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Investigation of Historical Area in Xi'an, China

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INVESTIGATION OF HISTORICAL AREA
IN XI'AN, CHINA

A Thesis Presented

by

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DEDICATION

To my beloved parents and family

ACKNOWLEDGEMENTS

ABSTRACT

INVESTIGATION OF HISTORICAL AREA IN XI"AN, CHINA

MAY 2014

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M.ARCH., UNIVERSITY OF MASSACHUSETTS AMHERST

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Historical area is the unique place to a certain context because it contains

the most valuable culture on the site and also keeps recording its history. While

the increasing pressure from developing tourism and booming population

seriously impacts the old site resulting in culture lost.

This thesis investigates a typical historical area in Xi'an in a logical

process. The process starts with analysis from local fabric as urban scale to living

unit as family scale to make a clear view on local culture lost. According to the

context, set up appropriate criteria to select typical site to make sure the solution

can be well integrated into similar scenario. Then, based on the analysis,

generate possible conceptual responses. Finally, design from a modular unit, to

courtyard space and to the final block prospect, and make sure the final solution

in every step could not only solve the problems, but also accommodate the local life style.

The whole design process appropriately integrates the concept of shared space in dealing with the overload urban and living density. The application of the phasing study makes the whole research and design process more sustainable and feasible.

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CHAPTER 1

XI'AN

Xi'an, the place I was born and grew up, I spent my previous 23-year life with so many impressive memories. Its orthogonal clean street and alleys are reflecting the sophisticated ancient urban planning more than a thousand year ago, its countless ancient buildings tell us her long history anywhere over the whole historical urban area, its dialect introduces her deep culture and its local life style represents what is straightforward and enthusiasm. These are the reasons why I start my thesis project in Xi'an.

World   China   Shaanxi   Xi'an (Administrative)

Figure 1. 1 Location of Xi'an

1.1 Background

Xi'an, the capital of Shaanxi province (Figure 1.1), is one of the oldest cities in China, with more than 3,100 years of history, the city was known as Chang'an before Ming dynasty. Xi'an is one of the Four Great Ancient Capitals of China,

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having held the position under several of the most important dynasties in Chinese history, including Zhou, Qin, Han, Sui and Tang. Among these dynasties, Tang dynasty is the period when Chang'an was the most populous city in the world and was generally regarded as a high point in Chinese civilization – a golden age of cosmopolitan culture. Through use of the land trade along the Silk Road and maritime trade by sail at sea, the Tang were able to gain many new technologies, cultural practices, rare luxury, and contemporary items. From the Middle East, India, Persia, and Central Asia the Tang were able to acquire new ideas in fashion, new types of ceramics, and improved silver-smithing. At the same time, more and more scholars, visitors and merchants from around the world visited and studied in Chang'an and even lived here for a long time.

Xi'an lies on the Guanzhong Plain [1] in the south-central part of Shaanxi province, on a flood plain created by the eight surrounding rivers and streams. This is also why people who live here are call 'Guanzhong Ren'. The city borders the northern foot of the Qin Mountains (Qinling) [2] to the south, and the banks of the Wei River to the north. The Mount Hua [3], one of the five sacred

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[1] Historical region of China corresponding to the lower valley of the Wei River
[2] Major east-west mountain range in southern Shaanxi province, China
[3] One of China's Five Great Mountains, and has a long history of religious

Taoist mountains, is located 100 km (62 mi) away to the east of the city. Not far to

the north is the Loess Plateau. (Figure 1.2)
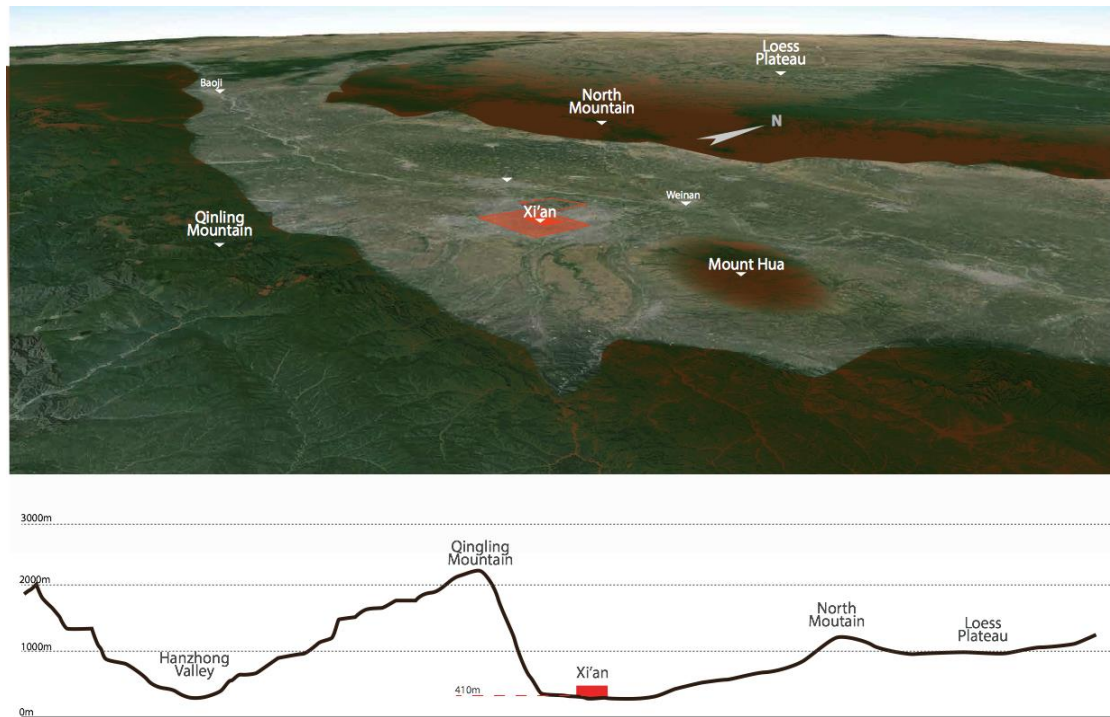
Figure 1. 2 Topology of Xi'an

All these geological factors determine that Xi'an has a temperate climate.

The Wei River valley is characterized by hot, humid summer, cold, dry winters and

dry springs and autumns. Most of the annual precipitation is delivered from July to

late October. This typical climate determined and formed the local building and

local life styles. For examples, to prevent the sunlight during the hot summer time,

women always put handkerchief on their head. (Figure 1.3)

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Figure 1. 3 Handkerchief on women's head

1.2 Demographics

By the end of 2005, Xi'an had a population of 8.7 Million. Compared to the census data, the population has increased by 8.7% from 2000 to 2005 (2010 Chinese Census)[4]. The population is 51.66 percent male and 48.34 percent female. The majority of Xi'an residents are Han Chinese [5] who makes up 99.1 percent of the city's total population. There are around 81,500 people belonging to ethnic minorities living in Xi'an, including 50,000 Hui people, also called Muslim

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[4] Sixth National Population Census of the People's Republic of China

[5] An ethnic group native to East Asia constitutes approximately 92% of the population of Mainland China

people, who mostly live in the Muslim community and most of them are the descendent of the Muslim immigrates.

1.3 Culture

In terms of Xi'an's long history, the city has an abundant and deep culture.

1.3.1 Urban Layout

The current urban layout of Xi'an could be dated back to Tang Dynasty. The overall layout was totally based on the axial symmetric and composed of outer wall city, palace city and imperial city. The crisscross orthogonal streets divided the urban area into 110 squares, so this layout is also called the chessboard layout. Each square has its formal function including residential

Figure 1. 4 City planning of Chang'an, Tang dynasty

Figure 1. 5 City Wall of Xi'an

courtyard, commercial area, landscape palace and others. So the city planning is in a tidy and neat compartmentalized layout, which was the prototype applied by other cities in their planning in ancient China. (Figure 1.4)

The City Wall defines the current historical urban area, which is where the Tang imperial city was (Figure 1.5). The overall layout of historical area in Xi'an shows the beautiful orthogonal compartmentalized pattern following the way ancient Chang'an did.

1.3.2 City wall

The City Wall was built based on the imperial city of Tang Chang'an City During Ming Dynasty. It is the best preserved and the biggest ancient city wall in the world. The City Wall, built with grey bricks to defend the enemy, is about 12m high, 15-18m wide at the bottom and 12-14m wide at the top.

Currently, the City Wall is one of the most famous place attracting millions tourists come to visit. In addition, from 2005, people can travel through the city wall as a loop on the top, and this provides amazing views of this old city (Figure 1.6)

1.3.3 Old Sites

Figure 1. 4 Panorama image of the urban context taken on city wall

Besides the City Wall, there are hundreds of ancient buildings and sites among the whole city, including towers, Palaces, mausoleums, courtyards and some other building styles (Figure 1.7). These are all the touchable history from which we can see and learn the culture and stories of this old city.

Figure 1. 5 Old sites map of Xi'an

1.3.4 Life Style

Figure 1. 6 Ten strangeness of Guanzhong Ren

Among the different styles of culture in Xi'an, the most vernacular part of local life style in Xi'an can be concluded as 'Ten Strangeness of Guanzhong Ren' from which we can learn the specific and conventional ways that people eat, live, speak, sing and even entertain. They are 'Noodle is as wide as belt', 'Pepper is a dish', 'Pancake is as big as a pan cover', 'Bowl is as big as a basin', 'Handkerchief is put on women's head', 'House is built with one side slope roof', 'Lady will not marry with the guy in other area.' 'Squatting on a chair rather than sitting', 'Use stone as a pillow', 'Roaring Qinqiang rather than singing' (Figure 1.8). Each of these special local life styles has its own story or origin, while all of them are mainly impacted by the local climate, economy, geology and even the dialect.

Nowadays, we can still often see these phenomena in some local restaurants, some suburban areas and some historical urban areas.

1.3.5 Qinqiang

Qinqiang, another symbolic culture of Xi'an, is the representative folk Chinese opera in Shaanxi, China where it was called Qin thousands years ago. Qinqiang literally means 'the tunes of sound in Qin'.

1.4 Historical Area

Except the individual building or site, there are also several historical areas from which we can understand and learn how people lived together as a whole community during that time. As a large scale neighborhood of the living space and a small parcel of the urban fabric, the historical community can not only reflect the typical ancient urban planning by its street scape and well-preserved buildings, but also keeps the most significant culture like the living styles by the way they formed and changed.

Figure 1. 7 Two historical areas in historical urban area of Xi'an

There are two main historical communities in the historical urban area of Xi'an. One of them is the community beside the Stele Forest [6], which is the most important area of college education during the previous four hundred years. The other one is Muslim Community, which is significant in how the religious community formed and transformed in the large context of Han Chinese through thousands years. (Figure 1.9)

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[6] A museum for steles and stone sculptures and was formerly an 11th-century Confucius Temple

www.manaraa.com

There is a journal 'Feasts for the Eyes, and the Palate, in Xian, China' of New York Times talking about Xi'an. In this journal, she talks a lot about her tasting experience along the Muslim Street. (Figure 1.10)

Figure 1. 8 Journal on Xi'an of The New York Times

CHAPTER 2

MUSLIM COMMUNITY
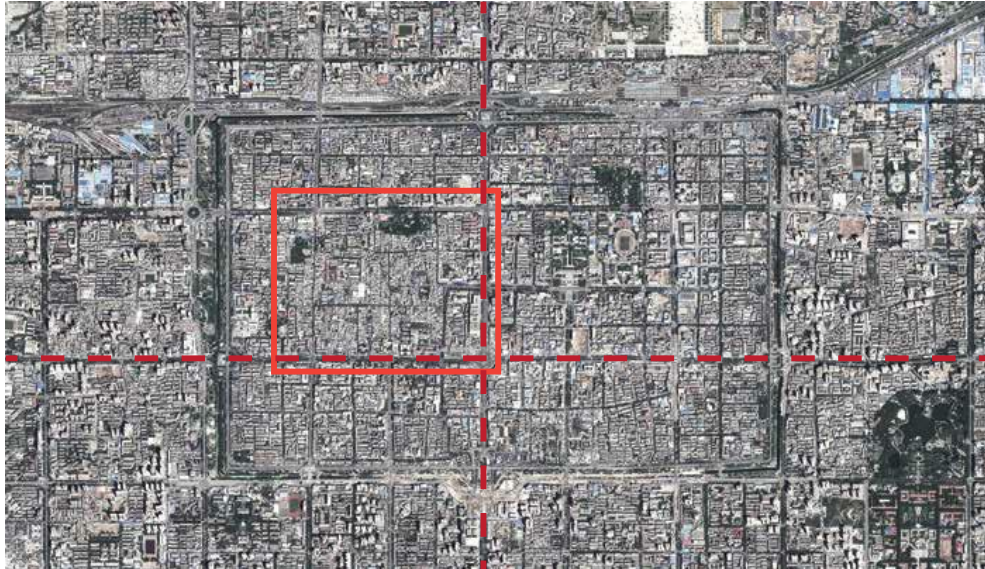
Figure 2. 1 Location of Muslim Community

2.1   Background & History

The Muslim Community is located beside the urban center in Xi'an where

the Bell Tower sits (Figure 2.1). From the location, we can understand the

significance of this area in history. It could be dated back to Tang Dynasty when a

lot of visitors and merchants were visiting and living in Chang'an and this area

was defined and assigned by the emperor as the main community for the foreign

visitors. As the time went on, today, this area became the main Muslim community with 50,000 Muslim people[1] living and running their own mostly preparing and serving special Islamic food.

2.2 Culture

2.2.1 Religion

People living in the community practice Islam, which was introduced into Xi'an very early. Emperor Gaozong of Tang dynasty officially allowed the practice of Islam in 651 AD. In terms of its long history, this community developed independently among the Han Chinese because it had such a strong religious culture. The significant role that the religion always plays is gathering people together so that the community could be kept as a complete whole unity, staying away from any negative impact from outside while still getting along well with other religions or groups.

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[1] Population survey of the seven central cities of China

People living in Muslim community keep the weekly ritual in mosque and each Ramadan[2] strictly. Religion is also reflected in their clothing. Even though the Muslim and Han communities continue to integrate, women in the Muslim community keep wearing the hijab[3]. (Figure 2.2)

Figure 2. 2 Muslim traditional wearing

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[2] Ninth month of the Islamic calendar when fasting from dawn until sunset

[3] A veil that covers the head and chest, which is particularly worn by a Muslim female:

2.2.2Food

Food is another significant reflection of local culture. Nowadays, there is a great part of culture in food attracting more and more to people visit this community. The Muslim Street, the main street in the Muslim Community, is well known in China and even around the world. Along this street, you can enter the restaurants on each side to try the delicious Islamic food, which is also sold by the vendors on the street.

2.3 Mosque

Mosques are the place of worship for followers of Islam. Most mosques in China resemble pagodas with green roofs instead of the yellow roof common on imperial structures in China.

There are 10 Mosques with different history and sizes over the whole Muslim community, and people practice weekly ritual there. These Mosques are important and tangible heritage sites from which we can learn Islamic Culture and how mosque buildings are integrated with traditional Chinese style and plan layout. The Great Mosque, the largest one of these mosques, is the spiritual center of this community.

2.4 Residential Buildings

Like mosque building style, the residential buildings follow the typical local style of a living courtyard as well. There are several courtyards preserved in a pretty good condition. Some of them are still used as local residential buildings. Others have been well protected and used as museums for visiting and researching.

As the occupancy pattern and the family structure changed through time, many local residents did some renovation on their existing building to make more room for extended family and new utilization. Because of the reconstruction, there is a sharp distinction between the historic courtyards and those that have been renovated.

Figure 2. 3 #144 Courtyard

One of the best preserved courtyards is the #144 Courtyard, which is now used as a museum from which visitors can clearly learn about Chinese culture. Visitors learn about traditional Chinese culture, including information about the imperial examination, as well as the local building style and the delicate Chinese wood structure. This courtyard was the house of Gao Yuesong who was a scholar won the third place in the imperial examination in Ming Dynasty. This courtyard was built around 400 years ago, so it is amazing that such a well-protected condition can give us a clear view of what it was like. (Figure 2.3)

CHAPTER 3

'GUANZHONG' COURTYARD

3.1 Conventional Style

The #144 courtyard is a typical paradigm representing the style of conventional buildings and courtyards in GuanZhong Area where the courtyards are called 'Guanzhong' courtyard. Guangzhong courtyard had a pretty long history in the history of traditional Chinese buildings and constructions. There is still a lot of well protected courtyard in cities and small towns over the Guanzhong area, these courtyards were mainly built during Ming and Qing Dynasty about 100-400 years ago.

By looking at these typical styles of courtyard and buildings, we can conclude some features from the local building and courtyard style, such as compact layout, efficient land use, critical material and construction, flexible spaces between interior and exterior and the high level of the decorative art of its wood frame and ceramic work.

All these typical features are basically determined by the local context, such as rainfall, weather, humid and economy. These factors gradually result in

the form and utilization of roof, living condition including sunlight and ventilation and the courtyard and the overall space arrangement.

