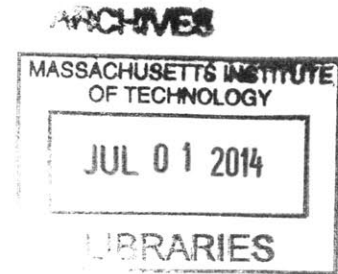


# The Walled City -- Beijing Hybrid Development Plan in the 2nd Ring Road

by Shaoyi Liang

B.ARCH  
SOUTH CHINA UNIVERSITY OF TECHNOLOGY, 2009

SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE  
OF  
MASTER OF SCIENCE IN ARCHITECTURE STUDIES  
AT THE  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY



JUNE 2014  
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Signature of Author: \_\_\_\_\_

Signature redacted

Department of Architecture  
May 22th , 2014

Certified by: \_\_\_\_\_

Signature redacted

Alexander D'Hooghe  
Associate Professor of Architecture and Urbanism  
Thesis Supervisor

Accepted by: \_\_\_\_\_

Signature redacted

Takēhiko Nagakura  
Associate Professor of Design and Computation  
Chair of the Department Committee on Graduate Students

Nader Tehrani

Professor of Architecture  
Department Head

Reader

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## ABSTRACT

The circular ring roads are one of the key elements that define the spatial organization of Beijing today. However, as the city continues to expand, the ring roads located in the inner city, combined with the gridded street-networks, usually creates more problems than solutions. The second ring road, constructed in the early 1980s-at the era of China's Economic Reform, proves to be a major example of such an issue. Despite its intention to create rapid transportation paths around the periphery of the city, as the city expands, this ring-structure serves as a new center for the city; it is notorious for its traffic jams, pollution, and drastically degenerated urban environment—a “wall” that cuts off two sides of the city and its associated urbanity.

The thesis explores the potential of new intervention on the site of the second ring road, adopting and addressing the city's transportation infrastructure as a vehicle to providing much-needed public space, new programs, and other civic amenities for the city. The proposition is that in the design of the city, architecture, open space, and infrastructure should be combined as one intertwined discipline. The strategic deployment of urban and architectural forms, applied with contextual considerations, are devised to re-introduce the “urban characteristics” back to the city.

Thesis Supervisor: Alexander D'Hooghe

Title: Associate Professor of Architecture and Urbanism

## **Acknowledgements**

I gratefully acknowledge both my thesis committees, Alexander D'Hooghe and Nader Tehrani, for your patience, cogent criticisms, and kind support.

I am very lucky to be able to develop my architecture and urban thinking under the guidance from both of you.

I'd like to thank Michael Dennis, for leading us to the fascinating studies of cities old and new. And thank you Tunney Lee, for your insights on the real-world planning and city design.

I owe many thanks to my colleagues and friends in MIT. I have a wonderful time here with you all, a memory I would cherish for a long time.

My sincere gratitude to Yungho Chang, for always being a positive influence to us young generation - both as practice architect and academic educators. A special thank you to James Shen, for your contaminating passion for architecture and all the inspiring talks about work.

And finally a warm hug to my mother, Cuiqiong Tang, whose endless love and support has made me come so far.

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## Chapter 1

### Introduction

For the last three decades, Beijing has been undergoing major changes in its urban form. As the city extends its boundary at tremendous speed, the discrepancy between urban land use and transportation planning magnify at the same time.

Since the 1990s, the construction of circular ring roads became the new major element that define the spatial organization of Beijing's urban form. The second ring road, first projected in the 1960s and eventually completed in 1992-at the era of China's

Economic Reform, was the first road system that is comprised of elevated highways with no traffic lights.

Despite its intention to create rapid transportation paths circulation the periphery of the city, as the city expands, this ring-structure serves as a new center for the city. Within 32 kilometers it has 33 flyovers at major intersections-some of which the size of 18 Manhattan blocks, being placed as close as 500 meters from each other.



Fig. 1.1 Aerial view of part of the Second Ring Road in Beijing

This massive collection of elevated highways and flyovers, which itself take up vast amount of prime land in downtown Beijing, paradoxically impose a suburban nature in the city center: roadways become essential in connecting other disassociated components added in the city which did not exist until the last 4 decades. Between huge infrastructure and wide roads, it is almost impossible to walk. All such urban development is at the expense of the demolition and relocation of the original city wall, canals, tram networks, and compact neighborhoods before 1950. 100m

Nonetheless, the Second Ring Road is now notorious for its traffic jams, pollution, and drastically degenerated urban environment—it became a “wall” that cuts off two sides of the city and its associated urbanity.

In a larger scope of the city, Beijing is now building its “7th ring road” connecting the city and Hubei Province. The quest of having the city enclosed by a circular highway never seems to end. Only at each time, the task itself manifolds and yet never manage to catch up the speed of the city expanding its size.

On one hand, the haste of urban expansion in Beijing seems to be inevitable consequence of its economic growth and various policy transformation over time to ensure that growth. On the other, the way the city spreading out further exacerbates the problems of mass transportation, among other issues. The question remains, therefore, not “how to deal with the congestion problem resulting from urban expansion”. But rather, “if we can we design a more compact Beijing that is livable and has reasonable transit capacity.”

Instead of constantly locating people outside the city, and then build enormous roads to transport them in and out—more effort should be paid to the opportunity in building the dense, mixed urban center.

The thesis thus seeks to propose an alternative patterns and strategies for development in downtown Beijing- by exploring the potential of new intervention on the site of the Second Ring Road- addressing the city center’s somewhat malfunctioning transportation infrastructure. It is anticipated that the eradication of the city center’s

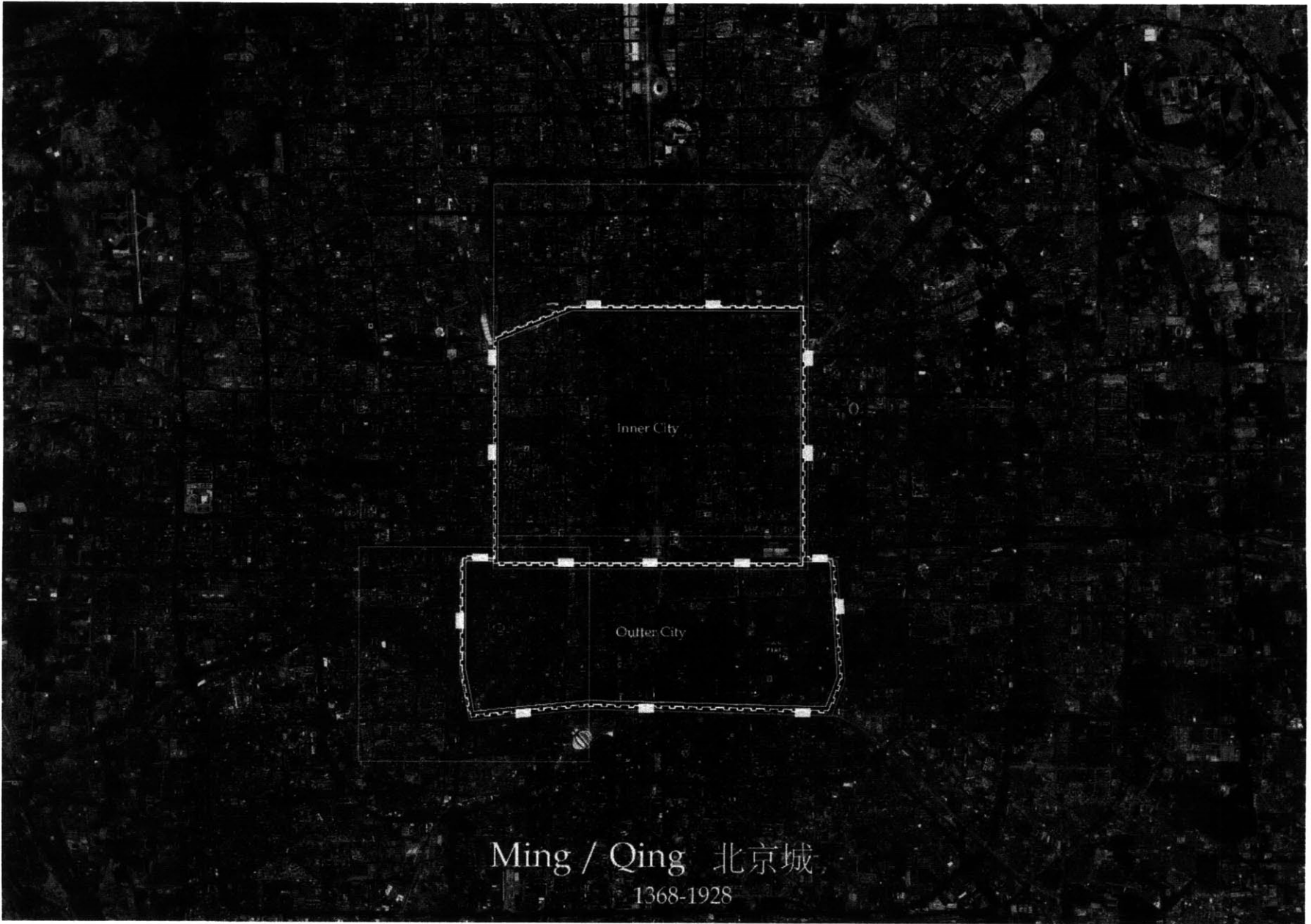


mega-infrastructure can free up land for building a new loop city within the city- a effective vehicle to restore urbanity, avoid congestion, and add other much needed civic amenities for the city.

RINGS : TYPOLOGICAL SECTION



Fig.1.2 Typological Section of the Ring Roads in Beijing



Ming / Qing 北京城

1368-1928

## Chapter 2

### Pre-history : Beijing city wall

Beijing was the capital city of the last three imperial dynasties, with a series of fortification systems which includes watch towers, city wall, and a moat system.

The last city wall was constructed between 1400 and 1553, surrounding the Inner City Wall in the north and the Outer City in the south.



Fig.2.1 Beijing Chongwenmen city wall, 1902

(Source: <http://www.wikipedia.org/>)

## Preservation

In the 1950s, there was a debate on whether the city wall of Beijing should be demolished or not. The planner and architect Sicheng Liang and Zhanxiang Chen called for preserving Beijing's city wall, as the ancient structure was "the artistic, historical ornaments on the city's façade... and an excellent park can be built on the tops of the walls..."

In 1950, Liang published an article "On the Discussion on Whether to Have Beijing's City Walls Preserved or Torn Down" in *New Construction Magazine*.

In the article, Liang proposed the city walls to be developed into a continuous park:

Liang, Sichen, and Chen, Zhuanxiang.

*Proposal on the Location of the Central*

*Administration District of the Central People's*

*Government*

“ the moat that surrounded the walls, is ideal for rowing and people may skate on it when the water is frozen in winter... the park, fitted with garden seats and lilacs, roses and other flowers, will be large enough to allow hundreds of thousands of visitors at one time. In summer evenings, people may come for coolness and leisure. Once atop the walls in bright, clear autumn days, one will have a good view of the entire city and sceneries far beyond....by being so close to nature, people would become even more broadminded. ”

Regarding to the barrier effect the wall might be to the new traffic, he pointed out that, “Effective control of vehicle flows is a requirement of key importance for planning modern road systems. On no account must vehicle flows be allowed to “flood” the city... the city walls can be readily used for control of vehicle flows.

The plan was part of the bigger “Liang Chen Proposal” city plan for Beijing, which in essence emphasized the control of city expansion.

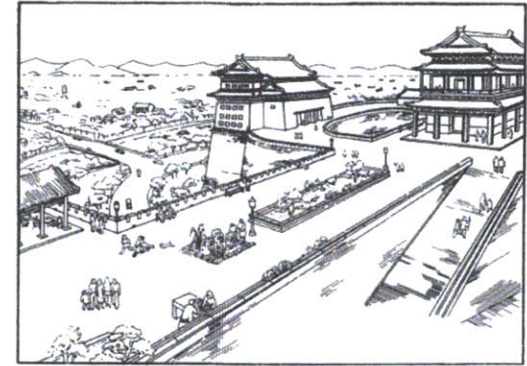


Fig.2.2 Sketch by Liang Sicheng, showing an image of the proposed park on top of the city wall (source: *Selected Works of Liang Sicheng, Vol. IV, 1986*)

## **Demolition**

Nonetheless, the ancient fortifications were seen by the central authorities as a barrier to the development of the modern Beijing. The party leaders did not respond to Liang's proposal. The Outer city wall was completely gone in the year 1950. From 1952, the Inner city wall was torn down bit by bit.

The demolition of the city wall was further propelled by the construction of the metro line, which was also planned as the underground bomb shelters were the relationship between China and the Soviet Union became intense.

In 1979, the city stopped dismantling the city wall and named the remains "cultural heritages". No more than the Deshengmen Watchtower, Zhengyangmen Gatetower, a section of northern moat, and a section of south city wall near the Beijing railway station was left intact.

## **Chapter 3**

### **The Second ring road**

As a general rule, the Second Ring Roads in Beijing follows the old city wall.

Although proposed as early as 1950s, the actual 2nd Ring Road was first constructed in 1980s, and completed in 1992, still at a time when private cars did not exist and the traffic load was relatively small. The system is 32 kilometers long in total, covering a surface area of about 3.3 square kilometers. The condition of the road surface deteriorated fast, and was totally resurfaced in 2001.

There are 33 elevated bridges and fly-overs along the Second Ring Road—a design to reduce waiting time for the change of traffic lights at the intersection between the main grid and the Ring Road—only ended in creating serious bottleneck condition and traffic congestions. There are few direct links in the Ring Road connecting to expressways. Apart from the full junctions, vehicles are not able to cross the Ring Road.

### Typological Separation : a first jump in scale

The Second Ring Road is the dividing line between two different types of urban fabrics: the historic net of small and dense Hutongs in its geometric center, and the vast-dimension super blocks built in the last 50 years.

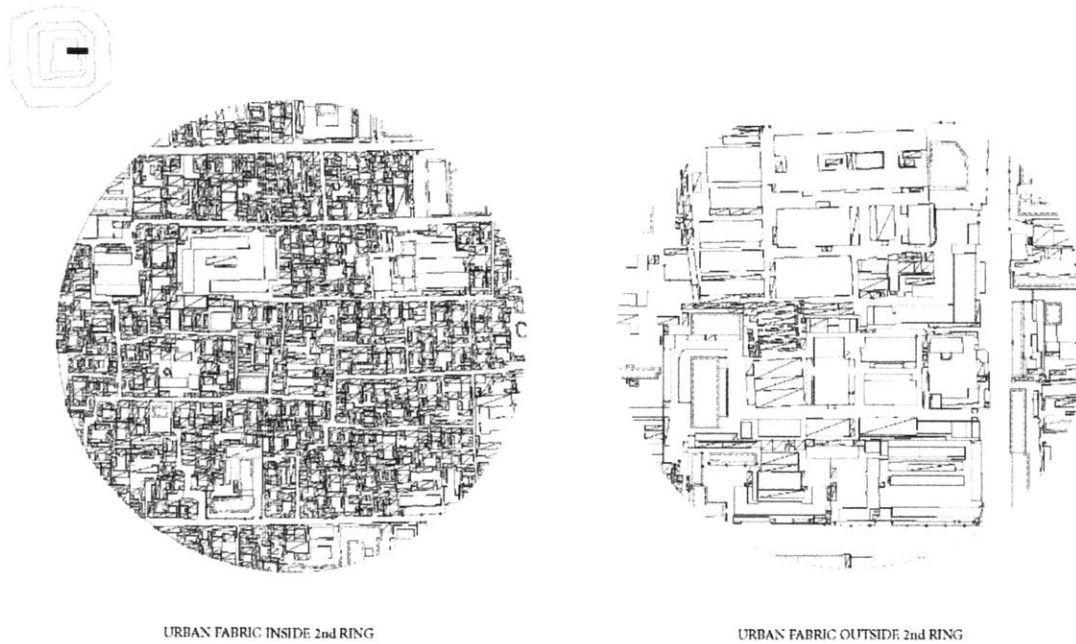


Fig.3.1 Urban fabric comparison on both sides of the Second Ring Road



Pedestrians has to look for the overpasses bridges to cross the streets that are on average 12 lanes wide. Additional networks of inner-city highways were also built on the site of the former canals and tram networks of the pre-1950s.

### **Expansion, Congestion, and Disruption**

The Second Ring Road was built in 1980s, at a time when private car ownership was something nearly unheard of. In 2012, there are more than 5 million cars registered in Beijing, 5 times of the registered number 1 million in 1997.

At the same time, the urban area in Beijing expands mono-centrally. The population in Beijing has grown from 15 million to 20 million in last seven years-of which more than a third of them are migrants from other cities or rural areas. Almost in a curious way of urban sprawl, large blocks of residential compounds, business parks, etc. were designated at the edge of the city, each of which connected by massive road ways.

The distance between living and working becomes larger and larger, and new road building and mass transportation systems have not been capable of catching up its speed.

The inner rings immediately proved inefficient to carry such increase of traffic load.

A key reason for the severe congestion problem might well lie in the disruption between city planning and transportation planning. Ring roads, are purpose-built highways surrounding a town or city. They are circumferential, providing fast bypass to adjacent towns. When the second ring road was proposed on the site of the city wall, the area outside the wall was still considered suburban. But 10 years after the actual structure was built, Beijing has expanded so much that the second ring road has already become the very core of the city—a condition no longer makes sense of the ring road system.

