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# CHINA RAIL-BORNE

alternative identity of the urban transit hub of Hangzhou



Daya Zhang  
Undergraduate Thesis  
School of Architecture  
Syracuse University  
May 2014

Advisor:  
Martin Haettasch + Ryan Ludwig

China Rail-borne:

alternative identity of the transit hub of Hangzhou

Daya Zhang



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## 01 Abstract

The next stage of China's growth and advancement rests on the assumption that its population will be more and more concentrated in cities since approximately 350 million farmers are expected to move towards the urban areas from 2005 to 2025.

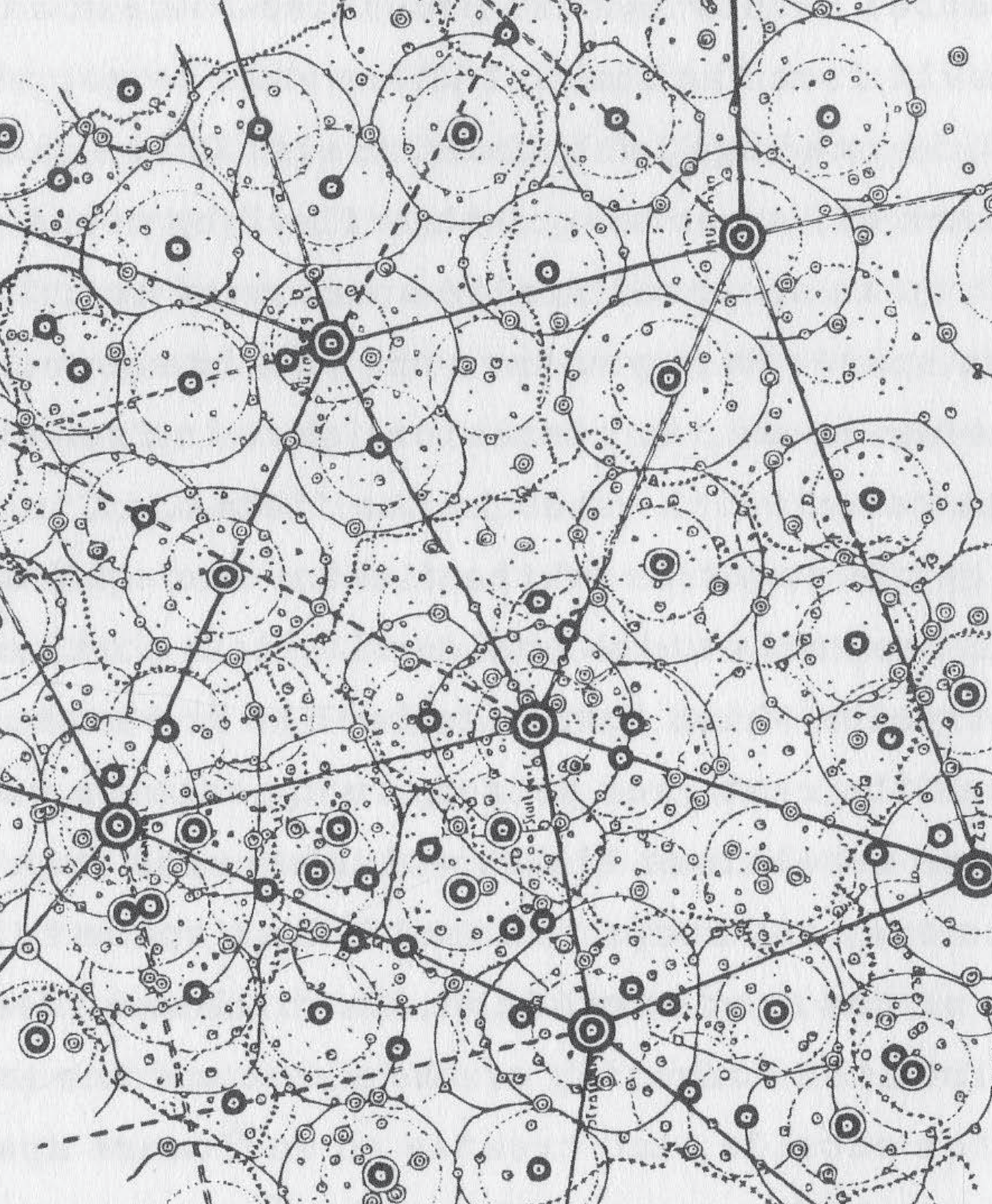
How to connect its population of more than 1 billion within those cities, and among them, is always an urgent issue for Chinese government to deal with. Railway is the most common mode for Chinese to travel around. However, the overcapacity has plagued China's railway network for years, especially during the national holidays, such as Spring Festival.

The emergence of the high-speed rail tends to move people in a faster pace and make China "a smaller place" to travel around. The contemporary train stations across the world are no longer simple combinations of the head building and the shed for trains but complexes consisting of various events ranging from shopping mall to office to theater to parking lot. Examples include Kyoto Station in Japan and EuroLille in France.

Instead of renovating and expanding the existing urban stations, Chinese government has been investing large amount of money to build mega-stations in the outskirts of the big cities. Most of them consist of a single giant volume of waiting room over the train track and other modes of transportation in the belowing layers, implying the evolution of train station towards airport in terms of location, scale, layout, etc. The train station in China is losing its one of the primary functions as a meeting place.

At the same time, the old urban stations are put aside and decaying. With the rapid urban expansion, the old stations of the big cities, which were on the periphery when they were firstly built, dominate in the city center now. What I am looking for is an alternative of the rail stations as a civic complex in the urban context allowing for the fragmentation and disunity to create public spaces, develop green belts, promote pedestrian and bicycle mobility, and intensify the urban experience for the collective.





## 02 The Phenomenon

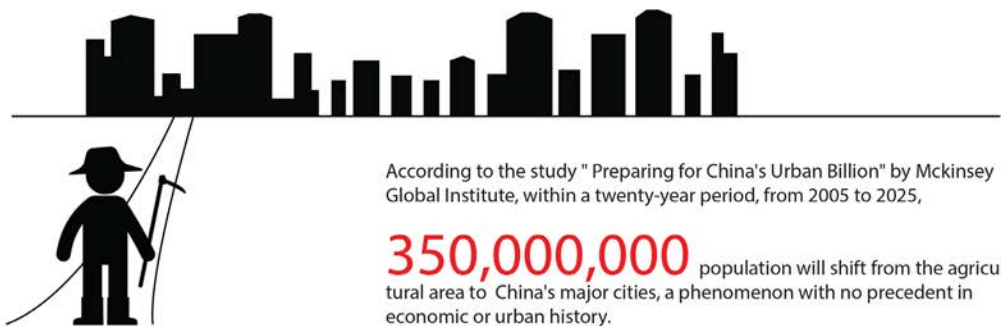
population shift from the rural to the urban area

“megacity” complex

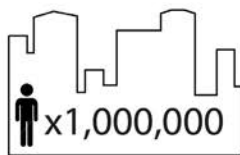
polynuclearity model






# The Grand Immigration



## Number of city with more than 1,000,000 people



Time Span of the Immigration

		
221	35	9
20 yrs	19th cen	20th cen

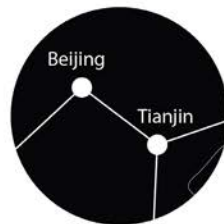
## "Megacity" Complex" **x 15**



Pop: 85,000,000



Pop: 25,000,000



Pop:20,000,000


According to the study “Preparing for China’s Urban Billion” by McKinsey Global Institute, within a twenty-year period, from 2005 to 2025, 350 million population will shift from the agricultural area to China’s major cities, a phenomenon with no precedent in economic or urban history. (Fallows)

The rural-to-urban shifts that transformed the culture and economy of Europe through the course of the 19th century and North America through the 20th century will be compressed in China into a span of a relatively few years. (Fallows)

This shift is expected to give China some 221 cities with populations of over a million by 2025, versus 35 in all of Europe of 2010 and only 9 in the United States.

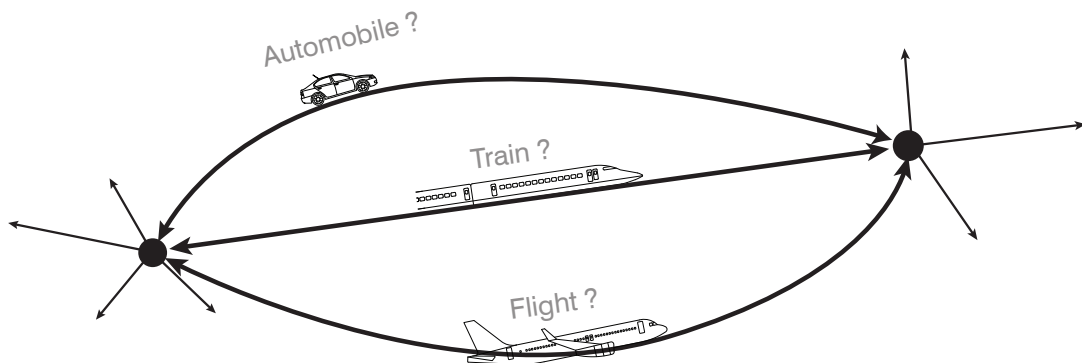
The heavily urbanized future China would also have fifteen “megacity” complexes, like Shanghai- Hangzhou, of more than 25 million people. The Guangzhou- Shenzhen- Zhuhai complex of the Pearl River Delta would by itself have 80 million to 100 million inhabitants. (Fallows)

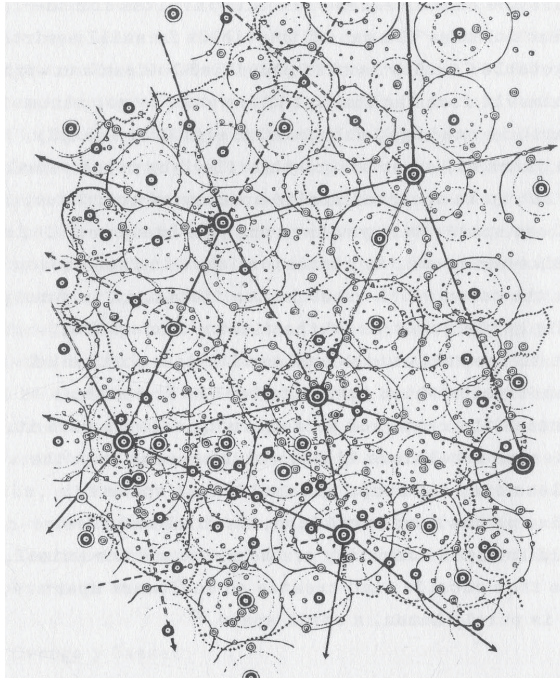




The next stage of China's growth and advancement rests on the assumption that its population will be more and more concentrated in cities. Transportation within those cities, and among them, naturally becomes an important focus for government investment and therefore private profit.

- James Fallows, *China Airborne*





The next stage of China' growth and advancement rests on the assumption that its population will be more and more concentrated in cites. Transportation within those cites, and among them. naturally becomes an important focus for government investment and therefore private profit.

- James Fallows, China Airborne

## THESE TRAINS ARE FAST NOW ...



**TGT Atlantique** (France):

186 mph



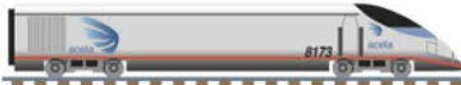
**Eurostar** (UK & France):

186 mph



**Nozomi 500 Series** (Japan)

190 mph



**Amtrak Acela** (United States)

200 mph



**ICES** (Germany)

205 mph

## ... BUT THE FUTURE IS FASTER

High-speed trains trail an experimental Maglev (for magnetic levitation) train that set a record of 345 mph last April in Japan.

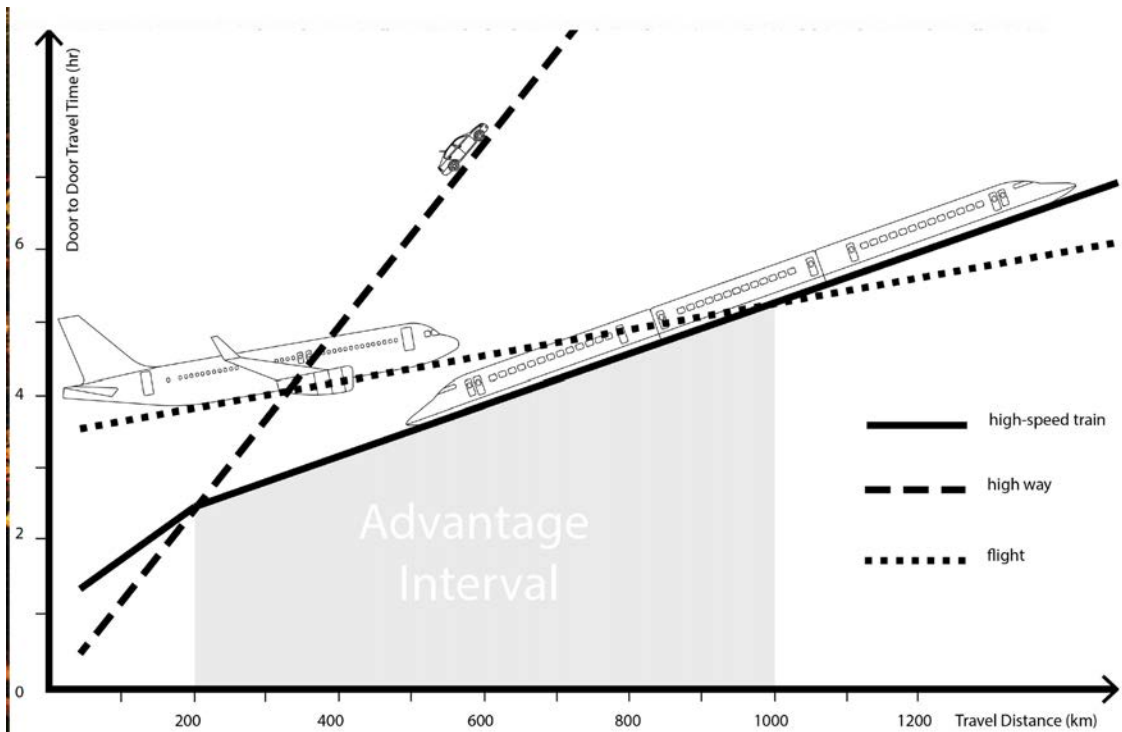
**Maglev trains float along a track**, guided by electromagnets, thus avoiding friction and allowing them to travel much faster than conventional trains.

**JR-Maglev test track** (Japan)

360 mph



figure: high speed rail development, <http://blogs.trb.com/news/specials/newsillustrated/blog/BulletTrains.jpg>

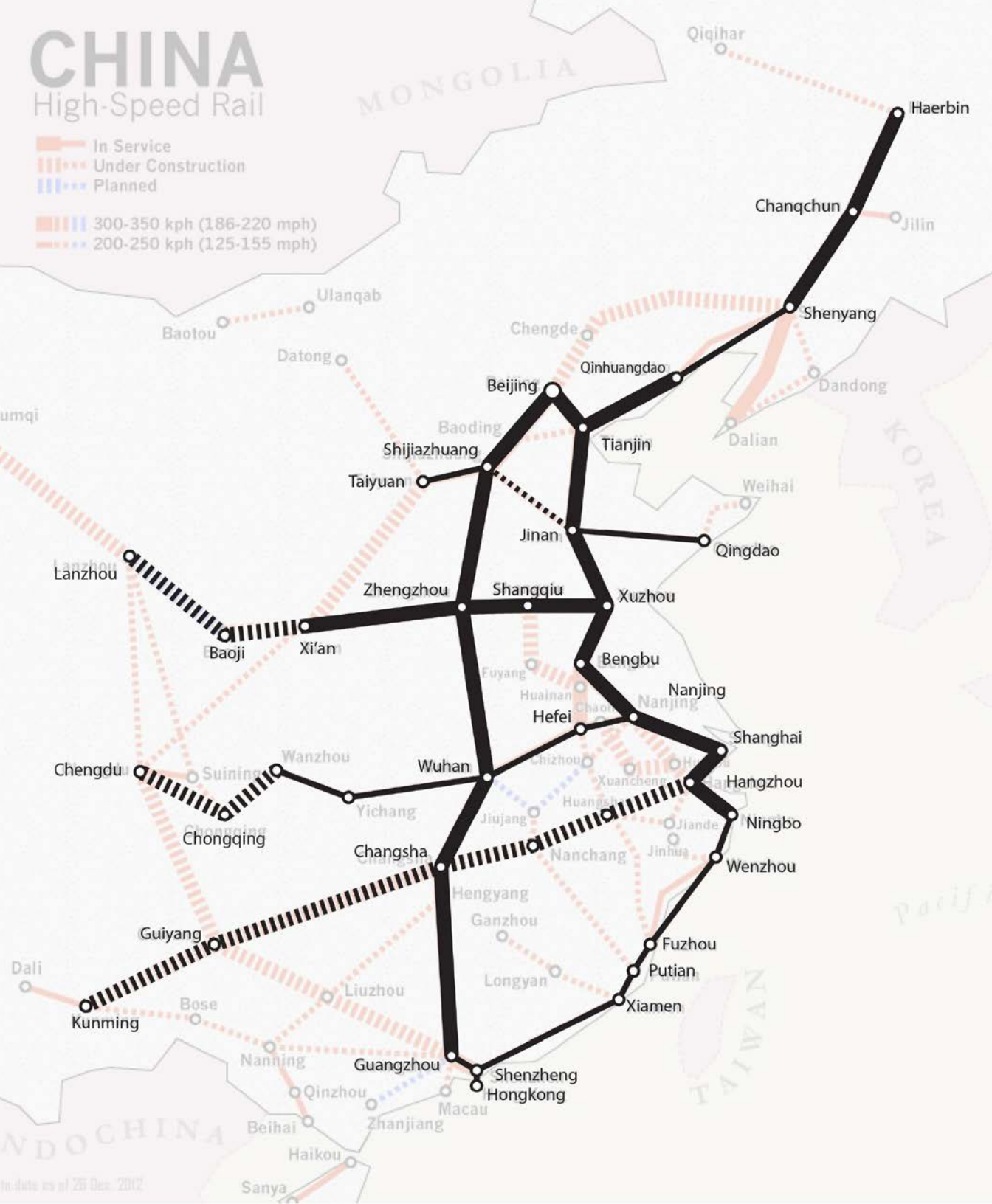


The invention of the high speed train claimed the revival of the train travel. The high speed train is more efficient and ecological over automobile and flight for the door-to-door travel time of 2.5 to 5 hrs (Liu, Li). Because the railway station is usually in the city center, it is convenient for the passengers to arrive there by public transportation. Instead of being competitors, those three modes of transportation are expected to work together and transport people within the accordingly distance: automobile within the metropolitan areas, train between the cities, flight for the international long-haul .



