

國立交通大學

建築研究所

碩士論文

物件、空間與結構

Matter, space and structure

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## Abstract

I believe that all the design process can be classified in some guideline. These guideline have different request which support and enhance the meaning of concept. After 4 years study of architecture, I figured out that maybe the strongest design always based on most strictly principles. So, what is these principles? In my opinion, that would be matter, space and structure which can be combined as architectural design. First, matter, not only as a object but also mention the material and the characters. Furthermore, the type of a space can represent the quality and identity. Finally, the structure as a infrastructure and framework can support the whole design. The concept should be based on one guideline as the main idea.

## 摘要

我認為所有的設計過程都可以被歸納至一些準則，而這些準則可以使得設計概念更加強大而精確。在四年研讀建築設計的過程中，我發現設計的限制越多，設計的目的也越精確。這些準則可以被歸納為物件、空間與結構，這代表所有的設計都可以從這三方面去探討跟剖析。也因此我將我這幾年的設計，以這三個重點分別去強化，試圖去探討此三準則對設計的重要性。首先，物件並非僅指單一物體，而是更抽象的代表了事物的狀態、材料等等。空間則是代表空間的品質，決定了設計的型態。最後的結構，則是整個設計的架構以及決定一種解決問題的方法。這個準則並沒有哪一個才是概念的代表，可以強化其中一種作為設計的核心。



## INDEX

1	System design
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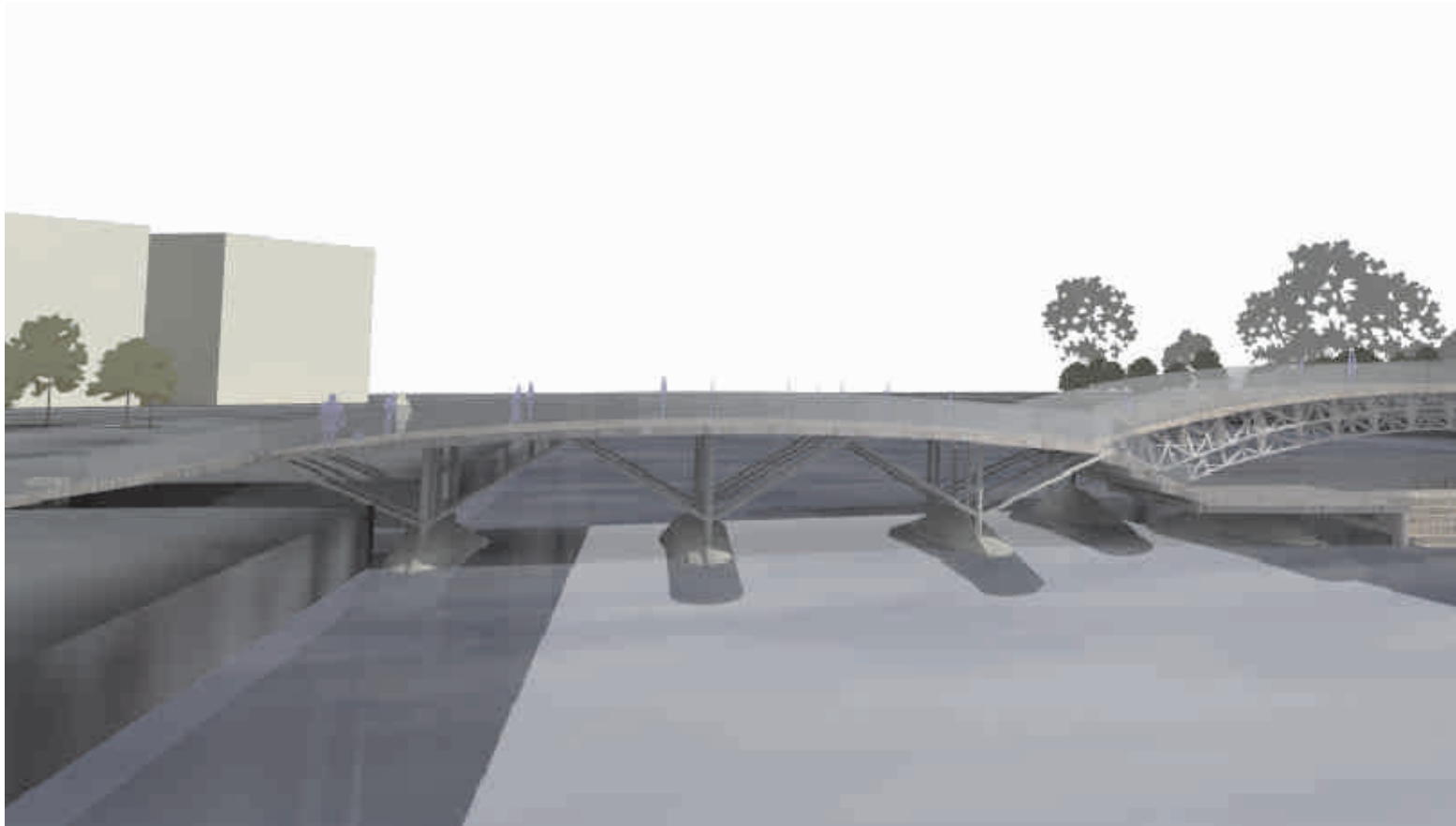


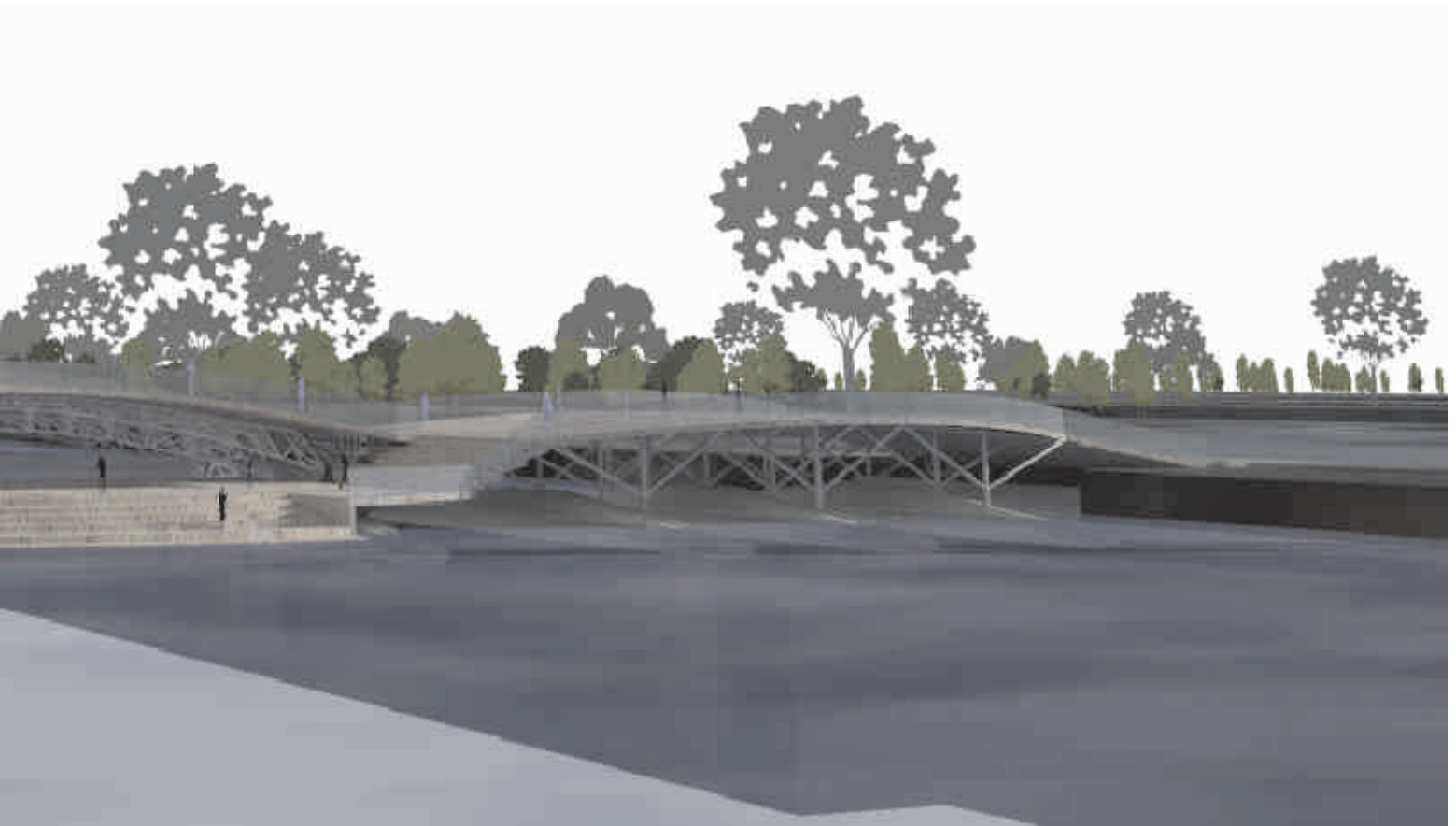
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# Bridge Design and details

## The PLAZA bridge

The objective of the third project is to give ability in designing large span structures with an informed strategy of minimizing the use of material and energy with the maximum stiffness and performance and the fourth project is to offer ability in designing a more elaborated proposal in depth including advanced detailing of materials, surfaces, details and structural elements.



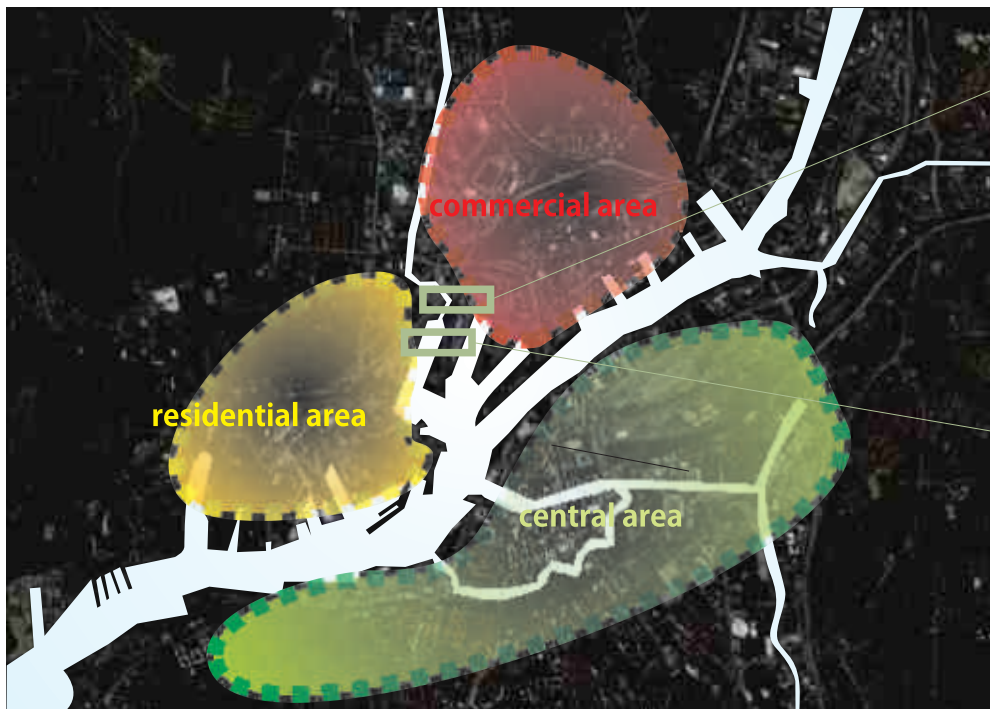




## System design\_The river park

The objective of the second project is to give ability in designing complex systems with an informed strategy diverse population and to develop a plan for an integrated urban park and a mass transportation system along

Frihemnen located in the central Gothenburg but it is a pity that now it is a abandoned area. So I chose the frihemnen to become a central river park and to development a complex traffic system with pedestrian, bike and bus. All the urban and rural activities can be happened in this river park which not only have the convenient transportation system but also a beautiful natural environment. Through these activities, people can be gathered here so this park will be like a recreational area.



It is the perspective view shoot from the skywalk which showed that the frihemnen harbor was almost empty and discarded.