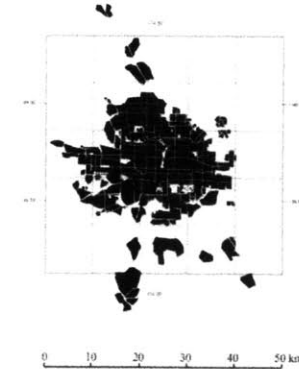


Fig.3.1 Central Built Up Area in Beijing,  
1990-2000

*(Source: Global Metropolitan Observatory)*

The congestion also has large impact on the air quality of the city. Beijing is perhaps the worst polluted capital in the globe. Furthermore, the inner ring has occupied vast area of downtown prime land, creates inhospitable streets interfaces, and amputates urbanity wherever it goes.

### **Open space and the Green Belt**

The urban fabric in Beijing was historically delicately integrated with nature and landscape. The canals, lakes, and parks located in and around the city, and many of the great streets were lined with rows of trees that were closely planted.

“ as you travel along roads and streets...it is the trees that take you along the way. ” was the impression people had if they visited Beijing streets in the 1980s.



Fig.3.2 Air pollution in the Second Ring Road

*(Source: www.voafanti.com)*

In his book, “Rehabilitating the Old City of Beijing: A Project in the Ju'er Hutong Neighborhood (UBC Press, 1999 ), Liangyong Wu pointed out that the Second Ring Road is a clear example of insufficient planning which resulted in missed opportunities for development, among the many issues related to Beijing’s traffic management and roadway planning.

“If the city wall had not been demolished,” he suggested, “the site of the Second Ring Road could have been planned as tree-lined avenues and plazas, with link roads for local traffic. ”

“Even now, careful urban design could improve the image of the Second Ring Road... Large building complexes could restore its image at the edge of the city, and new landmarks could be created near the site of the old city gates”

It seems the city of Beijing also realized the need to increase public open space by utilizing the leftover area near the Second Ring Road. According to Beijing Daily, by August 4014, two green path will be added along the North and South Second Ring Road,

Wu, Liangyong

*Rehabilitating the Old City of Beijing: A Project in the Ju'er Hutong Neighborhood , UBC Press, 1999*

Beijing is planning the construction of a 16-kilometer Cross Town Traffic

<http://online.thatsmags.com/post/land-theft-autos-the-existential-woes-at-the-heart-of-beijings-rapid-development>

with a total length of 5.2 kilometers long. Pavilions and landscape will be assembled along the path, to provide space and amenities for leisure and recreation activities.

Unfortunately, the attempt to put the green linear park right next to (or in some cases, in the middle of) the massive traffic, as well as pollutant of air and noise, is at best “well-intended” but in reality ill-designed. Most part of the green area associated with the second ring road was merely a decoration which wasted both valuable land and the opportunity for common good.



Fig.3.3 Green areas next to the Second Ring Road (Source: <http://dqzy.bucea.edu.cn/>)

## Chapter 4

### Highway removals

The answer to the Second Ring Road conundrum might be a bold step ahead, to totally remove the inner city ring road system itself. Already many cities in world has recognized the problems ring roads and expressways produce when they are located in the city center. A lot of them take the measure to demolish these huge elevated structures, and many more are planning to do so, in the hope of improving the quality of the urban environment, as well as optimizing traffic flows.

Portland was the first city in the U.S (1968) that initiated the idea of demolishing its highway. Harbor Drive , which was built in the year 1942, was closed in 1974. The land freed up from the elevated freeways constructed a new waterfront park, which opened in 1978.



Fig.4.1 Harbor drive in Portland, 1962

*(Source: City of Portland Archives)*



Fig.4.2 The Waterfront Park built on the site of the original Harbor Drive Highway

*(Source: www.expedia.com)*

## Case study 1

### Embarcadero Freeway, San Francisco, CA , United States

#### History

The Embarcadero Freeway was built in 1959, connecting the Bay and the North Beach. The elevated, 6-lane freeway physically separated downtown San Francisco from the waterfront.

Demolition of the freeway began soon after the 1989 Lorna Prieta Earthquake, and completed in 1991.

#### The New Street

A new “complete street” was designed in the place of the original double-deck freeway. A boulevard was built along the waterside, usually crowded with bicycle riders, strollers and joggers.



Fig.4.3.4.4 *Embarcadero Freeway and Ferry Building, 1960 (Source: Telstar Logisitics)*

## Connections

The promenade was seamlessly emerge to the main street of San Francisco at the point of their intersection, allowing a more convenient pedestrian passage connecting activities of both sides.

## Nodes, Land Mark

The Ferry building was once a busiest terminal in the Bay Area, and gradually lose its grandeur when the freeway was constructed. After the demolition of the freeway, a public square is built before the Ferry Building. Now the building is renovated and accommodate a hustling gourmet food market as well as other prepared for further expansion. The Clock tower of the Ferry building has once again became landmark of the neighborhood.



Chronicle / John O'Hara

Fig.4.5, *Embarcadero Freeway and Ferry Building* (Source: <http://ww2.hdnux.com/photos/>)



Fig.4.6 *Public square and Ferry Building* (Source: [en.wikipedia.org](http://en.wikipedia.org))



**Influence:**

The traffic on the Embarcadero was reduced nearly by half, and the remaining traffic is displaced onto other roadways in the area, which appears to be well absorbed.

15 years after the Embarcadero Freeway was removed, whole new neighborhoods, as well as new civic and social amenities were brought into being in its nearby areas.

The removal of Embarcadero highway further contributed to the prosperity of its neighboring commercial and residential development. The land value which used to face right next to the freeway increased as the result of the safer, more amiable urban environment. An addition of 7,000 housing units are planned or being built.

The city's waterfront emerged and became an attractive destination both for the locals and tourists, which was only possible because of the highway removal. The tourism industry grew in past years, especially after the Ferry building was reopened in 2003.

The successful impact of the highway removal, is essentially connected to the development of the downtown area.

## Case study 2

### Cheonggye Expressway, Seoul, South Korea

#### Background

Cheonggyecheon was a waterway in the city center of Seoul before it was covered up in 1958-1976, to the construction of new roads and the Cheonggye Highway. The expressway accommodated approximately 168,000 vehicles per day, nearly 65 percent of which was through-traffic.

In the year 2003, the city removed the elevated expressway, and restore the original stream. A new linear park of 3.6 mile was also established along the stream. Surface traffic road was reduced to two-lane, one-way streets on both side of the park.



Fig 4.7 Cheonggye freeway in downtown Seoul  
(Source: <http://www.preservenet.com/>)



Fig 4.8 Stream recovered from highway-removal , Seoul, 2005 (Source: *national geographic magazine*)

## Management of traffic congestion

The city of Seoul did not relocate the traffic on the expressway to newly built roadways. Instead, it seeks a combination of traffic control policies to improve the congestions problem city-wide, and especially for the central core of the city.

### 1) “ No Driving Day” Program

A few months after the demolition of the Cheonggye highway, a new “ No Driving Day” program was introduced. The program is voluntary based, and use various incentives to encourage people go to work via public transportation.

“ Car owners are rewarded for their dedication to reducing car use through a number of incentives. Participants can receive:

- 5% reduction in car tax
- 50% discount on selected tunnel tolls
- 20-30% discount at selected public parking locations
- Priority parking in areas close to home

- Reduction in congestion tax
- Discount at petrol stations
- Discounted repair services
- Free car wash
- A decrease in monthly insurance payments by 8-9%
- Social discounts; restaurants, bike rentals, bookstores etc

With 3 of every 10 eligible cars signed up to the program, totaling between 700,000 and 900,000 vehicles; traffic volume has decreased by 7%, operating speeds have increased by 13% and annual traffic related emissions are down by 10%. “

*From Seoul’s Voluntary No Driving Days*

<http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/transport/seouls-voluntary-no-driving-days/>

2) A new fee for private vehicles

At two major entrance to CBD, a new fee is charged for private vehicles with less than three passengers during the week days, reducing traffic by 14 % and speeds increased 38 % within a year. At the same time, traffic on alternative routes increased 6%, and speeds improved 16%.

3) Increasing parking fees while reducing the amount of public parking for public parking in downtown area

4) The improvement of the rapid bus system was also a key component in the larger transportation package. Additionally, the park is connected to several metro lines.

## **Post-Removal Evaluation**

### Traffic

The exact traffic counts of the comparison between the highway and the new roads are not available yet, while the total number of vehicles passing through downtown dropped by 9 per cent, as a result of the implementation of the new rapid bus system and a package of transportation regulation policies. Because the original bridge carried mainly through-traffic, the demolition of the highway structure itself did not directly result in traffic congestion in the busy city center.

### Urban environment

It is estimated that around 90,000 visitors come to the park one year after its opening. In the waterway park summer temperature is comparably lower than other parts of the central city. Land value of nearby parcels increased by 30 per cent along the new linear park. The transformation from elevated highway to Waterway and open space considerably improve the quality of the urban scape in the area.

## Notes

The Cheonggye Expressway is in many ways similar to the condition of the Second Ring Road in Beijing. It was a major transit route located in the city center, with elevated bridges for by pass traffic and wide lanes for vehicles of local traffic on both sides. The traffic flow was addressed by a comprehensive management package which belongs to a much larger strategy to improve traffic condition city-wide. The restoration of the old river and the establishment of the new linear park also serves as an important component of the larger development plan, improving both urbanistic quality and economic value of its surrounding areas.

### Case Study 3

#### Madrid Rio, Madrid, Spain

#### Background

The M-30 Motor way was an inner ring road located in the center Madrid. It was considered a major barrier to the urban environment at its location, cutting off urban fabric and creating much air and noise pollution in the area.

Starting 2004 the city of Madrid re-route the section of the M-30 ring road to underground, resulting in an area of new surface land 10 kilometers long, a potential site of 649-acre for new development of parks, new housing, and social facilities. The new tunnel routes is in total 56km long, as part of the new 99km road construction plan. The total project budget is estimated at €3.7 billion and the project is completed in 2011.



Fig 4.8 Construction Works

(Source: Franchini, T. Arana, J. *The Mega-Blue-Green Network: Madrid River Project* )

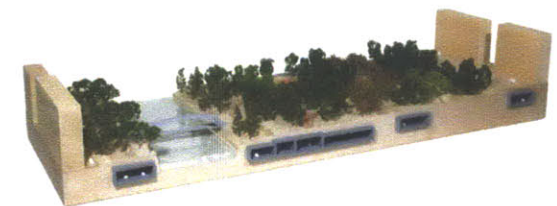


Fig 4.9 Locations of interest in Madrid

(Source: [www.west8.com](http://www.west8.com))

## Design

The main objectives of the project was to increase M-30 motor way's capacity, to improve the connections with secondary roads, and regenerate the river bank's urban space. The restoration of the river bank re-connects the city center that was once cut off by the elevated highway.

West 8 and MRIO were chosen as the designer for the open space along the banks of the Manzanares River.

## Features

### 1. Green Space

Green zones are created along the river, with 25,000 new trees being planted. Some of the major elements of the green zone includes a 6-km long pine tree promenade, called "Salón de Pinos" with playgrounds, exercise facilities, and bicycle paths; the Arganzuela Park, a main landscaped area of 23 hectares, featuring a popular city beach on the river bank;

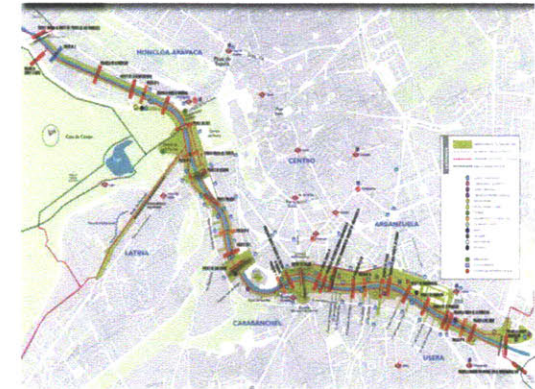


Fig 4.10 Locations of interest in Madrid

(Source: <http://inmadrid.org/>)



and Huerta de la Partida, a former 18<sup>th</sup> century royal orchard of 38,000 square meters which return to its former spectaculars.

## 2. Sports, Leisure and culture

There is a Cycle lane of 42 km long, linking to existing bike routes. The 17 new playgrounds, as well as a wide range of cultural attractions, provide the necessary space for leisure and cultural activities.



Fig 4.10, 4.11 Parks and Leisure Centers in Rio Madrid

(Source: <http://www.esmadrid.com/>)

The urbanland.uli.org made a top ten list, for *Urban Land*, ranks highway removal projects by *progress made toward* teardown and replacement. They suggested the growing popularity of freeway removal projects around the United States.

Top Ten Current Highway Removal Projects in the United States			
Rank	City	Roadway	Project Status
1	Providence, Rhode Island	Route 195	A highway section south of downtown was relocated, and demolition of the old section is being completed. A commission has been formed to oversee development opportunities on the freed-up land.
2	Baltimore	U.S. 40 segment known as the Highway to Nowhere	Demolition of a one-mile section of ramps and retaining walls began last year. The cleared land will accommodate new transit parking and future light rail, as well as reconnect neighborhoods.
3	Oklahoma City	I-40 Crosstown Expressway	Construction of a relocated highway south of downtown is ongoing; when that work is completed next year, the current elevated highway through downtown will be replaced by a gateway boulevard.
4	Cleveland	West Shoreway	The project to convert 2.5 miles of downtown freeway into a boulevard is being engineered and has federal money set aside for it, but the projected cost is rising, prompting discussion of modifications.
5	Seattle	Alaskan Way Viaduct	Seattle residents voted in August to go ahead with a tunnel to replace the viaduct damaged in a 2001 earthquake. The entire project cost is estimated at \$3.1 billion.
6	Trenton, New Jersey	Route 29	A feasibility study on the highway's congestion completed in 2009 determined that the preferred alternative is converting it into a boulevard. The state has begun to allocate money for the project.
7	New Haven, Connecticut	Downtown Crossing/Route 34	The city has received a \$16 million federal grant for the \$32 million project to convert a one-mile section of downtown highway into two boulevards.
8	Hartford, Connecticut	I-84 Aetna Viaduct	Last year, the regional council of governments released the latest local study suggesting that the best alternative is to turn the obsolete, one-mile elevated section downtown into a surface-level boulevard.
9	New Orleans	Claiborne Corridor	Community organizations have called for removing the highway stub to reconnect neighborhoods. With the help of a federal grant, the city is studying transportation options.
10	New York City	Sheridan Expressway	Citizens groups have been calling for removal of the roadway for years. Using a federal grant, the city is studying transportation alternatives and neighborhood impacts.

Sources: U.S. Department of Transportation, Congress for the New Urbanism, news reports.

Table 4.1 Top Ten Current Highway Removal Projects in the United States

(Source: urbanland.uli.org)

There are many more examples of highway relocation projects as cities around the world are increasingly aware of the problems created by the excessive highway infrastructure, both in terms of transportation efficiency and the quality of urban space. The demolition of the elevated highway also offers the unusual and valuable opportunity to provide large amount of prime land for development in the city center. Those land could be ideal for accommodating the much needed open space and a dynamic mix of urban programs.

**Lessons learned from freeway removal precedents:**

1. Reduction of roadway capacity may also reduce the amount of automobile travels. And the original road traffic could be absorbed to alternate routes. Other transportation modes would be adapted to by the travelers if they are more convenient

2. Traffic capacity may be enhanced, and the traffic flows are optimized and more efficient by the separation of different types of transportation

3. The newly gain space has a catalytic effect, especially if located in dense urban areas.

4. Both transportation planning and urban design should be considered as parts of larger city design strategy. The change of transportation infrastructure should consider both traffic efficiency and the opportunities of urban impact it creates along the route

## **Chapter 4**

### **The hypothetical wall city**

Base on the precedents and analysis of the site, the thesis argues the need of removing the massive freeways of the second ring road, and relocate, optimize the original traffic through underground tunnels.

The project propose a linear urban vision which includes development strategy of transportation, eco-system, and urban development, reflecting in three scales: the city, the neighborhood, and the building.

### 1) Transportation:

Through traffic is relocated to underground tunnel to provide good access to the other side of the city without passing the inner city neighborhoods. Local traffic, which accounts for about 20 % in total, remains on surface above ground. While reducing the width of the roads tremendously, this move also minimizes intersection complications of the original 33 expressway bridges, and improves air pollution condition.

### 2) Open space:

The surface land thus freed from expressways and bridges can provide an additional band of land, ranging from 80m to 120 m wide, 3.3 km long for developable —an opportunity to provide a much-needed open space system in the central city.

15 new neighborhood parks are embedded along the ring to ensure a 1km radius accessibility. An avenue of trees with a wide strip for cyclists and pedestrians links these new parks together.

### 3) Programs

The new development contains a mix of social, cultural, sports commercial, housing programs. A ribbon of shops, swimming pools, libraries, restaurants, markets, galleries is introduced next to the tree avenue. Housing, offices, hotels, and conference rooms are located above them.

The identity of the programs derives from the needs of their actual surroundings.

### 4) Linkage

The avenue of trees, the neighborhood parks, and the new public programs-all sought to provide a space for people to gather, socialize, hang out, exercise, and interact.

These activities, as an extension of the existing street life, attracts people from in and around.

## 5) Layers

The linear structure accommodate the spatial logics of three layers: infrastructural layer underground, public layer on ground level, and private layer on above. The vertical division ensures the proportion of the public programs accommodated in the new development.