# CHINA

## High-Speed Rail



## 03 China's master plan

high speed rail's advantage

global map high speed rail development

China's plan

Spider Net Spread Mode

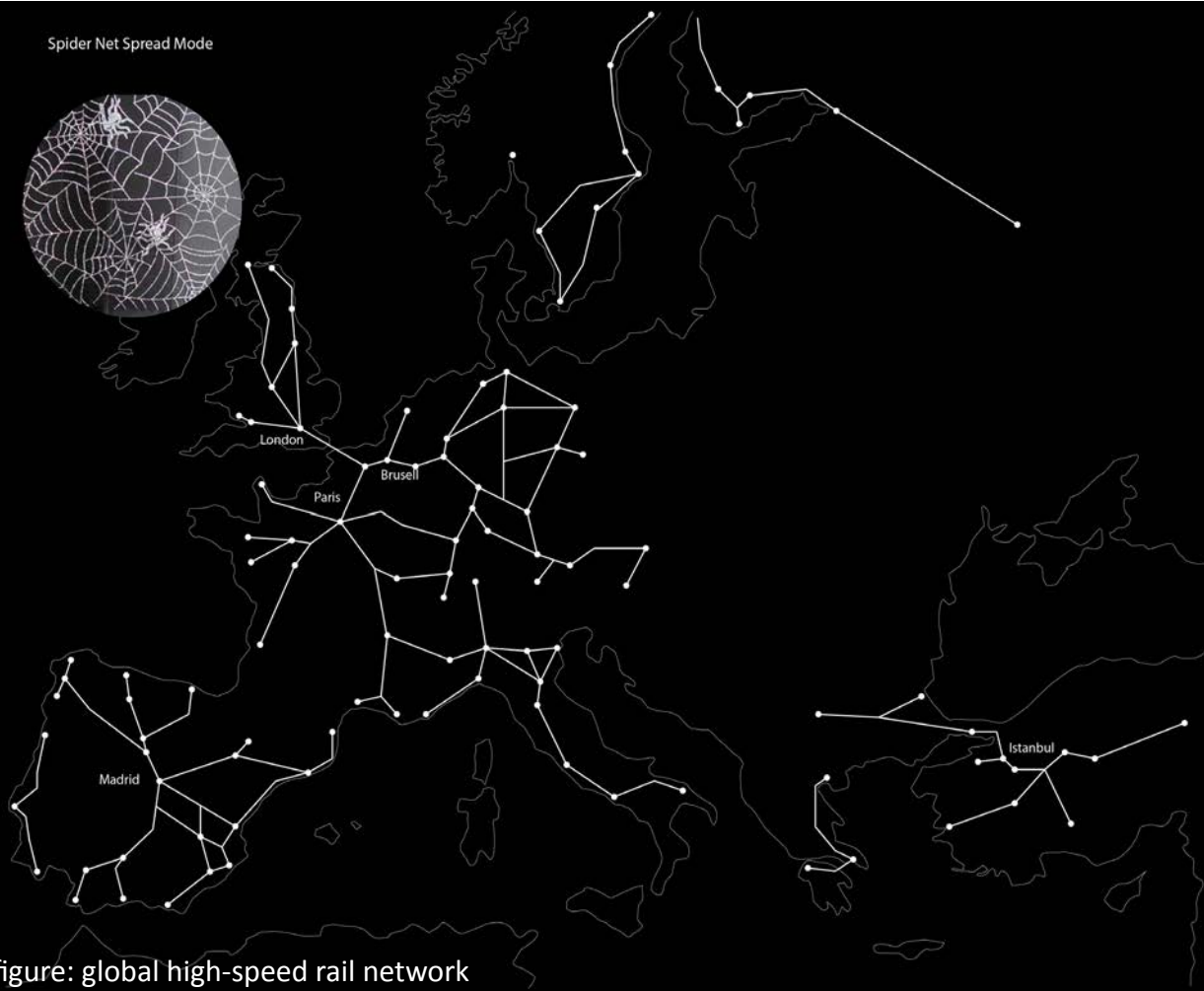
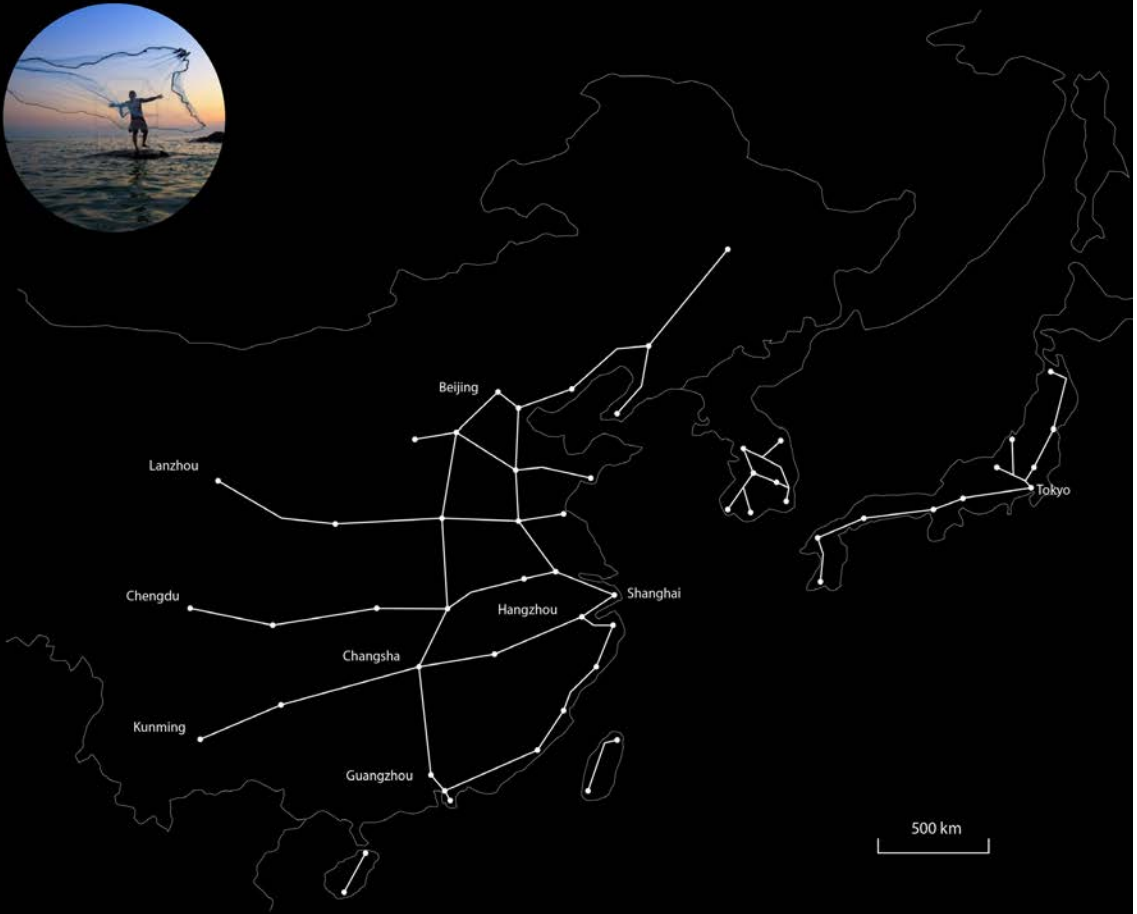


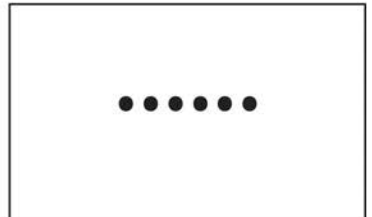
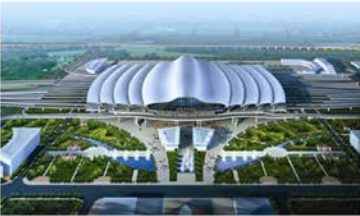
figure: global high-speed rail network

Fishing Net Spread Mode



Chinese government planned to build 4 major high speed railways from North to South and another 4 lines from east to west by 2020. The total length of the high speed track will be extended to 25000 kilometer with a roughly-evaluated cost of \$300 billion. "In less than a decade, we constructed more high-speed rail lines than what it took Japan and Europe 40 years to build," said Zhao Jian, an economics professor at Beijing Jiaotong University and one of the country's leading experts on rail transportation (Jiang).





“China has accelerated construction of the high-speed rail network — including sleek glass-and-marble train stations — as part of the country’s stimulus spending in response to the 2008 global financial crisis. They’ve taken on a massive amount of debt to build it.” 295

- *Patrick Chovanec, Professor at Tsinghua University*

Since 2006, Beijing, Shanghai, and 9 major cities have built their mega-railway station on the outskirts of the city. In terms of the location, scale, layout, those newly constructed transit hubs are similar to the airport. The urgent question is that: is it the real identity of the station in high speed era?



## 04 Critique of the New Station: a hegemonic unitary megaobject

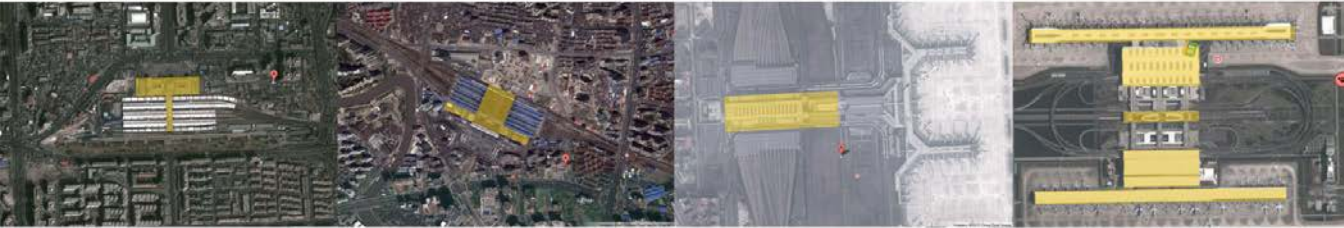
a typical newly built station: Hangzhou East Station  
pristine site  
pursuit of bigness



Beijing Station



Scale



Exterior



Layout | Circulation

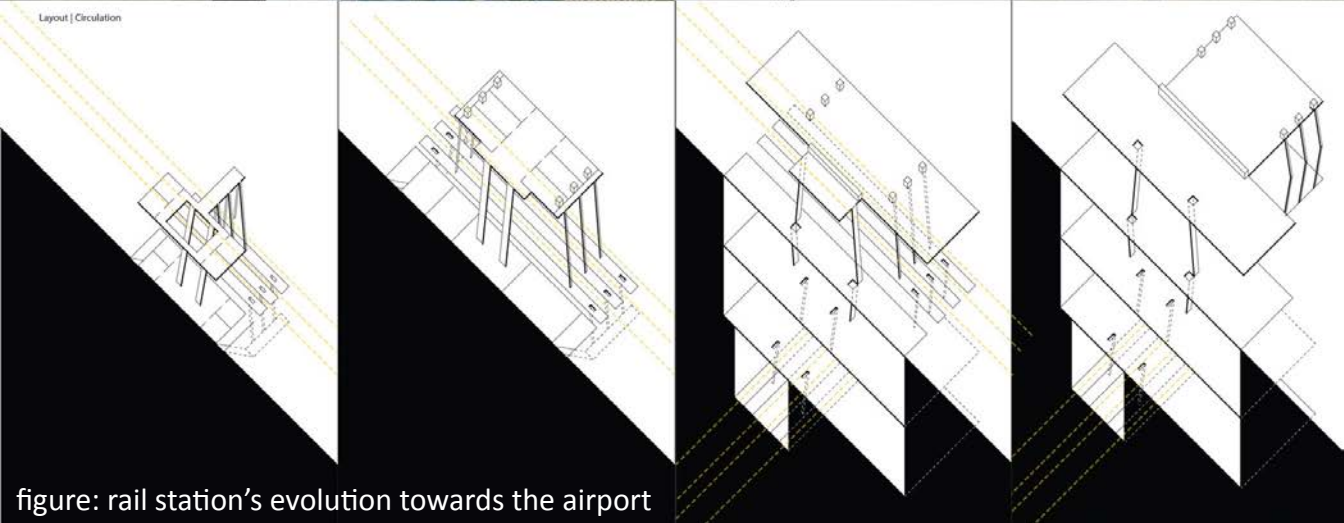


figure: rail station's evolution towards the airport

## Persuit of Bigness (Grandiosity) but Emtiness:

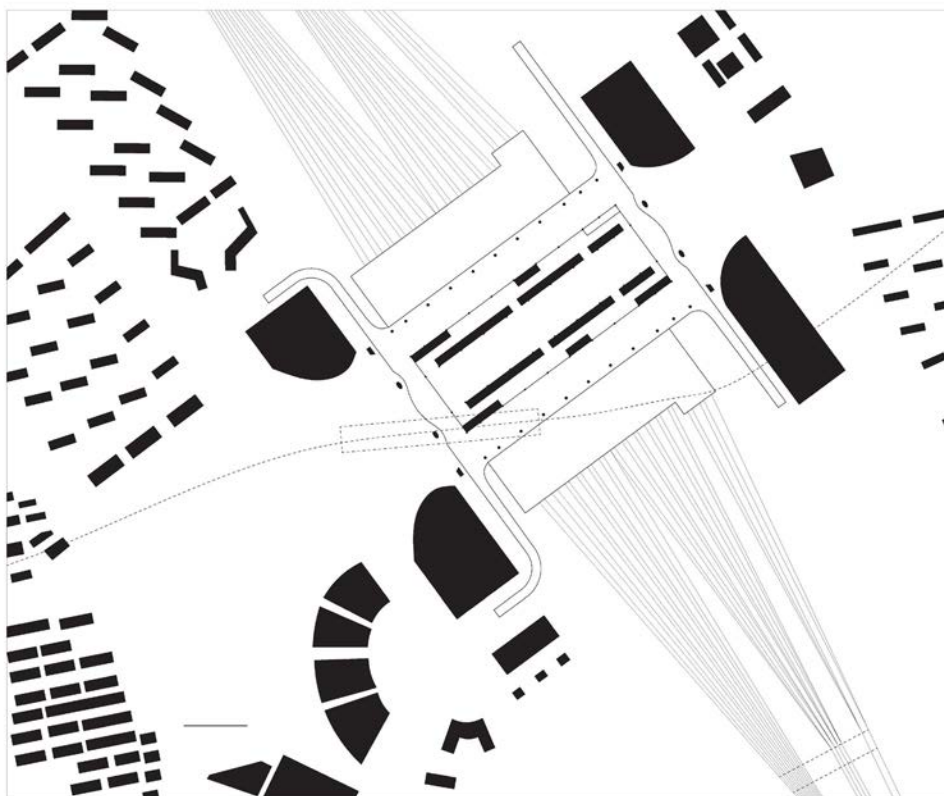
Every time a new mega-station is completed in China, it clams itself to be the biggest in Asia. A giant single volume tries to house all the collective wills within. However, the collective cannot be expressed in a single architectural form, for architecture is a language that has already exhausted itself by doing too much speaking. Instead, the contours of a collective form will be found exactly in this grouping of different symbols. Through the juxtaposition and superimposition of two forms, a third form will implicitly emerge. Only urban design is sensitive to this aesthetic, because it emerges between buildings.


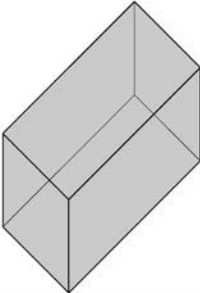


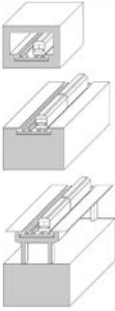
## Pristine Site:

Those newly built stations are usually located in the outskirts of the city, a pristine site, where the project tends to acquire the monumentality through its bigness imposed on the continuous landscape, like an airport. This is contrary to civic life as described by Lewis Mumford and William Whyte, and to our own observations of the cities. For the unexpected encounter to occur, different trajectories need to intersect. Different flows of people need to intersect. Therefore, it is absolutely necessary for the civic complex to be embedded in the urban context. Surrounding streets, flows of people, and roads ought to be addressed in and through the project. The rail station is losing its status as a meeting place in terms of location.

# A Typical Newly-built Station in China - a hegemonic unitary megaobject

Hangzhou East Station  
2008-2013  
China No.4 Railway Civil Engineering Group Co. LTD  
Hangzhou, China



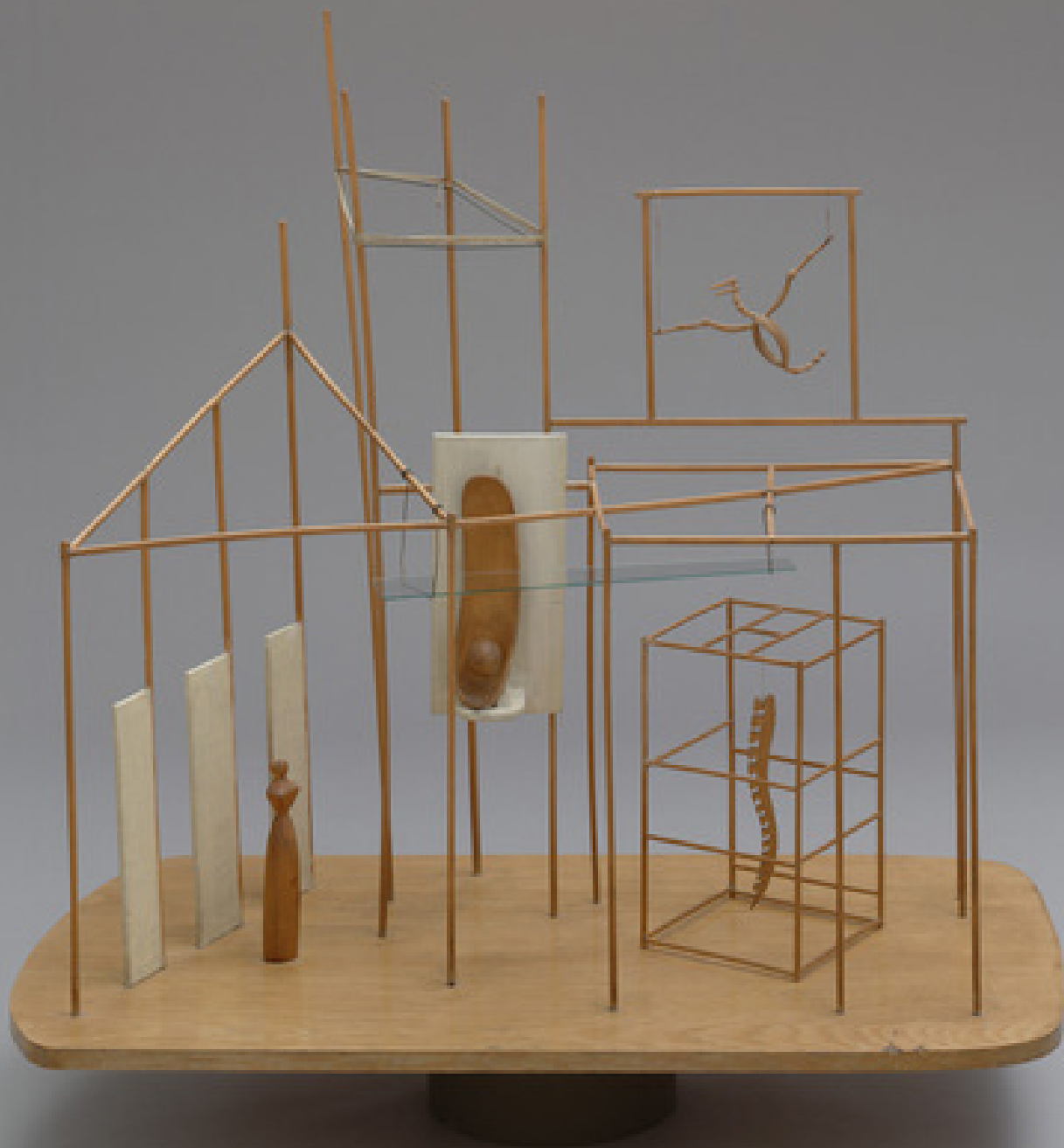
	Location	Hegemonic Unitary Megaobject	Passengers / day	Platform
<p>The old station opened in 1992.[1] located on Tiansheng Road. It was closed on 20-January 2010,[2] and demolished.[3] Its train services were moved to Hangzhou Railway Station and Hangzhou South Railway Station [2]</p> <p>A new station is being constructed on the site. It officially opened on 1 July 2013. In conjunction with the opening of the Hangzhou-Ningbo Passenger Railway and Nanjing-Hangzhou Passenger Railway. The station will also serve the Shanghai-Hangzhou Passenger Railway. It will have 30 railway lines, and will have stations for Hangzhou Metro lines 1 and 4.[4] A coach station and bus terminals are also being constructed.[9]</p>			 = 10,000  high peak	

The old Hangzhou East Railway Station opened in 1992 to share the traffic load of Hangzhou Railway Station. Since it is a pass-by station, the scale was small with 2 platforms and one waiting room of 500m2. Only 4 trains stopped at the station every day with several hundred passengers.

In 1996, Hangzhou Railway Station was demolished and rebuilt on the same site. Therefore, the east station was expanded and served 100 trains and 45000 passengers every day to take over the duty until the completion of the Hangzhou Railway Station in 1999. As the traffic increasing, the old facilities of the east station cannot satisfy the passengers' needs anymore. The station was closed in 2010 and a new station is built on the same site and open in 2013 to serve as one of the 9 national major transit hubs. It has 18 platforms with 34 lines within the total construction area of 240000 m2, 80000 m2 of which is station facility. The total investment is 1.9 billion RMB.

Under the wave-like roof is a giant waiting area with spotted shopping kiosks.





## 05 An Alternative: space of friction

hegemonic unitary mega-object V.S space of fiction

civic center

group design

urban station as civic center

Wholeness of a single giant volumn

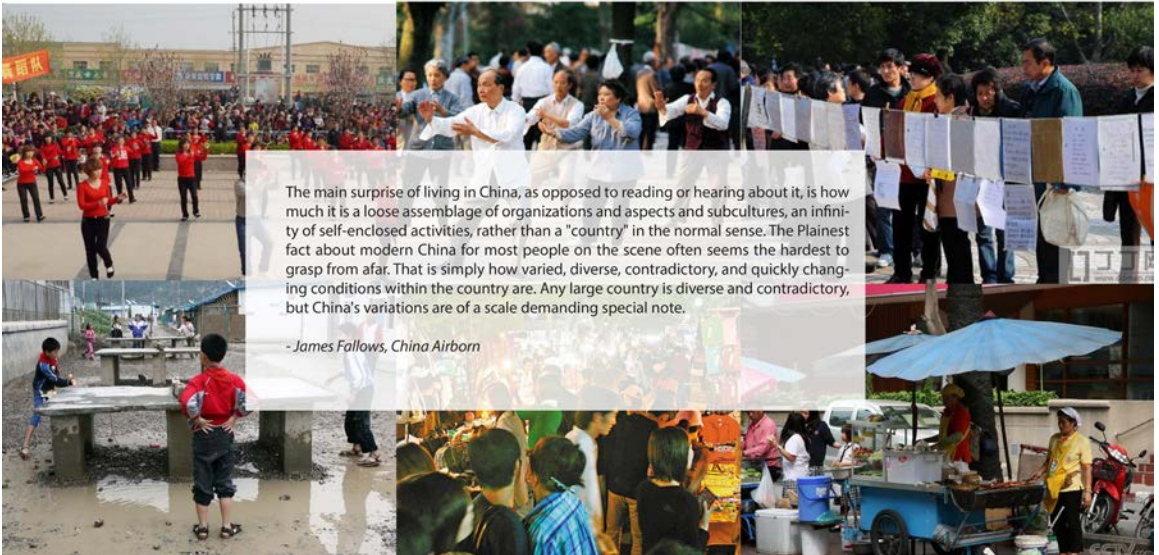


Palace of Soviet, unfinished, Boris Inofan, 1922

Conflict by disunity and fragment



Palace at 4 A.M., sculpture, Giacometti, 1934



The main surprise of living in China, as opposed to reading or hearing about it, is how much it is a loose assemblage of organizations and aspects and subcultures, an infinity of self-enclosed activities, rather than a "country" in the normal sense. The Plainest fact about modern China for most people on the scene often seems the hardest to grasp from afar. That is simply how varied, diverse, contradictory, and quickly changing conditions within the country are. Any large country is diverse and contradictory, but China's variations are of a scale demanding special note.

