四合院 SIHEYUAN

– Sheltered places in an extreme prairie climate

A practicum by Bing Wang

A practicum submitted to the Faculty of Graduate Studies of the University of Manitoba

In partial fulfillment of the requirements of the degree of

Master of Landscape Architecture

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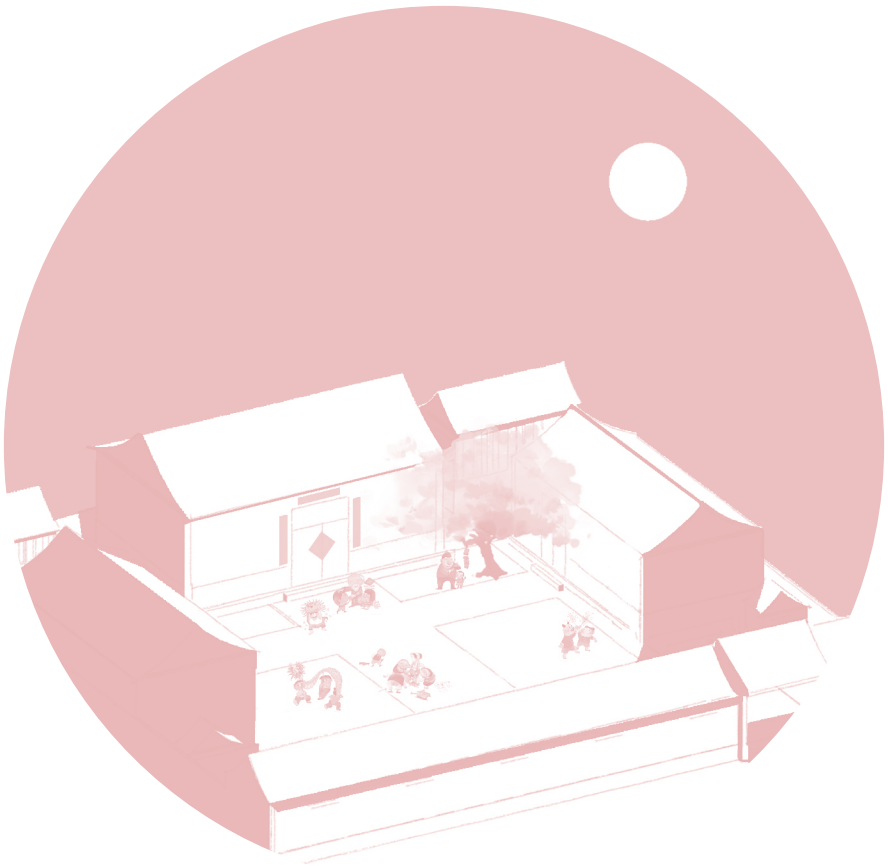

I had a great childhood living in Siheyuan. My impression about Siheyuan rested on my childhood memory. During the time I studied in the Faculty of Architecture at the University of Manitoba, its pleasant courtyard reminded me of my earlier experience with Siheyuan. As a result, I decided to make Siheyuan my practicum topic. To research for this practicum, I went back to China a few times. I revisited several remaining traditional Siheyuans and Hutongs, the Forbidden City in Beijing, some traditional dwellings in Jiangnan, as well as Suzhou gardens. Even though I had been to most of these places before, with the perspective as a landscape architectural student, I started to notice a lot of interesting details that I could never have noticed before, such as the wooden structure details, the pavement pattern and materials, and the various tree species, etc. I had a deeper understanding of the spatial qualities and was able to better appreciate the profound beauty of these places better.

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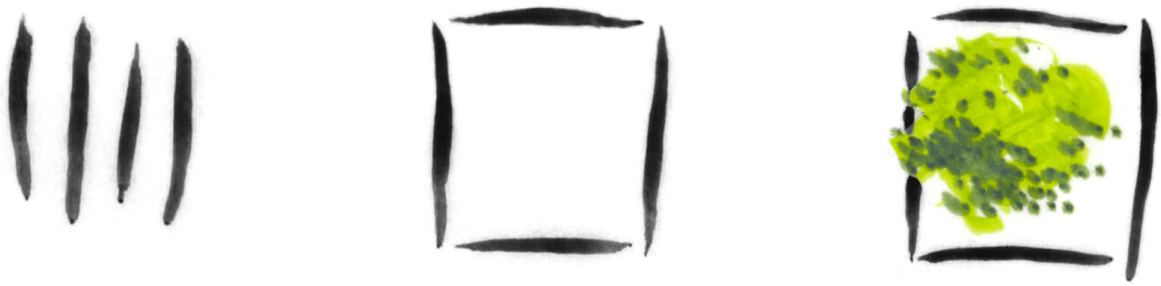


Fig 0.1 Visualization of Siheyuan

FOUR

ENCLOSURE

YARD

ABSTRACT

Siheyuan is a traditional Chinese dwelling type. The term is made up with three characters: *Si* means four, *He* means enclosure and *Yuan* means yard (Fig 0.1). The literal translation of Siheyuan means quadrangle. I have a great childhood memory of living in such kind of environment. It has remained my study interest through the years as a Landscape Architecture student, and eventually became my practicum topic. The purpose of this practicum is to explore the traditional Chinese courtyard dwelling types with a particular emphasis on the Siheyuan. By conducting case studies on sheltered dwellings in different cultures, it is hoped that valuable lessons about courtyards can be learned so as to inform the proposed design. Strategies derived from analysis and researches are applied to the design of three existing courtyards on the University of Manitoba campus. The design intends to improve the quality of these spaces with the awareness of Winnipeg's local climate and their functionality in a campus environment.

Fig 0.2 Image of Chinese Characters of Home

Chinese character system is the only remaining ideographic system among all character system in the world (Mo, 2002, p.45). The meaning of the characters is reflected through their visual representations. I would like to introduce two Chinese characters (Fig 0.2), which mean "home". They tell us how home is perceived by Chinese people - a place that is protected. The top part of "家" is "宀 ", which represents the roof of building; the bottom part is " 豕", which means pig. The character represents that during the ancient time, people kept pigs in their home for food. The second character is "園". This character has two parts, the inside of it means vegetables and fruits, and the outside of it means enclosure. These two characters form the word "home", which means a place where people feed animals and grow vegetables, but most importantly, it is a place that is sheltered.

INTRODUCTION: MY CHILDHOOD IN SIHEYUAN

When I was a child, my family lived in a traditional Siheyuan housing in my hometown – Shijiazhuang. It is a city 300,000m southeast of Beijing. This traditional Siheyuan housing type has rooms on four sides with a courtyard in the middle. Unlike the ancient time when one family owned an entire Siheyuan, there were two other families sharing our Siheyuan. My family lived on the north side, and the other two families lived on the east and west sides. In our courtyard, there was a big tree at the northeast corner, and we shared one water tap and washroom in the northwest corner (Fig 0.3). In the morning and during cooking hours, mothers always enjoyed their gossip time beside the water tap. Sometimes during weekends and holidays, the three families would gather together, spent one afternoon talking and drinking tea in the courtyard.

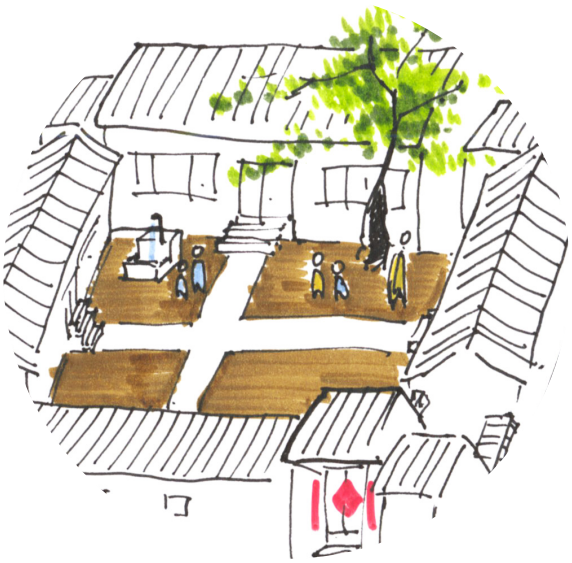


Fig 0.3 My home in memory

I had a great childhood living in such kind of environment. Because of Siheyuan is protected from the cold north wind in winter and hot sunshine in summer, it allows many opportunities for different activities. In summer afternoons, my mother sat in the shadow of a tree, while I played with my friends in the courtyard; in winter evenings, my family baked sweet potatoes and set off firecrackers in the courtyard. The Siheyuan provided us a peaceful and enjoyable living space in all seasons. It was much more than the architecture itself; it nurtured great human relationships between its dwellers. My impression of this Chinese traditional Siheyuan is that it was always peaceful, lively and full of happiness. Even though it was shared, it still provided intimacy and protection, and housed many loving memories.

Fig 0.4 Drawing of activities in Siheyuan

Fig 0.5 Chinese Character of Demolish

But recently, more and more traditional Chinese dwellings are being demolished. In their place, modern apartment buildings are being built in great numbers. My family also moved to a high-rise residential building. Although there are still some Siheyuans left, they cannot meet the requirement of people's contemporary lifestyle. Many of those remaining Siheyuans had their courtyard filled in by the residents to create more rooms. Authentic traditional Siheyuan is turning into a distant memory. This reality has prompted me to learn about traditional Siheyuan and explore ways of bringing back its essence through landscape architecture practices.

Fig 0.6 Previous design model

During my study as a landscape architecture student at the University of Manitoba, I had a chance to learn about the courtyard architectural type in Barcelona in my third year of the undergraduate study. In the course, I learned about the archetype of Ildefons Cerdà's plan in Barcelona, it is called the Eixample district. It was designed in 1859 in response to an increasing population and a desire for a higher quality of life. It is the extension of the old Barcelona city based on a grid system. In Cerda's design, each block forms an inner courtyard, which gives the surrounding buildings access to sunlight, air, and green (Gao, 2011). During the study, we also analyzed different courtyard types and their microclimate. This study increased my interest in this particular dwelling type and inspired my practicum topic.

CHAPTER ONE

SIHEYUAN

Enclosure is a common architectural concept in many countries through history. It appears all over the world because of its useful features, such as the providing shelter, isolation, protection, and privacy, etc. As one of the representatives of enclosed architecture, Siheyuan not only has all these characteristics but also has a unique feature: each Siheyuan can act as a module that forms a community, which is called Hutong. It was essential to the structure of urban fabric in ancient China. In this chapter, I am going to introduce the components and characteristics of Siheyuan.

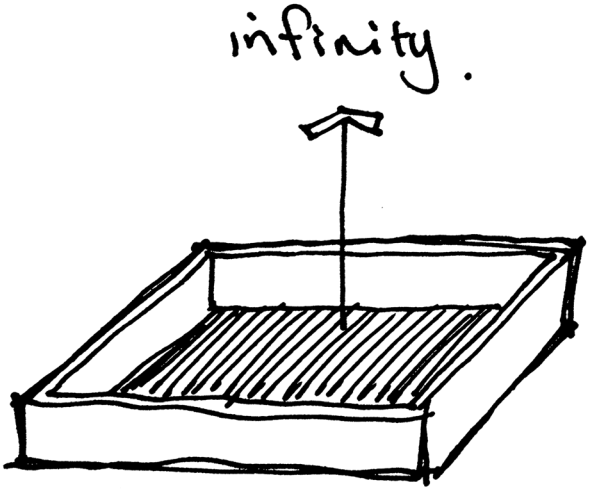


Fig 1.0 Enclosed Architecture

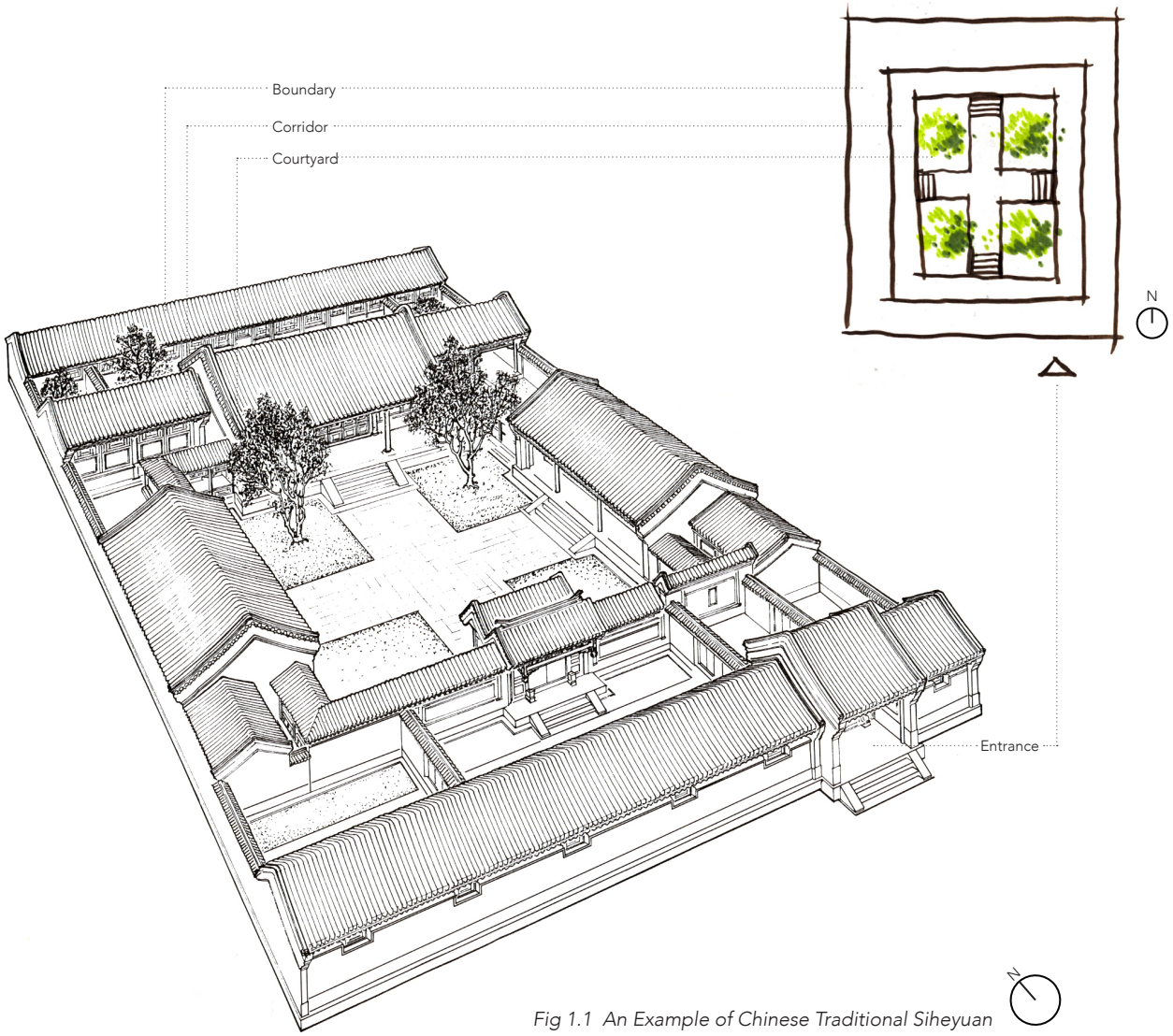


Fig 1.1 An Example of Chinese Traditional Siheyuan

The basic scale of Siheyuan is "Yi Jin Siheyuan", Yi Jin means one courtyard (Fig 1.1). It has one courtyard in the middle with houses on four sides. Spatially, a typical Siheyuan is composed with three main components from the outside to the inside: the boundary that consists of walls and rooms, the courtyard, and the corridor connecting the two. In the courtyard, there is the crossing pathway, and four corners for planting choices.

1.1 THE BOUNDARY

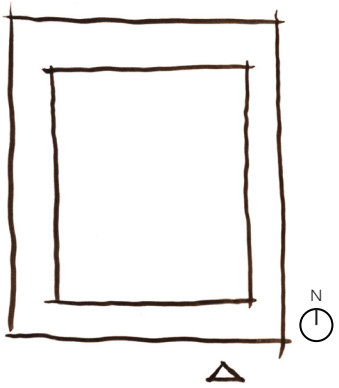


Fig 1.2 The boundary

The first layer of the Siheyuan from the outside to the inside is the boundary, which consists of rooms and walls. The main entrance of the entire Siheyuan is usually located on the southeastern corner, facing south. Once inside the Siheyuan, the layout of all the rooms is based on the principle of hierarchy among family members. From north to south, the level of each room decreases progressively (Fig 1.3). On the south is the room for visitors, servants, and gatekeepers. East and west rooms are for the younger generations in the family. The north room get the most direct sunshine during the day; accordingly, it functions as the principal room for the head of the family. Further north, there is the back row room for girls who are not married yet due to its privacy (Cui, 2013, p.42).

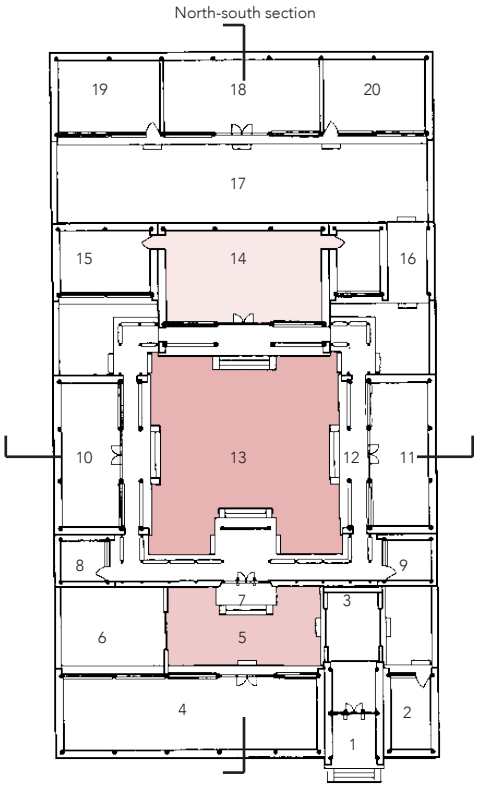


Fig 1.3 Plan of formal Siheyuan

Apart from the main rooms, the boundary of Siheyuan also includes a screen wall, a festoon gate, and side rooms. At the entrance of a typical Siheyuan, there is always a screen wall in sight. In the idea of Fengshui, it helps block the bad spirit. Spatially, it blocks people's view from the outside and creates more privacy for the inside (Beijing Siheyuan: Dwelling Under the Shadow of the Imperial City, 2008, p.34). A festoon gate is located on the back of the front yard to separate the private courtyard from the front yard. People also believe that this partition also helps to block evil spirits. Usually, on both sides of the three main rooms, there are side rooms. In ancient times, servants used to live in side-rooms so that it is more convenient to take turns on duty during day and night.

1.2 THE CORRIDOR

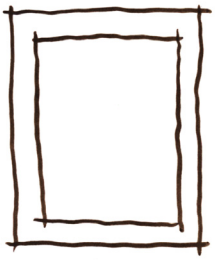


Fig 1.4 The corridor

The second layer is the corridor. Usually, it is a corridor with a ceiling that provides shelter to people living in Siheyuan. It connects each surrounding room. It also functions as the bridge between the interior and the exterior (Cui, 2013, p.42). Each individual room is a private space for family living in Siheyuan. Consequently, the corridor becomes the semi-public/semi-private space in Siheyuan.

1.3 THE COURTYARD

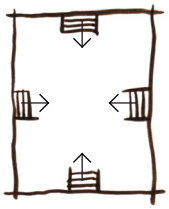


Fig 1.5 The yard

In the center, there is the courtyard of Siheyuan. Usually, it is three steps sunken below the corridor and the boundary. Thereby, it creates an insulation space between rooms and the ground, at the same time, it protects the room from moisture by avoiding attaching to the ground directly. A courtyard is "a room with no ceiling" (Aben and De Wit, 1999, p.2). It is a special space that is the outside to the surrounding rooms and the inside to the entire Siheyuan. The courtyard in the middle is the public space where the family would get together and spend their leisure time. Many activities are allowed with the protection from the courtyard. "On entering a space with thick walls through a heavy door, you would logically expect to find yourself indoors. All the more surprising, then, when that indoor turns out to be outdoors" (Aben and De Wit, 1999, p.4).

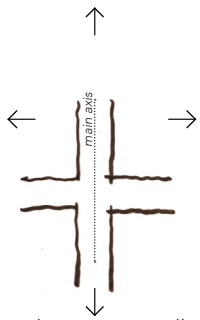


Fig 1.6 The crossing walkway

In the yard, there is a crossing walkway connecting the four main rooms. It also connects with the corridor, which provides convenience to people's circulation in Siheyuan. In addition, there are usually cisterns in the middle of the yard or along the main axis. In ancient times, there is no water source in the rooms of Siheyuan so that people need to keep water in cisterns all the time. Thereby, it helps the yard become cooler in summer, more importantly, it acts as the water source in an emergency of fire. Later, people started to feed fish and plant water lily in the cisterns.

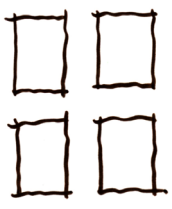


Fig 1.7 The corners

Four corners in the yard are normally open for different elements. For example, water wells. As previously mentioned, there is no water source in the rooms of Siheyuan, consequently, water wells are always found in these empty spaces. Another option is green spaces. There are usually five different types of arrangement for these green spaces, which are four trees on corners, one single tree, shrubs along the pathway, potted plants, and vines on a pergola.

1.4 FIVE TYPES OF PLANTS' ARRANGEMENTS

Four trees on corners

Four trees on corners is one of the most popular arrangement in Siheyuan. Chinese flowering apple (*Malus spectabilis*), Clove (*Syzygium aromaticum*), Chinese scholar tree (*Styphnolobium japonicum*), Chinese jujube tree (*Ziziphus jujuba*), and Pomegranate tree (*Punica granatum*), etc., are common tree species chosen in Siheyuan due to their size, shape, and great seasonal performance. Blooming in spring, providing shade in summer and bearing fruits in autumn.

One single tree

One single tree is also found in a lot of Siheyuans. It is always located on the north side the plants are able to get more sunshine. Some shade tolerant plants are often planted on the south side of the yard. For example, Plantain lily (*Hosta plantaginea*).

Shrubs along pathway

In addition, people like to plant shrubs along the walkway. Such as Littleleaf boxwood (*Buxus microphylla var. sinica*), Golden rose of China (*Rosa hugonis*), Crepe myrtle (*Lagerstroemia indica*), and Chinese rose (*Rosa chinensis*), etc.

Potted plants

Flowers and potted plants are also found in the courtyard. Common choices are Chrysanthemums (*Chrysanthemum*), Peony (*Paeonia suffruticosa*), Jasmine (*Jasminum*), Oleander (*Nerium oleander*) for open areas, and Hostas (*Hosta*) for shade spaces.

Vines on pergola

Apart from the four types above, people like to build pergolas, which allows vines to grow in the courtyard. Such as Chinese wisteria (*Wisteria sinensis*), Amur grape (*Vitis amurensis*), and Sponge gourd (*Luffa aegyptiaca*).

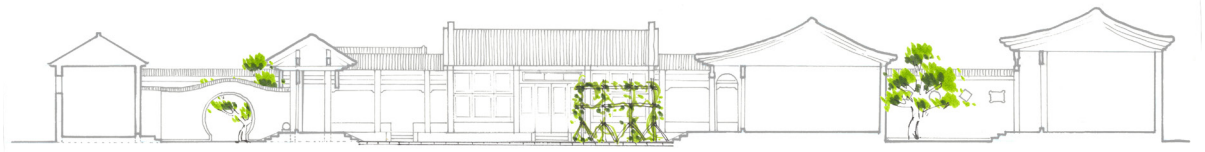
Fig 1.8 Plant arrangements in Siheyuan

Four trees on each corutyard

One single tree on north east corner of the courtyard

Shrubs along pathways

Potted plants on corners of open spaces



Vines

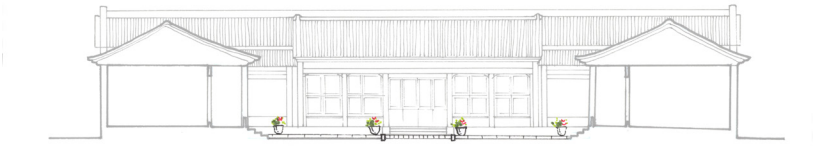
Fig 1.9 North-south sections of Siheyuan

With these distinctive types of plant arrangements, Siheyuan becomes full of vitality. This sheltered courtyard in Siheyuan provides the family more opportunities for varied activities. Besides, it protects the plants in the courtyard. Thereby, people have the opportunity to experience an unlimited delight of green which was brought by the plants.

Four trees on each corner of the courtyard

One single tree on north east corner of the courtyard

Shrubs along pathways



Potted plants on corners of open spaces

Vines

Fig 1.10 West-east sections of Siheyuan

Fig 1.11 Trees in courtyards

Fig 1.12 Image of backyard

Under the protection by the rooms on four sides, the courtyard is shared by the family for leisure and recreation. It is not only the middle of the Siheyuan spatially but also the center of people's lives in the Siheyuan (Cui, 2013, p.42). In a formal Siheyuan, besides the courtyard in the middle, there are also backyard and front yard. The back yard is a private space for daughters in the family, and the front yard is for visitors. Sometimes, the courtyard also functions as a sunning ground where people can spread and dry wheat on the floor. The courtyard brings everyone living in the courtyard closer, and joy of life.

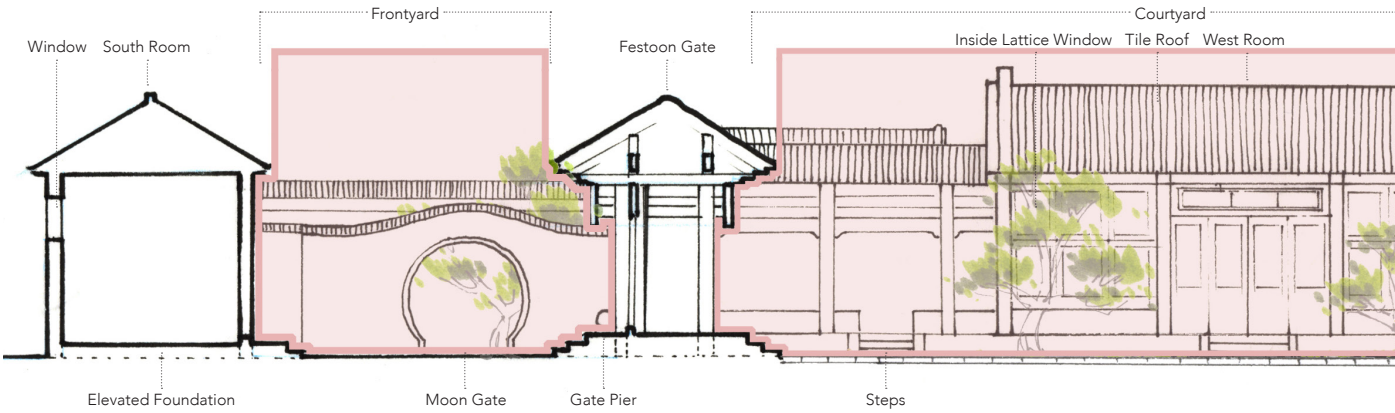


Fig 1.13 Wisteria sinensis in courtyard

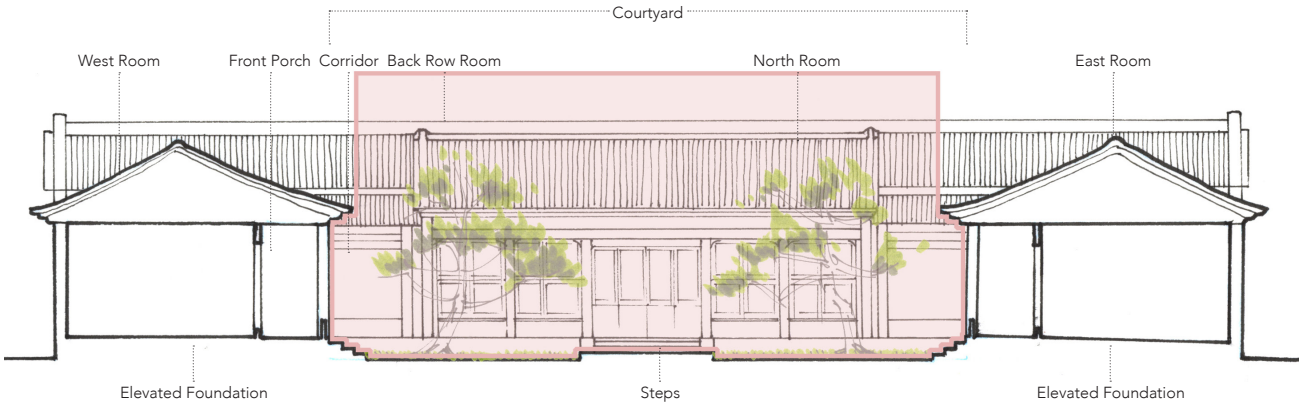


Fig 1.14 Courtyard East-West section

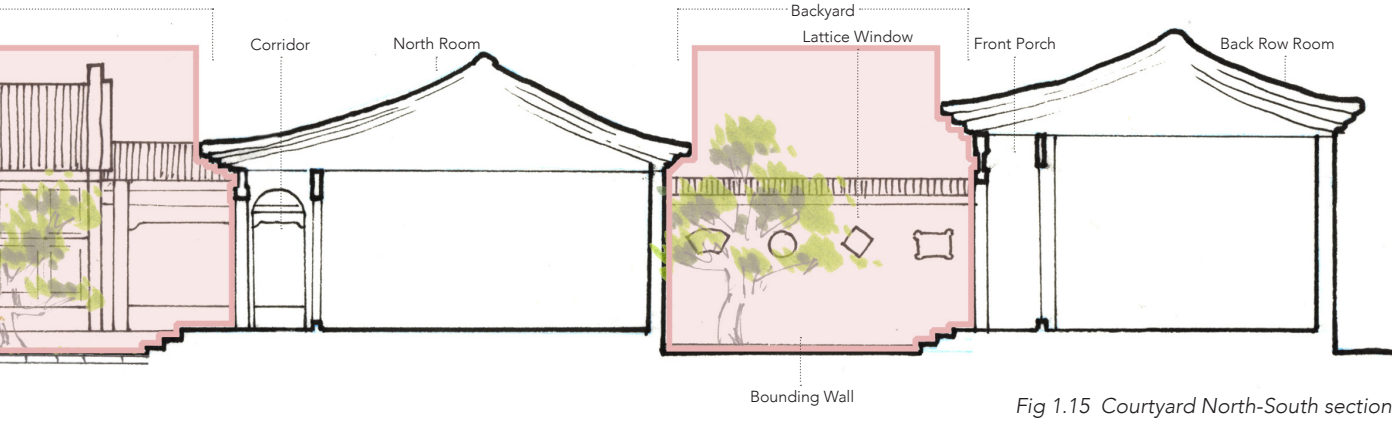


Fig 1.15 Courtyard North-South section

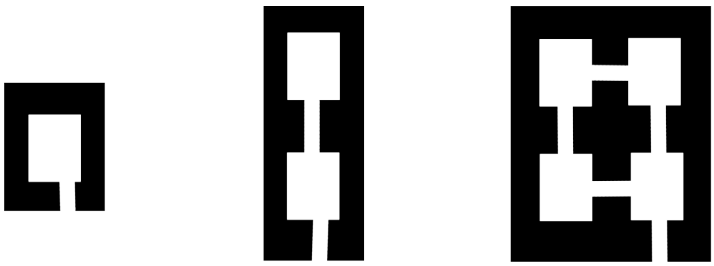


Fig 1.16 "Yi Jin Siheyuan", "Er Jin Siheyuan", and "Duo Jin Siheyuan"

As mentioned previously, "Yi Jin Siheyuan" which means one courtyard Siheyuan, is the basic scale of Siheyuan. There are also larger scale Siheyuans, which are "Er Jin Siheyuan", "San Jin Siheyuan", and "Duo Jin Siheyuan". "Er Jin Siheyuan" means Siheyuan with two courtyards. It is the extended version based on one courtyard *Siheyuan* housing type. Another courtyard is added between the original courtyard and the back yard with a gate in between. "San Jin Siheyuan" means Siheyuan with three courtyards. The third courtyard is usually added on the north direction as well. "Duo Jin Siheyuan" is Siheyuan with multiple courtyards. It is developed along both on North-south and West-east directions. Normally, there are multiple functions in the multiple courtyards house, such as education, offices and living (Ma, 1999, p.46).

Fig 1.17 Yan Jia Hutong in Beijing

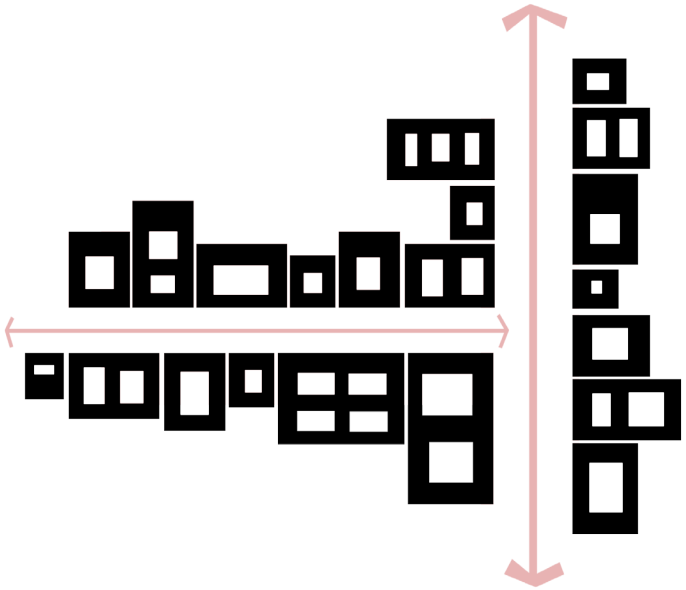


Fig 1.18 Siheyuan and Hutong

Besides growing within the unit, Siheyuan also expands into a community. Usually, the residential Siheyuans are built along narrow and quiet lanes. In Beijing and some other northern cities, the lanes are known as Hutong. In southern cities, such as Shanghai, they are called Lilong. The formation generally follows a hierarchical fish-bone-shaped structure. From the major street to small lane (Hutong) to Siheyuan that extends in a systematic way from the most public spaces to the most private spaces. Each Siheyuan is the module unit to the whole community.

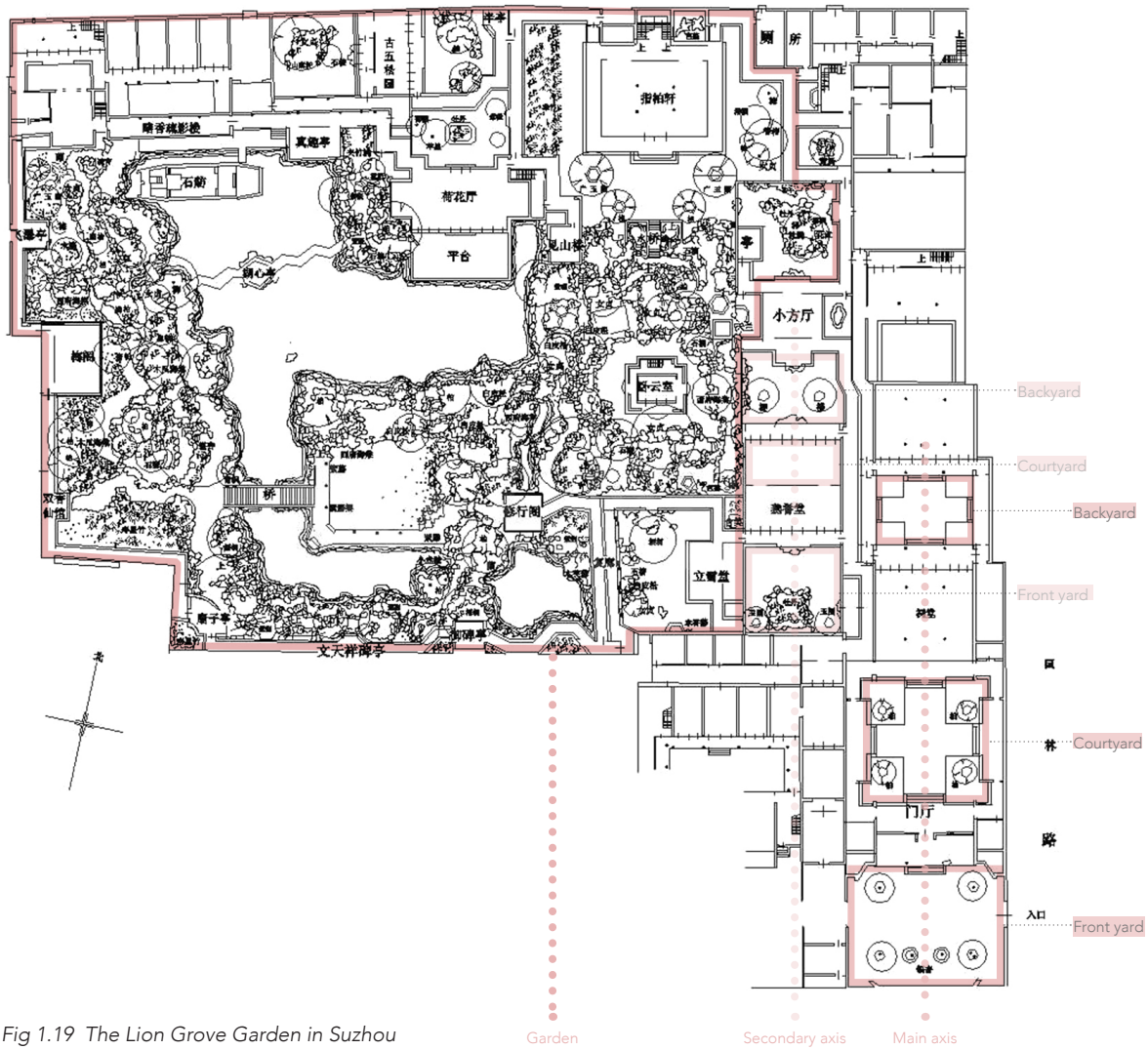


Fig 1.19 The Lion Grove Garden in Suzhou

In the past, in some wealthy families and nobilities' dwellings, there are private gardens beside the Siheyuan. One of the most representative examples is the Lion Grove Garden in Suzhou - a city that is home to many renowned Chinese Scholar Gardens. The Lion Grove Garden is famous for its elegant design details of materials, patterns, and plants. Once privately owned now open to public, the garden has become one of the best known attractions in Suzhou, gaining much more attention and fame than the main courtyard house it is attached to.