3.1.1 Layout & Space: Courtyard block

The basic unit in Guanzhong Courtyard is the courtyard block that is occupied by a single family in a large group. In the courtyard block, there are several small courtyards enclosed by buildings. (Figure 3.1)

Figure 3. 1 Traditional 'Guanzhong' Courtyards

The layout of the courtyard block reflects the basic pattern of traditional Chinese courtyard. The courtyard and rooms are arranged along the long axial

1-step Courtyard block

1st step

2-step Courtyard block

2nd step   1st step

3-step Courtyard block

3rd step   2nd step   1st step
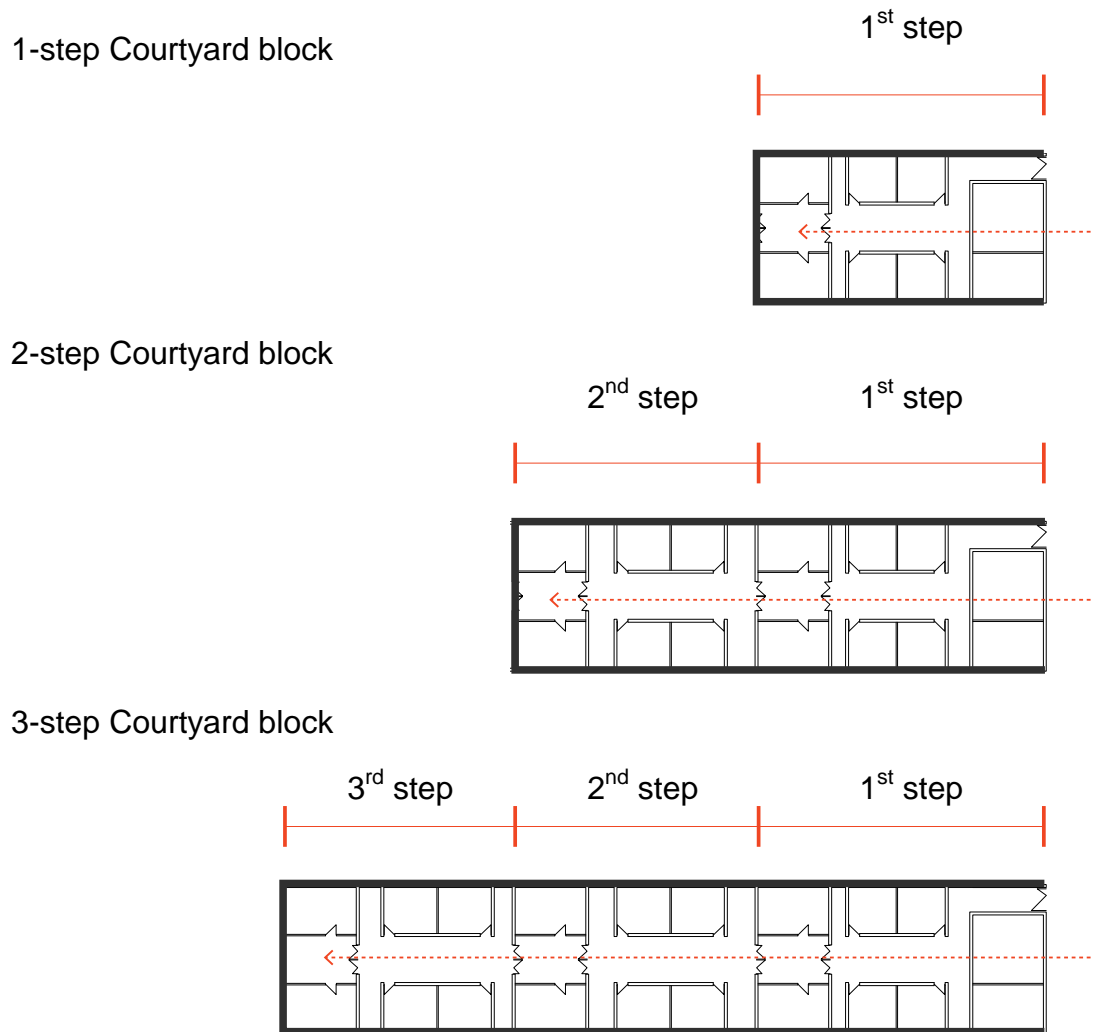
Figure 3. 2 Conventional space arrangement

direction. The public rooms located right on the axis divide the whole courtyard
block into several sections, which are called steps in a conventional way. The
divided courtyards define the numbers of the steps. The number of the steps of
the whole courtyard is usually up to 3. While for a general family with standard
income, 1-step courtyard block is the most common one. The more steps a

courtyard block has, the more wealth the family was. As the circulation is axial and unidirectional, so the privacy for each step of courtyard is increasing along the axis from the entrance. This determines the specific utilization of different rooms in various steps of courtyard block. (Figure 3.2)

Set the 3-step courtyard block as an example. Generally, there are two different directions of rooms' opening, one standing on the axis and opening along the axial direction is called main room, the other one locating by two sides along the axis and opening to the perpendicular direction of the long axis is called side room. These two different types determine not only the different space utilizations, but also various levels in the family, which also reflect the feudal hierarchy order in traditional Chinese culture. In general, the main rooms have higher level than the side rooms and the rooms nearer the entrance have lower level. As a large

Owner/Parents

Children

Family Room

Living Room

Servant
Extended Family

Entrance
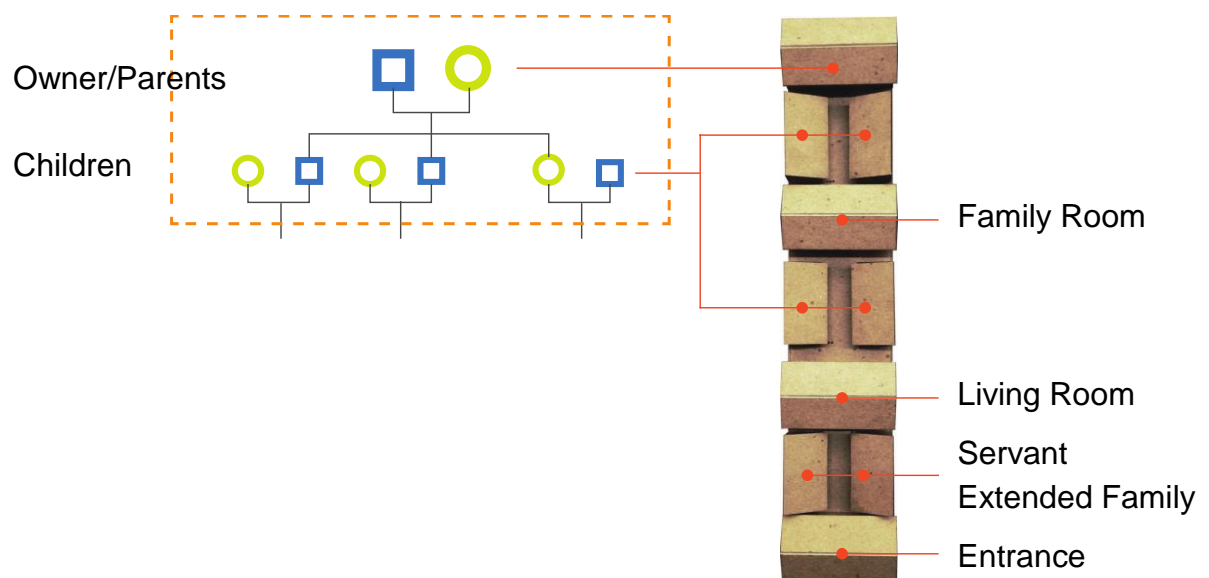
Figure 3. 3 Traditional space utilization

family lives in this 3-step courtyard block the owner, which are always the parents, live in the last main room that has the highest privacy and respect. The rest of the main rooms will be mainly used as the public rooms, which could be understood as the living room or family room in modern terms. The side rooms are generally utilized as the bedrooms of next generations, the elder cousins live in the rooms that are nearer to their parents' bedroom. The kitchen, servant room or storage rooms are usually the rooms in first step, which is the most public space. (Figure 3.3)

As it is shown on the plan all rooms and spaces are organized around the central courtyard in each step, so it is not hard to understand how a significant role the courtyard plays in family's daily life. The courtyard is also used as the exterior living room because it is a concentrated feature.

According to the way in which courtyard and rooms are organized in every step, the courtyard could be categorized as Sanhe Yuan (Buildings enclose courtyard on three sides) and Siheyuan (Building enclose courtyard on four sides).

3.1.2 Layout & Space: Block

Along the streets and alleys, the individual courtyards are repeating and aligning up continuously. The large block is filled with a group of courtyard blocks in a pretty tide pattern. Based on traditional courtyard layout in which the circulation is unidirectional from entrance to the end of courtyard block, so every courtyard is facing to street side. In each block, there are at most two rows of courtyard blocks along the long axis of the block and the two rows meet each other at the end of the courtyard block where sometimes there might be a small

Figure 3. 4 Courtyards in block (in two rows)

backyard. (Figure 3.4)

3.1.3 Layout & Space: Streets/Alleys

Compared with the courtyard space, the alley in front of the entrance is more like a social interactive space for social connection among neighbors. The alley space extends the whole space sequence from the inside to the outside and from the private to the public.

3.1.4 Roof

As one of the 'Ten strangeness of Guanzhong Ren' describes, the local people build their house with single a slope roof, which is mainly reflected on the form of side room. Because of the significance on the main room, the roof is constructed with double slopes. The reason why the roof is formed in this way is conventionally explained by the limited economic condition of the local area, so it results from the reduced material consumption. On the other hand, to deal with the impacts of hot summer, the slope directing down into the courtyard can block some direct sunlight and collect water in courtyard.

3.1.5 Sunlight

The courtyard effectively leaves walls of both main rooms and side rooms enough exposed surface to let the light in. Besides, due to the limited number of

floors (1-2 floors) and the clear roof sloping, the light conditions both in courtyard and interior space are pretty good.

3.1.6 Ventilation

Similar to the sunlight, the ventilation is also in a good condition due to the low building height and the courtyard space. The outside space between rooms can enhance continuous air flowing through the courtyard space.

As both sunlight and ventilation are well maintained by building form and space arrangement, people can obtain a good living condition.

3.2 Dang Village

One typical paradigm of assembled courtyard blocks as a well-preserved

Figure 3. 5 Bird view of Dang Village

community is the Dang Village located 80km away on the east from the urban area of Xi'an. This 670-year old village is occupied by 320 families and more than 1,400 residents. The single step Courtyard block is the most popular style over this village. (Figure 3.5)

Every courtyard block is about 260 square meters with rectangular layout. Some of them are in square.

Dang Village is famous for its overall well-protected condition from large scale community to the individual building and even to the smaller wooden or lithic

Figure 3. 6 Lithic decoration in Dang Village

decoration all over each corners of the building. (Figure 3.6)

3.3 Pingyao

Ping Yao, of which history dates back 2,700 years, is the best well known ancient city with the well preserved Chinese traditional courtyards and its ancient streets around the world. Today, it is still inhabited by 50,000 residents and is renowned for its well-preserved ancient city wall. It is an UNESCO World Heritage Site.

The city walls of Pingyao were constructed in the 3rd year of the Hongwu Emperor (1370). The walls have six gates. The north and south sides have one gate each. The east and west sides have two gates each. This pattern is similar to

Figure 3. 7 Bird view of Pingyao

that of a turtle (the head, tail and four legs), earning Pingyao the moniker 'turtle city'. (Figure 3.7)

Different from the Dang village, Pingyao still retains its large-scale city layout from the Ming and Qing dynasties. The crisscross orthogonal streets with different sizes are clearly shown on the plan. These walking spaces with different levels form a convenient and sophisticate transportation system over the whole city. So that, once you step into different streets and alleys, it will give you various experiences of the ancient city and traditional living scale. The blocks in Pingyao are in the similar pattern with the block of Guangzhong Courtyard.

While, the increasing tourism gives a lot of pressure on Pingyao, no matter the city wall, the ancient street, the traditional courtyard or buildings. Cultural heritage challenge that Pingyao has currently is the same as other ancient cities are facing, such as Xi'an and Dang Village.

CHAPTER 4

MUSLIM HISTORICAL AREA

Figure 4. 1 Location of the historical area of Muslim Community

Figure 4. 2 The streets in the historical area

4.1 Context

4.1.1 Location & Streets

The Muslim historical area is the primary preserved area of the whole Muslim community. In this area, there is one most important main street, Muslim street, lying on its east side, Beiguangji Stree and Dapiyuan Street, as the secondary street, are lying on its west end and north end and these three dense commercial streets form the whole Muslim Historical Area. Xiyangshi Street is another secondary street crossing the whole area from Beiguangji Street on the west and the Muslim Street on the east so that it divides this historical area into two large blocks, the north parcel and the south parcel. There are several small

Figure 4. 3 Vehicle accessible pedestrian

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alleys getting through the parcels to divide them into several basic residential blocks (Figure 4.2).

Many visitors complain that vehicles crowd street that used to only be used by pedestrians. As more and more Muslim families are available to get cars to make their life more convenient, it is inevitable that they will drive through the streets to get home. As a result, it is always pretty crowded on the main and secondary commercial streets with cars and people passing by each other. So traffic patterns are unplanned, making the whole scene chaotic. (Figure 4.3)

4.1.2 Food & Cuisine

Along the Muslim Street, there are hundreds of different Islamic food restaurants and retail stores on each side. These restaurants and stores are the businesses run by local Muslim residents who live in the courtyard right behind their retail businesses. Besides eating in restaurants and shopping at stores, people can also buy and eat delicious cuisine from street vendors (Figure 4.4). Additionally, as the kitchen space is always located beside the entrance, it is a great experience for every tourist that you can see how food you are interested in is cooked. This is also another attractive part of the tourism here. The special

Islamic food and cuisine they make and sell are popular and famous for visitors to

the city. This is also why the Muslim Street is the hottest tourism spot in Xi'an and

there is a saying in China that if you visit Xi'an but have not yet visited the Muslim

Street and tried its cuisine, you have not even been to Xi'an yet. (Figure 4.5)

Figure 4. 4 Vendors along street

Figure 4. 6 Outside Cooking

Figure 4. 5 Location of two Mosques

4.1.3 Mosques

There are two Mosques in this historical area, one is the Great Mosque located in the central part of the south parcel. A small alley called Huajue Street passes by the Mosque. The other one is Daxuexi Alley Mosque standing at the northwest corner of the north parcel. These two mosques are the two oldest mosques in Xi'an. (Figure 4.6)This can show how important this area was in history and religion.

The Great Mosque is the oldest and one of the most renowned mosques in the country, founded in 742 AD. It was reconstructed during the Ming Dynasty and further expanded in the Qing Dynasty. The whole area of the mosque is about 130,000 m^2 with 4,000 m^2 building area. There are two gates opening on the East end, on is at North corner and the other is at the South. The layout is in a narrow rectangular shape stretching on the east-west direction and is also following the traditional Chinese courtyard planning like the local residential courtyard with 4 single steps (Figure 4.7). The building style is in the typical Chinese traditional building pattern as well. The perfect combination between the religious culture

and traditional Chinese building style determine the Great Mosque extreme great value in history.

While, it is a very interesting observation about the Great Mosque that the whole space of the Mosque is divided into two parts, the first 3-step part is opened to the public for visiting, while the last one is only accessible for the local Muslim people for their weekly ritual. However, based on the observation and the conversation with the guard in the mosque, it is strange that there is little number of tourists visiting this mosque.

The Dapiyuan Mosque is another important ritual place for local Muslim
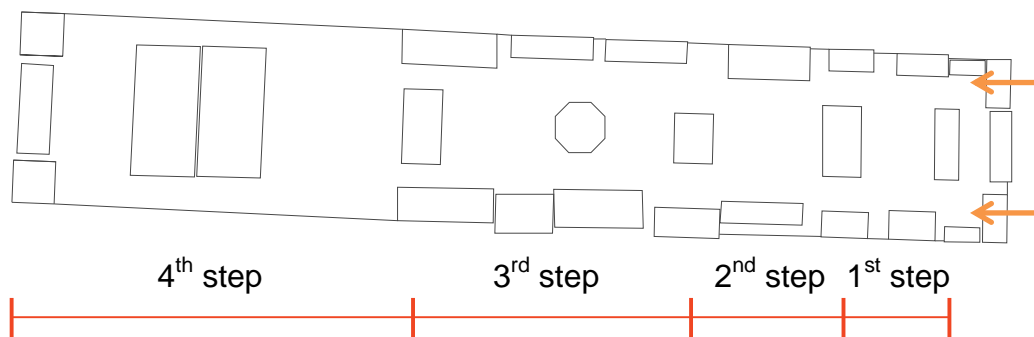
Figure 4. 7 Great Mosque in Google maps and its building outline

people and it is built in 1411 A.D.

4.1.4 Demographics

The population density in the historical district is very high. There are almost 20,000 local Muslim people living around the Great Mosque in this historical district of which the area is around 49 acres. So the living density of this historical area is about 408 people each acre, while this is a really high value.

The original family living pattern is that all family members live together in a single courtyard block. Due to the population booming, the family structure is starting to change. Since the family size is getting bigger and bigger, the general living pattern transforms from a large single family to several smaller branches, like sub-families early since 1950's. And the representation of this transforming is that more and more adults live alone and set up their own small families. This change impacts traditional culture and the space occupancy pattern.

4.2 Block Density / Building Density

According to the current living density in this area, it shows a general situation of the living condition. While, it is still necessary to look at the urban density of this area so that it can give us a more clear view.

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Figure 4. 8 Nolli Map of Rome, 1748

When we talk about the urban density, one thing important to this topic is the 'Nolli Map of Rome, 1748' on which the black and white blocks show the different spaces of Rome. (Figure 4.8) On the map, the black represents the building and the rest white parts show the public spaces in the city including the plazas, streets, alleys and some courtyards. So, through this pretty simple drawing, it directly shows a very clear vision of building density and public space arrangement.