- James Fallows, China Airborn

figure: diversity of Chinese collective activities

“Two projects for a palace, both proposed in 1934, elucidate how the return to formalism in planning coincided with a complete reversal of its devices. In Giacometti’s sculpture *Place at 4 A.M.*, a number of sculptural forms appear in incoherent combination, not juxtaposed on a platform but hung at different heights, resembling a dented birdcage. This shattering and regrouping of the elements of the classical composition, a hitherto monolithic structure, may be read as a powerful center argument to a hegemonic unitary mega-object in architecture. Contrasted with Boris Iofan’s Soviet Palace design, in which ideas of classical balance and compositional wholeness are joined in an attempt to synthesize diversity in the face of modern rupture, Giacometti’s sculpture constitutes a formal opposite that can be constructed as a symbol of an ideological opposite.”  
(dHooghe 42)

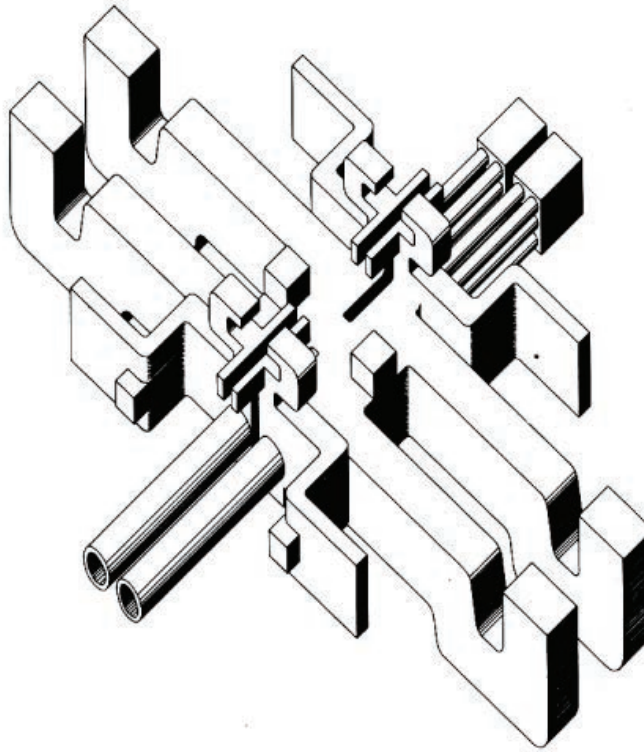


figure: Hans Hollein, design for an interchange, 1964

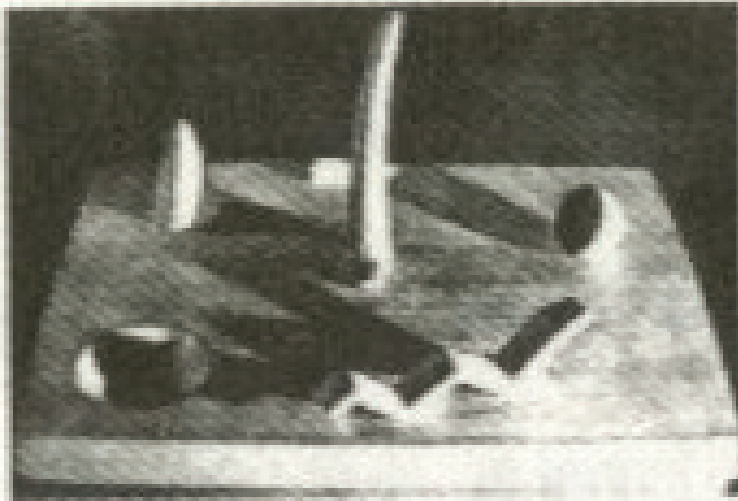


figure: picture of Giacometti's Project Pour Une Place

“To succeed in the heroic re-conquest of semi-urbanized territories of sprawl, a more powerful device will be necessary. **The Civic Complex, or Core**, is Sert’s proposal. The Core is larger than a building, but the difference is not just a question of size. A proper Core must **consist of various objects and define the space between them**. It will entail the creation of a pedestrian environment, united by a systematic spectacle of abstract art, and by a greater density than the surrounding automobile driven suburb”

-----*Alexander D’Ooghe, The Liberal Monument*

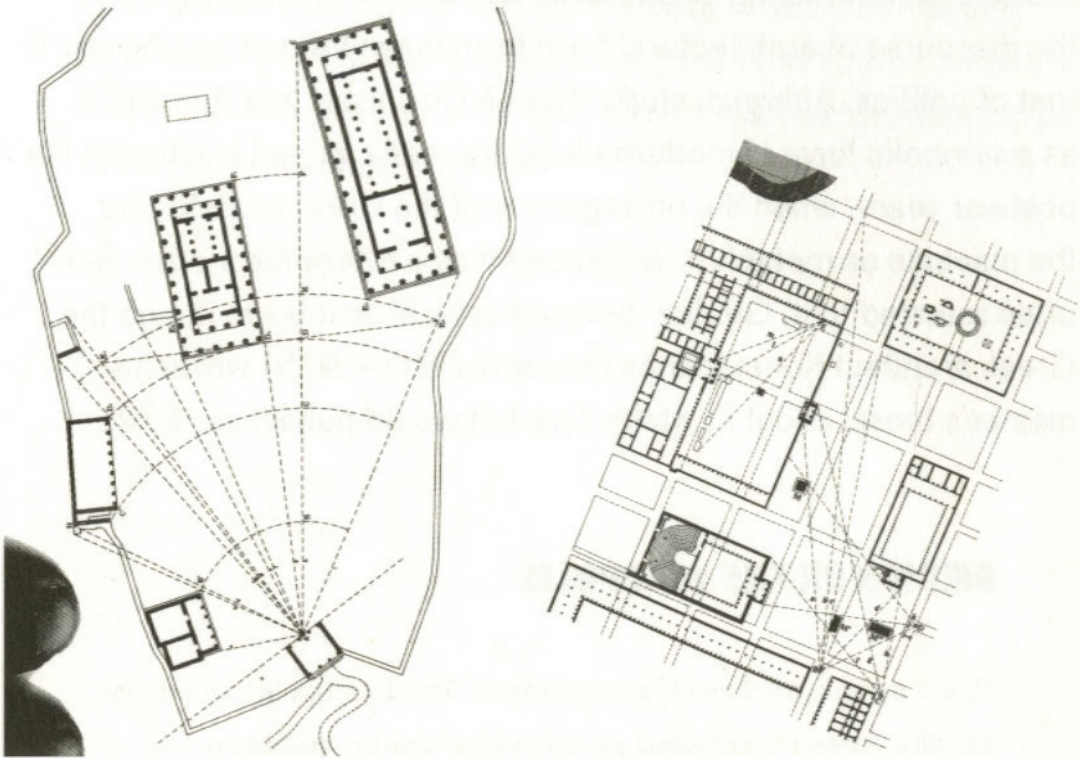
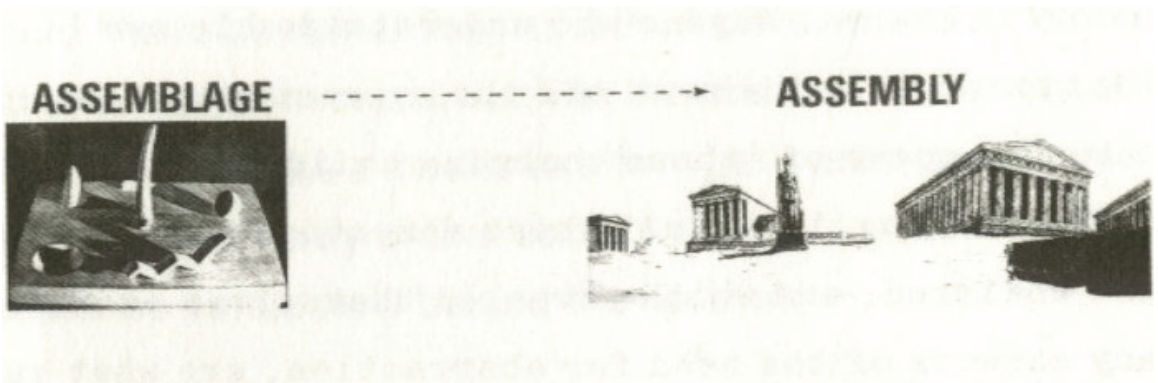
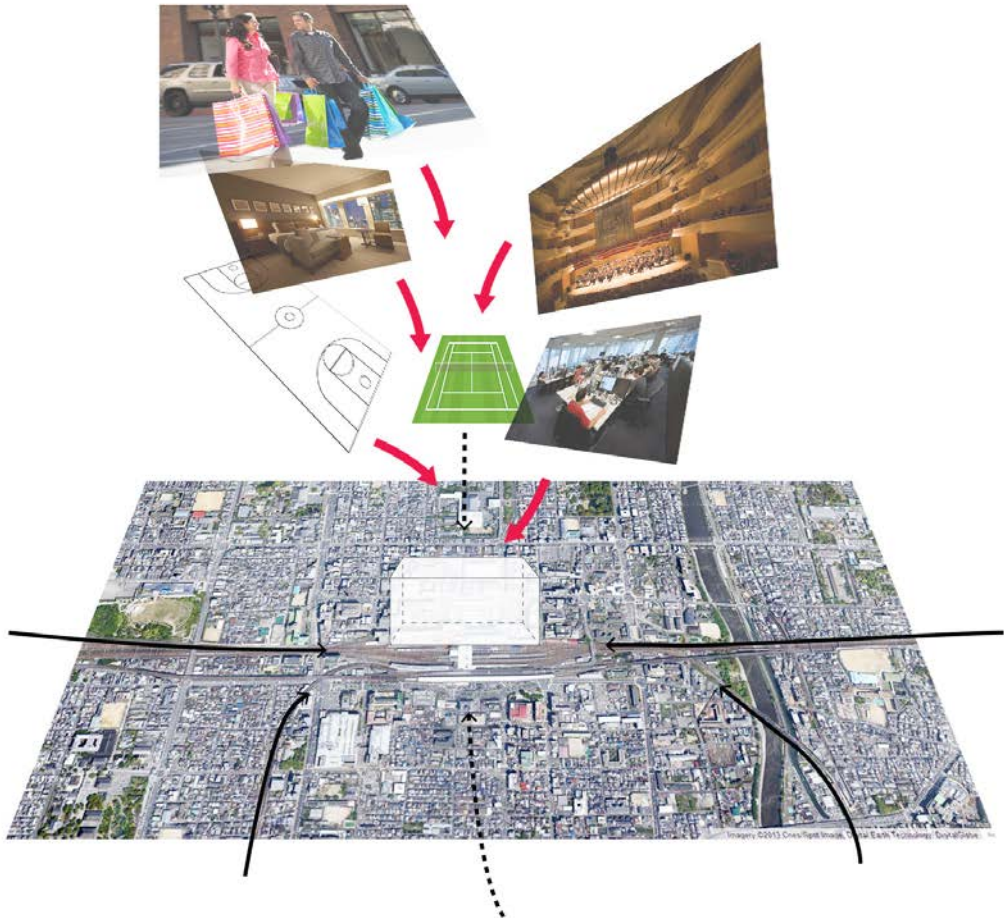


figure: group design concept demonstrated in the Surrealist sculpture and the Acropolis, p64-65, The Liberal Monument by Alexander d' Hooghe

“The layout of Greek monumental buildings gives rise to the freest interplay between their volumes.... The principle of group design is extensively applied to the planning of the democratic Greek city- states, where the rights of the individual and the rights of the community are clearly demarcated. **Group design** means that a **spatial harmony is set up between several independent buildings, each of which has its own formal individuality**....The Acropolis in Athens shows well how group design was used in the 5th century. Looking inward from the entrance, the Propylaea, the Parthenon appears as a complete entity. So does the Erechtheum. From the step of the Propylaea one sees both standing on the rising terrain within the same angle of vision. ”

-----*Siegfried Giedion, the Beginnings of Architecture*

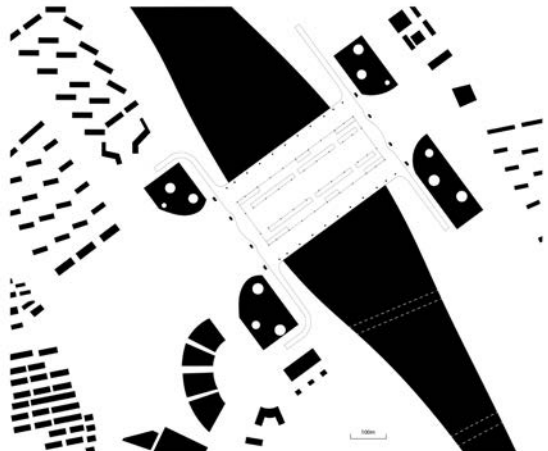
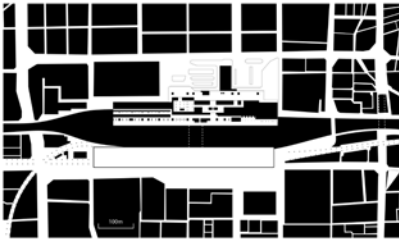
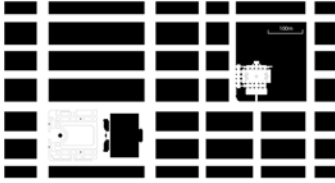




- collective activity
- people brought by different transit modes

## Urban Station as Civic Center

The typology of rail station by its nature is a people collector and distributor. Every-day large volume of people flows of different interests interact there voluntarily or the other way around. Therefore it is an ideal place for a civic complex "where the fountains play where again boy meets girl, where the city could entertain and put up our distinguished visitors, where the many societies which uphold our democratic ideals can meet in clusters of auditoria in the city place." (Kahn). This civic space can be a combination of shopping with a movie theater, a hotel, office, apartments, a post office, and conference facility. We want the private sector to build this, but in a manner that maximizes its public character and accessibility.



## 06 Urban Station as Civic Center by doing (X)

X1 = Void, Grand Central, NYC

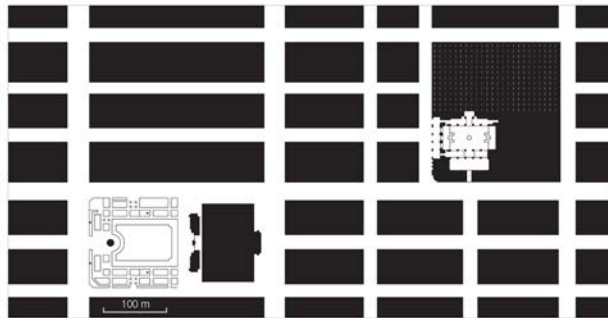
X2 = Urban Mask, Central Station, Florence


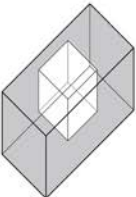














































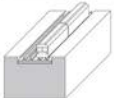
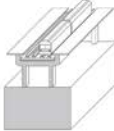
X3 = City Within the City Kyoto Station

X4 = Crossing, Berlin

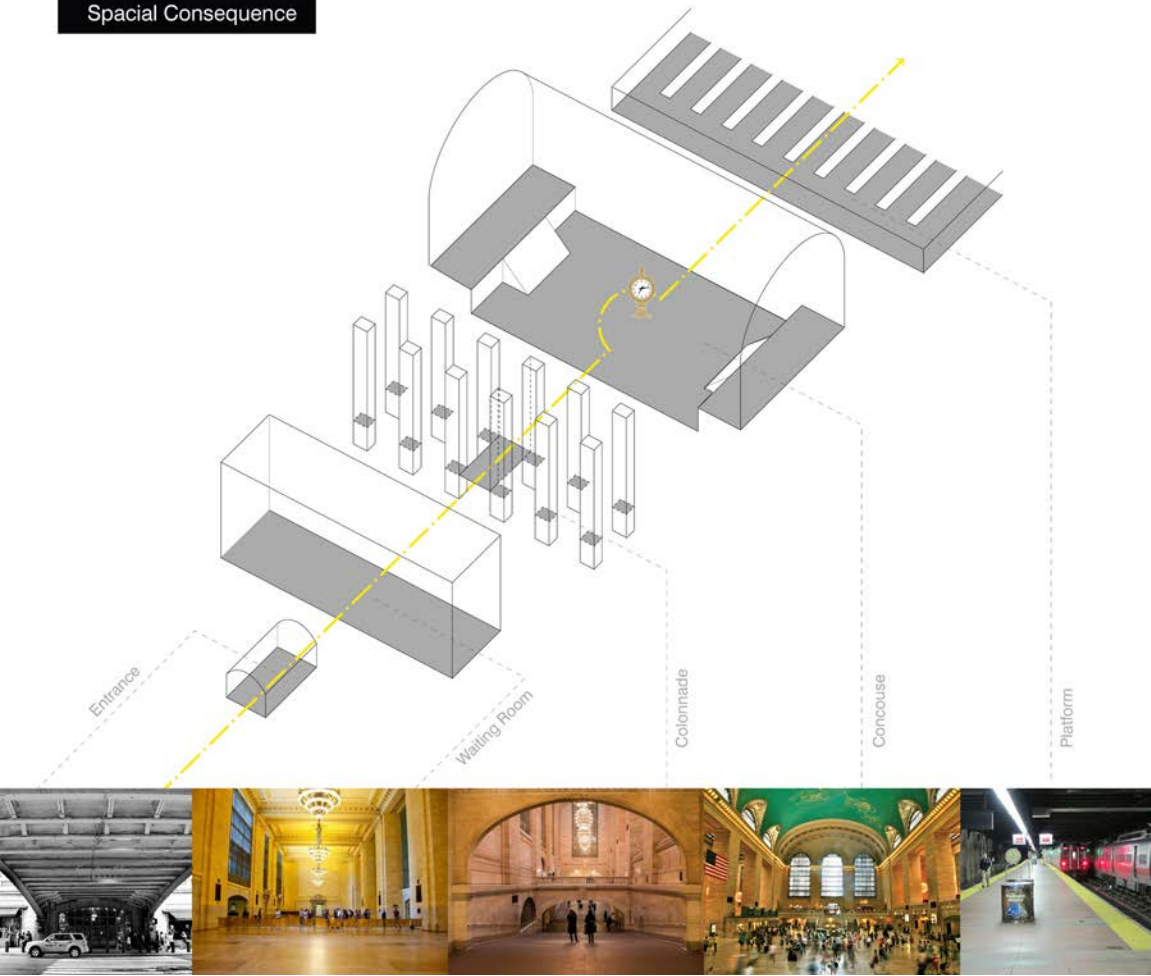
# Urban Station as Void

Grand Central Terminal  
1903-1913  
Read & Stern and Warren & Wetmore  
New York, United States



	Location	Civice Space   Void	Passengers / day	Platform
<p>The concourse becomes a more interior space. Within Grand Central Station, a series of <b>monumental space</b> waiting rooms and concourse- mark out the rythem gradual approach to the trains themselves. The different spaces are heterogeneous in design.</p>			 = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000  = 10,000	<p>67 x</p>   

Spatial Consequence

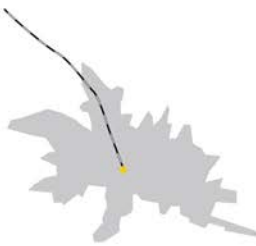
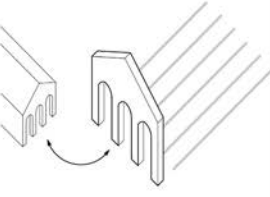
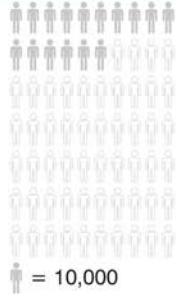
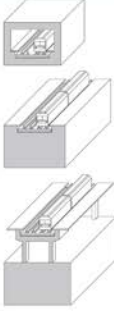


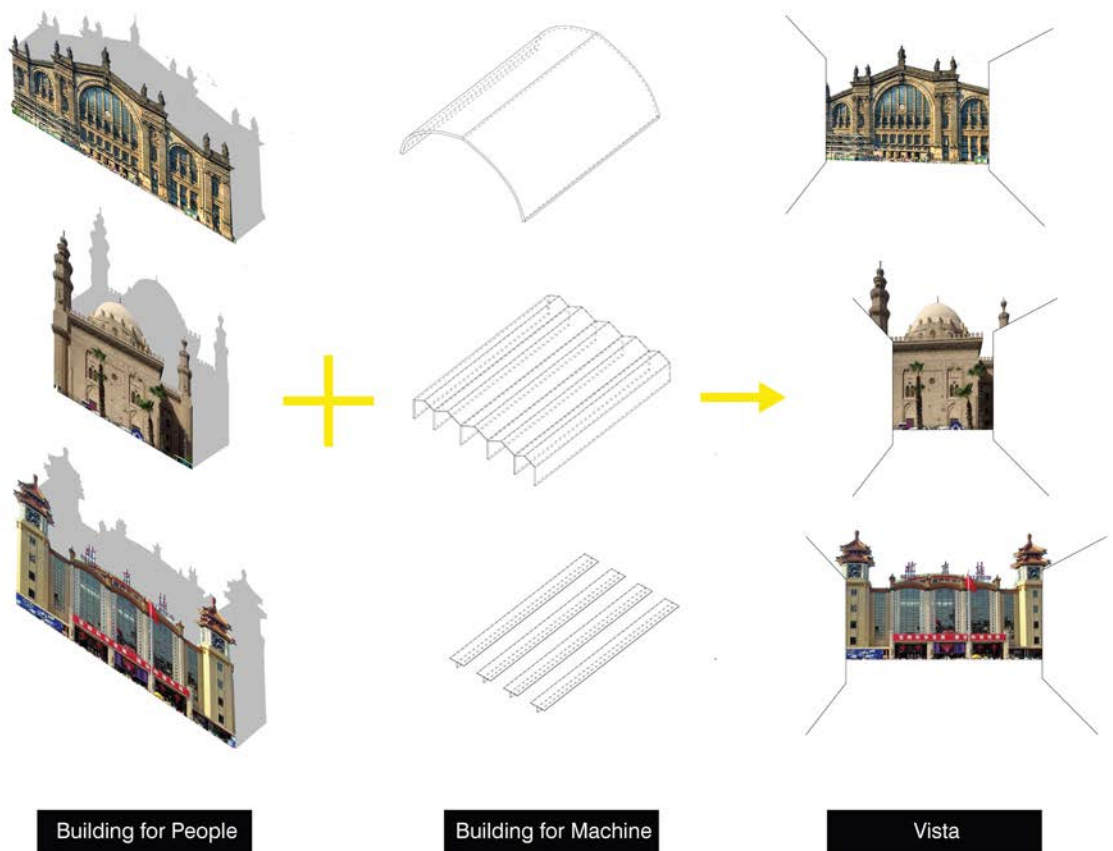


# Urban Station as Mask

Stazione di Santa Maria Novella  
1932-35  
Gruppo Toscano  
Florence, Italy

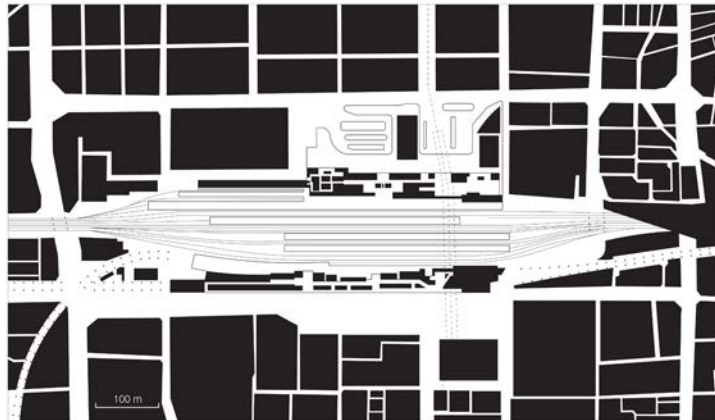



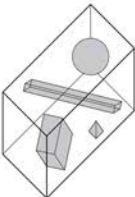
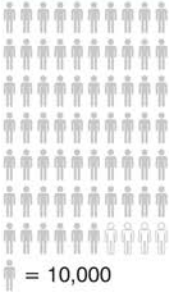
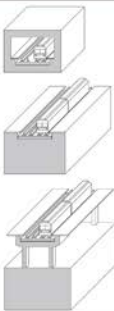
	Location	Civice Space   Mask	Passengers / day	Platform
<p>" the 19th century covered every new creation with the mask of history... New means of construction were being created, but they caused a certain amount of fear, and were endlessly <b>disguised</b> behind stage-sets of stone. These historically inspired masks are indissolubly linked with the image of the 19th century and their existence cannot be ignored."</p>				<p>19 x</p> 