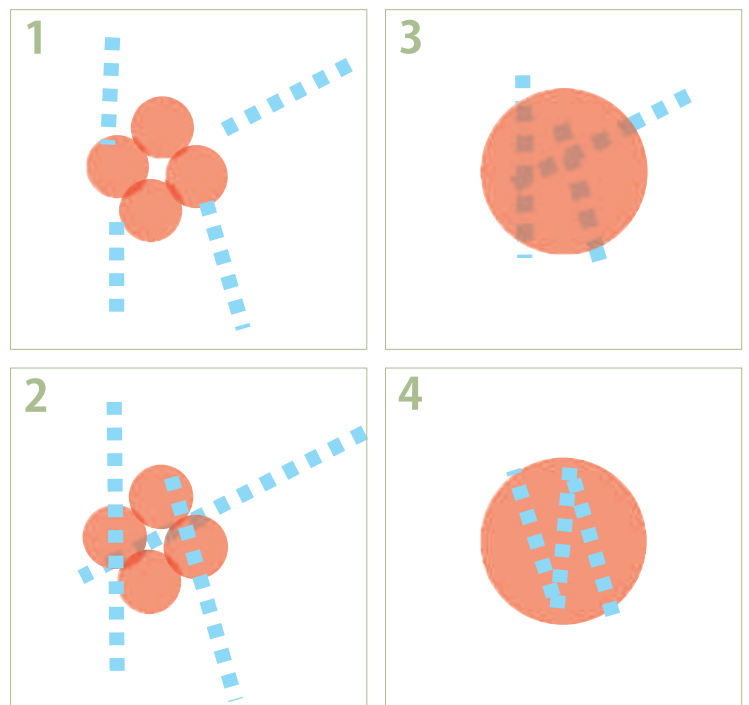
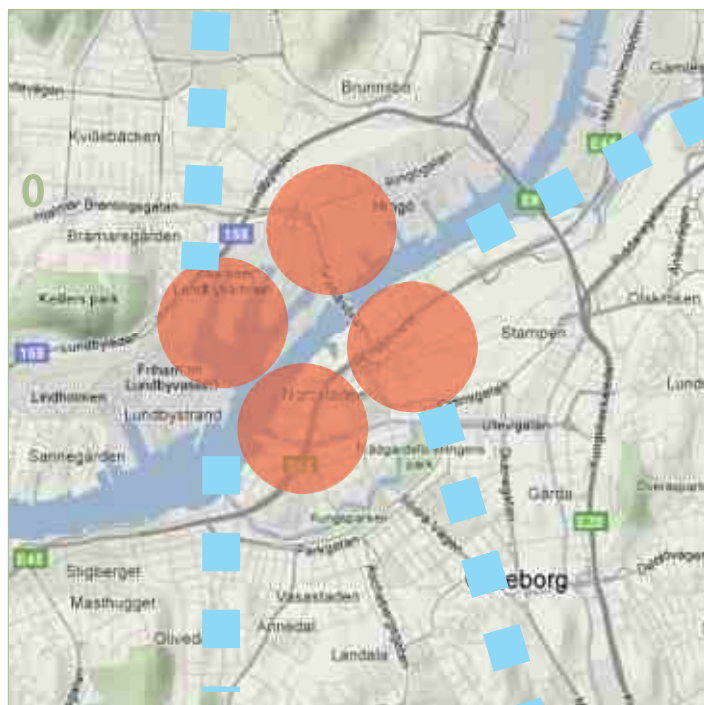


This river is the connection between frihemnen and kvilleback area and it still remains the originally natural environment.

These three major areas have different identify which have a lot of potential can be combine together, however the kvilleback now seems a weakest area for development.

of introducing new sustainable transportation technologies in the city accessible for the  
g the rivers and brooks of Gothenburg.

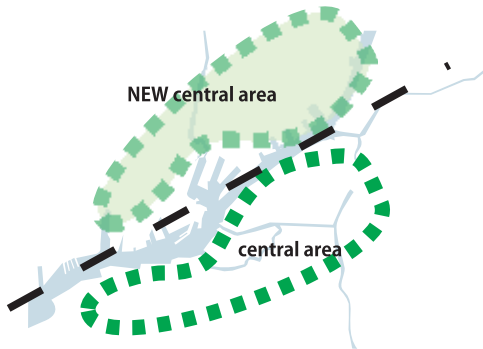
These four red area and four blue lines which represented the four main area and four main river of Gothenburg.  
As my concept, these four area can be gathered as one major area which becomes the heart of Gothenburg, and  
the river system can be combined together then become a big river park.





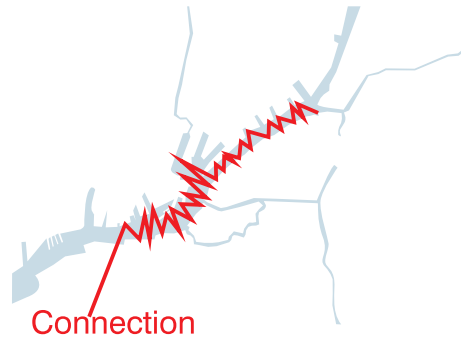
## CONCEPT

### MIRROR



First of all, the central area have a lot of commercial and residential function. In opposite, the north side of river seems have no real program for people to use. My concept is that I want to see this river as a mirror, not an isolation. So I want to reflect all the activities from south side to north side to enhance the power of kvilleback and attract more people come to this new developed area.

### SEW UP



Another concept is that since this river has a great status of Gothenburg, all the activities should be sewed together even if they are in different side. So the transportation system on the river becomes very important.

### SPREAD

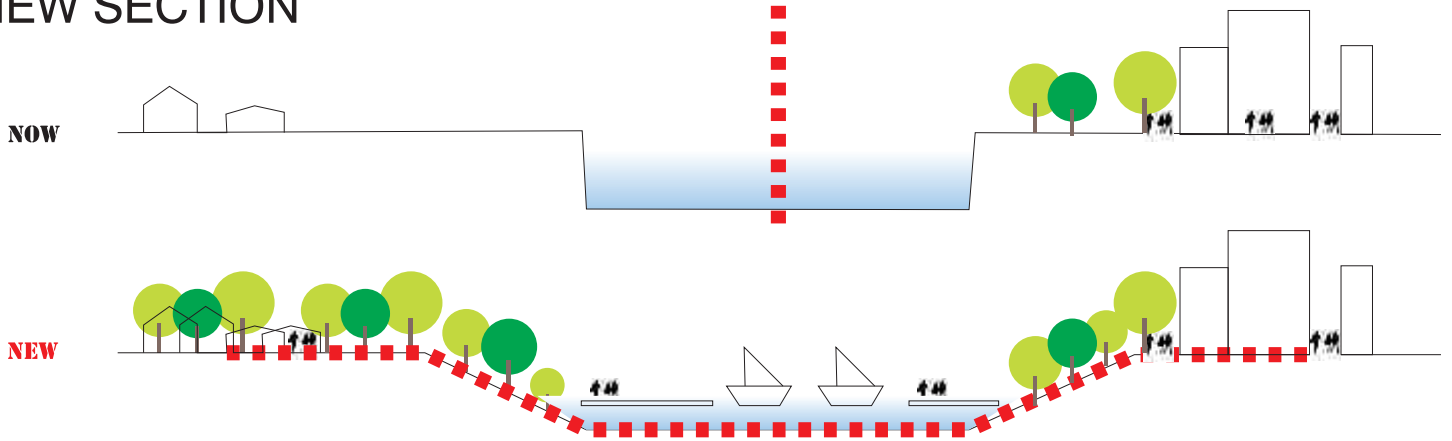


How to connect all the activities including the transportation system? As my design, I will set up a river park which located in Frihemnen as a recreational area. Here also is the central of transportation system so people can easily get this place. This is the park which combined with the technology and natural environment.

Because of the geology of Frihemnen is very weak, there should not place artificial instrument on it. The best way to deal with the program in this area is to recreate a park. This river park can be the lung of Gothenburg and provide the natural activities such as walking, biking in this park and also the boat on the river. People will gathered here during the week day in the afternoon and also the weekend.



## NEW SECTION



The two different section showed that the original circumstances and the new one. Now the river have the very sharp boundary from land to the sea. In order to connect these two side of the river, I try to sew these gap and recover it as the green area so people can be easily reach the water and also accessible to the boat transportation system.

### PEDESTRIAN SYSTEM

### BICYCLE SYSTEM

NORMAL WALKING PATH

MOUNTAIN BIKE

STAIRS AND STAGES

RIVERSIDE BIKE SYSTEM

RIVERSIDE PLATFORM

SPEED BIKE

CAVE SPACE

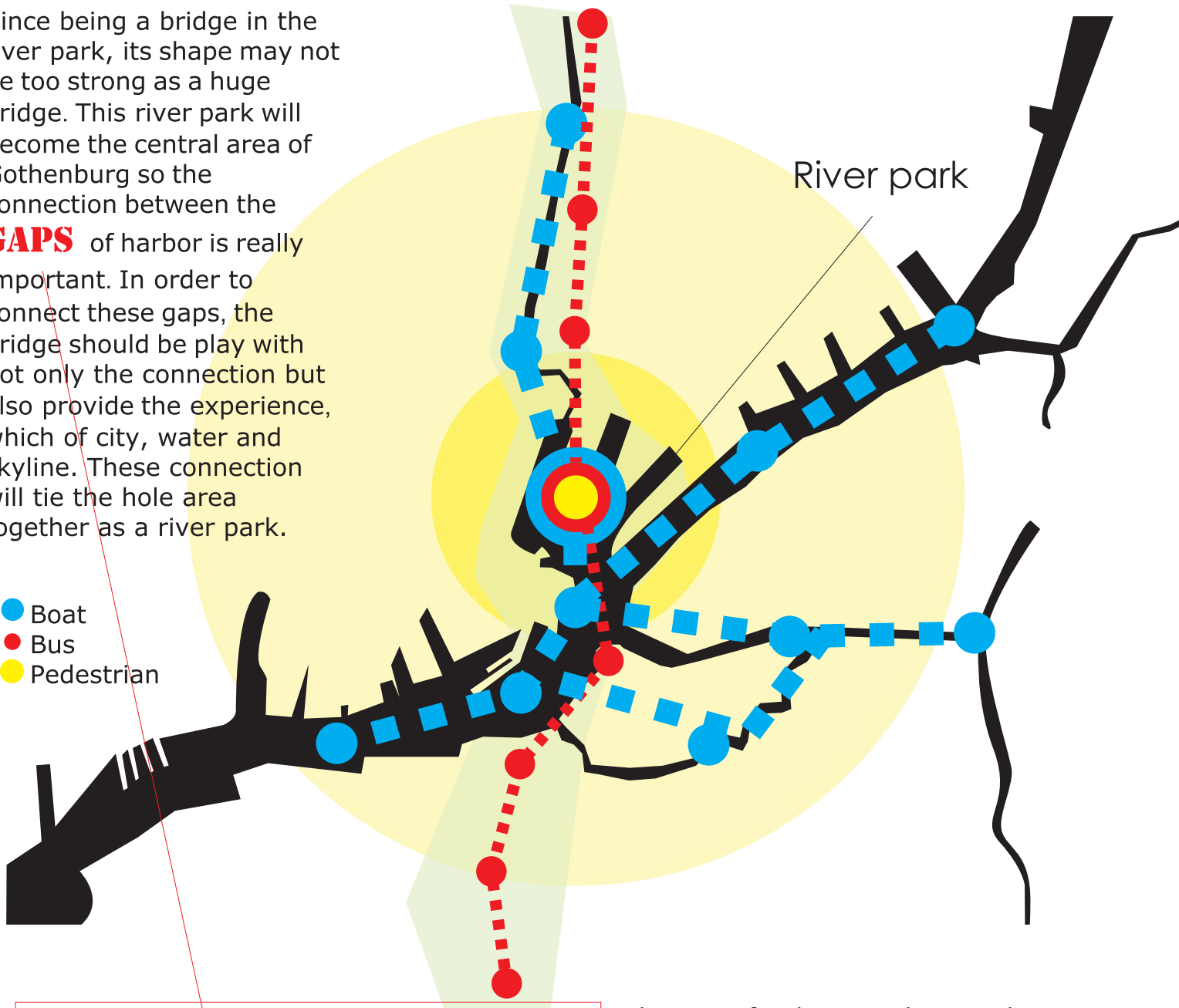
RIVERSIDE PLATFORM





Since being a bridge in the river park, its shape may not be too strong as a huge bridge. This river park will become the central area of Gothenburg so the connection between the **GAPS** of harbor is really important. In order to connect these gaps, the bridge should be play with not only the connection but also provide the experience, which of city, water and skyline. These connection will tie the hole area together as a river park.

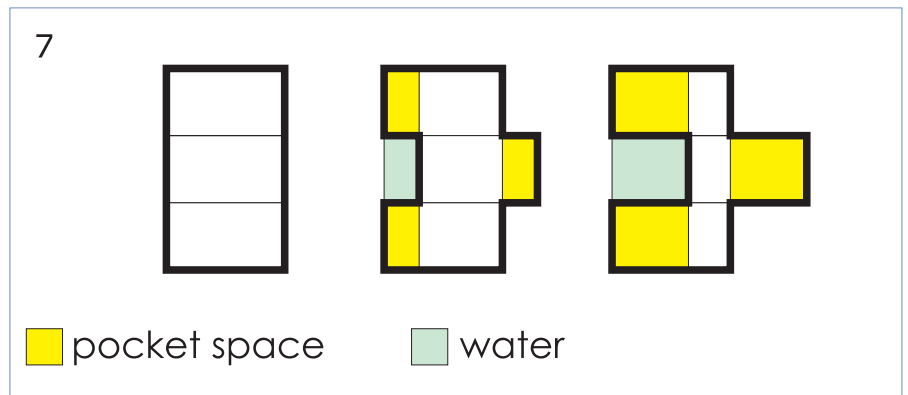
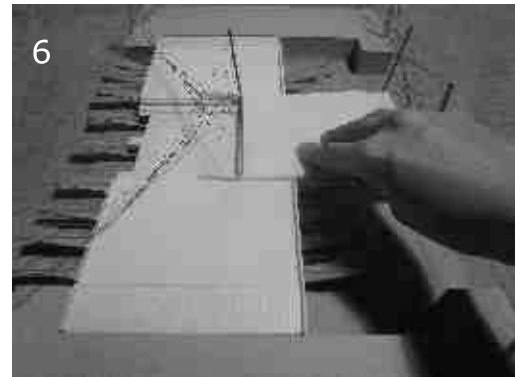
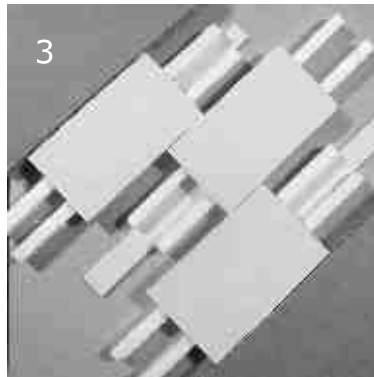
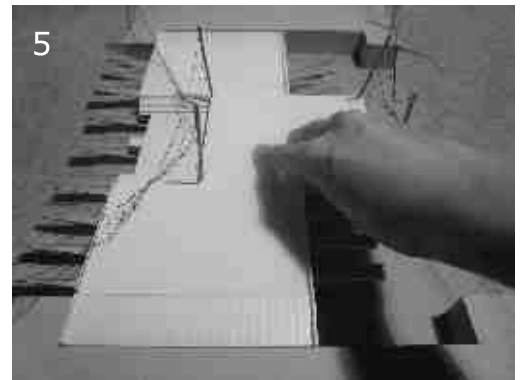
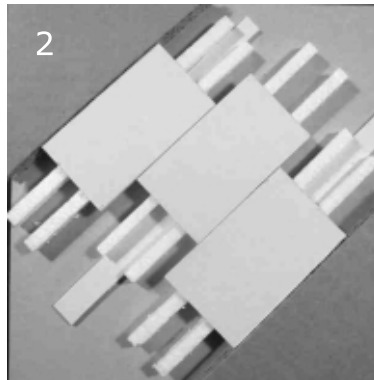
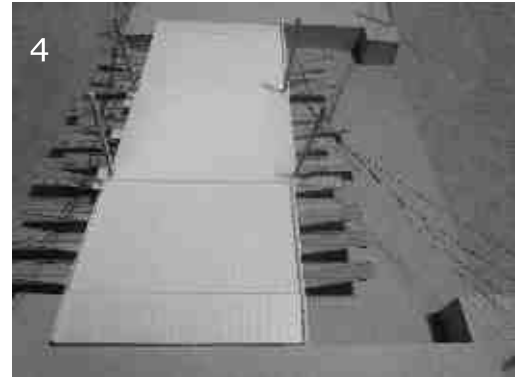
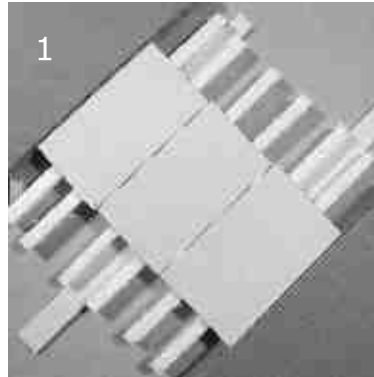
- Boat
- Bus
- Pedestrian



