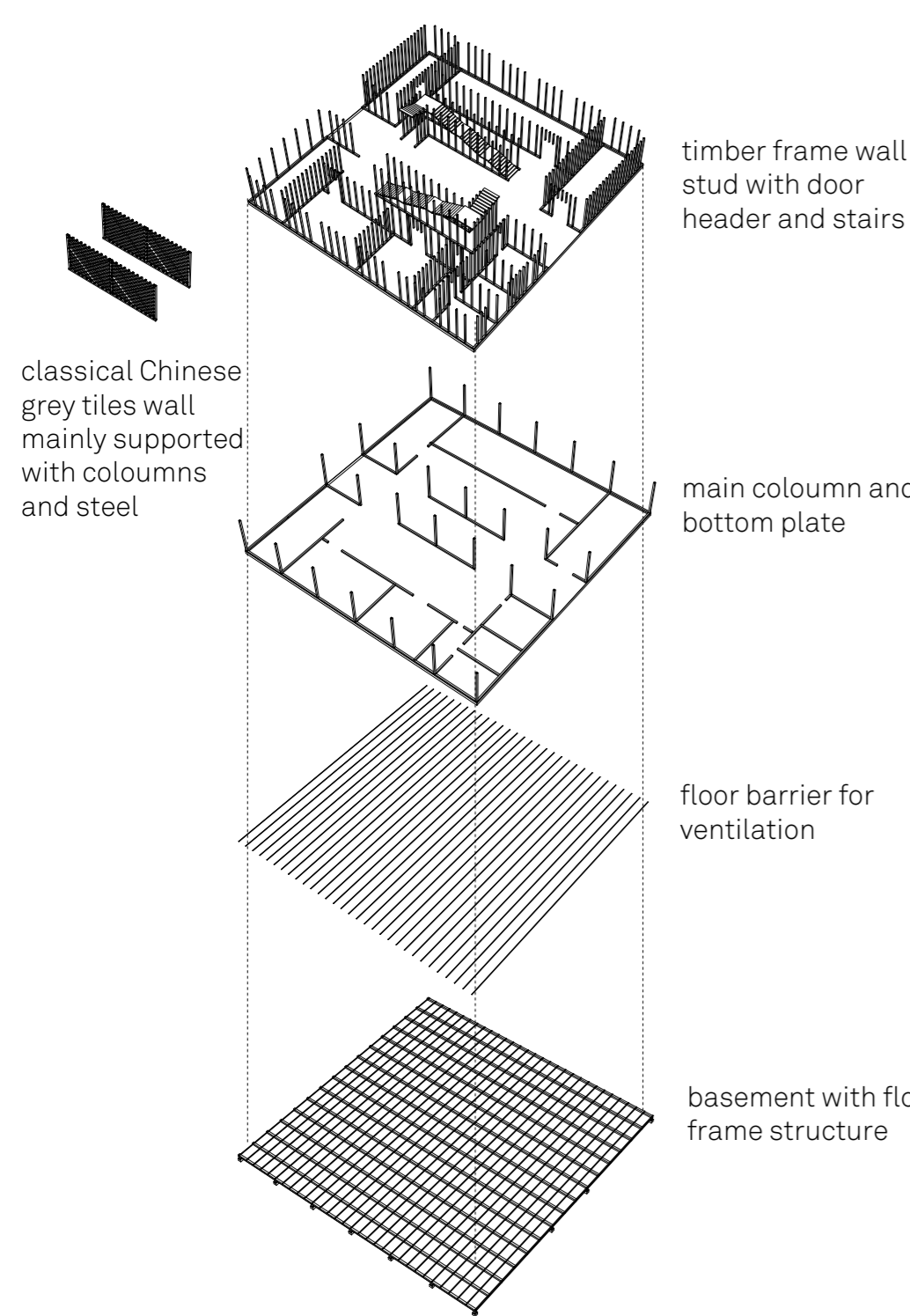
Retangular shape is the main element of buildings of Pingyao especially.

Quadrangle is the main type in Chinese north city,which is type of circeled,people live and communitte together,the peoperty of this kind of shape and the space feelings,is the main special elements.