To follow the way how the 'Nolli Map of Rome, 1748' represents and to give myself a clear idea about what happened to the urban density in the Muslim historical area, I made an urban texture model in which the similar black pieces represent the buildings in courtyard blocks and the rest are the public space and courtyard space.   So the quantity of the space between each block and each
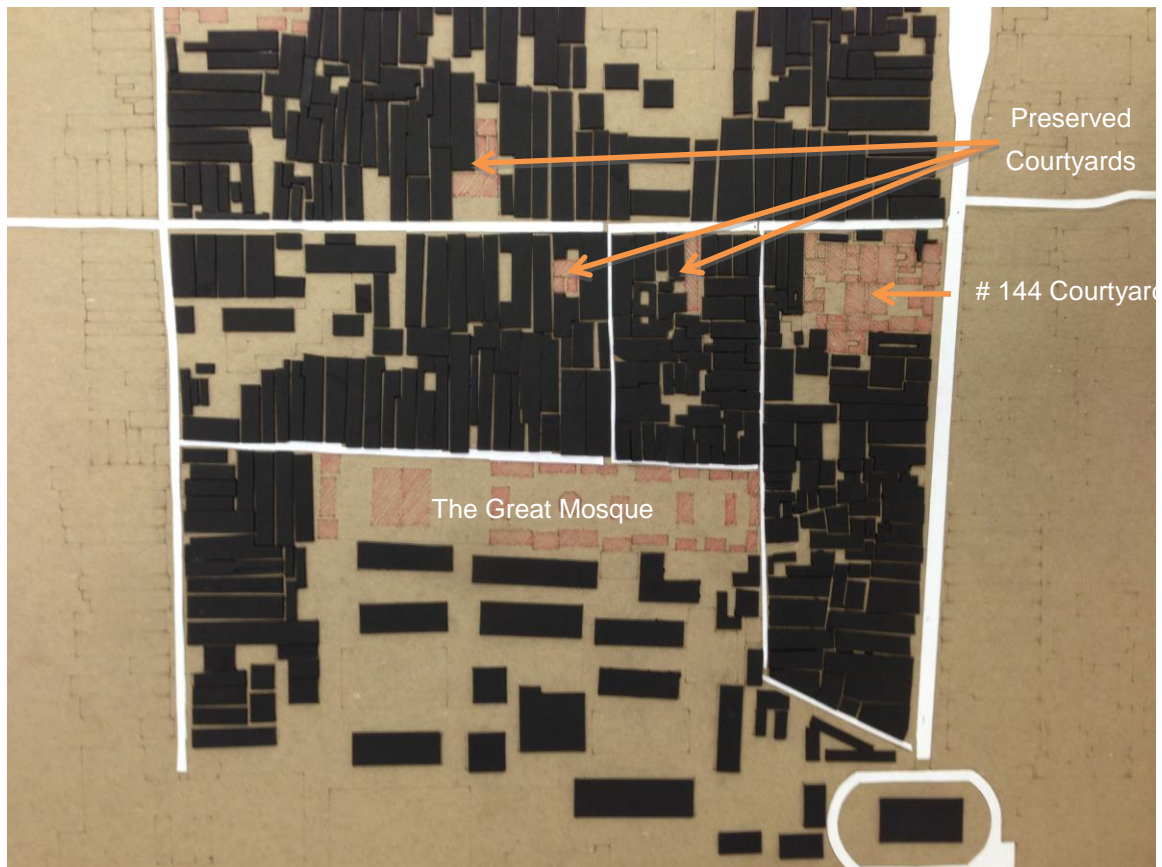
Figure 4. 9 Urban density study model

courtyard can clearly show the various building density among different blocks. (Figure 4.9)

To be specific and clear about the various urban densities, I select three certain blocks to start my research. These three blocks, named with A, B and C, are all beside the Great Mosque, and the reason selecting these blocks is people live in these three different blocks have the same accessibility to the Mosque but have different public context. So that the differences in the density can represent the different space utilization affected by the public interaction.

Start with looking at these three blocks and comparing with the density of the block from Pingyao. They are in similar scenarios that each block has a pretty high density. But in selected blocks, some crowded small pieces of buildings are somehow different from the buildings in Pingyao. These pieces of buildings are
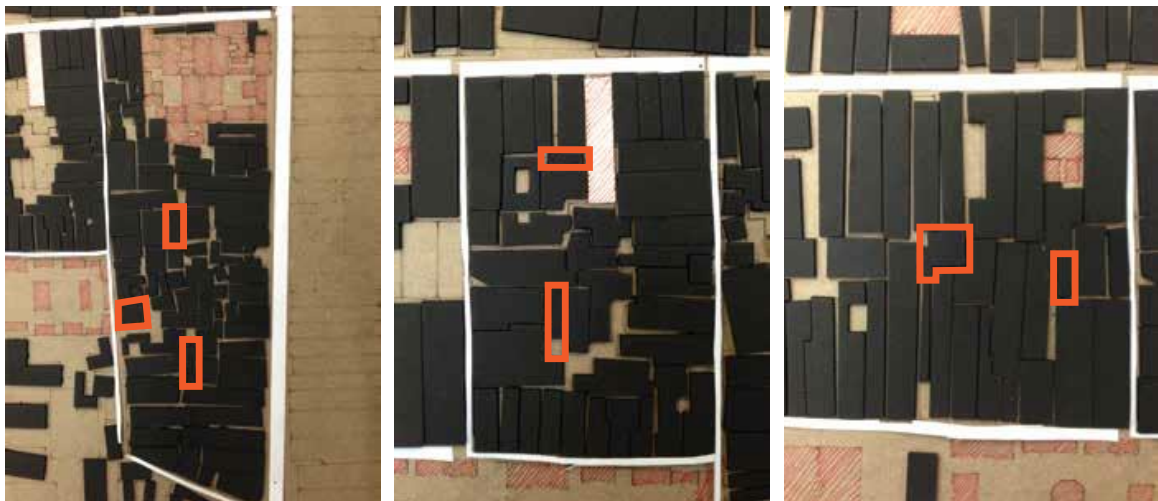
Parcel A   Parcel B   Parcel C

Figure 4. 10 Congestions in blocks

more like congestions that make these areas being out of breathe. By removing these small pieces on the texture model, we can find that it is better to demolish these single buildings, and the space left can give this block a chance to breathe and introduce some air floating through buildings around. (Figure 4.10)

Furthermore, to get more unoccupied space so that the block has more chances to breathe and more flowing natural air, there are several possibilities of demolition can be found in the area. (Figure 4.11)

| Parcel A | Parcel B | Parcel C |

Figure 4. 11 Possibilities of demolition

Finally, as the result of removing all the possible demolished pieces, we can get three different openings left by the demolition in these blocks. For the Parcel A, the space is a potential public connection between the two sides in the block. In this way, people in this block can get more natural ventilation by the open

space, and the people, no matter visitors or residents, can have a common space with more social interaction here. For the Parcel B, there is an in-block open space that could be used as a large courtyard, besides the increased air flowing. This open space can also benefit the neighbors in maintaining their basic social interaction. For Parcel C, the open space is more like a back courtyard shared by the families on each side. (Figure 4.12)

Parcel A   Parcel B   Parcel C

Figure 4. 12 Different open spaces

4.3 Buildings and Courtyards

On the texture mapping and modeling, the red sections represent the well-preserved buildings. Besides the mosques and the #144 that have been utilized as museum, there are only three other red parts representing the well-preserved residential buildings in the similar condition with the #144 Courtyard. All black pieces are reconstructed modern buildings. It is clearly shown on the texture map that, besides the congestion pieces, the rest of new constructed buildings are all in narrow rectangular shape, which means these buildings are all built within the previous property lines. So even most buildings are rebuilt with new material and building methods, we can still see the ancient urban texture and density.

While, staring at the urban density is still limited because of focusing on a large scale of the living condition. To be much clearer about the specific living condition of the local residents, zooming into a smaller scale in courtyard and building is the next step in research logically.

The typical form of the new constructed building is the three-floor construction built with brick and concrete. It follows the compact and long span courtyard space in traditional pattern, but with a much more dense living space

and less courtyard space compared with the previous research on the 'Guanzhong Courtyard'. During the building observation, it is an obvious feeling that the inside space of the new building is pretty dark, even some of them have several small openings like sky-wells. We can also assume that in this building with high building density, the ventilation is also in a low condition.   (Figure 4.13)
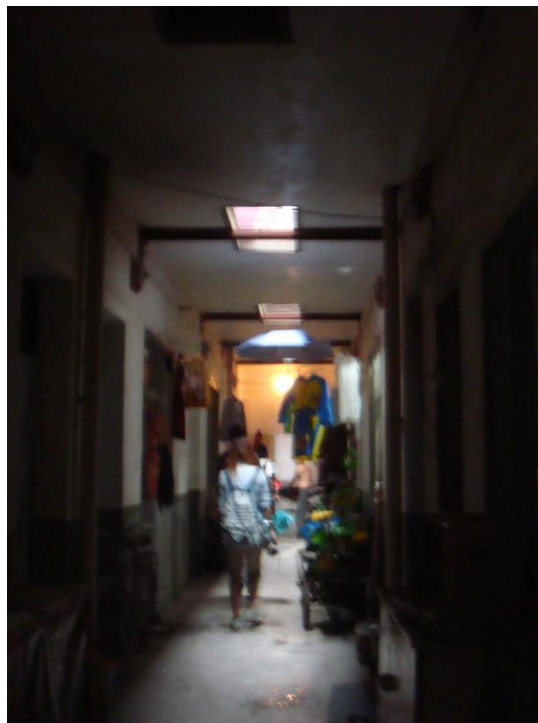
Figure 4. 13 Current living condition

So, to make a clearer comparison between the current construction and the previous courtyard, I make two study models in the same scale, one is the typical Guanzhong Courtyard with three steps and the other is the new construction in the same size and steps. I intentionally cut them into three pieces

to represent the three different steps. In this way, I can also automatically assemble them to expand my study on the space transforming from the old to current. (Figure 4.14)

Traditional Courtyard
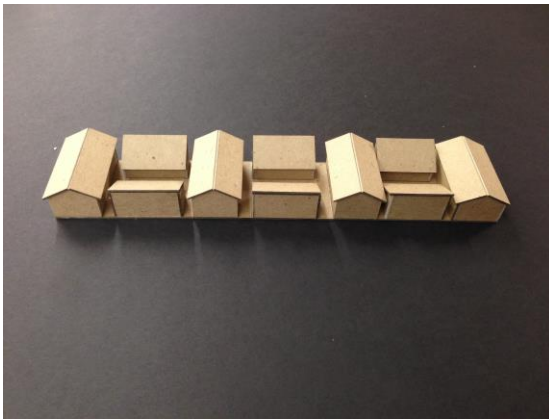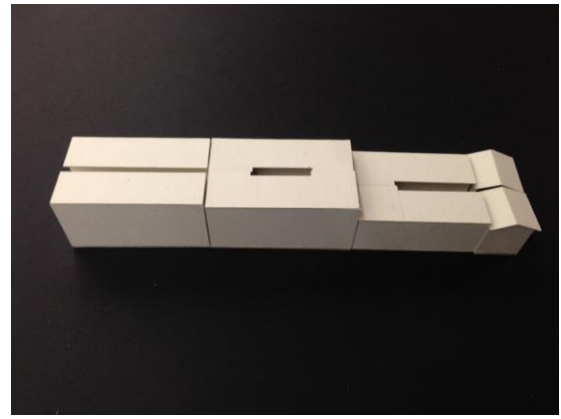
Figure 4. 14 Study model   Current Courtyard

The transformation of building form and space utilization is mainly following the change of the family structure and scale during the same period, which we had talked about in the section of 'Demographic'. The density of the building is increasing because of the enlarging size of each family. So, to sustain enough space for the extended family members, the height of the building needs to be elevated. (Figure 4.15)
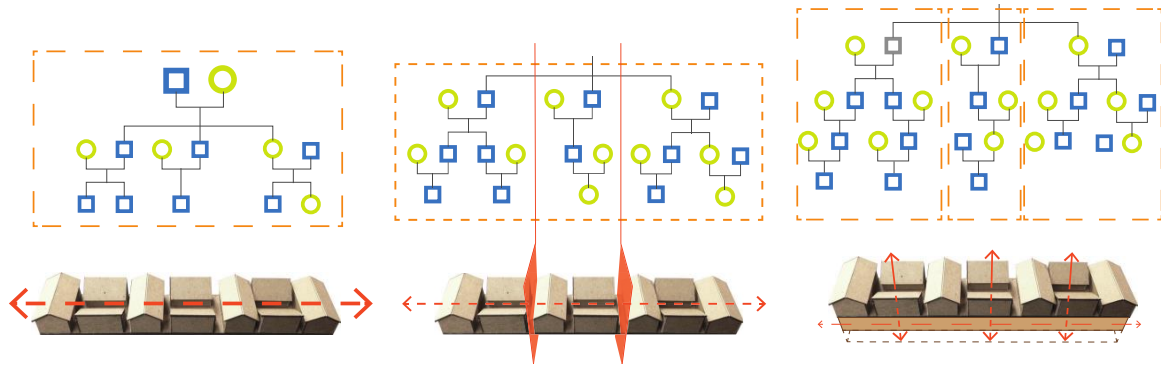
Figure 4. 15 Space utilization follows family structure transforming

Another question about this transformation is where and how it starts. If we look at the space utilization, as the commercial space and servant space are locating at the beginning of the courtyards sequences, so the activity around this area is more various and complicated, so that this area will be the easiest parts to change. So, by modeling and diagraming the sequences of the transforming, we can not only understand how the building form and courtyard space change, but also learn how the floor area ratio and the area of the courtyard change through the whole process. (Figure 4.16)
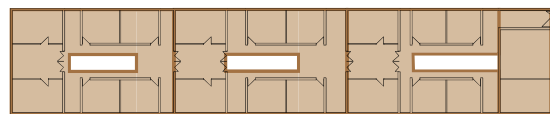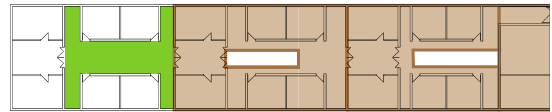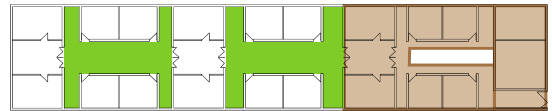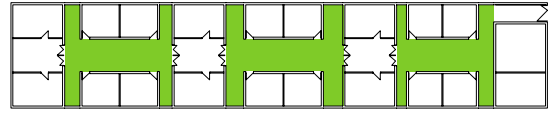
Figure 4. 17 Process of courtyard transforming

Figure 4. 16 Process of courtyard transforming reflected on plan

From the data, it is surprised that both the FAR and the area of courtyard changes rapidly from 0.7 to 2.5 during 50-60 years, while the 2.5 of the FAR is also pretty high in temporary living density. It is sad that courtyard, the core space

of the local life in old time, is almost disappeared during such a short time span. (Figure 4.17)

Besides the disappearing courtyard, the sunlight condition and ventilation are declining as well. From the section model of existing building (Figure 4.18), because of the extreme high density, either sunlight or ventilation cannot get through such a dense volume. While, the low living condition is definitely a severe threaten to the local culture, because local residents might leave this area to find a better place with better living condition. In terms of the culture value is mainly based on the whole community, as the families in community are dispersed, the culture value will decrease as well. To maintain the cultural value, the most significant way is keeping local people live there.
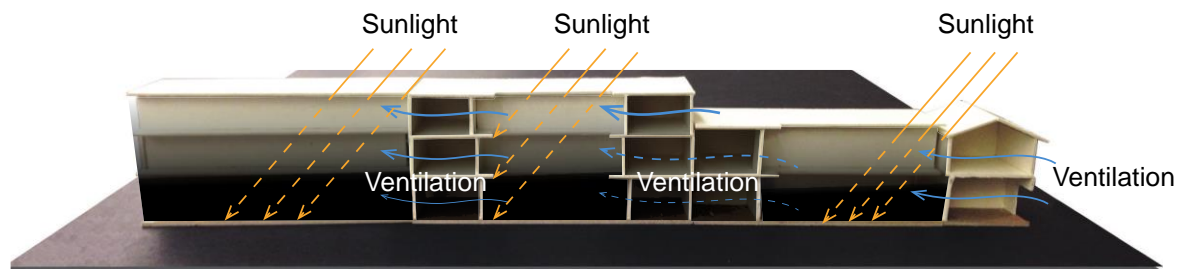
Figure 4. 18 Solar gaining and ventilation condition

So these new constructions with low living condition need to be replaced and improved by a better living pattern and system.

4.4 Site Selection

In terms of the basic context and the further study on the urban density and building preservation conditions, the parcel A is selected to be the site in the next design process. And there are two main reasons for the selection:

1. The context of the parcel A is complex in terms of the different level of roads and the Mosques right beside. On the site map (Figure 4.19), we can see the main street, Muslim Street, on its east, the secondary street, Dapiyuan Street, on its west and the 3rd level road, Huajue Alley, on its west. So it is a typical area for the design so that the final solution for this parcel could be well integrated into other parcels as well.

2. The condition of the building preservation is complex as well, on the building category diagram (Figure 4.20), The whole 144# Courtyard on the north part of this block is in well-preserved condition. In this case, the rest buildings and courtyards are all the new construction. While, based on buildings that whether are built within the ancient property lines or not, these rest buildings can be further categorized into 2 different groups. The 1st group is categorized as 'In-Pattern', which is understood as new buildings are built on the ancient property lines. While,

the other one is 'Out-of-Pattern', which clearly represent the new buildings are built without any limitation.

Based on the three different levels of the preservation conditions, the design in the large scale is focusing on the 'Out-of-Pattern' as the first step in a long-term design process.

Well-preserved   'In-Pattern'   'Out-of-Pattern'
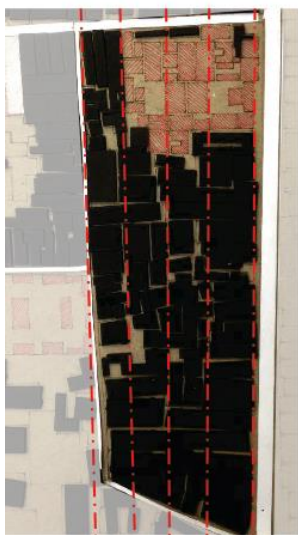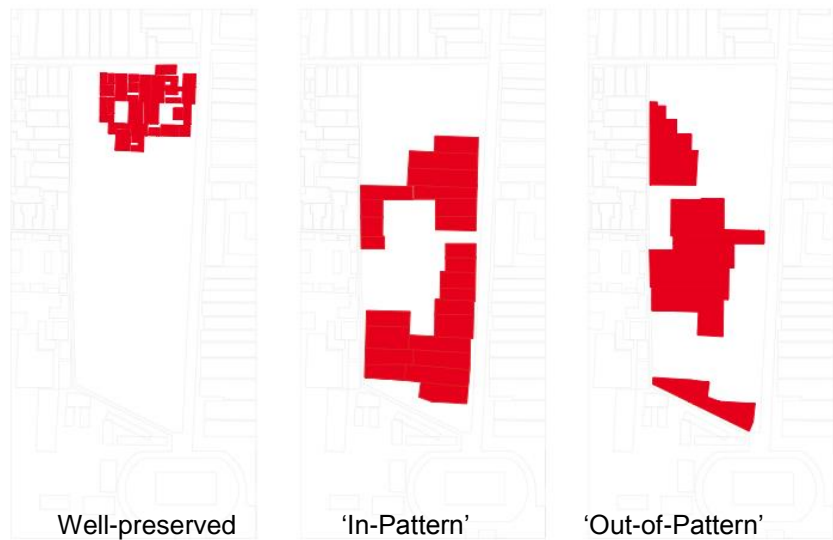
Figure 4. 19 Site   Figure 4. 20 Three categories of existing buildings

CHAPTER 5

CONCEPTUAL DESIGN

5.1 Block Scale

5.1.1 Culture Lost

As the tourism develops, the core local cultural capitals and Muslim religion should be celebrated and known by more and more tourists. While it seems that tourists are becoming increasingly interested in Islamic food rather than the Great Mosque, This is made apparent by the fact that there are much fewer tourists visiting the Great Mosque than the Muslim Street. (Figure 5.1) It is a serious loss for local culture and the scenario could worsen if this unbalanced issue cannot be deal with efficiently. The loss of Islamic culture will totally change the cultural

Figure 5. 1 Visitors' density on street and in Mosque

value of this area and eventually somehow results in the massive cultural extinction.