## 6) Major prototypes of Street Interface:

The arcades and alleyways: next to the shops and markets- for walking or staying in the street

The semi-covered space: next to public programs indoor –to invite people in

The transparent thin-slab structure: next to the neighborhood parks—to act as transparent screen

The bridge: at the intersection between local traffic and the new structure



To conclude, the thesis explores the potential of removing the Second Ring Road of Beijing and sets up a framework for new development strategies on the prime land resulted in the removal.

The tactic deployment of urban and architectural forms, applied with contextual considerations, are devised to re-introduce the “urban characteristics” back to the city. Mobility is improved not only by transportation infrastructural design, but also by wisely planning the mixed-used, anti-expansion city. The removal of the Second Ring would provide the opportunity to rethink the larger strategy of the city design, transportation needs and urban living quality, sustainability and economy.

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Beijing Second Ring Road

[http://en.wikipedia.org/wiki/2nd\\_Ring\\_Road\\_\(Beijing\)](http://en.wikipedia.org/wiki/2nd_Ring_Road_(Beijing))

6 Case Studies in Urban Freeway Removal

<http://www.seattle.gov/transportation/docs/ump/06%20SEATTLE%20Case%20studies%20in%20urban%20freeway%20removal.pdf>

Seoul's Voluntary No Driving Days

<http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/transport/seouls-voluntary-no-driving-days/>

The integral design 'de Groene Loper' of Avenue2

<http://www.a2maastricht.nl/data/files/alg/id162/IP%20engelse%20samenvatting.pdf>

West 8, Rio Madrid [http://www.west8.nl/projects/madrid\\_rio](http://www.west8.nl/projects/madrid_rio)

The Madrid Rio Project <http://www.esmadrid.com/en/madridrio>

[http://2.bp.blogspot.com/-7arEgdA6J50/TfS6k\\_nC5kI/AAAAAAAAAB0o/Q0VhT-3yQ8g/s1600/Madrid+Rio+-+then+and+now+4.JPG](http://2.bp.blogspot.com/-7arEgdA6J50/TfS6k_nC5kI/AAAAAAAAAB0o/Q0VhT-3yQ8g/s1600/Madrid+Rio+-+then+and+now+4.JPG)

Madrid M30 Motorway

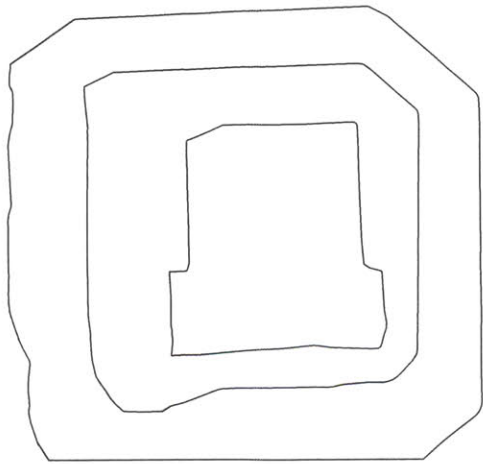
[http://www.sisgeo.com/uploads/schede/madrid\\_M30.pdf](http://www.sisgeo.com/uploads/schede/madrid_M30.pdf)

Top 10 Metro Highway Removal Projects

<http://urbanland.uli.org/development-business/top-10-metro-highway-removal-projects/>

**PROJECT**

# CROSSROADS



the 4 rings of inner city

## RINGS

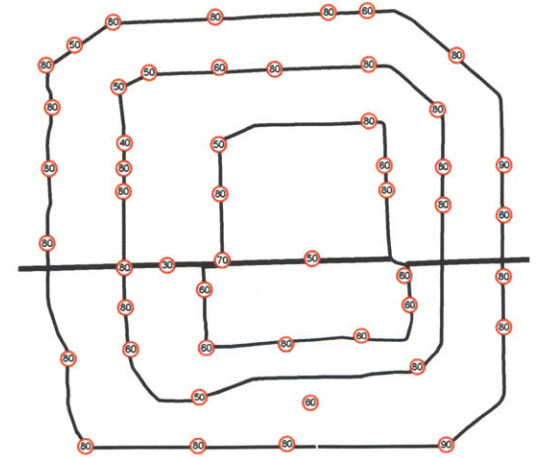
+



the original street-network

## GRID

=



the complicated traffic regulation map

## PROBLEM

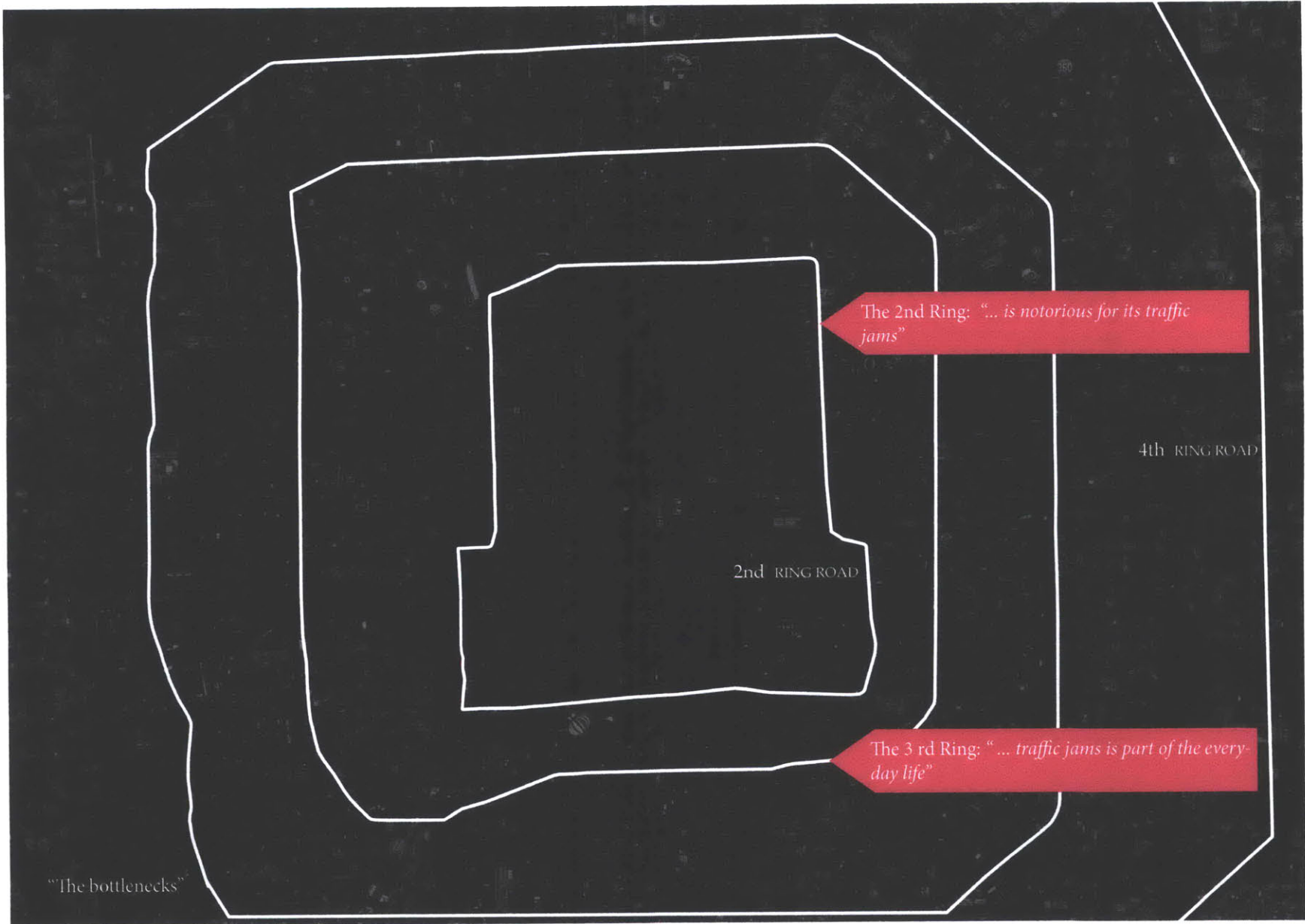
"The bottlenecks"

2nd RING ROAD

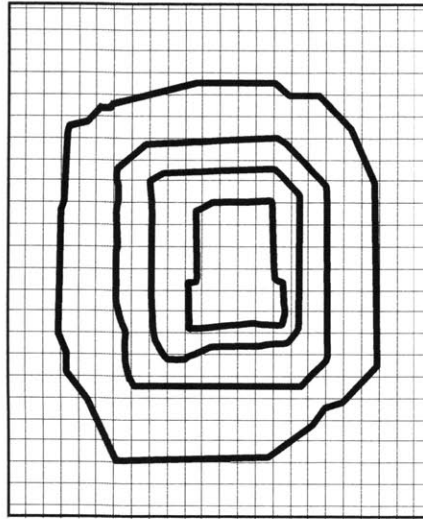
4th RING ROAD

The 2nd Ring: "... is notorious for its traffic jams"

The 3rd Ring: "... traffic jams is part of the every-day life"

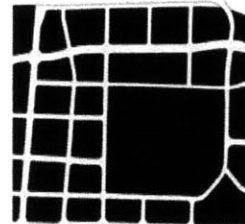


# HYPOTHESIS



CITY

RINGS SHOULD NOT BE INSIDE THE CITY CENTER  
DEMOLITION OF THE INNER RINGS CAN PROVIDE  
LAND FOR NEW DEVELOPMENT



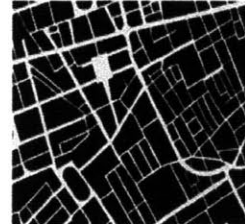
MISSISSAUGA



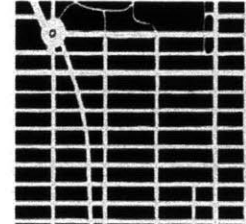
BARCELONA



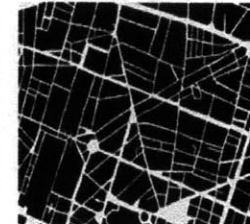
COPENHAGEN



LONDON



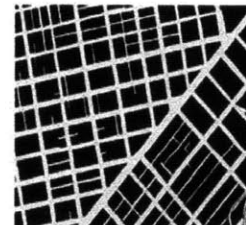
NEW YORK



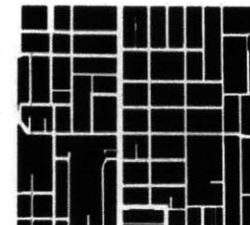
PARIS



ROME



SAN FRANCISCO



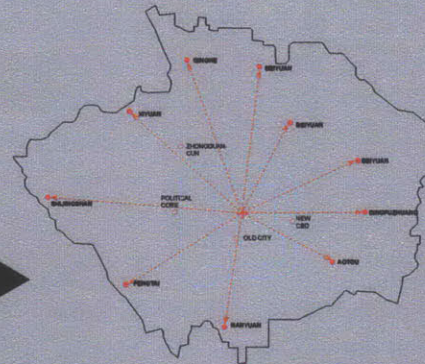
TORONTO

LET THE GRID SYSTEM ITSELF FUNCTIONS

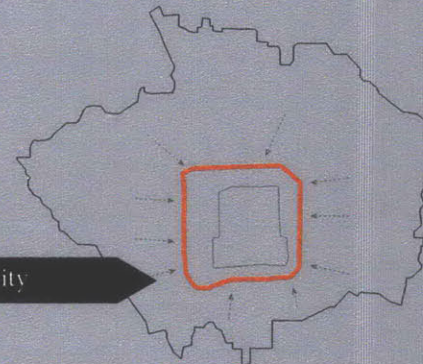
the thesis argues the need of removing the Second Ring Road and restore the urbanity cut off by the massive structure.

# GOALS

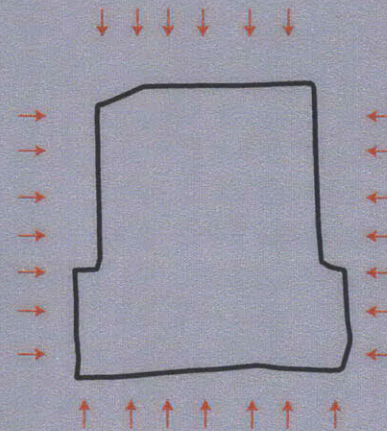
improve traffic congestions



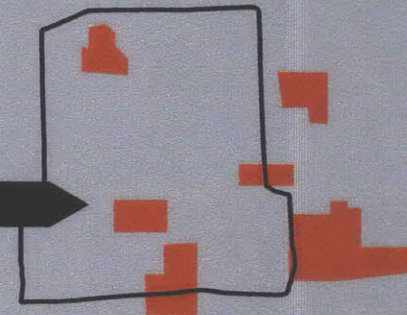
reconstruct urbanity



constrained expansion

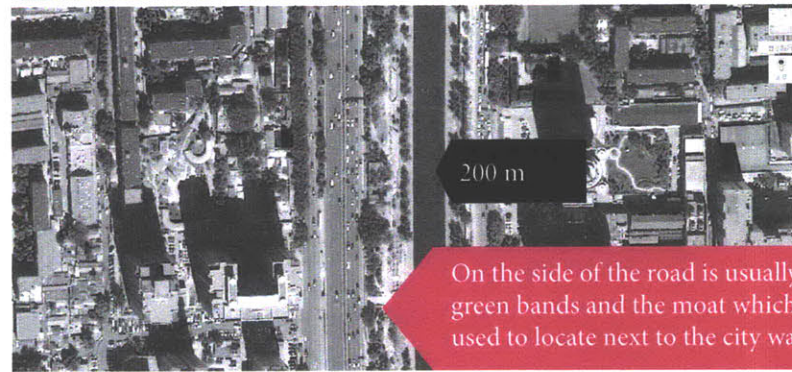
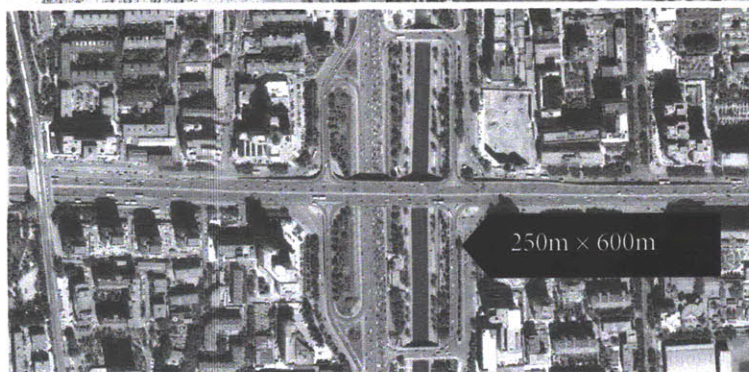
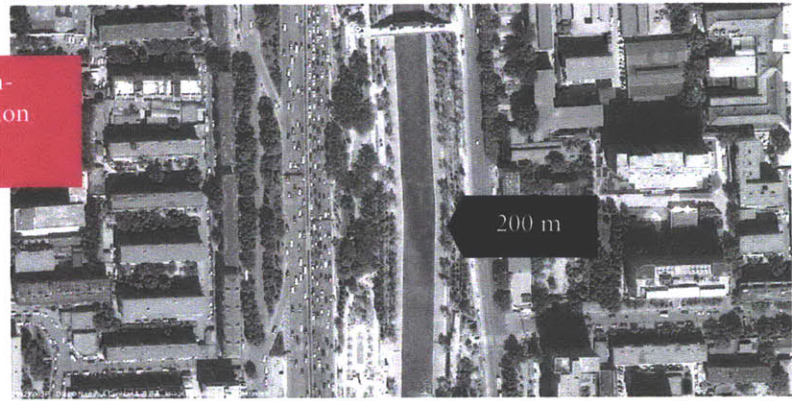
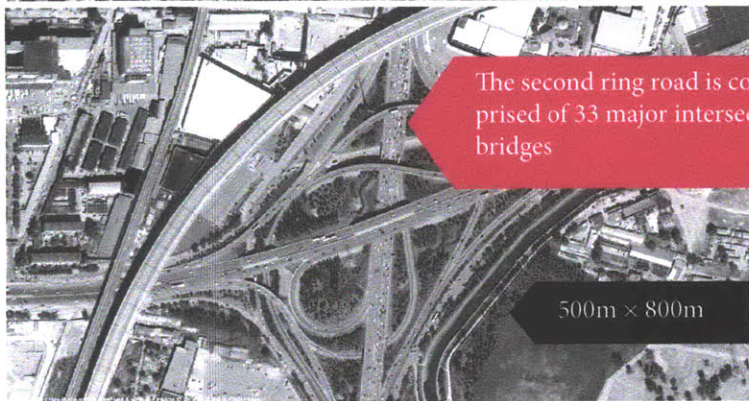
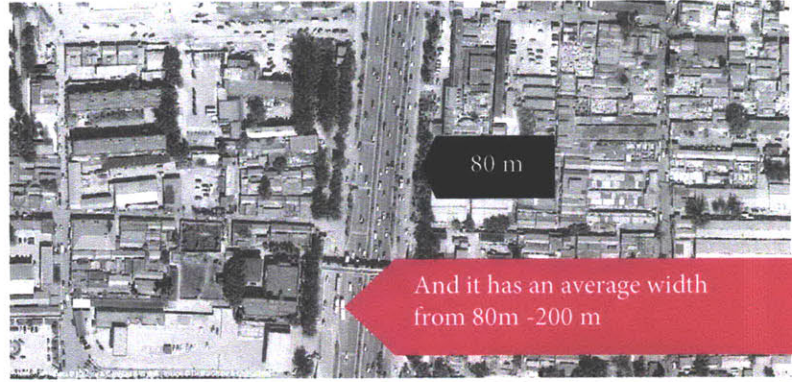
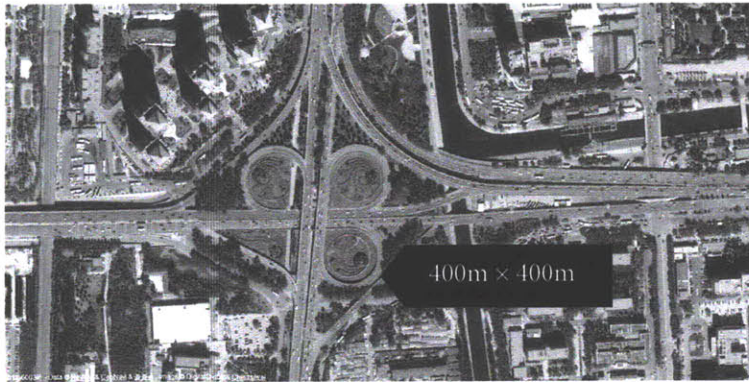


urban catalyst



- 1) strategically improve traffic congestions, and ameliorate the air pollution problems accompanied with it.
- 2) fill up the urban void made by the massive transportation structures above ground
- 3) look for development opportunities within the city , and hence to constrained unlimited expansion of the city, reducing the need of commute transportation.
- 4) use the new development as a catalyst to improve the urbanist quality of adjacent neighborhoods