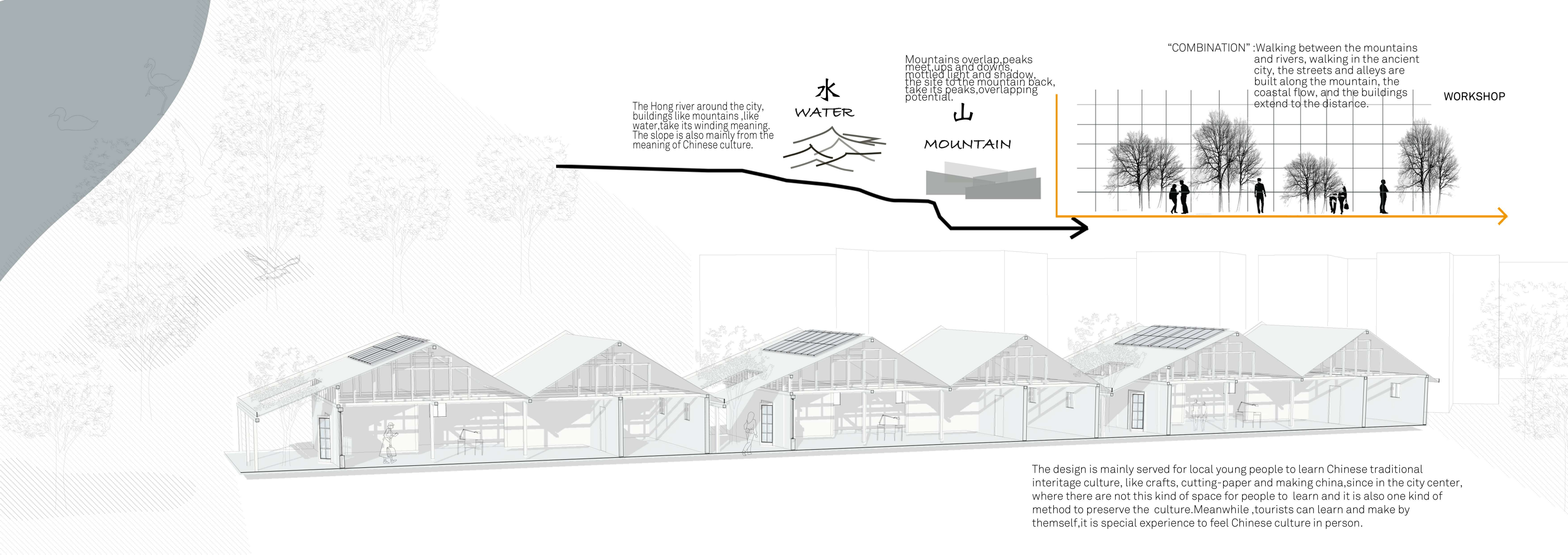
taken by professor Marco Imperadori

In the courtyard of this building,designed one tile walls and is inspired by this kind of elements.There are a lot of elements in Chinese buildings to show the relationship between virtualuty and solid ,all of these elements influenced by Chiese traditional philosophy “阴阳” .



- Extensive green roof layer, ie, DAKU vegetable layer
- Cultivation layer made by a mix of volcanic aggregates,
- Filtering and waterproofing barrier, ie, DAKU
- Mechanical protected layers 47mm
- Anti-root barrier 20mm
- Polyurethane sandwich panels with waterproof protective film 100mm
- Transpirant barrier
- Spruce wood OSB panel 15mm
- Rock-wool insulating layers 60mm
- Spruce wood OSB panel 20mm
- Wooden citron 100mm

- Larch finishing 20mm
- Screed 80mm
- Heating pipes
- Construction joint of the screed
- Vapor screen
- Thermal insulation 40 mm
- Vapor barrier 10mm
- Larch finishing 20mm



The Hong river around the city, buildings like mountains, like water, take its winding meaning. The slope is also mainly from the meaning of Chinese culture.