One of the focal points in design concept is using the architectural method to deal with the problem of cultural decline by encouraging people to visit the Great Mosque. To find the solution, the first thing to be clear about is what causes this problem.

5.1.2 Disconnection

Starting with the circulation of the tourists in this area is the first step to understand what caused this problem. From the first piece in diagram of problem exploration (Figure 5.2 .I), the main circulation loads on the main street, which starts from the main entrance of this area. If you want to visit the Great Mosque, you must enter a small alleyway. The larger scale of the main street and the bustle of busy city like make the small alleyway nearly invisible to the passerby. It is easy to understand why tourists unintentionally go straight and stay on Muslim Street, rather than exploring the Great Mosque.

Figure 5. 2 Diagram in exploring culture connection

Furthermore, based on the site observation, the small alley is the only access to the Great Mosque from the main street. Since the next turning is nearly 250 meters away and indirectly accesses the Great Mosque, this means that if people miss the first turn, it will be impossible for them to the Great Mosque.

5.1.3 Possibilities of Connection

Exploring a new strong connection between the main street and the Great Mosque is a strong possible solution to the problem. This would connect the area of public circulation and a core cultural spot that is currently neglected.

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Initially, the simplest way is enhancing the current connection through that small alley. The alley is currently 3-3.5 meters wide with a series of small retail stores on each side (Figure 5.3). In addition, there is no clear sign or an obvious entrance that direct visitors to the Great Mosque. In this scenario, to enhance this connection, the alley should be widen and clear signs should be added.

Figure 5. 3 Narrow Commercial Alley

Making a new connection between the Great Mosque and the main street is another solution. Compared with the first solution, which is indirectly dealing with the problem, this solution could be more straightforward. According to the axial layout of the Great Mosque, it is reasonable and appropriate to make a direct

connection crossing the block from the main street and the Great Mosque (Figure 5.2. II).

Both connections will finally be designed as strong connected pathways only for pedestrians.

5.1.4 Circulation

The principal intent of both possibilities of connection is to create space for circulation between the Great Mosque and the main street. As only demolition could make the second solution work, tracing the diagram of both solutions in the current buildings context would make it clear which of these two solutions is more feasible. Fortunately, showing on the tracing diagram (Figure 5.2. III), the diagrams of both solutions can be well fitted into the 'Out-of-Pattern' area in which the buildings should be demolished at the very beginning.

5.1.5 Buildings Infill

To form the proper streetscape for this connection, the new buildings should be located in an appropriate way. Showing on the infilling diagram (Figure 5.2. IV), the new buildings should be contextually located within the area of demolition. In terms of the footprint of the demolition area, it would be most

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feasible to create a diagonal connection. While the courtyard should be in a rectangular shape, the final shape of the connection would be a zigzag shape.

5.1.6 Block Exploration

After dealing with the cultural connection, the next step of conceptual design would be focus on the design of the whole block. As the whole process starts from the buildings in 'Out-of-Pattern' group to the buildings in 'In-Pattern' group, a site model in which different colored foams represent the different building groups will be helpful in dealing with different groups in different processes. In the site model, the red-purple one represents the preserved 'In-Pattern' buildings and the blue one shows the new one replacing the
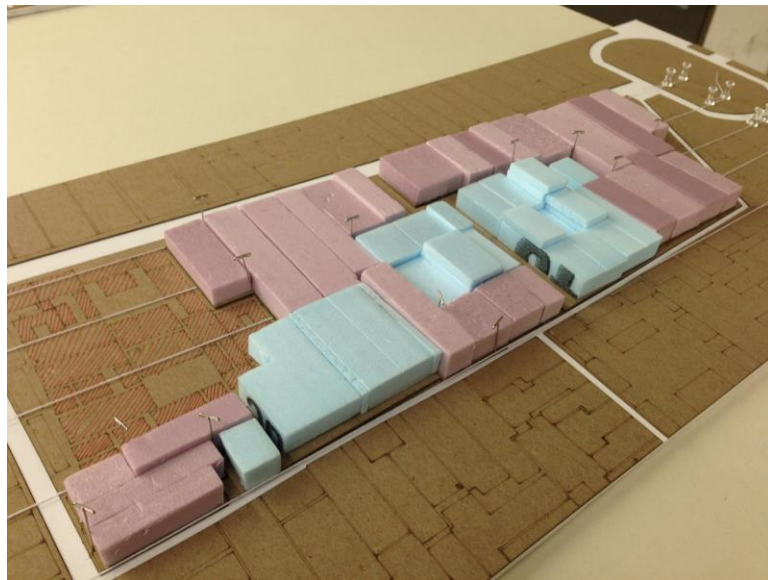
Figure 5. 4 Site block study model

'Out-of-Pattern' buildings. By moving and locating the small foam block in blue, which represent every individual new courtyard block, there are three solutions to promote the new space arrangement. (Figure 5.4)

1. In this option, a continuous circulation for residents is created between the two rows of courtyard block. The circulation flows from the inside of the block

| I | II | III |
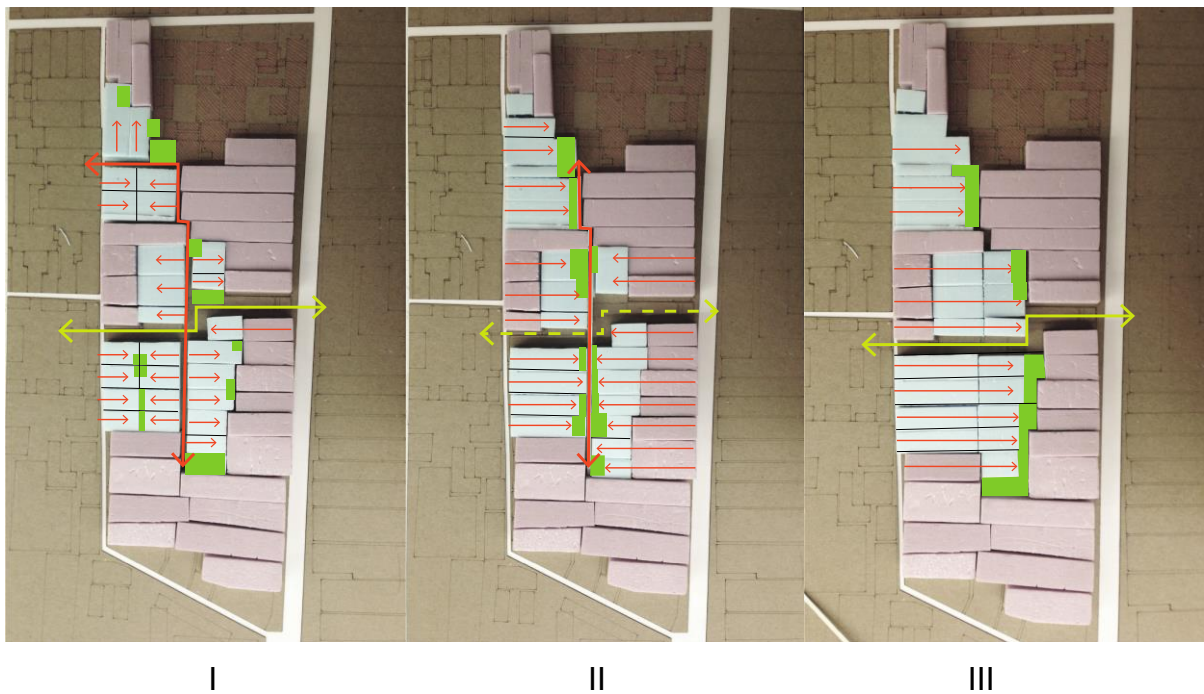
Figure 5. 5 New pedestrian pattern and units arrangement

to give a floating circulation from the north to the south among the courtyard blocks. The potential problem might possibly happen at the place where residential circulation and visiting circulation meet, and it will result in exposed feeling of residents and visitors might take a wrong turn, entering private housing area. (Figure 5.5.I)

2. This option is aimed on improving the 1st options by creating two different physical levels for the two circulations so that the two different groups of people could maintain the regular social connecting without interruptions from the other groups. As the circulation for visitor should be designed public, so the residential pedestrian is elevated to second floor level to maintain privacy (Figure 5.5.II). While, this elevated residential pathway will result in adding more stairs to make sure people on different floors have access to it. But the additional stairs might take up more living spaces, and this is not feasible in this area.

3. In this option, to avoid the problems from the previous two options and have a better solution in dealing with the conflict between the two circulations, the whole residential block would be divided into two sub-blocks by the public pedestrian pathway, and each of the sub-blocks has their own pedestrian pathway in the sub-block. (Figure 5.5.III)

5.2 Shared Living Space

The concept of shared living space is another focal point in the further design, focusing on improving living units and courtyard blocks. In this way, the shared space can not only maintain the density of living space, but also release more space for courtyard and improve the living condition.

5.2.1 Shared Circulation

In terms of the new space utilization of the courtyard, the courtyard block is currently occupied by several small families compared with the past, when it was occupied by a large family. The traditional linear circulation was a private pathway through each courtyard, while it is more like a public scissor that cuts through the courtyard spaces today. (Figure 5.6) As a result, private courtyards will be used as a pathway for others. It feels uncomfortable to have strangers pass through your courtyard. Due to this, the traditional axial circulation crossing courtyard block cannot work well for the modern life and space utilization.
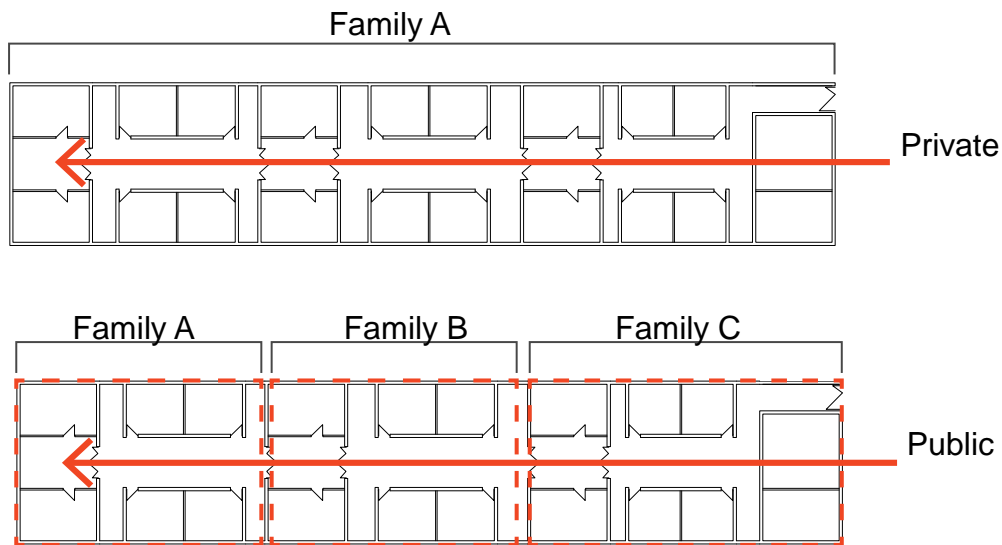
Figure 5. 6 Comparison of space occupancy

Traditional courtyard occupancy (Top)
New courtyard occupancy (Bottom)

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To deal with the conflict between public circulation and private courtyard, the principle to the proposed solution is organizing a new circulation in same linear pattern but leave the private courtyard space for each family. However, if we look at the two adjacent courtyards together, there is a potential space for a
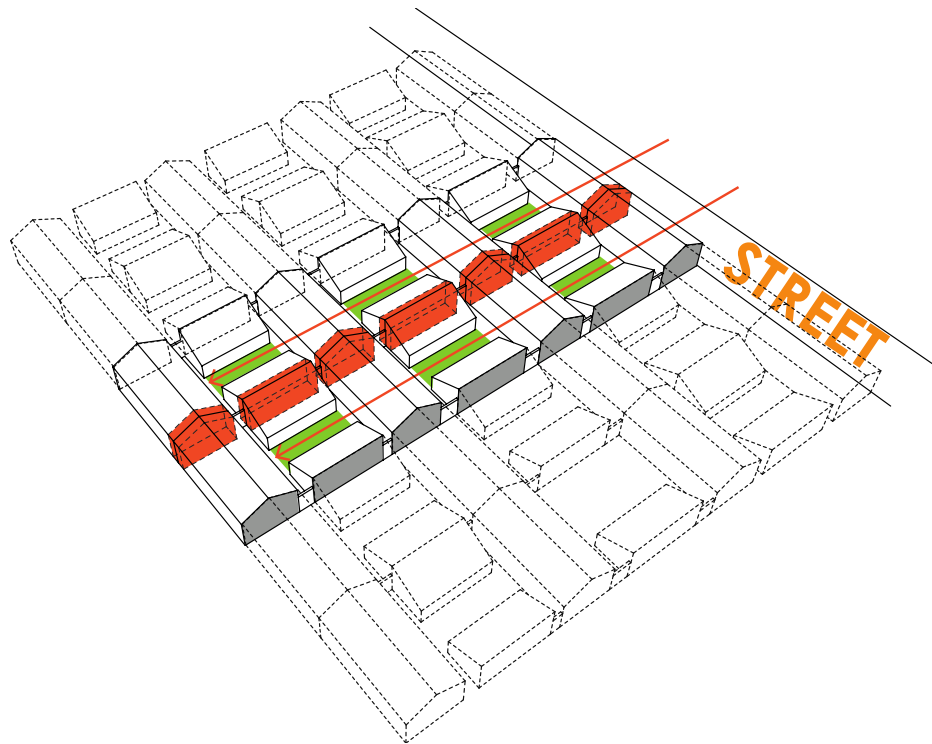
Figure 5. 7 Diagram, exploring new axial circulation
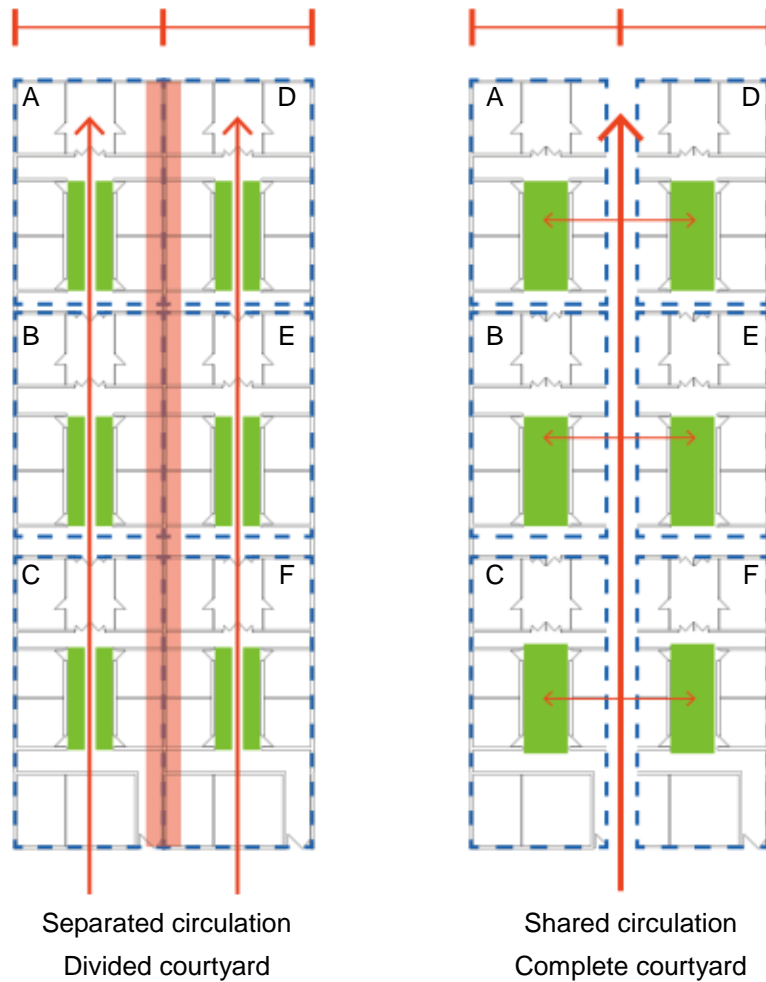
Figure 5. 8 Process of exploring new circulation

new circulation at the interface part between two courtyards. (Figure 5.7) This space for new circulation is composed with two sections from both courtyards, and is also shared by two courtyards. In this case, the two separate circulations are converted into a single one that not only takes up less space, but also maintains the privacy of each small courtyard. (Figure 5.8)

So, this shared circulation will benefit residents' life in two ways:

1. Maintain complete courtyard space for each extended family.

2. More available space could be applied to courtyard space or living space in order to improve the living condition.

5.2.2 Shared Large Courtyard

Due to taking some space away from side rooms on each side, the diminished side room will be hard to use (Figure 5.9.I). Additionally, the sidewalls along the shared pathway are rigid view blocks resulting in unpleasant walking experience. And this is against our original intent in improving the living condition (Figure 5.9.II).