# VOID





# FILLING



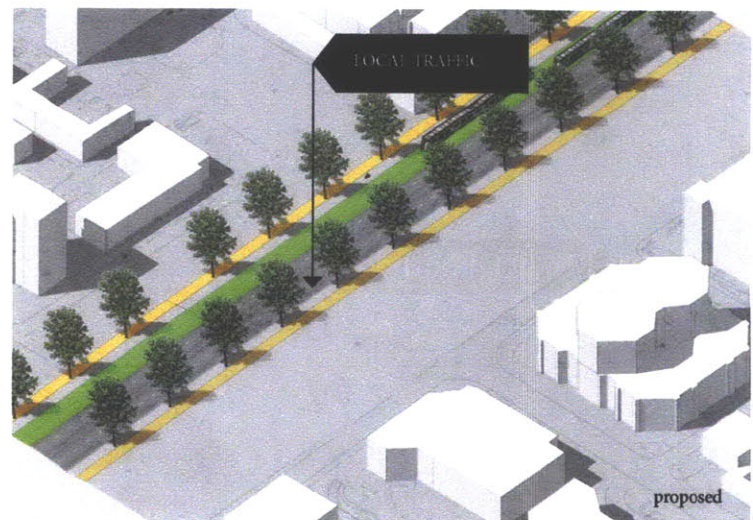
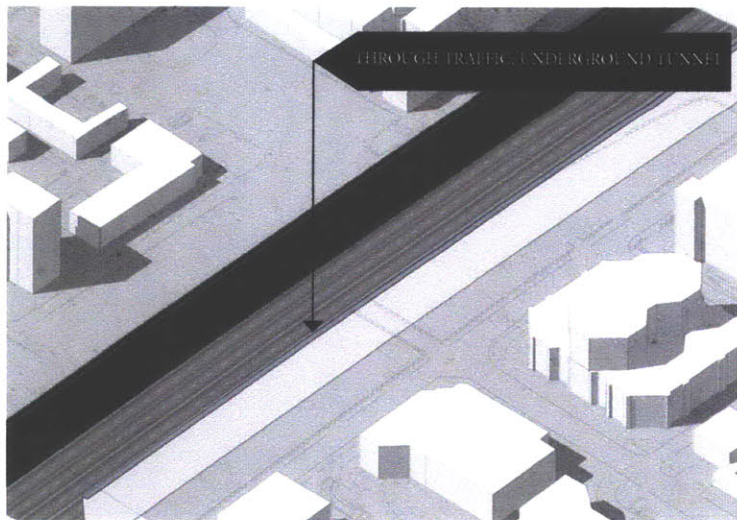
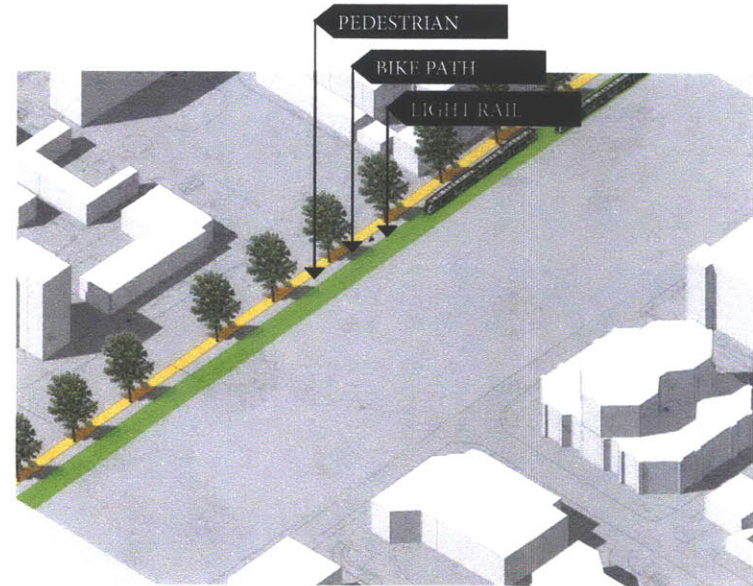
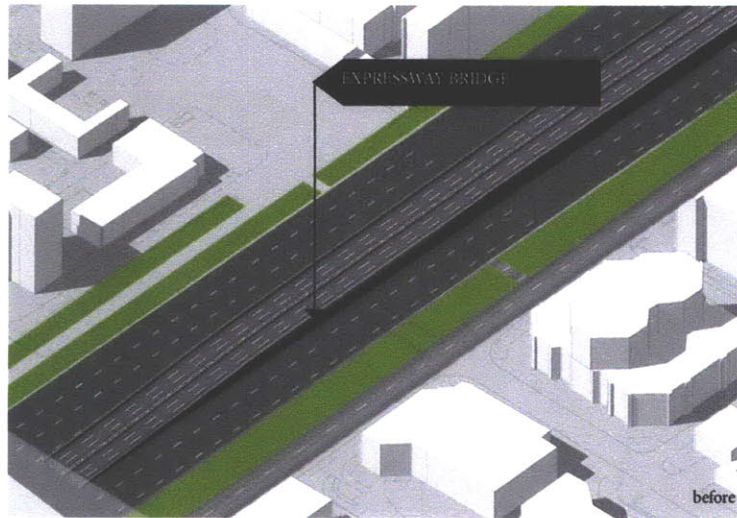
# TRANSPORTATION STRATEGY

80% THROUGH TRAFFIC

20% LOCAL TRAFFIC

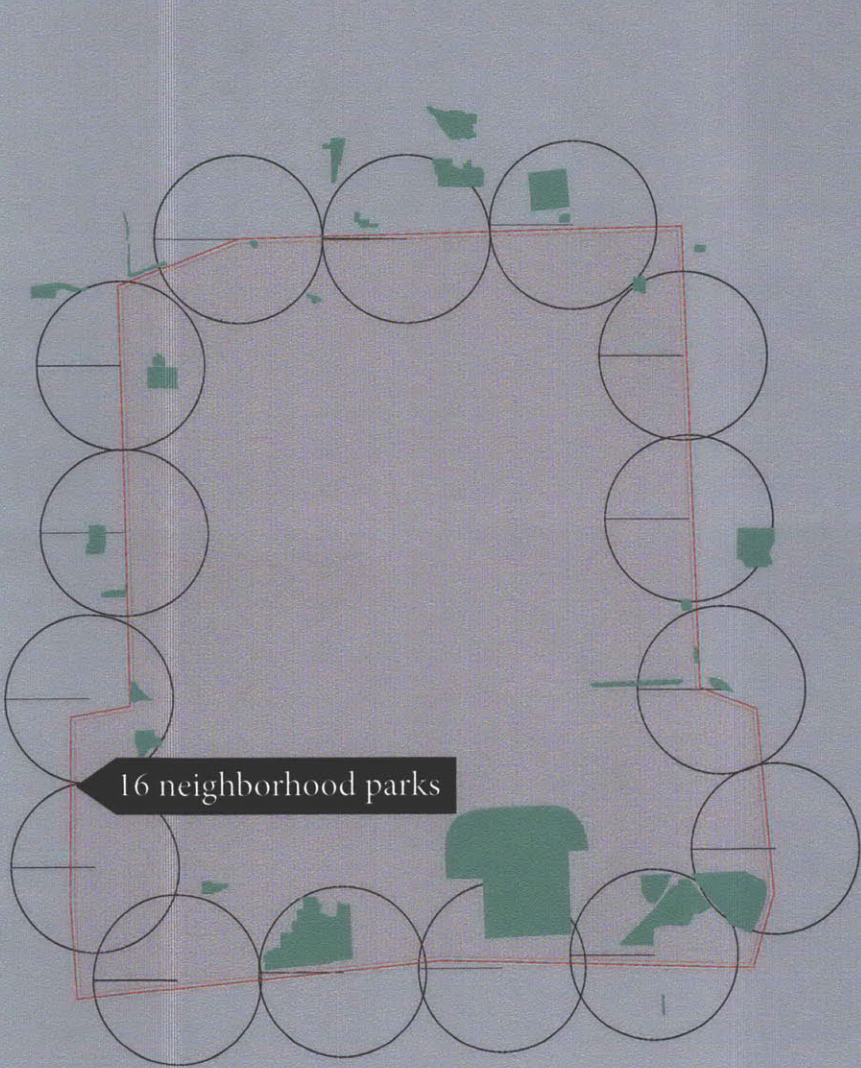


STEPS

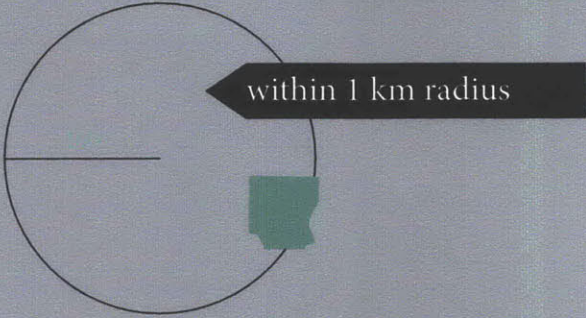


1. Remove the elevated highway
2. Tunnel Construction
3. Local traffic, Pedestrian , Bike Path, and Public transportation
4. Proposed Roadway

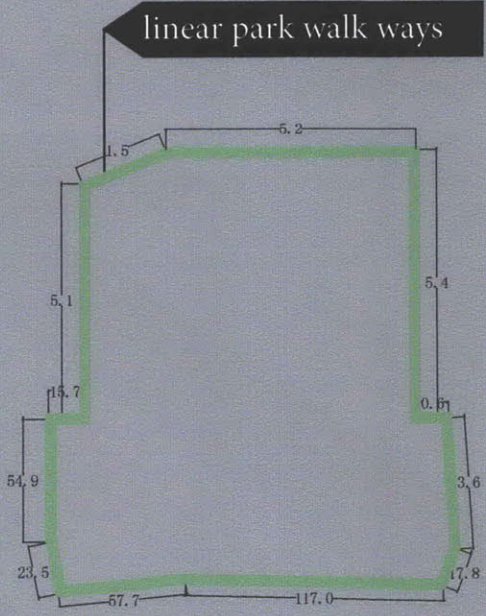
# GREEN SYSTEM



16 neighborhood parks



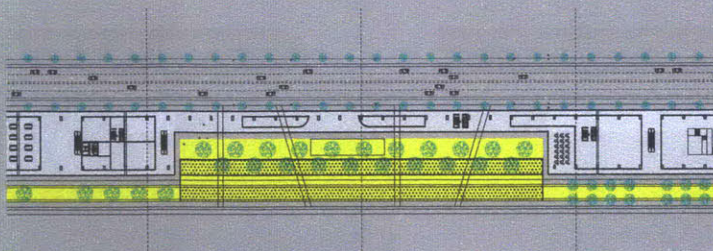
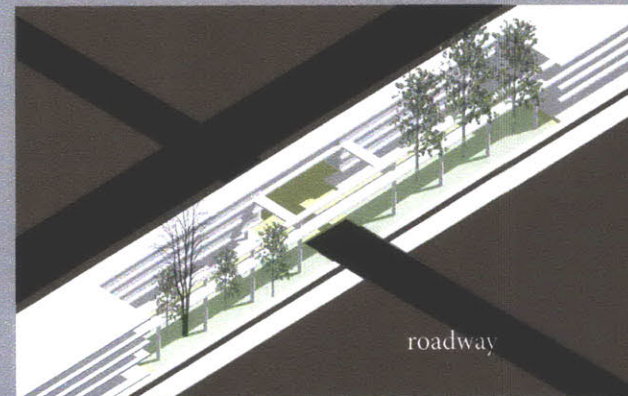
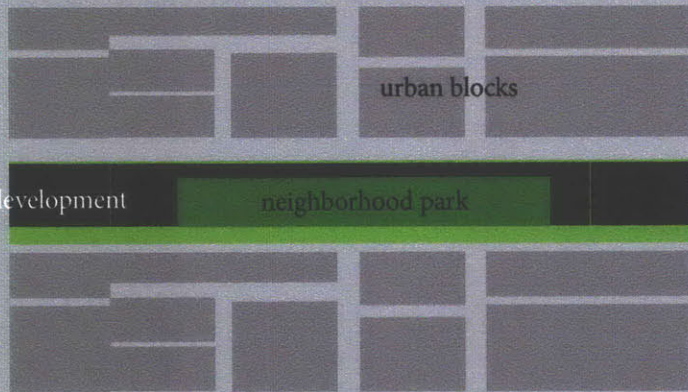
within 1 km radius



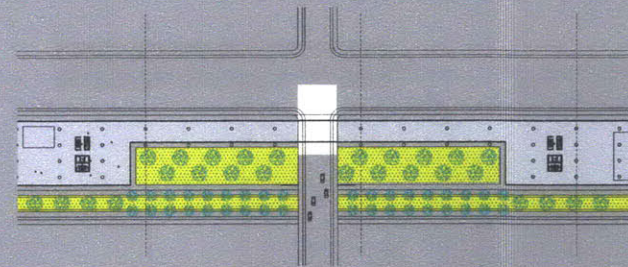
linear park walk ways

The eco system: Neighborhood park + Linear green path

# PARKS



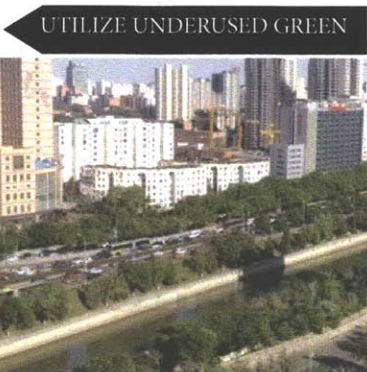
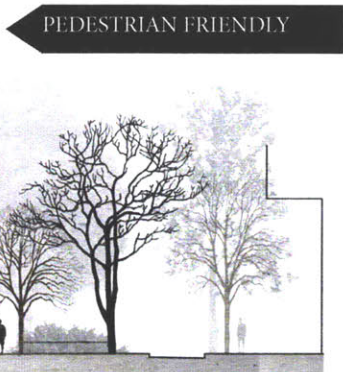
dense urban areas