The gap of Frihemnen have to be connected as a complete area.

## CONCEPT MODEL

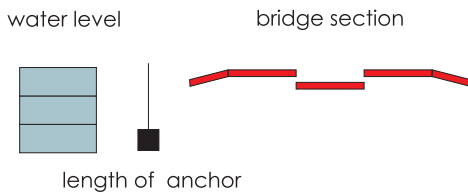
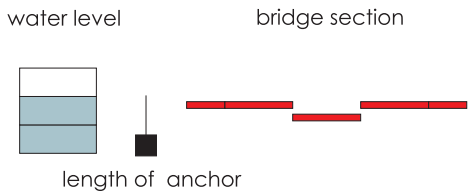
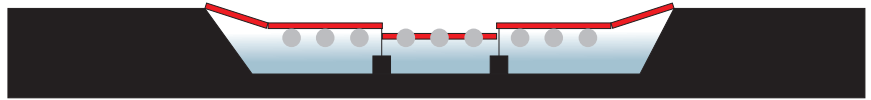
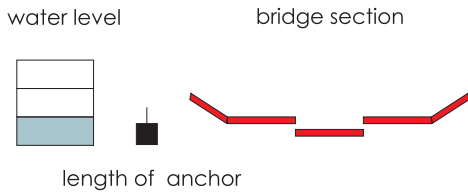
- 1 three flat platform can construct a big plaza
- 2 when the middle board moved, the space of this bridge will be changed and created some pocket space
- 3 from the different movement of these board, the circulation of plaza will be well defined as a narrow passage
- 4 real model
- 5 when it moved
- 6 created the passage and water plaza down below
- 7 concept diagram





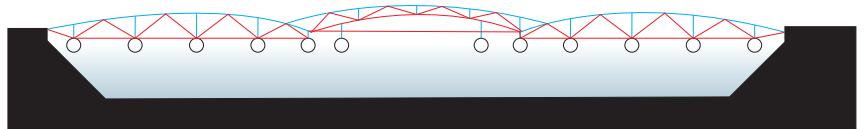
## Different Water level

Since this bridge is flexible, it can stand the different water level. The anchor is used for making the joint more stable and its length can also be adjusted based on the water level.

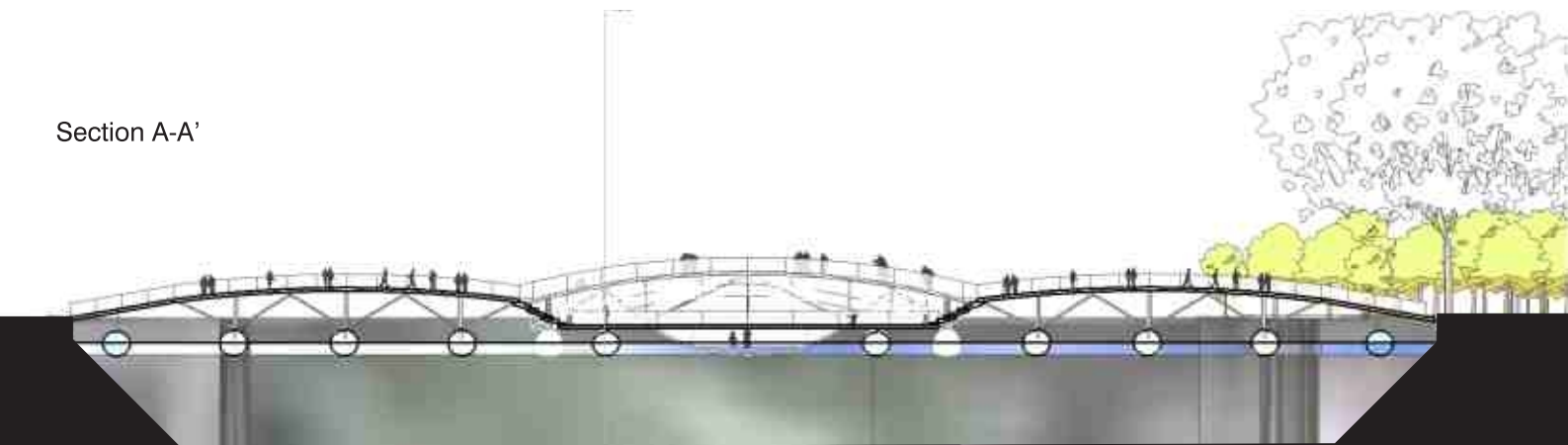


### Structure Analysis

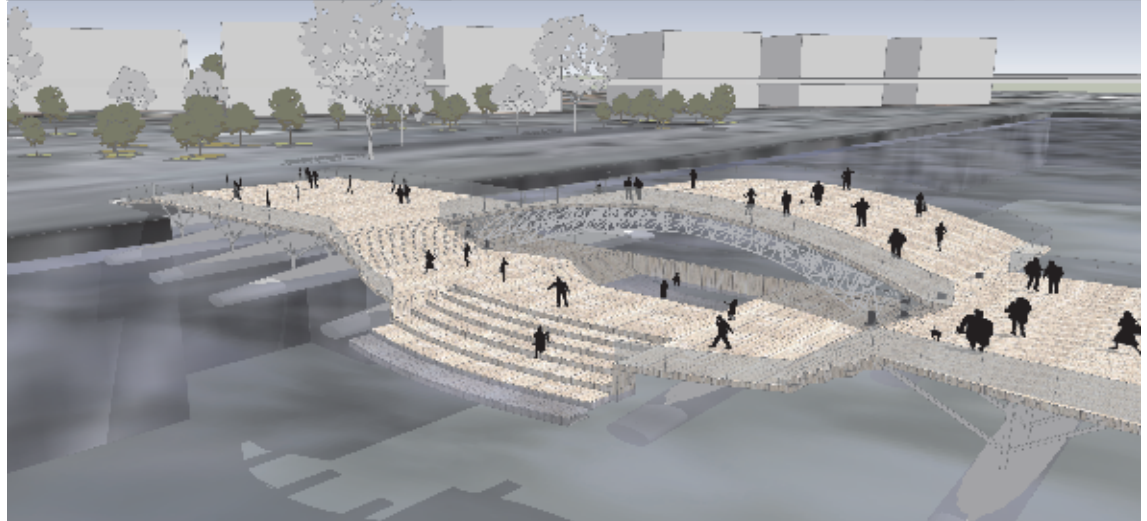
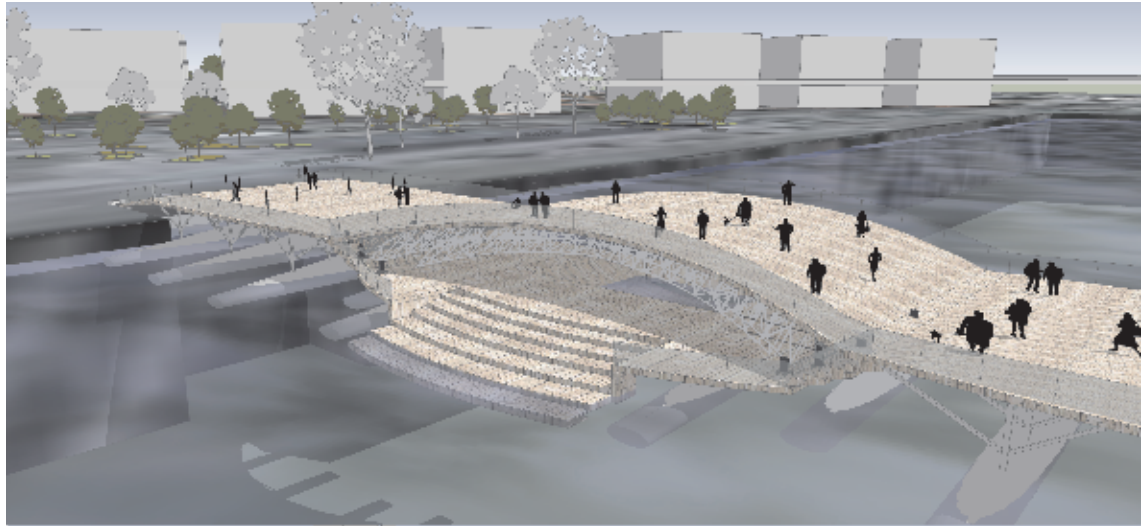
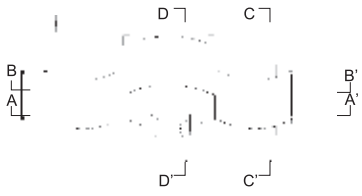
■ Tension  
■ Compression



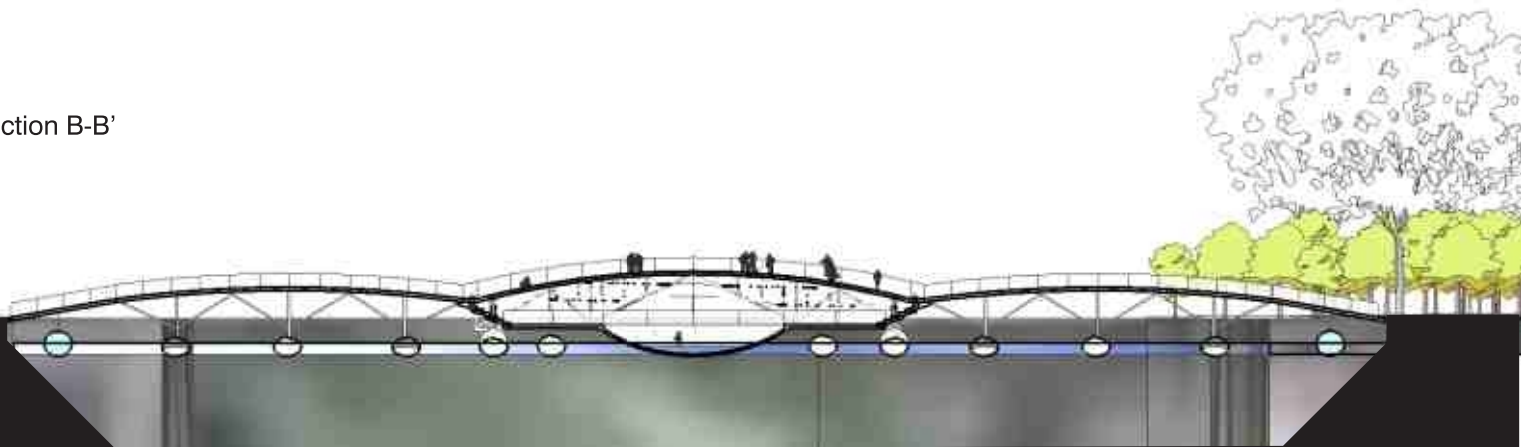
### Section A-A'