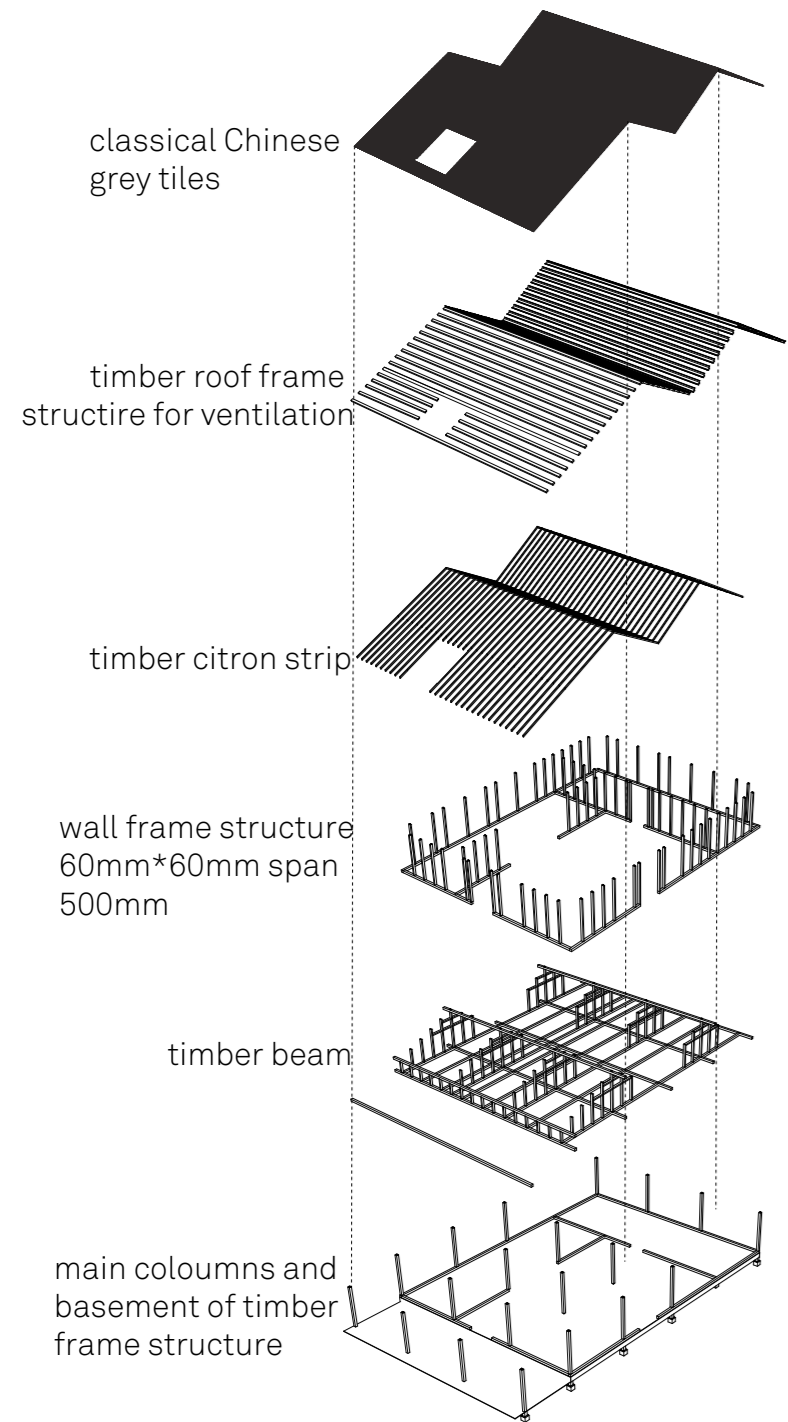


Mountains overlap, peaks meet, ups and downs, mottled light and shadow, the site to the mountain back, take its peaks, overlapping potential.