I. Diminished side room   II. View block on pathway
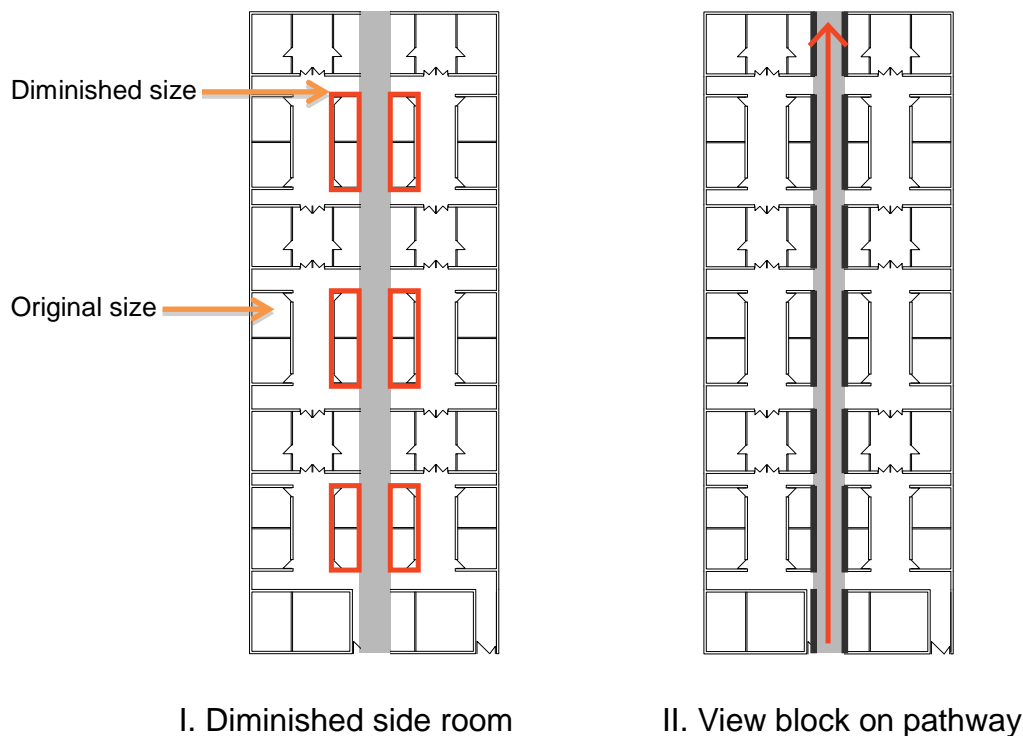
Figure 5. 9 Problems along pathway

To avoid negative space on pathway, the diminished side rooms should be removed. While, in terms of the high living density, the space of diminished side rooms should be re-used by integrating them into space on the other side of courtyard (Figure 5.10).

In this way, there will be a larger shared courtyard providing an open view to people who walk along the pathway. The footprint of each step will be a rectangular courtyard enclosed by a whole living volume on three sides. And two adjacent step courtyards could be combined as a larger courtyard unit (Figure 5.10).
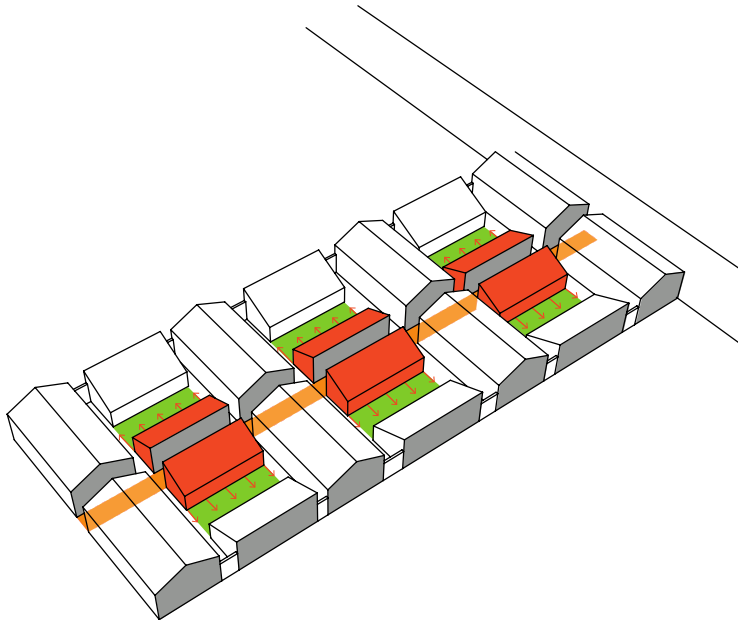
Figure 5. 10 Exploring shared courtyard
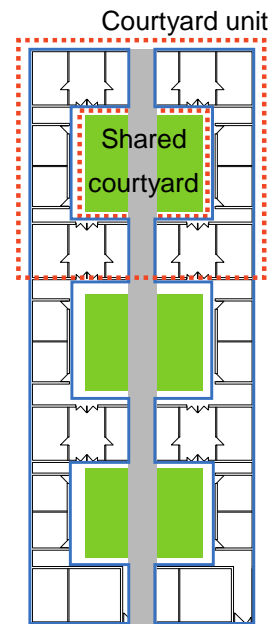
Figure 5. 11 Shared courtyard & Courtyard unit

5.2.3 Density Increase

To maintain a high living density, elevating the buildings can create enough living spaces. As majority of the current buildings in this area are 3 floors now, keeping the same building height and floor height can maintain the similar density and prevent courtyard from being too dark caused by larger building height. (Figure 5.12)
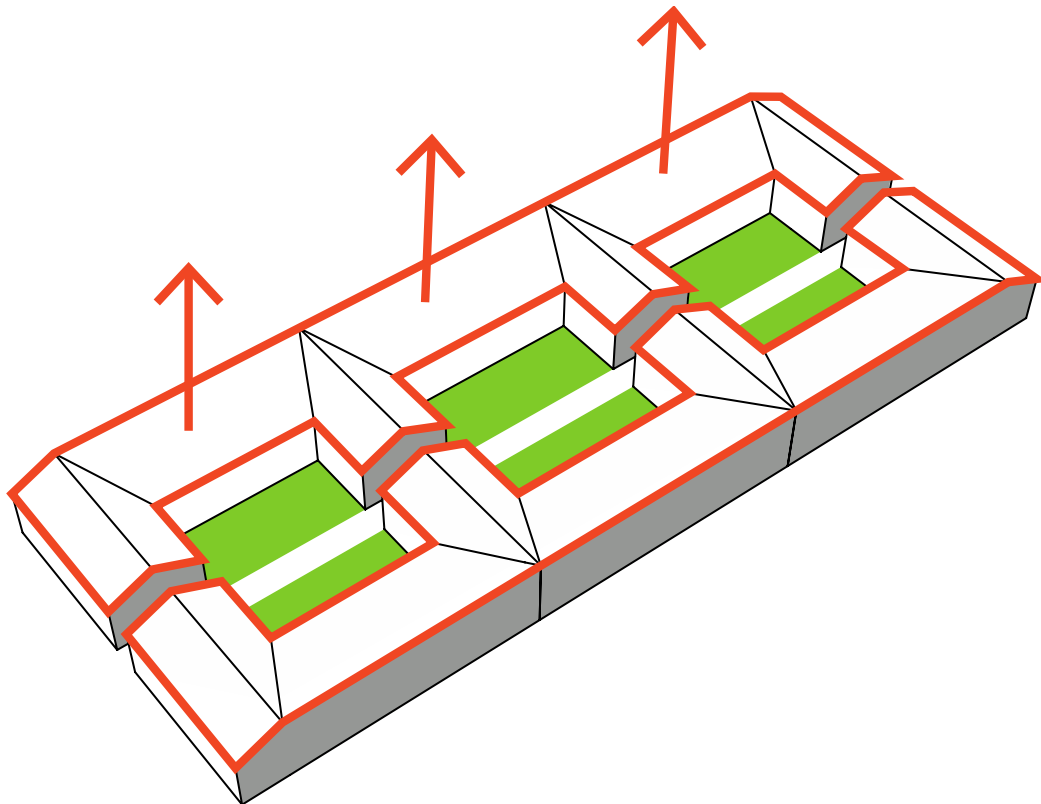
Figure 5. 12 Living density increasing

5.2.4 Living Condition

As the result, besides maintaining the living density, the general living condition can be improved by the shared circulation and shared courtyard. Further more, the large shared courtyard can also result in better sunlight and ventilation. (Figure 5.13)

Sunlight

Ventilation

N
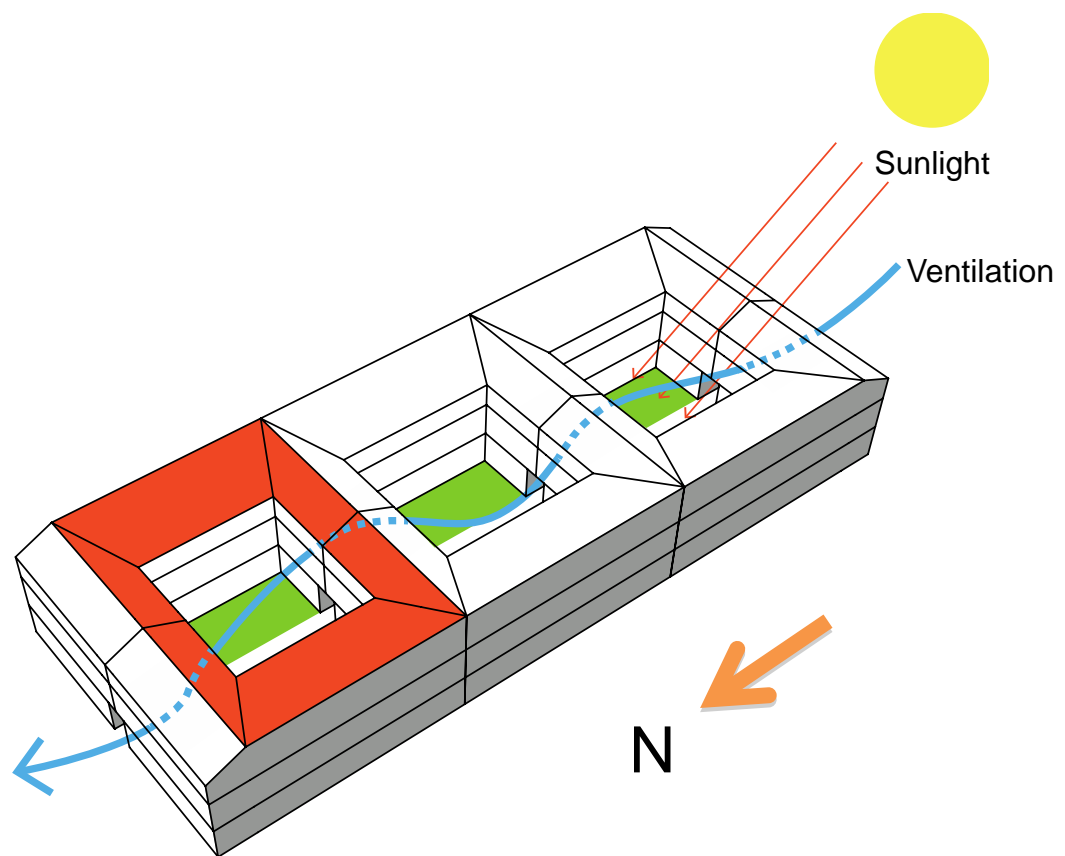
Figure 5. 13 Improved living condition

CHAPTER 6

DESIGN PROPOSAL: LIVING UNIT

6.1 Unit Design

Set the reformed courtyard unit in previous conceptual design process as a modular unit, so in design proposal process of living space, it is easy to organize and integrate these modular units into the current context of courtyard block with steps in a certain pattern.

So the main task in this process is unit design that works well in dealing with maintaining living density and improving living condition.

6.1.1 Modular Dimension

In terms of the standard courtyard dimension, the common footprint of each step is 12m by 20m. So the area of each unit in further design will be 240m^2. Based on the database from Ministry of Housing and Urban-Rural Development of the People's Republic of China[1], the standard area for each person is 36 m^2 and that for each family is 117 m^2, so the 240m^2 area in each floor can support two

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[1] A ministry of the government of the People's Republic of China which provides housing and regulates the states activities in the country, formerly known as the Ministry of Construction

families. While, as the courtyard will take up certain amount of the area in this 240 m^2, so the interior space is smaller than the standard, while it will be fine if the living condition can be improved.

6.1.2 Tight Space/Floating Space

In terms of that the interior space will be smaller than the standard, the idea of tight space is applied into the space arrangement of unit. There is a lot of good projects ever dealing with tight space well. And I select on of them, which is 'Seth Peterson House' design by F.L Wright (Figure 6.1).

Figure 6. 1 Entrance view of Seth Peterson House

Looking at the floor plan (Figure 6.2), the footprint is composed by two rectangles overlapping each other. Two solid walls stand at the overlapped place dividing the whole interior space into two parts of which one is public space in the
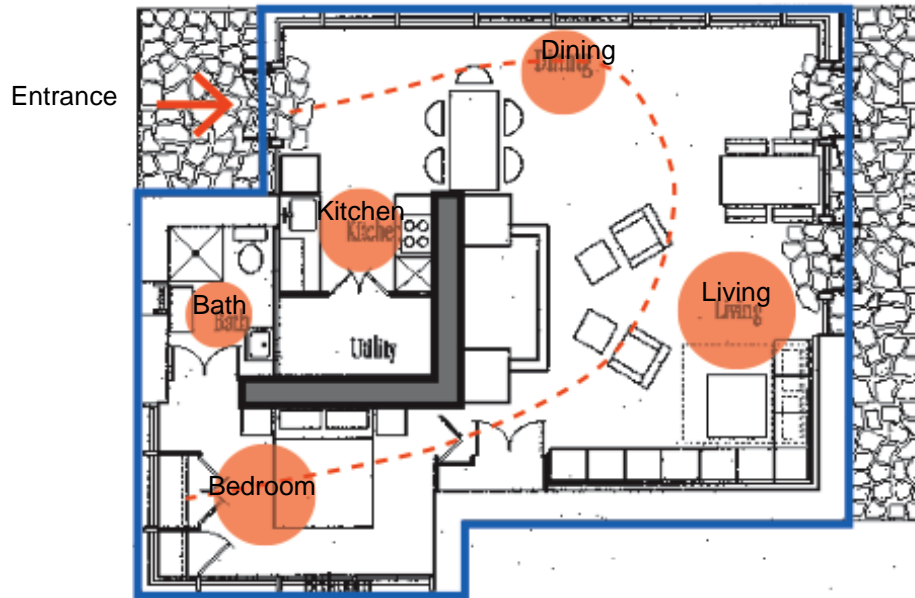
Figure 6. 2 Floor plan of Seth Peterson House

larger rectangle including entrance, kitchen and dinning room and living room (Figure 6.3) and the other one is private space in the smaller one which is main sleeping area. It is clear that there is no specific space for circulation and space flows through each functional space, so that people can even feel spacious in such a tiny house.

Kitchen and Dining   Living room

Figure 6. 3 Interior view

Following the idea of tight space from the example, it is necessary to use study models and program diagrams to arrange the space and program of each unit and try to organize them in a floating sequence. As the living room is the core space in modern life for every family, similar to the traditional courtyard space, so the all the programs and spaces start and expand from the living room. In the overlapping diagram of program sketches and the unit model (Figure 6.4), the space sequence is clearly floating from the public pathway, to the semi-public courtyard, then to the semi private living room and kitchen/dining room and finally to the private bedrooms. The stairs lying between each family living space will support the vertical transportation from ground floor to the other two floors. (Figure 6.5)
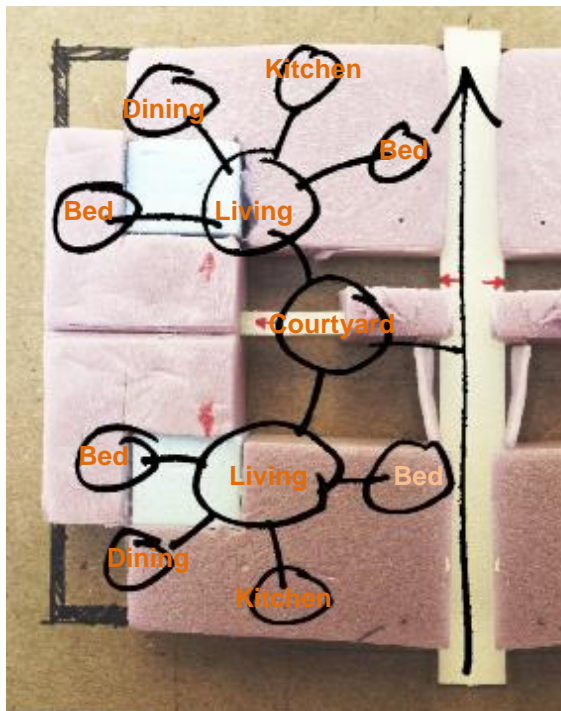
Figure 6. 4 Model and diagram exploring tight space
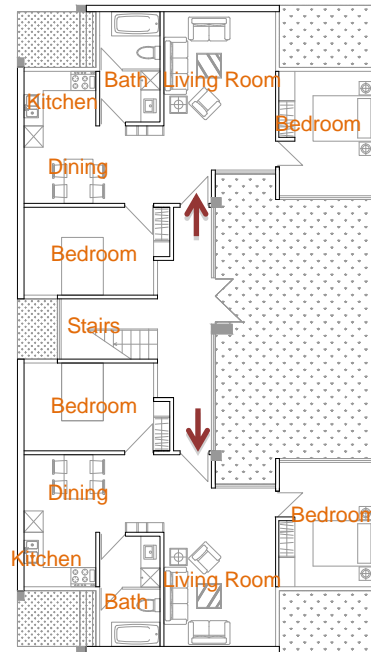
Figure 6. 5 Floor plan of 1# unit

In this pattern, all spaces could be well connected in a floating sequence so that each space can be fully used. And based on the space sequence in which the rooms are linearly located around the living room, the dimension in width of the interior space could be defined and uniformed in a certain span from 4m – 5m within which the living experience in each room could be maintained in a good level.

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6.1.3 Shared Space

Besides the tight space in a floating pattern, the shared space could also be used as the strategy in space utilization. Like the shared circulation and shared courtyard, the semi-private shared room could be integrated into the space between each family based on the fact that two small families are members of an extended family.