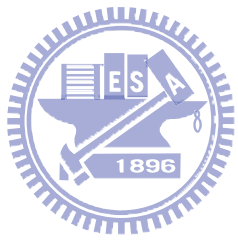


Plan

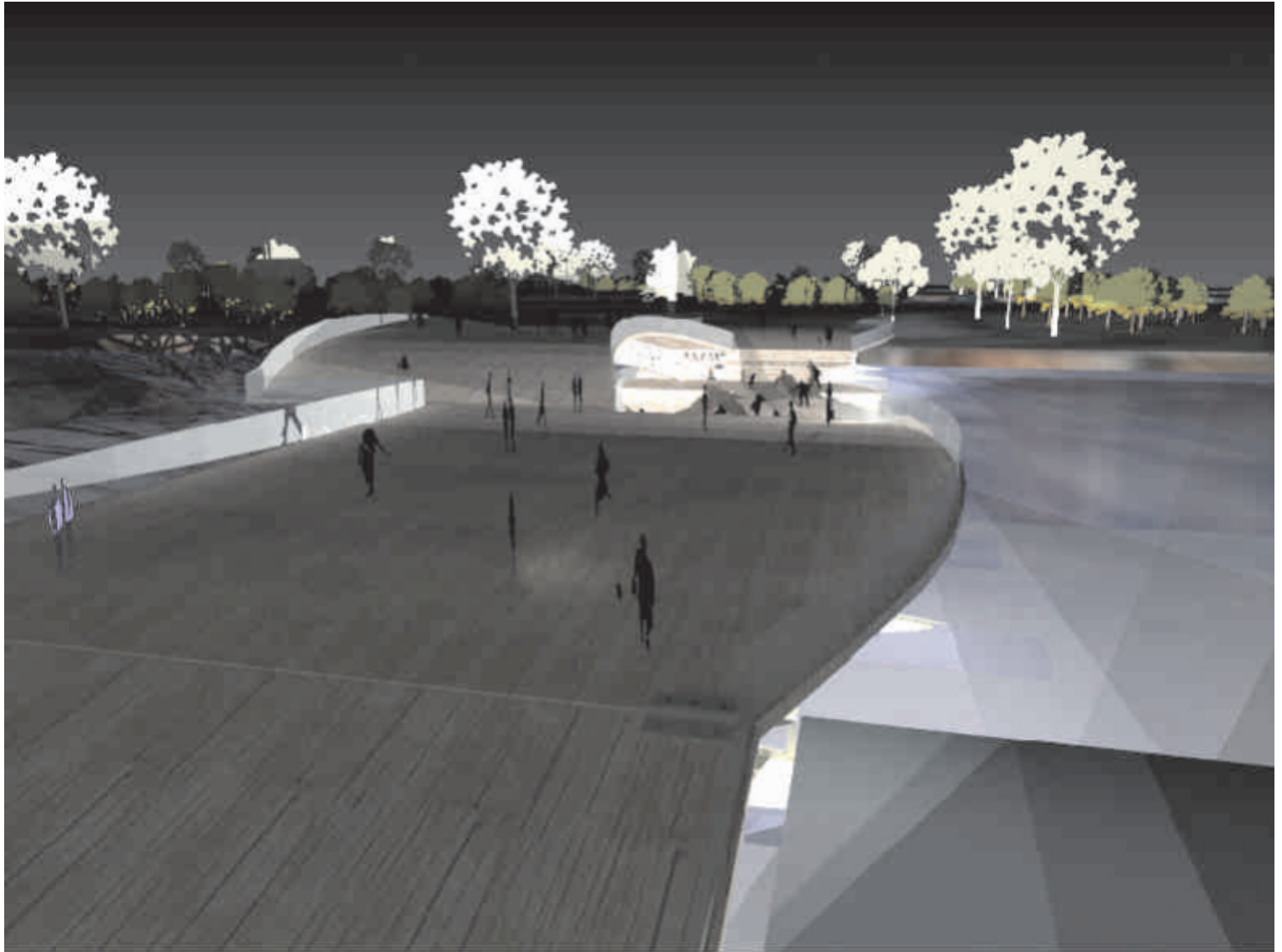


Section B-B'





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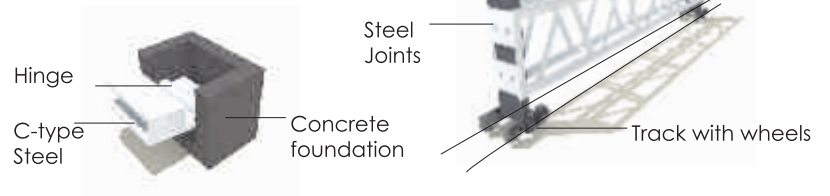


Section C-C'

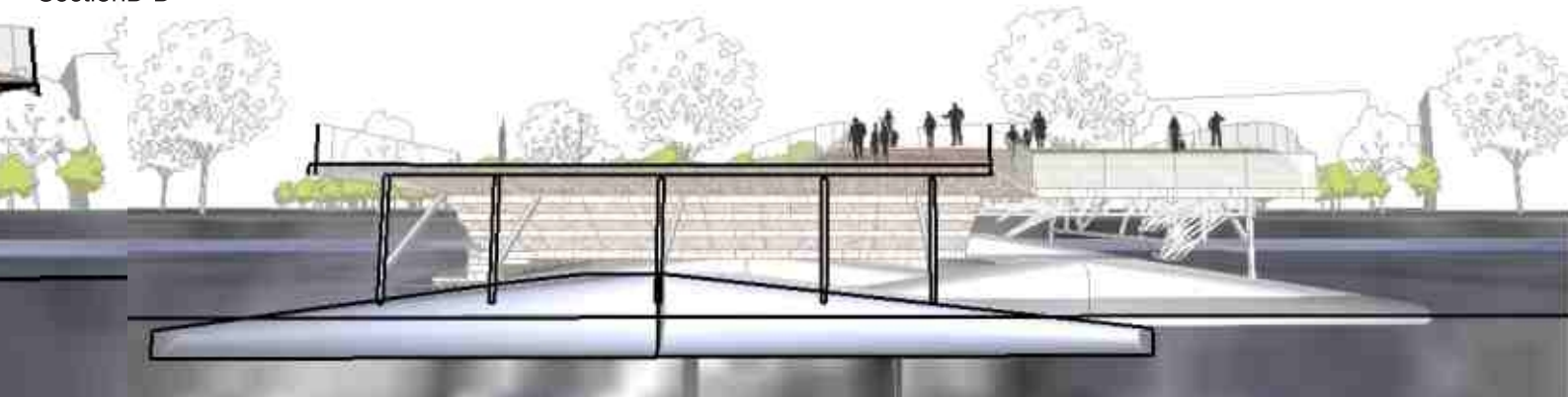




Structure details



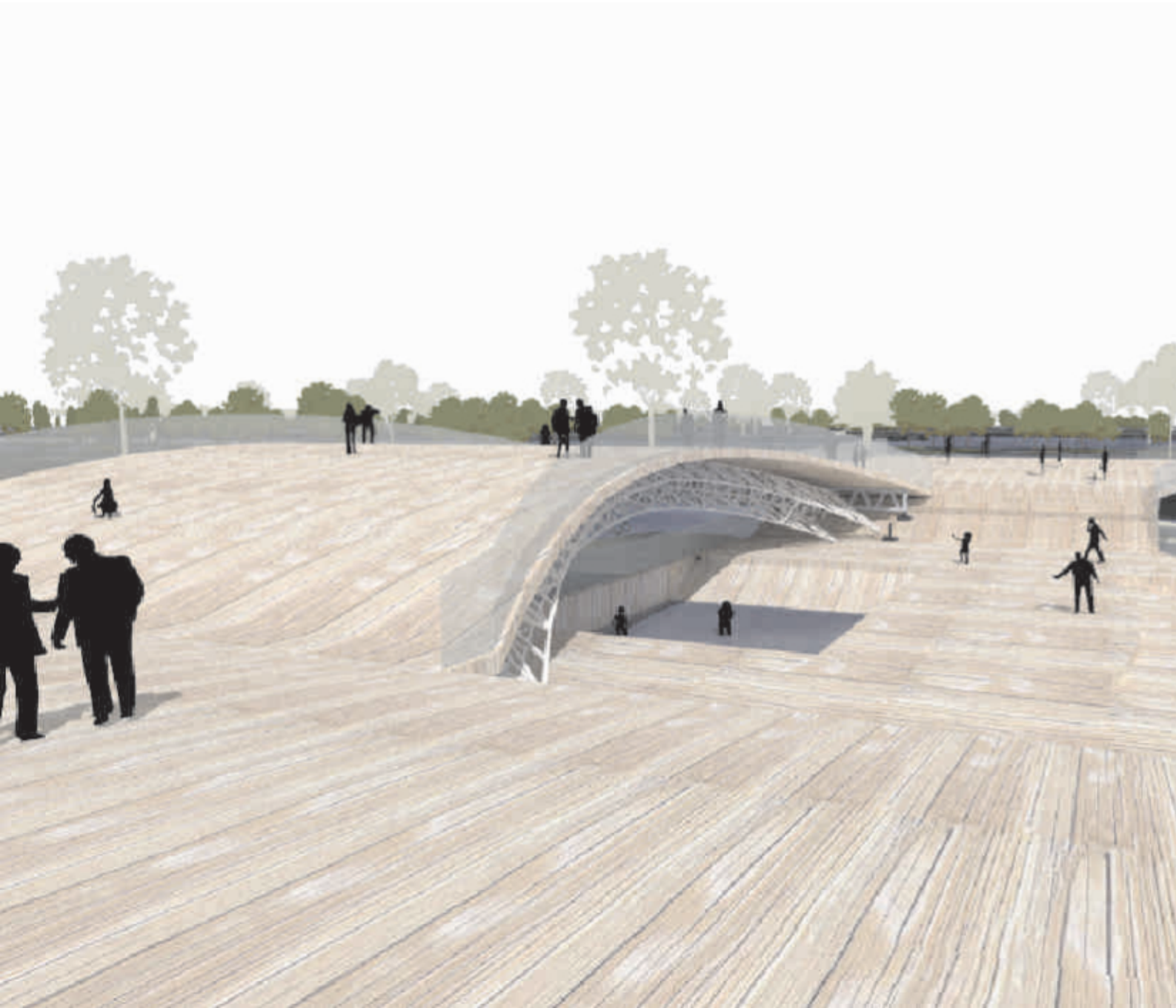
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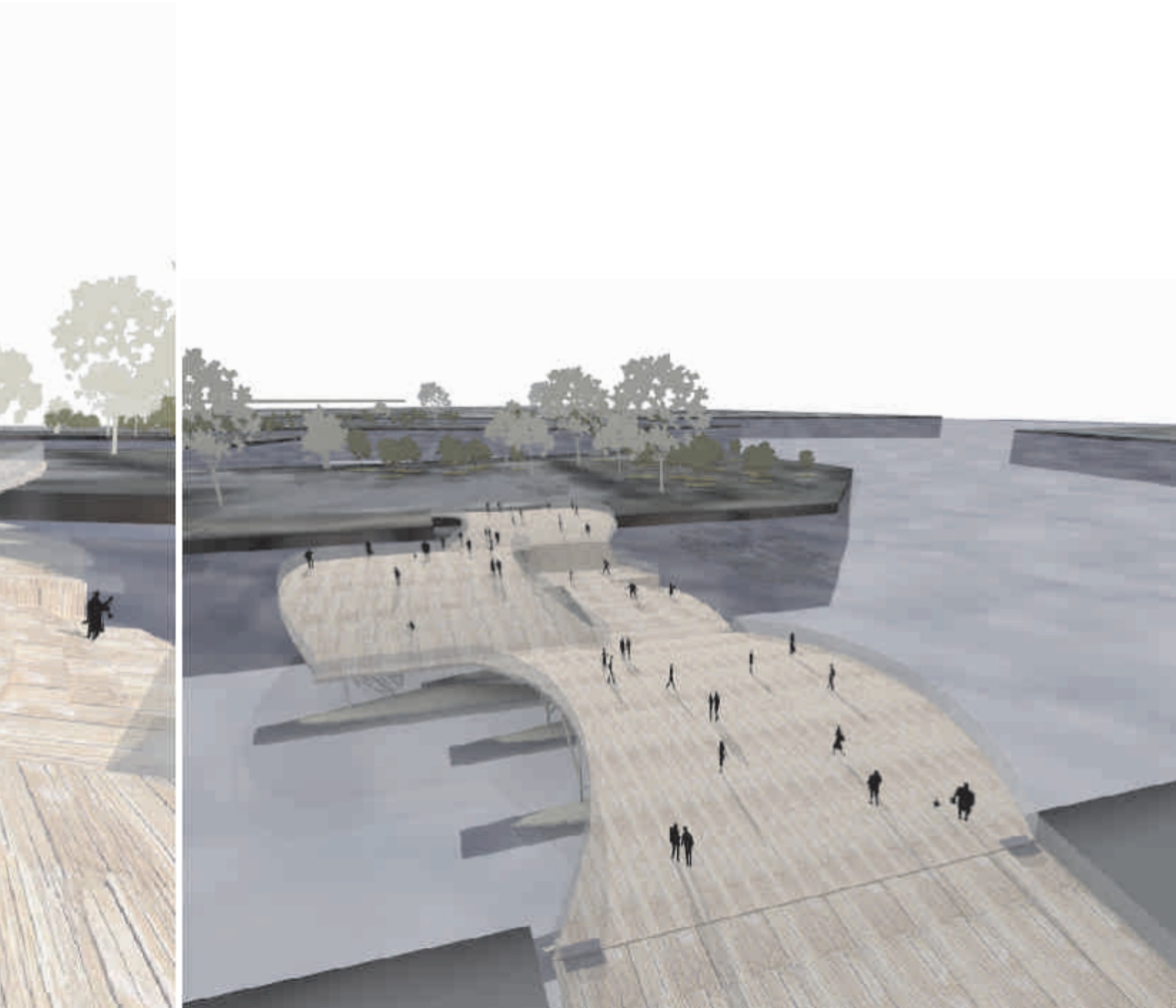


### Different space of bridge

The middle deck can be opened or closed based on the requirements. Children can play in the water which is most close place to the river and pedestrian can walk down to the lower space enjoy the riverside. When the deck closed, pedestrian can walk through this bridge directly and with the interesting movement and different level.