CHAPTER TWO

HISTORY

Historically, Siheyuan has four periods in its development:

Period 1: From Zhou dynasty (1046 B.C. to 256 B.C.).
This is the time when Siheyuan first started to appear.

Period 2: From Han dynasty (202 B.C. to 220 A.D.).
Siheyuan saw some development in this period.

Period 3: From Sui dynasty (581 to 619).
Records were found indicating the popularity of Siheyuan.

Period 4: From Yuan dynasty (1271-1368).
The development of Siheyuan reached a peak (Ma, 1999).

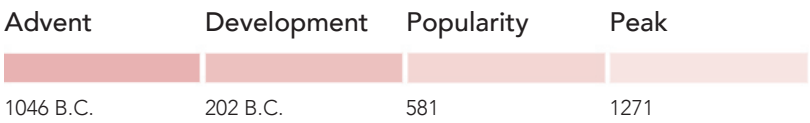


Fig 2.0 Time line of Siheyuan

In the process of perfecting the living environment, our human needs for dwelling consist of two main aspects. Besides meeting the physical demands, such as having a shelter from the environment, home also needs to cater to our psychological demands, such as living ethic and aesthetics (Sui, 2006, p.2). It is no accident that courtyard house has gained such prominence as a built form, for it elegantly satisfied both aspects. Before courtyard house appeared, people lived in single units. As the demand for food increased, spaces in between units were utilized for planting vegetable and feeding animals. Naturally, the birth of courtyard was a reflection of people's living demand. In China, people living in the northern part of the country named courtyard house Siheyuan, and those in the south named it Tianjingyuan.

Period One: Advent of Siheyuan since Shang (1600 B.C. to 1046 B.C.) and Zhou (1046 B.C. to 256 B.C.)

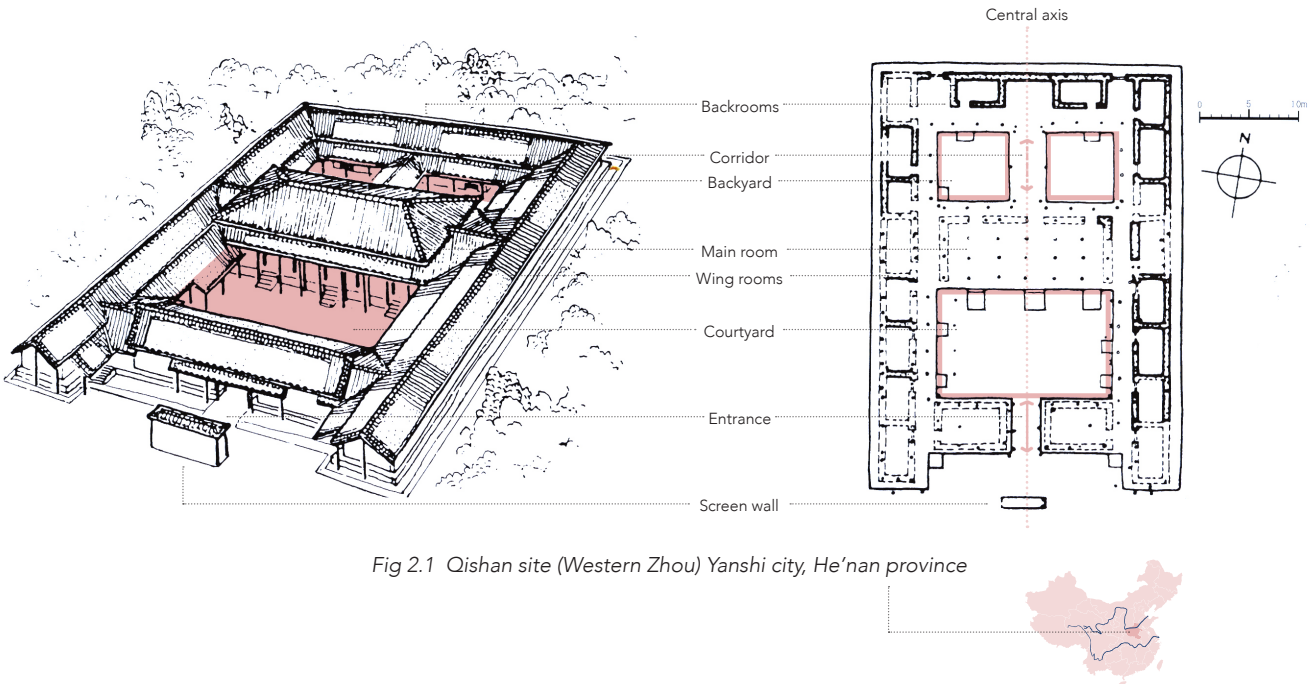


Fig 2.1 Qishan site (Western Zhou) Yanshi city, He'nan province

Siheyuan started to appear since Shang dynasty (1600 B.C. to 1046 B.C.) and Zhou dynasty (1046 B.C. to 256 B.C.). Zhou dynasty was the end of slave society and the beginning of feudal society. After experiencing the growth of primitive society and the slave society, there was an accumulation of productivity. At this point, Siheyuan appeared. Qishan site, which was built in Zhou dynasty, is the earliest ancient ruined of Siheyuan discovered to date. Its arrangement was neat and clear. It had a rectangle shape with a vertical axis in the middle; along the axis, there were a screen wall, an entrance, a main room, and backrooms. There were also corridors between the main room and the backrooms. In the middle, there was a courtyard (Fig 2.1).

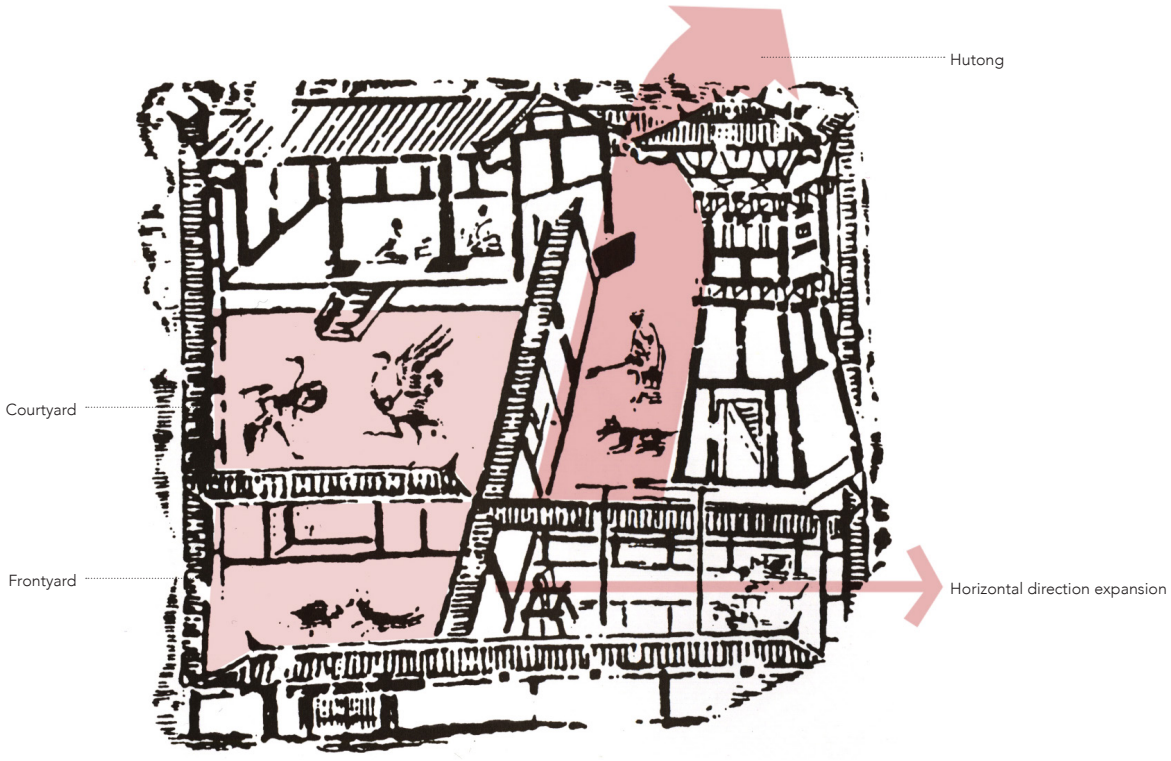
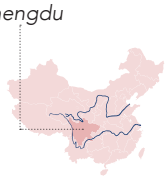


Fig 2.2 Painted brick from DongHan Dynasty excavated in Chengdu



Qin dynasty (221 B.C. to 207 B.C.) was the first dynasty that unified the whole China. It was during this period that the Great wall first began construction. Han, as the dynasty following Qin, was the dynasty when the economy and culture reached the first peak in the imperial China. Consequently, during Han dynasty, Siheyuan became more and more popular. On the Eastern Han painted brick excavated in Chengdu (Fig 2.2), we can tell the arrangement of Siheyuan expanded to "Duo Jin Siheyuan" (Siheyuan with multiple courtyards). It was also the time when Hutong first appeared (Ma, 1999, p.4).

Period Three: Popularity of Siheyuan since Sui (581 to 618)

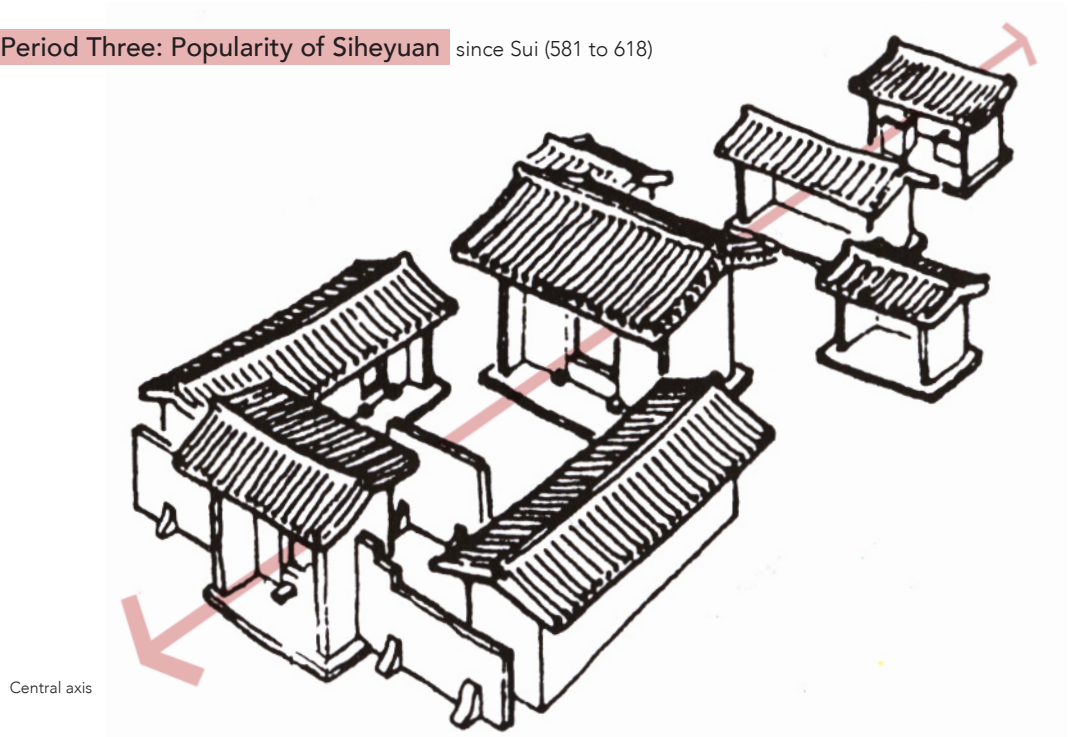


Fig 2.3 Siheyuan pattern on Tang dynasty burial objects

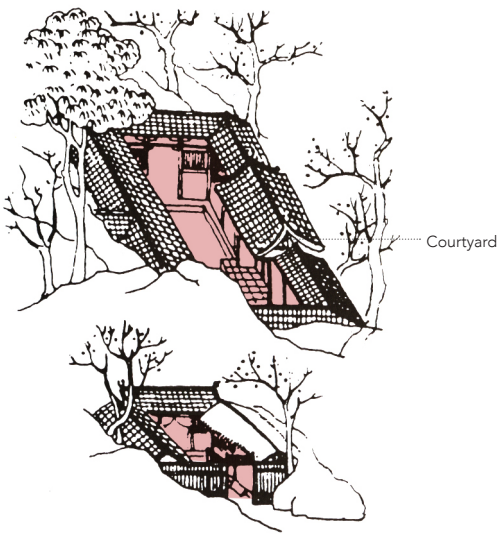


Fig 2.4 Siheyuan in drawing "Travel in Spring" by Ziqian Zhan, Sui Dynasty

During Sui dynasty, China's economy bloomed due to the construction of the Grand Canal, which connected the north with the south. There are a variety of historical documents indicating it is during this period that Siheyuan became popular. The pattern of Siheyuan could be found on paintings, burial objects, wall paintings as well as silk paintings (Figure 2.3 and 2.4).

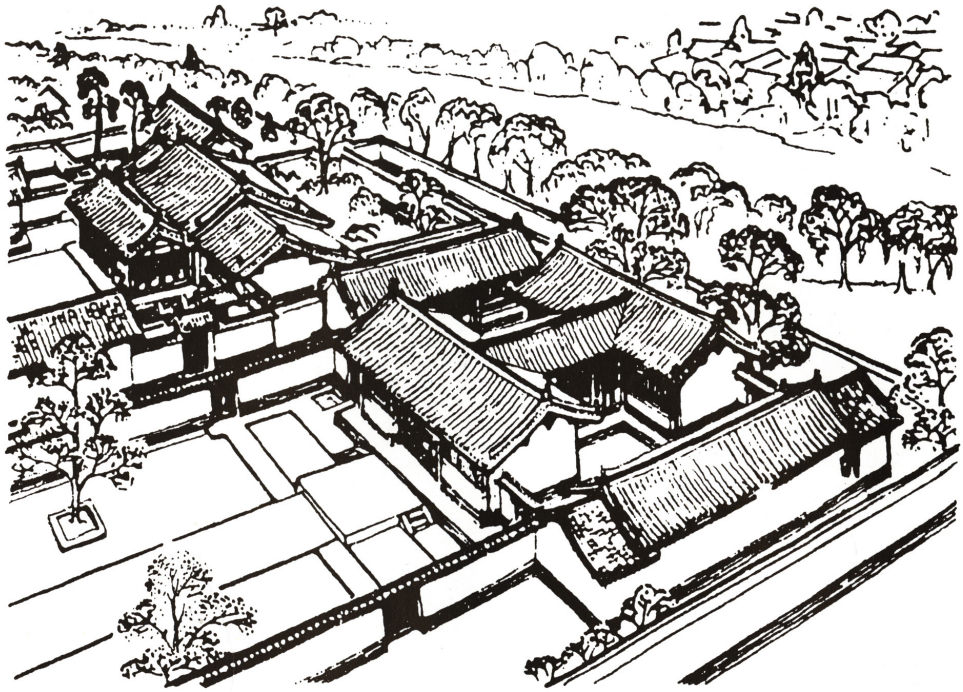
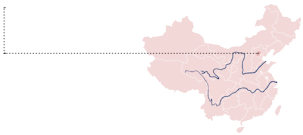


Fig 2.5 Palinspastic image of Siheyuan in Beijing (Yuan)



By Yuan dynasty, due to Beijing's designation as the capital, the city became a center for Siheyuan's development. According to the palinspastic image of Houying Siheyuan in Yuan dynasty, the community that consisted of Siheyuans formed during that time. Later in Ming dynasty, a breakthrough in brick making method further improved construction quality. In addition, the book *Lu Ban Theory* and *San Cai Tu Hui* provided theoretical guidance for construction of Siheyuan. During the following and the last imperial dynasty of China, Qing, high level of manufacture brought the development of this traditional Chinese Siheyuan to its peak. Large communities of Siheyuans were built. By the end of Qing dynasty, due to the invasion from European countries, China became semi-colonized, and the popularity of Siheyuan began to dwindle (Ma, 1999, p.7). After the founding of the People's Republic (1949), years of culture revolution destroyed most Siheyuans. Hundreds of Siheyuans and hutongs were ruined. It wasn't until the late 1990s when people started to treasure this valuable cultural heritage and advocated their preservation again.

CHAPTER THREE

TYPES

After introducing the historical development of Siheyuan, this chapter showcases five different types of courtyard housing across China. Siheyuan, is the specific name for courtyard house in northern China, especially in Beijing. China is a country of an area of 9,600,000 km^2 and a population of 1.3 billion. The territory spreads across a wide range in both longitude and latitude and encompasses 56 ethnic groups. Different geographic conditions, climates and cultures resulted in a variety of living styles. The dwellings in different regions can greatly vary in form and character, but courtyards can be found in most of these dwelling types.

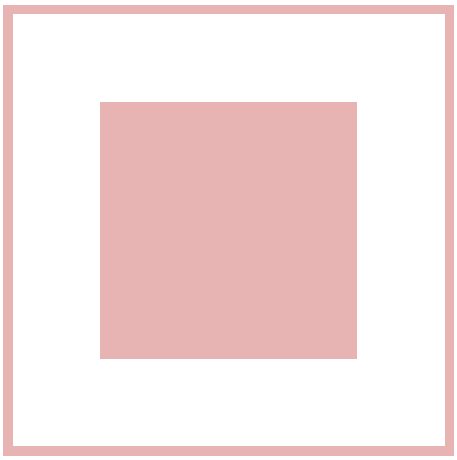


Fig 3.0 Courtyard

Fig 3.1 Map of China

The five courtyard housing types are: traditional dwelling in Dongbei, Siheyuan in Beijing, traditional dwelling in Jiangnan, Tulou in Fujian, and block house in Tibet.

Fig 3.2 Traditional dwelling in Dongbei

Fig 3.3 Siheyuan in Beijing

Fig 3.4 Traditional dwelling in Jiangnan

Fig 3.5 Hekeng Tulou cluster in Fujian

Figure 3.6 Blockhouse in Tibet

Fig 3.7 People's life in the courtyard, Dongbei Jixi City, Heilongjiang Province

In northern China, it is cold in winter and hot in summer, and waterways are not in rich supply. As a result, courtyard houses have smaller windows to keep the heat inside of the rooms. Courtyards are usually large, allowing more sunlight into the rooms. This style is adopted by both Dongbei (northeast) dwelling and Siheyuan. The traditional dwelling arrangement in Dongbei is the same as the Siheyuan in Beijing. The main room is located in the north and faces south to receive maximum sunshine all year round. Two more rooms are on the east and west. Each family has such a set of houses with a courtyard in the middle. Fence or another room is built on the south side.

Fig 3.8 Courtyard houses in Dongbei Jixi City, Heilongjiang Province

Fig 3.9 Siheyuan in Beijing

In ancient China, it was common for one family with several generations to live under the same roof in the same Siheyuan. The allocation of rooms depends on the members' positions in the family hierarchy. The elders always live in the north room, followed by the west room, then east room, and the back row room. In the middle, there is the courtyard. It is the space where all the people can share. Besides spending leisure time in the courtyard, people use the courtyard as sunning ground to dry wheats and hang their clothes. Furthermore, it was also used as playground for children. The privacy of Siheyuan allows them to safely play in the courtyard. It is not hard to see that the courtyard is not only the physical center of the Siheyuan, but also the center of a this way of life.

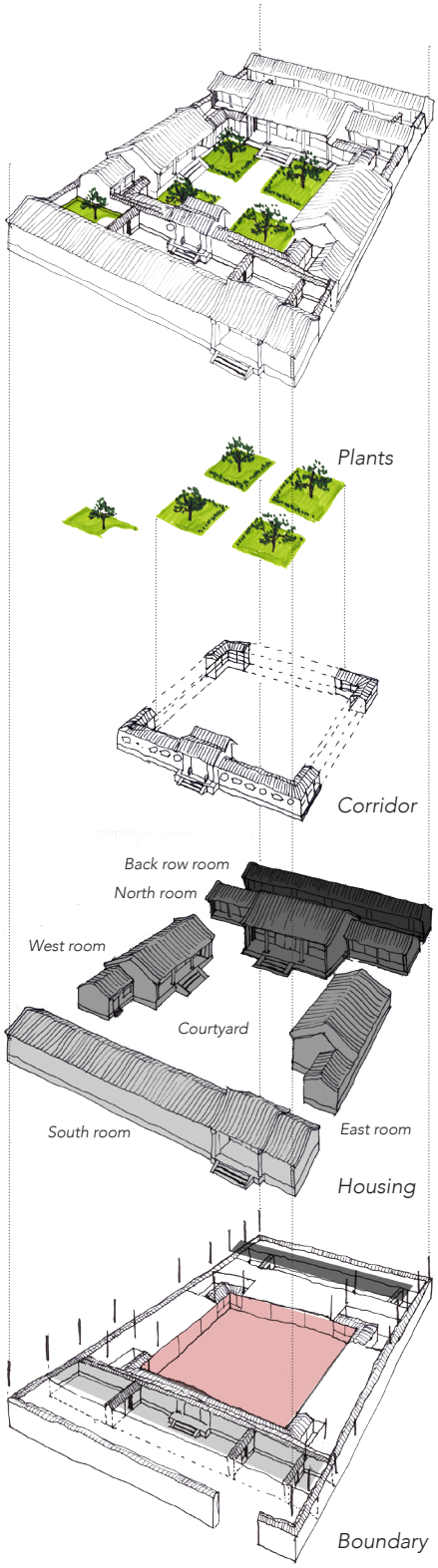


Fig 3.10 Layers of Siheyuan

Traditional Dwelling in Jiangnan

There are many waterways distributed in the Yangtze River Delta, and as a result, the traditional dwellings were built along the waterways. It is common for one side of the waterway to be the edge of the building, and the other side to be the walking corridor. Courtyards are narrower and smaller in Jiangnan (south of the river) due to its hot climate. The houses on the sides block the direct sunlight, while courtyards still receive light from above. In Chinese, "Tianjing" is the other name for these courtyards; its literal meaning is sky well, which very accurately depicts its appearance.

Fig 3.11 Drawing of waterways in Jiangnan

Fig 3.12 Dwellings and waterways in Suzhou, Zhejiang province

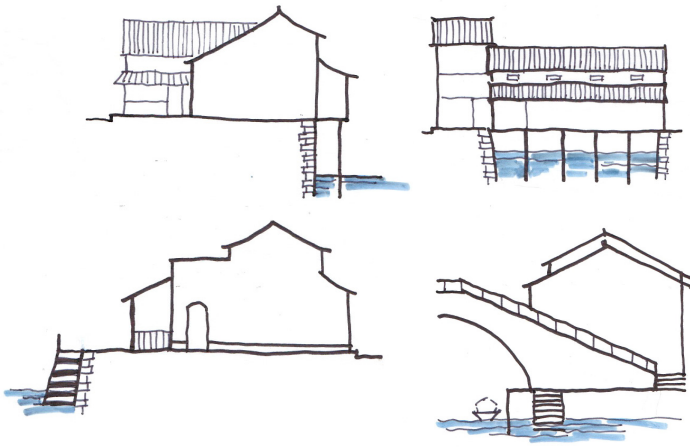


Fig 3.13 Sections of Jiangnan dwellings

Fig 3.14 Images of Tianjing in Jiangnan dwelling

Fig 3.15 Images of Suzhou, Zhejiang province

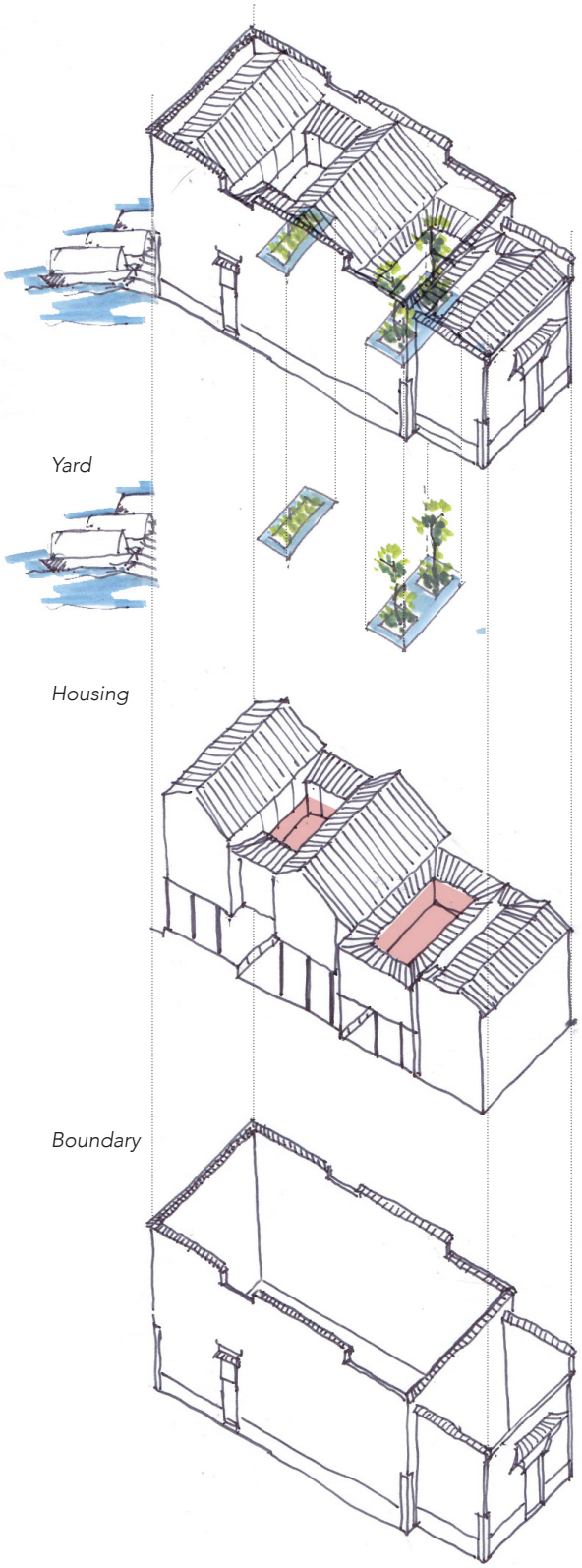


Fig 3.16 Layers of Jiangnan dwelling

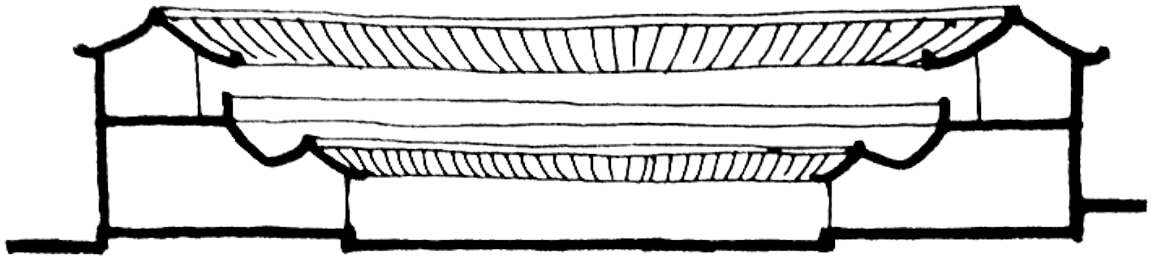


Fig 3.17 Section of Tulou

The literal translation of Tulou is soil building. It is a specific dwelling type created by Hakka minority, and located in the west of Fujian Province in China. The main material for its construction is compacted raw soil, and some other materials such as stone, wood, bamboo, bricks, tiles, and lime. The shapes vary from round to square, and other special shapes according to their specific geographical site. There are normally three to five floors in Tulou with all rooms facing into the encircled courtyard. This kind of arrangement accentuates the importance of this center space (Ni, 2008, p.200). The capacity of each Tulou can be hundreds, which contains 30-50 families, each family owns their bedroom and kitchen. In ancient time, all the families living in a Tulou are from the same root, but as time passed by, these families does not need to have consanguinity any more (Zheng, 2014, p.137).

Fig 3.18 Hekeng Tulou cluster in Fuzhou city, Fujian province

In Tulou, kitchens and dining rooms are usually located on the first floor, people also feed animals on the first floor; storages are on the second floor. The third and fourth floors are bedrooms. Most of the Tulous has an extra layer or more. These layers contain rooms for family meetings and guests. With all these layers, and only one entrance, Tulou provides great protection to people living inside. In the center, there is the open space. It is the most important place in the building, which is often the location of the ancestral temple. Sometimes a water well is also located in the center. Green spaces in Tulou is also found here, and sometimes between the layers. Like other courtyard houses, the courtyard in the middle is the shared space for all the families in Tulou; it is the center of people's lives.

Fig 3.19 Images of Tulou

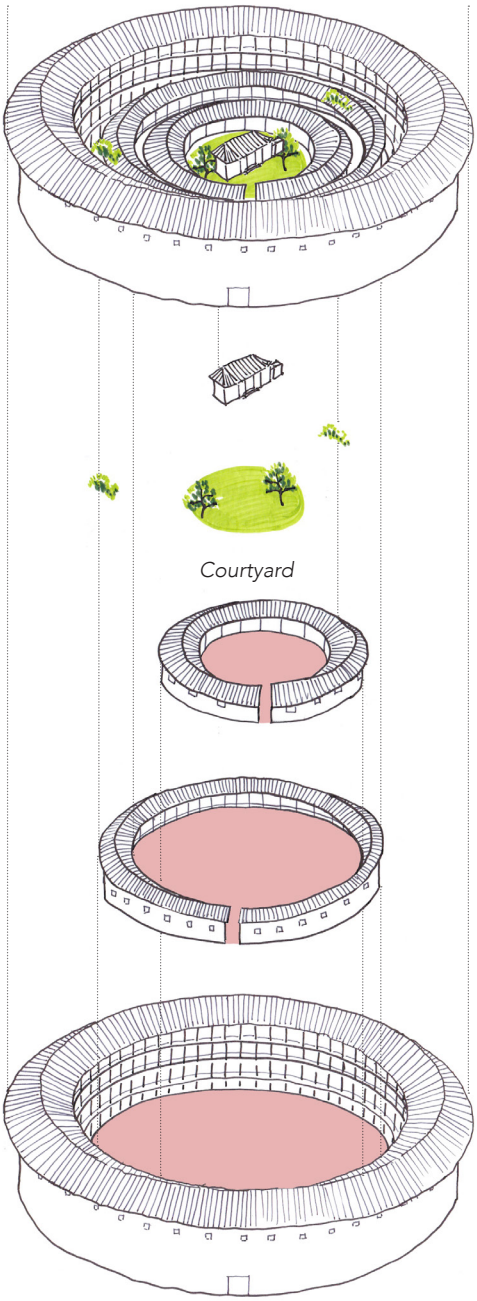


Fig 3.20 Layers of Jiangnan dwelling

Blockhouse in Tibet

Fig3.21 Blockhouse in Lhasa City, Tibet

The Blockhouse is the traditional dwelling type in Tibet, Qinghai, Gansu and West of Sichuan, which are located on the Tibetan Plateau. The Tibetan Plateau is the largest and highest plateau in the world with an average elevation of over 4,000m above sea level. Blockhouse is the traditional dwelling form built with local materials, such as stones, soil, and wood. Marble is widely used in the construction due to its rich reserve near Lhasa. Depending on the wealth of a particular family, the floor of Blockhouse ranges from one to three or four. In wealthy families, the first floor is used for keeping animals and storing fodder. The bedroom is on the second floor. And the third floor is where people chant (Wang, 2004, p.9). There is one courtyard on the roof that functions as a sunning ground due to its full exposure to sunlight. Sometimes, there is also a front yard, which is a sheltered place for people to get together.

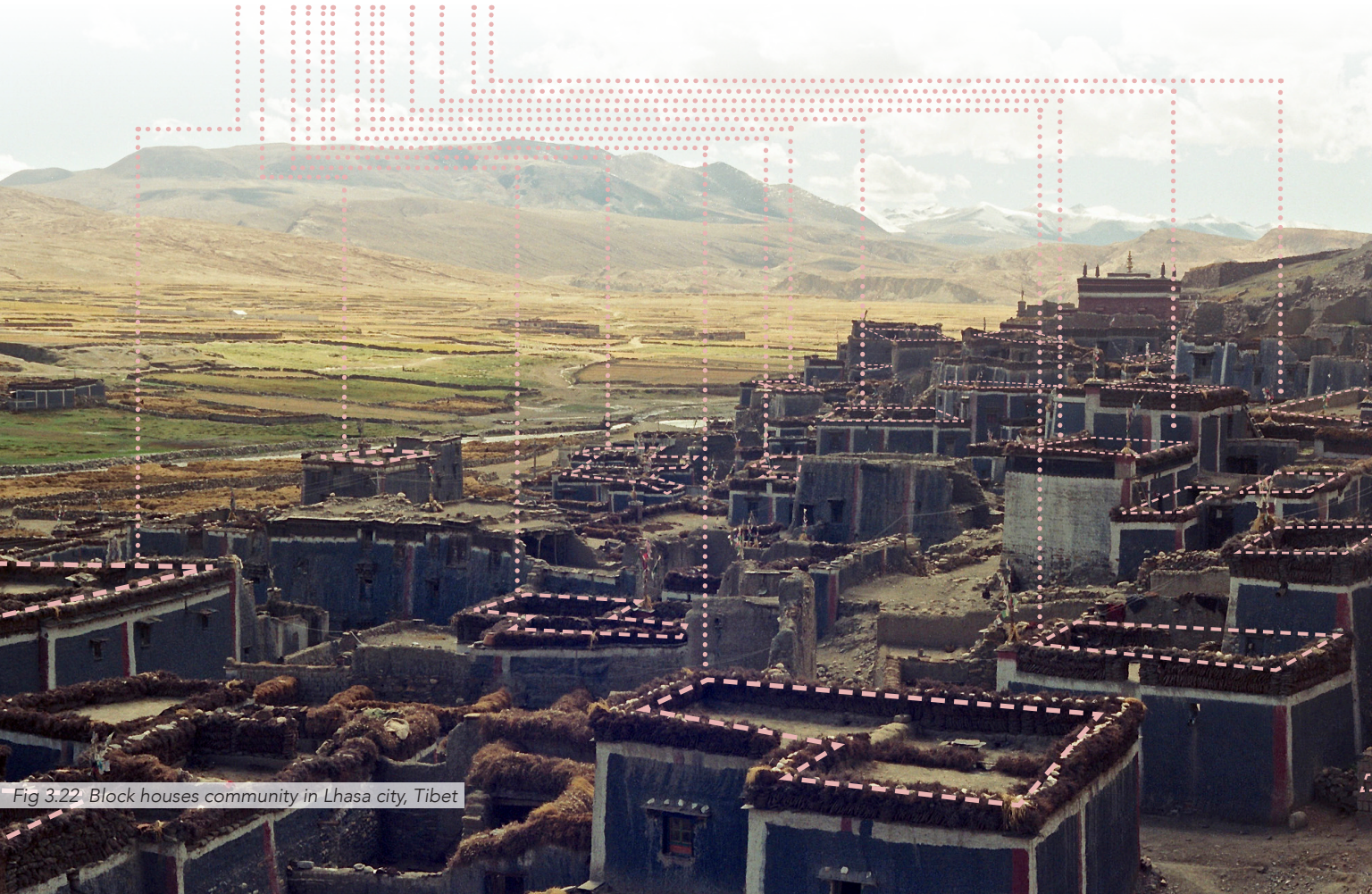


Fig 3.22 Block houses community in Lhasa city, Tibet

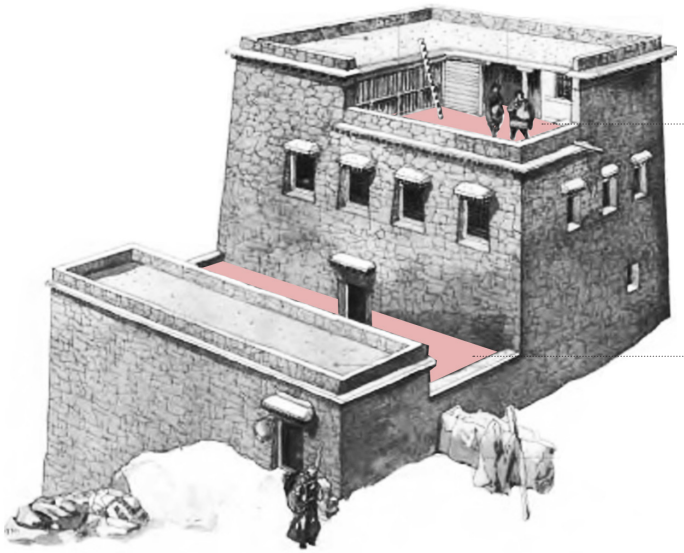


Fig 3.23 Blockhouse in Tibet

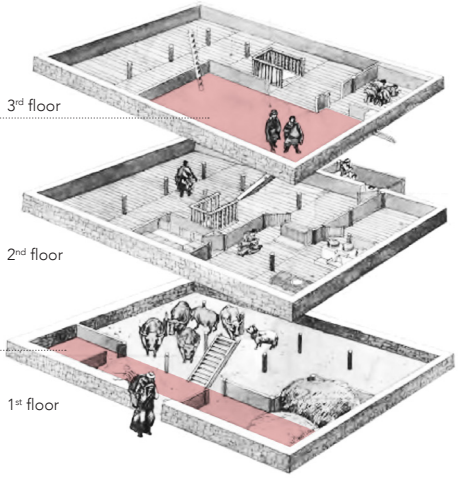


Fig 3.24 Layers of Blockhouse

Fig 3.25 Section of Blockhouse

Fig 3.26 Block houses community in Lhasa city, Tibet

CHAPTER FOUR

CASE STUDIES

In this chapter, three case studies about sheltered places are introduced. The Forbidden City in Beijing, China, and the Alhambra in Granada, Spain are two examples of remaining historical sheltered places with courtyards. The Suzhou Museum in Suzhou, China is a contemporary design which courtyards are an integral part of the design. I deconstruct these cases into layers to analyze their boundaries, courtyards, and water features. Sectional drawings illustrate the spatial characters. The application of these analytical drawing methods has led me to a deeper understanding of the spatial composition of the selected examples, allowing me to capture the essence of these places.