In terms of the local life style and Muslim religious tradition, as the extended family has a lot of chances to get together no matter eating or chatting, so the shared room could be utilized as a living room, a dining room or a flexible open space. In this case, the overall space sequence in the unit will start from the central shared room and expand to two families on each side. So, the original conceptual form of the living volume is altered from the 'C' shape to 'H' shape so that the length of interior horizontal circulation from the shared room to each bedrooms can be reduced to maintain a high efficient space utilization. (Figure 6.6) Furthermore, the 'H' shape living volume forms two separate courtyards, in different privacy levels, of which one is semi-public courtyard beside the public pathway and the other is private courtyard at the back. (Figure 6.7)
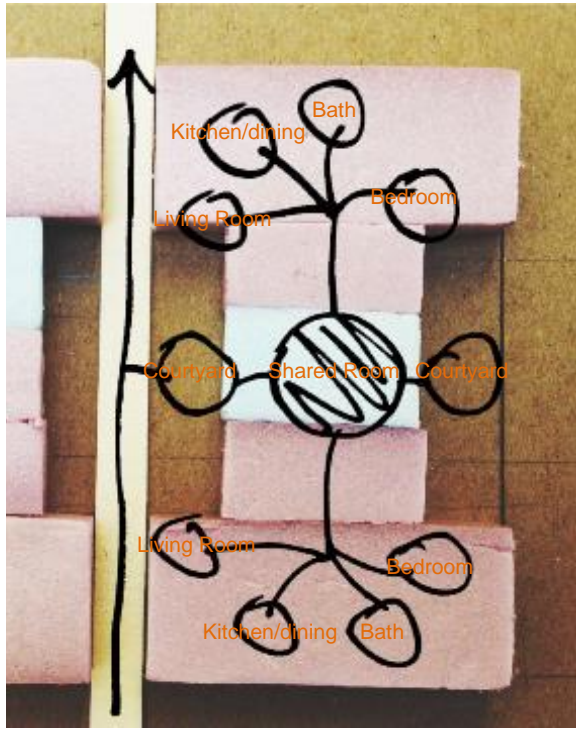
Figure 6. 4 Model and diagram exploring shared space
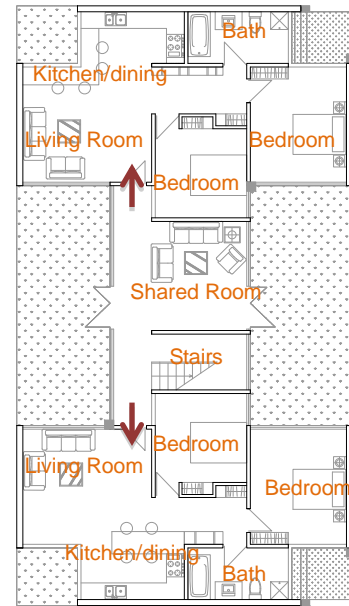
Figure 6. 5 Floor plan of #2 unit

These two units can be combined together into the modular courtyard unit,

which can be integrated into the further assembling of the whole courtyard block

in which the units will be repeated along the path with different steps.

6.1.4 Sky Well
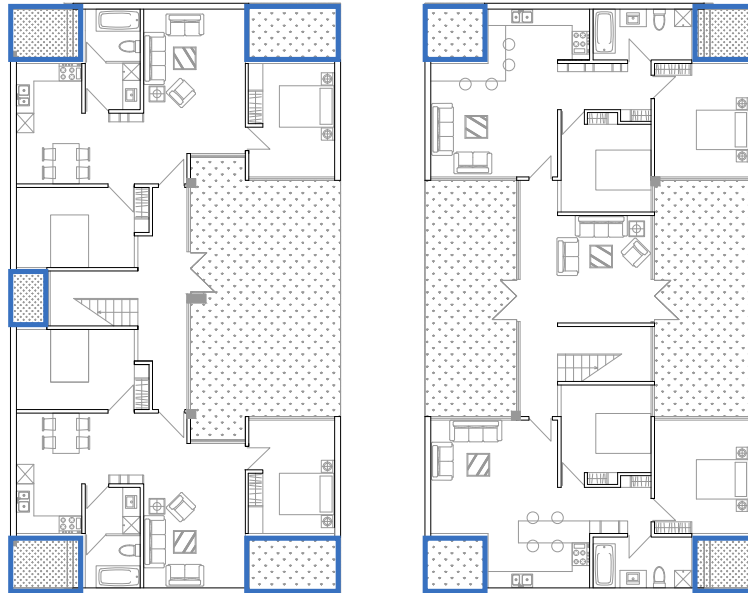
Figure 6. 6 Locations of sky well

In terms of the fact that the sunlight condition should be considered critically in such a high-density community, and the possible dark space will be at the interface part between the units because the interior space volume there is the biggest. So the idea of sky well should be integrated at the place where is dark. In the floor plan of the unit, the potential dark space will be around each corner where the distance from the courtyard is the longest. Another place might need sky well is at the staircases in the 'C' shape unit (Figure 6.8). The sky well not only

makes this vertical circulation a positive area but also provide more light to the

rooms beside it. (Figure 6.9)
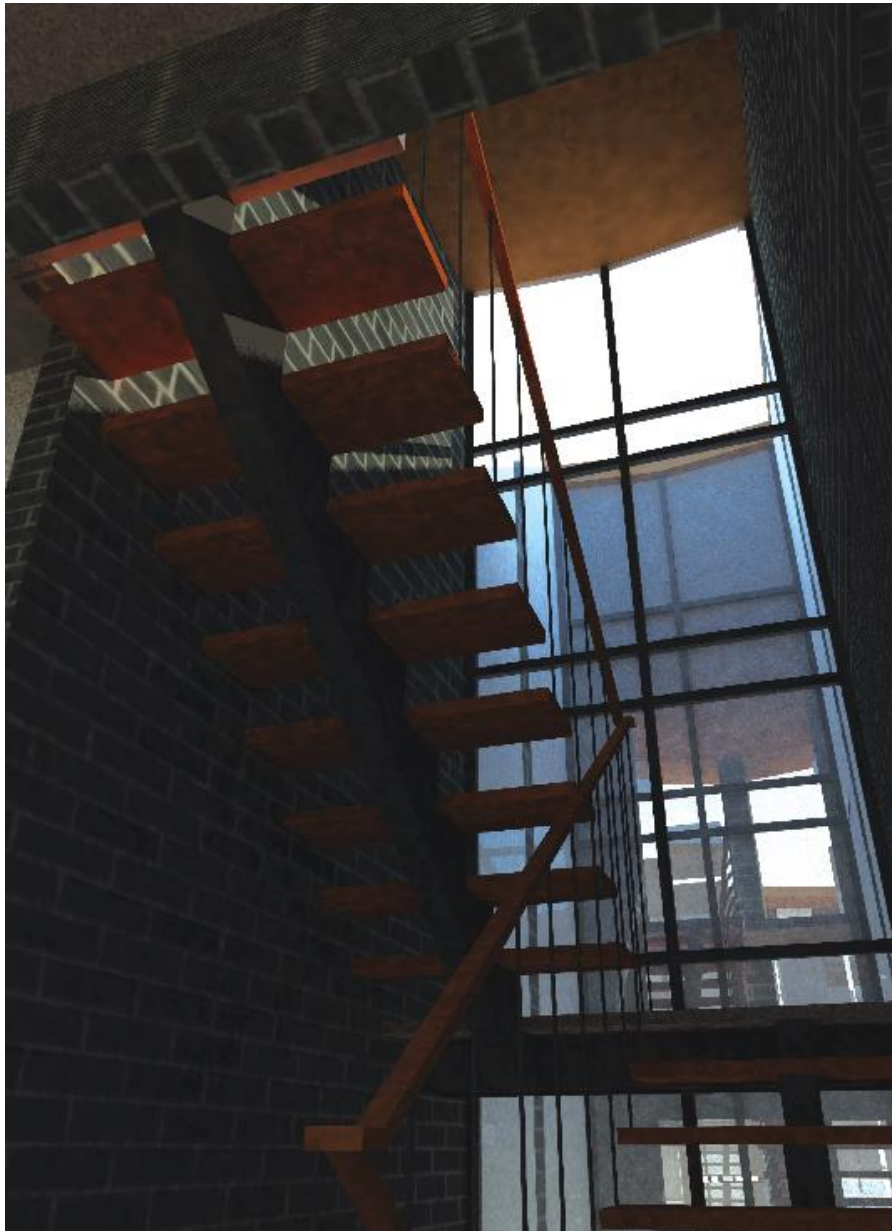
Figure 6. 7 View of sky well at stairs

To maintain enough solar gaining, besides the integration of sky well, sizing a sky well in a proper size is also a vital process. To help shape and size the sky well, the sustainable building design program 'Eco-Tect' is applied in adjusting the dimension of sky well so that the sky well itself can be in a good solar condition.

6.1.5 Sunlight Study

By repeating the processes in changing the sky well's dimension and analyzing the light condition after, the best solution is worked out. (Figure 6.10) It shows on the 'overall light level' analysis that the highest point of main courtyard
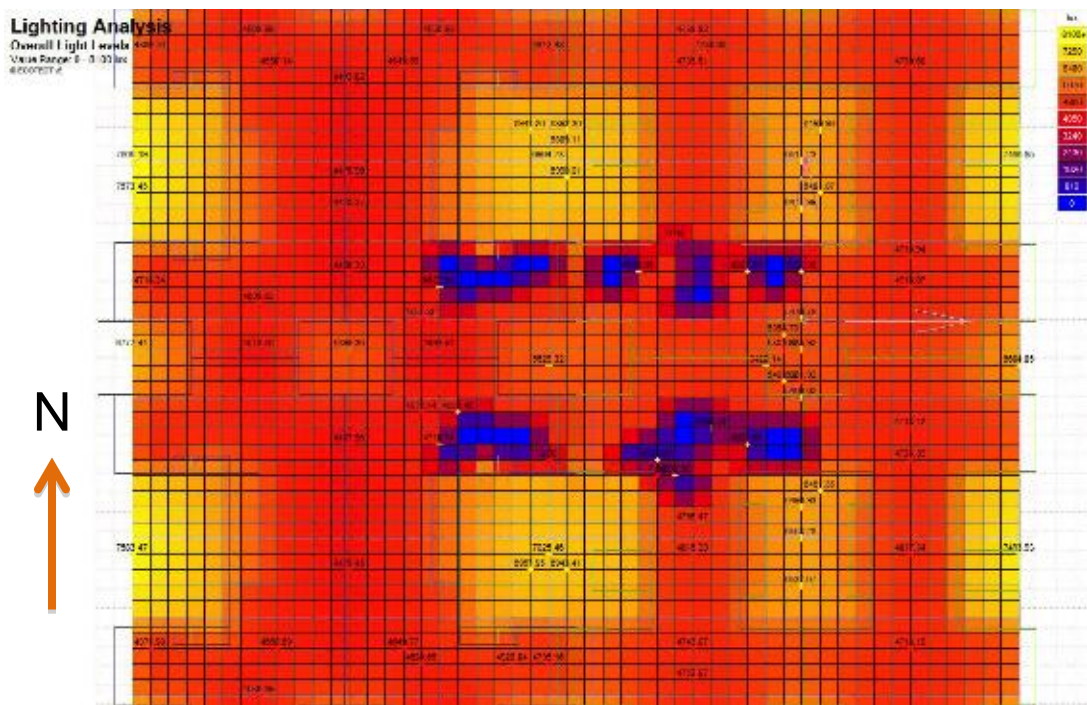
Figure 6. 8 Overall light level study in 'Eco-Tect'

is 6990 lux, and the highest point in the sky well that is accessible to people is 5630 lux. As there is no big difference between them, so it means that the light conditions are almost same in these two different courtyards.

Besides the critical and accurate data on the sunlight condition, the shadow study can directly represent how much sunlight can reach the courtyard ground over a whole year. Running the same eco-model in the program, the final analysis can clearly show the shadow in a specific time. It is shown on the reports that, at the ground level, the courtyard can receive direct sunlight in 8 months out of 12 months over the whole year. (Figure 6.11) So the direct sunlight condition is in a general good condition.
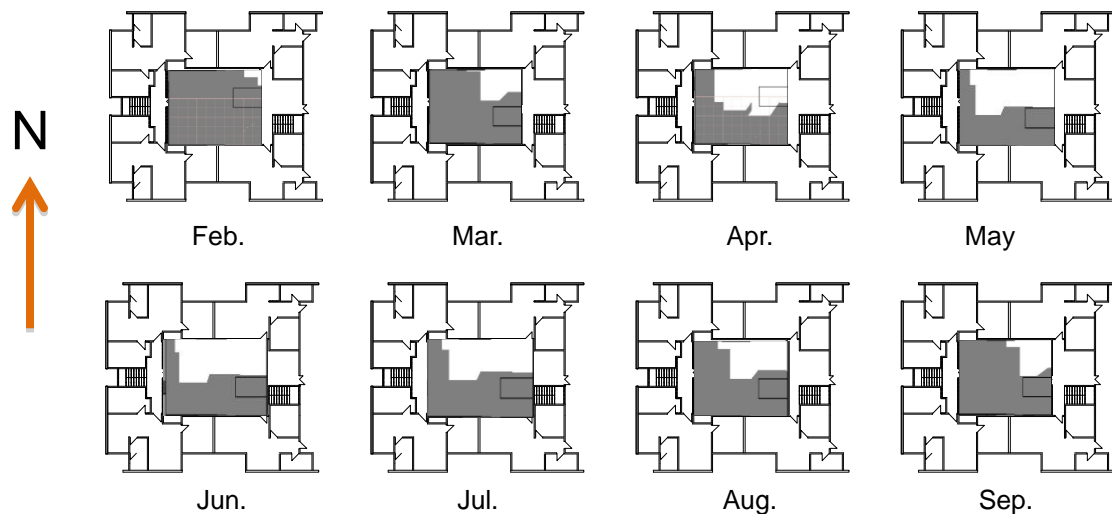
Figure 6. 9 Shadow study in Eco-Tect

6.1.6 Kalwall

In terms of the fact of high building density, to maintain the inside solar gaining is in a good condition along with privacy, a translucent wall system, which is called Kalwall, could be integrated into the wall system around the sky well and the courtyard. From what the structure detail of kalwall panel explains (Figure 6.12[2]), this translucent panel is not only good at conducting natural sunlight into room, but also has a good thermal performance by fixing insulation inside of the panel.

Insulation U-value options from .53 to .05 (2.8 to .28 W/m²K)

Diffuse-light transmission ranges from 3% to 50%

Solar Heat Gain coefficients from 1.0 to under .04

Fiberglass, aerogel or other insulation in various optional densities for extraordinary insulation

Lightweight panel and time-proven Clamp-tite installation system installs rapidly

A true sandwich panel for permanency, backed by over 50 years of experience

Permanent glass veil erosion barrier architectural face is tough and needs little upkeep

Grid core of precision interlocked I-beams may be thermally broken

Interior shatterproof faces formulated to meet interior finish, flame and smoke requirements of the toughest codes

Figure 6. 10 Kalwall structure details

2 www.Kalwall.com

While, this system could be installed together with the clear window as well, so that it can give resident direct view to the outside at proper locations. So this system is pretty flexible in different rooms of unit with different proportion between translucent panel and clear panel. In private spaces, bedrooms for example, will have more translucent panels, while there will be more clear panels in semi-private spaces like living rooms and shared rooms. (Figure 6.13)
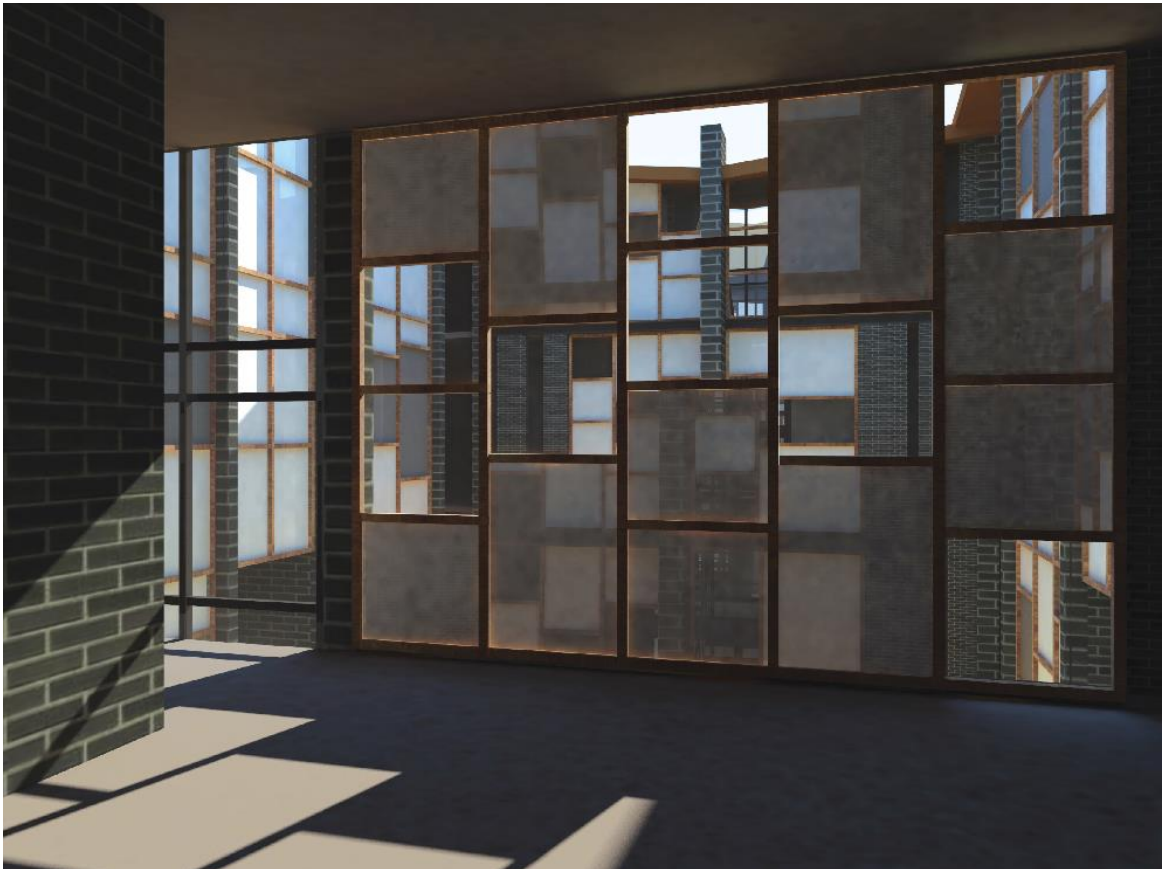
Figure 6. 11 View in shared room

6.1.7 Ventilation

Besides the sunlight, the integration of the sky well will also enhance the ventilation as well. These sky wells around the unit together with the main courtyard will be wind tunnels pumping the exhaust air from the inside to the outside.

Additionally, to enlarge the overall ventilation, operable windows could be applied into the Kalwall system to assist the inside air flowing, especially at the entrance and the staircase. From the section cutting at the staircase, it shows the clear paths of air flowing from courtyard, into the room and finally into the sky well at staircase. (Figure 6.14)

Figure 6. 12 Section: Sunlight and Ventilation

Fresh air can be ventilated continuously throughout each room improving interior ventilation condition.