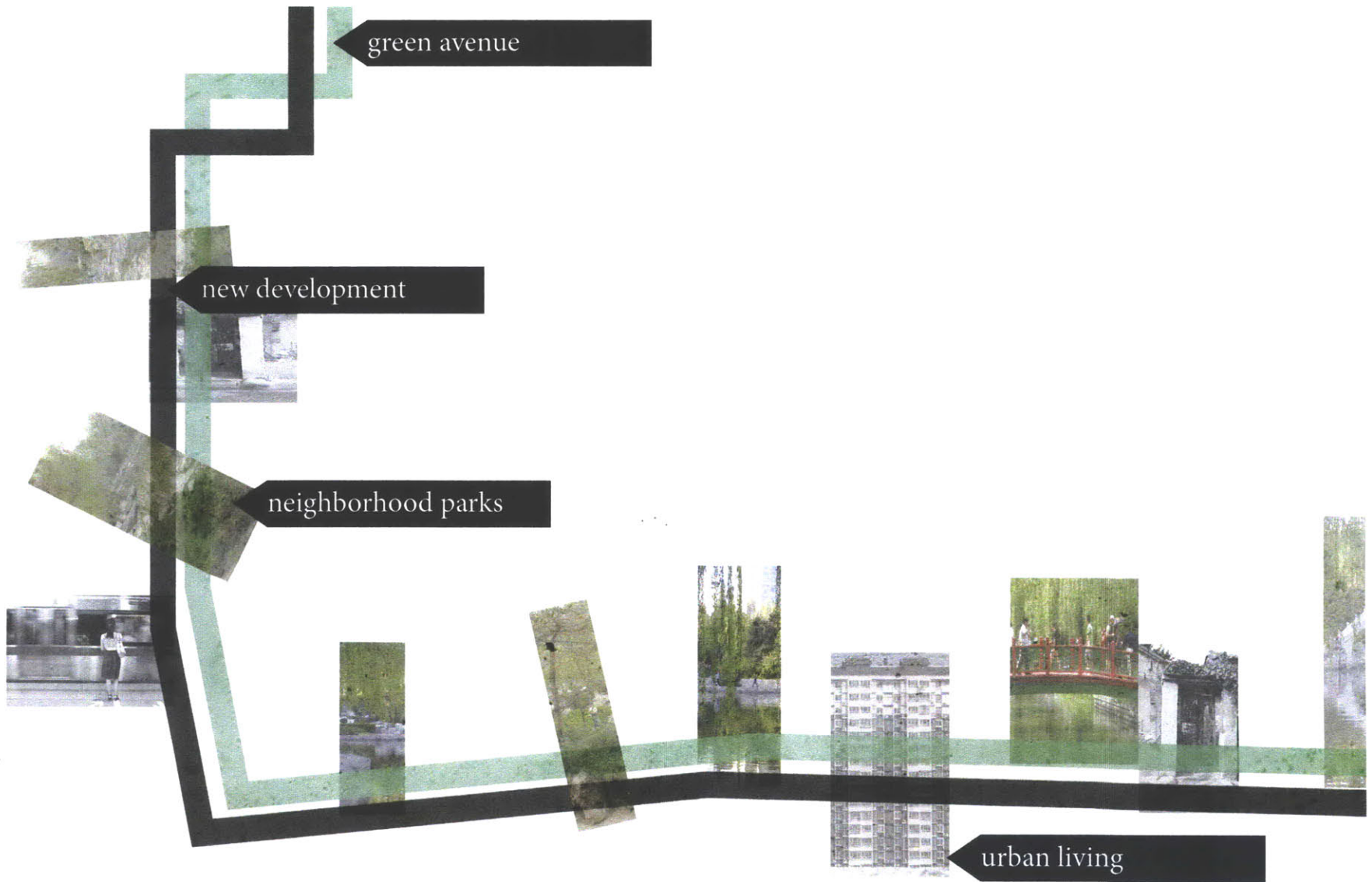
intersections

Location of the Neighborhood parks

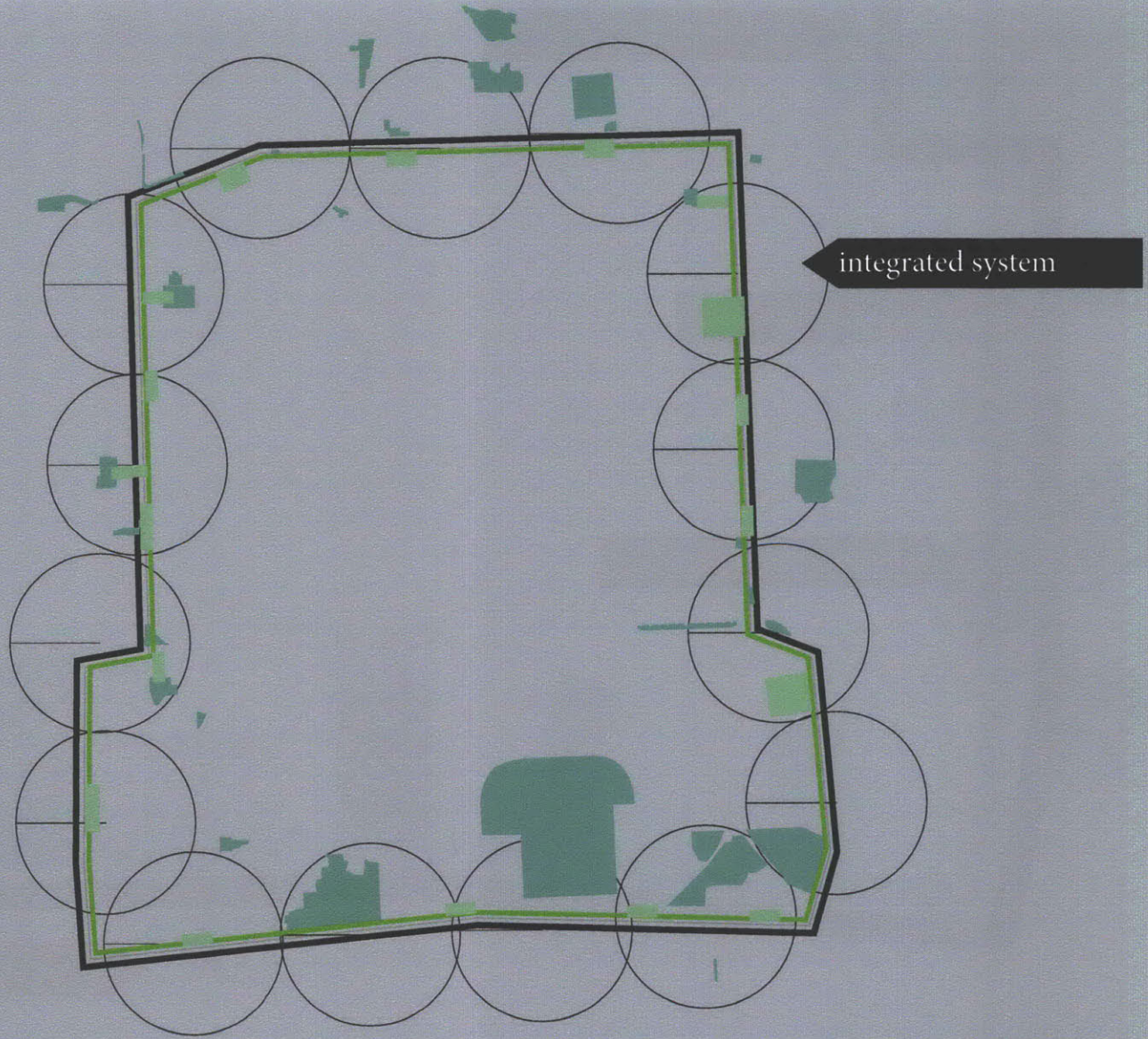
# THE GREEN AVENUE



The Continous Green Path



Connecting public parks and urban living

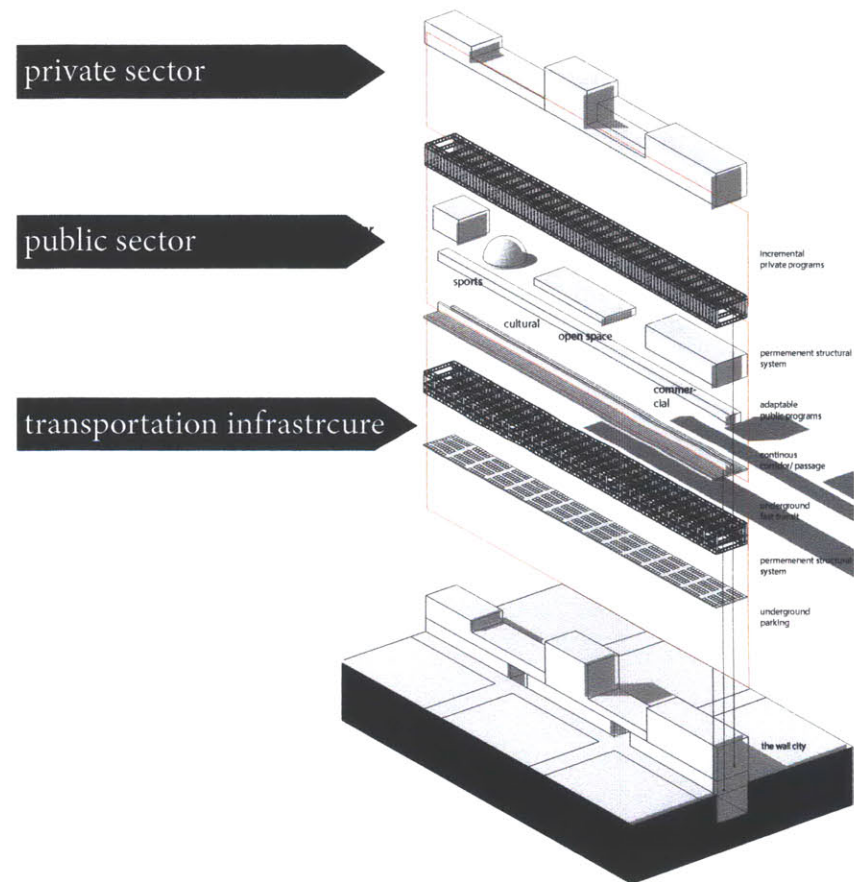


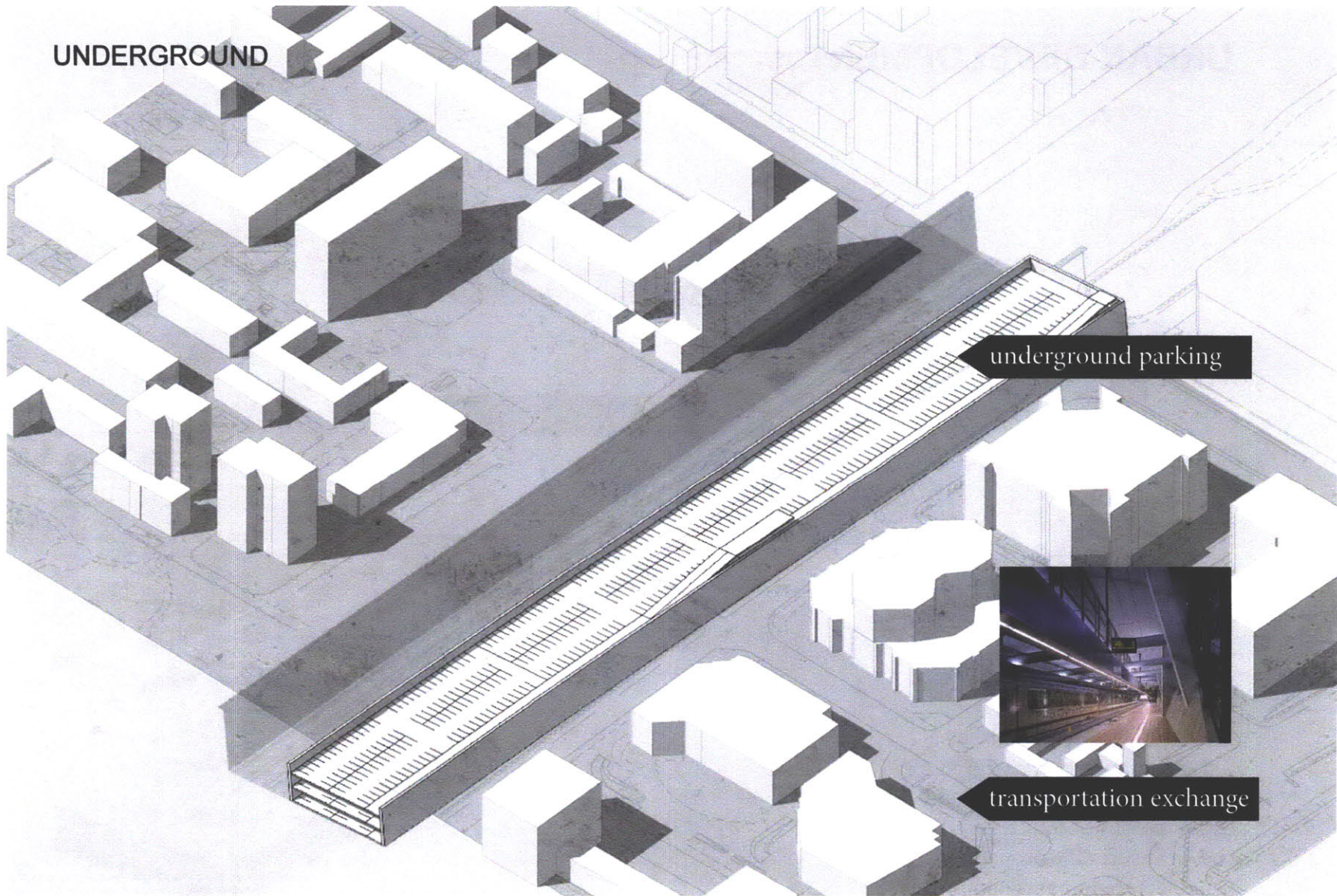


# URBAN DEVELOPMENT

## Layers

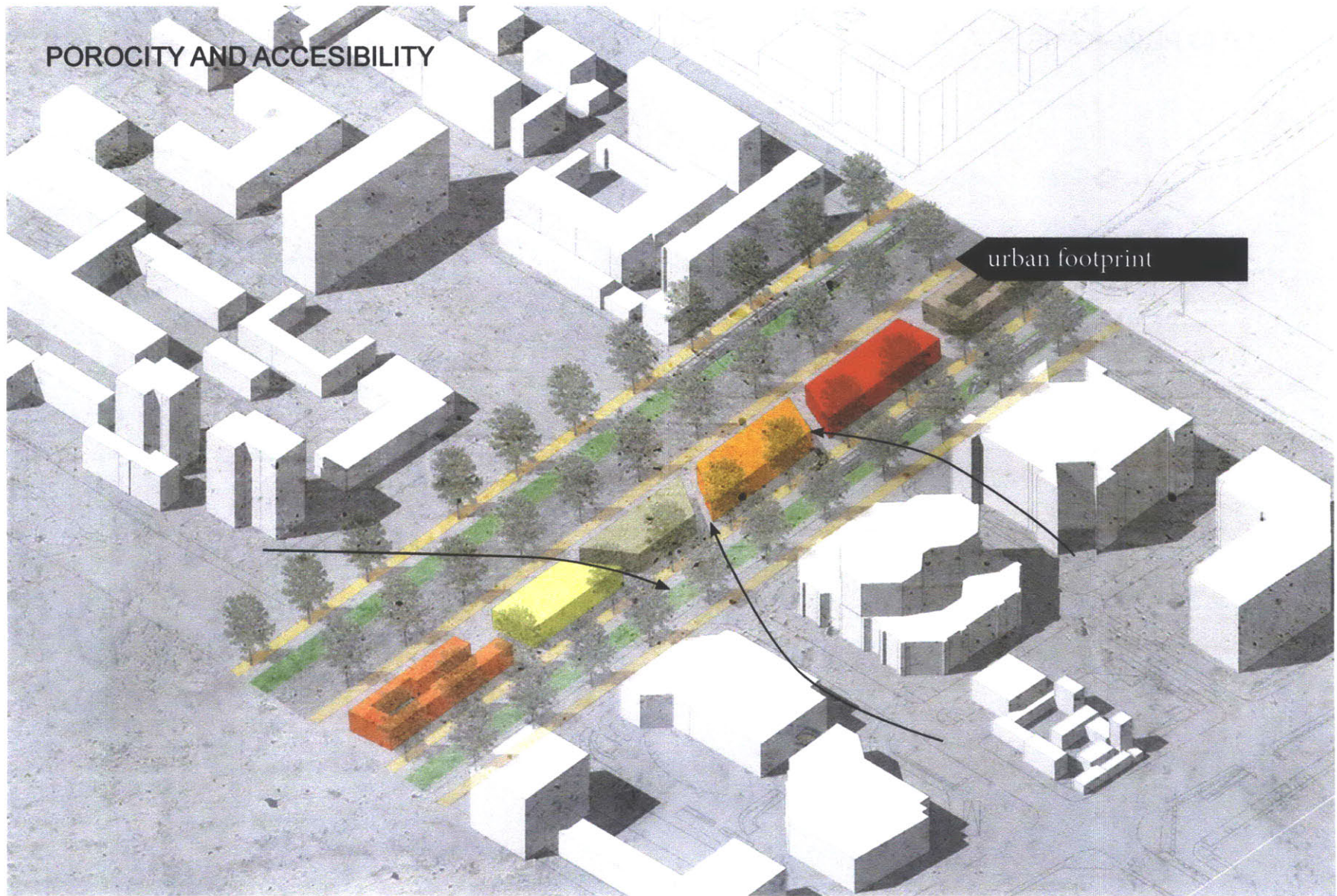
The linear structure accommodate the spatial logics of three layers: infrastructural layer underground, public layer on ground level, and private layer on above. The vertical division ensures the proportion of the public programs accommodated in the new development.





**Underground Infrastructural Level**

The underground layer is for parking, an important supplement to the insufficient parking space downtown, acting as an invisible spine that links to its surroundings. It also encourages people from here to switch their private cars to public mass transportation methods.