The Forbidden City

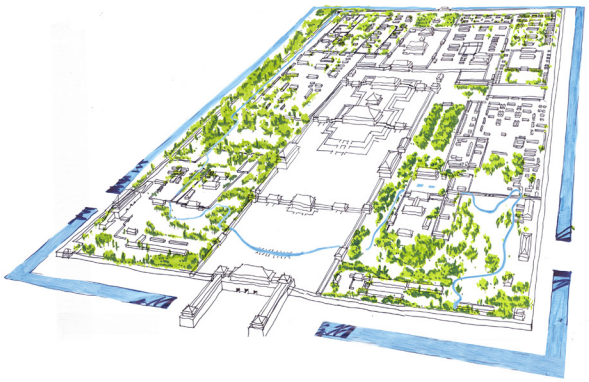
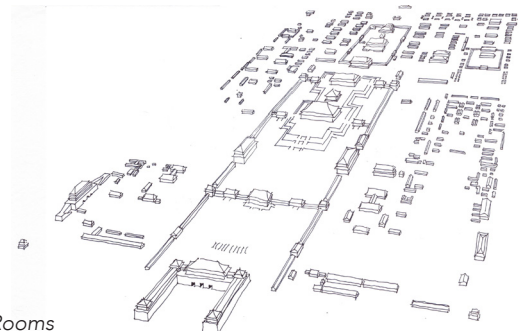
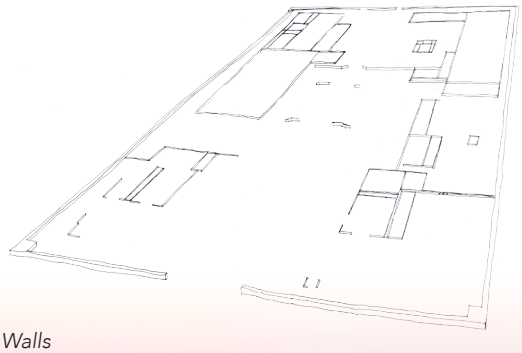


Fig 4.1 Deconstruction of the Forbidden City

The Forbidden City was built in 1406 AD. It is the imperial palace for both Ming and Qing dynasties. The whole architectural complex is 961m in length and 753m in width. Its planning followed the planning of Dadu in Yuan dynasty, which is the preceding dynasty of Ming. After fourteen years' construction, the Forbidden City was finished in 1420. Wood, tiles, stone and bricks are the main materials for the construction.



Rooms



Walls

Boundary

There are thousands of buildings in the Forbidden City. According to the data, there are 8704 rooms. All the buildings are constructed of stone plates, and wooden structure. The buildings on the central axis are larger than the ones on the sides because they are the places for the emperor to work, study, and sleep. The smaller buildings on the sides are for other imperial family members, servants and guards; the buildings enclose courtyards and form single palaces. The hierarchy of buildings creates distinct spatial qualities. Walls are also used for creating different sizes of courtyards and helping separate spaces according to their functions and importance. A 12m high and 3,400m long bounding wall enclose the whole architectural complex.

Fig 4.2 The Forbidden City

Fig 4.3 North-south section

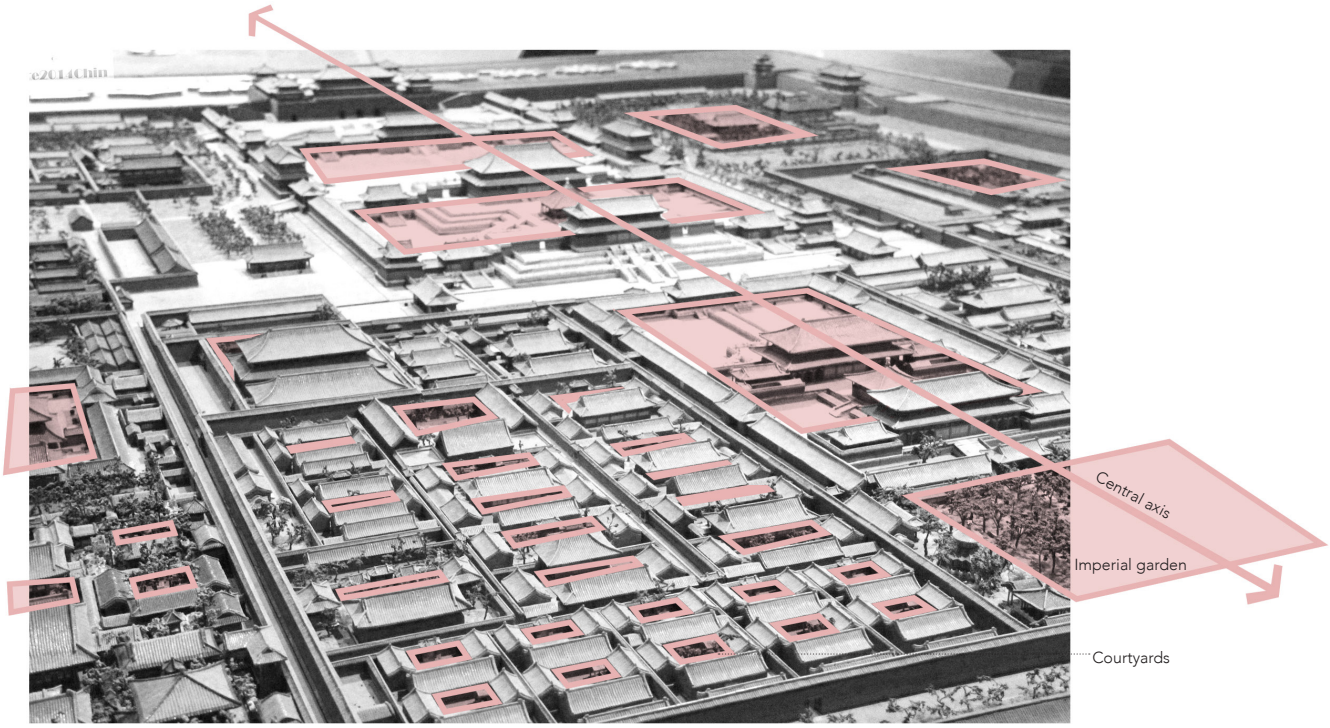
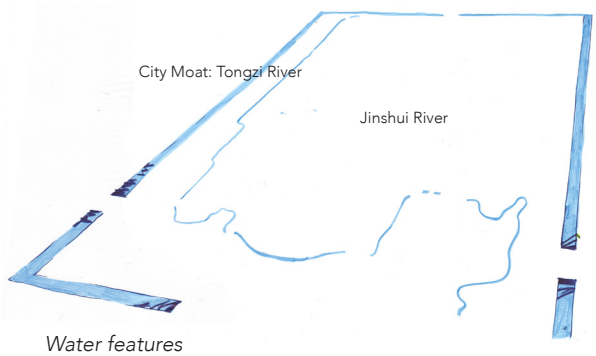


Fig 4.4 Model of the Forbidden City

Plants



Water features

Courtyards

In the Forbidden City, there are different open space types, such as central axis, gardens, and courtyards in every single palace. No trees were planted in the central axis; the purpose is to keep the central axis open and majestic. There are huge courtyards along the central axis which were used for meetings between the emperor and the ministers come from all over the country during Qing dynasty. There is an imperial garden on the north end of the Forbidden City for the members of the royal family. The other courtyards in the Forbidden city were used as common spaces and plants.

Water features

A moat called Tongzi River is constructed on the outside of the Forbidden City as protection. It is 52m in width and 6m in depth. Inside of the Forbidden City, Jinshui River winds from the north to south, in addition, 72 water wells are distributed. All there water features were functioned as water source, and water drainage.

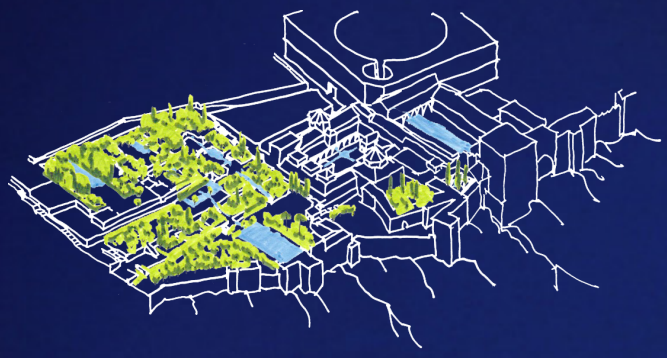
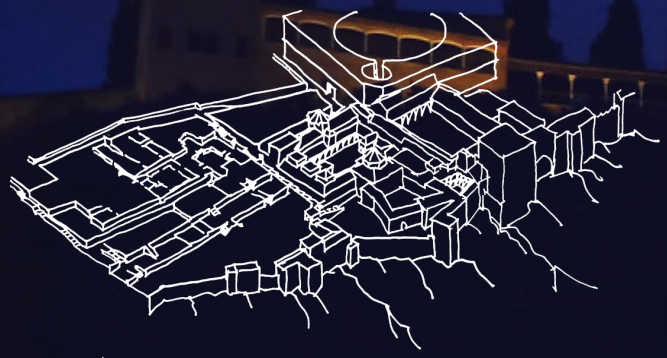


Fig 4.5 Deconstruction of the Alhambra

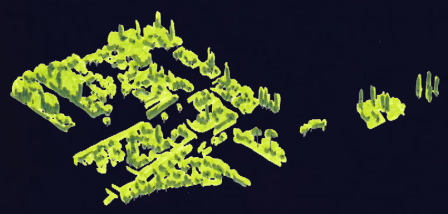
The Alhambra is the castle complex situated on the Sierra Nevada mountain range in Granada, Andalusia, Spain. It was completed at the end of 15th century. The climate of the city is typical Mediterranean climate, which is hot and dry in summer, warm and wet in winter. Therefore, courtyards can always be found in the Alhambra. In these courtyards, plants and water features contribute to cooling the temperature.



Boundary

Boundary

All the courtyards in the Alhambra are enclosed by architecture around them. Each of them has its own characteristic. Most famous courtyards are the Cuarto Dorado, the Court of the Myrtles, the Court of the Lions, the Patio of the Daraxa and the Peinador de la Reina.



Plants

Courtyards

In the Alhambra, corridors are often built along the courtyards, which provide people shelter spaces while they are walking between buildings. Trees are planted in the courtyards. Water fountains and pools are designed in a symmetrical arrangement. They help keep the courtyards cool in hot summers. Another purpose of planting trees is for decoration. Hedges are often found in the courtyards for partitions.

Water features

Water features

In Arabic culture, water represents life, and it is the fountain of meditation. Additionally, water helps to cool down the temperature in the courtyards. As a result, water features can be found in every single courtyard as the main character. Water ponds and water fountains are the two most popular water features.

Fig 4.6 Image of the Alhambra at night

Fig 4.7 Cuarto Dorado

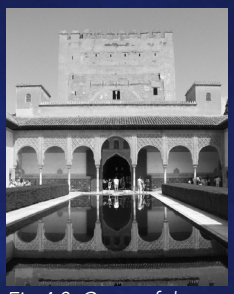


Fig 4.8 Court of the Myrtles

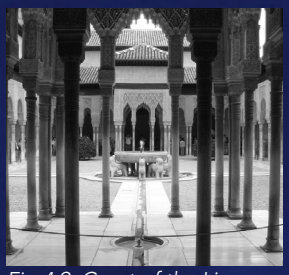


Fig 4.9 Court of the Lions

Fig 4.13 Major courtyards and related rooms

Fig 4.10 The Partal

Fig 4.11 Court of the Myrtles

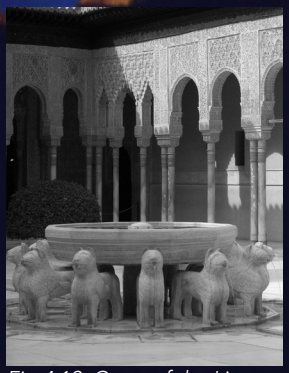


Fig 4.12 Court of the Lions

1. Cuarto Dorado
2. Court of the Myrtles
3. Hall of the Ambassadors
4. Court of the Lions
5. Hall of the Abencerrajes
6. Hall of the Two Sisters
7. Patio of the Daraxa
8. Peinador de la Reina

Fig 4.14 Section of the central axis

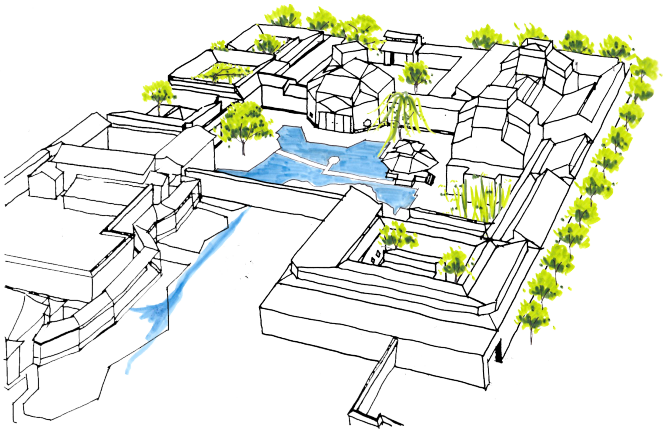
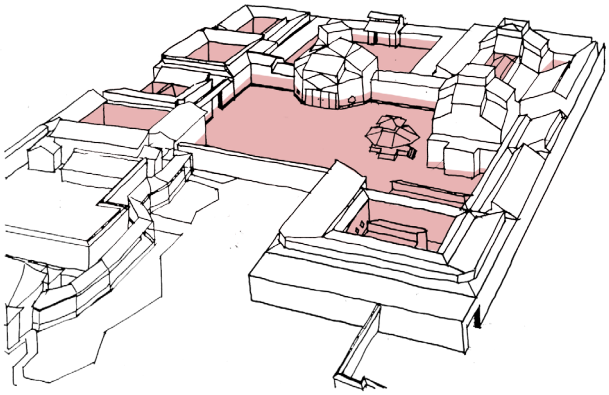


Fig 4.15 Deconstruction of Suzhou Museum

The Suzhou Museum was designed by I.M. Pei and inaugurated in 2006. Suzhou is I.M. Pei's ancestral hometown. His deep understanding about the local culture and architectural tradition resulted in an organic integration between the clean and modern design of the museum and its surrounding historical Chinese gardens.



Boundary

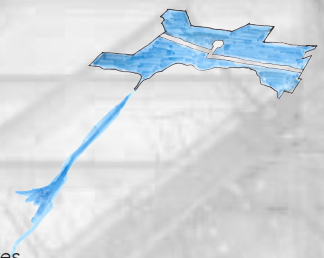
Boundary

Like traditional Siheyuan, houses and walls are used as boundaries for dividing the building complex into a sequence of courtyards and gardens.

Courtyards

In the Suzhou Museum, there are several courtyards in different sizes. In these courtyards, there are single trees, pavilions, as well as water features. Different species of plants were chosen according to the different themes of each courtyard. Willow and bamboo are widely used in the design. Besides trees, tree-shaped climbers such as *Wisteria sinensis* are also planted to provide cooling shade in the hot summer in Suzhou.

Plants



Water features

Water features

On the north of the Suzhou Museum is the Humble Administrator's Garden. It was built between 1510-1513 A.D. during Ming dynasty. The water system in the Suzhou Museum connects with the water system in the Humble Administrator's Garden. Besides helping the Suzhou Museum blend into the surrounding environment, the water connection helps with water drainage.

Fig 4.16 Photo of Suzhou Museum

Fig 4.17 North-south section

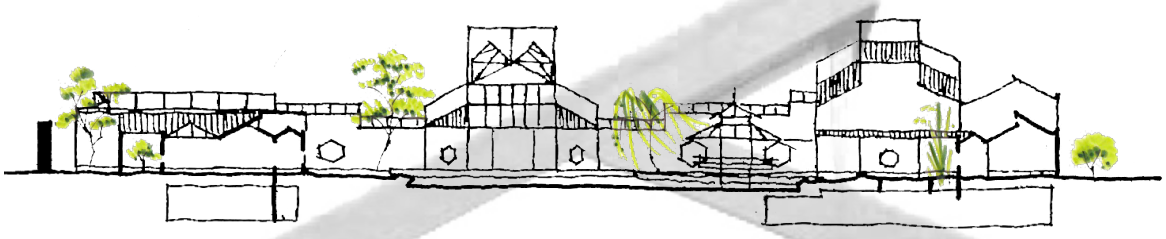


Fig 4.18 East-west section

Fig 4.19 Photos of Suzhou Museum

CHAPTER FIVE

MY CURRENT HOME

I moved to the city of Winnipeg to attend university when I was 20 years old. The city of Winnipeg is located in the center of Canada. The climate of this prairie city is humid continental. Due to its high latitude, it is extremely hot in summer and cold and dry in winter. The highest temperature in summer can reach 40℃ while the lowest can reach -40℃ in winter. Annual precipitation is about 500mm. It was my first time to live in another country, and the University of Manitoba became the place where I spent most of my time. I live and study at the university, and I depend on it both physically and psychologically. After years of being on campus, I have formed an attachment to the place and wanted to make a contribution to improving my second home. Therefore I decided to redesign three courtyards on the Fort Garry campus of the University of Manitoba.

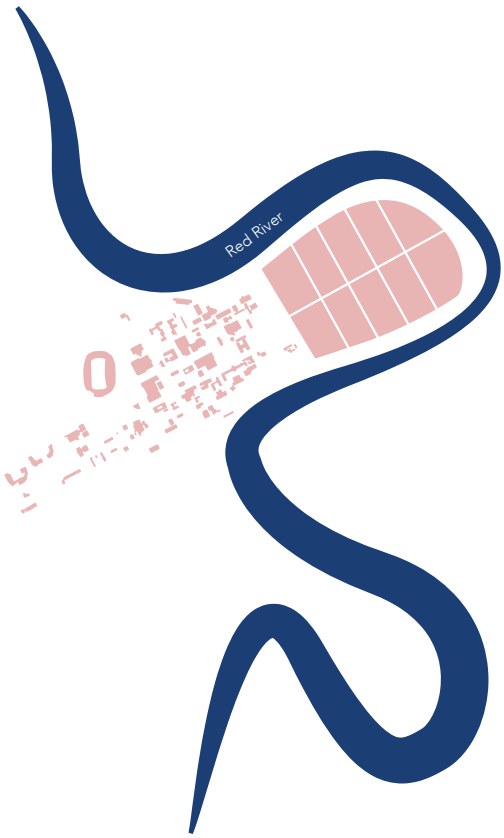
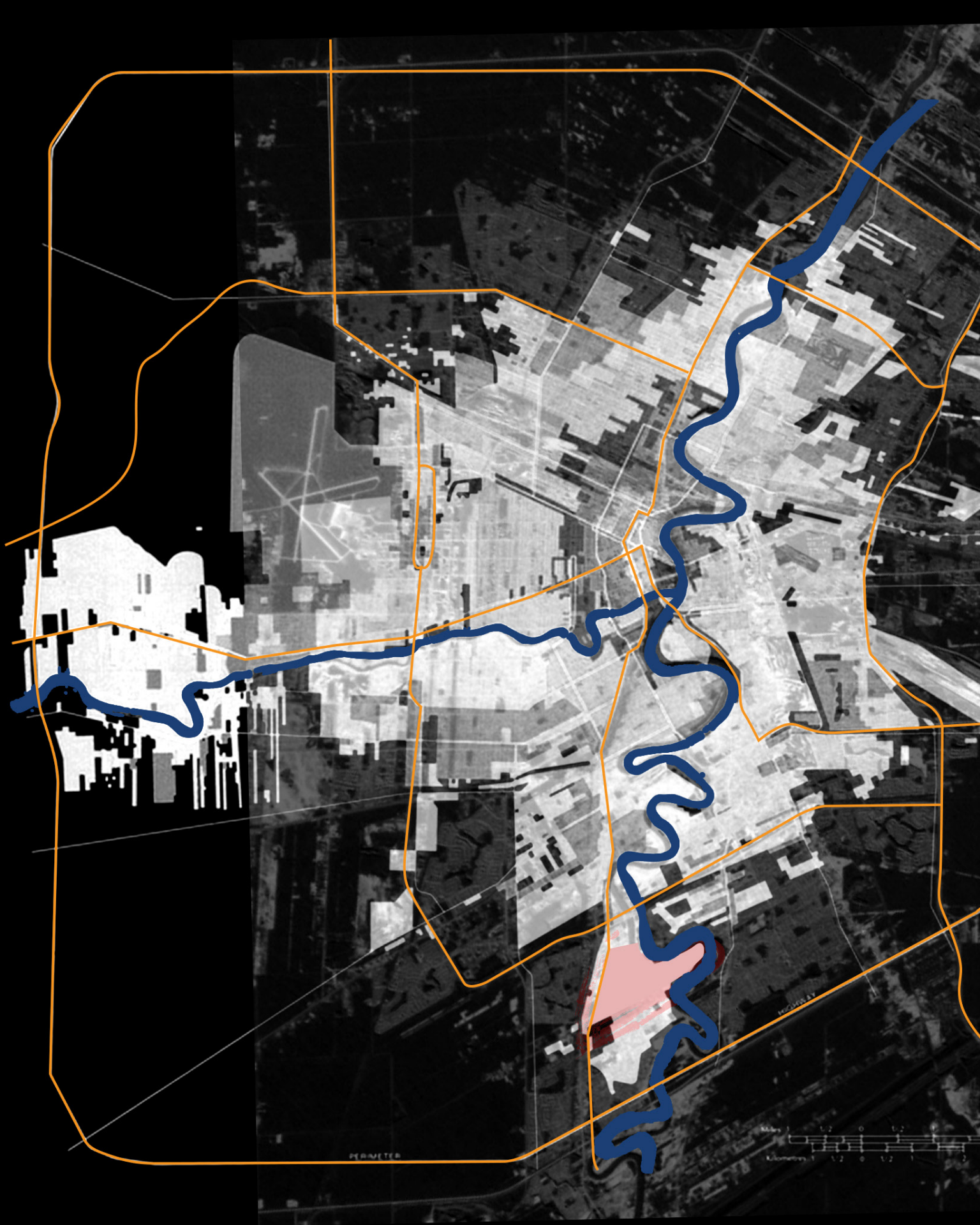


Fig 5.0 University of Manitoba Fort Garry Campus, Winnipeg, MB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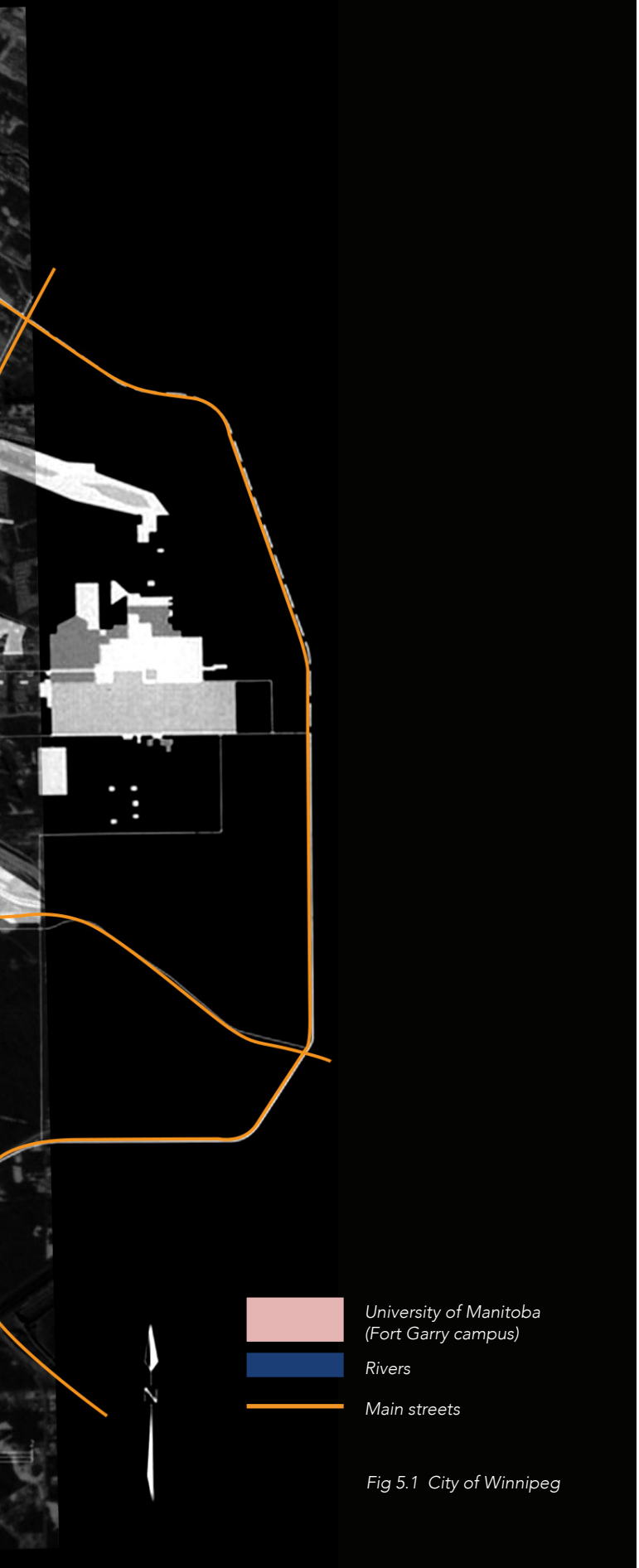


Fig 5.1 City of Winnipeg

"In 1877, seven years after the province of Manitoba was created, the University of Manitoba was established by bringing together three denominational colleges that had been established earlier, namely St. Boniface College, St. John's College, and Manitoba College" (Foster, 1978, p.1). The Fort Garry campus is located in the south of the City of Winnipeg, along the Red River. It occupied over 233 hectares of land, and currently, there are over 22 faculties at the university, with over 27,000 students and nearly 3,000 staff and workers.

Figure 5.2 University of Manitoba Fort Garry Campus building footprint

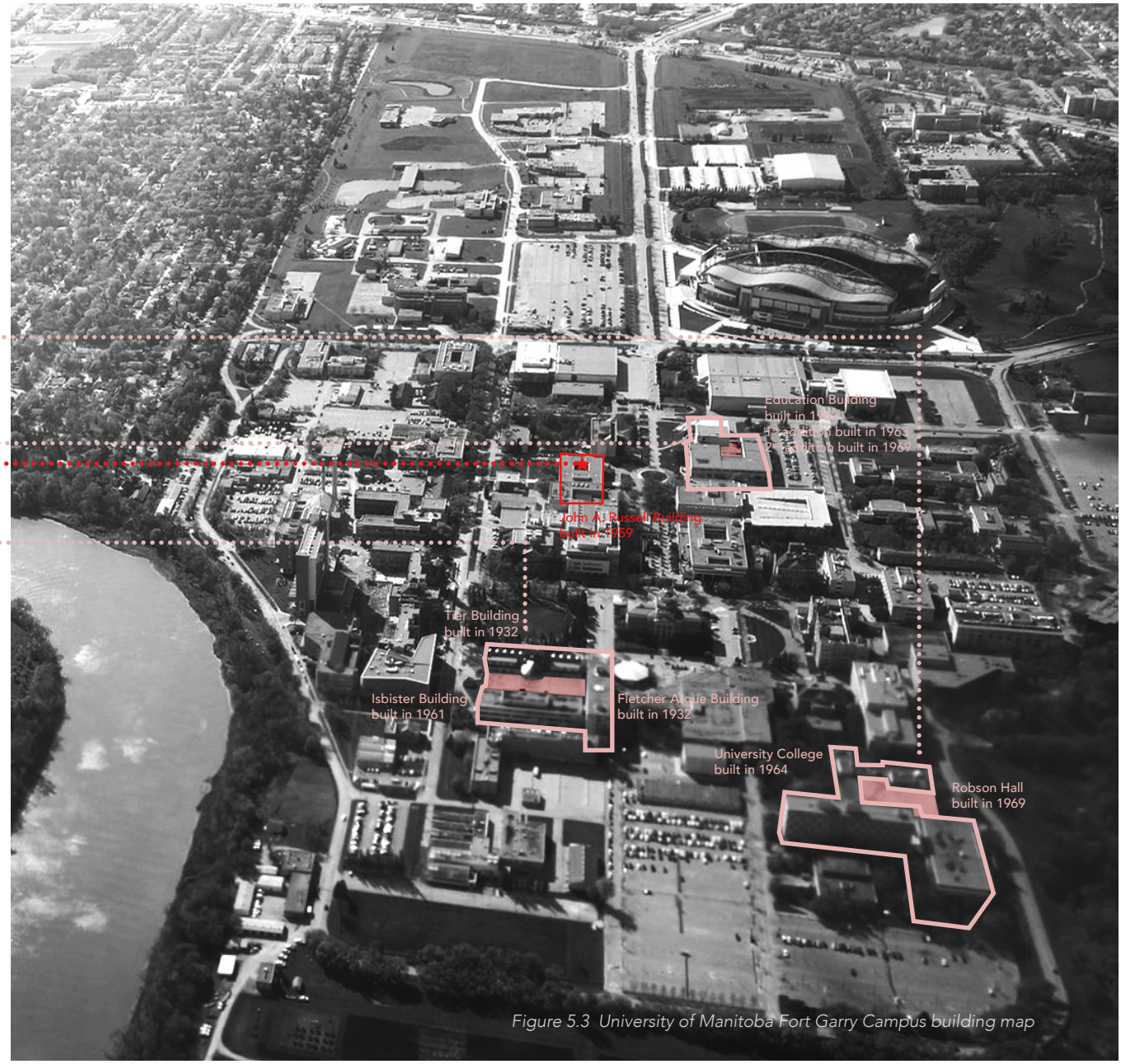


Figure 5.3 University of Manitoba Fort Garry Campus building map

In Siheyuan culture, a courtyard is not only the physical center of the family, but also the center of people's everyday lives, and it provides possibilities for different activities. On the Fort Garry campus at the University of Manitoba, there are some great courtyards that were initially designed to fulfill functions such as outdoor classrooms, but are now abandoned or underutilized. Therefore, these courtyards were chosen as the design sites of this practicum. By comparing their current conditions with their original designs and through site analysis, design decisions are made accordingly. Ultimately, they are meant to revitalize these courtyard spaces and bringing them back to people's everyday life on campus. The three courtyards are Tier Building Courtyard, Education Building Courtyard and University College Courtyard (Fig 5.2).

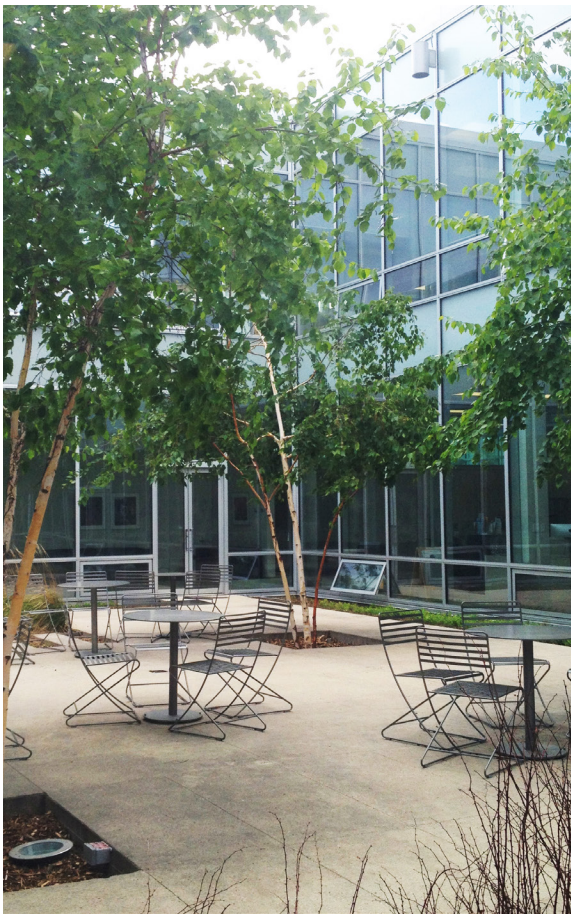


Fig 5.4 Russell building courtyard in summer

Fig 5.5 Atmosphere ice bar in winter

Russell Building Courtyard

As a student in the Faculty of Architecture at the University of Manitoba, I have a great experience with our courtyard in the center of the Russell building. The building was completed in 1959; the most recent renovation of the courtyard took place between 2004-2005. This courtyard provides a good example of how a small enclosed space became the core of a building and people's life within this building. This enclosure provides shelter, privacy and a special microclimate. During summer, several tables are set in the courtyard for students and professors to have conversations or enjoy their breaks. It is also used for social activities such as parties, BBQ, and faculty meetings. During winter, the courtyard functions as a visual access to the ever changing snowy landscape outdoor. At the annual Atmosphere conference in early February, we build an ice bar in the courtyard, where it is cold enough to build with ice but sheltered enough to enjoy a few drinks. This small space serves many needs for the regular occupants of the building, and becomes an essential part of the studying and working experiences at the Faculty of Architecture.

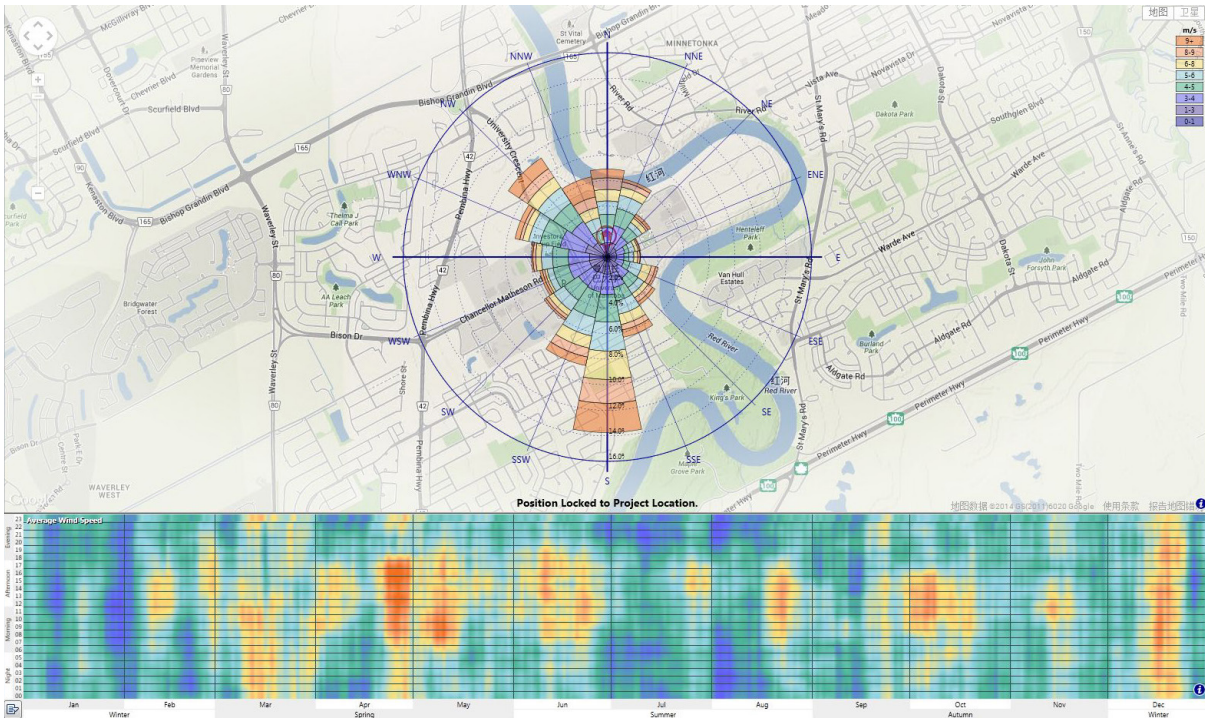


Fig 5.6 Wind diagram at the University of Manitoba (Exporting from Autodesk Vasari)

The city of Winnipeg is located in the middle of Canada, due to its geographical location, it has humid continental climate with wide temperature contrasts between winter and summer. It can reach 40℃ during the hottest time of the year, and -40℃ in the dead of the winter. The flat landscape allows strong wind to build up throughout the year. This is particularly noticeable in winter as there are two temperatures used for weather forecast: one for normal temperature, the other for wind chill. There can be an over 10 degrees difference between the two numbers, which makes a huge difference if you want to spend time outside. In summer when day time is stretched from early morning to late night, sun exposure is prolonged and extreme. Courtyard creates inviting shades to make outdoor space inhabitable. The specific microclimate conditions in an enclosed place improve the quality of stay significantly throughout all seasons.