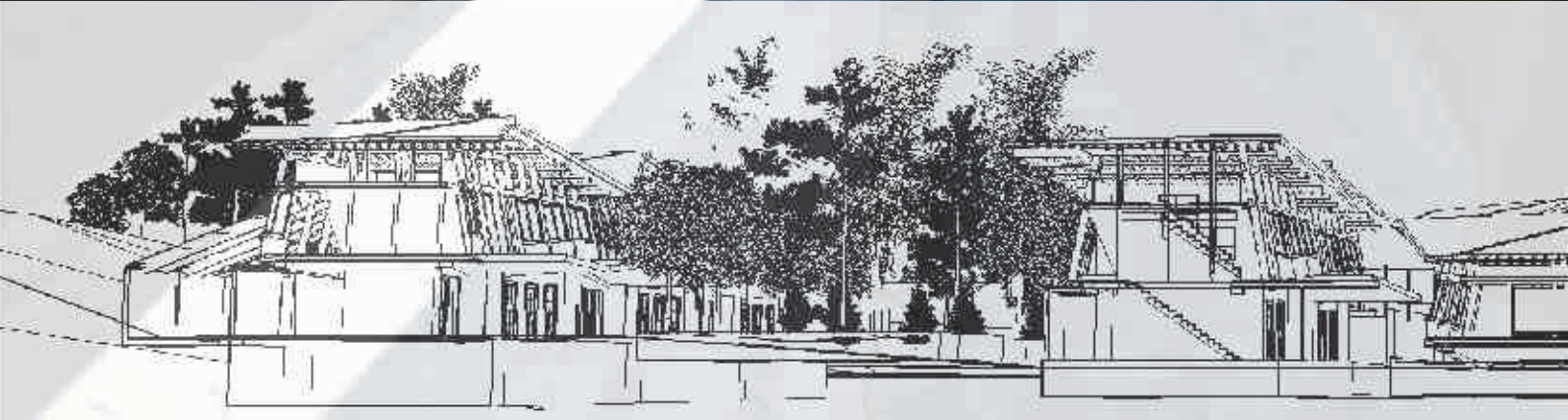
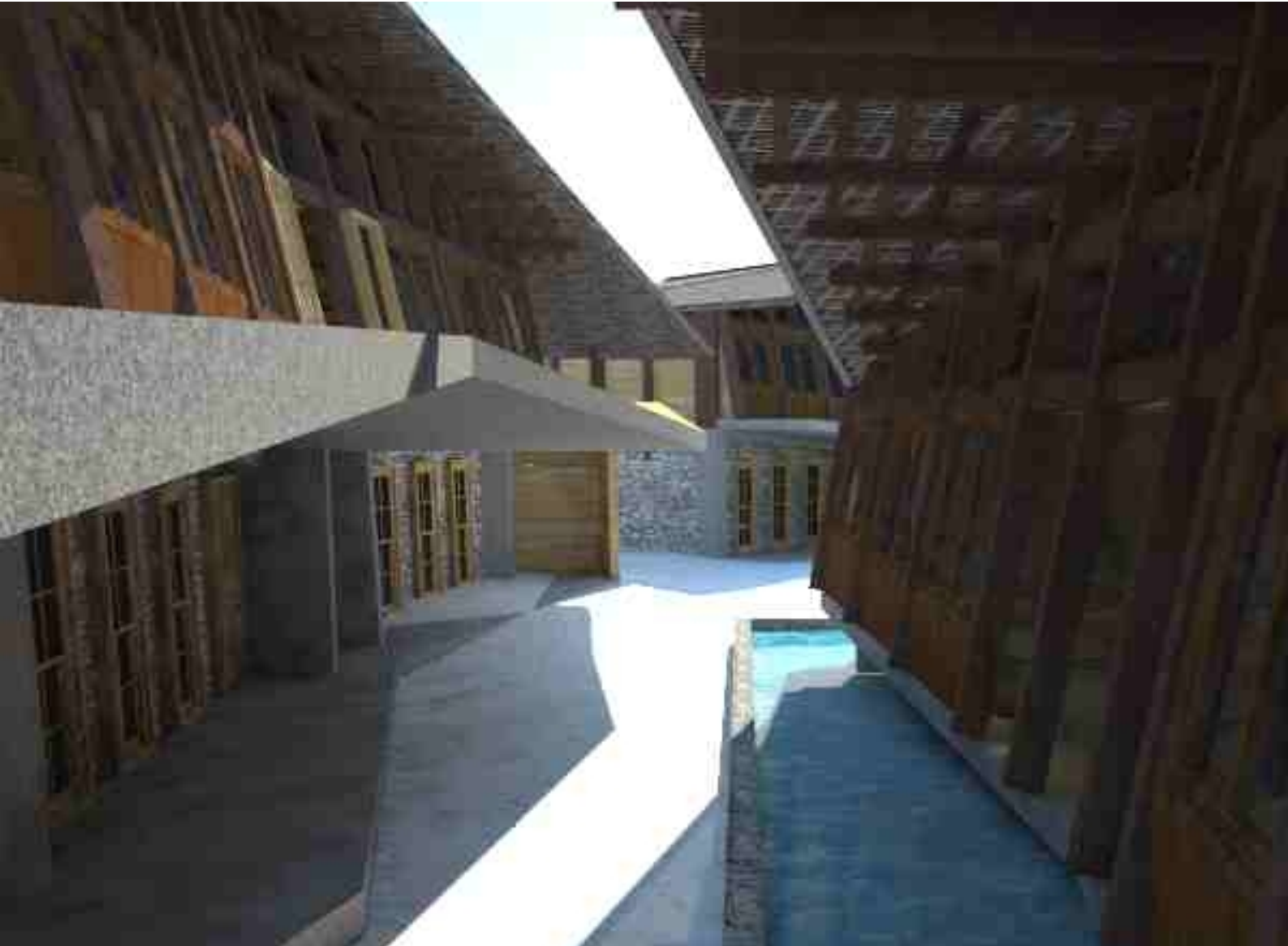








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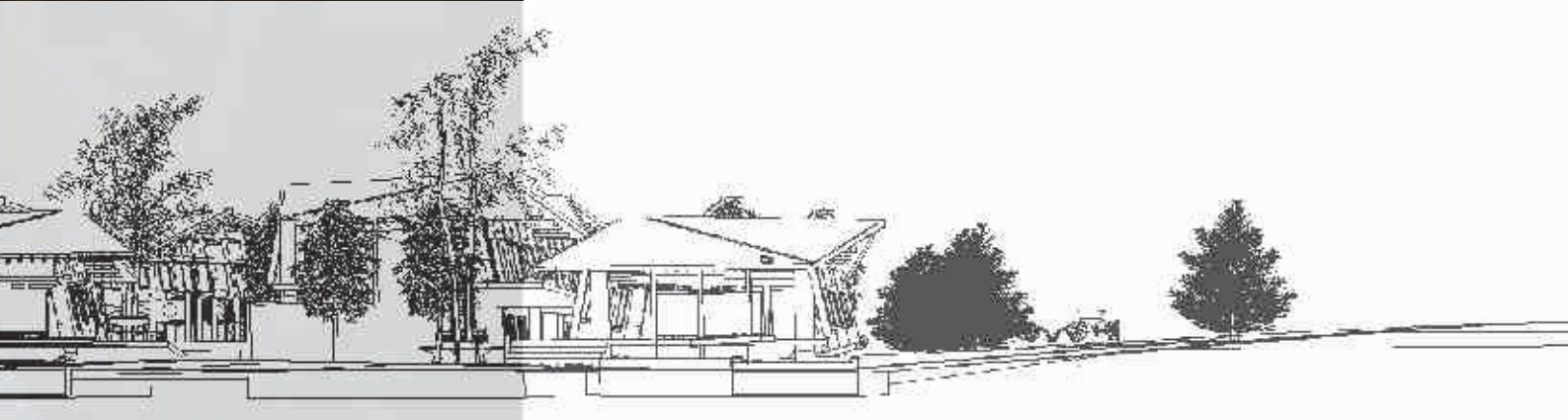


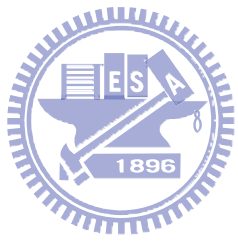


# ONE HOUSE

ONE HOUSE can be a classroom,  
a dormitory and even a school.

Sunshine primary school  
2009 Delta Cup-International Solar  
Building Design Competition





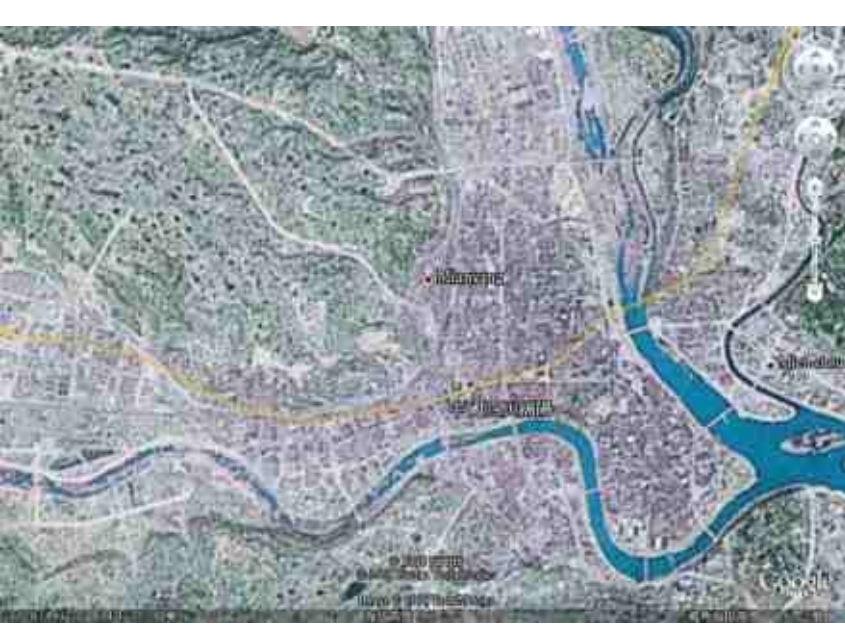
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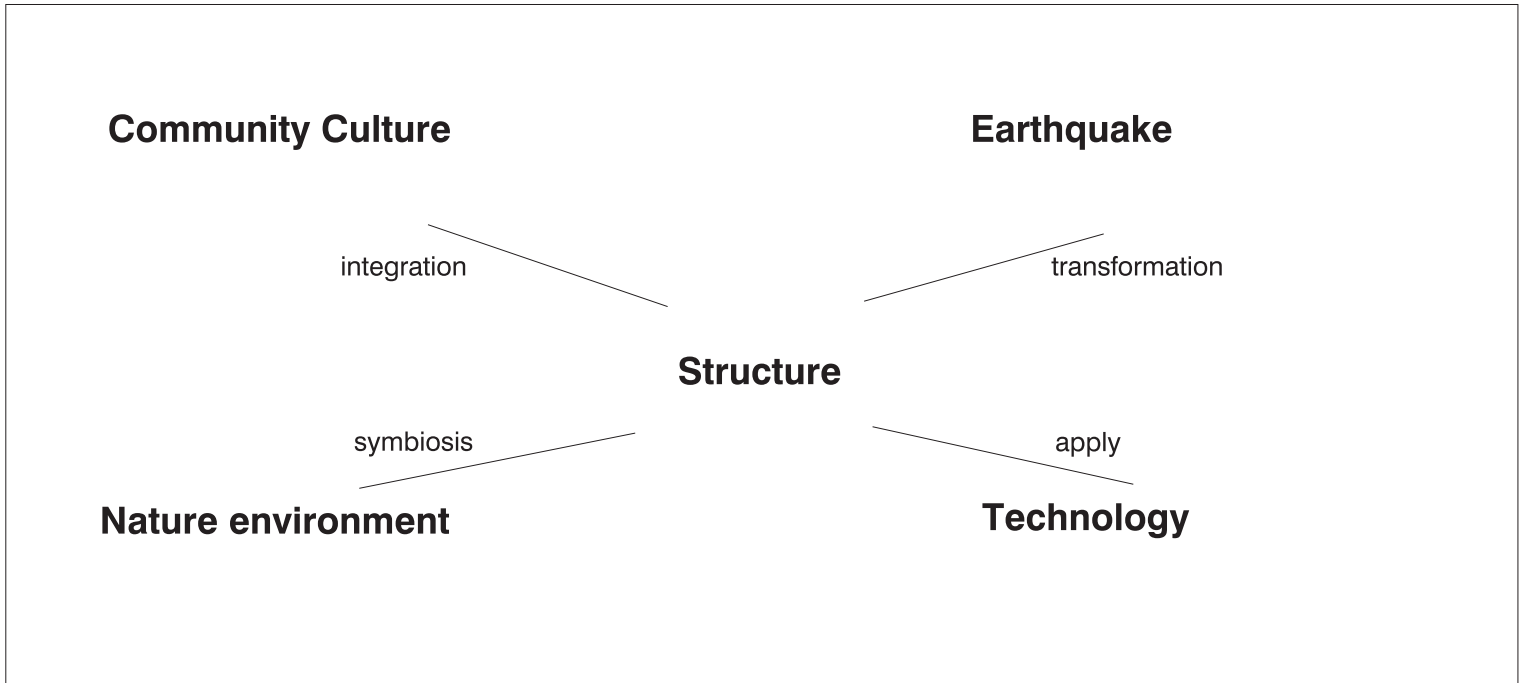
## CONCEPT

As an Elementary school, it should be an learning place that children can feel enjoyable and comfortable . As a shelter after the earthquake, the school should have more connection with the community. The Structure is based on an traditional structure called “chuan-do”, changing to a new style and memorizing the earthquake. This is a combination of wooden structure and new technology, and it is friendly and energy saving .