6.1.8 'Cloths Dryer'

The dryer is not necessary in Chinese modern life, especially in the individual family. The most common way of drying cloths is in a traditional way that hanging the cloth outside where more sunlight and ventilation, such as the top of the building or the courtyard (Figure 6.15). In addition to improving ventilation, the sky well can be used as a cloth dryer.

Figure 6. 13 Traditional drying

This determines that it is more appropriate if the bathroom could be located around the sky well so that residents could have a convenient access to hang their cloth to the outside. (Figure 6.16)

Place for hanging cloth

washer

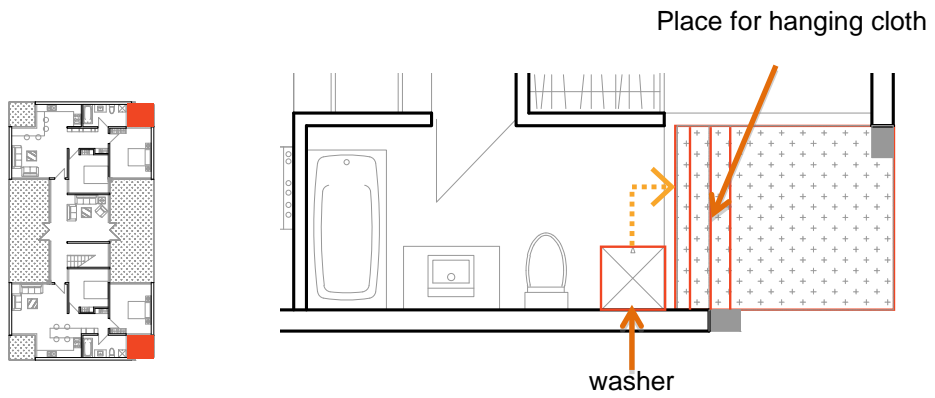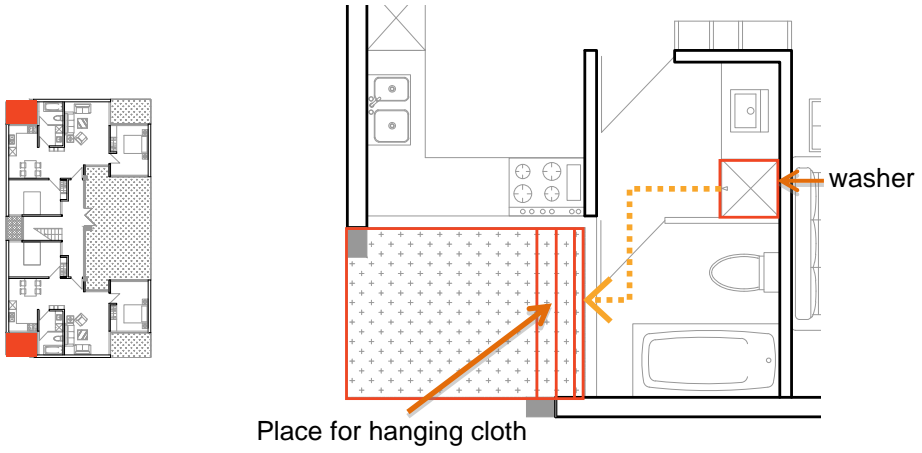Place for hanging cloth

washer

Figure 6. 14 Drying space in each unit

6.1.9 Roof Study

I

II

Placing gutter

Placing water collector
under ground

III
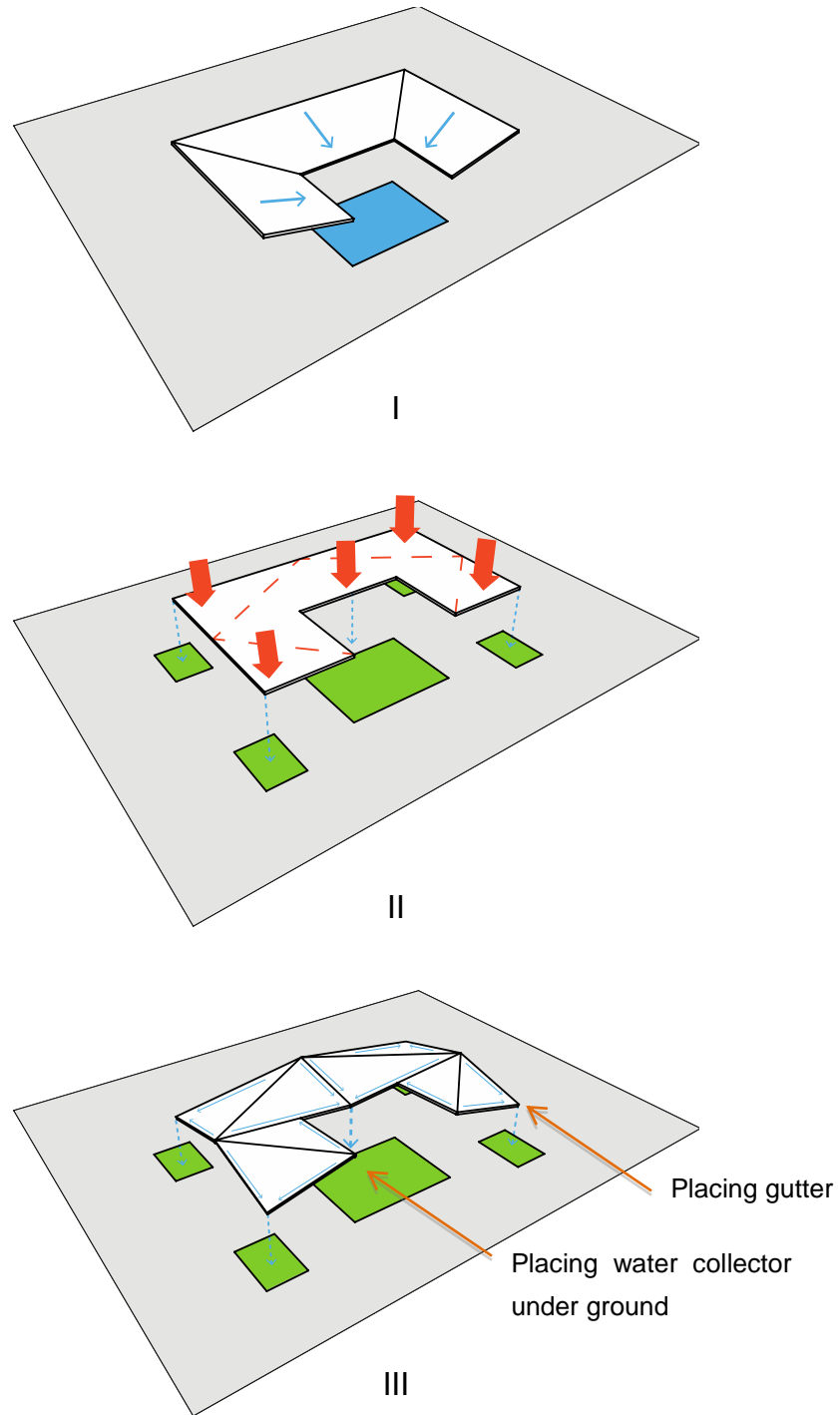
Figure 6. 15 Process of roof study

The conventional single slope roof conducts rainwater directly into the courtyard resulting in too much water in central courtyard overloading drainage system. Additionally, courtyard is also hard to use because the water will keep staying for a long time until all are drained out. (Figure 6.17.I)

So the roof should be designed to provide both water drainage and water collection. The roof design begins with a flat roof in the same footprint as unit. The sky wells and courtyards are the potential places for water collection, so the flat roof could be folded in the pattern that slopes direct down to sky wells and courtyard. (Figure6.17.II). In this way, the rainwater falling on roof will be automatically distributed by sloped roof, drained down by gutters and finally collected by certain water collector, like water container or rain garden at proposed area (Figure6.17.III).

The roof will be constructed with the standing seam metal roof.

6.1.10 Gutter

The gutter is necessary in conducting the rainwater in an organized way rather than free falling. While, exposed pipe is always in an inappropriate way on the elevation without any special treatment. So, the gutters are applied into some brick columns and brick walls, and some of the columns are structure elements

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but some could be used as elevation elements to make a complete and continuous façade. (Figure 6.17)

Rainwater

Gutter in brick column
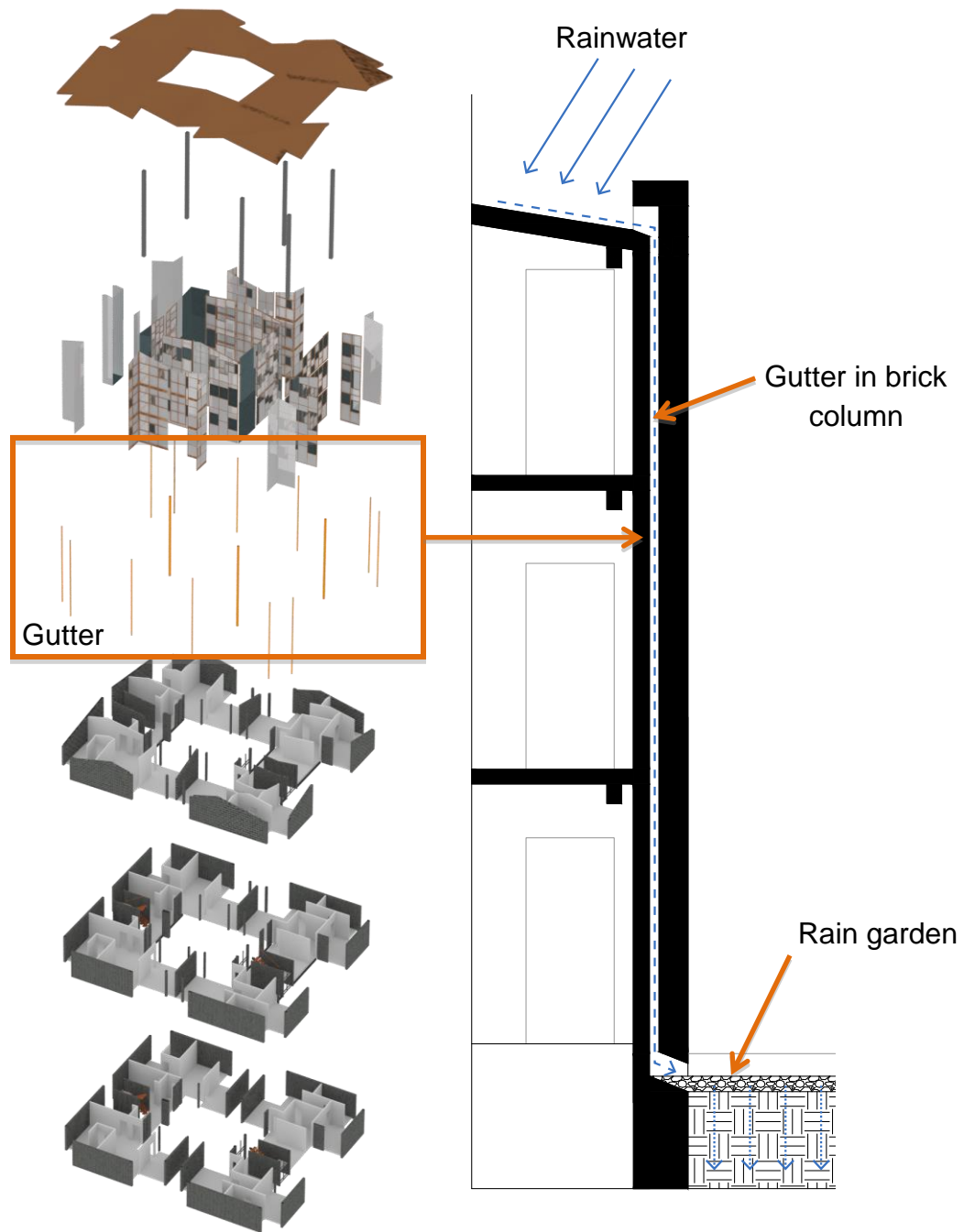
Gutter

Rain garden

Figure 6. 16 Gutter system and rain garden drainage

CHAPTER 7

DESIGN PROPOSAL: PUBLIC SPACE

By repeating the units along the shared pathway, the larger courtyard block

is formed following the traditional pattern in sequent steps. The shared pathway

through the courtyard block plays the role as a thread organizing all the public

space in an ordered sequence from the crowded public street to several semi

public courtyards with different dimensions.

7.1 Semi-public Courtyard

Small Courtyard
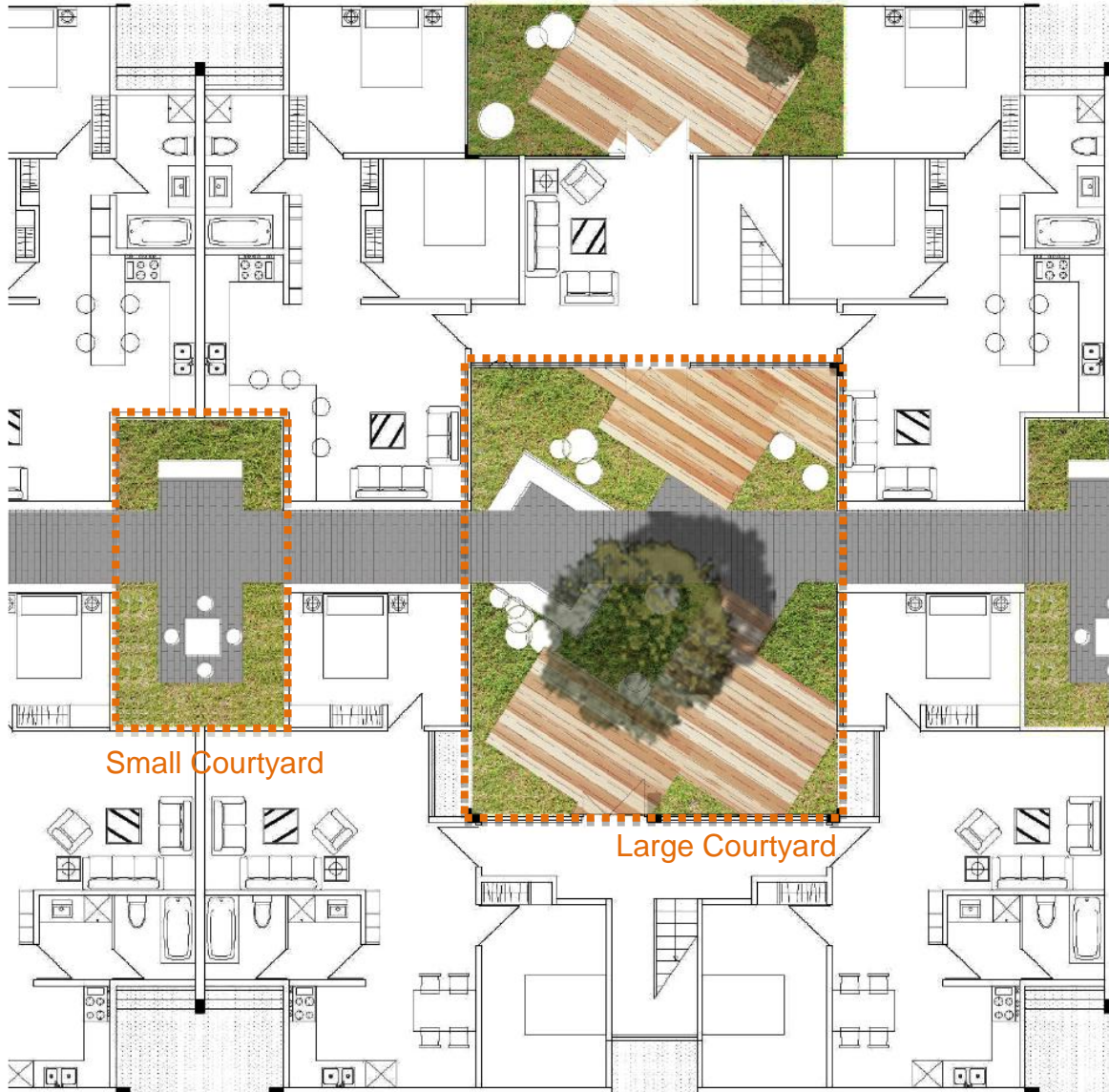
Large Courtyard

Figure 7. 1 Courtyard plan

Figure 7. 2 Bird view of big courtyard

There are two different semi-public courtyards along pathway (Figure 7.1), one is a large shared courtyard used as outside space for each unit (Figure 7.2), the other one is a smaller courtyard at the sky well used as a neighbor social interactive space, which leaves a pleasure space for neighbors to stay and talk with each other (Figure 7.3). So this small courtyard can deal with the problem of limited neighbor interaction since the alley and street are used as commercial space. Besides, the sequent courtyard spaces, like several nods on a line, can

make this long shared pathway more active by different landscape in stead of

feeling boring.
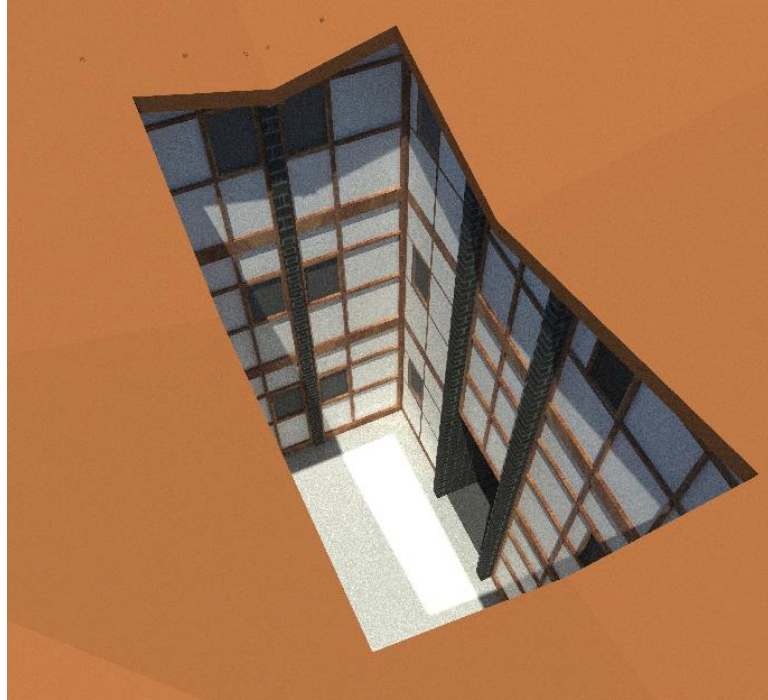
Figure 7. 3 Bird view of small courtyard