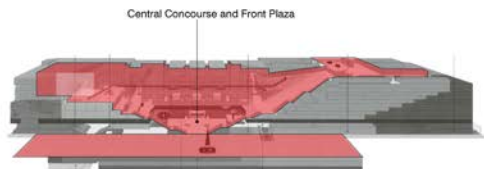
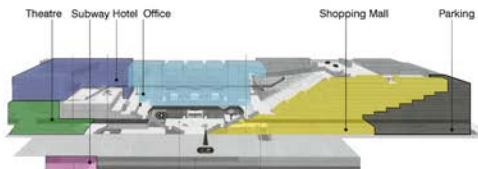
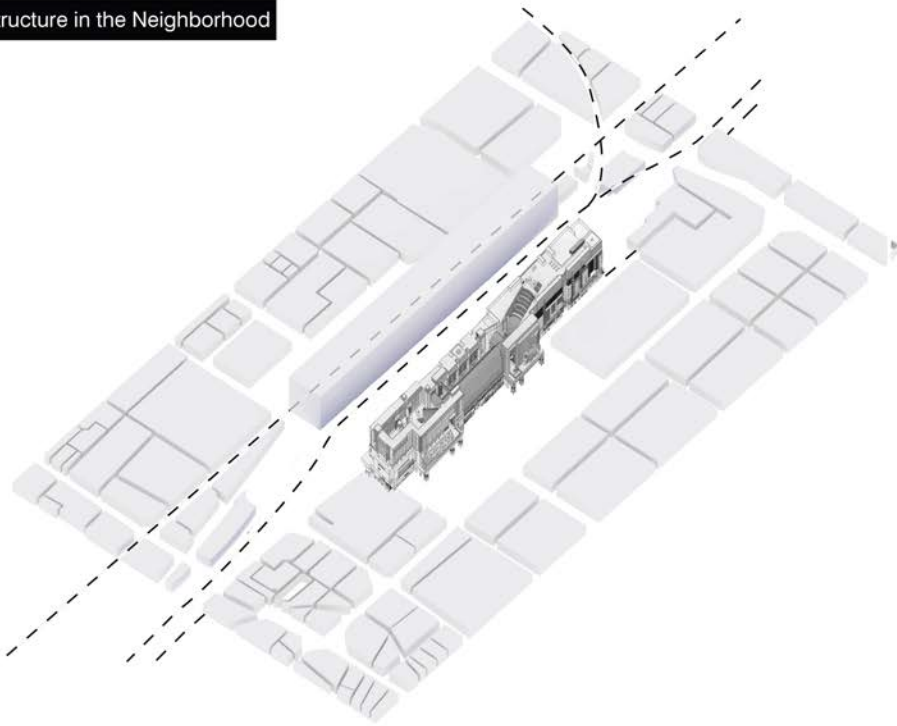
# Urban Station as City Within the City

Kyoto Station Building  
1991-97  
Hiroshi Hara  
Kyoto, Japan



	Location	Civice Space   Plurity	Passengers / day	Platform
<p>The complex as envisaged by Hiroshi Hara was one in which those using the various facilities would constantly be aware of the presence of the station, even if that facility itself only accounts for 10% of the total surface area within the building. Two island platforms serving four tracks for the Shinkansen are elevated, above the platforms for the Kintetsu Kyoto Line.</p>			 <p>= 10,000</p>	 <p>14 x</p> <p>4 x</p>

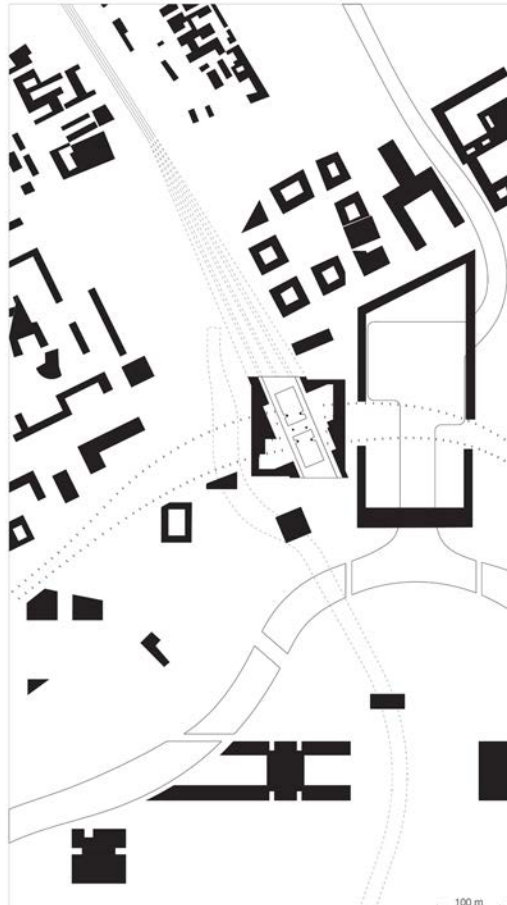
### Megastructure in the Neighborhood

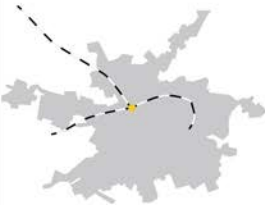
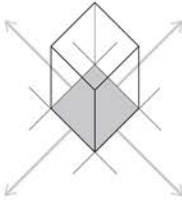


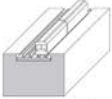
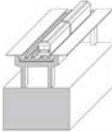


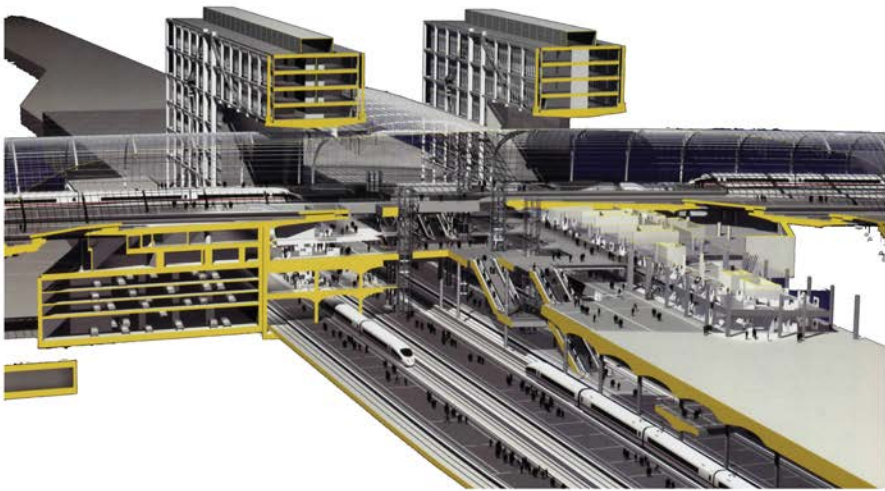


# Urban Station as Crossing

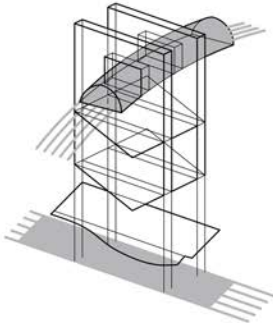
Berlin Lehrter Bahnhof  
1993-2006  
GMP  
Berlin, Germany-



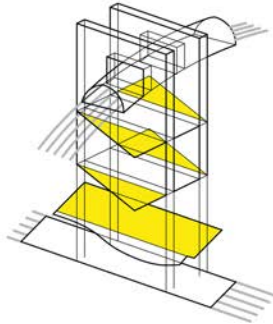
	Location	Civice Space   Crossing	Passengers / day	Platform
<p>It is challenging not only because of the technical and structural qualities of the building itself but also because of the urban -planning issues raised by the <b>location</b> of the station. Sited in the Zoological Garden district of the city- to the west of the Humboldt River port- the new facility will occupy the position of the 19th cen station that was destroyed long ago. To the south of the bend in the Spree River lies the area of the Reichstag and government ministries, to the north the district of Moabit; such a location required that this station- intended to become of the most important rail traffic hub of Germany- be given suitably significant architectural form.</p>			 = 10,000	<p>8 x</p>    <p>5 x</p>



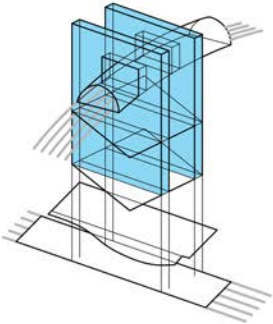
Infrastructure



Commercial & Service



office





元都宮  
去城十里

門山北

北

門山南

門林武

王都推官

浙江  
去城十里

門春慶

門春慶

門春慶

門春慶

貢院

廣文堂

廣文堂

武庫

武庫

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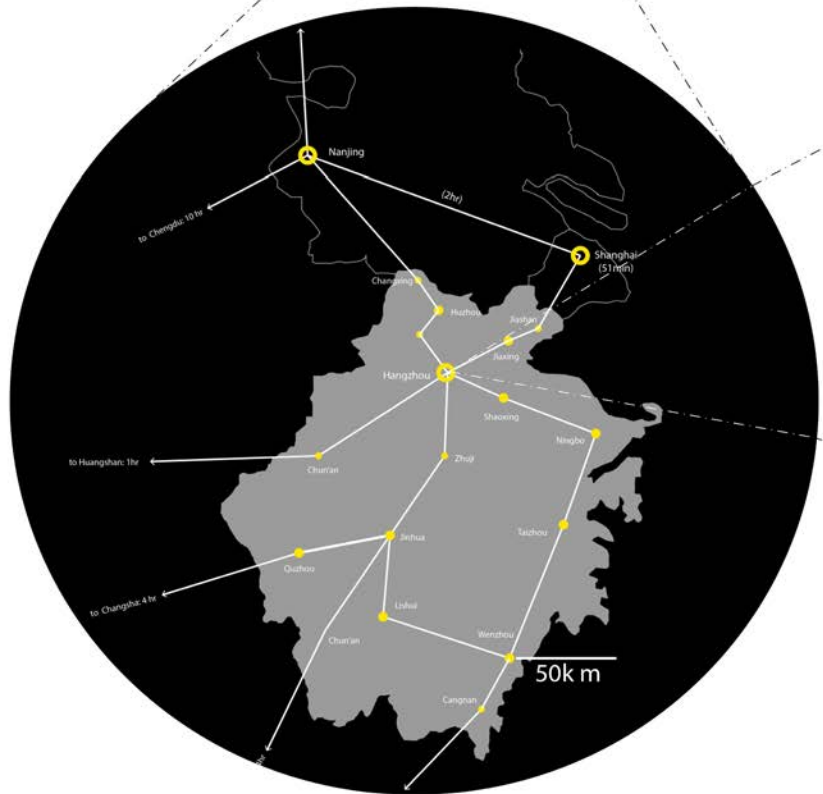
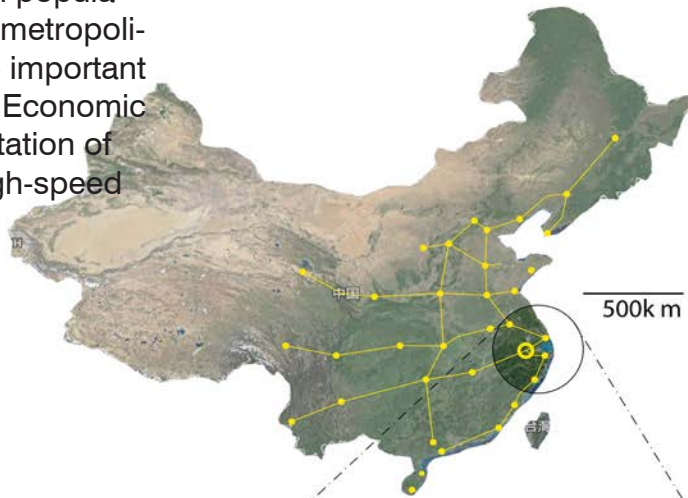
錢幣堂

錢幣堂

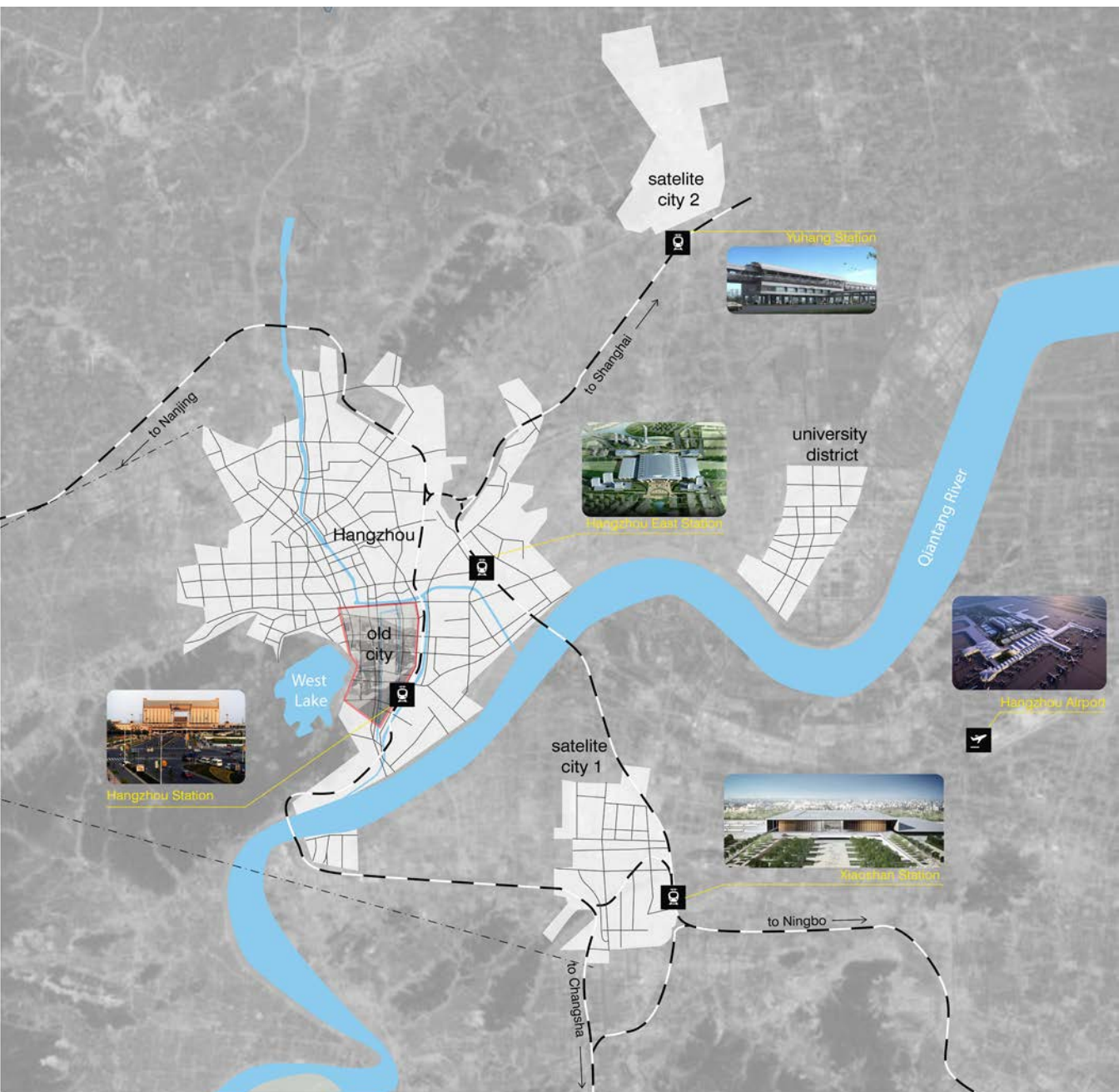
## 07 Site: Hangzhou

the city wall and the rail infrastructure  
the emerging axis

The city of Hangzhou is the capital of Zhejiang Province with population of 8,700,373 in the metropolitan area. It is one of the important nodes of Yangtze River Economic Delta and the starting station of Hangzhou-Kunming high-speed rail line.







The history of Hangzhou Railway Station and its relationship with the city expansion: the old city is a walled-up small area on the east side of the West lake. As the city grows eastward, the location of Hangzhou Railway Station turns from the periphery to the city center. The shift from the West Lake era to Qiantang River era is undergoing rapidly (Fan).

1597

At that moment, the old city wall from Wulin Gate to Qingbo Gate together with the water-front of the West Lake clearly defined the city boundary. The area outside was the endless landscape.

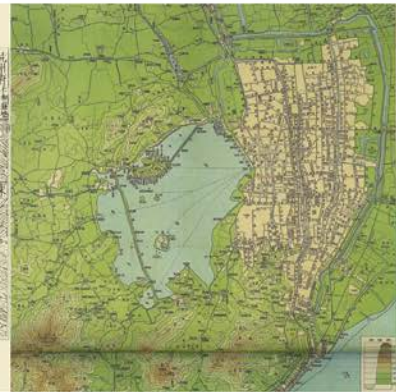
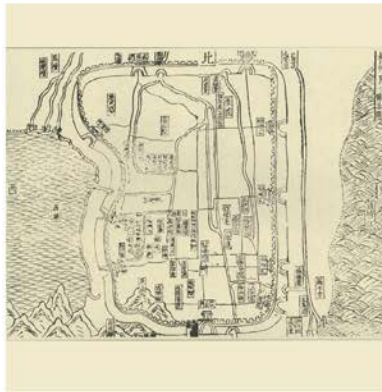
1910

The railway extended to Hangzhou in 1906 and the first station was built 300 meters outside of Qingtai Gate. But the citizen complained it inconvenient to travel to the station. The rerouted railway broke the wall and the new station was built in between around 1910.

### Station and City Development



### Historic Map



### Architecture on the Site



1955

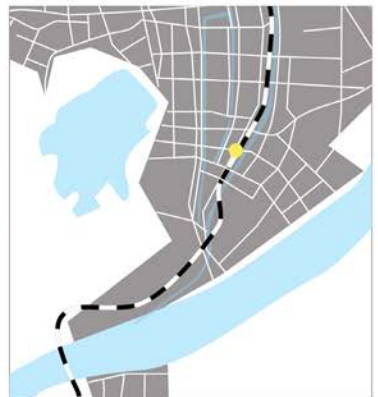
The second station was destroyed during the Sino-Japanese War (1937-1945) and rebuilt under the Japanese regime. The third station was completed in 1942 in Japan's Nara period.

current

The city wall was pulled down to make way for the road after the establishment of the PRC. As the passenger load continuously grew, the station's capacity could hardly cope with the future demands. Therefore, the old station was pulled down in 1997, and the new station was erected in 1999

future

The other side of the rail track is rezoned from the industry and farming to the new CBD of Hangzhou. Therefore, Hangzhou station dominates an important node on the city axis.





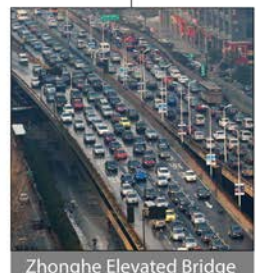
On the west side of Hangzhou Station lies the West Lake Ave. Residence, department stores, parks and schools are along the revenue from the West Lake to the station. The other side of the axis starts from Qiantang River. The new CBD is rezoned with high end office and commercial areas. However, the axis is broken on the near east side of the station where are the informal residence and outdated factories. The government plans to clear the area up and replace it with a new terminal buildings, commercial areas and residence.