Fig 5.7 Early Summer and Winter in front of the Faculty of Architecture at the University of Manitoba

Fig 5.8 Site image

Fig 5.9 North-South section

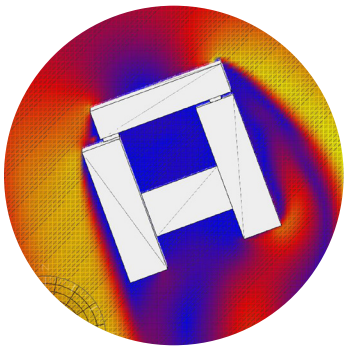
Fig 5.10 East-West section

The first courtyard on the Fort Garry campus I have chosen for my practicum is the Tier Building Courtyard. It is surrounded by buildings on four sides. The Tier Building on the west has five floors with classrooms and offices. The Isbister Building on the south and east sides is about 10m in height. Most rooms in the building are offices. The Fletcher Argue Building on the north has six floors, and there are classrooms, offices and student lounge in it. The size and height of this building shield the courtyard from the cold northern wind in winter.

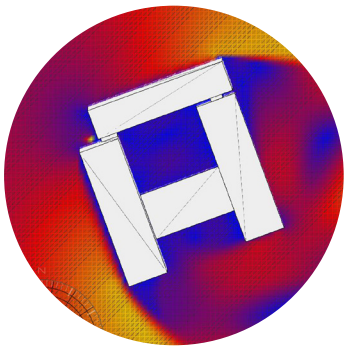
Fig 5.11 Tier Building footprint

OCTOBER, 21, 2015 SUNNY 2:50pm

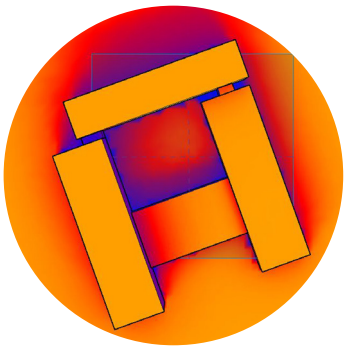
Data Collection:	Min Wind Speed	Max Wind Speed	Temperature
Inside Courtyard:	*4.3 km/h*	*9.8 km/h*	*18.7 ℃*
Outside Courtyard:	*10.2 km/h*	*22.6 km/h*	*23.4 ℃*



Northern Wind Diagram

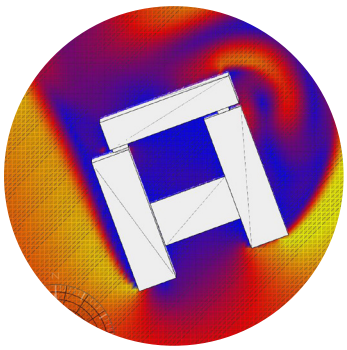


North-Western Wind Diagram

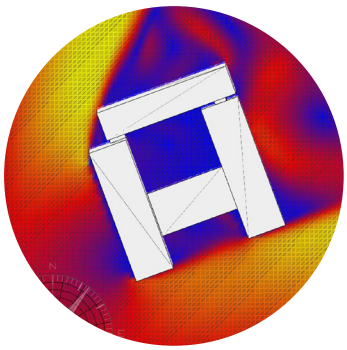


Winter Solar Diagram

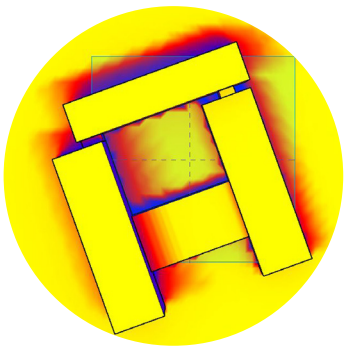
Winter Diagram



Southern Wind Diagram



South-Eastern Wind Diagram



Summer Solar Diagram

Summer Diagram

Fig 5.12 Diagrams for the Tier Building Courtyard

To get a better understanding of how the built forms could have affected the thermal conditions inside the courtyards, I recorded temperature and wind speed for both inside and outside of the three courtyards, and built a wind pattern study based on the data. In the above diagrams, the warmer colors represents stronger winds. This analysis further proves that courtyard can reduce wind speed up to 10km/h and create a temperature difference up to 5℃. It is an effective measure to lessen the negative impact of the climate extremes.

Fig 5.13 Site image

Figure 5.14 North-South section

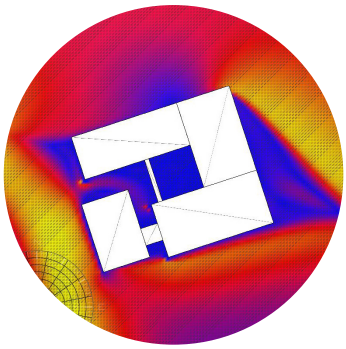
Figure 5.15 East-West section

The second courtyard is the Education Building Courtyard is located in the middle of a U-shape building. There are offices and classrooms in the building. On the west of the courtyard, 1.5m above the ground, there is a cantilevered hallway. Currently, this 1.5m gap under the hallway is the only way to get into this courtyard. A locked door in the building on the northeast corner of the courtyard was once the official entrance to this outdoor space. Since there is no other visible entrance, the courtyard stays unnoticed.

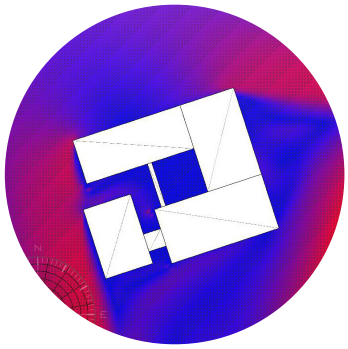
Fig 5.16 Education Building footprint

OCTOBER, 21, 2015 SUNNY 3:40pm

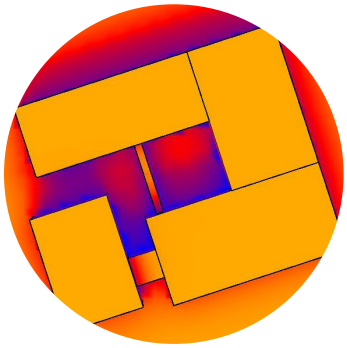
Data Collection:	Min Wind Speed	Max Wind Speed	Temperature
Inside Courtyard:	*7.1 km/h*	*15.8 km/h*	*17.9 ℃*
Outside Courtyard:	*9.0 km/h*	*21.3 km/h*	*20.1 ℃*



Northern Wind Diagram

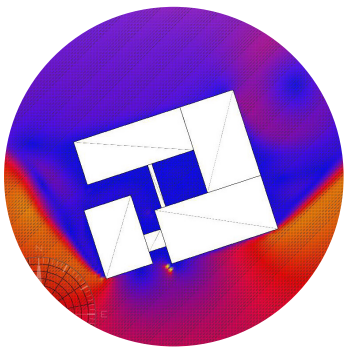


North-Western Wind Diagram

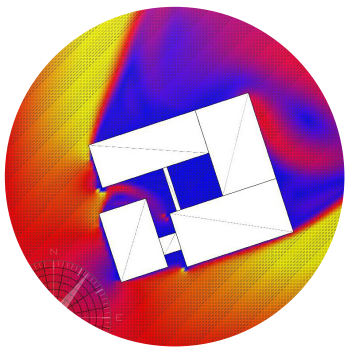


Winter Solar Diagram

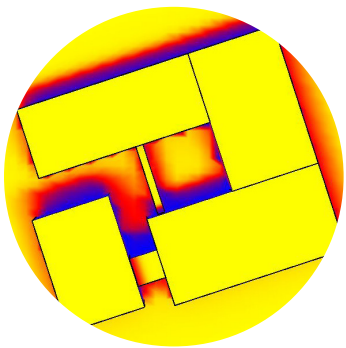
Winter Diagram



Southern Wind Diagram



South-Eastern Wind Diagram



Summer Solar Diagram

Summer Diagram

Fig 5.17 Diagrams for the Education Building Courtyard

Fig 5.18 Site image

The third courtyard is the University College courtyard. It is surrounded by three buildings on the south, east, and west. The University College Lecture Hall is on the south, there are classrooms in the building. The Robson Hall (Faculty of Law) and the University College Residence are on the east. There are classrooms and offices in the Robson Hall. On the north of the courtyard, there is a row of trees which functions as a screen that blocks the traffic from the courtyard.

Fig 5.19 North-South section

Fig 5.20 East-West section

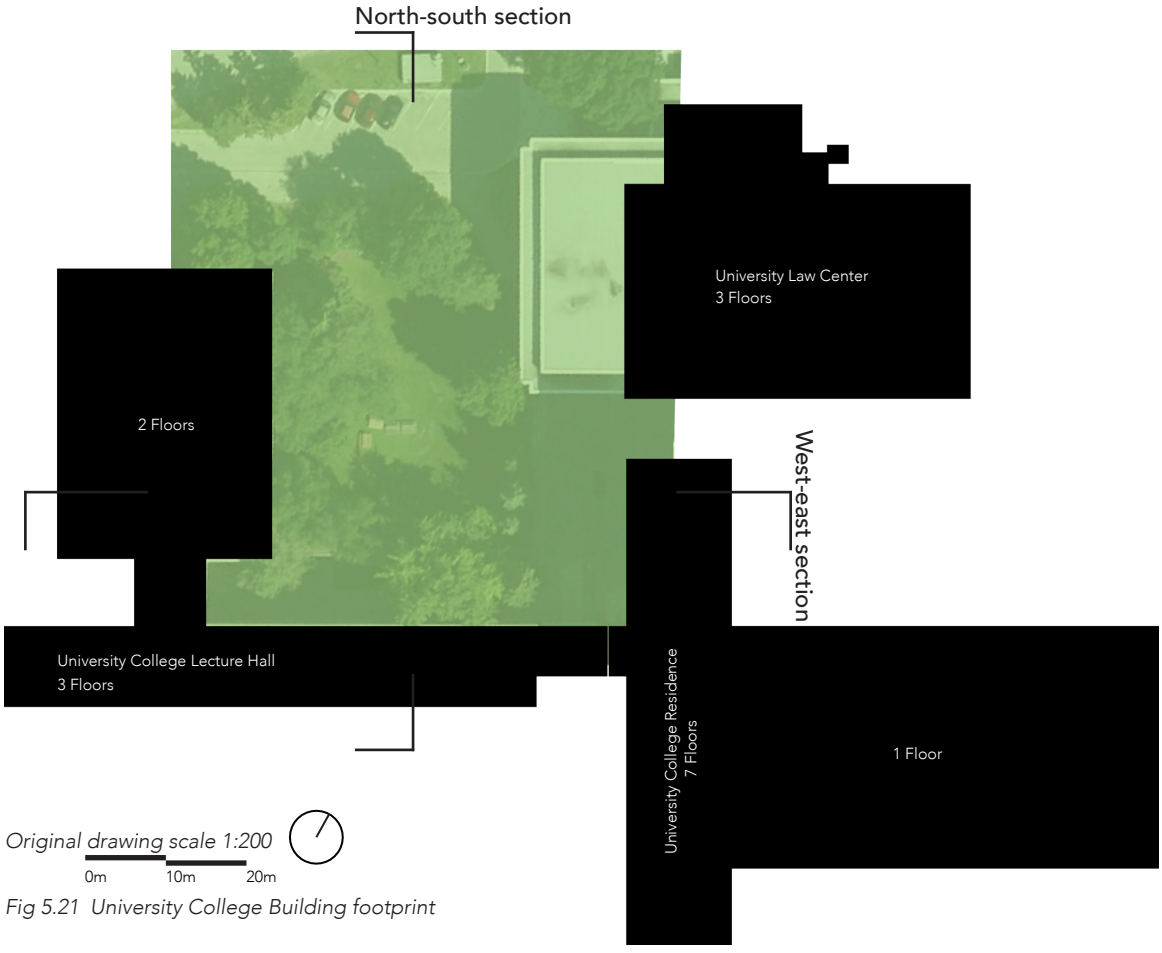
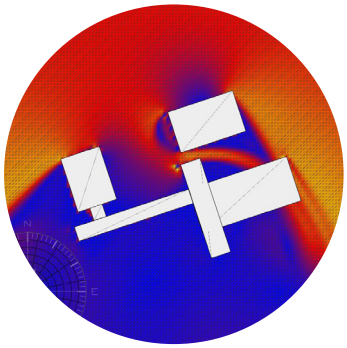


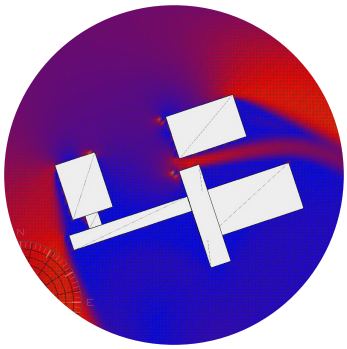
Fig 5.21 University College Building footprint

OCTOBER, 21, 2015 SUNNY 3:10pm

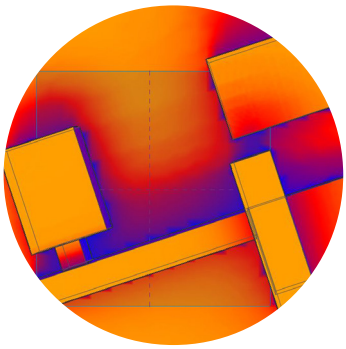
Data Collection:	Min Wind Speed	Max Wind Speed	Temperature
Inside Courtyard:	*2.8 km/h*	*9.5 km/h*	*18.7 ℃*
Outside Courtyard:	*5.4 km/h*	*12.8 km/h*	*23.4 ℃*



Northern Wind Diagram

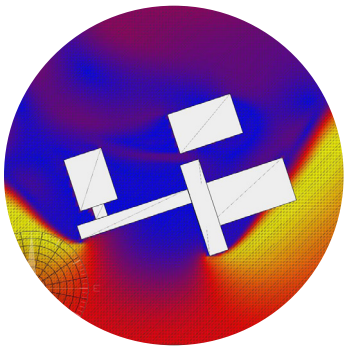


North-Western Wind Diagram

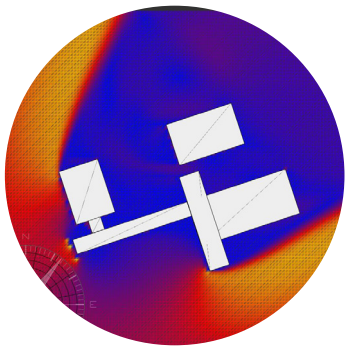


Winter Solar Diagram

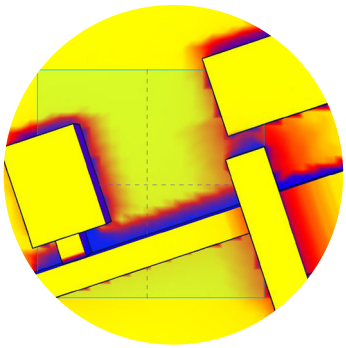
Winter Diagram



Southern Wind Diagram



South-Eastern Wind Diagram



Summer Solar Diagram

Summer Diagram

Fig 5.22 Diagrams for the University College Courtyard

CHAPTER SIX

Design

6.1 Mirror Yard
6.2 Moss Yard
6.3 Moon Yard

All three courtyards were designed by Dennis Wilkinson around 1964. During that time, Dennis Wilkinson was a professor at the University of Manitoba. He was appointed as a landscape architect on campus. His strategy aimed to set the campus apart from its suburban context by creating an "aura of eloquence, beauty and meaning" (Winnipegarchitecture.ca, n.d.). Prof. Charles H. Thomsen has mentioned during a lecture that Wilkinson's original design intention was to create outdoor classrooms. Unfortunately, more than half a century later, the courtyards are largely abandoned and hardly recognizable.

To respond to these sites' history and their current conditions, the design of each courtyard is developed through the following process:

1. Reconstructing the original design idea
   - Collecting original drawings, old photos, and data.
   - Collecting second hand account from Prof. Charles H. Thomsen.
   - Combining all the information into drawings.
2. Site survey and assessment
   - Site measurements and material inventory.
   - Site visits with arborist Les Wellwood from Physical Plants at U of M.
   - Visiting the site with Les Wellwood for tree survey.
   - Evaluating the existing conditions and proposing new plant arrangements.
3. Design

   The presentation of the re-designs for all the three courtyards follows a standardized structure:
   - Site Plan 1:100 (original scale)
   - Section 1:100 (original scale)
   - Plants and Materials Selections
   - Isometric Drawings and Design Layers
   - Lighting Plan
   - Daytime/Nighttime Perspectives
   - Design Explanations

My main design intentions are respecting the existing, making minimum and sensitive alterations, and adding some elements to make them better suited for the present and predictable future demands. Each courtyard design has its own characteristics in response to their conditions. I name them **Mirror Yard, Moss Yard, and Moon Yard.**

Reconstruction

Based on the old photos, I tried to reconstruct the original design for the education building courtyard. In the original design, there was a sunken concrete platform in the center of the courtyard, which was intended as a stage used by lecturers to conduct classes. Surrounding the sunken platform were three steps of stairs where students could sit. In the sunken platform, an elm was planted to provide shade. Trees are distributed along the edges of the courtyard. On the south end, there were two scots pines and shrubs to hide the entrance to the basement level. The crab apple tree on the northeastern corner was also part of the original design. It is not hard to imagine how students and professors must have enjoyed lectures and debates in a classroom with a tree and the sky as the ceiling.

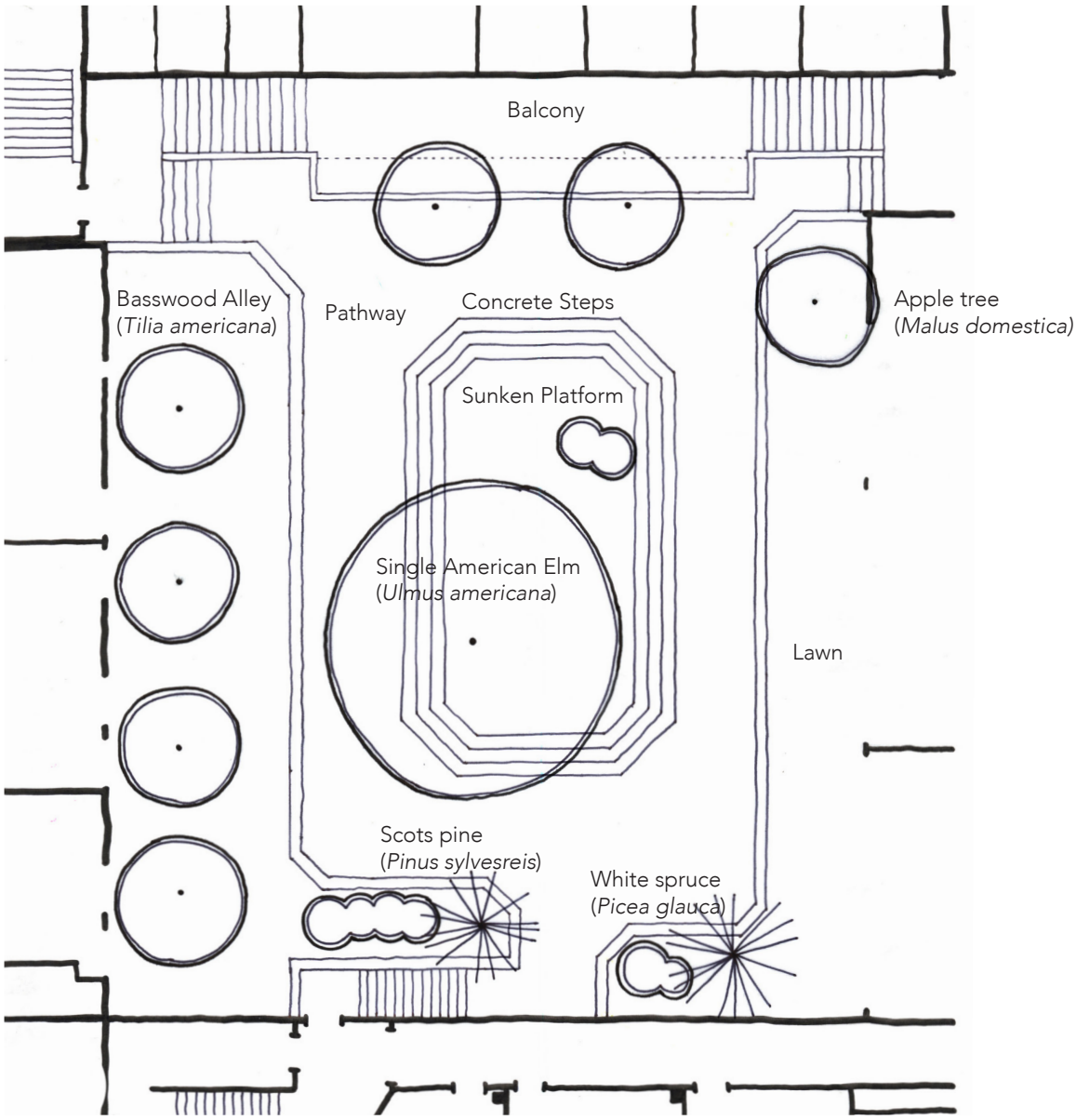


Fig 6.1.1 Original design intension based on old photos

Fig 6.1.2 Photos during construction, n.d.

At present, the original pathway is reconstructed and covered by lawn during the previous renovations, and the only remaining part of the pathway on the north side is paved with dark orange bricks, which does not coordinate with the original design. On the sunken concrete platform, there are several wooden picnic benches. During several site visits, I found students were appreciative of the tranquility of the place while studying in the courtyard.

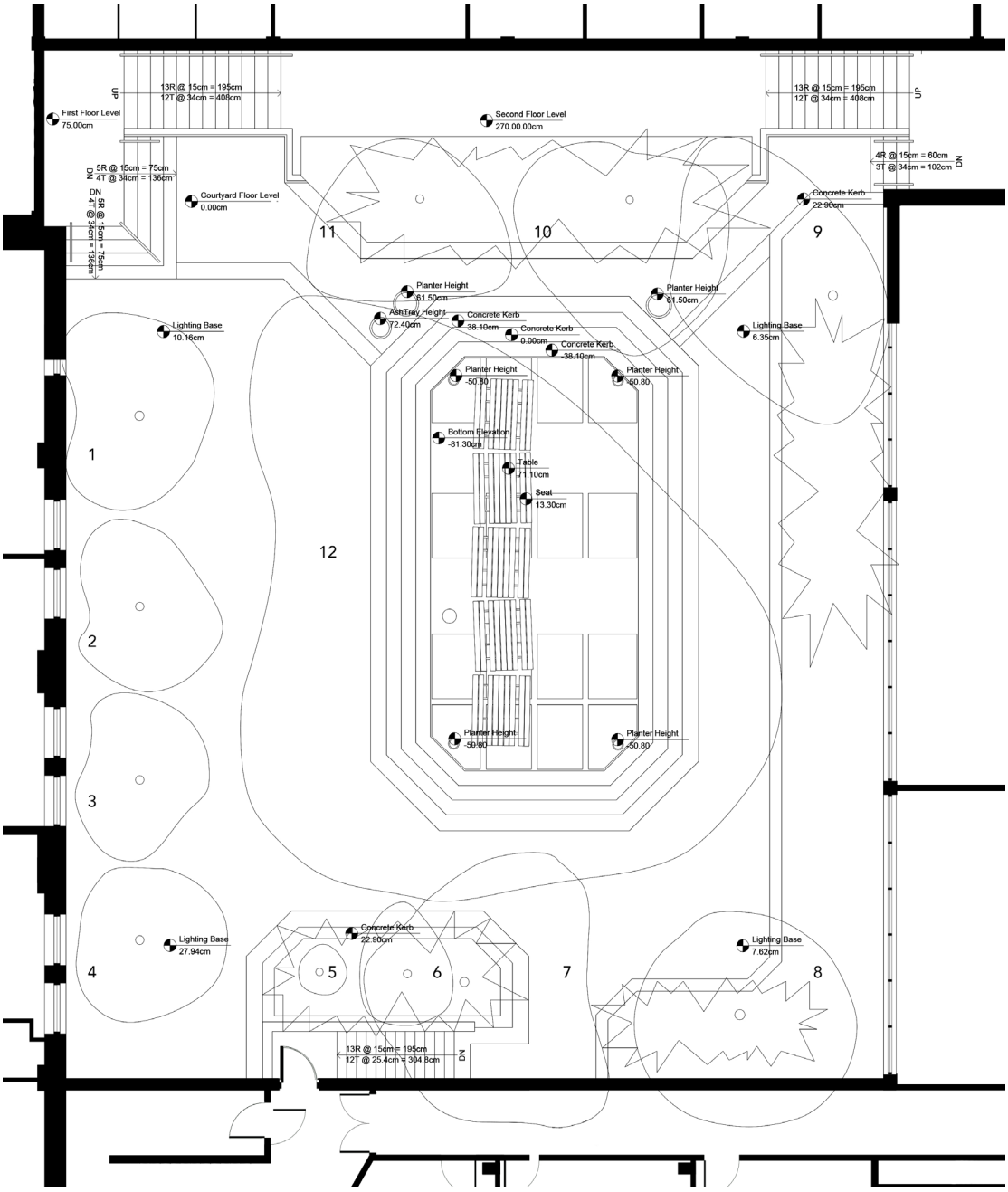


Fig 6.1.3 Site survey of the existing condition

In order to draw the exact shape of each tree's canopy, I measured the radius in eight directions (Fig 6.4) of each single tree. I also estimated the trees' heights by having a figure on the side. In addition, with the help from an arborist Les Wellwood from the department of Physical Plant at the University of Manitoba, I was able to estimate the approximate age of each tree.

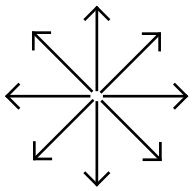


Fig 6.1.4 Eight directions

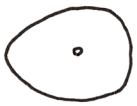
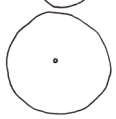
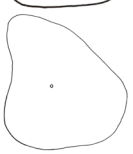
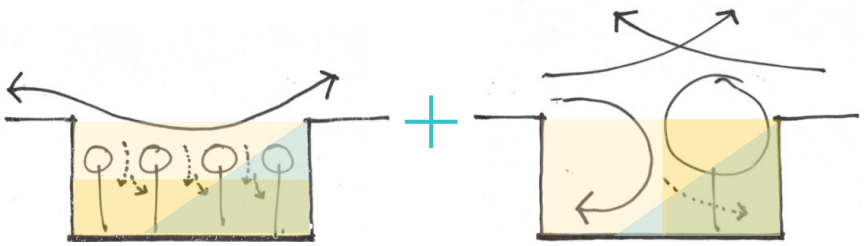
No.	Name	Age	Height	Shape	Circumference
1	*Tilia americana* Basswood/American Linden	≈15	6.3m		34cm
2	*Tilia americana* Basswood/American Linden	≈15	6.3m		40cm
3	*Tilia americana* Basswood/American Linden	≈15	6.5m		26cm
4	*Tilia americana* Basswood/American Linden	≈15	6.3m		35cm
5	*Tilia americana* Basswood/American Linden	≈10	4.2m		10cm
6	*Tilia americana* Basswood/American Linden	≈15	5.3m		23cm
7	*Pinus sylvestris* Scots Pine	≈50-60	14m		80cm
8	*Picea glauca* White Spruce	≈50-60	14m		110cm
9	*Malus domestica* Apple Tree	≈50-60	6.4m		80cm
10	*Tilia americana* Basswood/American Linden	≈15	7m		43cm
11	*Tilia americana* Basswood/American Linden	≈15	6.8m		41cm
12	*Ulmus americana* American Elm	≈60-70	13m		145cm

Fig 6.1.5 Tree species

Accroding to the site survey, there are White spruce (*Picea glauca*), Scots pine (*Pinus sylvestris*), Basswood (*Tilia americana*), American elm (*Ulmus americana*) and Apple tree (*Malus domestica*) in the Tier building courtyard.

Fig 6.1.6 Tree arrangements



In the Tier building courtyard, there is an alley of trees along the building on the west side, and a single elm in the center. The elm has a wide canopy, which protects the courtyard from heavy wind but also allows fresh air to circulate through. It can block strong sunshine in hot summers while still allow light to pass through the leaves. The alley of American lindens on the west side creates a visual access for the surrounding offices and the student lounge.

In my design, trees will be taken out only if when they are not in good condition or when they create significant obstacle in effectively utilizing the space. In this courtyard, tree no.6 is a random *Tilia americana*, since it grows under the shadow of tree no.7, it is not healthy, therefore it will be removed. In addition, tree no.10 and no.11 are two *Tilia americana* planted in front of the second-floor balcony of Fletcher Argue Building. They block the visual connection to the courtyard from the student lounge, therefore I decided to remove them.

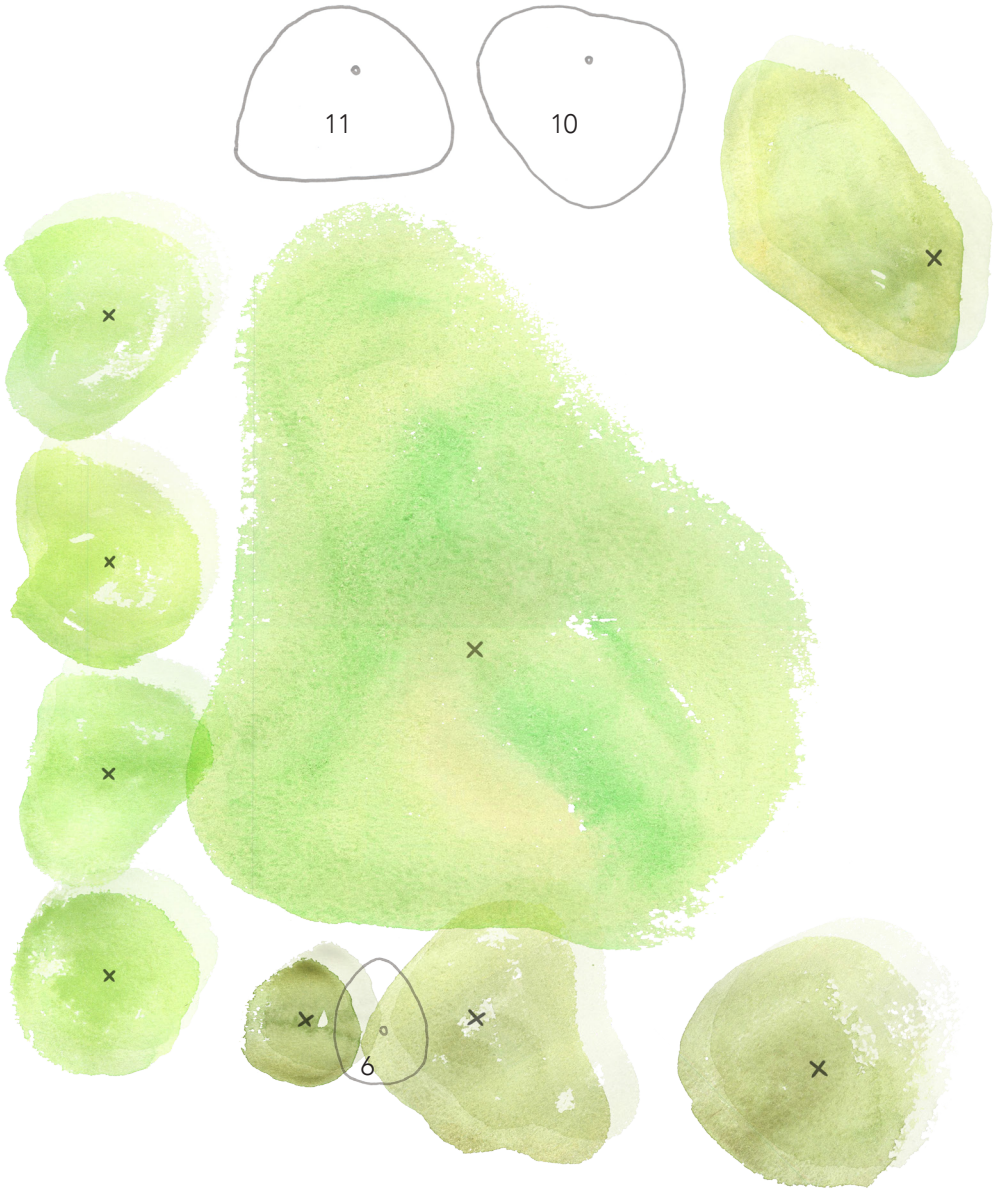
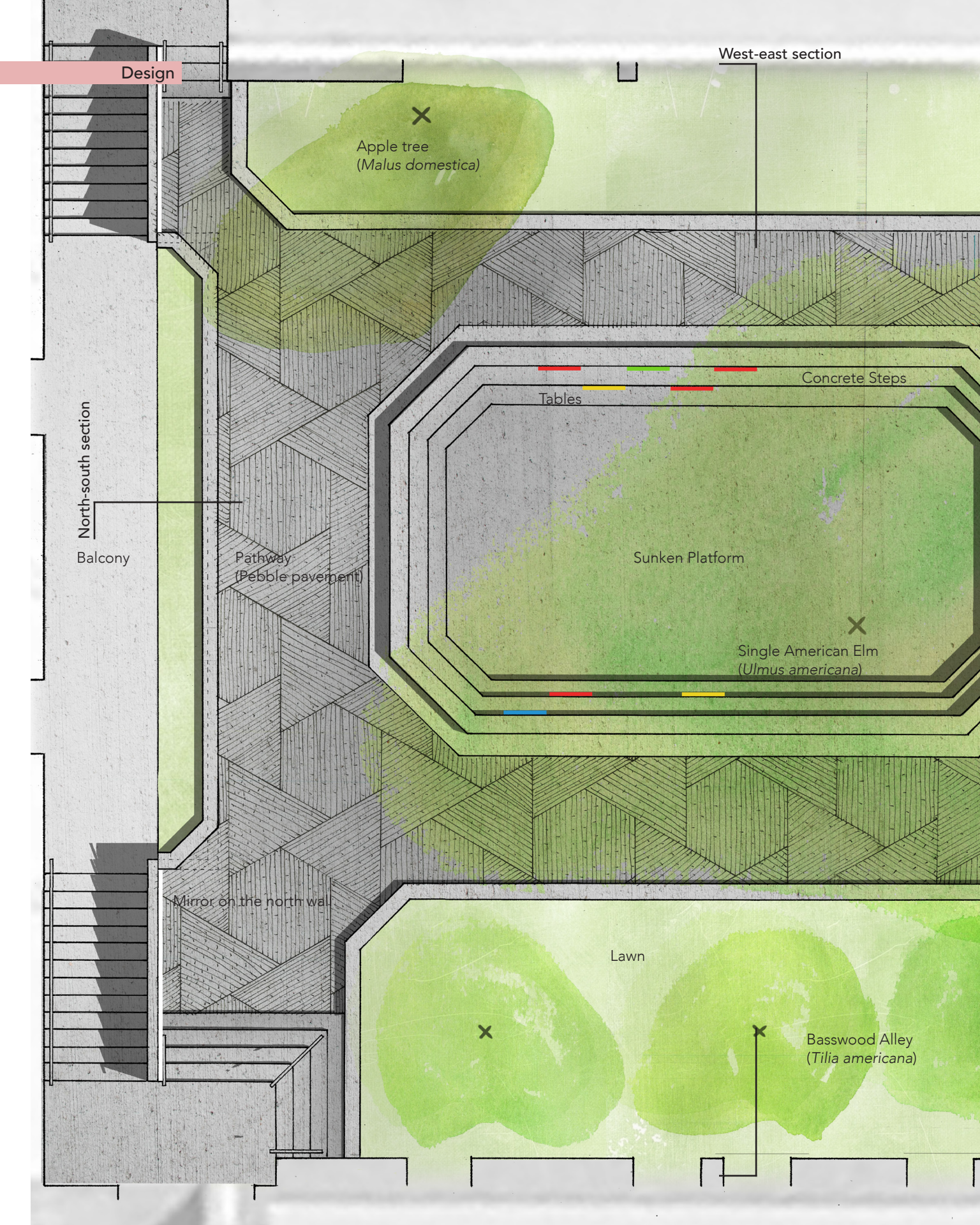
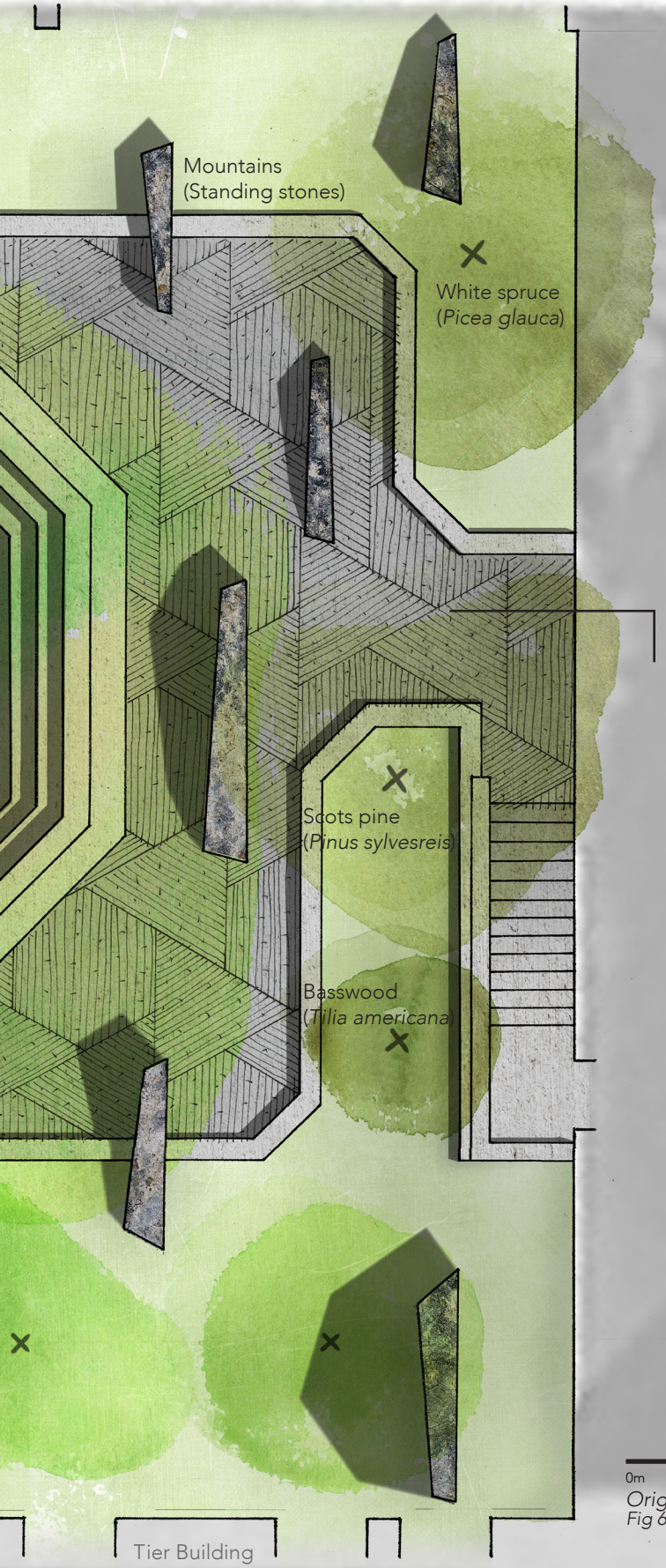


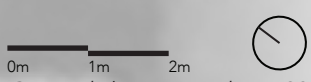
Fig 6.1.7 Intended canopies


West-east section
Apple tree
(Malus domestica)
Concrete Steps
Tables
North-south section
Balcony
Pathway
(Pebble pavement)
Sunken Platform
Single American Elm
(Ulmus americana)
Mirror on the north wall
Lawn
Basswood Alley
(Tilia americana)



TIER BUILDING COURTYARD MIRROR YARD “镜”

In my proposal for the Tier Building Courtyard, I keep the majority of the existing trees. As a tribute to the original design, the other three sides of the pathway are restored and reconnected to allow easier access around the sunken platform. It is hoped that this would encourage people to venture into the courtyard and make better use of the space. The pathway is paved with small pebble stones arranged in a triangular pattern. Small rock mountains are placed on the south side of the courtyard. They are the mountains in relation to the flat “water” surface of the sunken concrete platform. Together they complete the design concept of “mountain and water”. In addition, the small rock mountains help to screen the entrance to the Isbister building on the south end. A mirror is installed on the north wall to visually enlarge this enclosed space. With all the efforts, I hope that people will be attracted to the courtyard, and enjoy this redesigned out door classroom.