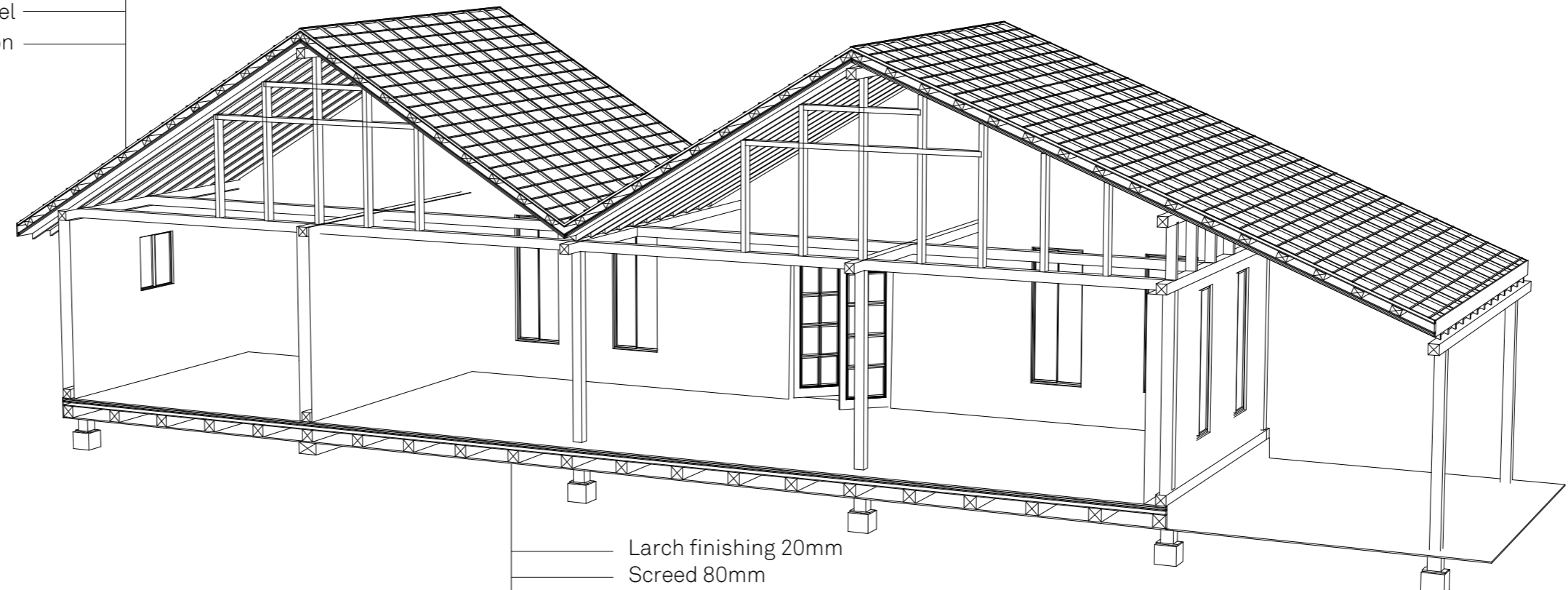
“COMBINATION” :Walking between the mountains and rivers, walking in the ancient city, the streets and alleys are built along the mountain, the coastal flow, and the buildings extend to the distance.

WORKSHOP

The design is mainly served for local young people to learn Chinese traditional interitage culture, like crafts, cutting-paper and making china,since in the city center, where there are not this kind of space for people to learn and it is also one kind of method to preserve the culture.Meanwhile ,tourists can learn and make by themself,it is special experiance to feel Chinese culture in person.