7.2 Transitional Space
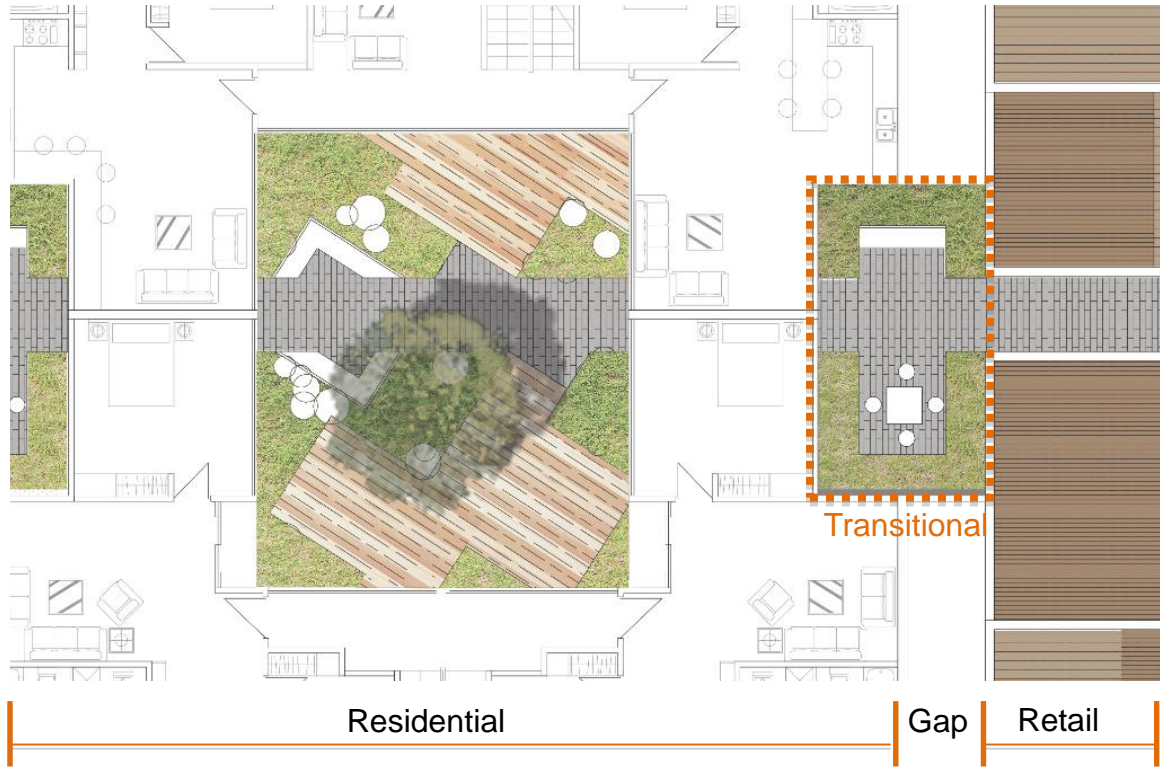
Figure 7. 4 Location of transitional space

Along the shared pathway, the semi-public courtyard at the very beginning

is different from the others afterwards, because this space is end of the crowded

street space but start of the quiet courtyard space. So it is a physical connection

between outside and inside of courtyard. On the other hand, it is also a gap space

between commercial building and living units.(Figure 7.4) In terms of these facts,

this semi-public courtyard should be defined as a transitional space through which

not only people can have a continuous space experience but also building forms will have a continuous connection.

While, as being a transitional space, the new form here should not be a solid volume by which the transitional feeling will be broken. So, the overall form should be more transparency, which reminds me Chinese traditional screen used as a shading to block the sunlight or the view partially (Figure7.5).

Figure 7. 5 Chinese traditional screen

So, a transparency frame formed by revised traditional Chinese screens will be installed at the sky well. And it might work well in both being a transitional connection and being a decoration representing local building culture (Figure7.6).   .
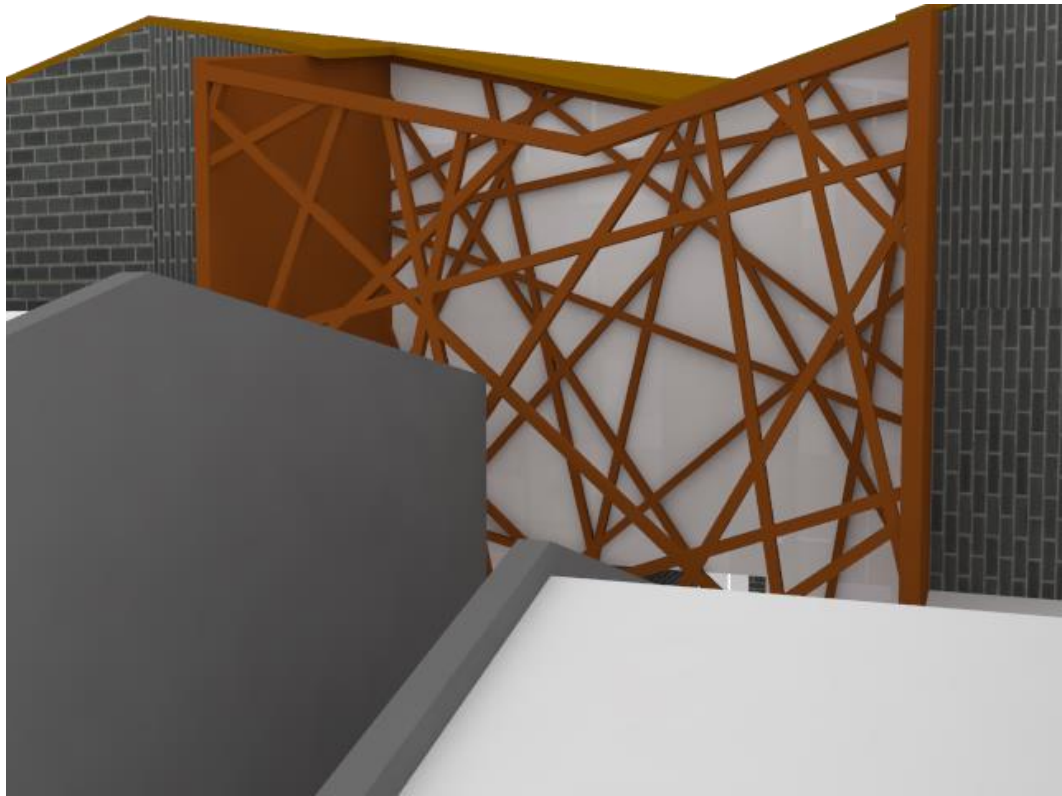
Figure 7. 6 Transitional screen

7.3 Commercial Space

7.3.1 Retail

In terms of the local life style and community context, the commercial part at the beginning of each courtyard block plays a significant role in defining the streetscape and providing space for visitors to try their food and feel the local culture.
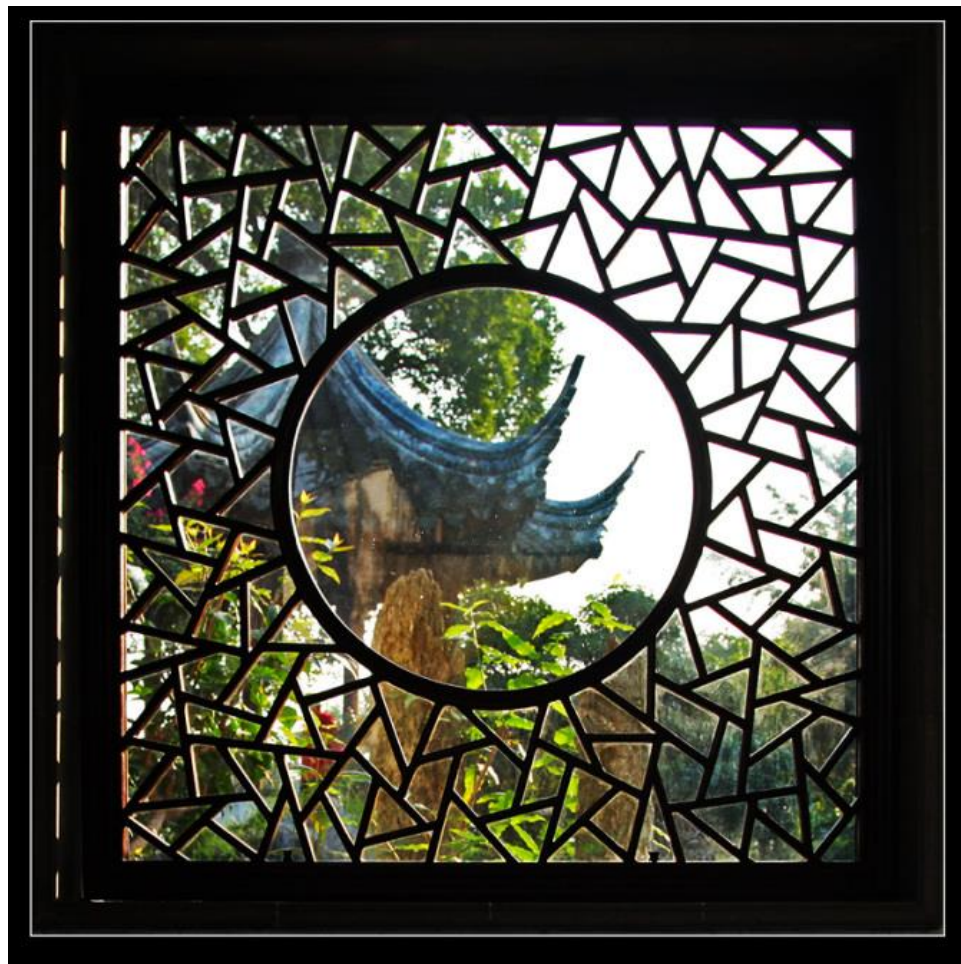
To make a better commercial street, there is a very good example of a Chinese traditional commercial street renovation in which the commercial streetscape is in a comfortable scale with a lot of interesting spaces along the street. The project, in a historical area of Chengdu, Sichuan Province, is called Narrow Alleys including three streets in east-west direction (from the north to south are: wide alley, alley and roadway sub). The residential houses with more than 900 households and over 50 courtyards are lying between the streets.

The street are renovated and opened until Jun. 2008 and currently including dining, leisure shops, cultural retails, inns and Dragon Hall. What is attractive to tourists is a cultural showcase of old Chengdu on the narrow alleys (Figure 7.7). By improving the streetscape and landscape, there is a lot of lively spaces along the street, such as outside dining spaces in the front of restaurant and culture experience space between the plants (Figure 7.8).

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Figure 7. 8 Streetscape and landscape in the Narrow Alley

Figure 7. 7 Showcase of life style in Chengdu

Based on the local context and the precedent study, there are several criteria that determine the new form of the commercial part:

1. Similar form with residential but simple.

2. Good view from both inside and outside of commercial space.

3. An active entrance space to be more attractive.

4. Keep using the same material 'Brick'.

Starting from the form of retail part, to make it similar but simple, the slope roof is the best choice in according with the current context but it is simple as well.

However, if the same slopes are repeated along the street, it will cause visual boring. So, keeping the slope roofs but making them various can create a good view from street.

The first way is varying both height and width of retail. Besides, the different setbacks from the edge of street can also make a more natural feeling of urban space. While, the next step should be designing the roof with various slope like different angles and directions. This can also accommodate the integration of

Figure 7. 9 Bird view of retails: the 'Yin' and 'Yang' Roof

Chinese culture in 'Yin' and 'Yang'[1] Functionally, the roof in 'Yin' can work well in water collecting and the roof in Yang can work well in water draining. (Figure 7.9)

Then, transparency façades for each retails can maintain a good view especially for visitors because food and cook process inside will be attractive to them when they wander along street. While the problem is complete transparency will make inside too bright and cause weird exposure to people who eat inside. To deal with them, Chinese traditional screen can be applied on the façade so that it functionally provides some shading and visually represents the local culture. While, to avoid being too busy on the overall form of retails, the simplest screen in waffle style is been used. (Figure 7.10)

In terms of the transparency façade on street side, the other walls of the commercial buildings should be solid to keep an appropriate balance in material. The grey brick used in traditional construction should be the best choice to correspond the general style of the historical area. While, there could be some variations on the construction to make the building look different, in this project, the commercial buildings will be constructed with rotated brick. So the sold wall will be in a vertical piling pattern.

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[1] Used to describe how opposite or contrary forces are interconnected and interdependent in the natural world, and how they give rise to each other as they interrelate to one another

Figure 7. 10 Retail street view

7.3.2 Street

In terms of the site context analysis at the very beginning, the crowded street filled with both human circulation and vehicles' circulations in two directions is inevitably declining the quality of tourists' experience. So there are two main principles in improving the condition on street.

1. No vehicle on street.

2. Well organizing circulation in two directions.

Integration of the new landscape in the middle of the street can solve either problem in an appropriate way. The new landscape is a block along the street axial direction not only stopping cars but also separating the circulation in two

Figure 7. 12 Courtyard-Street Plan
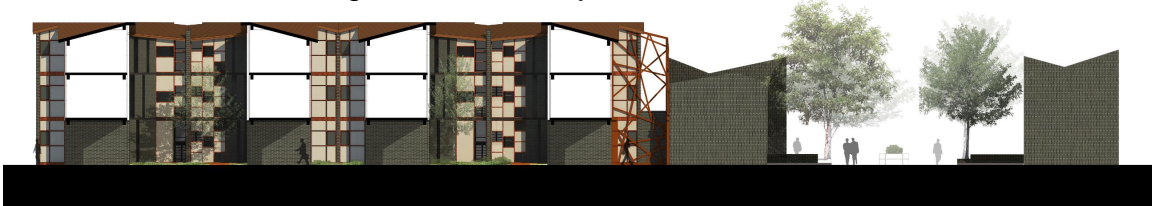
Figure 7. 11 Courtyard-Street Section

groups. Visitors can cross the landscape to the other side. Furthermore, the landscape itself can provide a lot of seating according to the current condition in lacking seating area and define a permanent space for locating vendors as well. Finally, a well-organized commercial pedestrian can maintain a perfect cultural experience. The street itself is a double-function or even triple-function space.

CHAPTER 8

BLOCK

In terms of that the basic intent in this project is to improve the residential living condition for the whole community and to enhance the cultural representation. So, the next step is to apply the modular unit and courtyard into a larger scale 'block'.

8.1 Phasing

While, according to the different conditions of existing buildings in the previous research and analysis, to be contextually and sustainably, the whole process could be divided into 3 sequent steps through which the demolition and the reconstruction afterward start with the buildings in 'Out-of-Pattern' group, and then to the 'In-Pattern' group.

In first phase, all buildings in the 'Out-of-Pattern' group are demolished at the very beginning, and then five new courtyard units will be built around the place where the proposed pedestrian locates. (Figure 8.1.I) The reason of starting only with a small group of courtyard units is to make this proposal more feasible, so that there are chances to get the specific response to the new courtyard from people who live there and it is also possible to have some adjustments to be

applied on the others in next steps. For instance, the residents living in the new courtyard might have a certain experience of solar gaining, ventilation condition and social interaction. While, the residents living around the new courtyards might also have some feedbacks, such as the sky well might indeed enhance their living condition more or less. So these comments and responses are significant in improving and upgrading further design.

I　　　　　　　　　II　　　　　　　　　III

Figure 8. 1 Phasing

Another focal point in first phase is creating a pedestrian to connect the main street and the Great Mosque following the idea in chapter 'Conceptual

Design', so that more people can visit the Great Mosque. The arrangements of new courtyard blocks define the space of new pedestrian with a proper size so that the new public space can follow the general streetscape pattern over this area. As the entrance of pedestrian locates at the middle of this street, so people can notice this turning and be willing to turn into the pedestrian to see what happen there after a certain distance wandering along the main street. Besides, along the pedestrian, appropriate integration of retail and landscape can active this space well as a double-functional public space.

Second phase starts with the courtyard units left from the first phase in the 'Out-of-Pattern' group with the proper adjustments and improvements based on the comments and feedbacks from residents. (Figure 8.1.II) In this phase, there are several complete courtyards blocks in a small section around the new pedestrian. So, it is good to provide a complete pedestrian pathway with a united building style.

The focus of last phase is spreading out the new courtyard bocks over the whole street block. (Figure 8.1.III) This phase is a finished result of this block in which there are two rows of continuous retails with new style along street, a complete public pedestrian introducing tourists into the Great Mosque crossing the big block and an enlarged street creating more public spaces and seating areas at the entrance on the south end. Besides these improvements, the most

significant part in this phase is two open spaces integrated into the space among courtyard blocks. These open spaces are the central public social spaces playing the role similar to the traditional alley space where the neighbors have their most social interaction.

8.2 Master Plan

Figure 8. 2 Master Plan

The master plan is the final representation of the third phase, which shows the proposed scenario of the whole block with the color and shape of roof, open space including street and courtyards, plants and the urban density. Compared with the original urban density showing on the texture model, it is clear on the master plan that there has been a lot of openness in different sizes. And local life can be surely benefited by these courtyards. (Figure 8.2)

When talking about the urban density, a specific data on living density will be a great reference to show how well this design works on both improving living condition and maintaining the existing living density. And the final living density of this proposal is about 410-420/acre, which is higher than the existing living density.

CHAPTER 9

CONCLUSION

Based on the improved solar gaining, ventilation and the similar urban density, the design proposal both in courtyard and living unit successfully change the current limited living condition. The new connections between the main street and the Great Mosque will enhance the cultural impact, so that the great religious value of this area will benefit the whole community both local residents and tourist.

It is also a successful in integrating the idea of tight space and shared space into this project.

Further design considerations could include the following adjustments and improvements:

1. Various modular units could meet different needs from different families, or flexible space utilization by the integration of new technology

2. More considerations on accommodating local life style.

3. Comprehensive system of water collection through the whole community

4. More integration of sustainable technologies to make lower energy consumption.

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