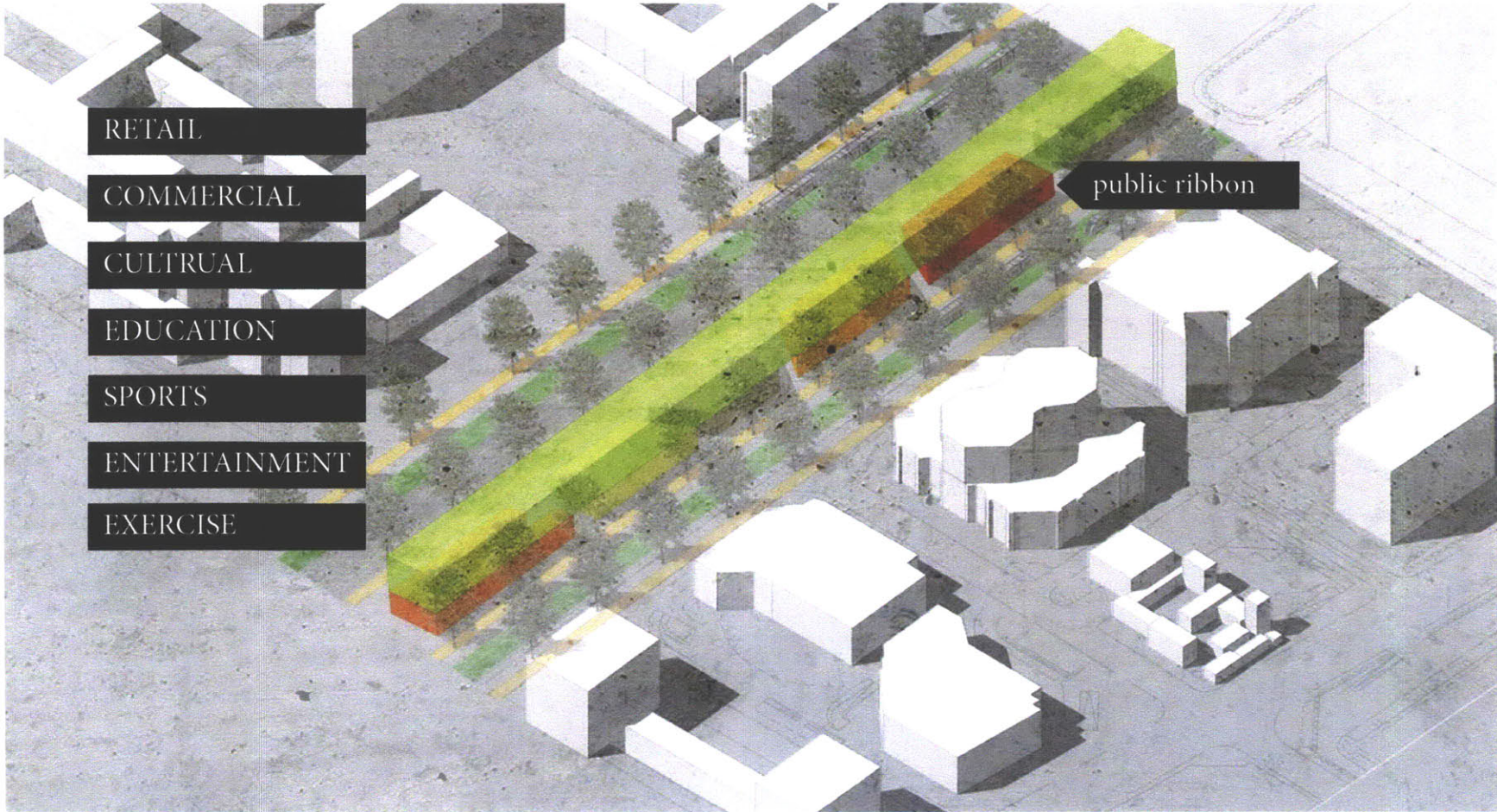
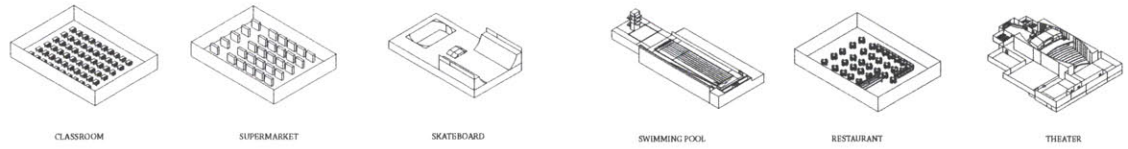


POROCITY AND ACCESSIBILITY

urban footprint

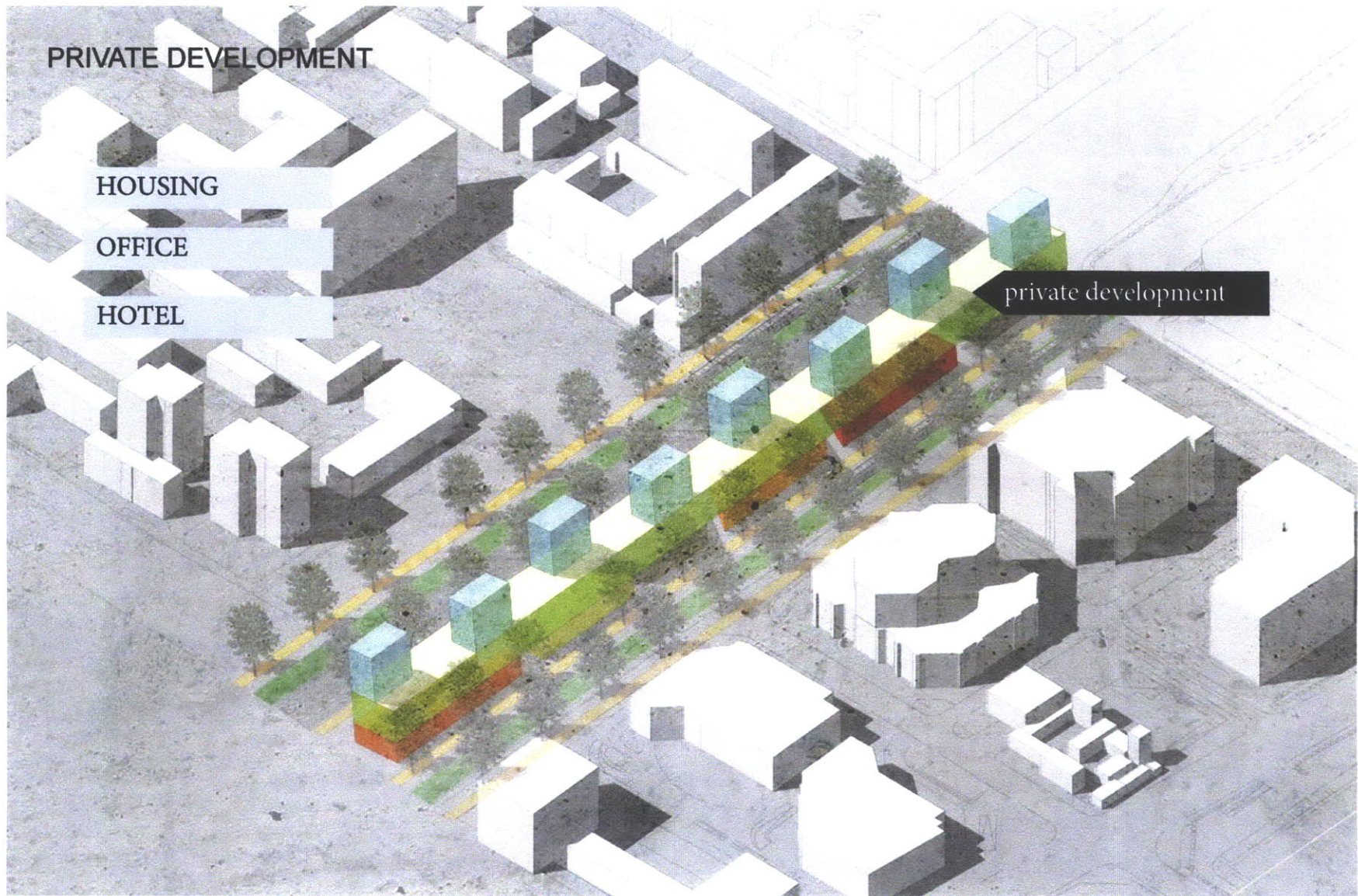
Ground floor with good accesibility and connectivity.

# PUBLIC PROGRAMS



## Public Development on the Middle layer

A certain percentage of new development accomodates popular commercial streets , markets and a series of civic amenities



**Private Development on the Upper layer**

The programs become more private as it gets further away from the streets



**Nodes and Linkages**

The avenue of trees, the neighborhood parks, and the new public programs-all sought to provide a space for people to gather, socialize, hang out, exercise, and interact. These activities, as an extension of the existing street life, attracts people from in and around.

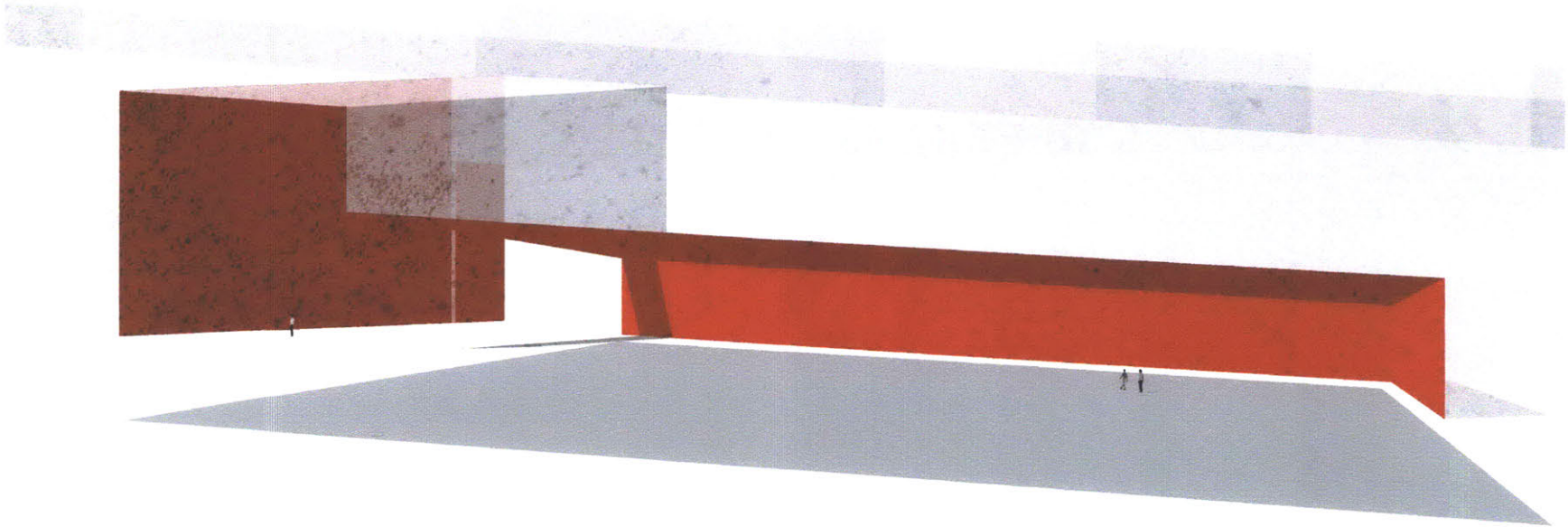
## **STREET INTERFACE TYPES**

## The semi-covered space

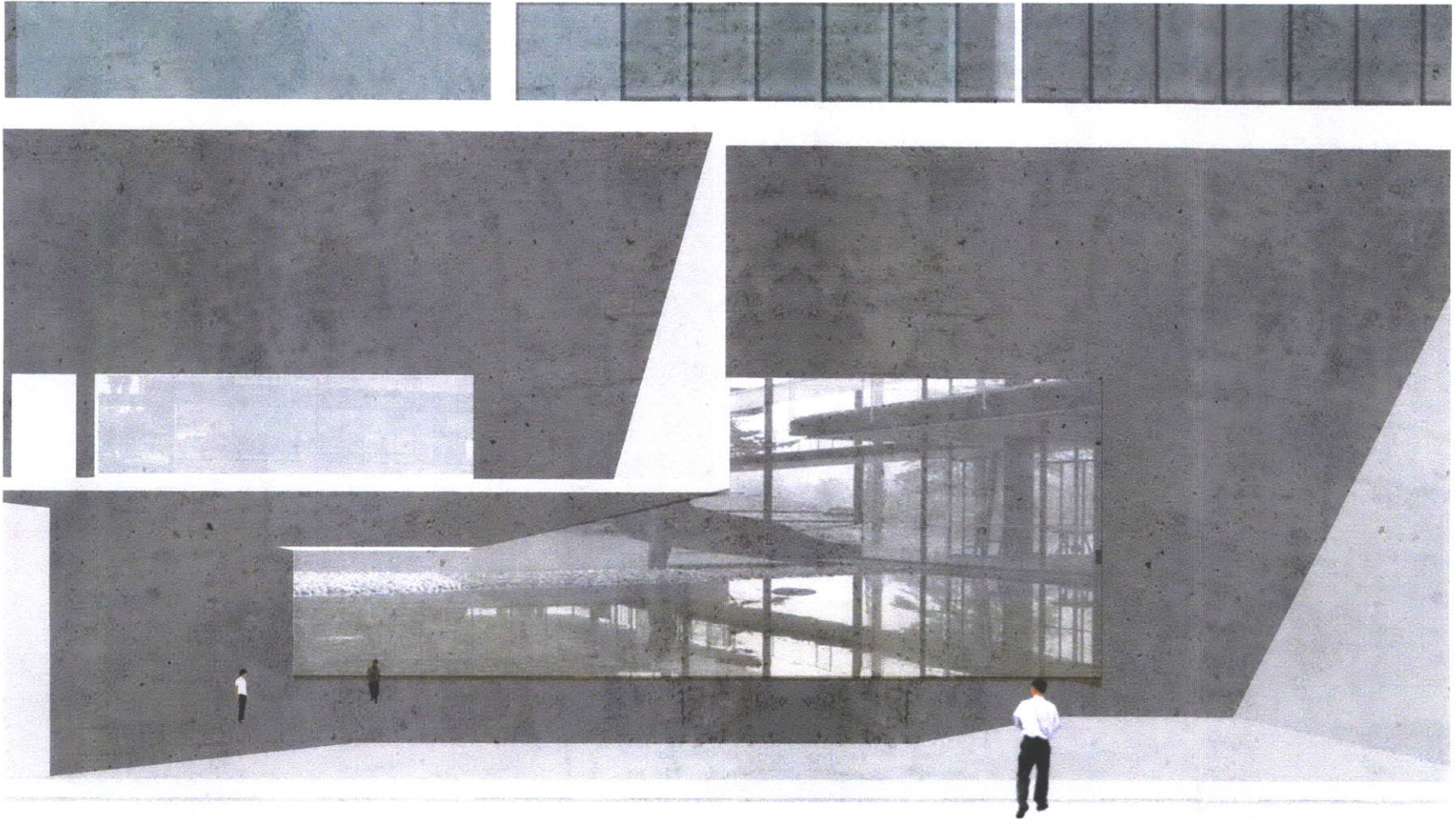
Passage to allow accessibility from both sides of the street