It starts from a unit, and the space can be duplicate that it can be get with different circumstances and can be changed flexible. Student will feel comfortable if the classroom is more like a home so they can learning well.

作為一個小學，應該是讓學童感到開心而且舒服的一個學習環境。而作為災後重建的避難所，跟周圍社區的關係應該更為緊密。本設計取法四川傳統穿鬥式的木構系統，以一種災後變形的新型態重生把舊有的建築構造與新科技結合，不僅形式讓人感到親切同時也能將能源再利用。從一個單元去衍生各種不同的機能和空間，目的在於希望這個通用設計因應不同地區、不同地形可以有彈性的調整宿舍樓與教學樓採類似設計也能使得學童感覺整個學校像一個大家庭一樣，在一個完整的機能下生活跟學習。





## ISSUE

### Nature v.s Technology

Nature environment  
- Energy conservation  
- Organic



Technology  
- Solar panel  
- Water reuse



### Culture v.s Education

Community Culture  
- Interaction with Dwellers  
- Mutual open space



Educational space  
- Wooden structure  
- Friendly

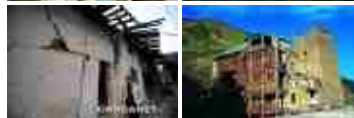


### Earthquake v.s Memory

After Earthquake  
- Deformation  
- Change or keep



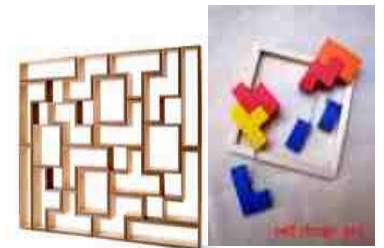
Traditional Building  
- Village  
- Lower floor



### Style v.s Place

Style  
- Old but new

Place  
- Can be applied in any site  
- Easy to display  
- Flexible program





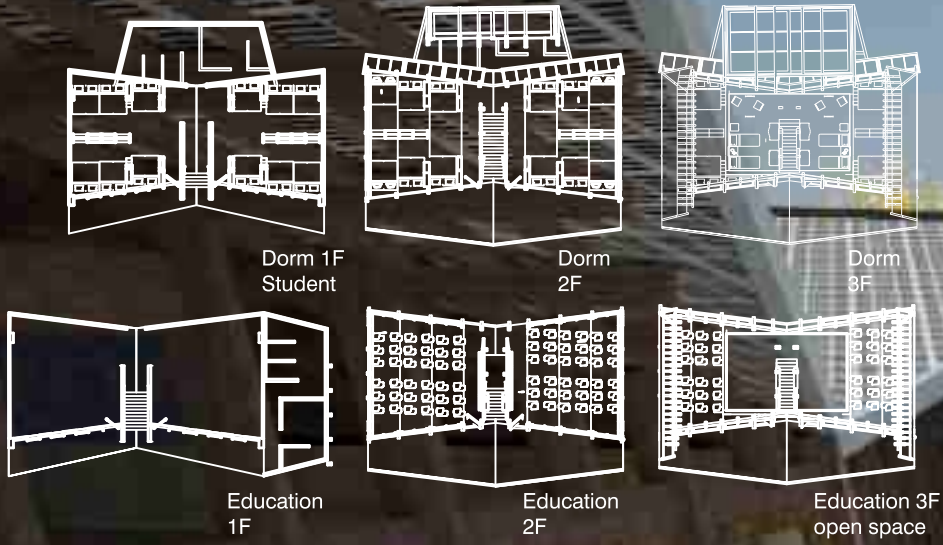
## Traditional Structure

Keep the old structure but transfer in a new style  
Maintain the image of a village but come out a new school





Plan



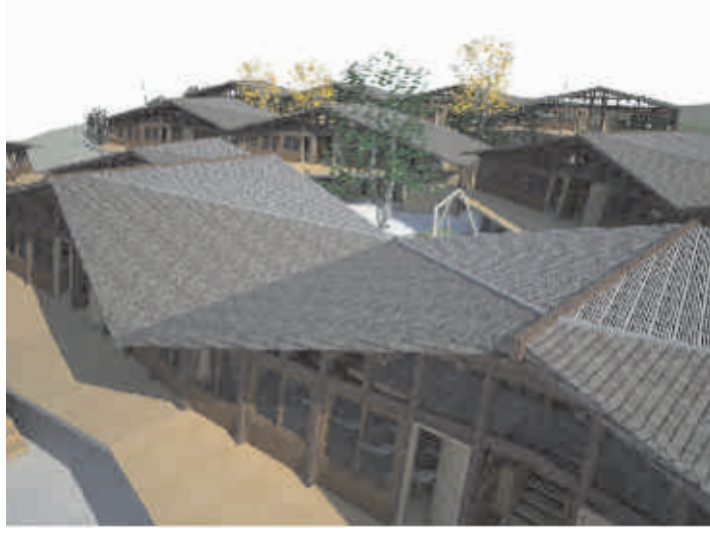
Section



Explosion of unit









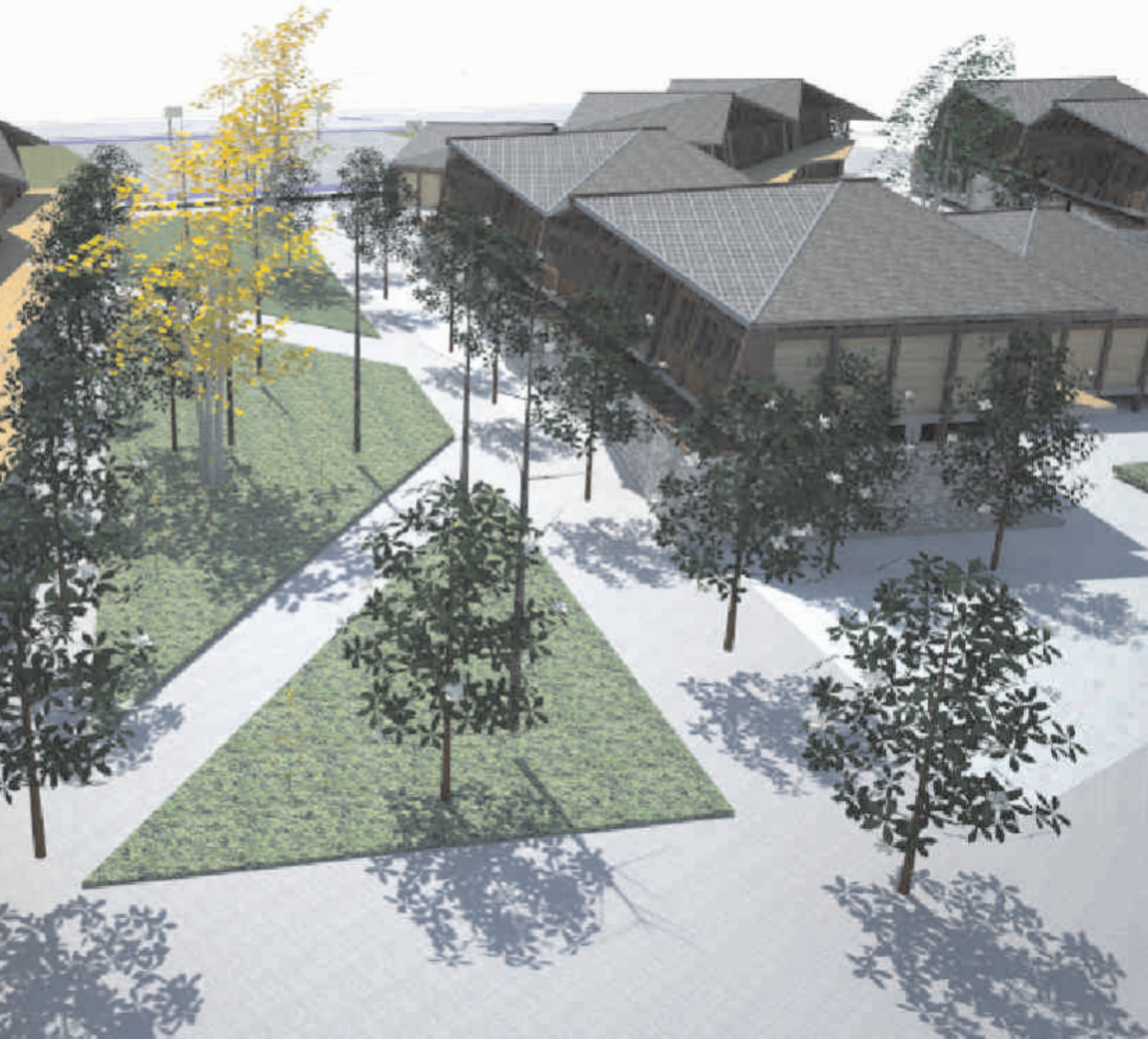
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Site plan



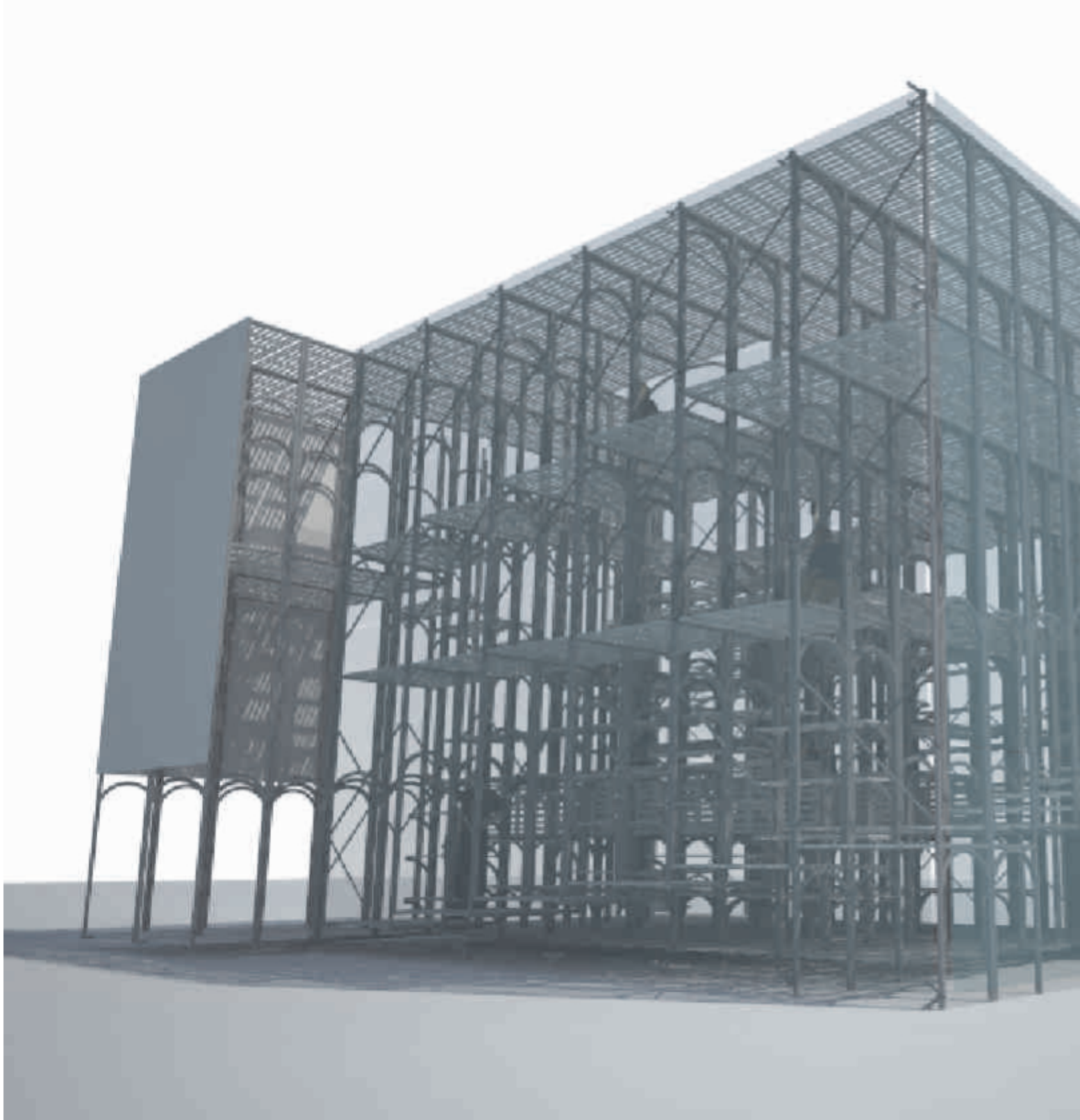
Use of solar panel

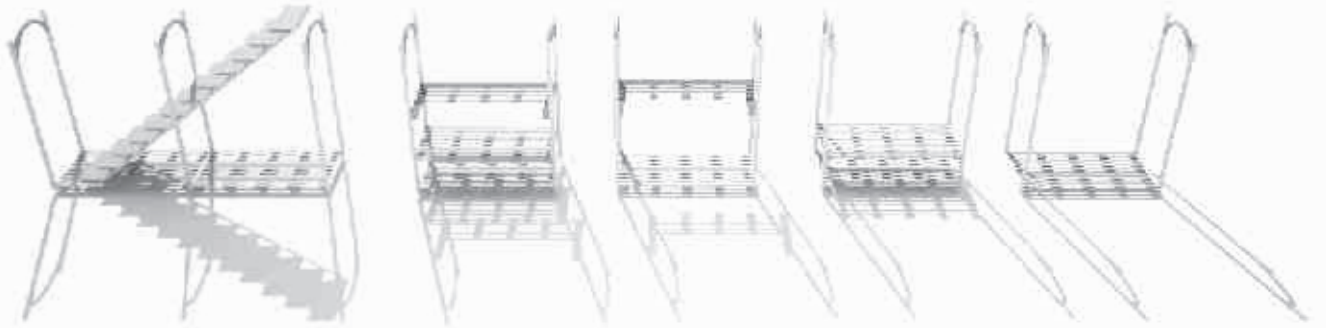






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# Complex shopping store

7-11, MUJI and eslite bookstore



# Shopping as an evolutional space

從熙熙攘攘的傳統市場，到現在精緻化後一應俱全的便利商店，市場的機能與行為不停的在轉變。  
戶外的傳統市場，有著消費者和供應者最直接一對一的接觸，殺價或是或多要兩根蔥都是購買的樂趣，彼此接觸的互動也多。  
到了凡事講求方便、迅速、效率的現今，一間便利商店剩下一個店員，消費者將東西自行拿取至櫃檯結帳，對話只剩下一句確認價錢。  
這當中太多的環境因素、人為因素。因為對市場消費環境品質的要求提升，傳統市場既有的髒亂印象，讓年輕的上班女性望之卻步。  
一般的便利商店更是成為每個人生活中不可或缺的一部份。儘管是只有幾坪的空間，卻足以供應食物、飲料、簡餐。這也意味著現代生活環境改變、生活需求改變，消費的型態就會改變。而這些改變造就了各種不同型態的市場，有些還苟延殘喘的存在著，有些則是人們不再外出買菜，不再討價還價，而是對著電腦螢幕按下滑鼠。而市場這個名詞也從一個實質空間轉變為虛擬消費的代名詞。