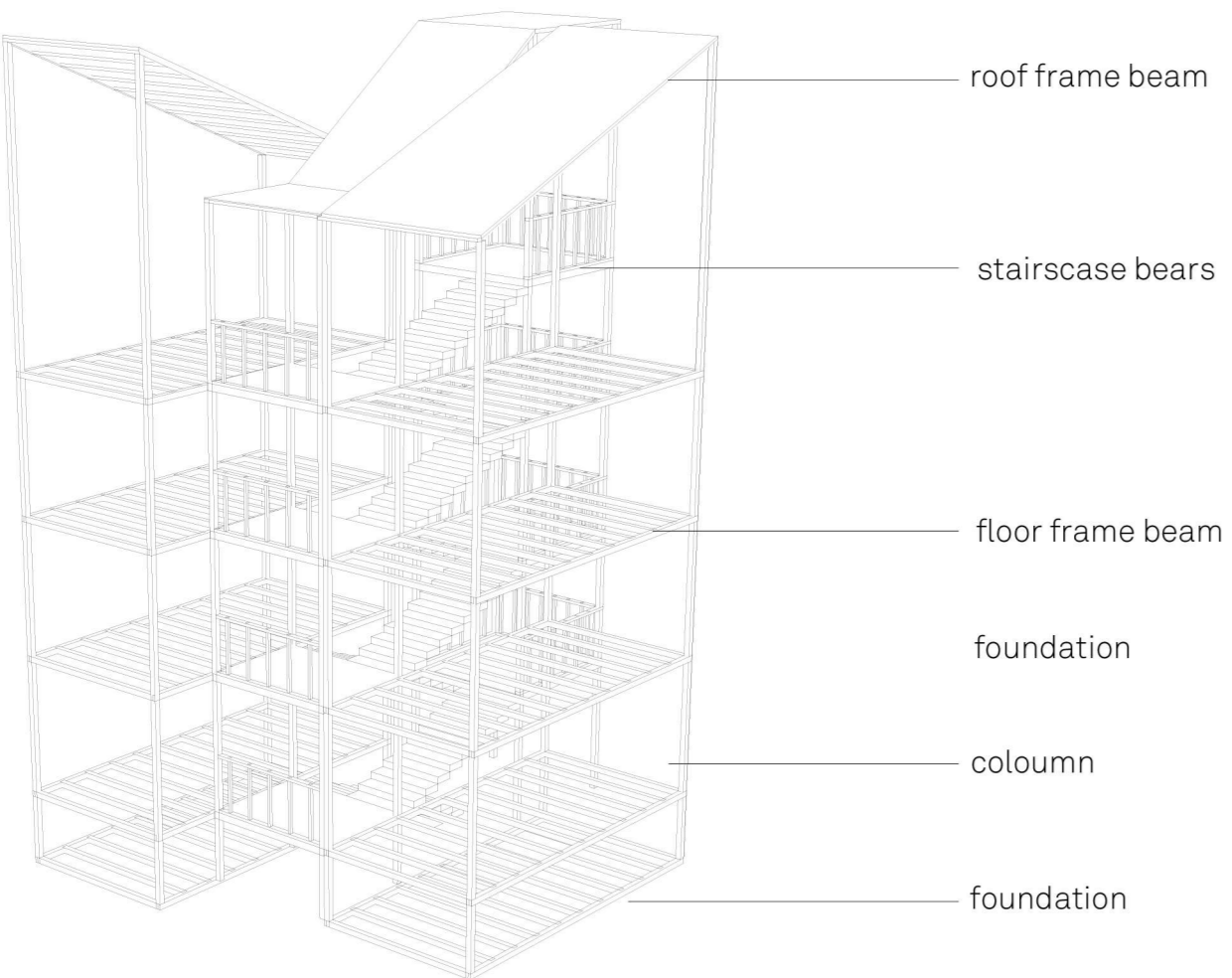
- Roof tiles
- Tiles holder strip
- Ventilation chamber between battens
- 20mm wooden board
- Vapor check and airtight sheet
- Containment strip
- Isolating
- OSB panel
- 100mm citron



**WORKSHOP**  
timber frame structure

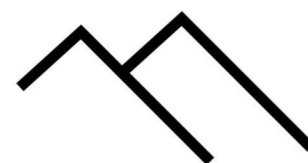
- Larch finishing 20mm
- Screed 80mm
- Heating pipes
- Construction joint of the screed
- Vapor screen
- Thermal insulation 40 mm
- Vapor barrier 10mm
- Larch finishing 20mm





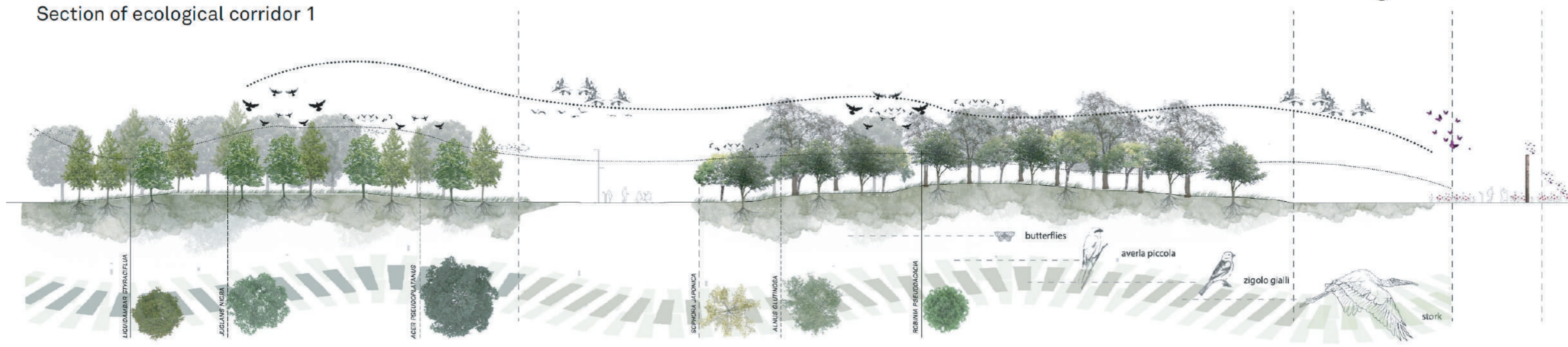
### INSPIRATIONS

The design of the tower is inspired by the slope roof still, which is the local sign of the fortune and designed to improve the quality of space, by functioning as a high quality land mark to watch birds and the whole Pingyao city, which can be built easily by the local knowledge. And here wood will be the main material to be used.