Original drawing scale 1:100
Fig 6.1.8 Master plan

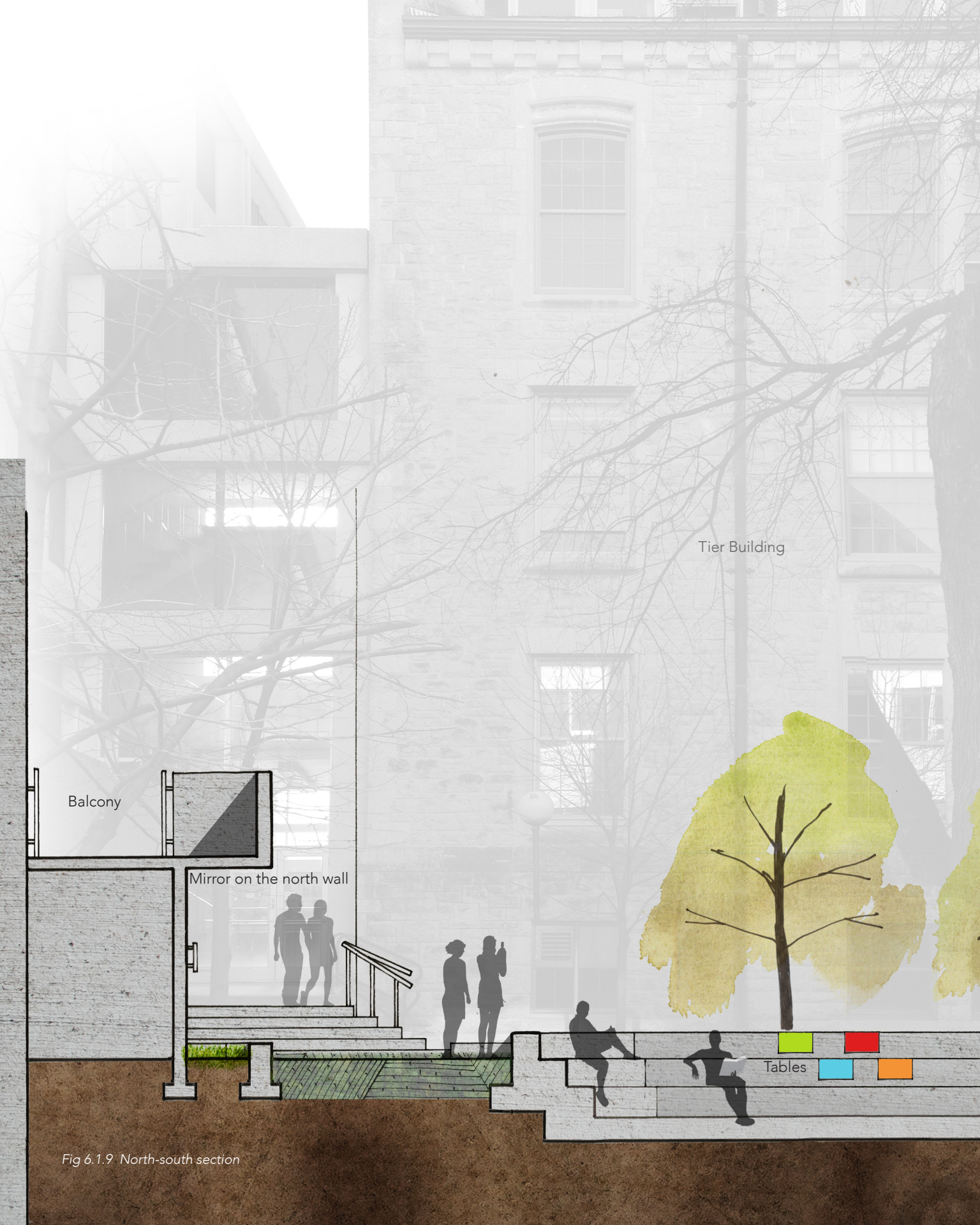


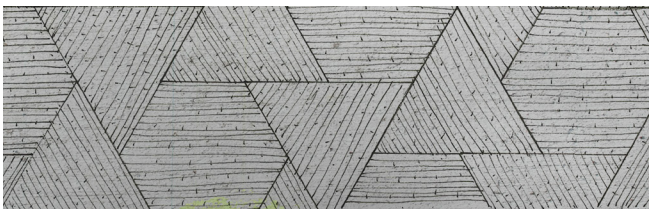
Fig 6.1.9 North-south section

To make this place an outdoor classroom, seats and tables are indispensable. Therefore, small tables painted with bright colors are installed along the edge of the sunken platform. They function like the ones on the airplanes, which can be folded to the side when they are not being used.

Fig 6.1.10 West-east section

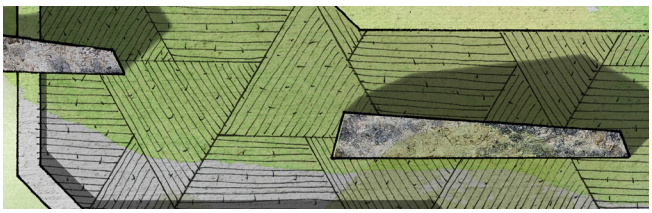
Two trees in front of the second floor balcony will be taken out to avoid visual blockage. On the north wall, I suggest a mirror wall, which reflects the whole yard to create the illusion of an infinite space. Mirror's reflective property also brings more light into the courtyard.

Natural stones are chosen for the ground cover and for the Rocky mountains. The floor is paved with a geometrical pattern of contrasting bright and dark natural pebble stones. This scenic micro landscape is made of dark gneiss stone. The existing lawn and concrete platform from the original design are left untouched.



Pebble pavement

Pebble stone



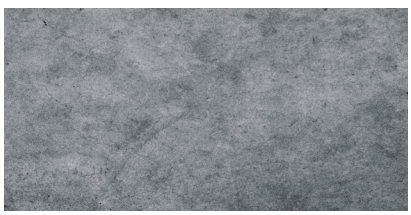
Rocky mountain

Natural stone

Lawn

Lawn grass

Concrete platform



Concrete

Fig 6.1.11 Materials

Isometric Drawing and Design Layers

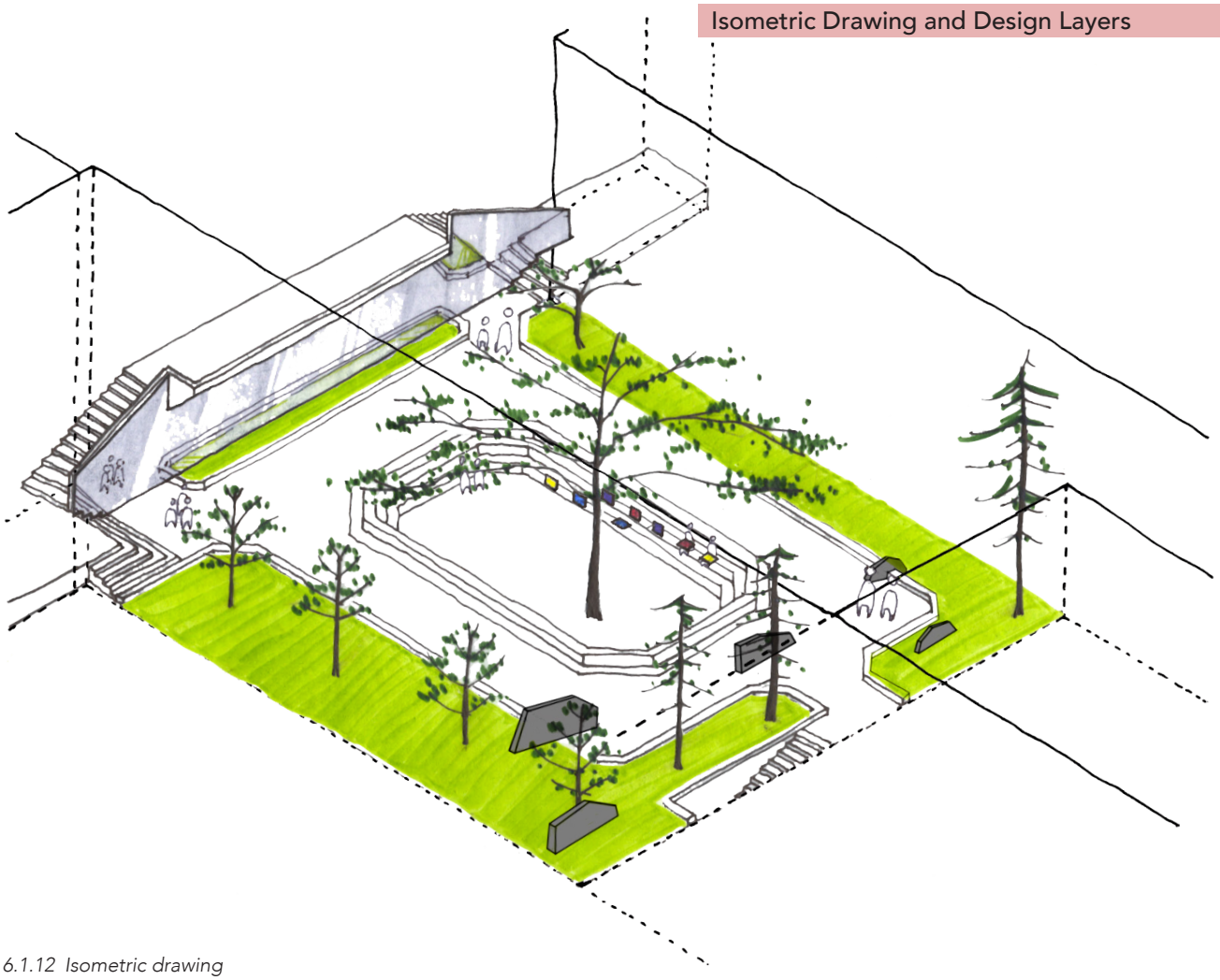


Fig 6.1.12 Isometric drawing

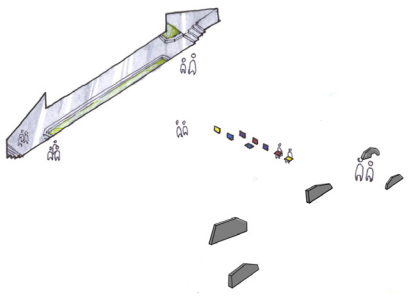


Fig 6.1.13 New elements

- Mirror wall
- Tables
- Rocky Mountains

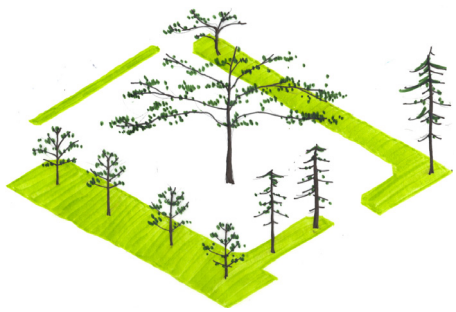


Fig 6.1.14 Vegetation

- Trees
- Lawn

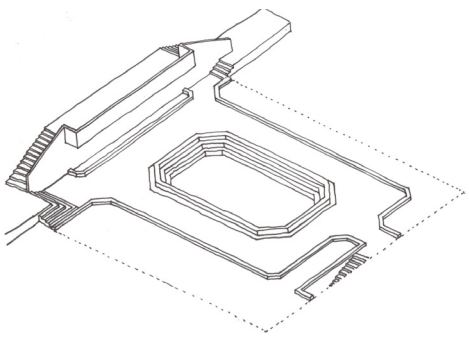
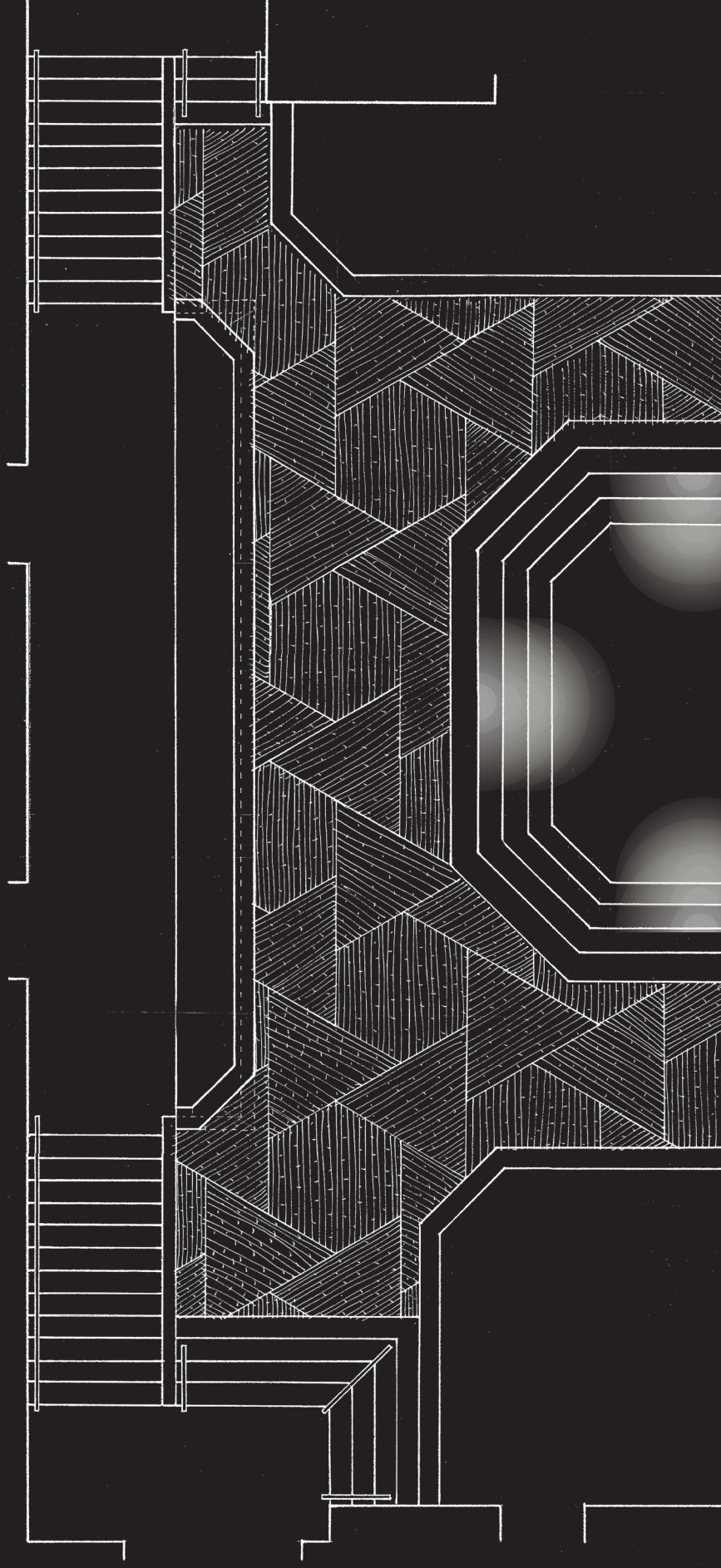


Fig 6.1.15 Topography

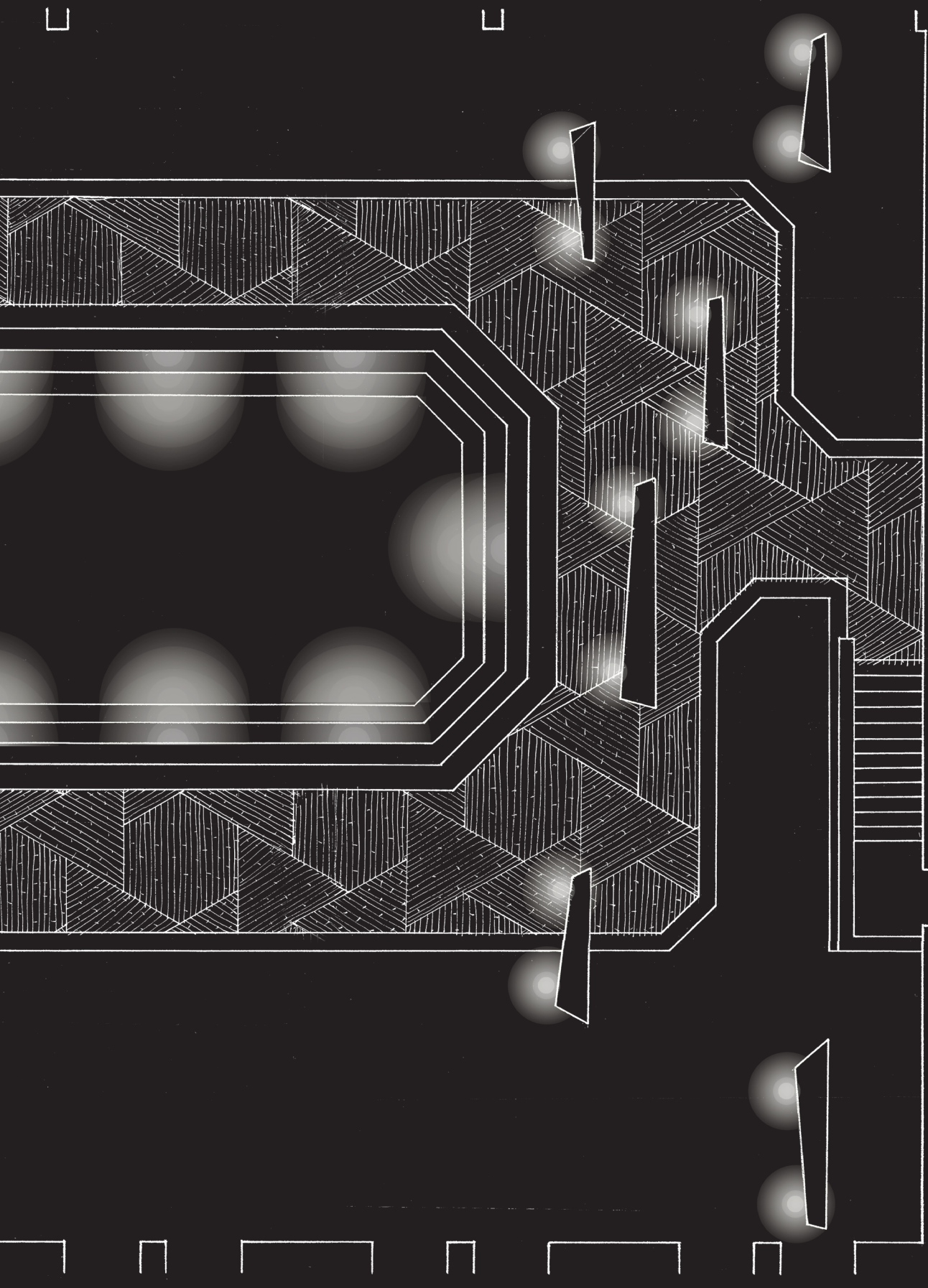
- Stairs
- Sunken platform
- Floor

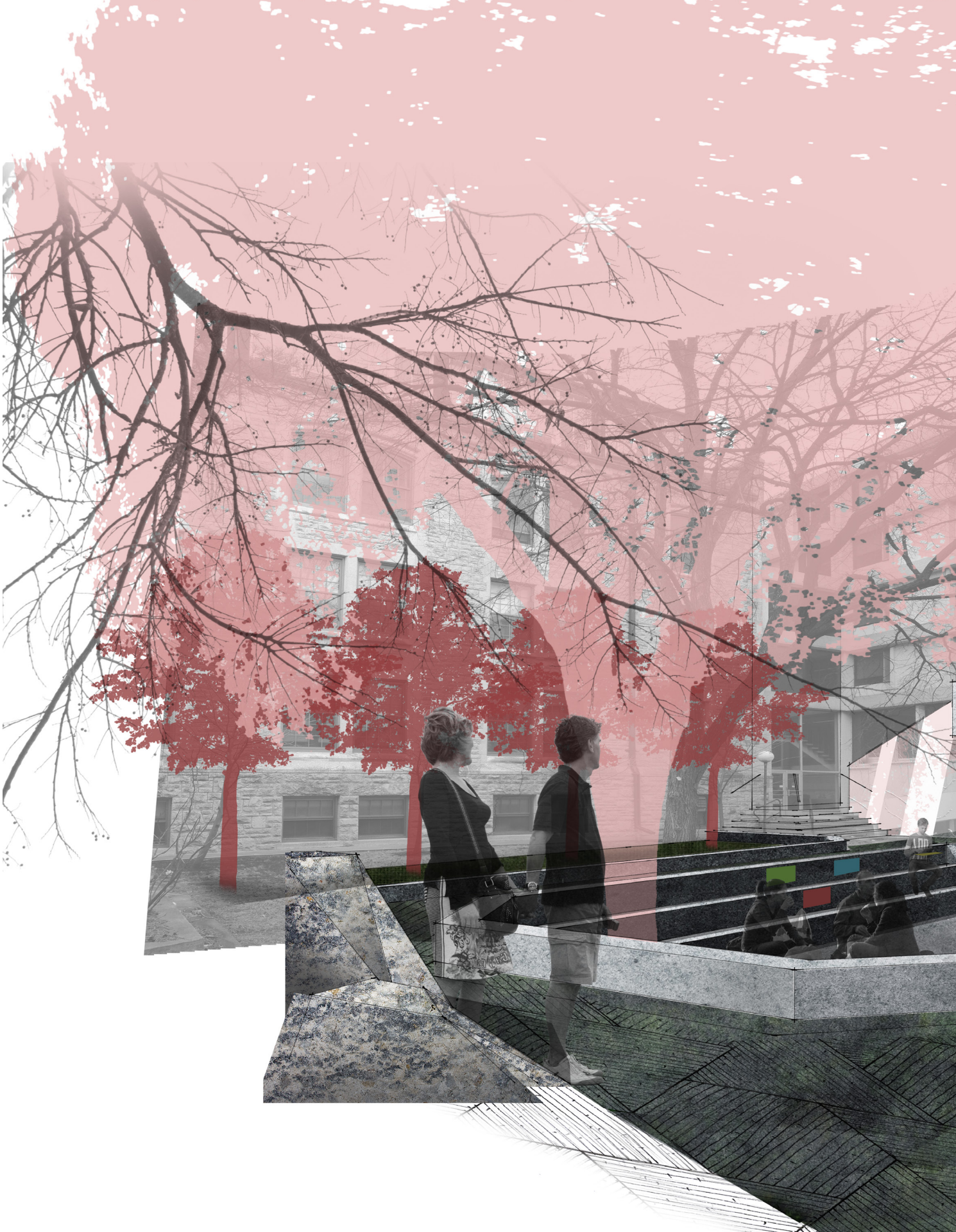
LIGHTING PLAN

The existing light poles on the corners in the courtyard are replaced by a lighting system installed around the step edges of the sunken platform and at the bottom of the mountains. The lighting system lights up the courtyard at night, but also emphasizes the idea of mountain and water. The soft light makes the sunken platform look like a pool of still water with the reflection of the mountains on its surface.



Original drawing scale 1:100
Fig 6.1.16 Lighting plan





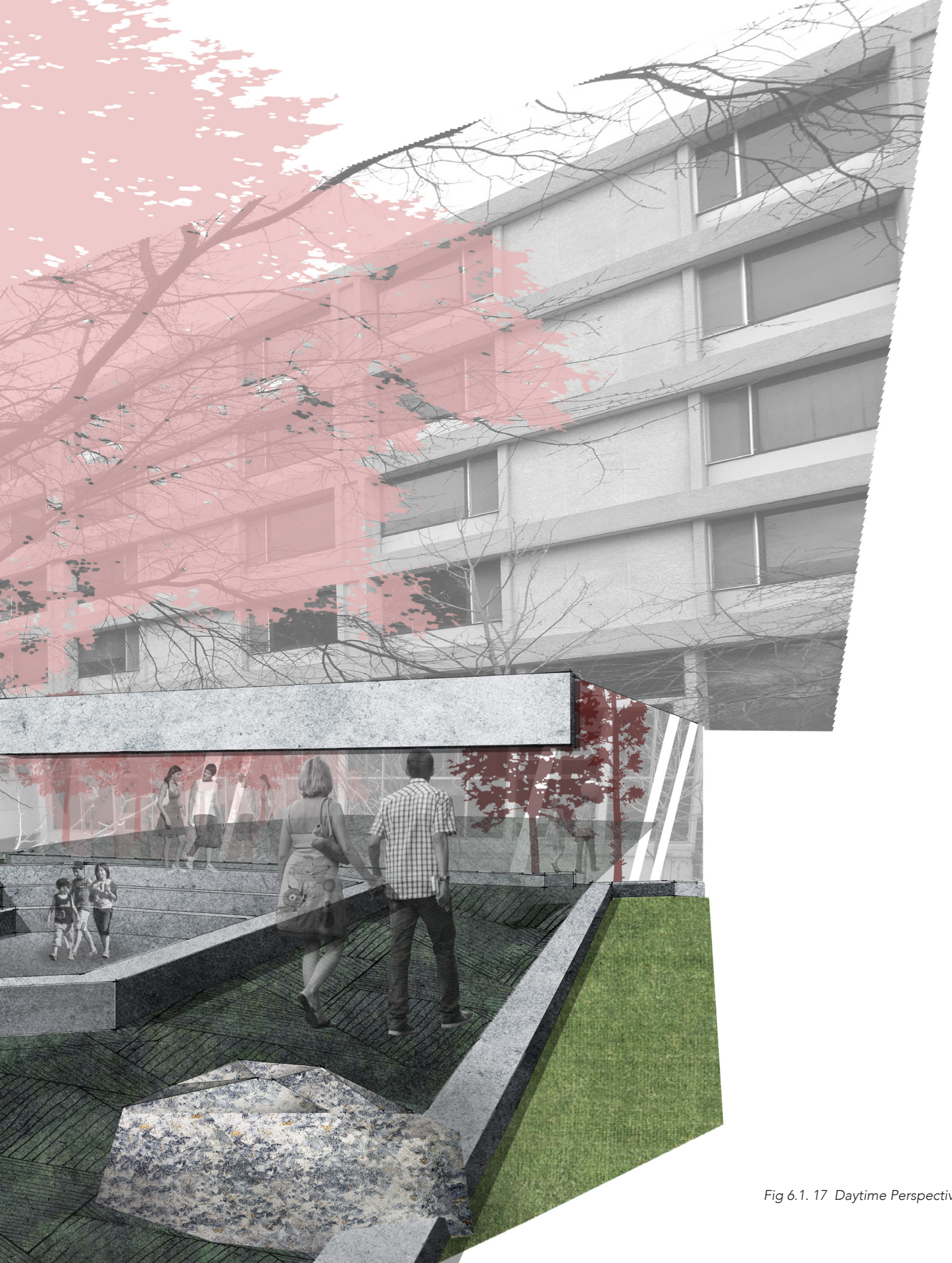
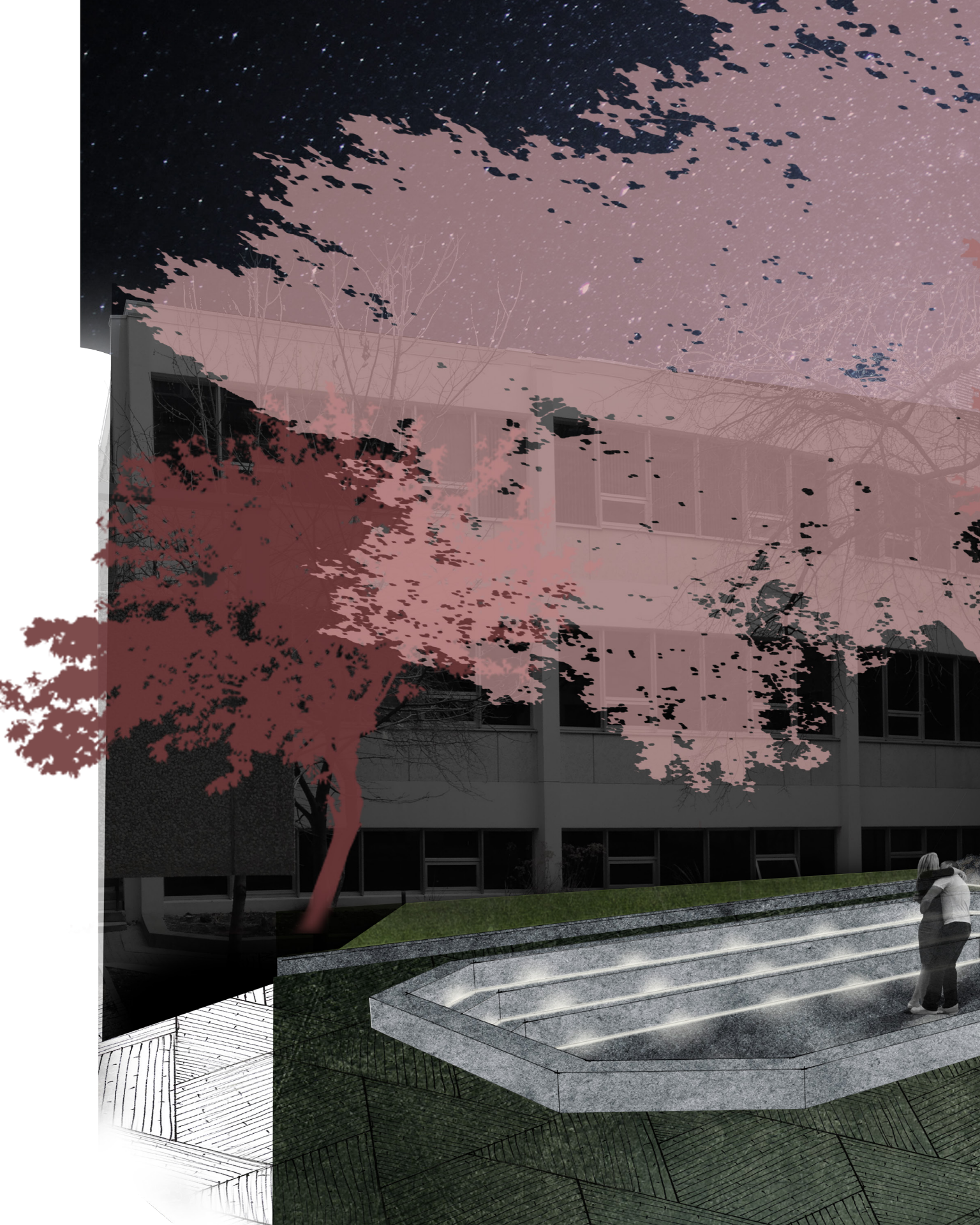


Fig 6.1. 17 Daytime Perspective



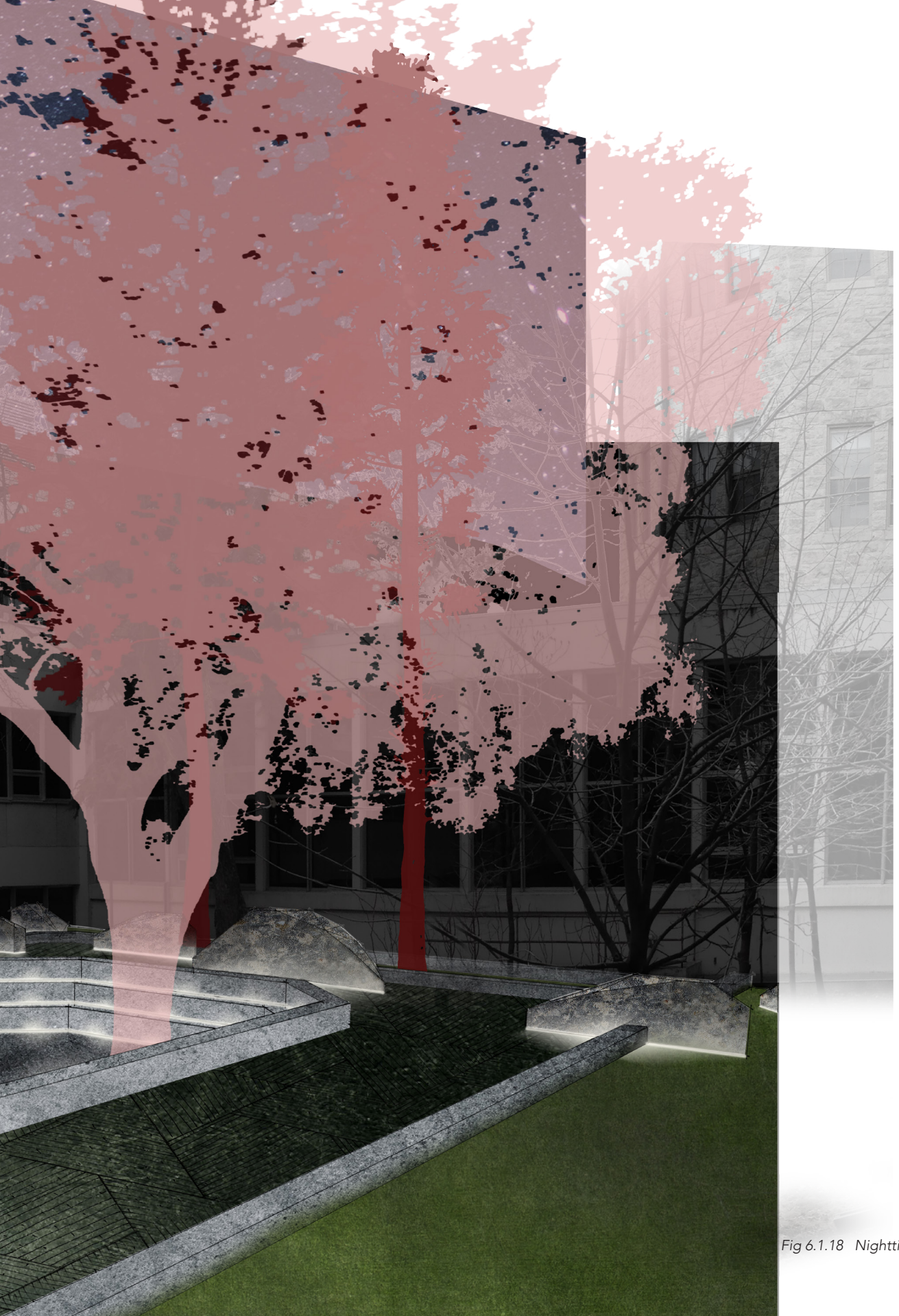


Fig 6.1.18 Nighttime Perspective

In the original design of the education building courtyard, there was a mirrored "L" shape raised platform in the middle. There were two multi-stemmed American lindens in the middle; one Amur maple on the west, and four single trees along north edge and south edge that no longer exist. The platform in the middle was the center of this site, and the original entrance from the second floor of the education building to the site was on the northeastern corner. Because there is no formal entrance to this courtyard, it is not obvious for students and professors from the outside. But when stepping to the building, you are surprised that it is here. The original design intention brought more vitality to it.