West Lake



Old City

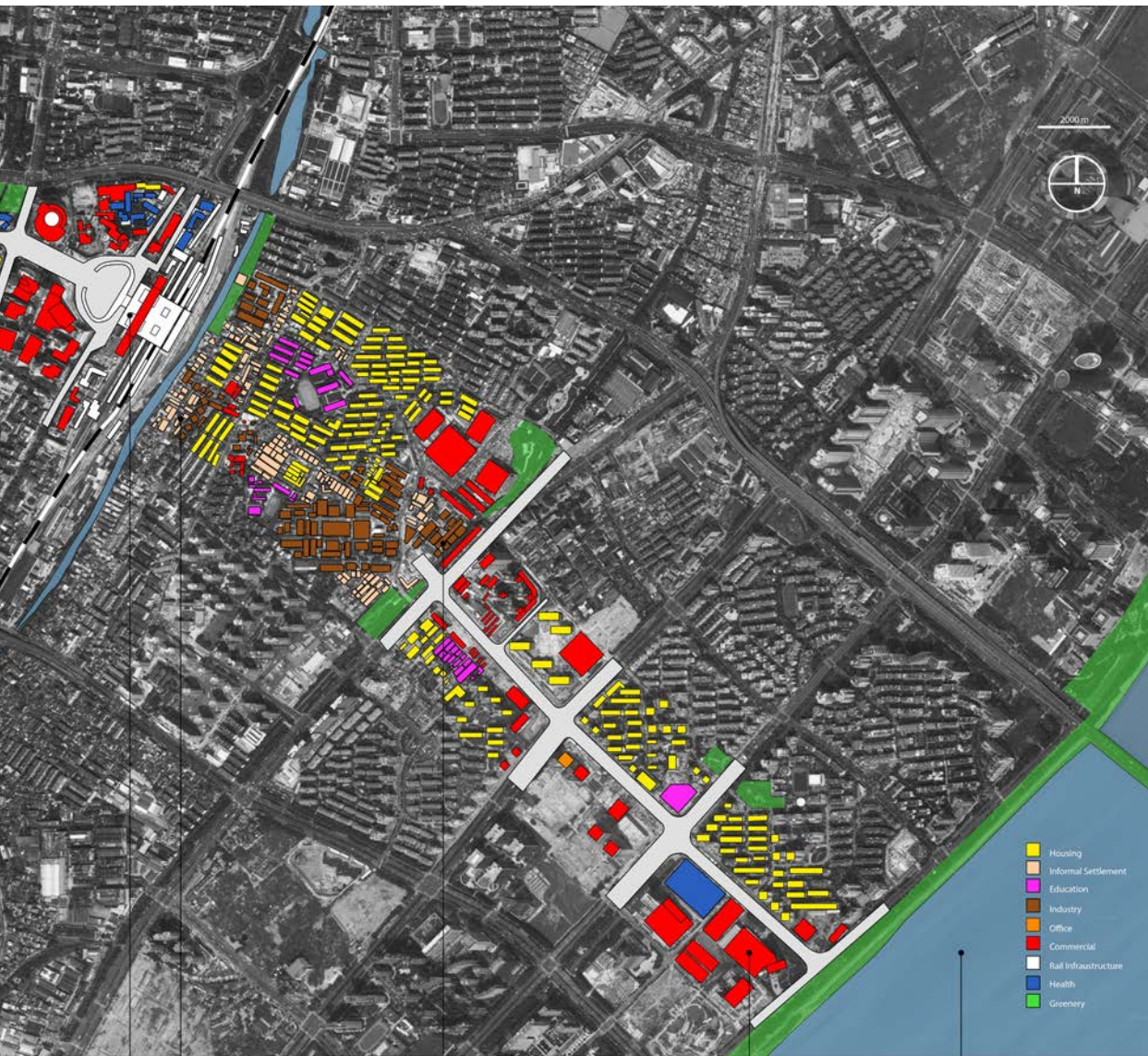


Zhonghe Elevated Bridge



Hang



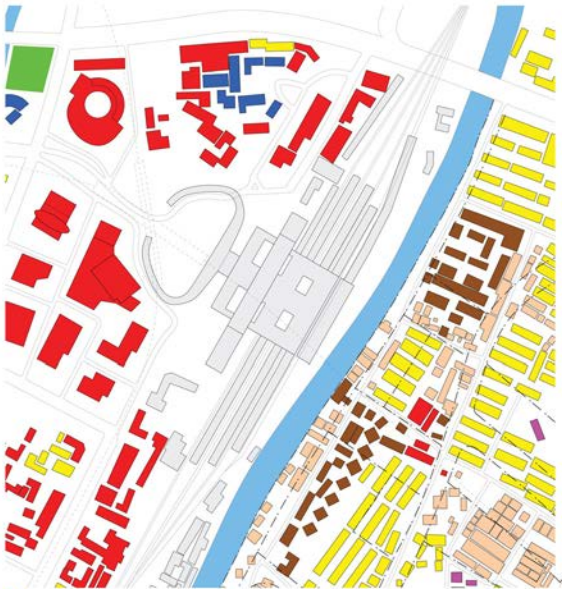
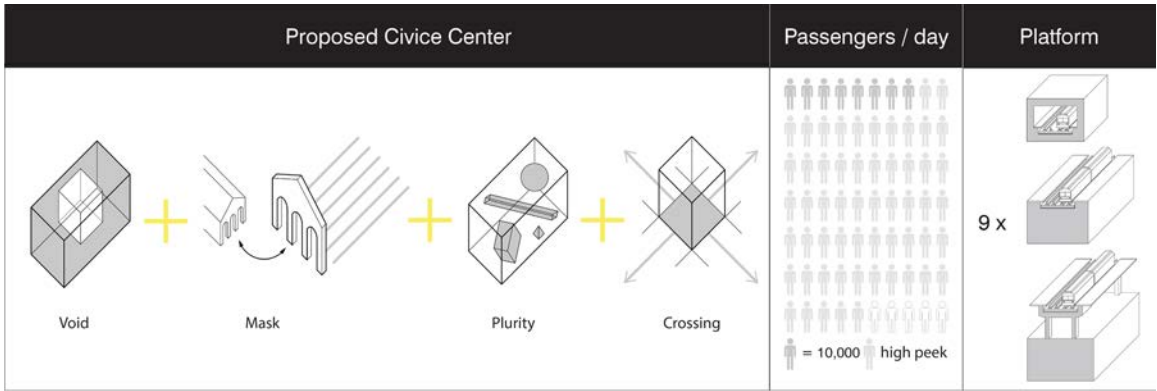


## Site

Hangzhou Station  
1999  
Taining Chen  
Hangzhou, China







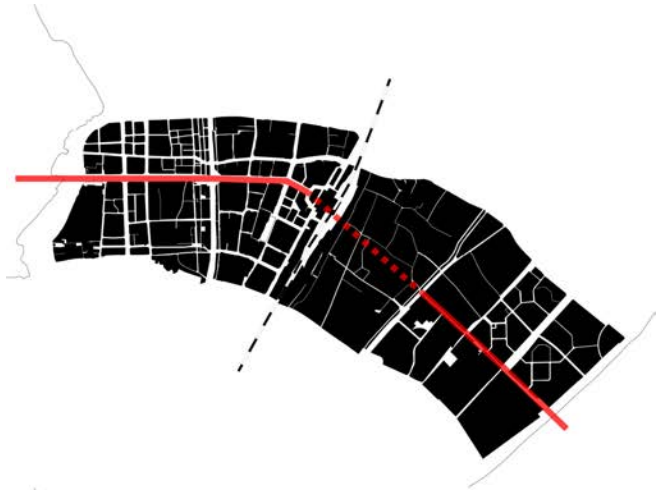
Site Plan with Existing Program 1:2000



New Zoning on the other side of the rail track 1:2000

- Residential
- Industrial/Commercial
- Education
- Health
- Other
- Commercial
- Light Industrial
- Health
- Greenery

Currently, the near east side of Hangzhou Railway Station is occupied by the informal settlement and factories.

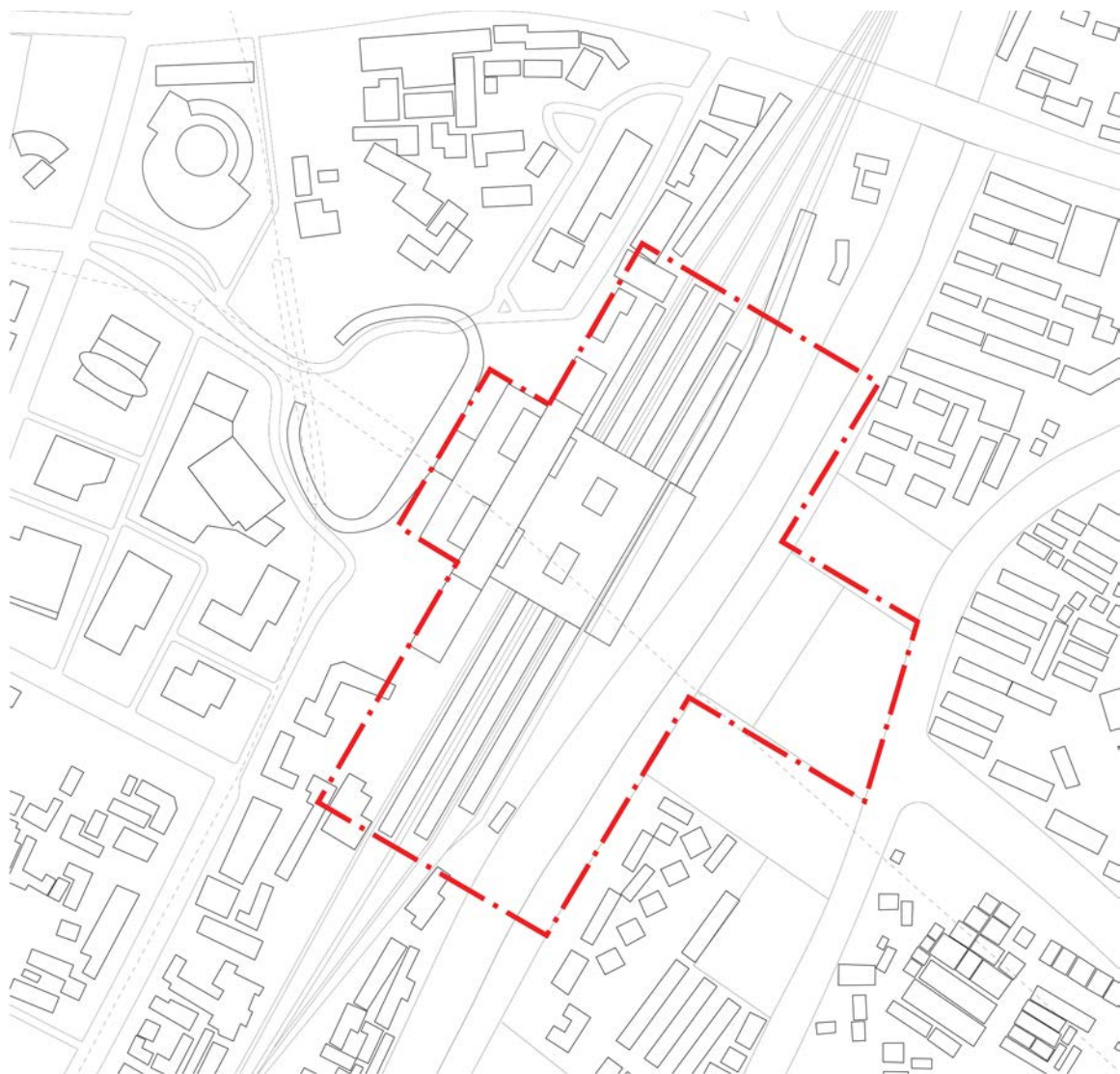


The government planned to clear up the area and connect the axes at the station.

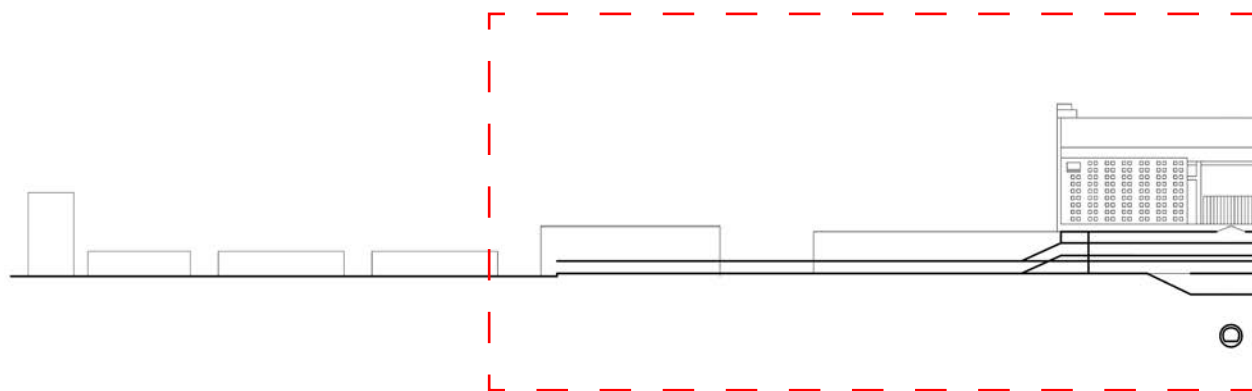
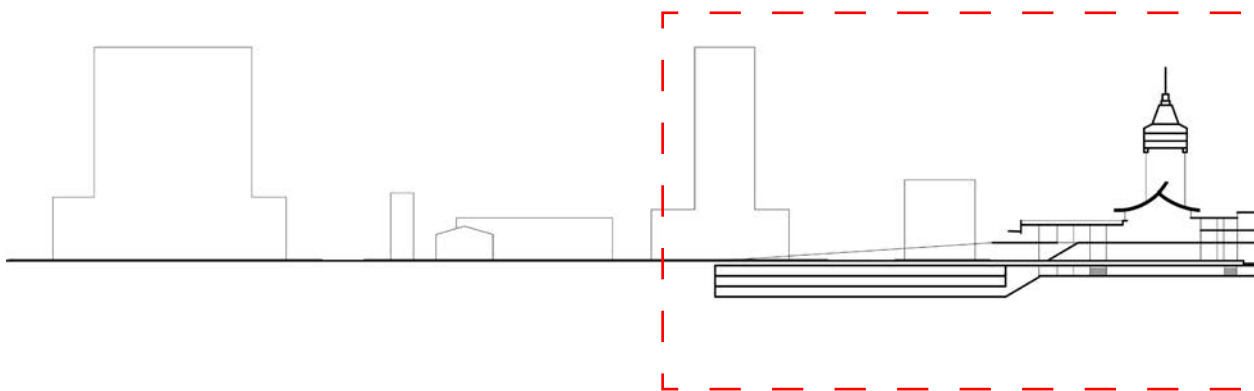


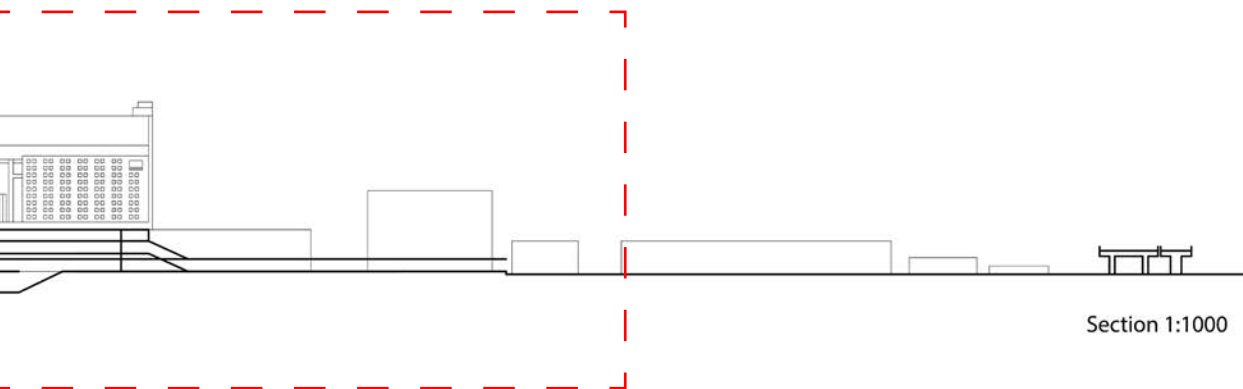
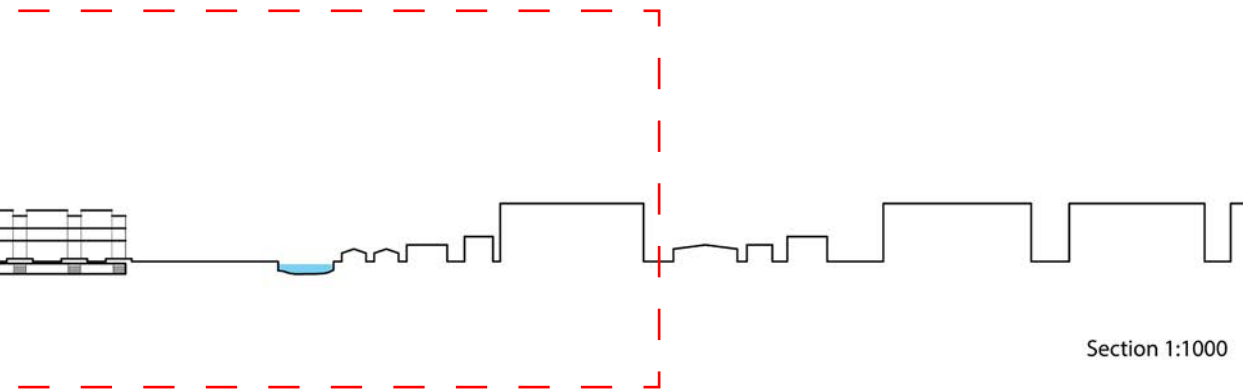
Therefore, the station will be a crucial node connecting the old city on the west side and the new CBD on the east side

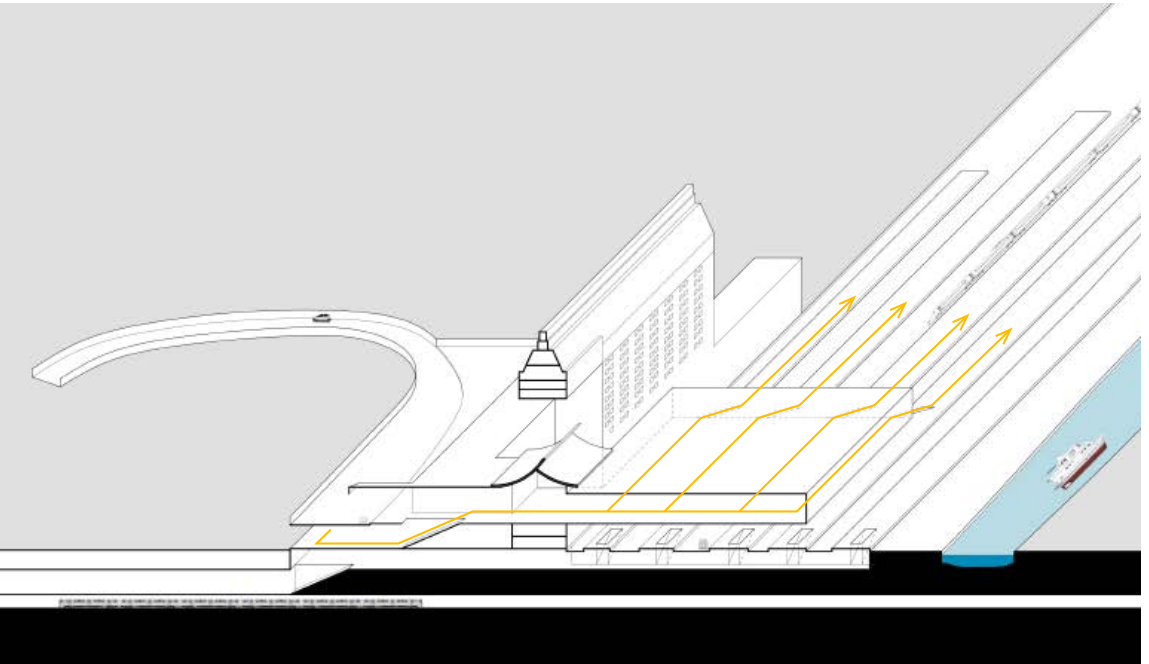
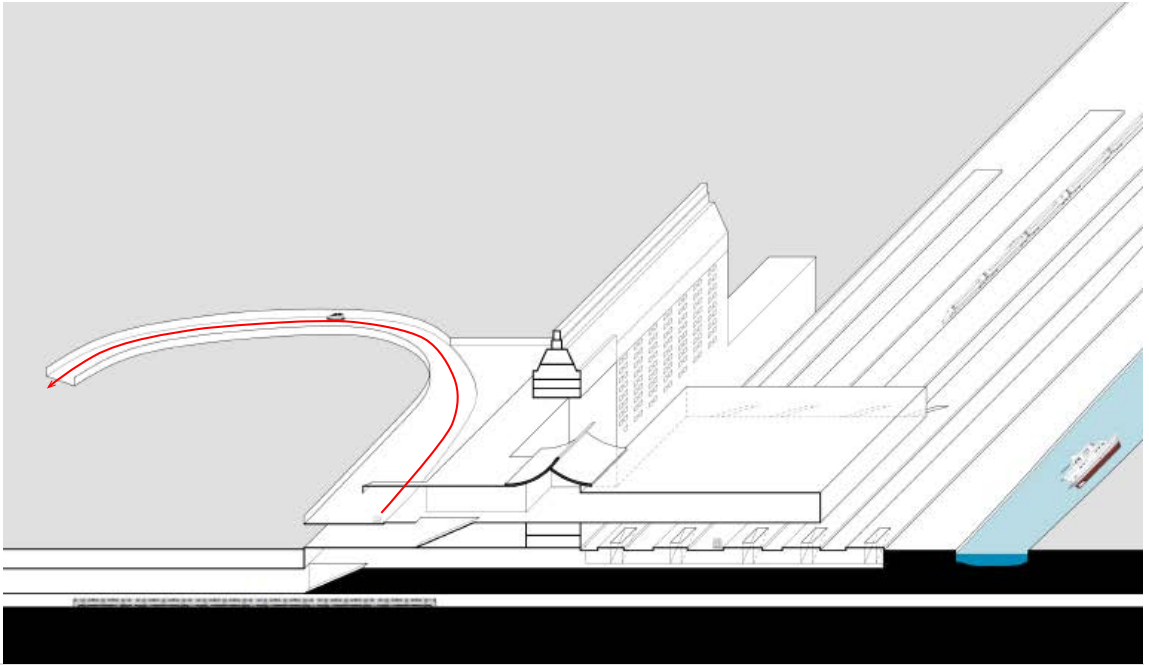