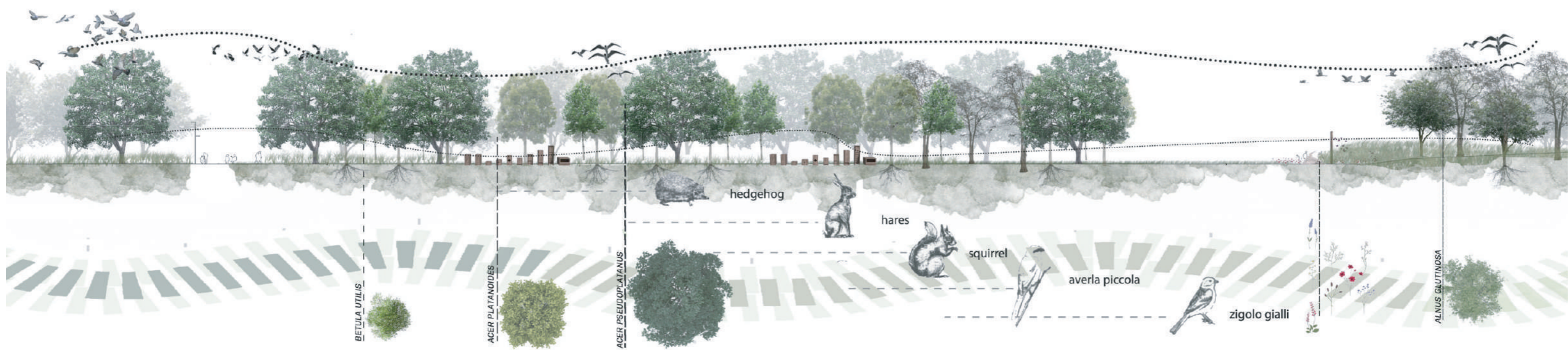


### OBSERVATION TOWER

Section of ecological corridor 1



Section of ecological corridor 2



## REFERENCE

\*Federica Brunone,Marco Cucizza,Marco Imperadori,Andrea Vanossi :Wood Additive Technologies,ISSN 2366-2603

\*China ediator :Annals of Pingyao ancient city 2002

\*Reconstructing Tradition:Heritage Authentication and Tourism-Related Commodification of the Ancient city of Pingyao 2018

\*Shaoxu Wang,Kai Gu:Pingyao the historical urban landscape and planning for heritage-led urban change,journal homepage:  
www.elsevier.com/locate/cities

\*Dengfei Li,Xianchun Yan,Yan Yu:The analysis of Pingyao Ancient town street spaces and view spots reachability by space syntax 2016

\*Zhang Min,Pan Xiaoli,Wu Bihu:Research on residents'ereption on tourism impacts and attitudes

\*Robin Heinen:A spotlight on the phytobiome:Plant-mediated interactions in an illuminated world,2021

\*Kyla D.Scherr,Marry A.Jamieson:Abiotic and biotic drivers of Strawberry productivity across a rural-urban gradient 2021

\*P.A.Hamback,A.R.Cirtwill,D,Garcia,M.Grudzinska-Sterno,M.Minarro,M.Tasin,X.Yang ,U,Samnrgard:More intraguild prey than pest species in  
arachnid diets may compromise biological control in apple orchards

\*Ingo Grass,Jorg Albrech,Nina Farwig,Frank Jauker:Plant traits and landscape simplification drive intraspecific trait diversit of *Bombus terrestris*  
in wildflower plantings

\*Chaz Hyseni,Jani Heino,Luis mauricio Bini,Ulf Bjelke,Frank Johansson:The importance of blue and green landscape  
connectivity for biodiversity in urban ponds

\*Andris Klepers-Iveta Druva Druvakaln(2020)-Rural landscape in Latvia:a comprarative analysis of representations and perceptions

\*Anta Viluma,Riga Technical Unversity-Ugis Bratuskins,Riga Technical universit(2017)-Baerriers for use of wood in architecture;the  
latvian case.