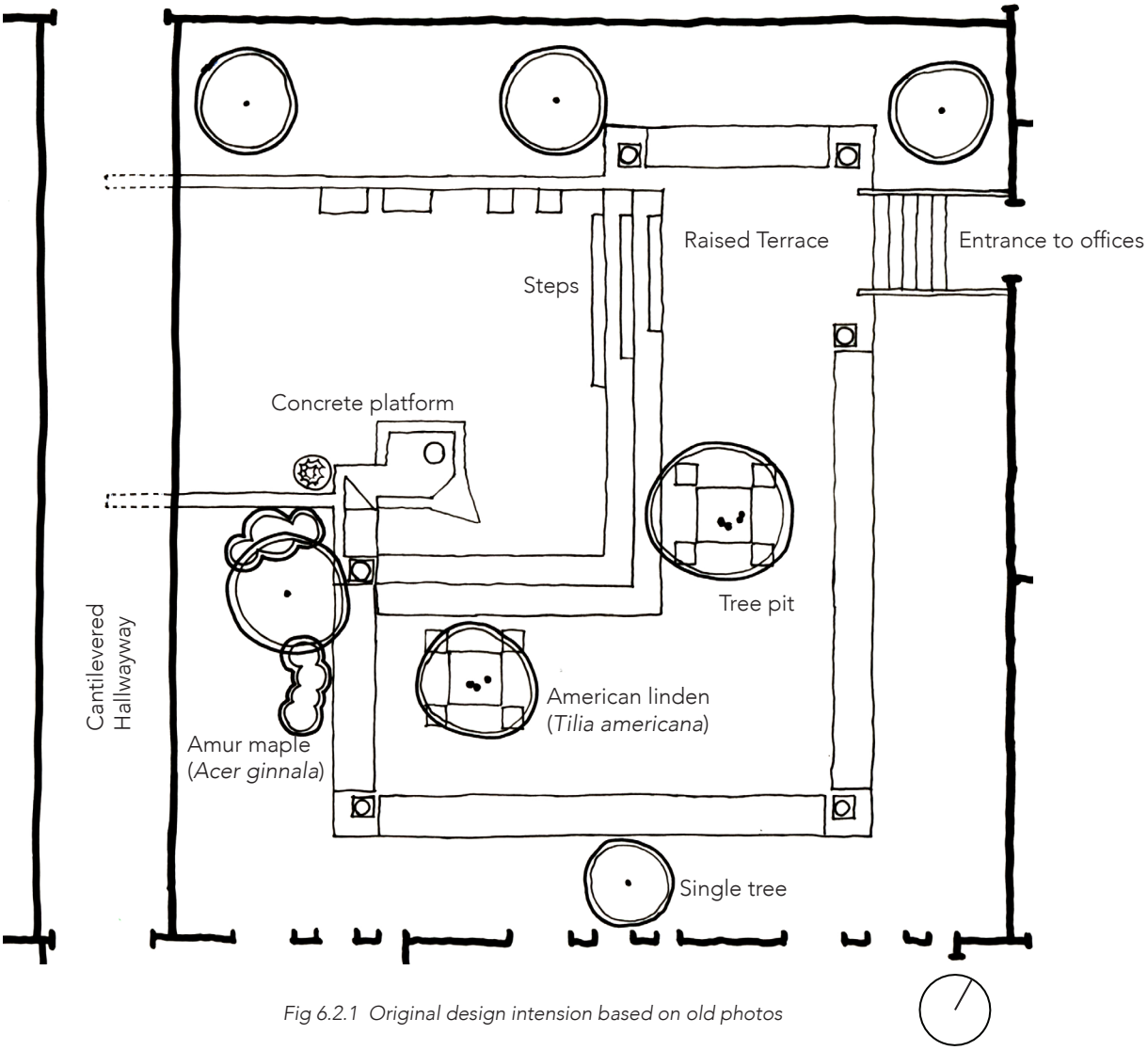


Fig 6.2.1 Original design intension based on old photos

Fig 6.2.2 Old photos after construction, n.d.

During the recent renovations, the concrete furniture on the site was painted with yellow color. The original reserved pathway was filled with dark grey gravel, and the only entrance on the northeastern corner was closed. As a result, the only way to enter the courtyard is the 1.5m gap between the ground and the underside of the hallway on the east side. However, these renovations did not improve the space because of the lack of connections in comparison to the original design, leaving the courtyard neglected.

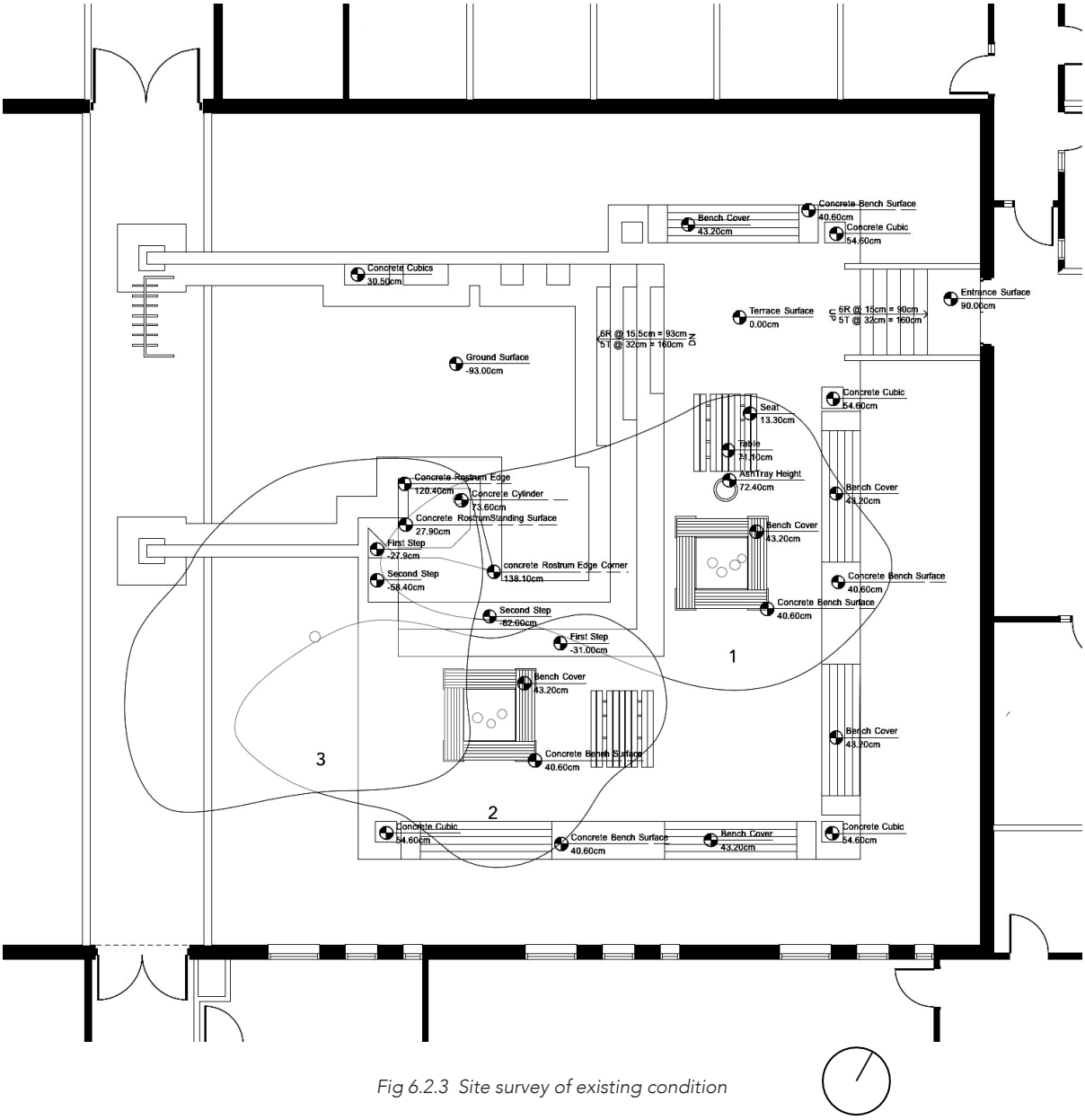


Fig 6.2.3 Site survey of existing condition

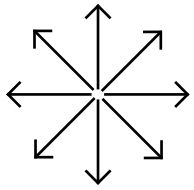


Fig 6.2.4 Eight directions

No.	Name	Age	Height	Shape	Circumference
1	*Tilia americana* Basswood/American Linden	≈50-60	8.2m		68+70+66+80 cm
2	*Tilia americana* Basswood/American Linden	≈50-60	7.6m		90+80+75 cm
3	*Acer ginnala* Amur Maple	≈50-60	5m		58cm

Fig 6.2.5 Intended Canopies

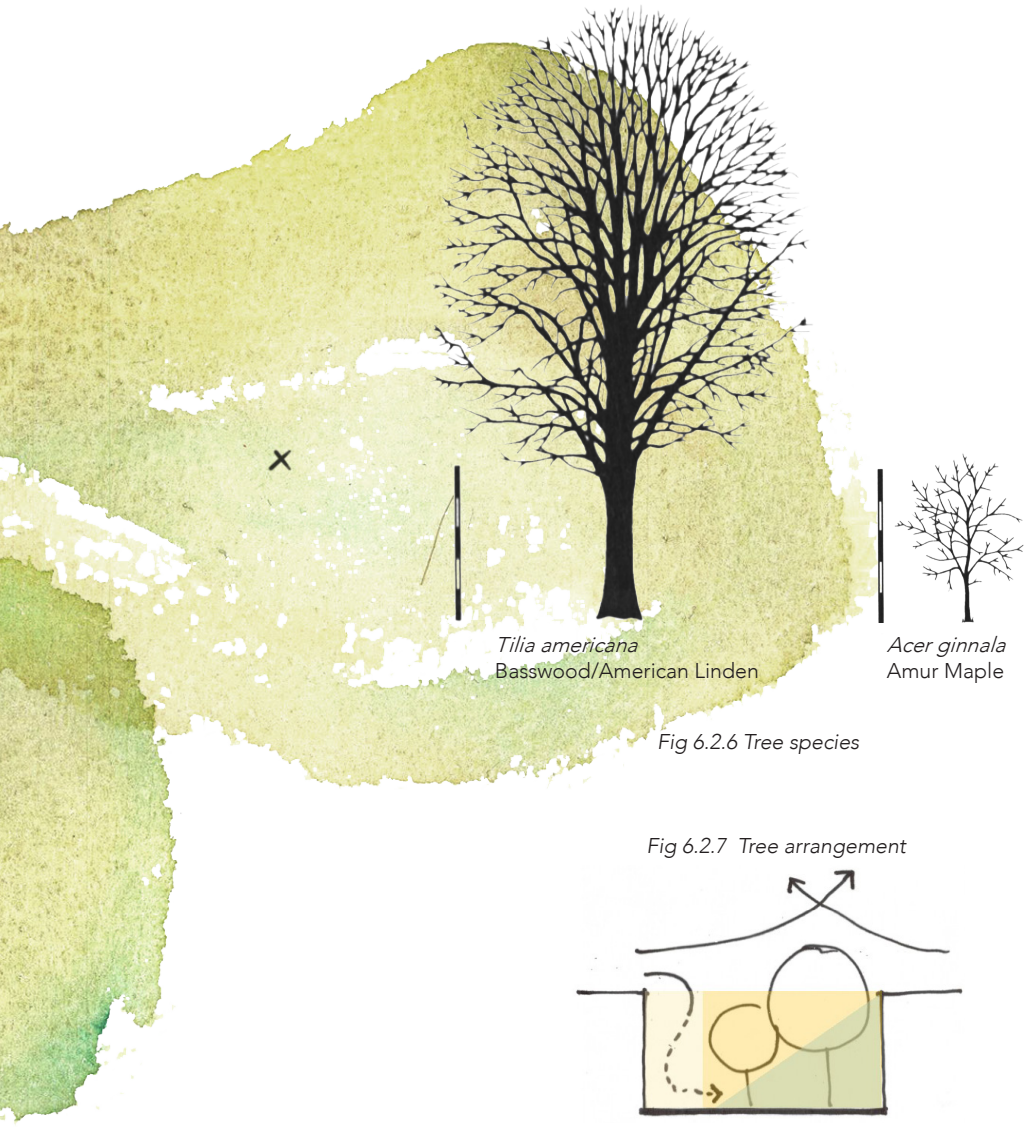


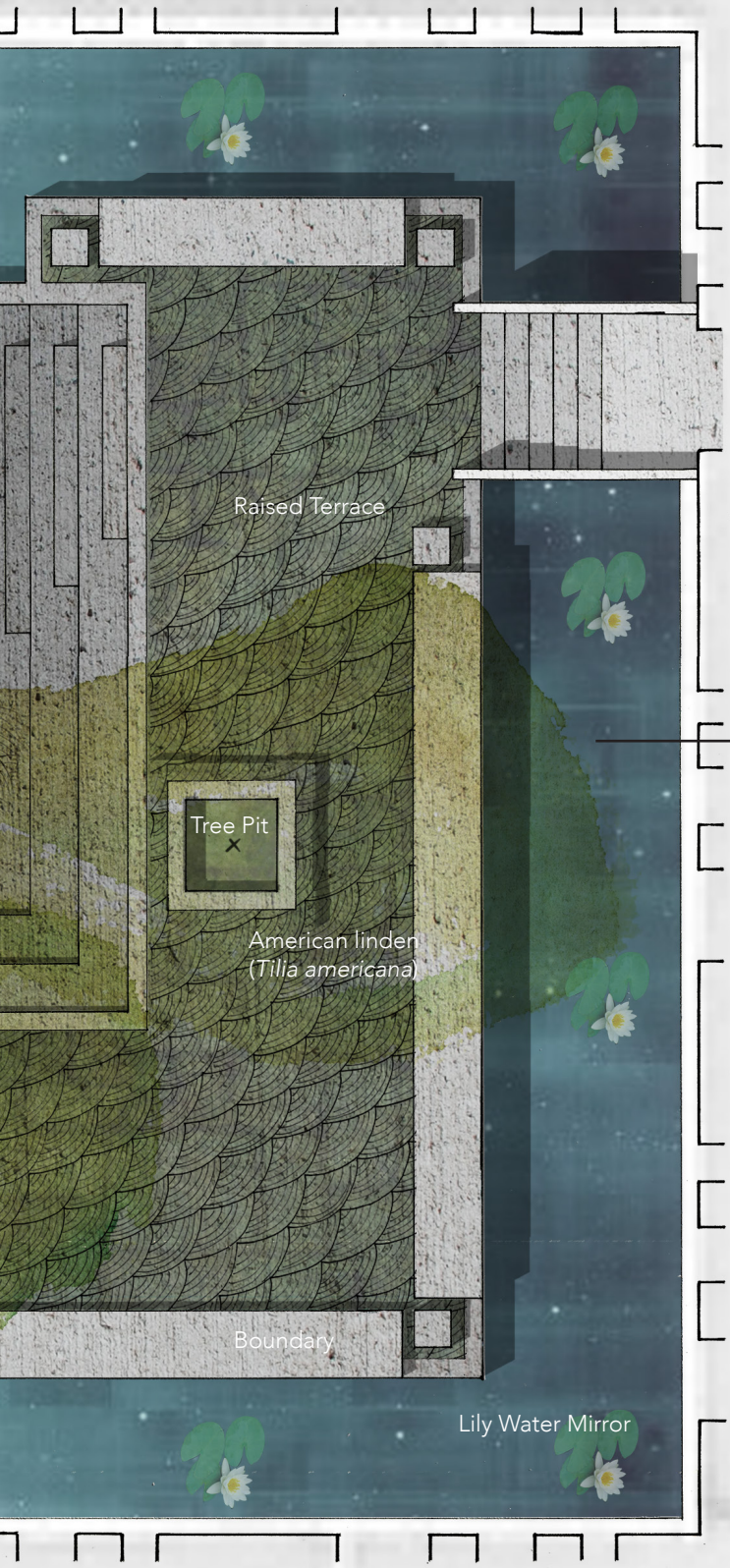
Fig 6.2.6 Tree species

Fig 6.2.7 Tree arrangement

Tree grove

There are two multi-stemmed American lindens planted on the south of the terrace, and one single tree on the southwestern corner of the Education building courtyard. Two wide canopies of the American lindens protect the courtyard from the outside. All the trees in this courtyard are healthy and well maintained, therefore they will remain.


North-south section
West-east section
Moss Plaza
(Tile pavement)
Steps
Hallway
Concrete Platform
Amur maple
(*Acer ginnala*)
American linden
(*Tilia americana*)



EDUCATION BUILDING COURTYARD MOSS YARD "苔"

The existing ground cover is replaced by the arched tiles pavement. As time goes by, moss will grow in between the tiles. In addition, the existing gravel filling around the courtyard is renovated to a water pound with lily in it; it helps to provide more moisture, which is essential for moss to spread. The pond also frames the scene in the middle. The yellow paint on the furniture is removed, the original concrete texture will be revealed. My design intends to reflect and enhance the tranquil quality of this courtyard while adding some new details to make the spatial experience more interesting.

0m 1m 2m

Original drawing scale 1:100
Fig 5.2.8 Master plan

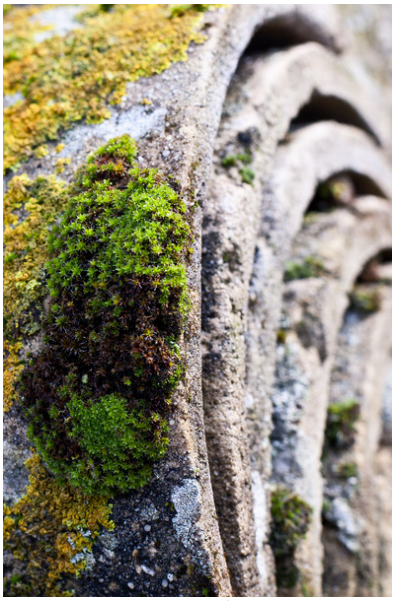
Fig 6.2.9 North-south section

In the water pond, holes are dug for lily root to grow and stand. The bottom of the pond has a 4% slope from the west to east. It is deepest on the east end with a depth of 70cm. On the west end, the water is shallower, and people are able to touch the water surface. Kids are welcome to play with water as well.

Fig 6.2.10 West-east section

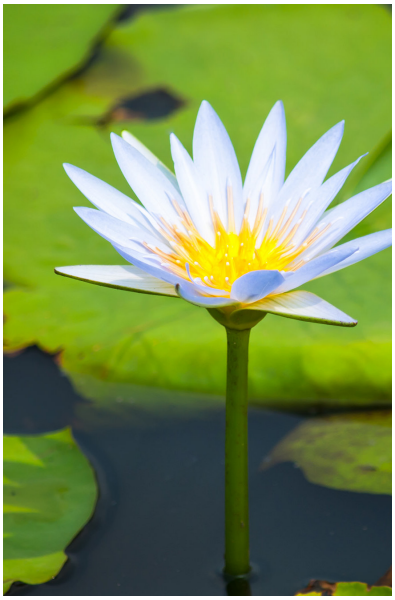
When sunshine passes through the wide canopies and drops on the water surface in a sunny afternoon, it brings tranquility into the courtyard. With the protection of surrounding buildings, gentle wind brushes over the pond to bring wafts of the lily fragrance.

The paving material is arched tile. They are placed on their side one by one with soil filling the gaps, which allows moss to grow in between the space under the shade created by the existing trees. Overall, the tiles create a wave like pattern to reflect the presence of the lily pond around the courtyard.

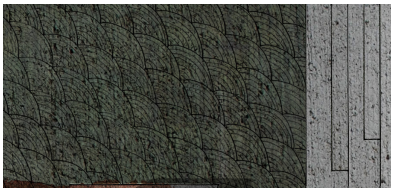


Arched tiles

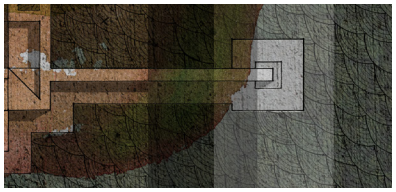
Concrete



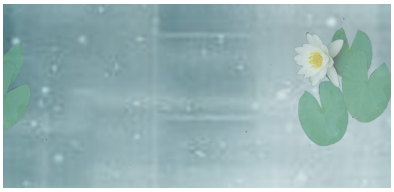
Lily



Arched tile pavement



Concrete terrace



Lily pond

Fig 6.2.11 Materials

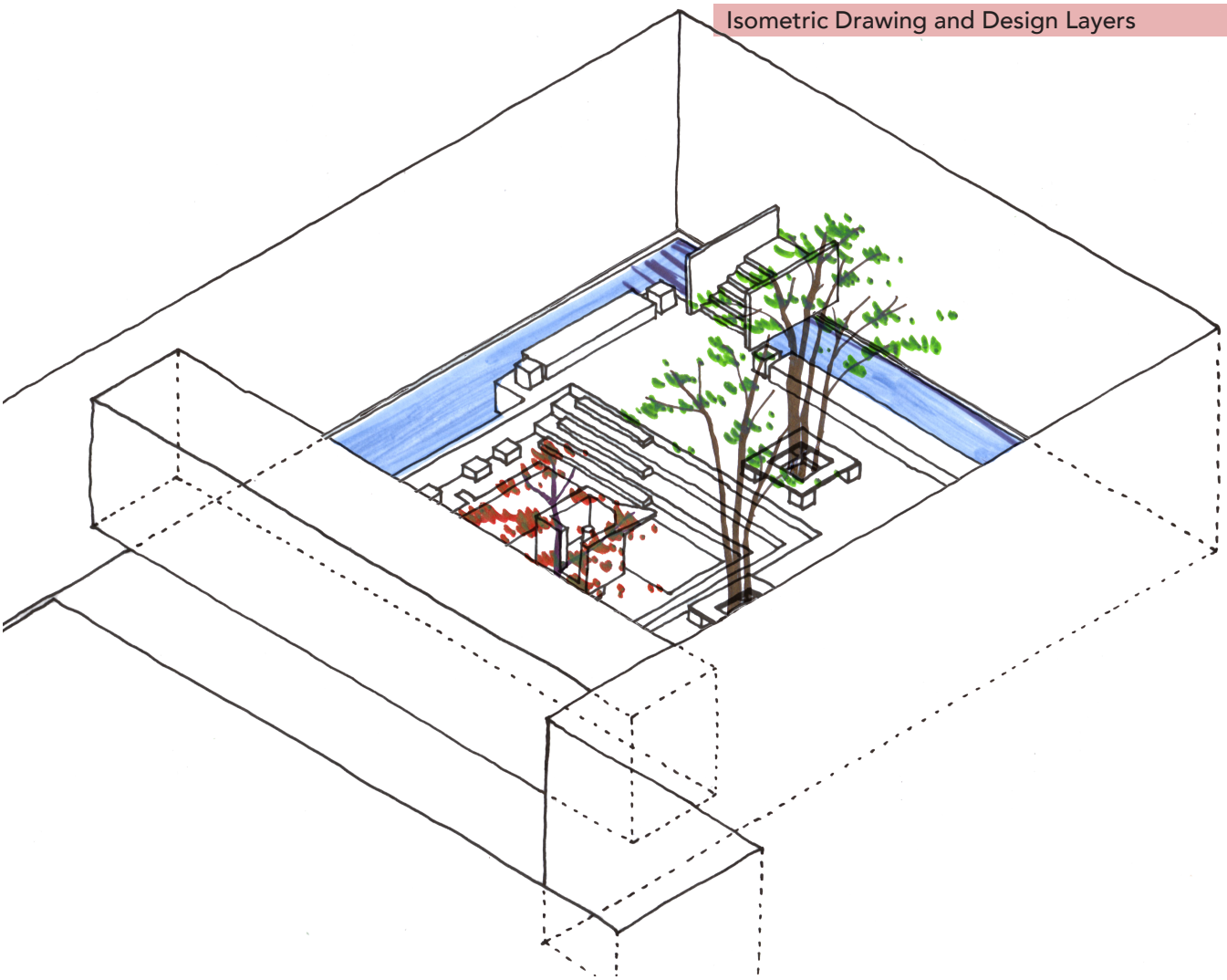


Fig 6.2.12 Isometric drawing

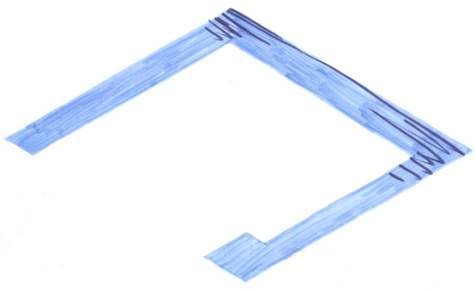


Fig 6.2.13 New elements

- Water pond

Fig 6.2.14 Vegetation

- Trees

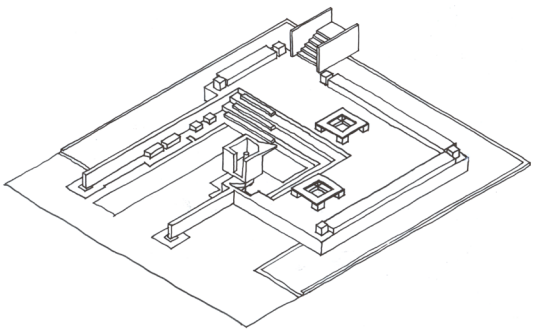
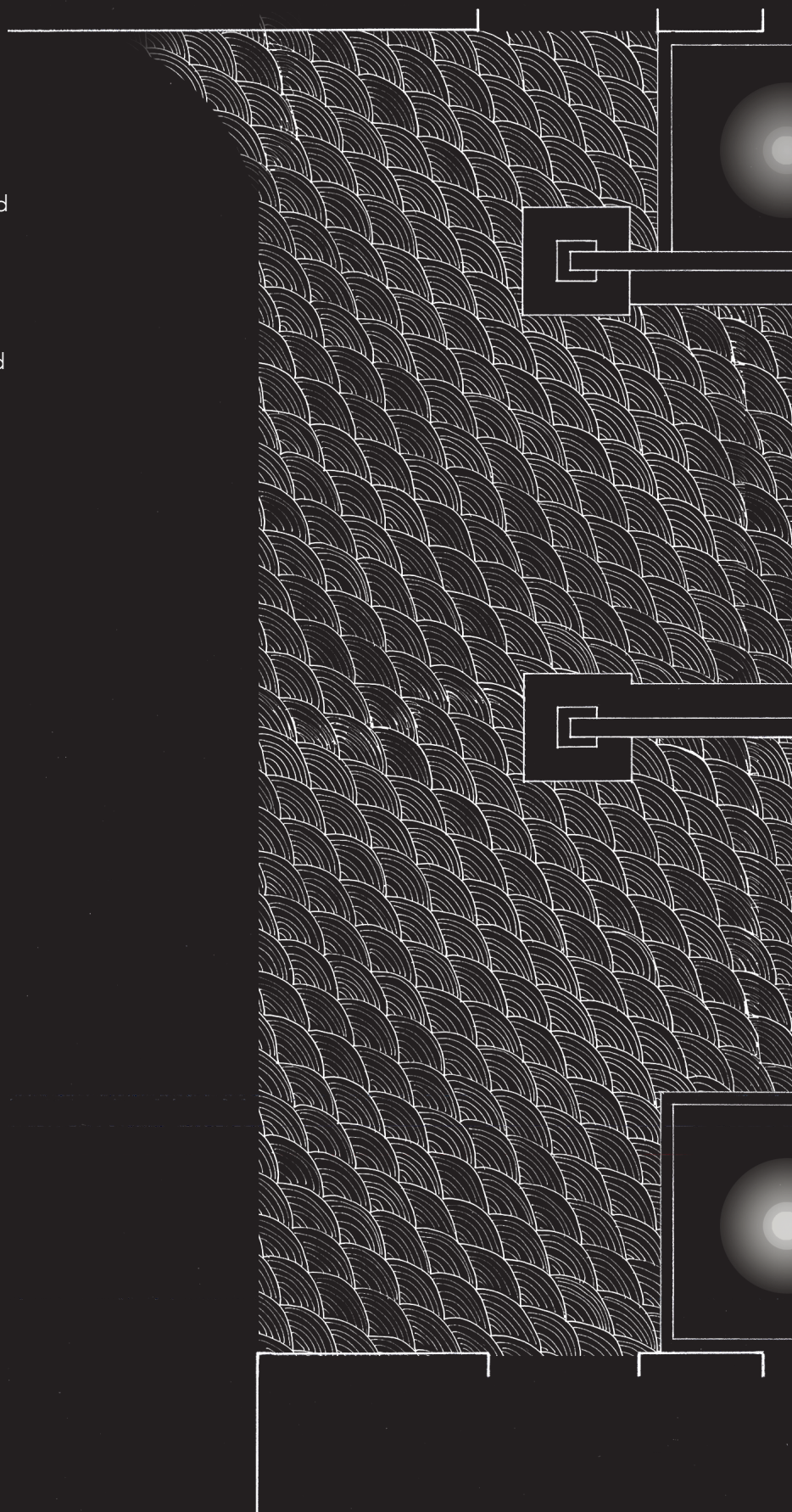


Fig 6.2.15 Topography

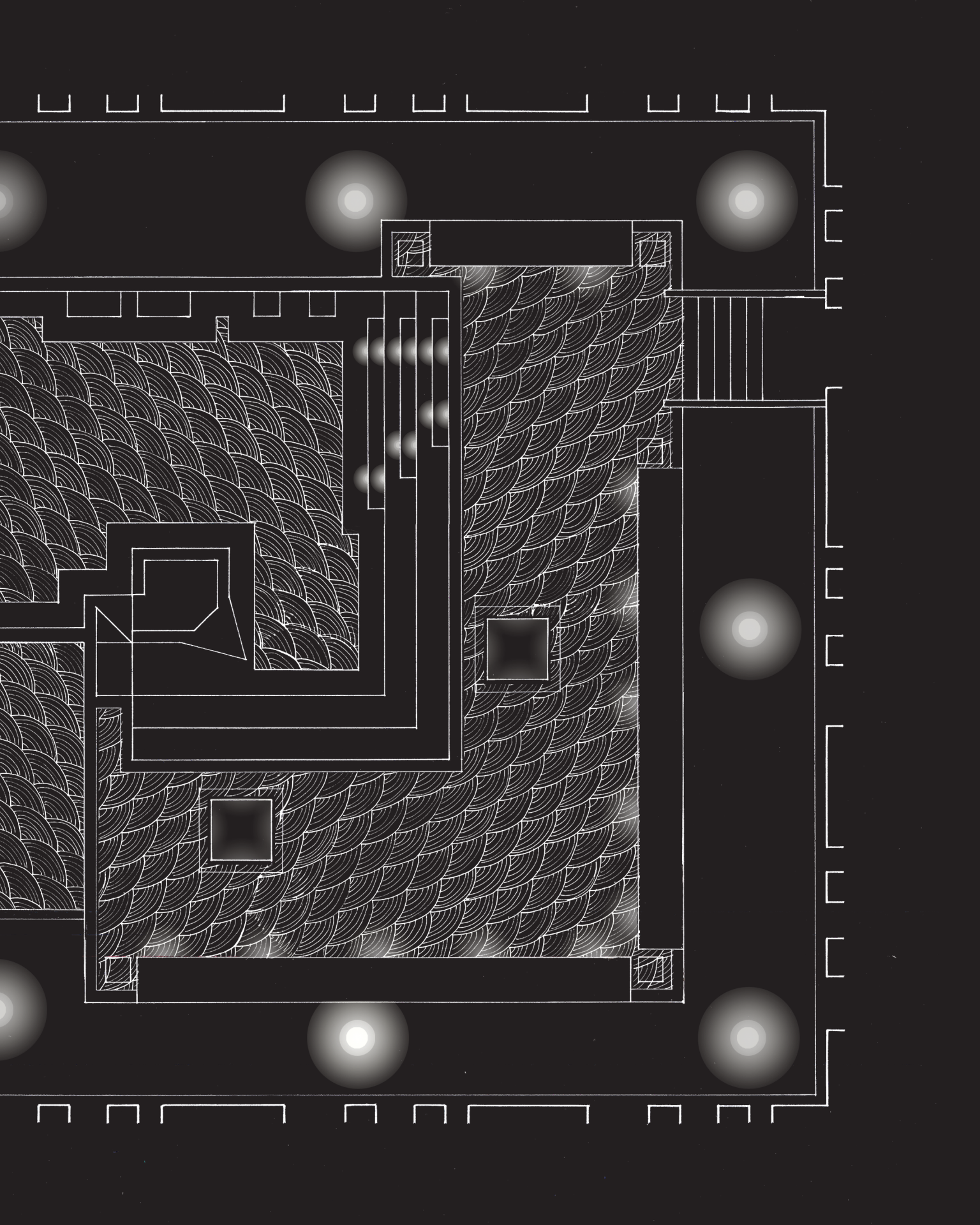
- Stairs
- Concrete terrace
- Floor

LIGHTING PLAN

Currently, the only lighting source in this courtyard is the light from the offices around it, which makes the courtyard unnoticeable. Limited numbers of lights are installed in the pond, at the bottom of the furnitures and along the edges of steps to guide people into the place without making the courtyard noisy.