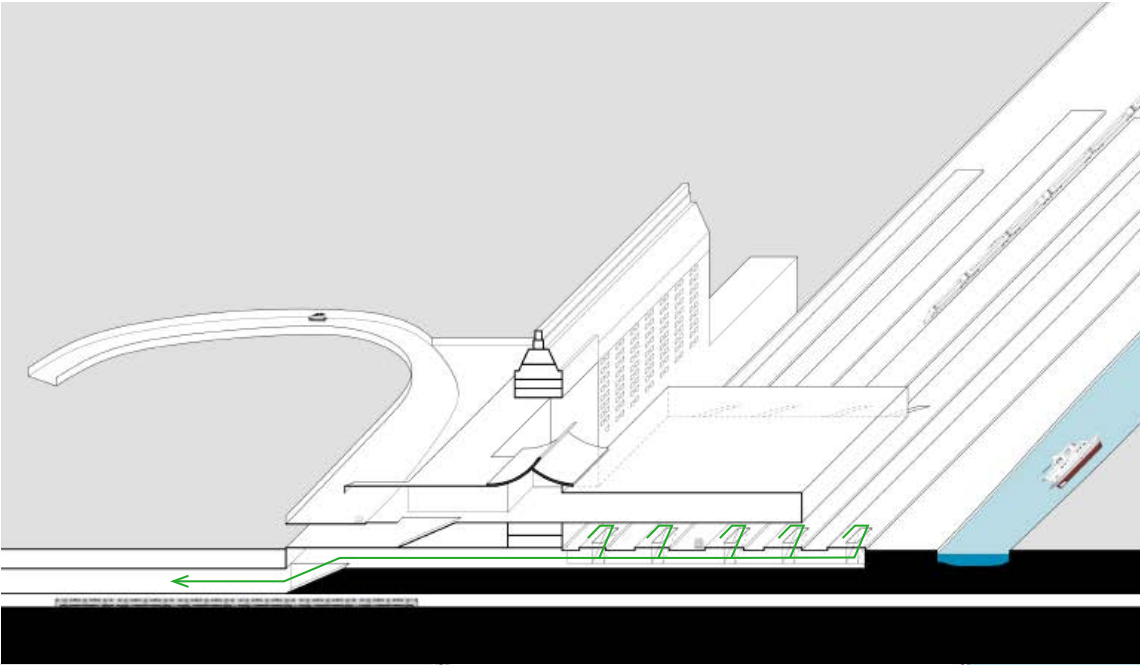


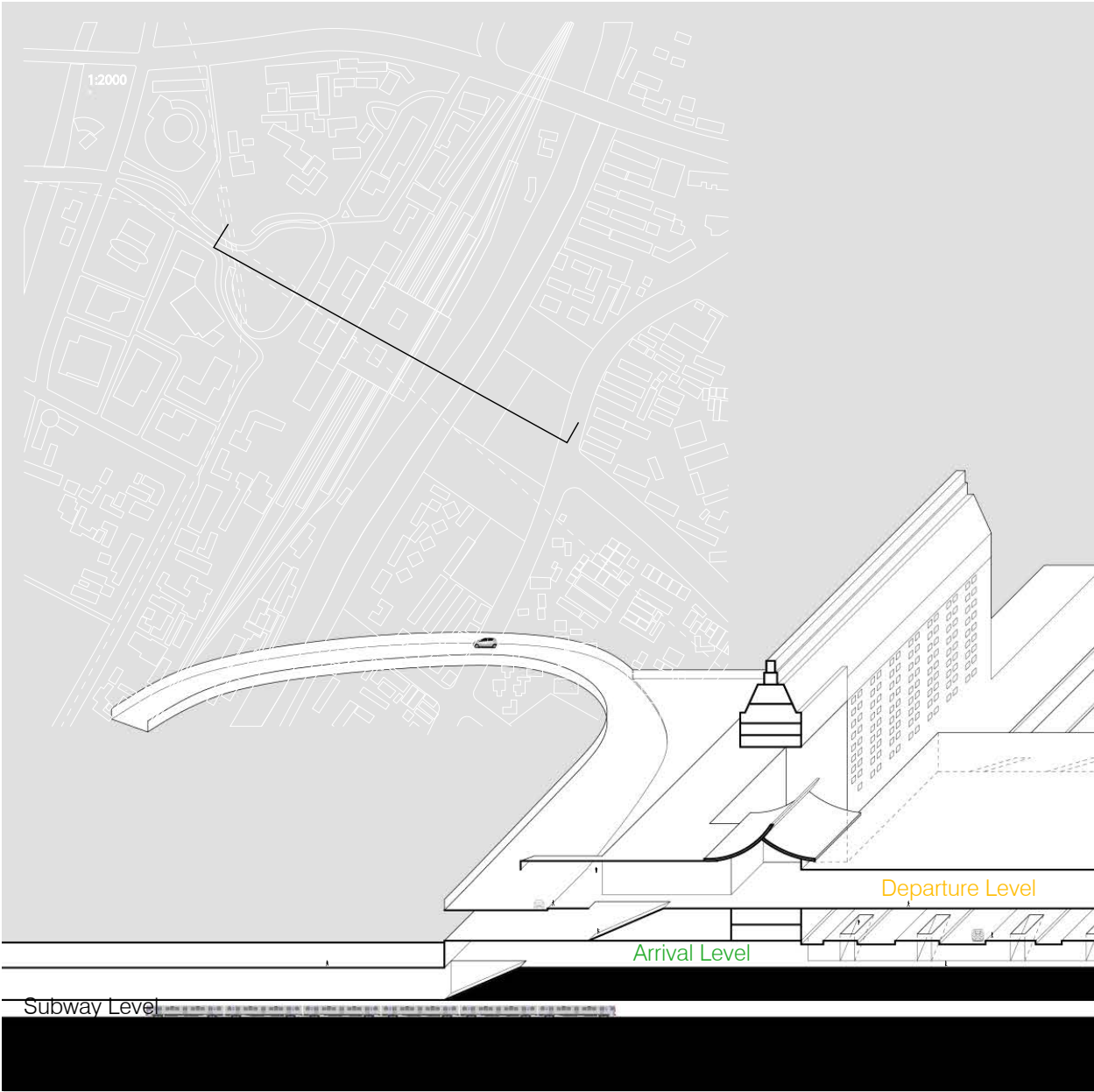


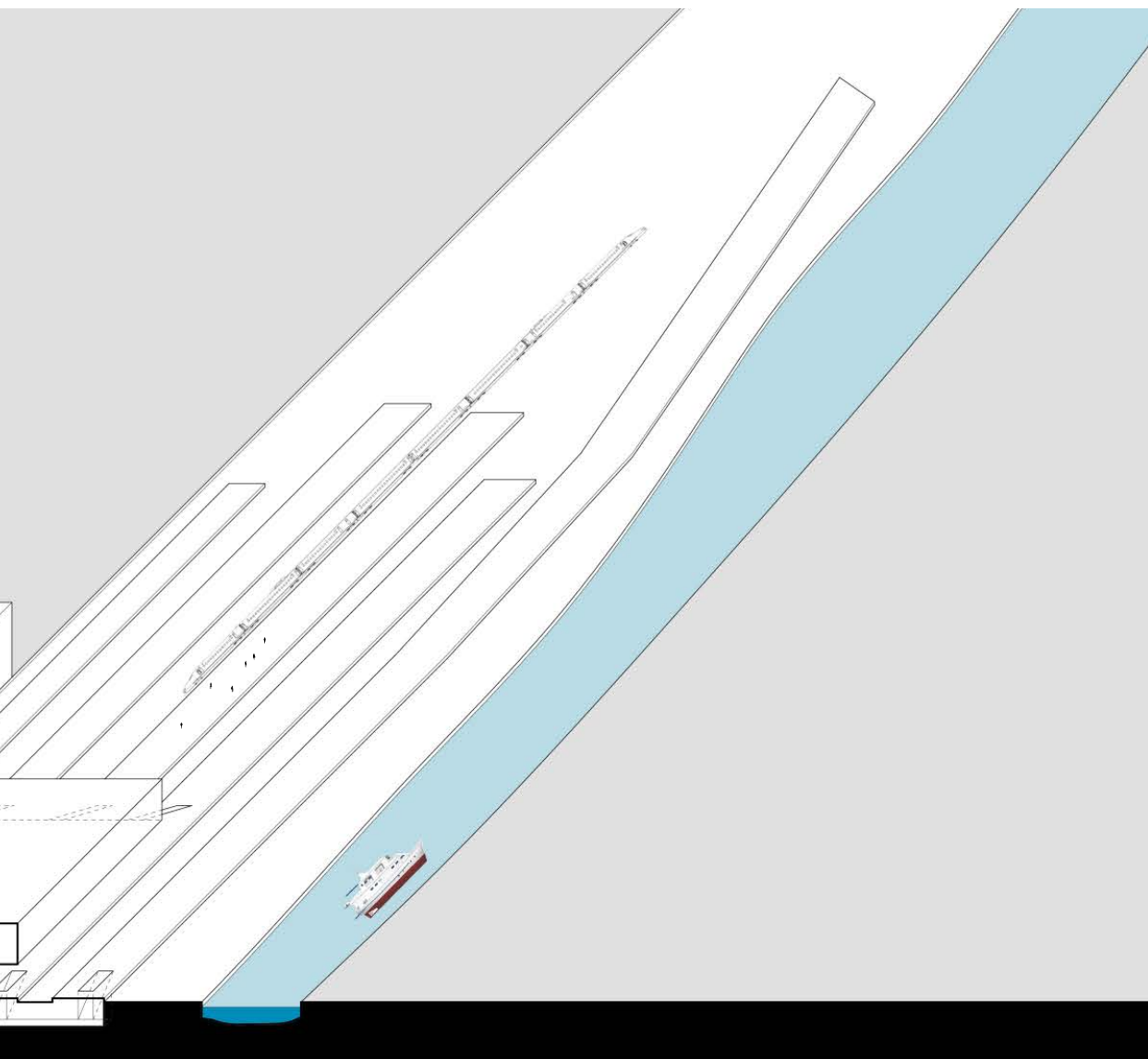






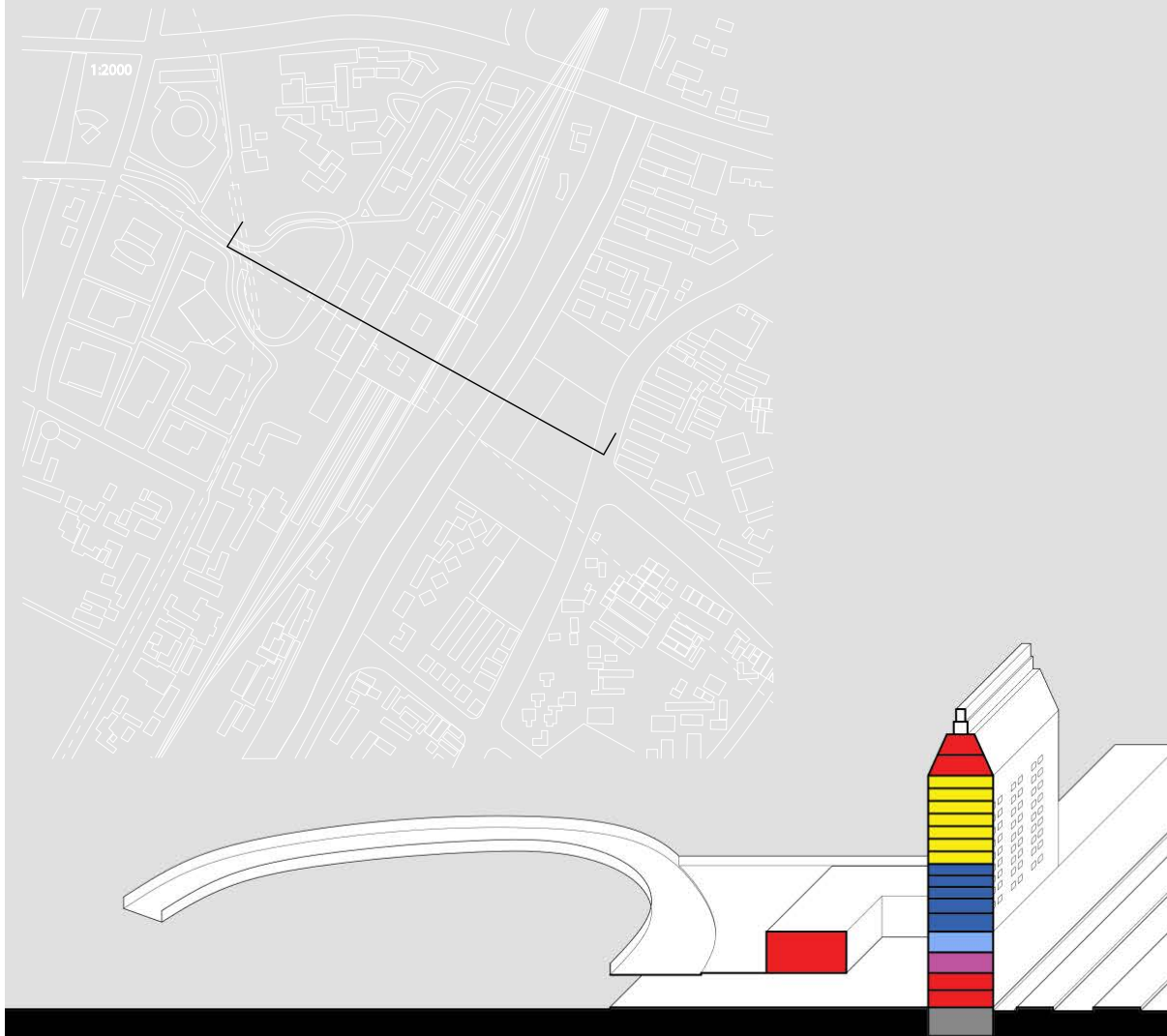






Section 1:1000





Restaurant  
1-4F, 17-18F



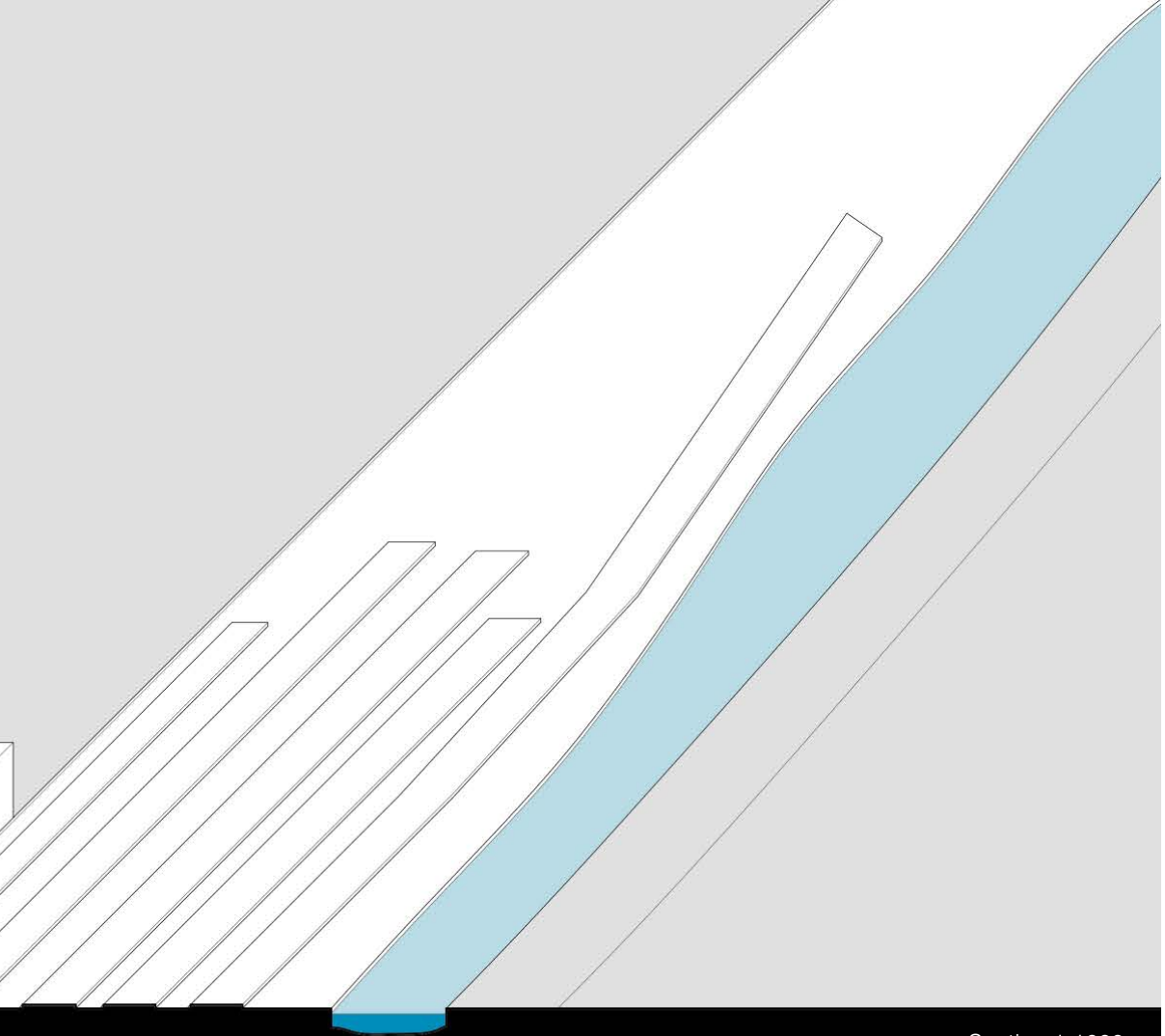
Hotel  
10-16F



Office  
5-9F



Conference  
4F



Section 1:1000



Conference Room



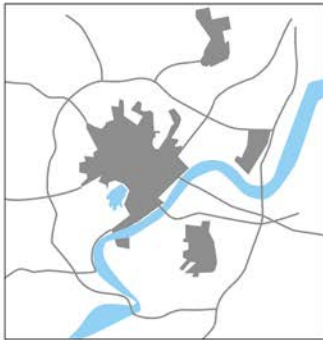
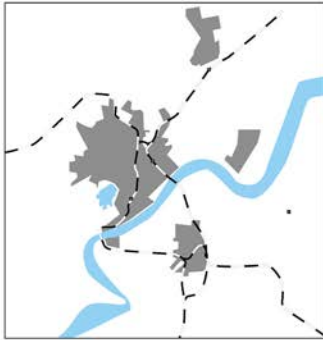
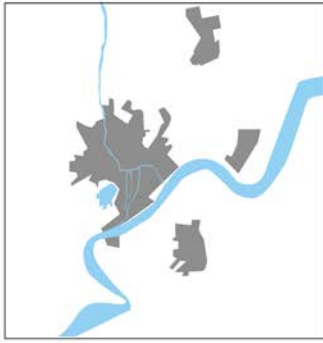
Sport Facility  
3F



Lobby  
1F

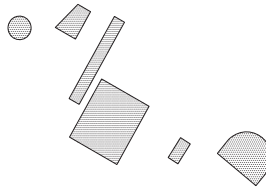


Parking  
-1F

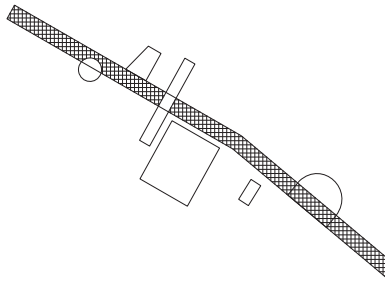


In terms of other modes of transportation, water bus, automobile and subways system are widely used in Hangzhou as well. The city is regarded as a pioneer in introducing the bike and car sharing system in China. The well developed BRT lines and the vast metro network which are expected to be finished by 2012 provide the citizens with more options to travel around in a convenient and ecological way. Therefore, it is crucial to design the transfer system between those different transit modes at the railway station in an efficient way and make it a pleasant public space for various flows of people to interact.