不同的機能定義了不同的消費方法，而人如何去消費空間？如何讓需求的改變去置換空間？

## Taipei city market Administration office

model traditional market 公有零售市(商)場 - 54 places  
wholesale market 批發市場 - 10 places  
supermarket 公有超市 - 35 places

**饒河街觀光夜市**  
本府的公運安會都決議照例上週泰通路。且於10月25日16時府建字第150913號函准設立。



**寧夏夜市觀光協會**  
82年10月20日北北市市函字第11318號函准成立。位在臺北市大同區寧夏路(南京西路與民生西路間)，旁邊有衛生所、醫療市場、合作社等等，長約400公尺，寬約15公尺，面積約6,000平方公尺。

## Taipei city market Administration office SIGNBO

model traditional market 公有零售市(商)場 - 54 places  
wholesale market 批發市場 - 10 places  
supermarket 公有超市 - 35 places

**東門市場**  
民國17年建設啟用，78年本館改建為鐵皮屋，以傳統市場型態販售各項生鮮食品、日用品，並以販售黃牛肉及標榜活海鮮聞名。



**光復市場**  
現址以前攤販聚集，經市府徵收市場用地於民國50年市場開幕，77年重新整修，共有56個攤位，攤商來源：原址營業攤販及四四西村攤販集中場。

## Taipei city market Administration office B2B

model traditional market 公有零售市(商)場 - 54 places  
wholesale market 批發市場 - 10 places  
supermarket 公有超市 - 35 places

**臺北花卉批發市場**  
原位於濱江市場2樓，因濱江改建，於民國86年5月15日搬遷至現址—內湖區瑞光路臨時增設案



**第二果菜批發市場**  
地下三層為交通局停車場管理處配合興建公共停車場。地下二層市場專用停車場。地下一層為冷藏庫。地上一層蔬果等批發。地上二

## Taipei city market Administration office BRA

model traditional market 公有零售市(商)場 - 54 places  
wholesale market 批發市場 - 10 places  
supermarket 公有超市 - 35 places

**天母頂好**  
蔬果、生鮮、日配及各式食品一應俱全

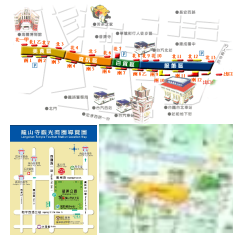


**延吉全聯福利中心**  
蔬果、生鮮、日配及各式食品一應俱全，並附設花市等等。

## Taipei city market Administration office UNDERGRO

model traditional market 公有零售市(商)場 - 54 places  
wholesale market 批發市場 - 10 places  
supermarket 公有超市 - 35 places

**站前地下街**  
82站前地下街位於南陽街與重慶南路間之忠孝西路正下方。本地下街春修安置原中華商場遷戶二千五百戶，本商場為台北車站地區內人潮搭乘台汽、台鐵、捷運時必經之路，亦為各地搭乘上述交通工具而來之人潮到本地區各商舖舒適便利之路。總面積一、五五、二九平方公尺規劃十七間店舖。商場另設有六處廣場，提供辦理各項公益及商業活動，提供市民及旅客優良之休閒購物環境。

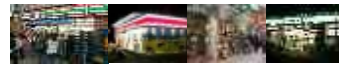


**台北地下街**  
台北地下街商場，東端與捷運淡水線台北車站連通，南端與台北車站前接，沿線提供二十七個連外通廊，充分發揮地下通道及疏散轉運人羣功能。本地下街商場共規劃一八七間店舖，審核定安置原中華商場遷戶八〇〇戶，現僅存八〇〇戶。經營業種涵蓋乾貨、電子、百貨及服飾等四大業種。另商場設有九處地下廣場，其中三處設置採光天窗，提供市民休憩購物之良好環境。

## Nowadays SPOT

convenient store 便利商店 - more than 9300 stores

**便利商店**  
店面數量 截至目前為止，臺灣主要便利商店店面數依排名序為  
(資料來源為各該商網站)  
I-11: 4016家(2008/1/29)  
全家: 3811家(2008/1/29)  
(2008/12/31)  
萊爾富: 1242家(概數)  
OK: 800家(概數)



**網路購物城**  
網路拍賣是通過現代高科技的 網路技術實現的一種新的物品買賣與交易的方式。這種方式的優點在與其不受時間地點的限制，只要你的電腦可以連接網路就能實現。這中新的交易方式是在網路技術達到一定水平的時候才能安全有序的發展。

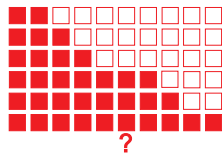




的例行公事，結帳完便快速離開，結束。  
儘管傳統市場價格低廉，販售種類繁多，她們仍然重新選擇了方便但高價的超級市場。  
人對於飲食的要求降低，才會有微波食品的出現。  
像雨後春筍般的越開越多間。而現今最流行的網路購物，更是開啟了消費型態的新一頁。說不定從此之後，

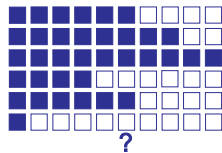
**Environment quality**

- model vender market 攤販集中場
- wholesale market 批發市場
- model traditional market 公有零售市(商)場
- supermarket 公有超市
- underground mall 地下街商場
- convenient store 便利商店
- Internet shopping store 網路購物城



**Space**

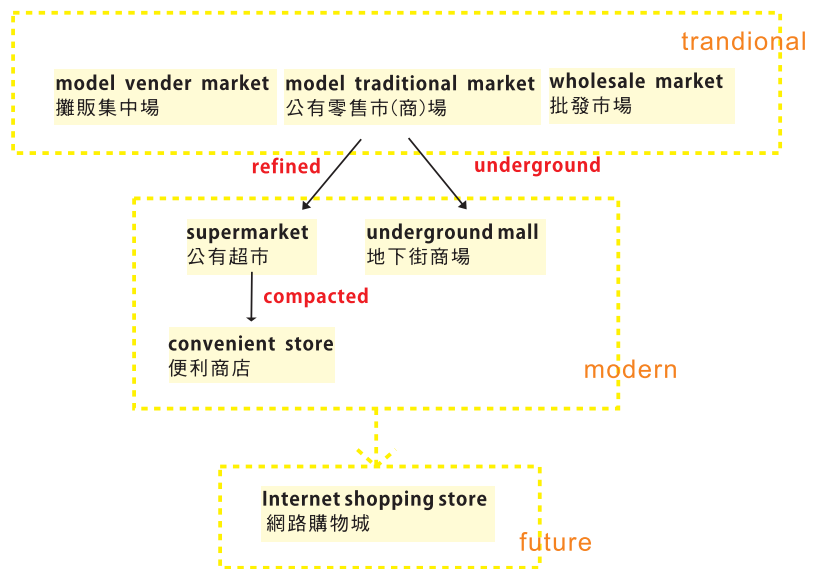
- model vender market 攤販集中場
- wholesale market 批發市場
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浪板 木材 鐵 帆布棚架 RC 招牌 冷藏區 價目表 室外 室內

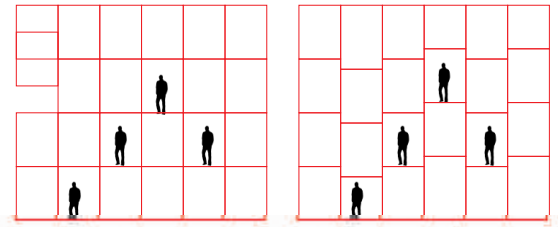
**Construction**

- model vender market 攤販集中場
- wholesale market 批發市場
- model traditional market 公有零售市(商)場
- supermarket 公有超市
- underground mall 地下街商場
- convenient store 便利商店
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Space section diagram

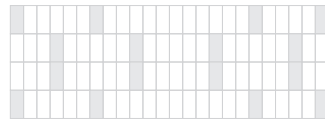
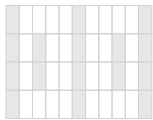
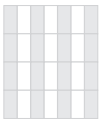


Type Of Space

7-11

MUJI

eslite bookstore

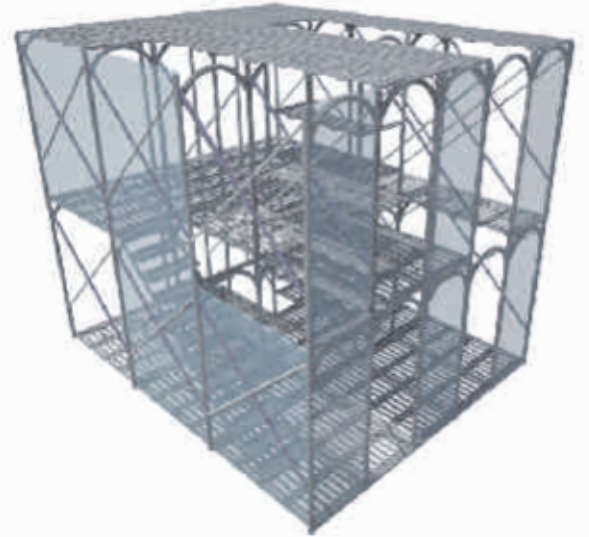
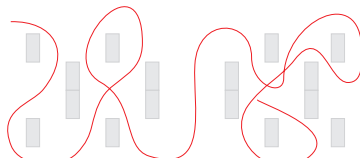
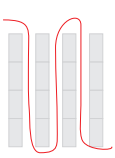