Original drawing scale 1:100
Fig 6.2.16 Lighting plan



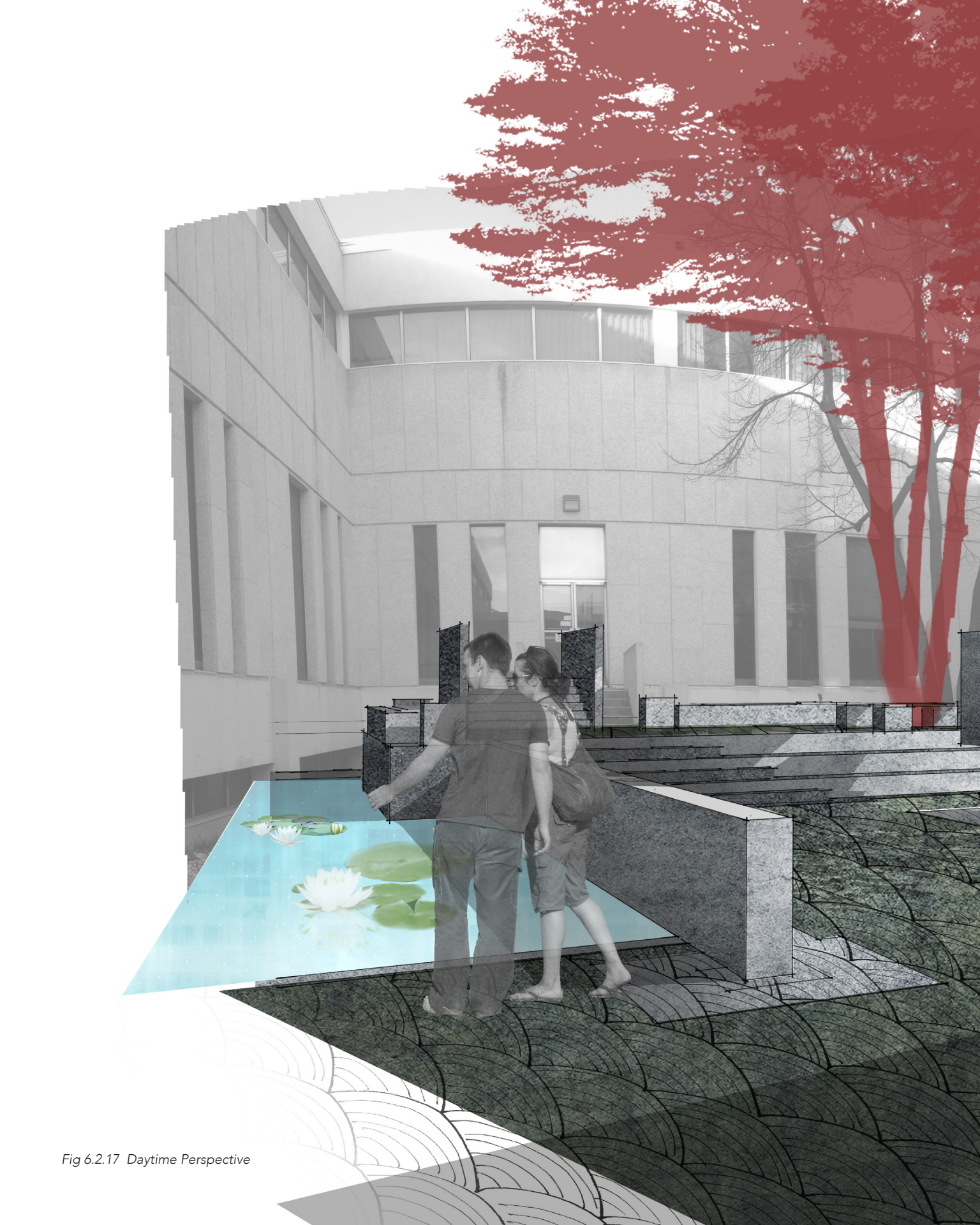
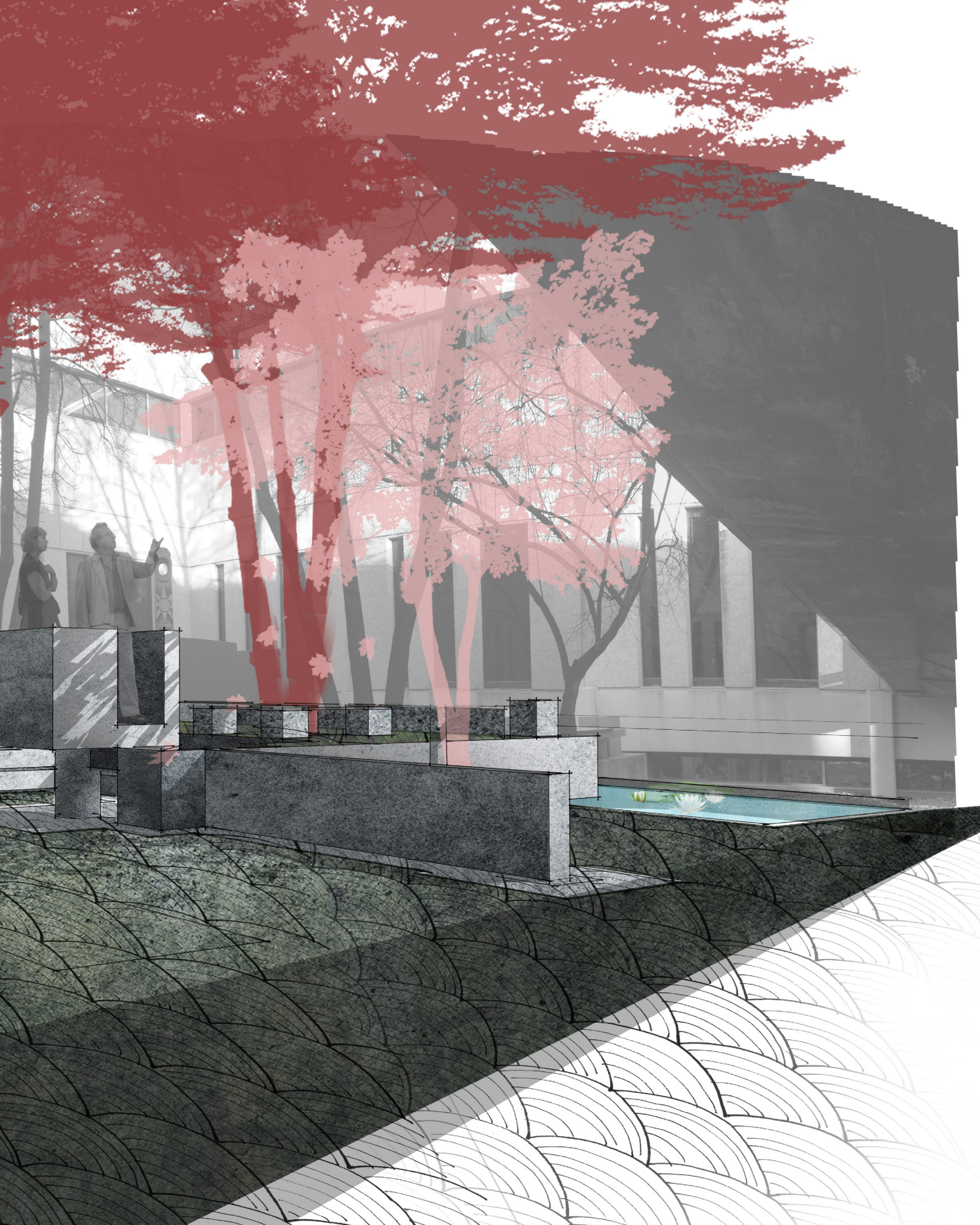


Fig 6.2.17 Daytime Perspective



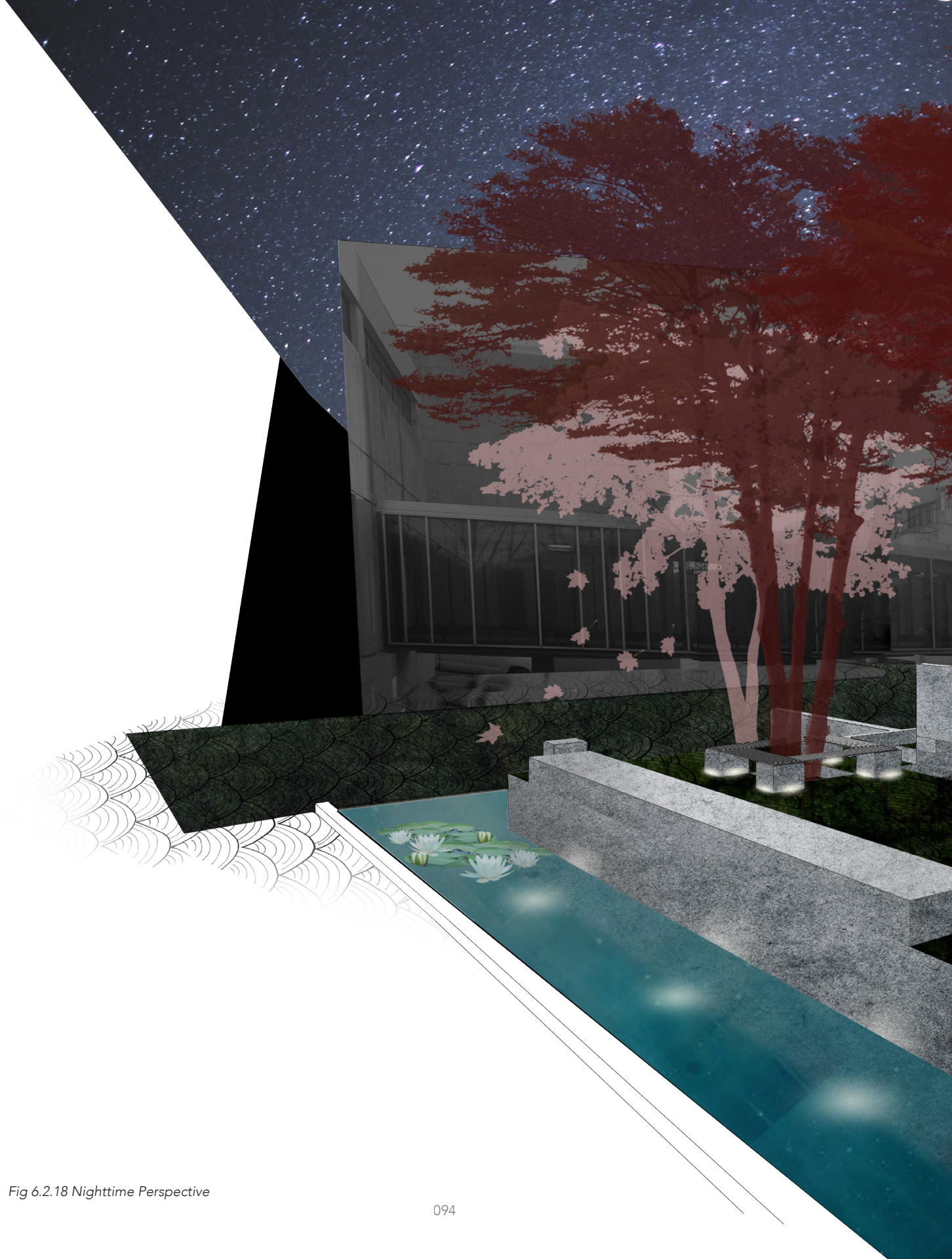
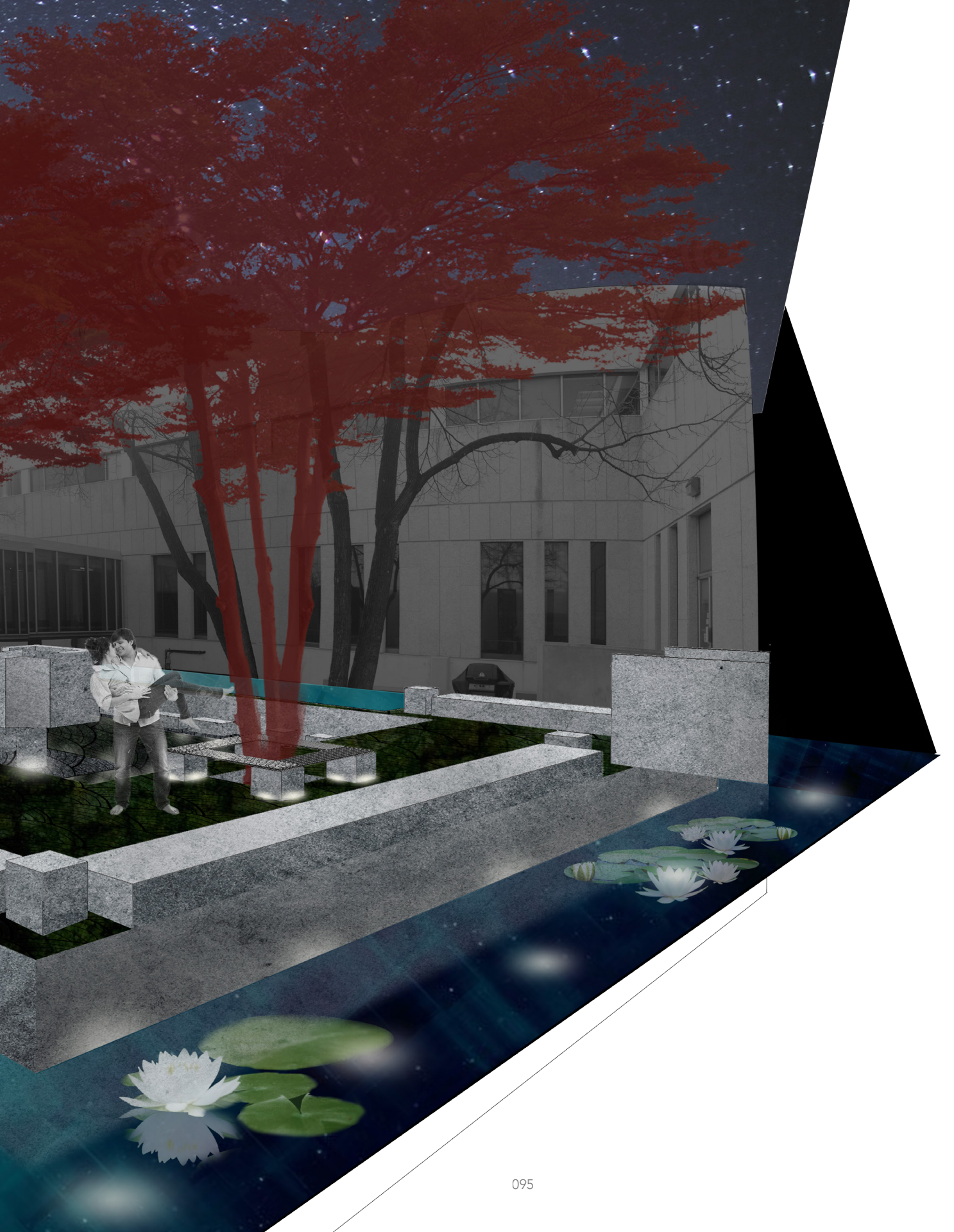


Fig 6.2.18 Nighttime Perspective



6.3 Moon Yard

Reconstruction

Following the design idea of creating outdoor classrooms, Dennis Wilkinson designed a "L" shape raised concrete terrace along the edge of the University College building. In front of the University Law Canter, there was a concrete platform that could be used by professors to give lectures. In the original design, there were several clusters of trees in the opening area, and an alley of trees functioned as the barrier along the north side. This design provided an outdoor classroom while still left an open space for people to have activities.

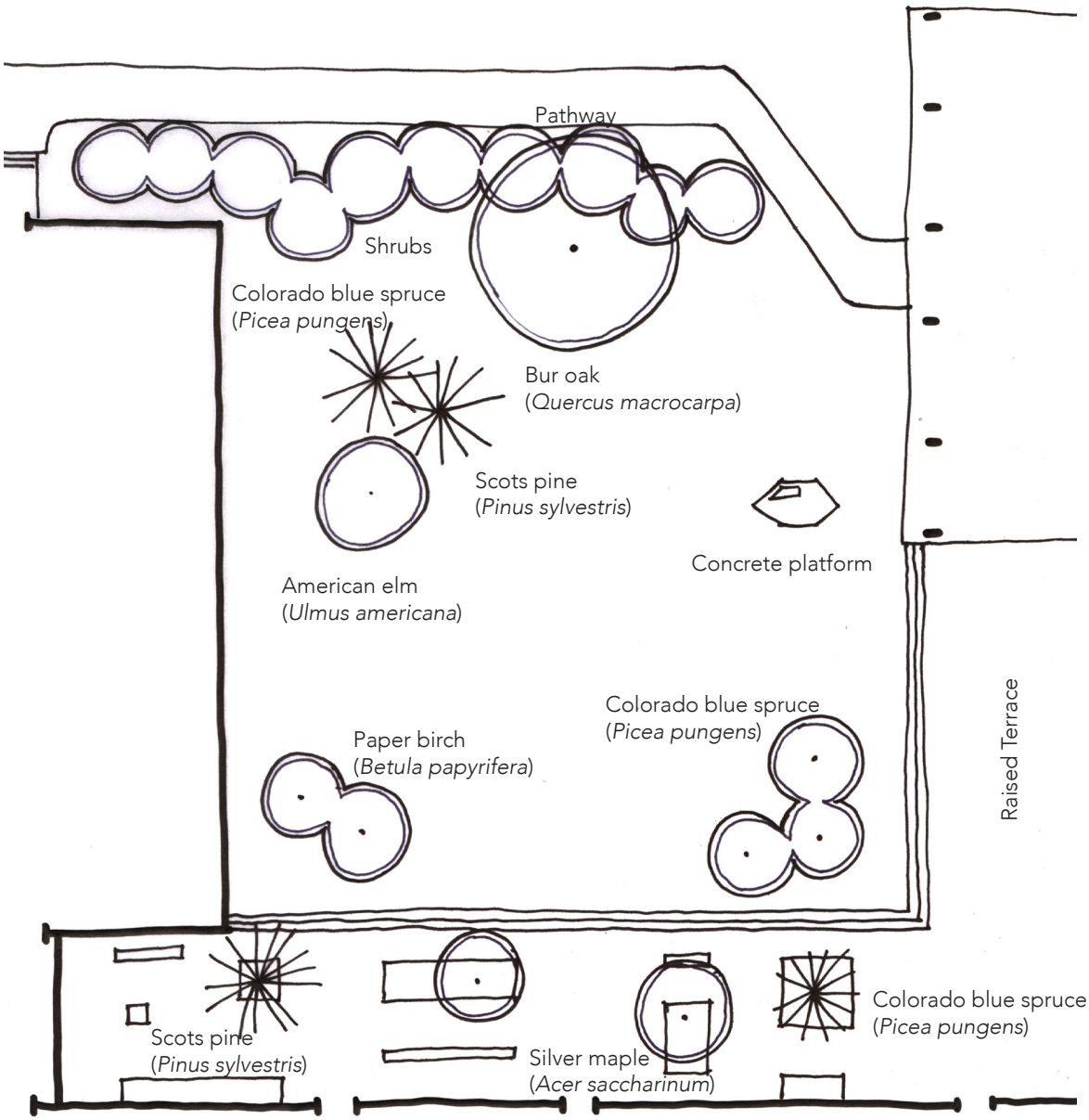


Fig 6.3.1 Original design intension based on old photos

Fig 6.3.2 Old photos after construction, n.d.

The current condition of the courtyard is different from the past. As trees grow, the wide canopies cover the courtyard, and minifies the previous big open space. Due to several renovations, the original alley of shrubs on the north no longer exists, and the concrete platform on the east side is demolished as well. To the north of the courtyard, there is an unsightly parking lot. The pathway along the north edge of the courtyard was rebuilt with asphalt in the summer of 2015. The ground along the edges of the open area has sunken by over 20cm due to water runoff.

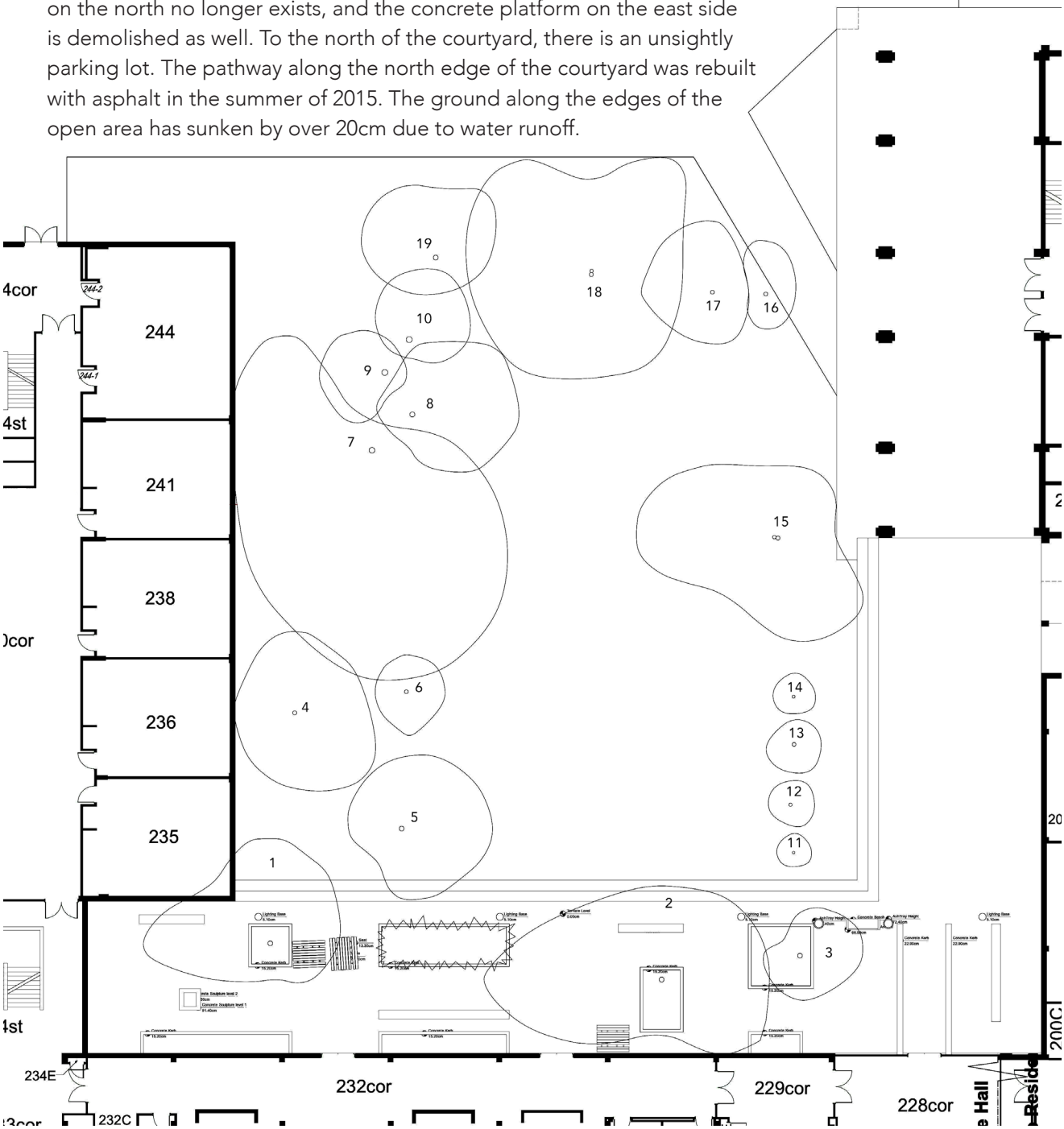


Fig 6.3.3 Site survey of existing condition

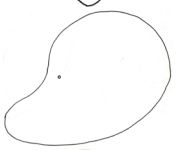
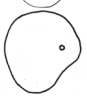
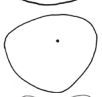
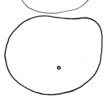
No.	Name	Age	Height	Shape	Circumference
1	*Pines sylvestris* Scots Pine	≈50~60	13m		135cm
2	*Acer saccharinum* Silver Maple	≈50~60 <20	16m		200cm
3	*Picea pungens* Colorado Blue Spruce	≈50~60 <10	17m		140cm
4	*Betula papyrifera* Paper Birch	≈30 <40	17m		95cm
5	*Betula papyrifera* Paper Birch	≈30 <40	16m		80cm
6	*Tilia americana* Basswood/American Linden	≈25	15.5m		65cm
7	*Ulmus americana* American Elm	≈50	18m		200cm
8	*Pinus sylvestris* Scots Pine	≈50	20m		106cm
9	*Picea pungens* Colorado Blue Spruce	≈50	19m		98cm
10	*Picea pungens* Colorado Blue Spruce	≈50	19m		106cm
11	*Picea pungens* Colorado Blue Spruce	≈50	19m		106cm
12	*Picea pungens* Colorado Blue Spruce	≈40	9m		60cm
13	*Picea pungens* Colorado Blue Spruce	≈40	10m		80cm
14	*Picea pungens* Colorado Blue Spruce	≈40	8.5m		55cm
15	*Tilia americana* Basswood/American Linden	>70	12m		150+135cm
16	*Pinus sylvestris* Scots Pine	≈50	12m		72cm
17	*Pinus sylvestris* Scots Pine	≈50	11.6m		100cm
18	*Quercus macrocarpa* Bur Oak	≈80	13m		160+150cm
19	*Fraxinus pennsylvanica* Green Ash (Volunteer)	≈30	10m		90cm

Fig 6.3.4 Intended canopies

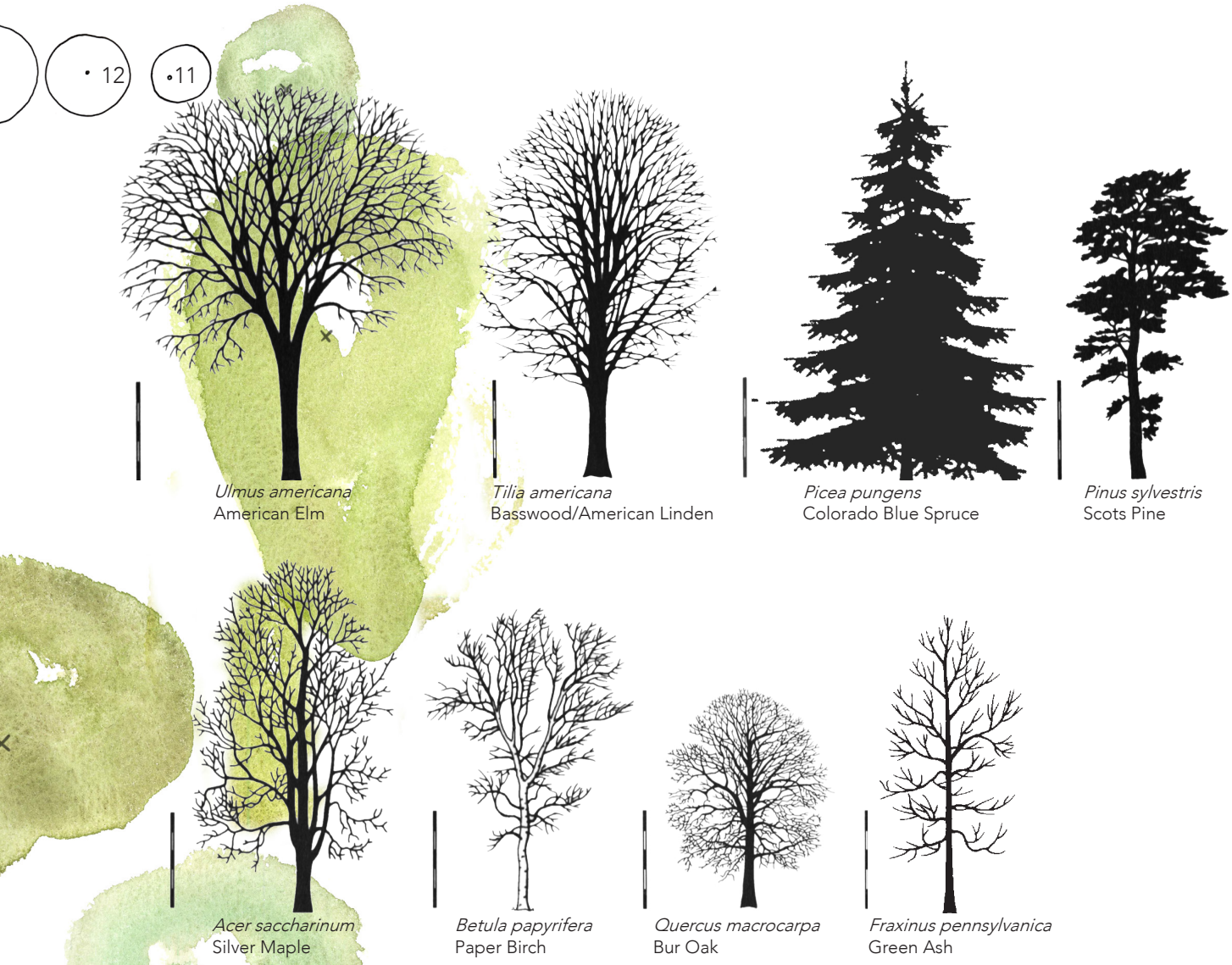
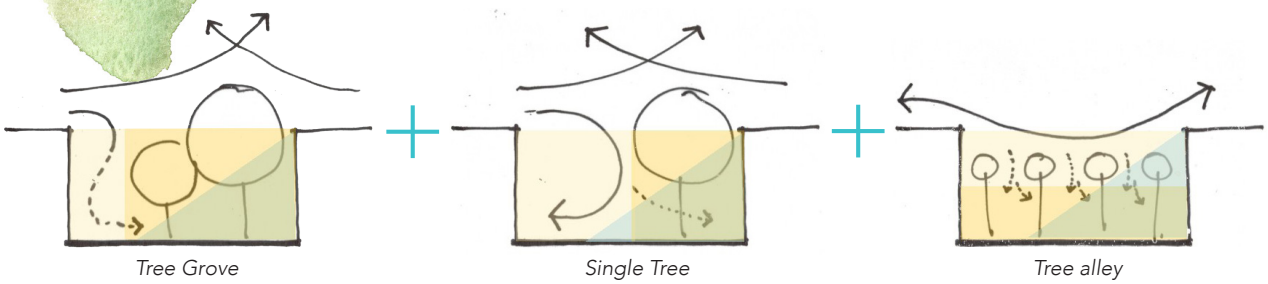


Fig 6.3.5 Tree species

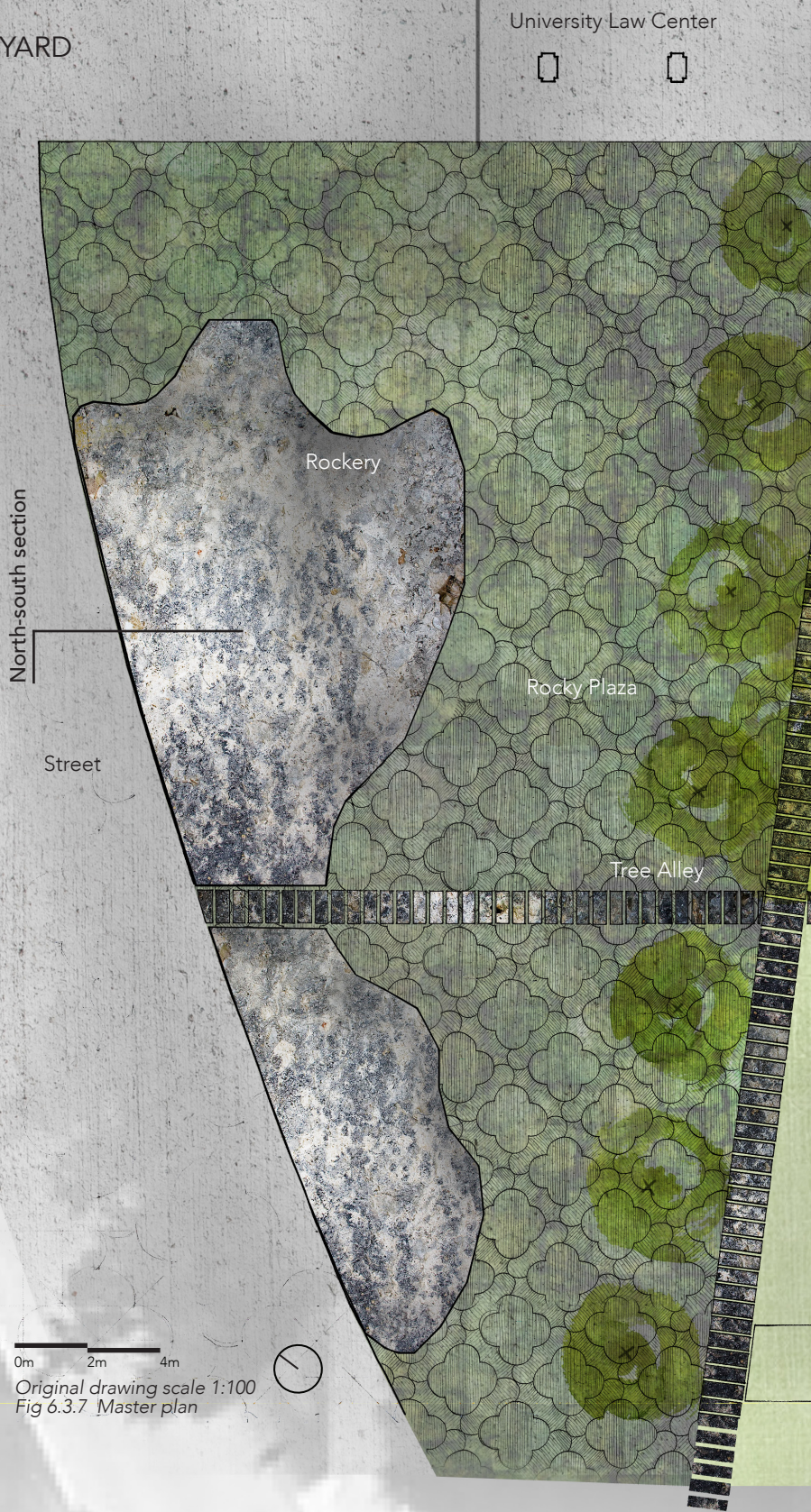
Tree no.11, no.12, no.13, and no.14 will be removed, because they are sick and they block the visual connection between the University Law Centre and the terrace in front of the University College Lecture Hall.

Fig 6.3.6 Tree arrangements

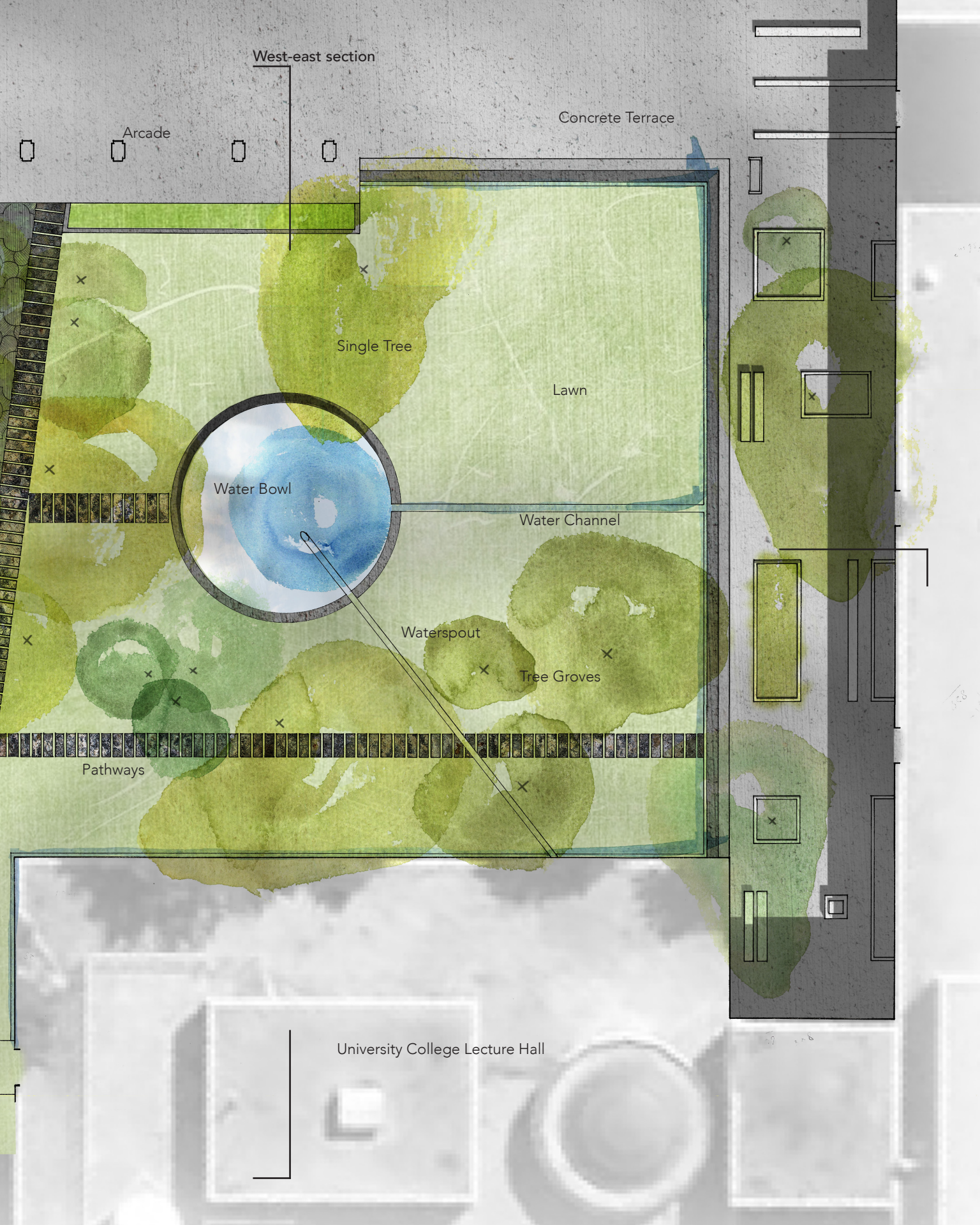


UNIVERSITY COLLEGE COURTYARD
MOON YARD "月"

The existing overall condition of this courtyard is satisfying, except the parking lot on the north, which upsets the overall aesthetics of the space. Since there is already a large parking lot on the east of the courtyard, it is also unnecessary. Therefore, it is turned into a rocky plaza with a rocky "mountain" on the north edge adjacent to the street. The ground is paved by pebble stones. Two pathways intersect and lead to the entrances of the Faculty of Law and the University College Building. A row of paper birch are planted along the pathway to separate the rocky plaza from the rest area of the site. They also act as a filter between the courtyard and the traffic. Since the rest area is sunken in the middle with four corners raised, and the elevation difference is about 130cm, runoff water would be collected in the middle. Consequently, a water bowl is designed in the middle with water channels along the yard edges lead into it. Above the bowl, I propose a waterspout that collects rainwater from the building roof around it. When it is raining, it spills water to the bowl, and it will become an event of water and sound. At night, the water bowl will reflect the moon in the sky and bring it into the courtyard. Besides functioning as water collection, it would become a piece of art.