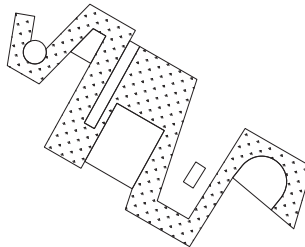
Object



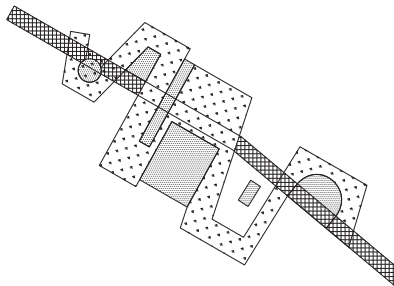
Boulevard



Promenade



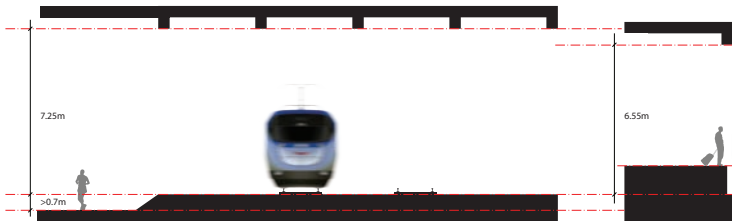
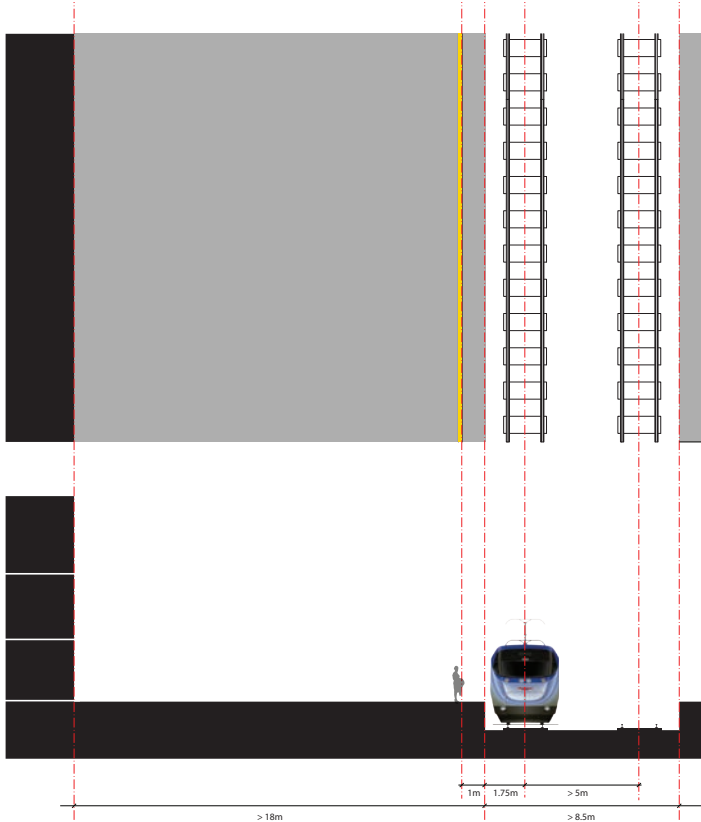
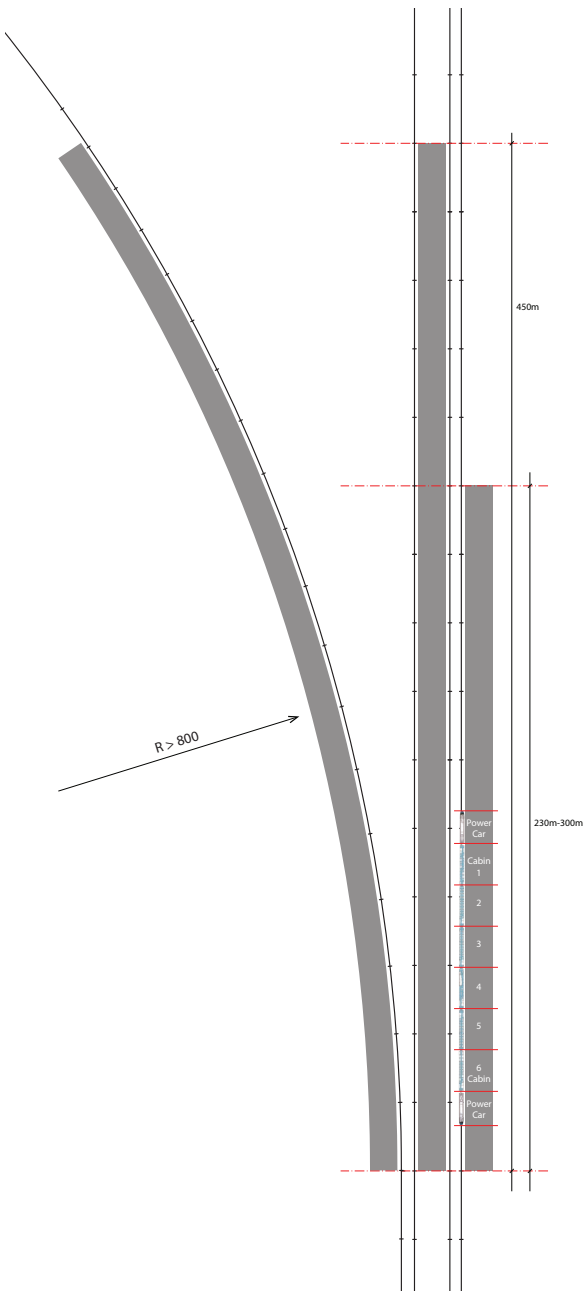
Composite

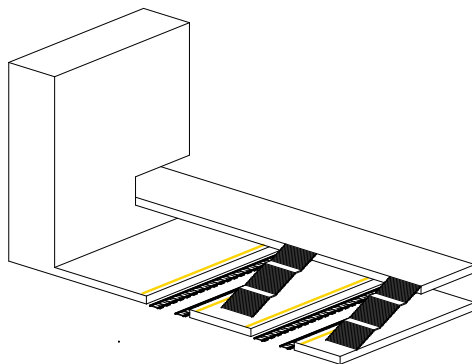
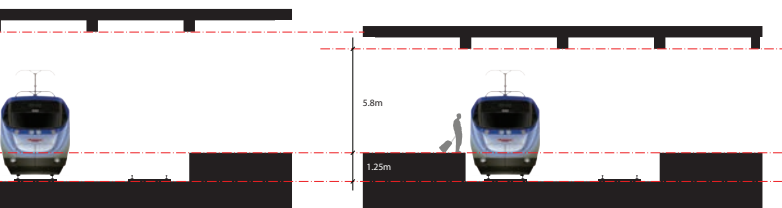
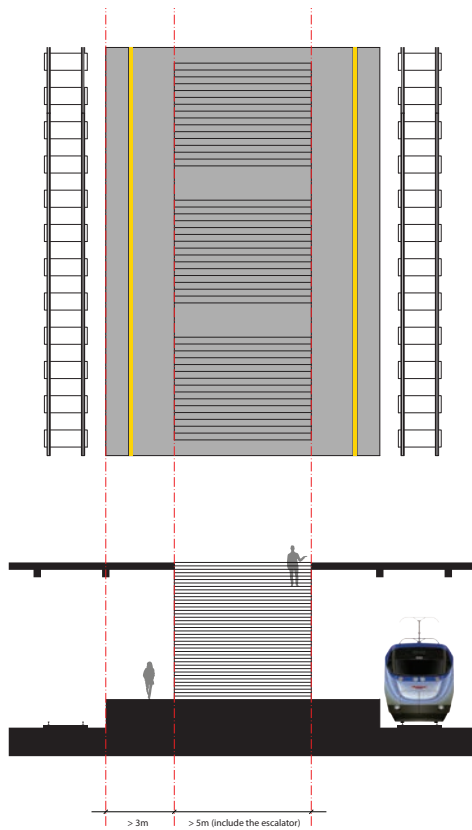
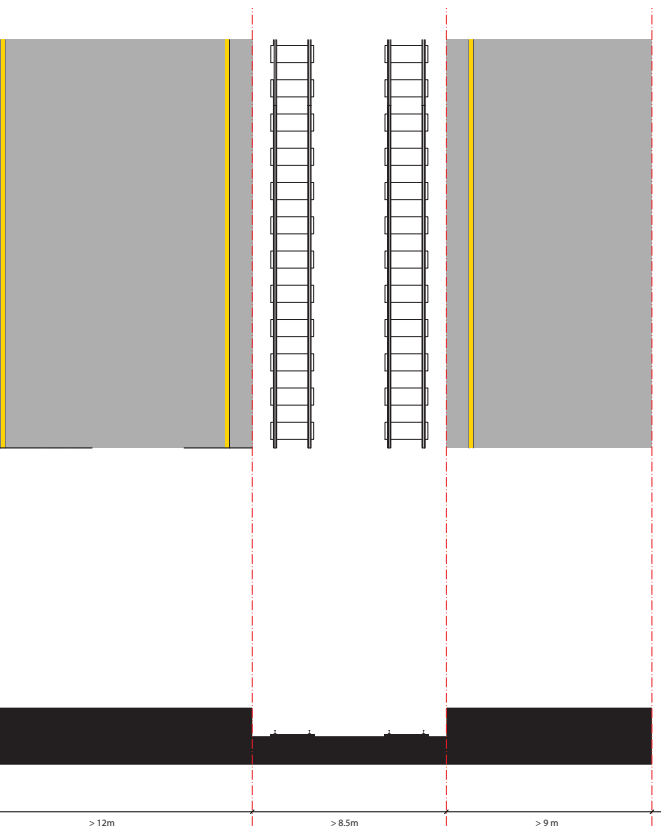




## 08 Design Proposal

# Train Station Design Regulation





# Learning from the Precedent

Wholeness of a single giant volumn



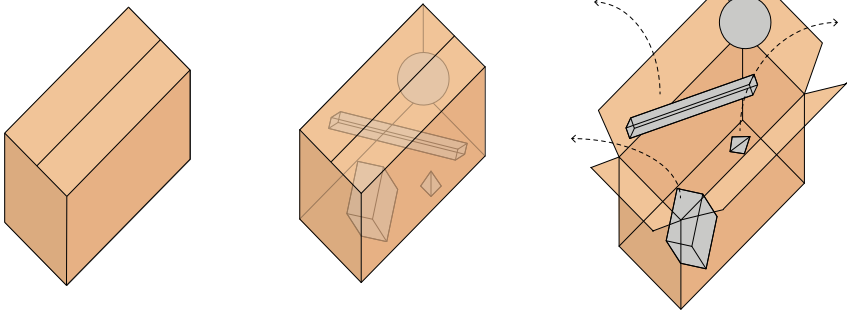
Palace of Soviet, unfinished, Boris Inofan, 1922

Conflict by disunity and fragment

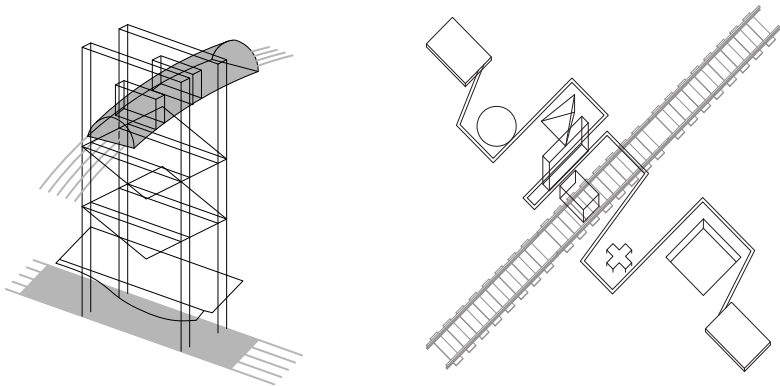


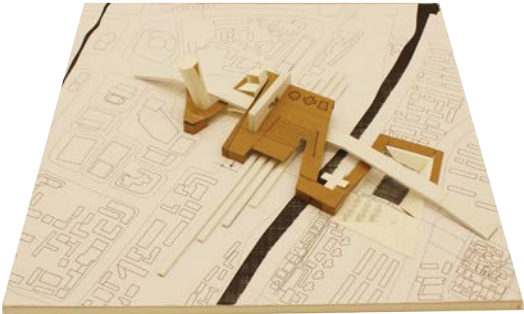
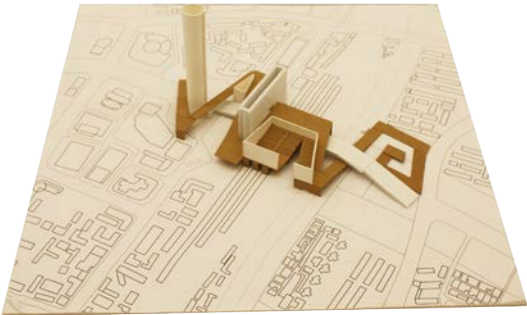
Palace at 4 A.M., sculpture, Giacometti, 1934