Semi-covered space, extending outdoor activities into the building

Outdoor Plaza

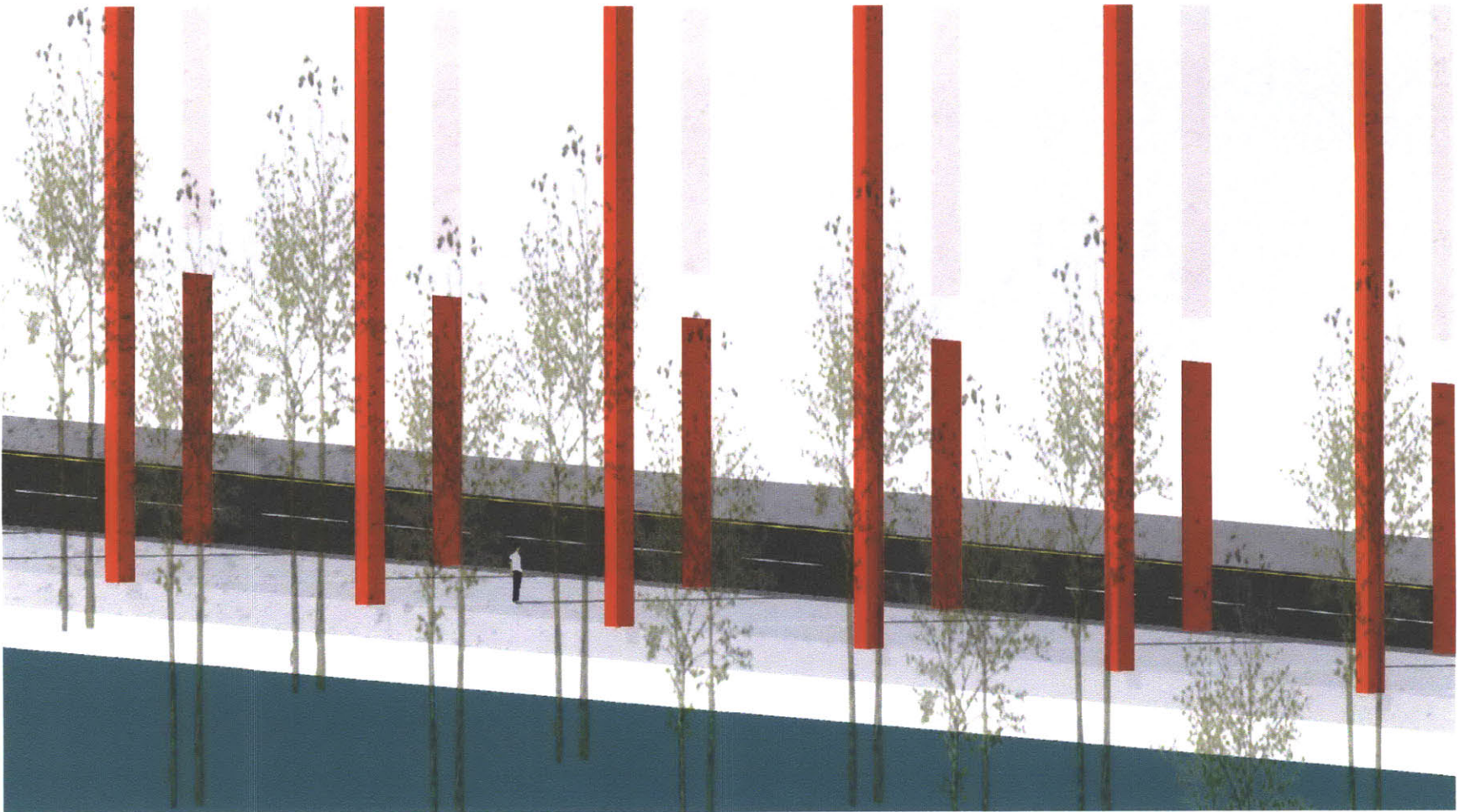




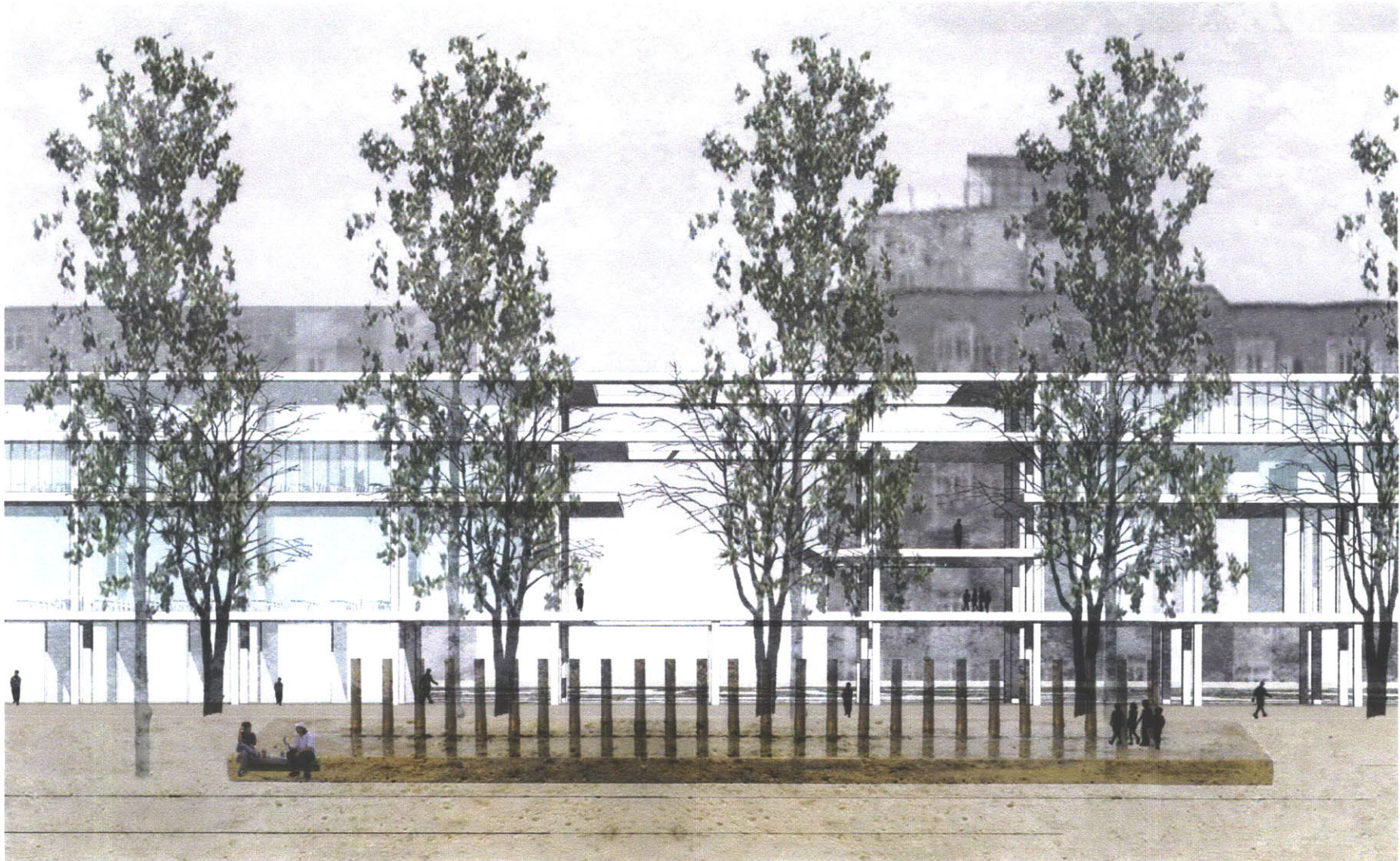


Collage image of an example of the semi-covered street interface

## The transparent thin structure

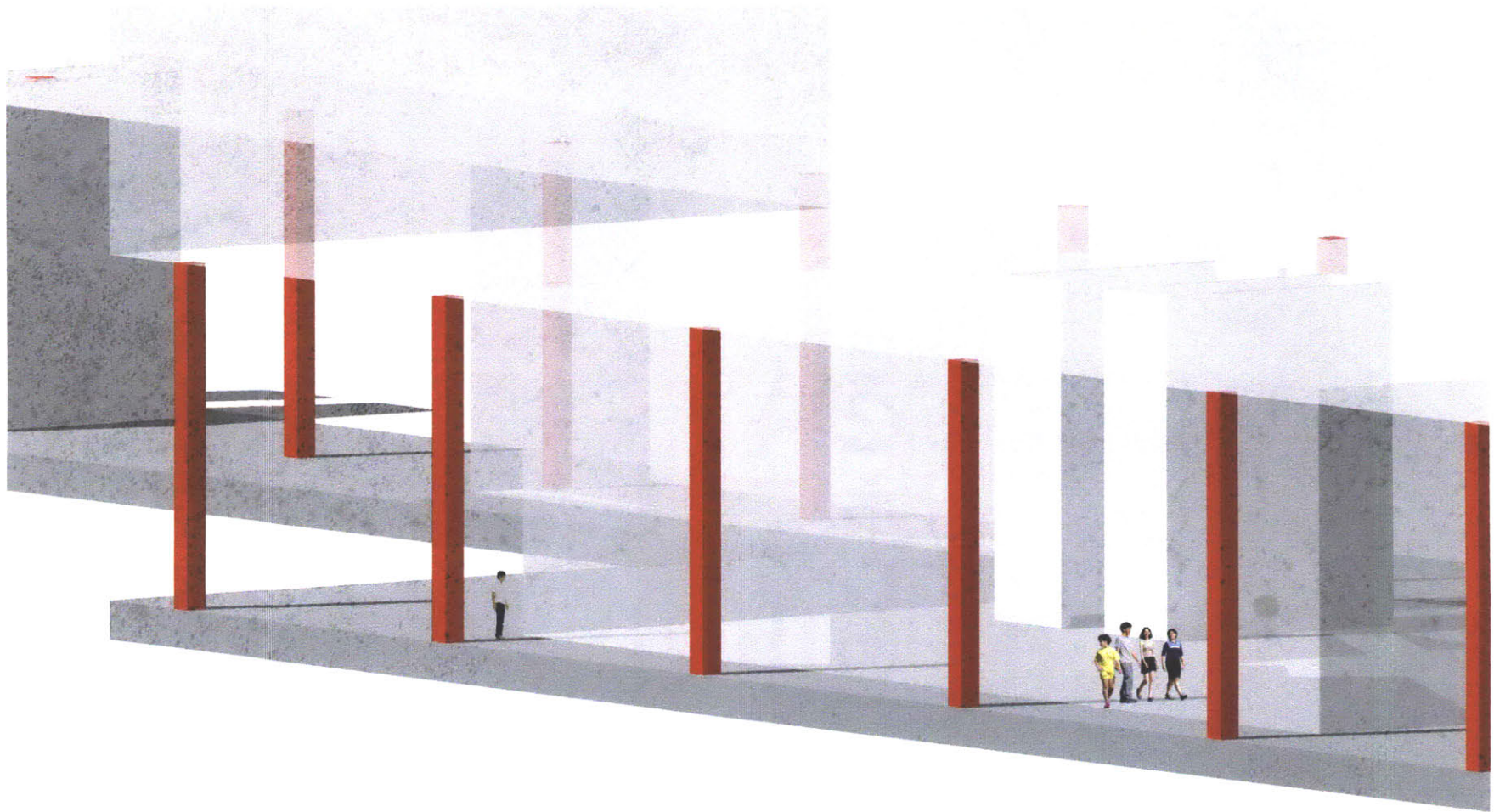


Street Interface Type 2: The transparent thin-slab structure

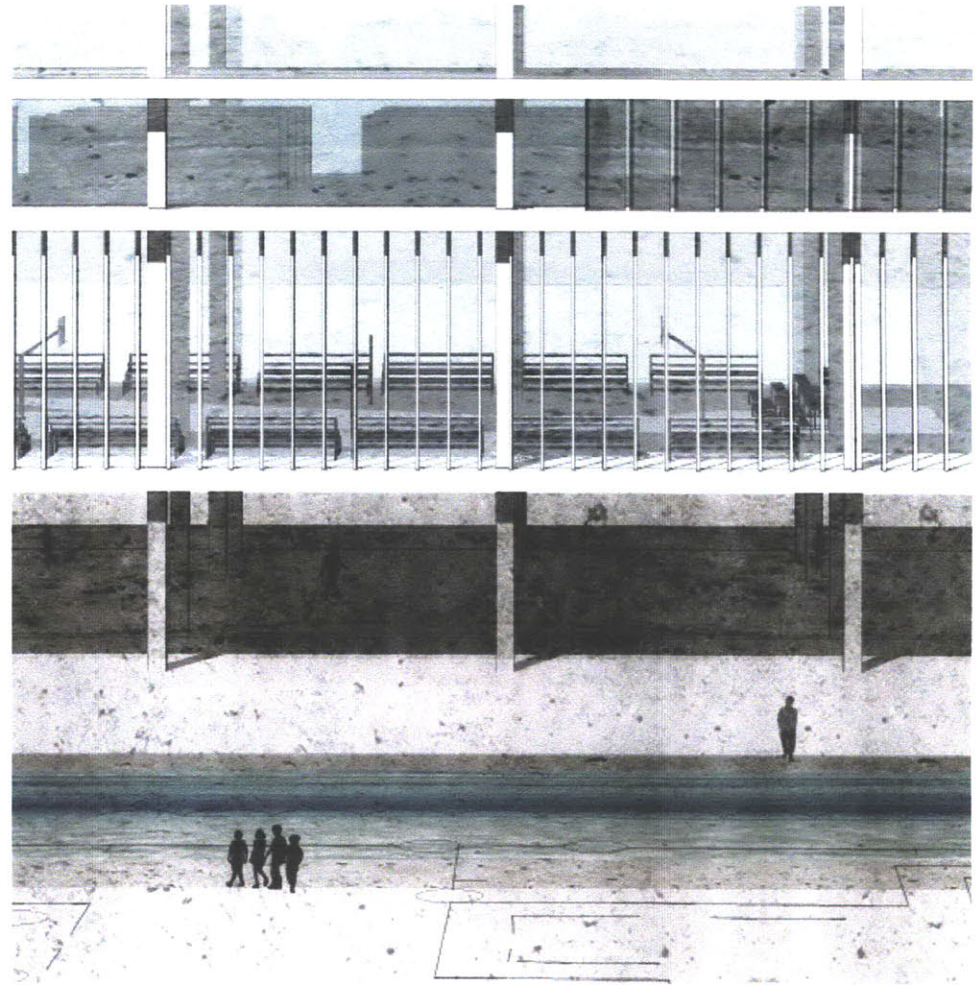


Collage image of an example of the semi-covered street interface

## The arcades

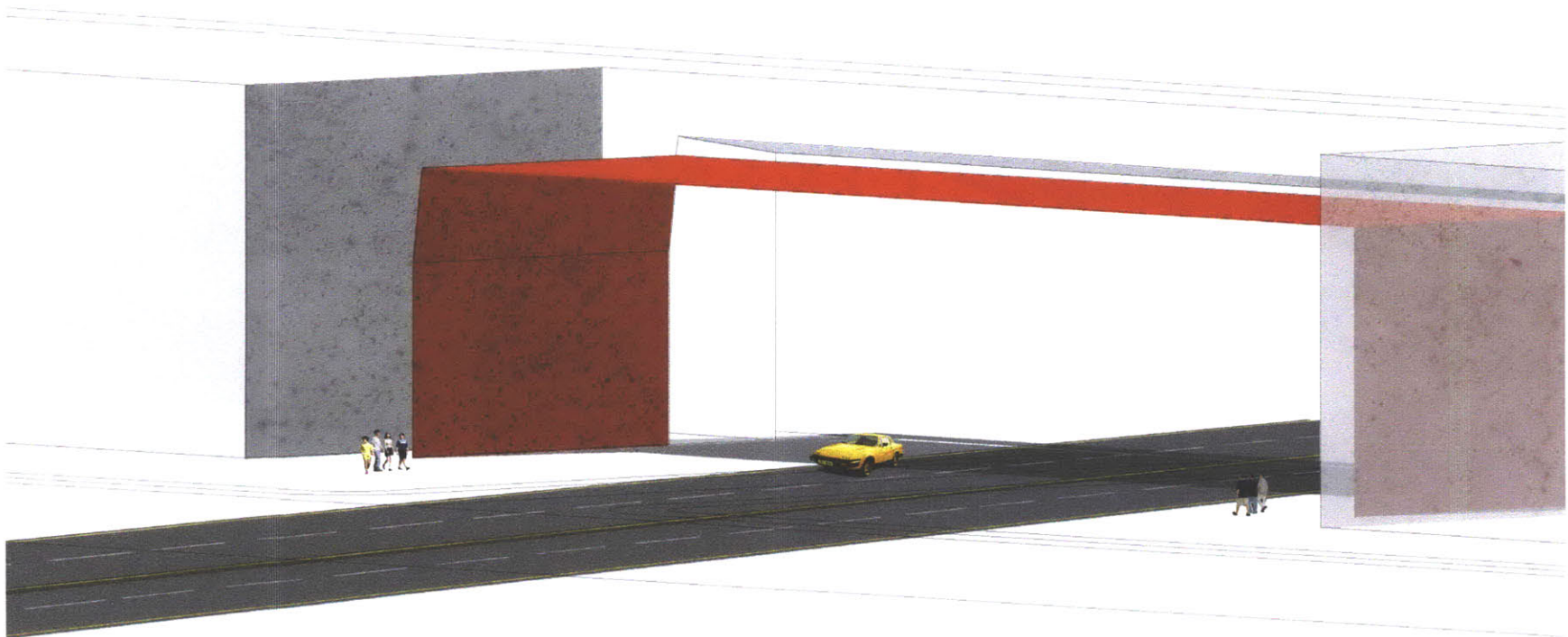


Street Interface Type 3: Arcades and alleyways



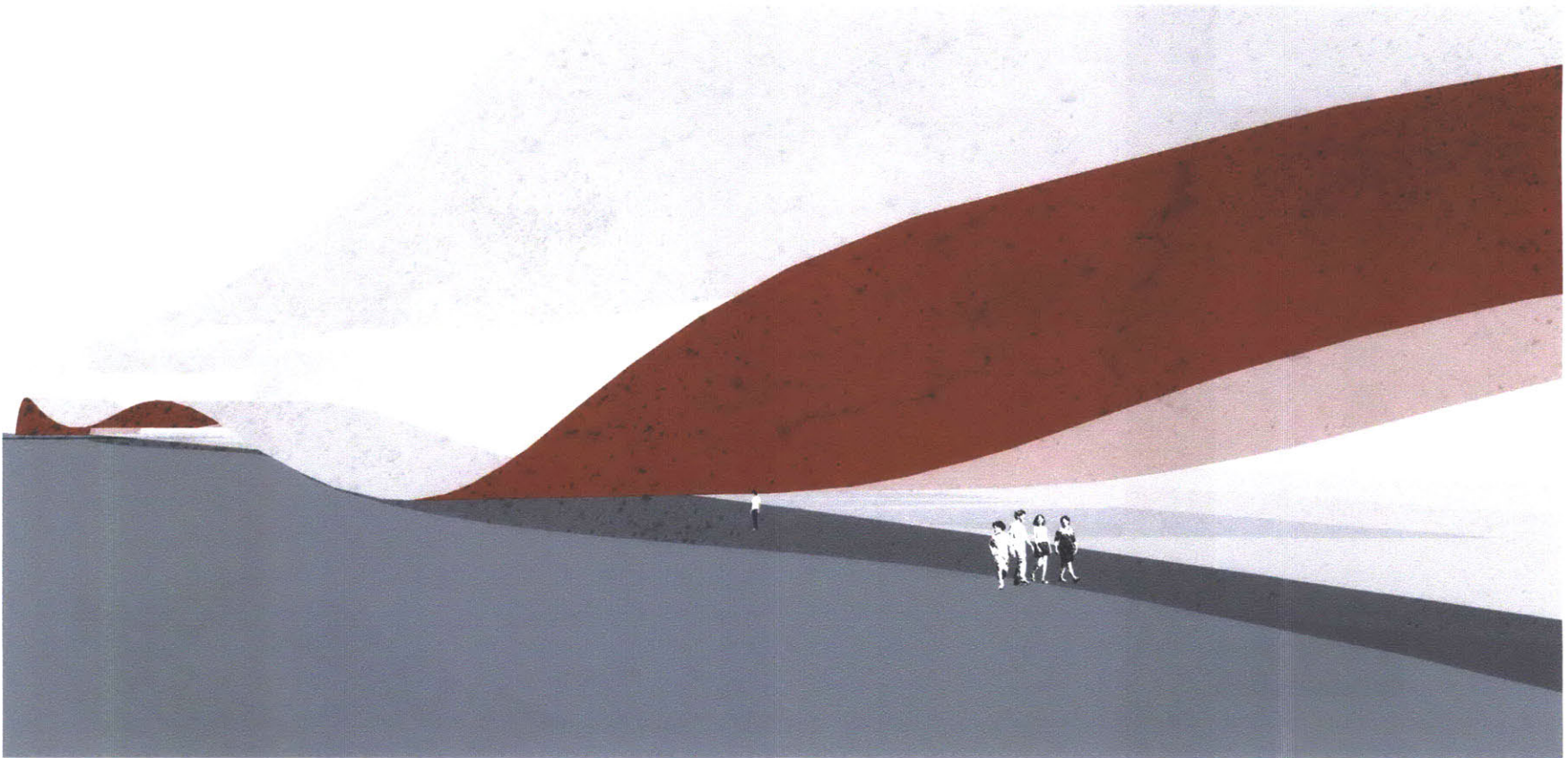
Collage image of an example of the semi-covered street interface