Original drawing scale 1:100
Fig 6.3.7 Master plan


West-east section
Arcade
Concrete Terrace
Single Tree
Lawn
Water Bowl
Water Channel
Waterspout
Tree Groves
Pathways
University College Lecture Hall

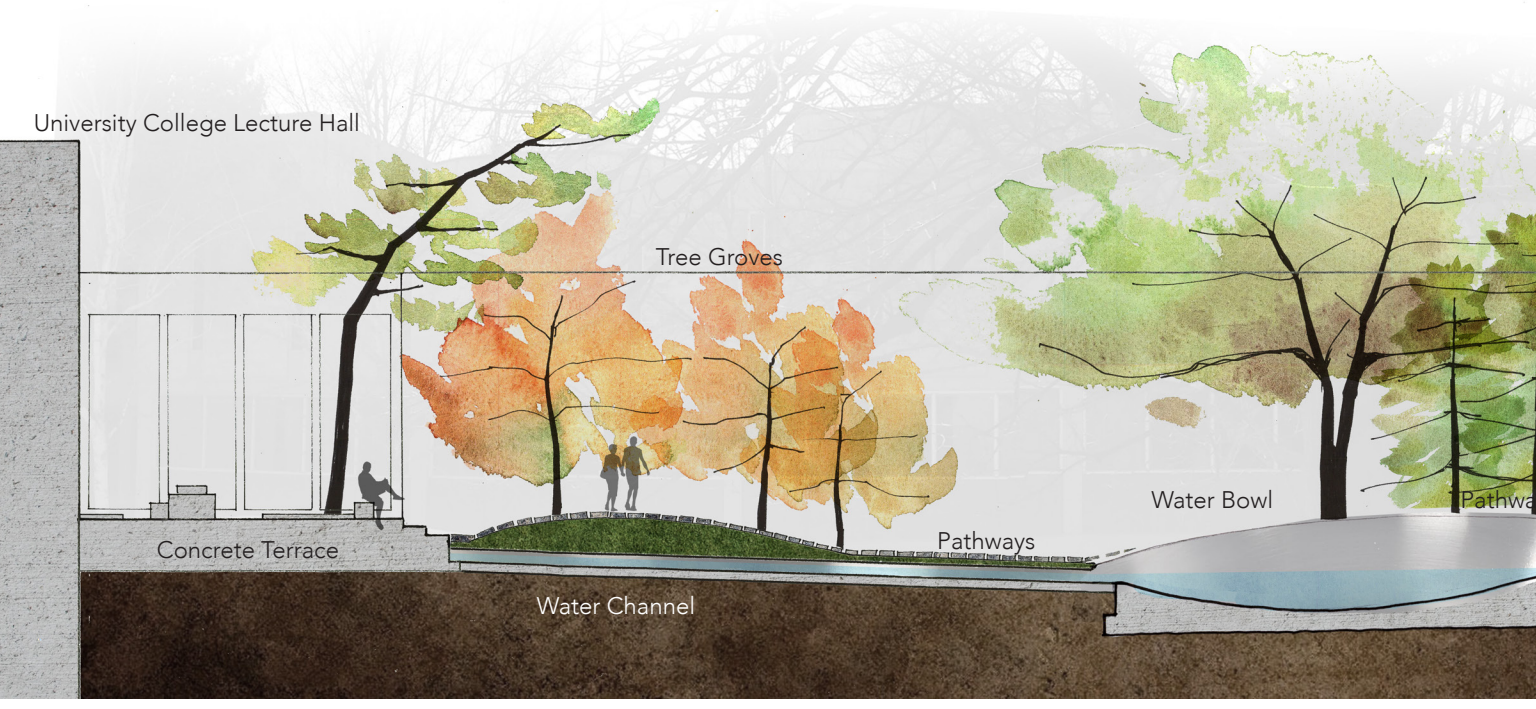


Fig 6.3.8 North-south section

The water bowl is lifted on the north, with the added benefit of the bowl's shape, the foundation of the water bowl stays clear of the tree roots on its north. Meanwhile, the rockery has a gentle slope on the south and a steep slope on the north facing the street. On one hand, it helps to enclose the courtyard, and protect it from the cold north wind in winter, on the other hand, it allows people to climb on and have a view to the overall courtyard back to the south as well as the Red River to the north.

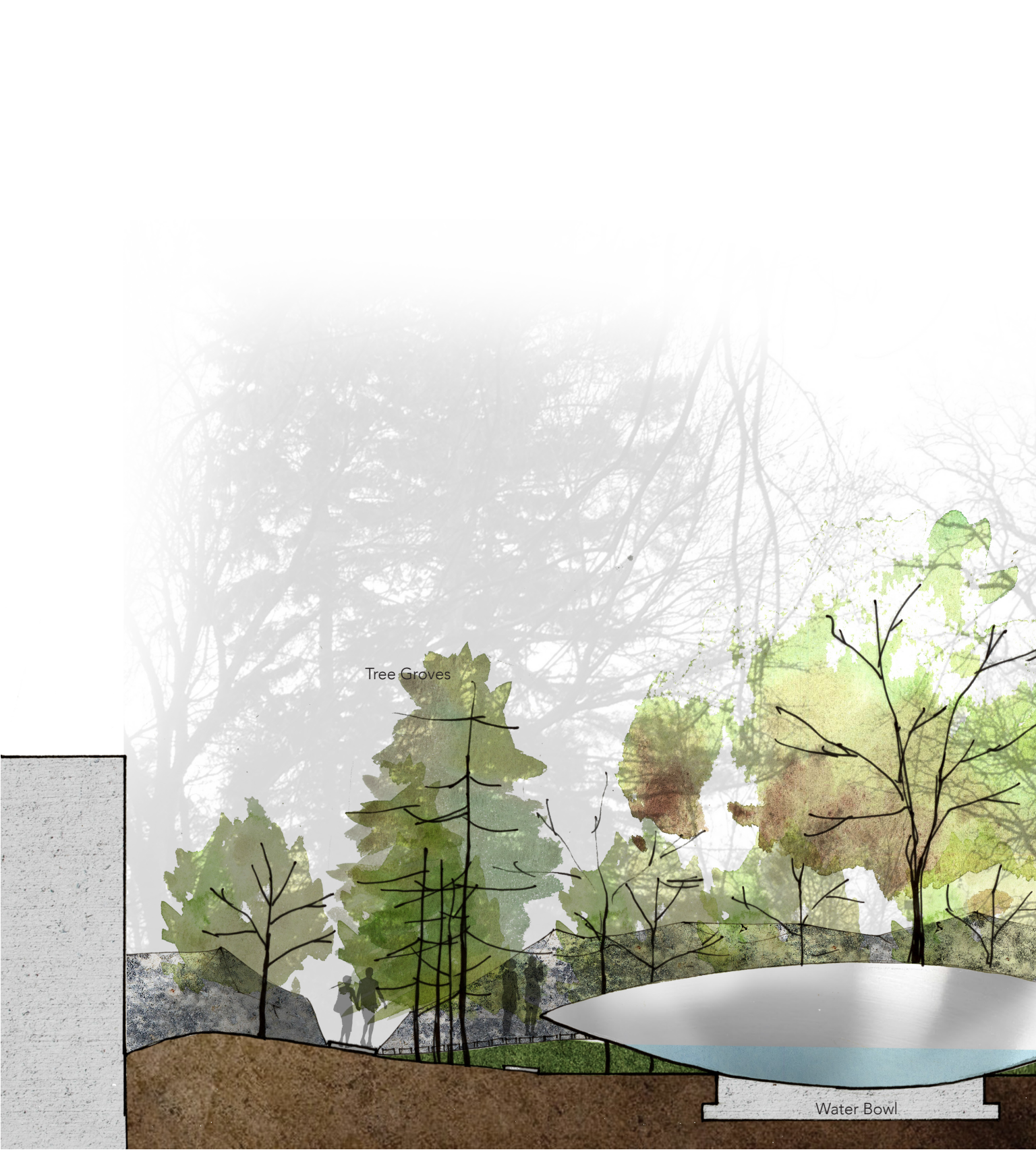


Fig 6.3.9 West-east section


Tree Alley
Rockery
University Law Centre

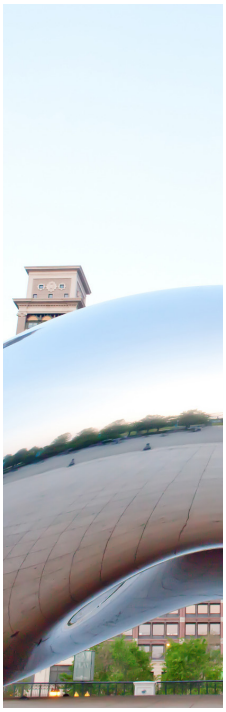
Plants and Materials Selections

The plaza is paved with natural pebble stones in a pattern that consists of flowers, which makes it more dynamic when the shadow of the leaves is casted on the floor. The mountain in the plaza is made of two large slabs of dark granite stone. The stepping-stones are also made of pieces of granite stone. I propose stainless steel for the water bowl due to its reflective quality. The existing lawn and concrete terrace are left untouched.

Pebble stone

Natural stone

Natural stone



Stainless steel

Lawn

Concrete

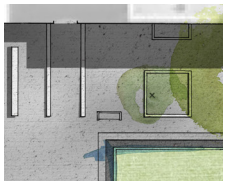
Pebble pavement

Rocky mountain

Stepping stones

Metal water bowl

Lawn



Concrete Terrace

Fig 6.3.10 West-east section

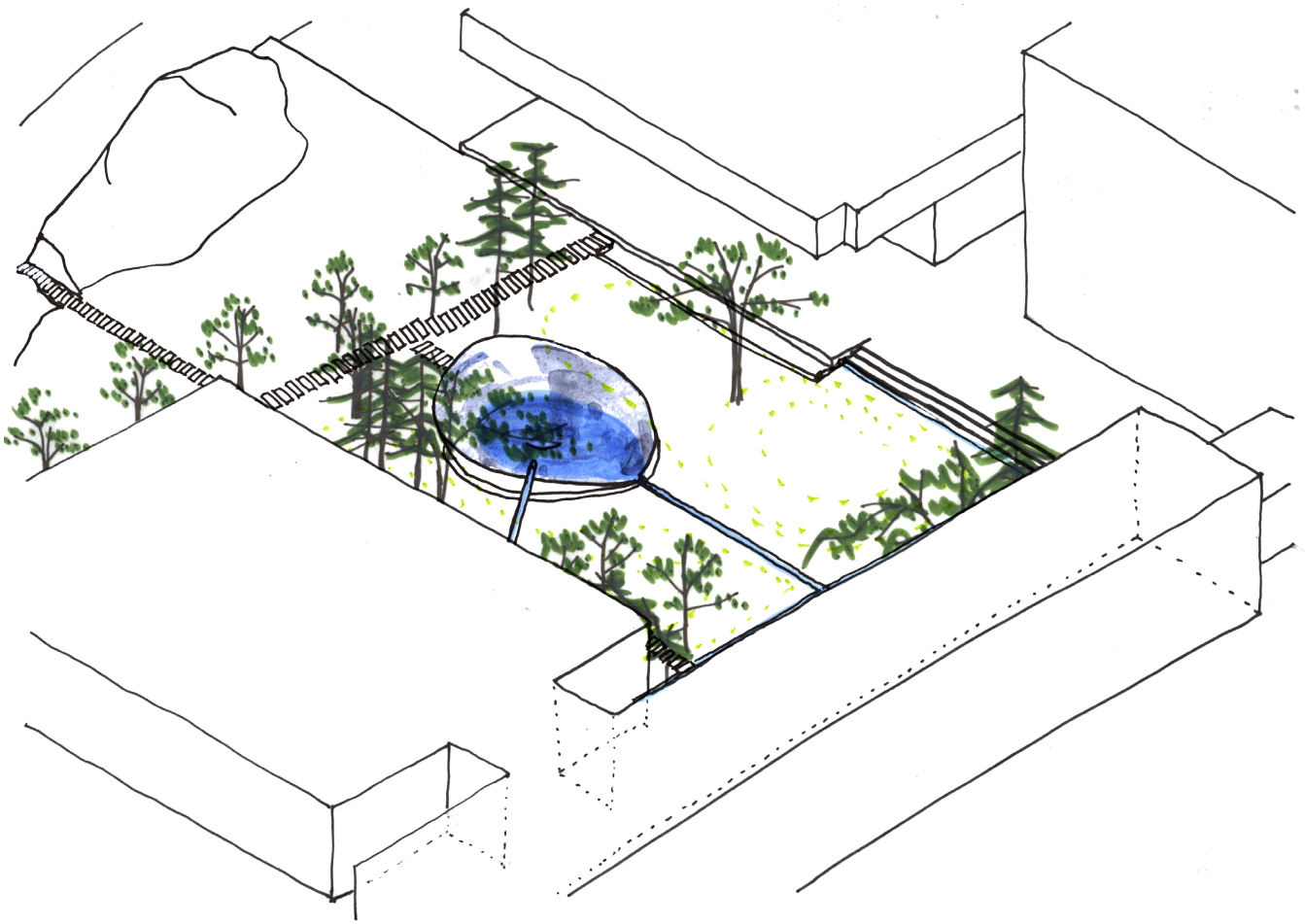


Fig 6.3.11 Isometric drawing

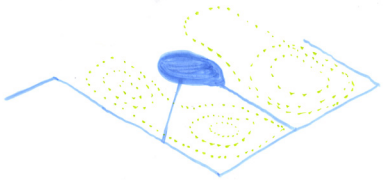


Fig 6.3.12 New elements

- Mirror water bowl
- Water bowl
- Water channels
- Waterspout

Fig 6.3.13 Vegetation

- Trees
- Lawn

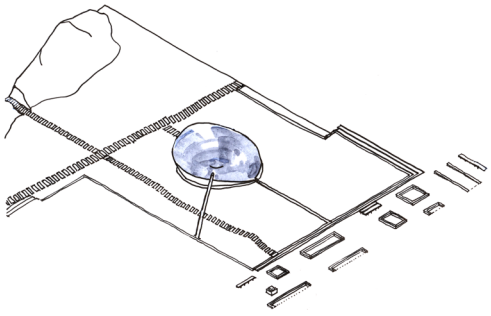
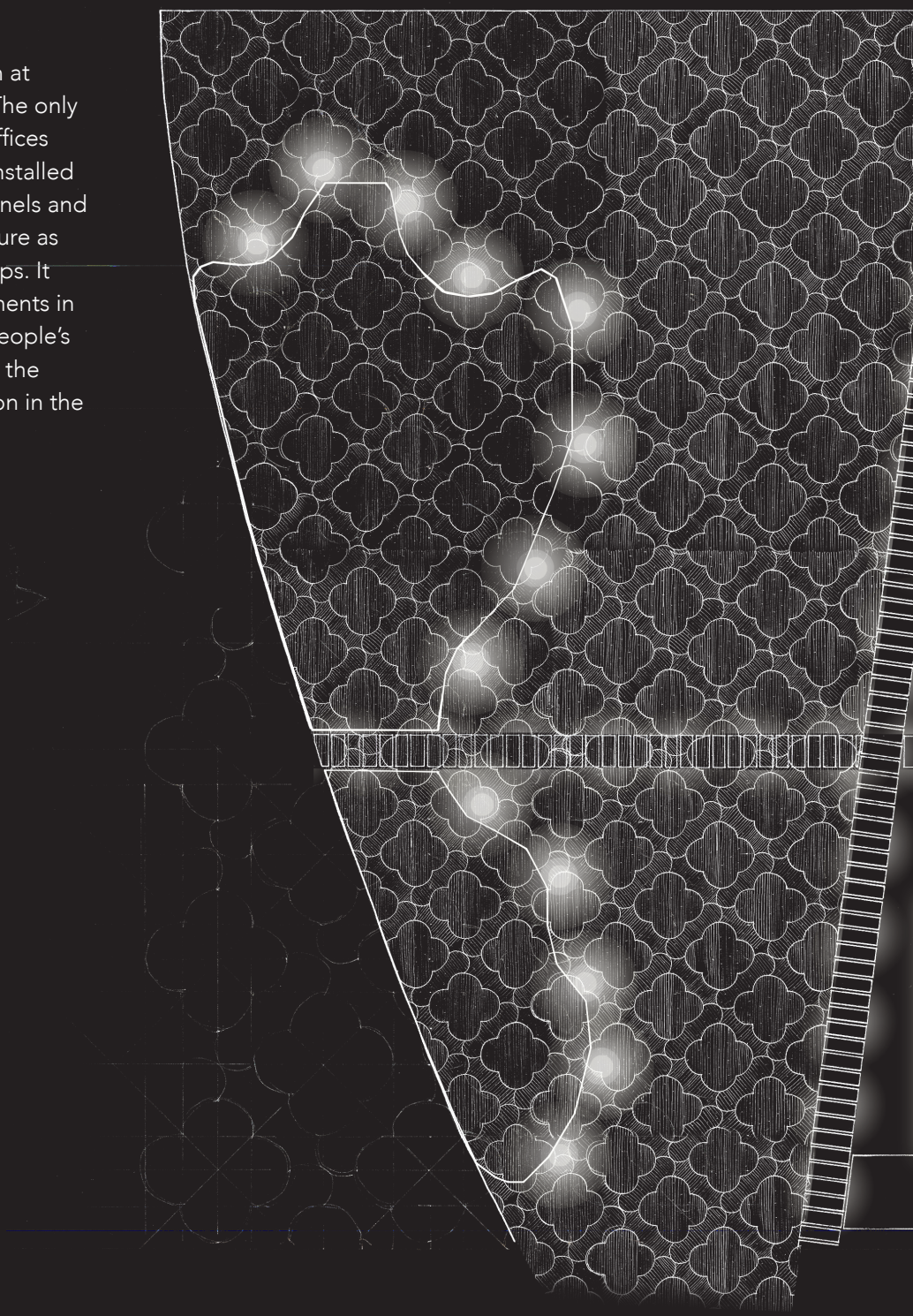


Fig 6.3.14 Topography

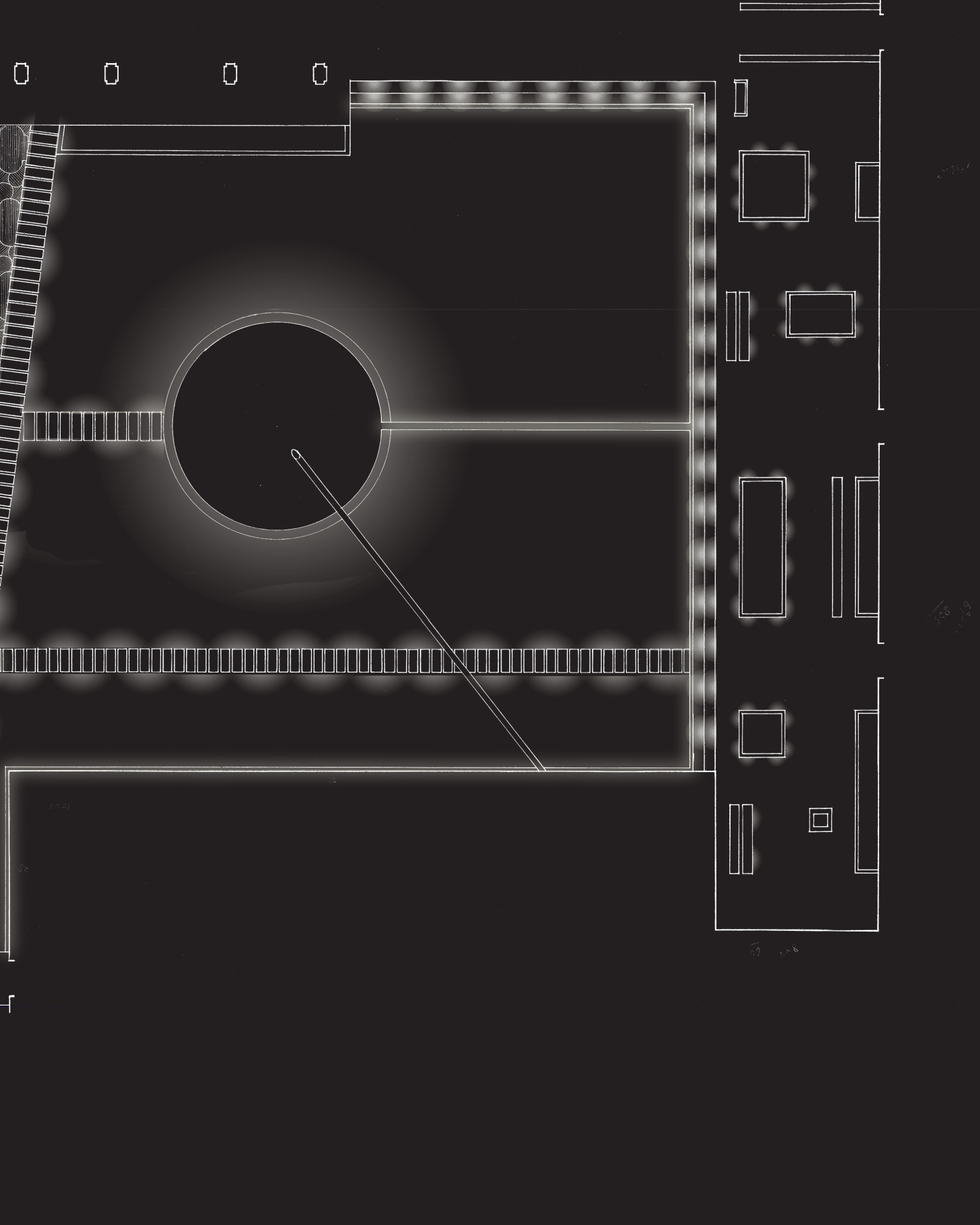
- Concrete Terrace
- Rokery
- Stepping stones

LIGHTING PLAN

There is no lighting system at present in this courtyard. The only light source comes from offices around it. Soft lighting is installed on the edge of water channels and at the bottom of the furniture as well as the edge of the steps. It helps to highlight the elements in the courtyard and guide people's directions without stealing the thunder of moon's reflection in the bowl.



Original drawing scale 1:100
Fig 6.3.15 Lighting plan



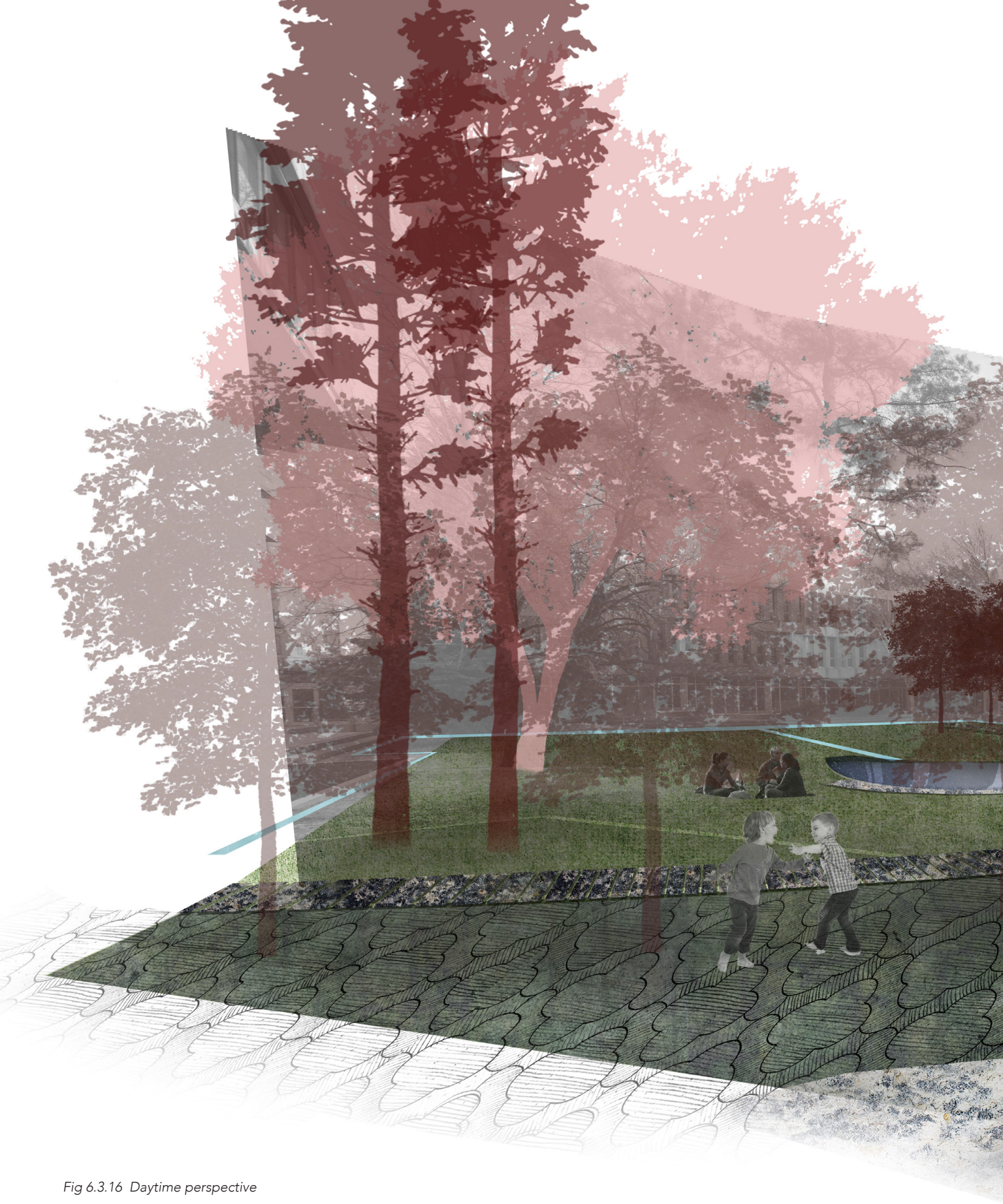
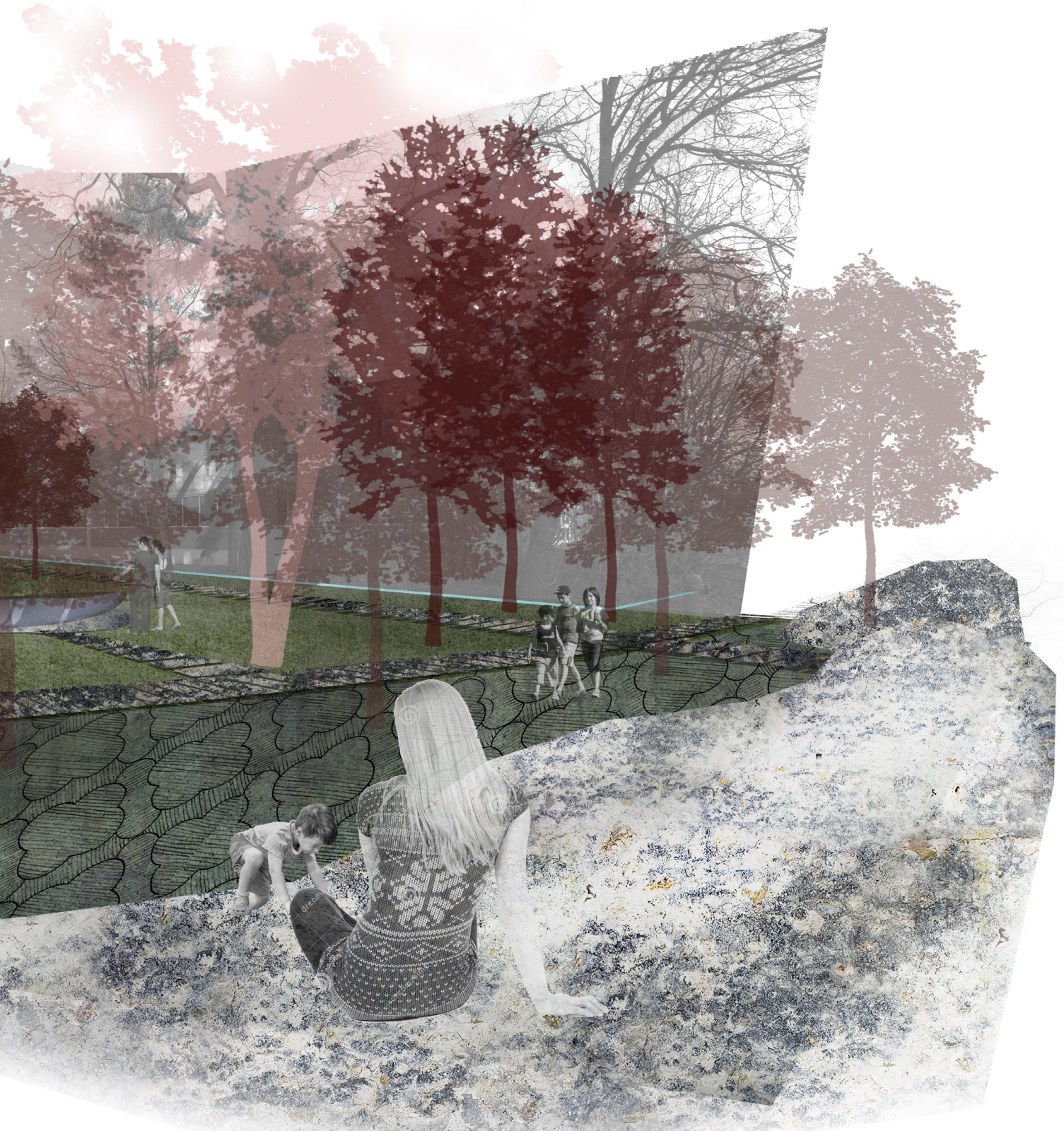


Fig 6.3.16 Daytime perspective



During the day, it is a great place for people to enjoy, while the bowl reflects the trees and the sky, and at night, sometimes, a clear and bright moon may be seen in the bowl.

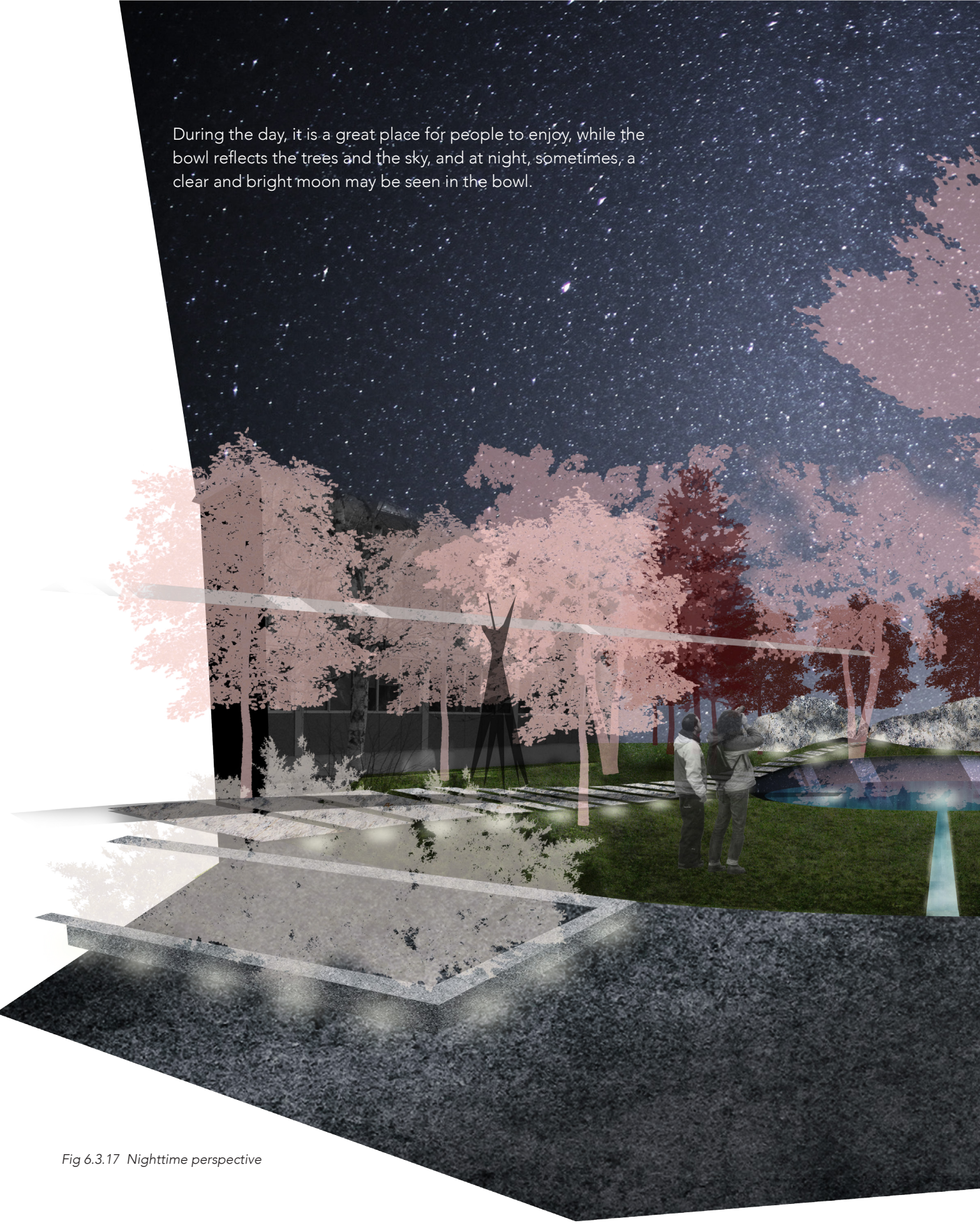
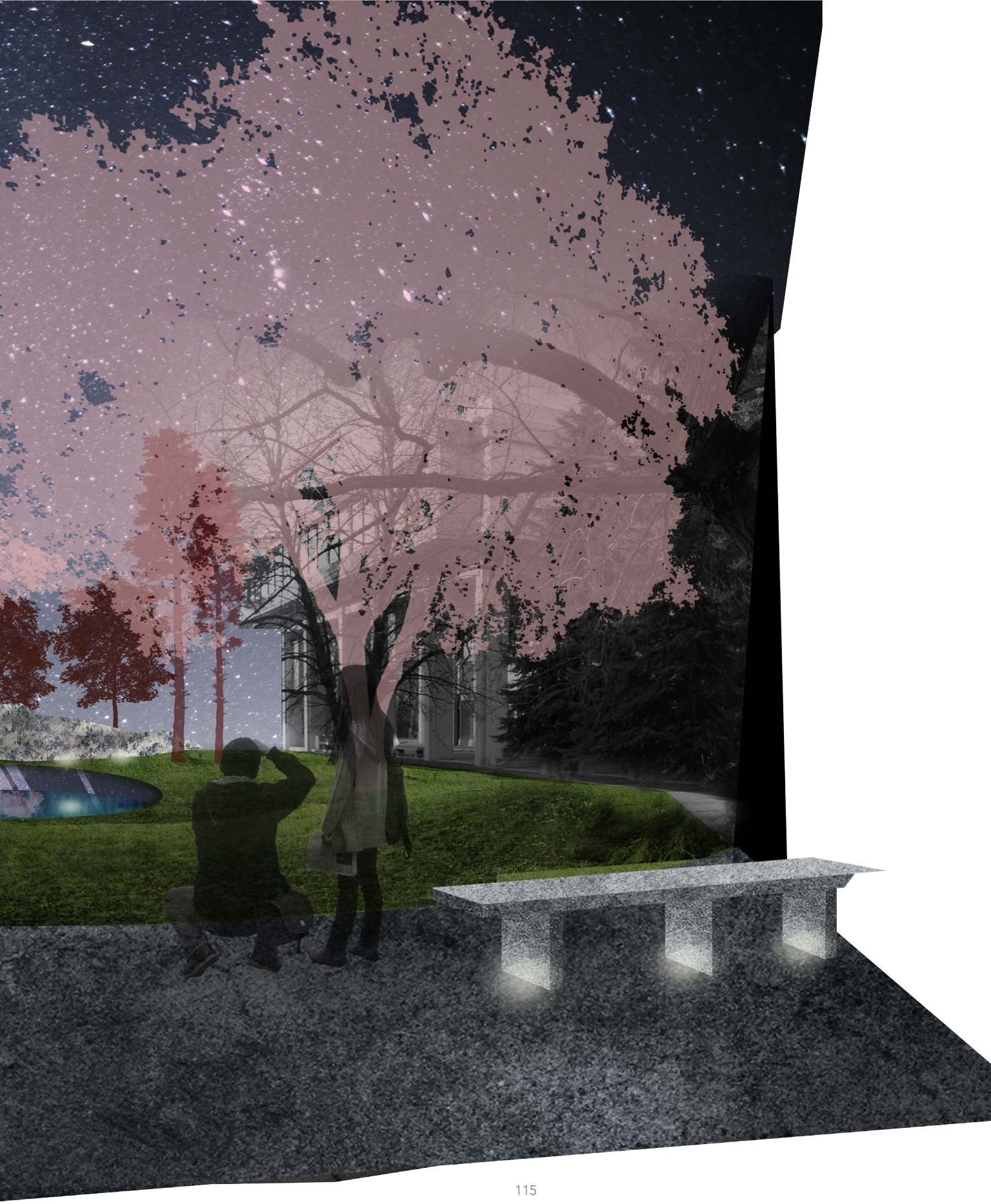


Fig 6.3.17 Nighttime perspective



CHAPTER NINE

CONCLUSION

Last but not least, this chapter reviews and summarize the overall design process as well as my personal thoughts.

Fig 9.1 Siheyuan in Beijing

During the process of my practicum, sometimes, I had doubted whether I was on the right track. After reading a few books about Siheyuan, and reviewing a number of contemporary designs based on the idea of traditional Siheyuan, I thought that it had been studied thoroughly, and there is limited areas of research regarding this topic. However, I soon realized that I had a personal connection to Siheyuan which cannot be replaced. It was this connection and my genuine love for this topic that supported me through the development and completion of this practicum.

My design process includes research, analysis, and design. Literature reviews, interviews, case studies, analysis, and surveys are the main methods that I applied to this project. Based on my research and analysis, my design proposal aims to rehabilitate as well as revitalize the three existing courtyards on the Fort Garry campus at the University of Manitoba. By respecting what is existing and applying a minimum touch, which hopefully I have achieved through the articulation of the design details, I hope my design proposal could facilitate a debate on the state of these hidden treasures on the Fort Garry campus. I am convinced that the rediscovery of these protected places would enhance the life and learning on Fort Garry campus in this fascinating prairie city.

Fig 9.2 A single tree in Siheyuan

Fig 9.3 Scene framing

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Fig 4.2

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