Kyoto station



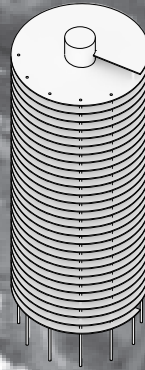
Berlin Central



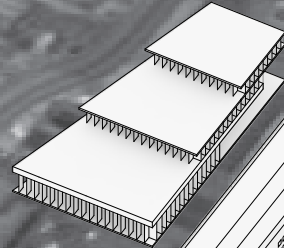




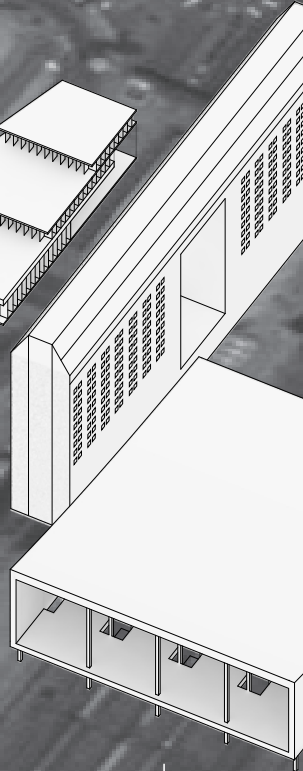
Parking Tower



Visitor Center

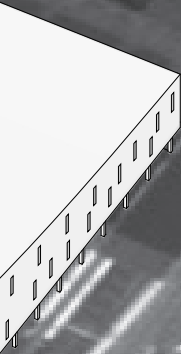


Exis

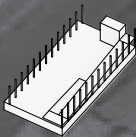


Waiting  
also perform

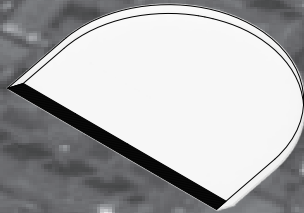
sting Hotel



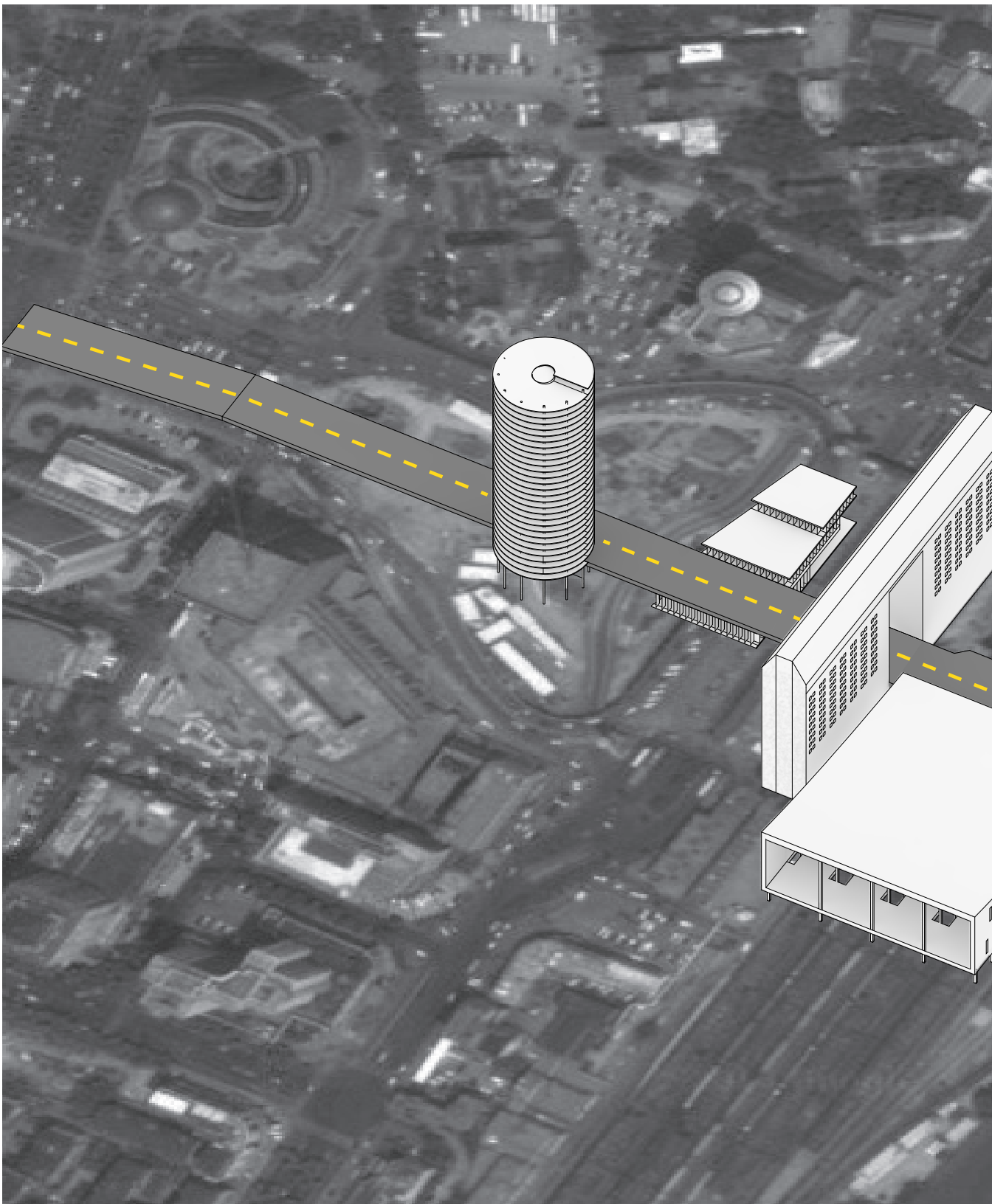
Water Bus Pier

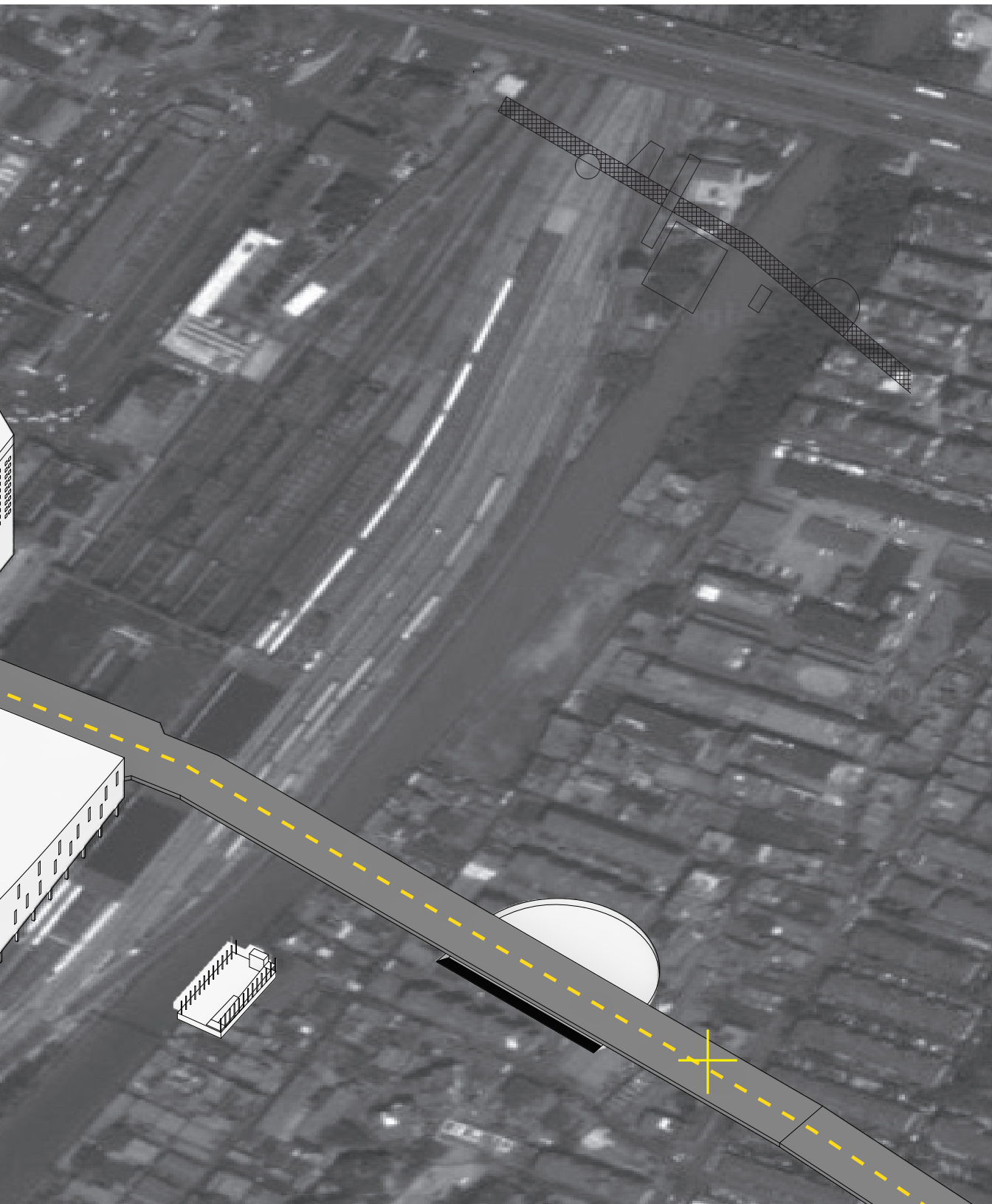


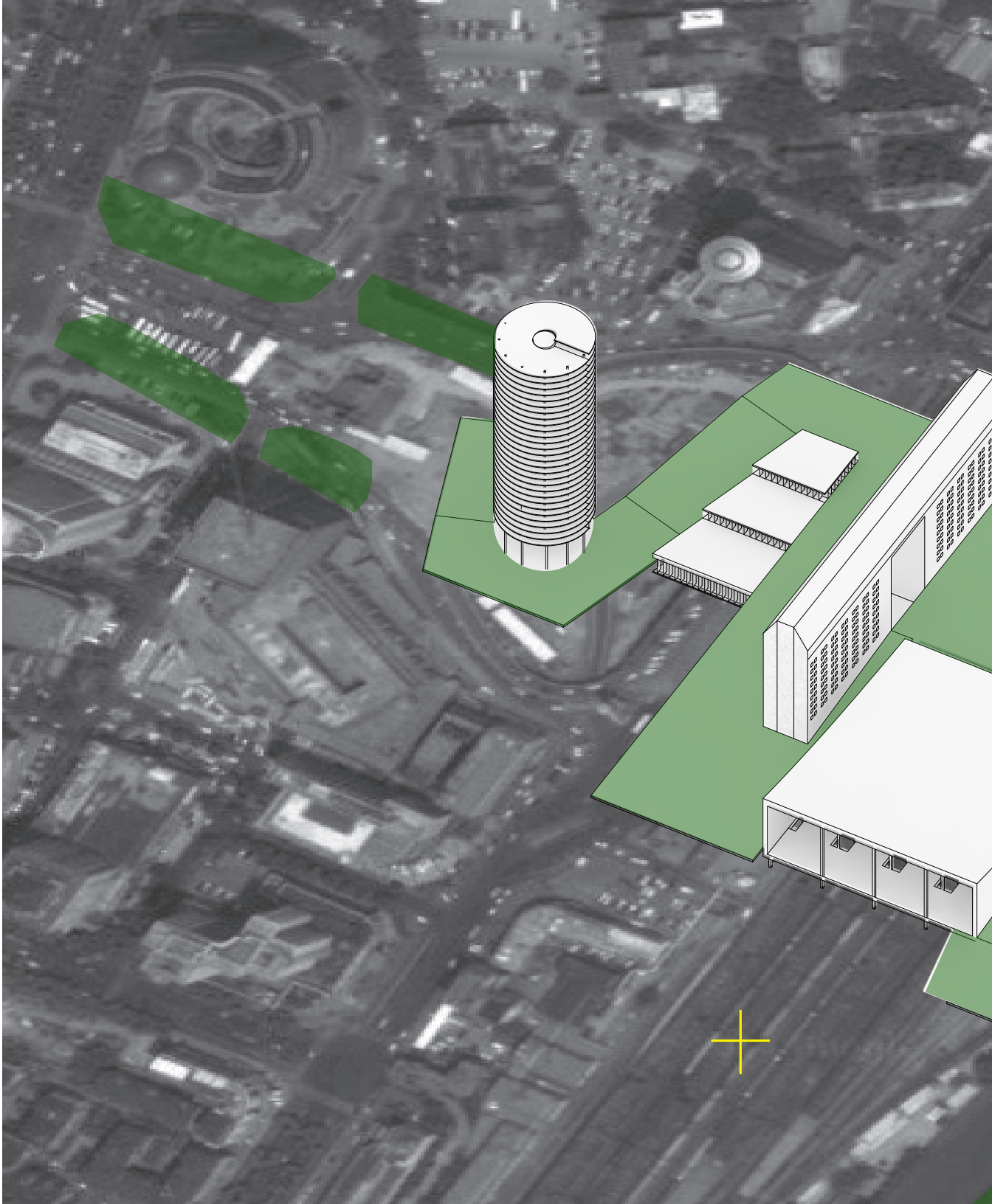
Sunken Plaza



Room:  
ms as theater

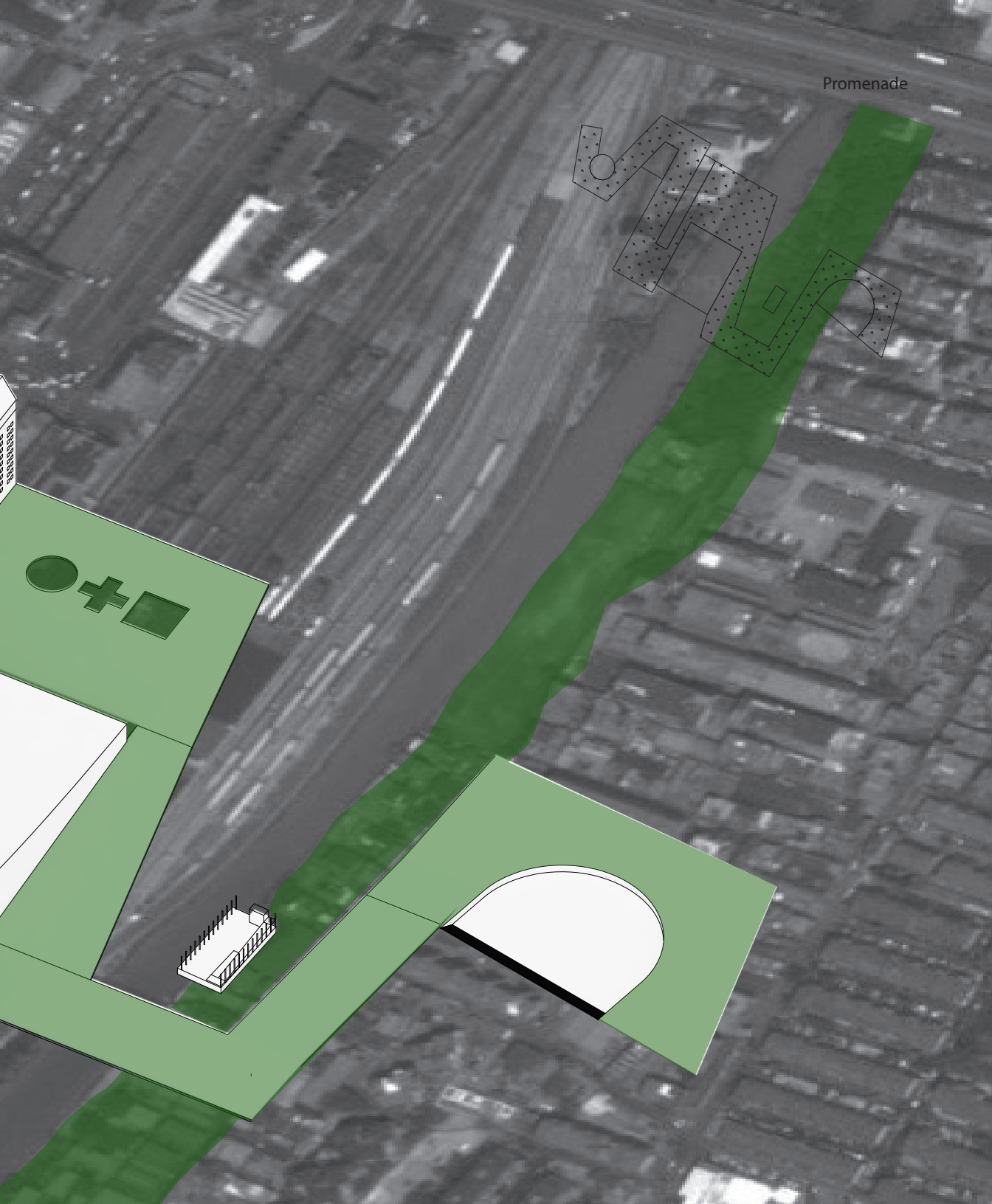






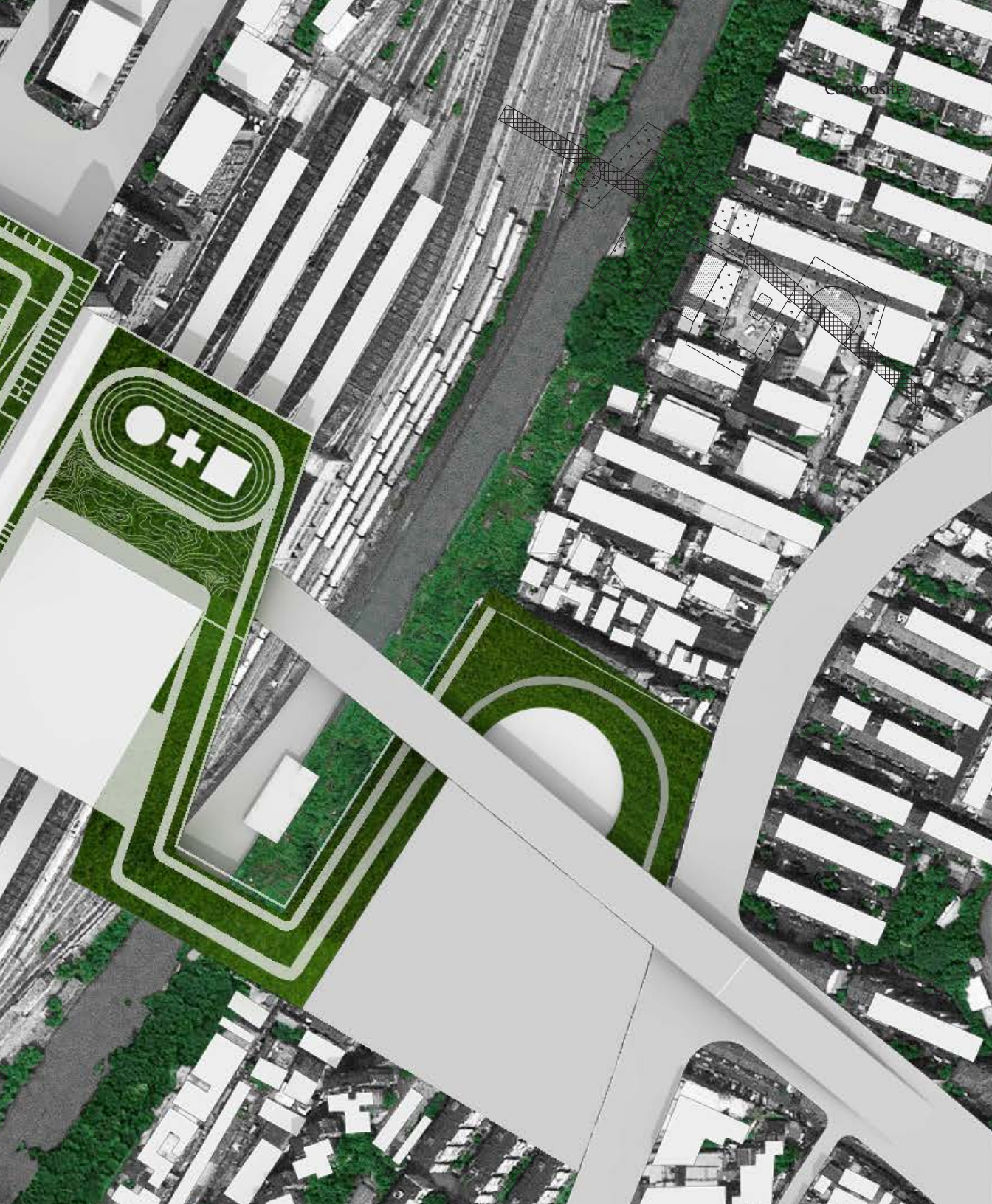


## Promenade



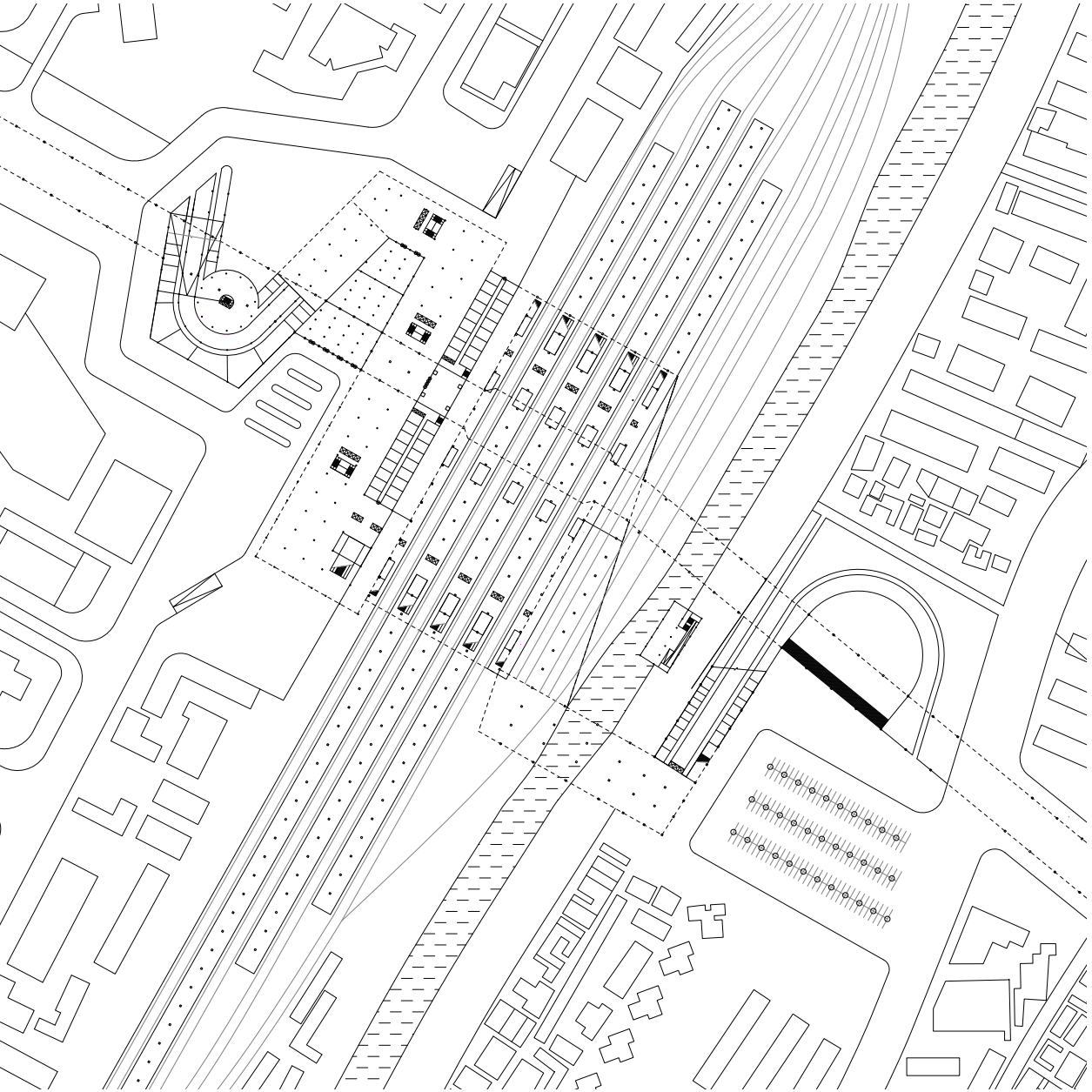




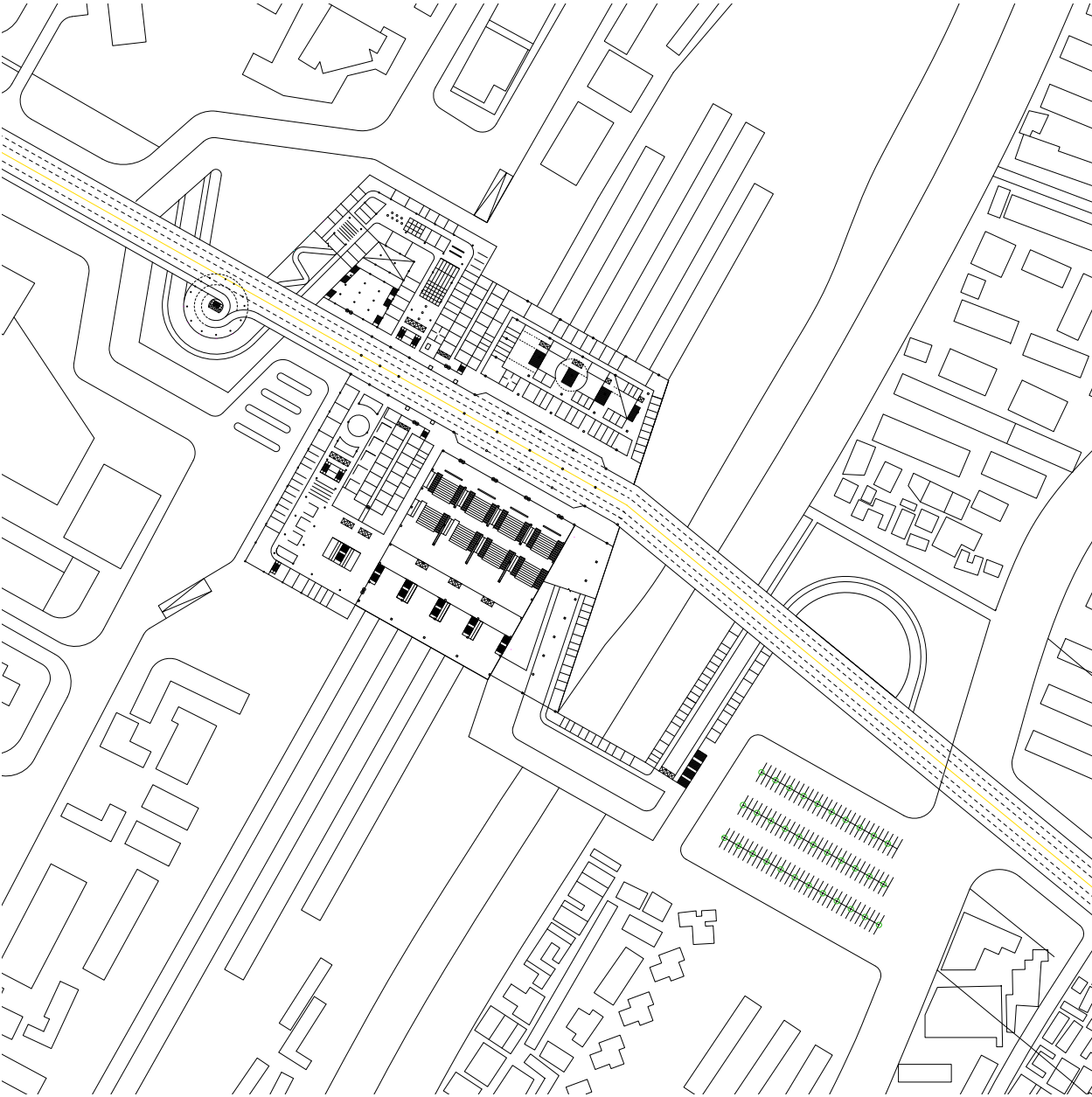


Composite

Plan - Ground Level

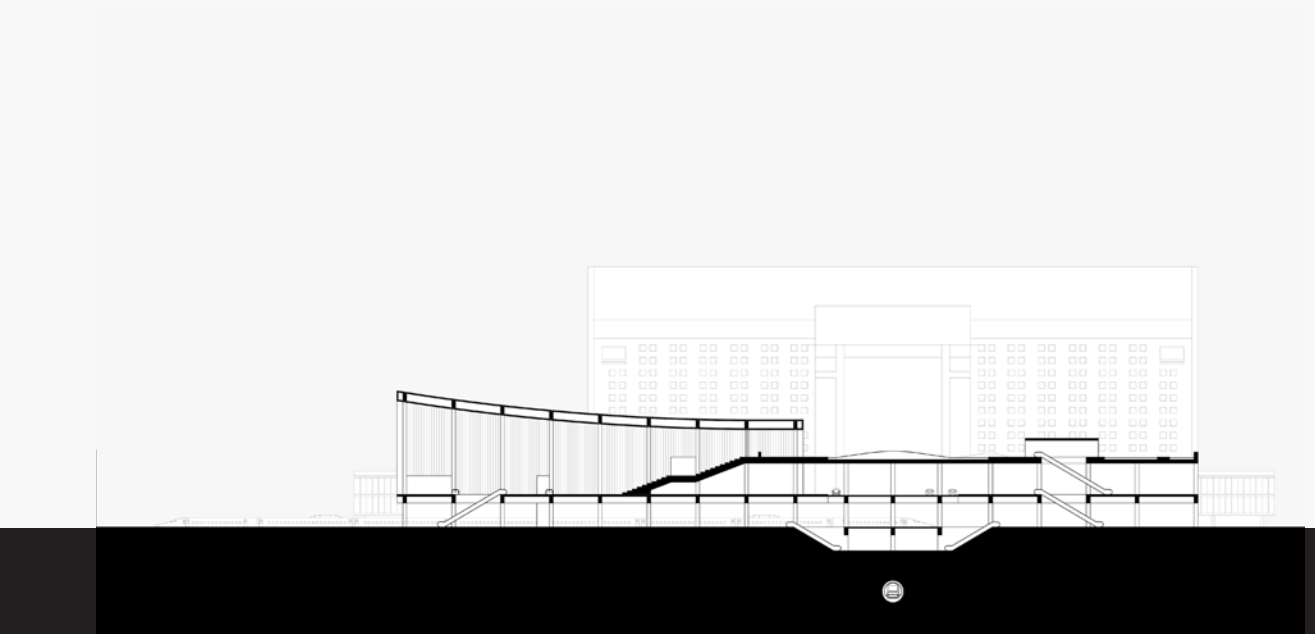


Plan - Road Level



















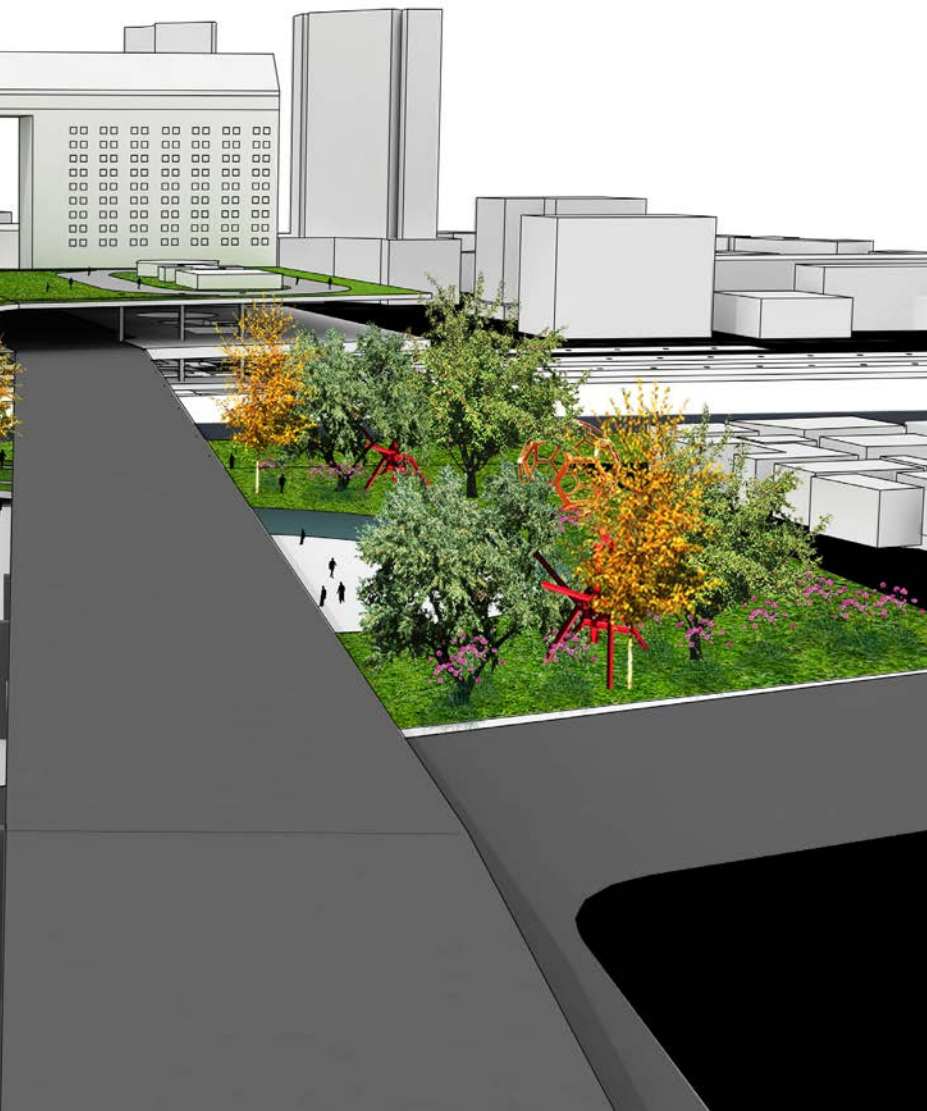
















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group, core, plynuclearity, platform, symbolic form, space of friction

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