Circulation

7-11

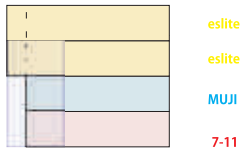
MUJI

eslite bookstore

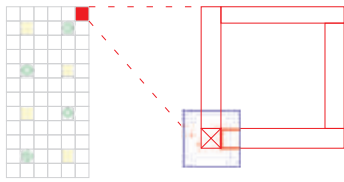




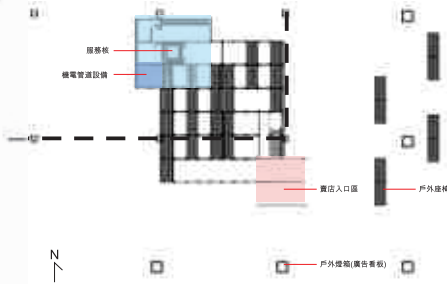
Layer diagram



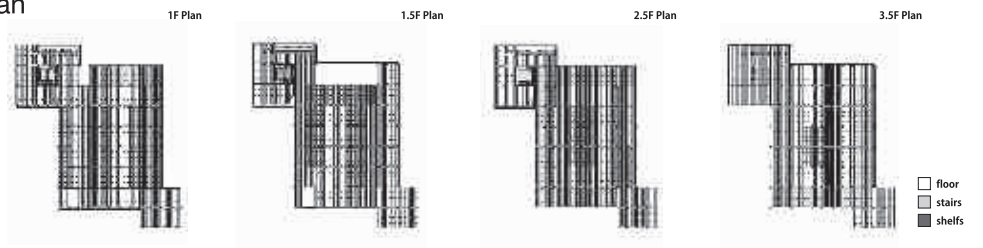
site plan diagram



ground floor plan



Plan



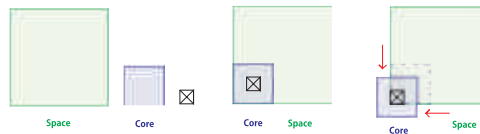
Elevation



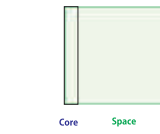
Section



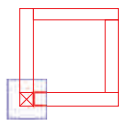
Space plan diagram

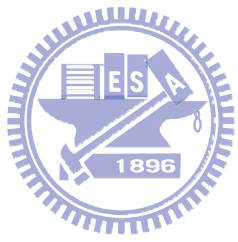


Space Section diagram

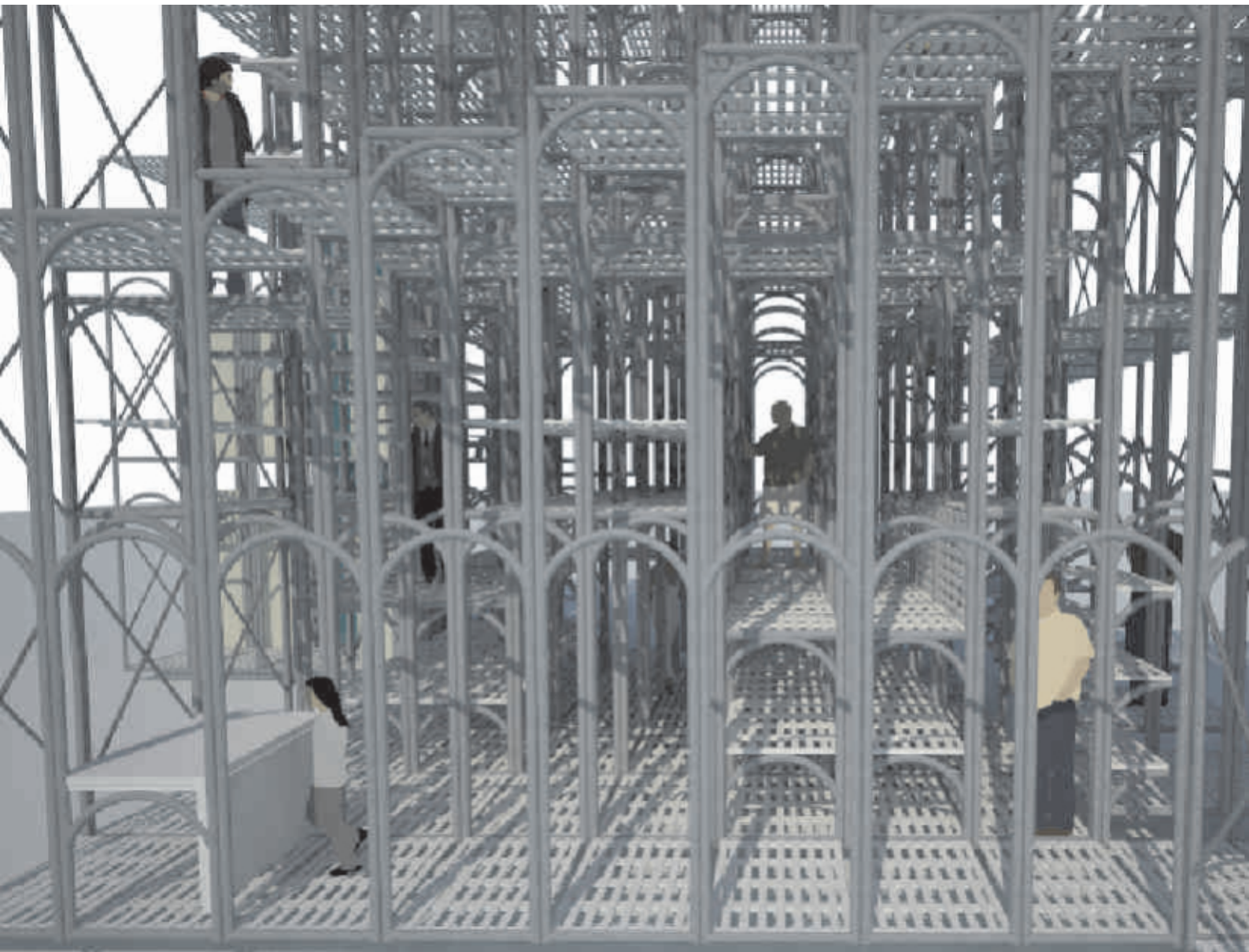


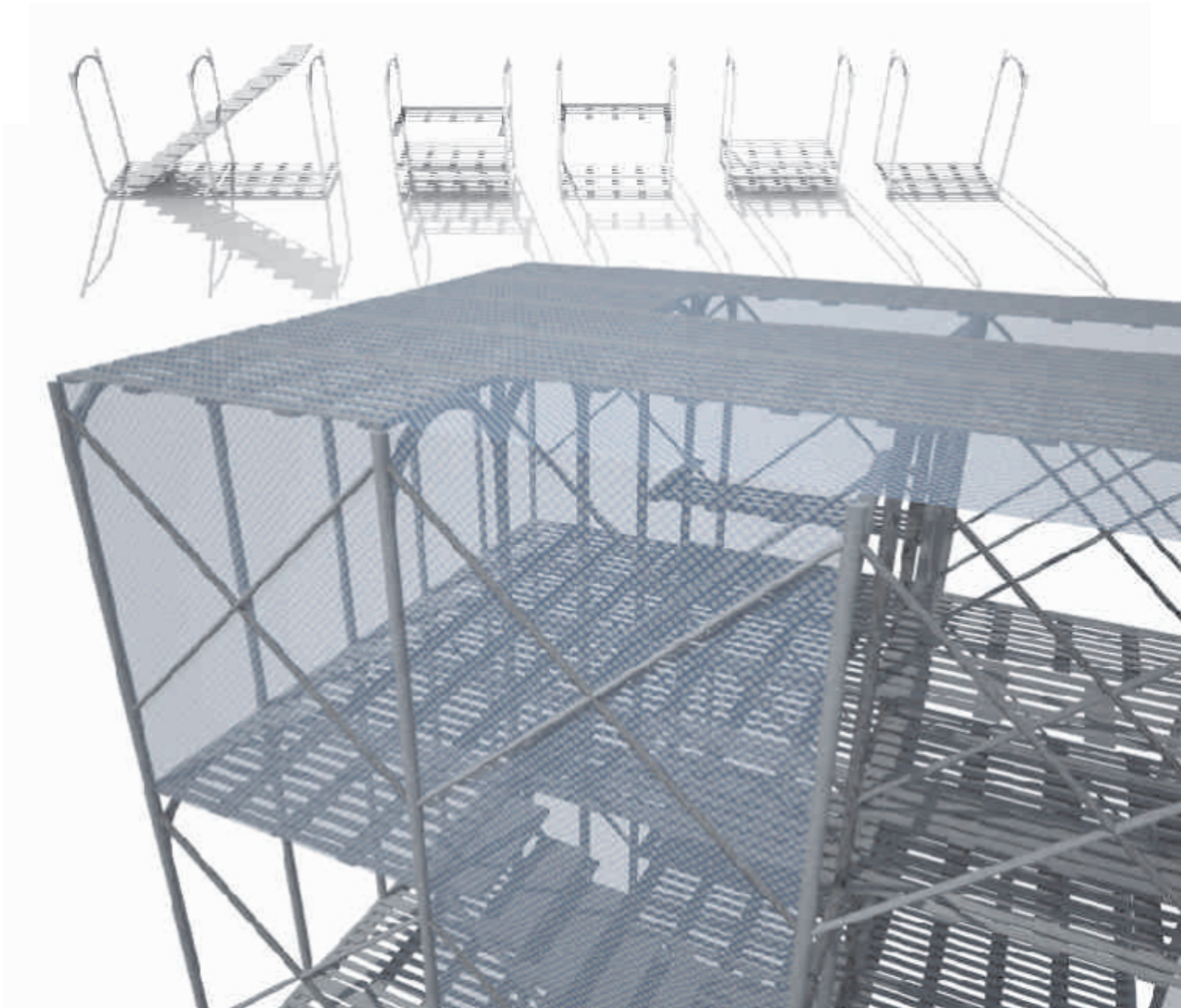
circulation diagram





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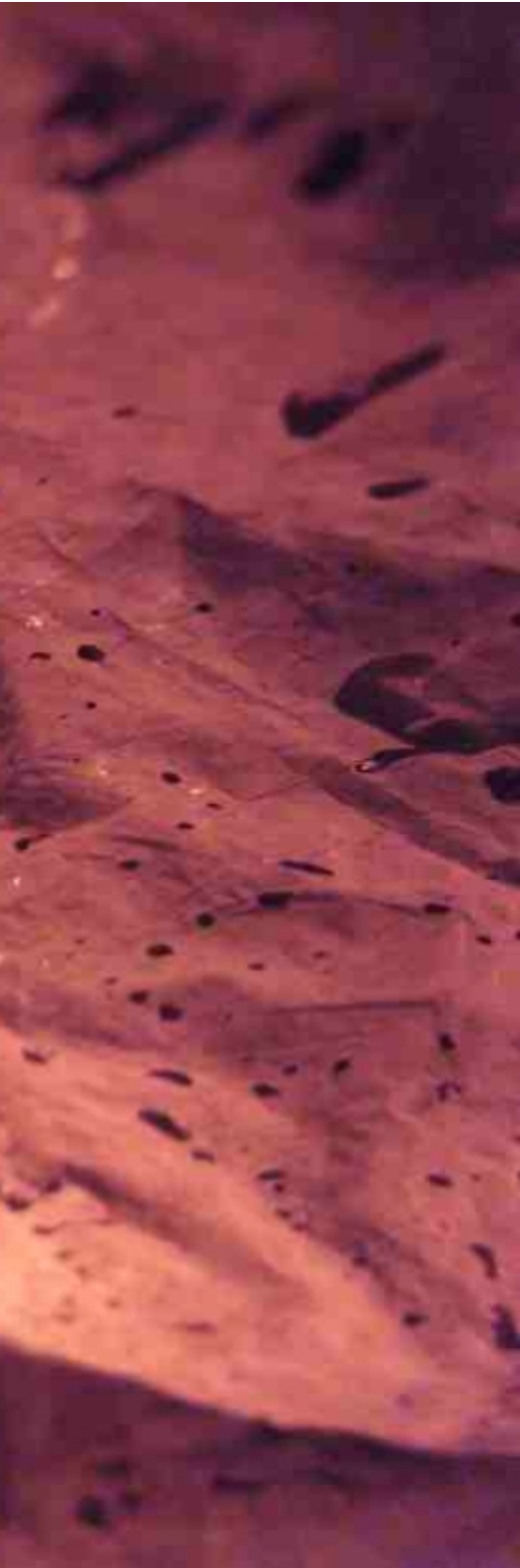
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National Chiao Tung University

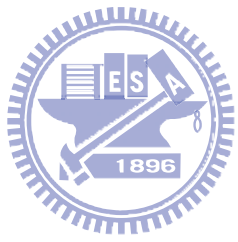




# Workshop\_Concrete flesh\_The layers

Concrete is a sensual material. The steaming fragrance from the pouring the reverberant sound from the hard crust - the vertical pull from gravity in the solidifying mould - the soft topography of curves and the silky surface





## All About Casting

In this workshop, the most special experience is that we can really try every step of casting and plaster and another group try to make some surface experiments. Then when we combined together many discussions, the final results comes up and it is fantastic! The concept about our layer is to have holes. With these four layers, the concrete model have the thickness can stand by it self and also



work as a group. At the beginning, our group try to make some wrinkles of  
together, we decide to develop one of our study model as a big concrete one. After  
that we put some stuff below and use its shape to create the different hills and  
to create the special space.



Study model of plaster



Testing process



Final plaster model



## Drawing process and final drawings



The first drawing which represented the imagination from our concrete model. The space between the two layers will have the different scale of hill or holes. People can sit on the side and enjoy the view outside or these holes will become a swimming pool.



We use plastic sheets as the another material and we drawing on different four piece just as the concept from our concrete model. Then we try to figure out what activities can be happed inside or what beautiful pattern can we create. Discovering the interactions from these layer is also the same relationship from our concrete model. The process is very interesting and we have a lot of fun!







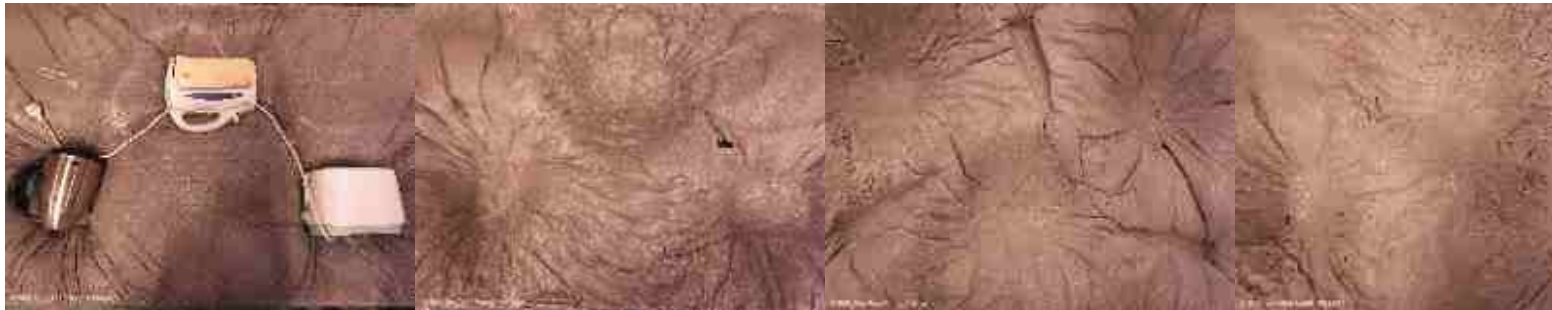
## Concrete casting process and final result

The final model is very hard to deconstruct at the beginning. But after our teamwork, the beautiful structure showed up and after some shit of four layers, it can stand by it self very well just as our expectation.



process of construction

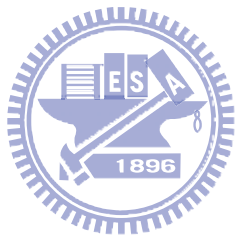
1 making wooden frame 2 enforce the structure 3 put on our stuff 4 adjust the position 5 put on the plaster t





When ready to pour 6





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Final concrete model