## The bridge

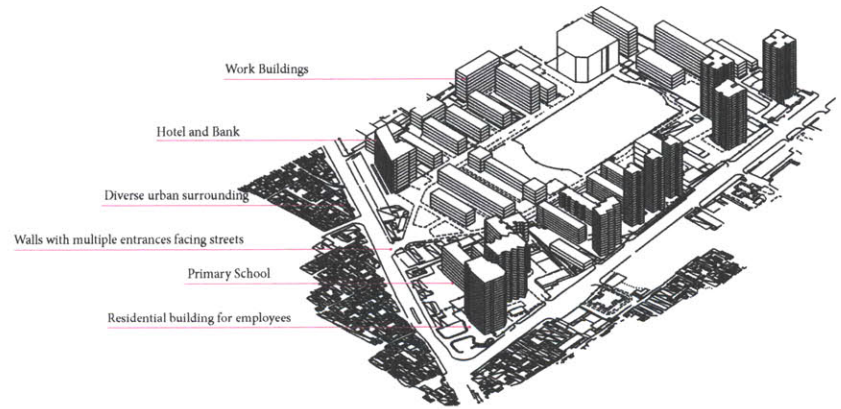
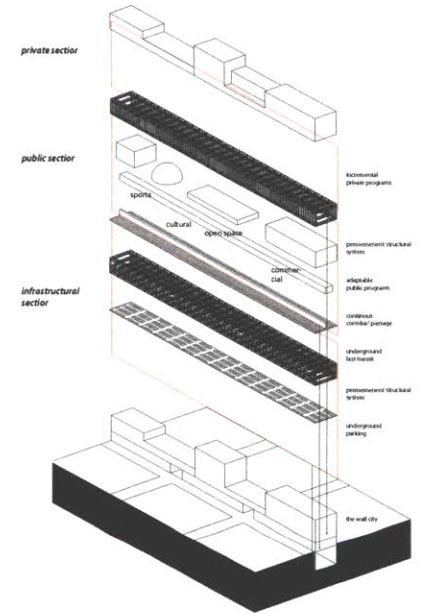


Street Interface Type 4: Passages, and Semi-Outdoor space

## The semi-covered space



CONTINUOUS MIXED

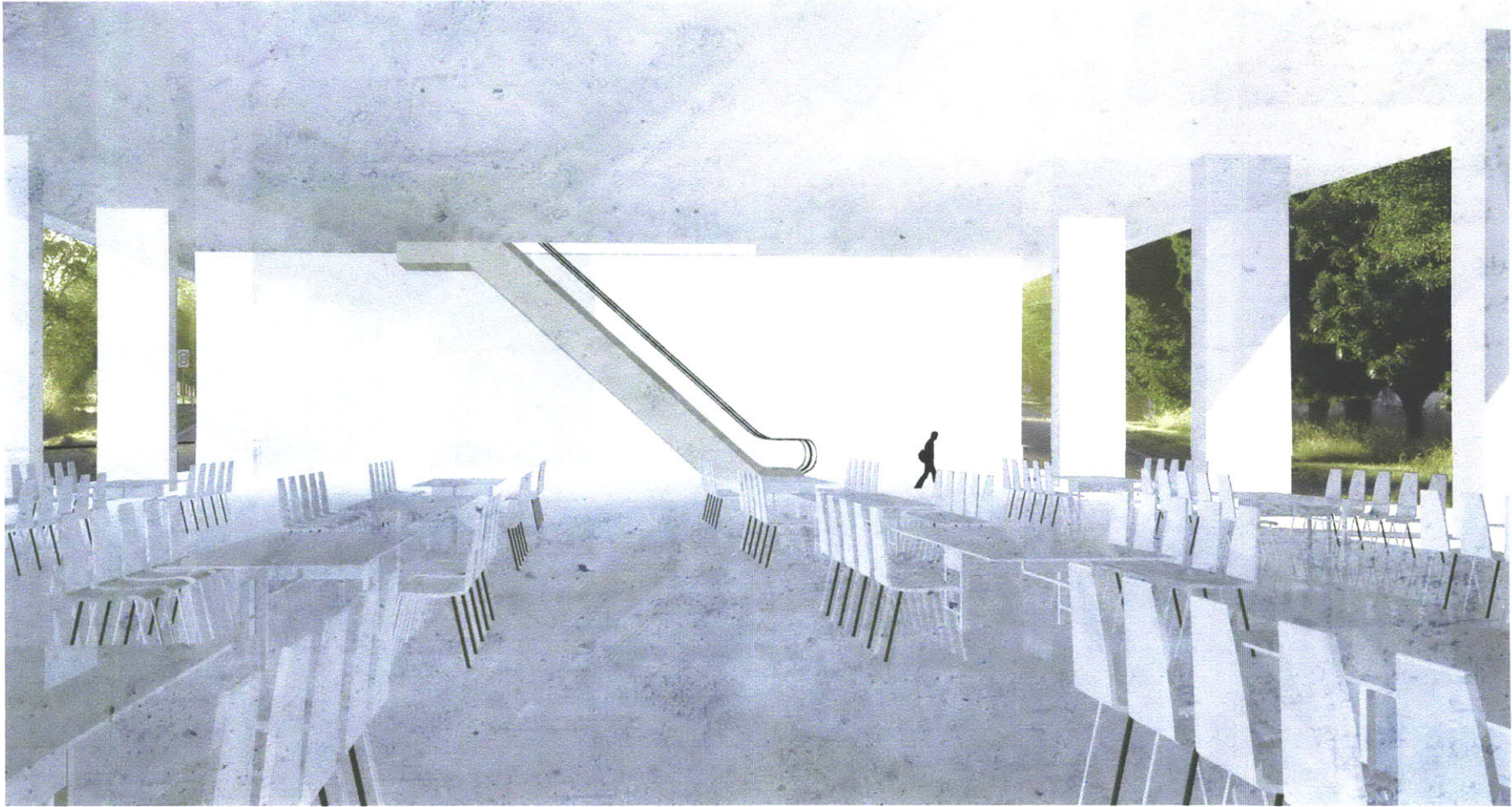




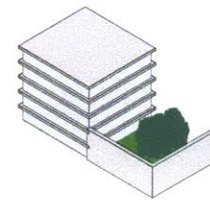
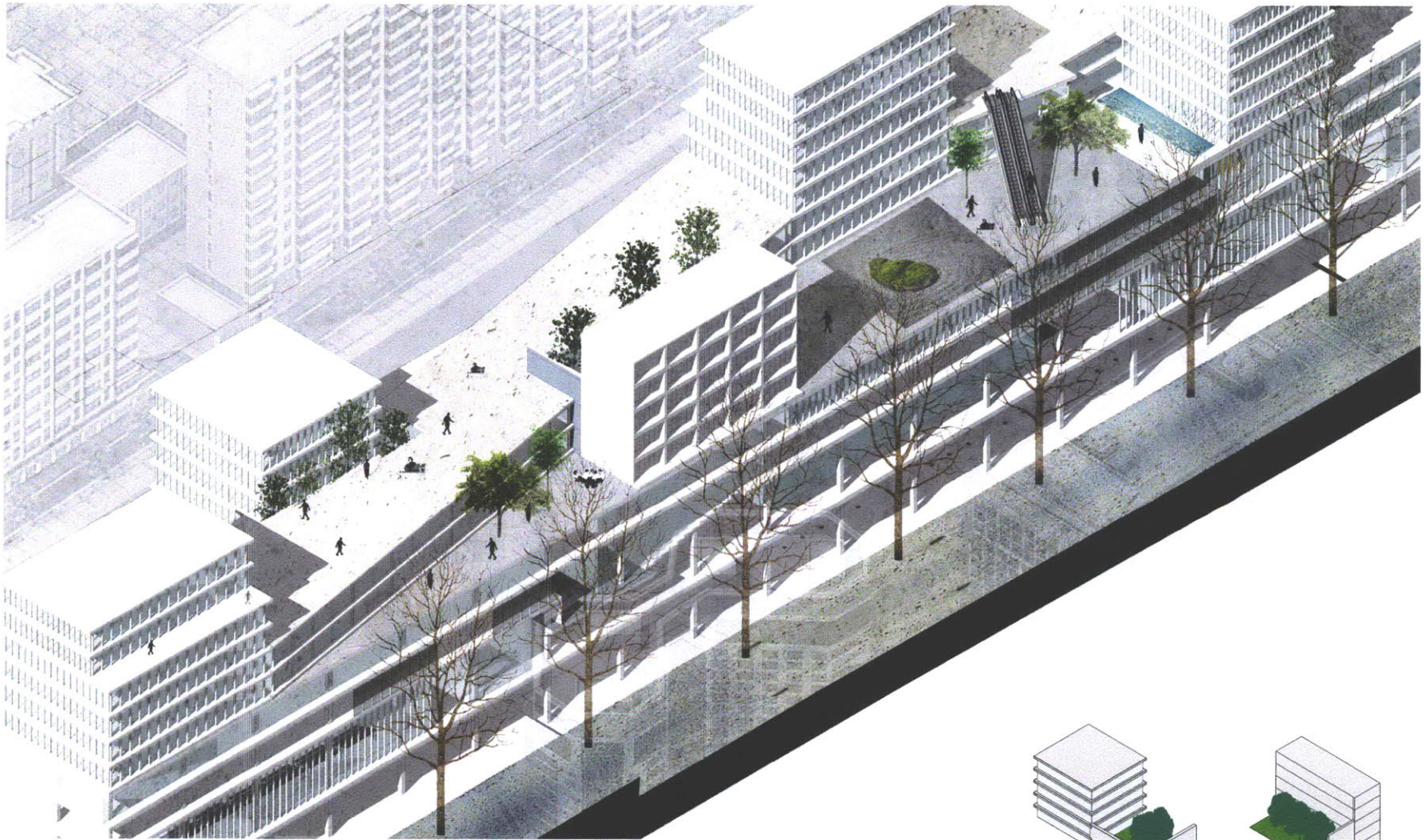
## **Urban Scenarios**



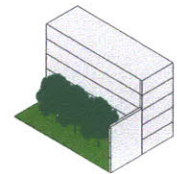
The transparent thin-slab structure: next to the neighborhood parks



New Public Program: Interior view

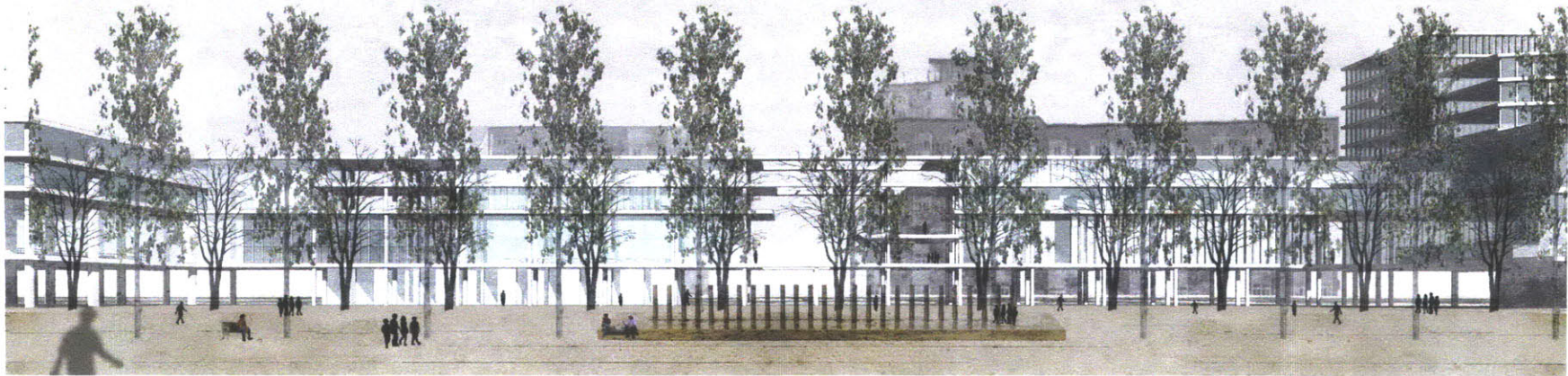


housing

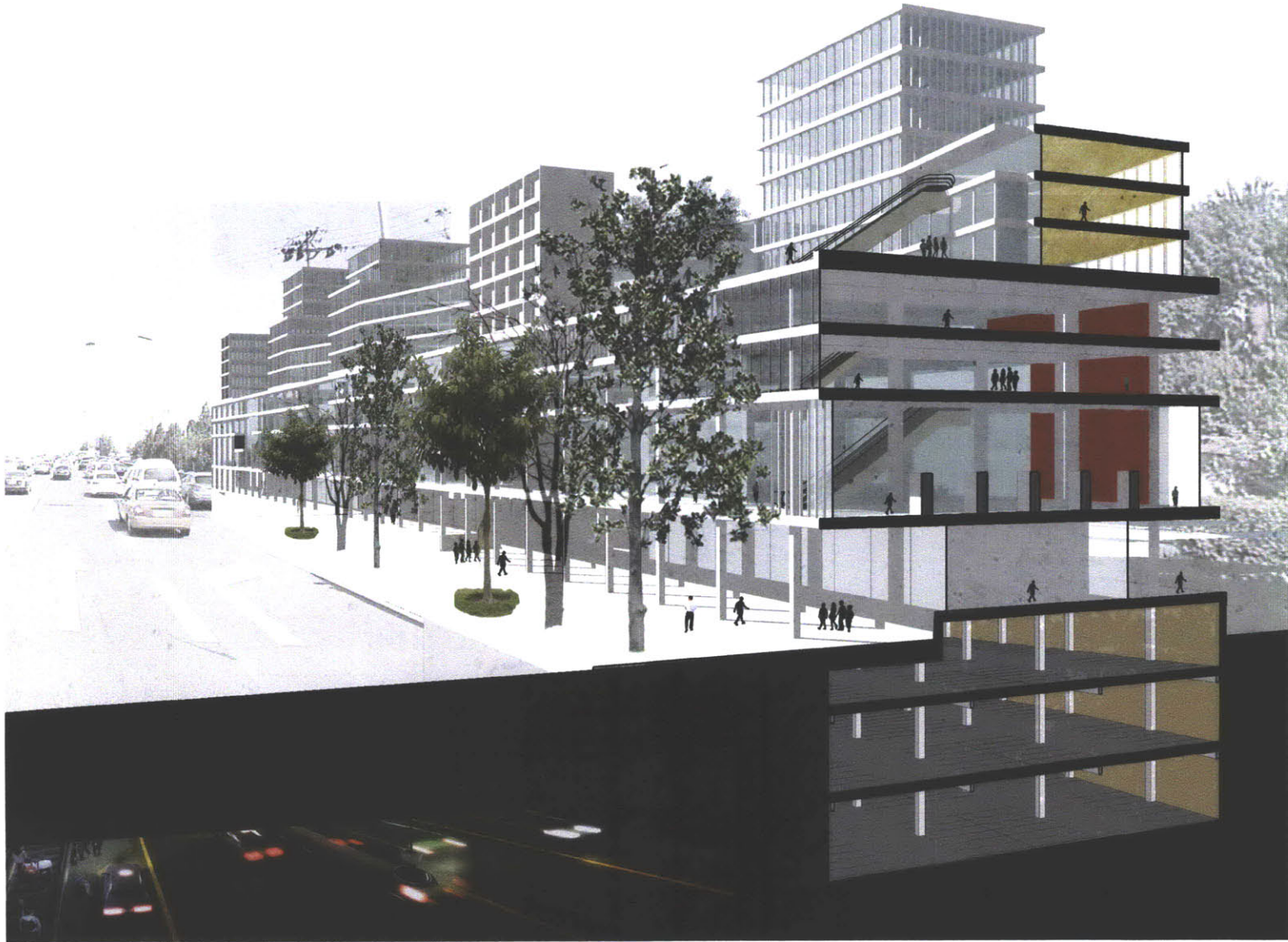


garden

Housing complexes on the upper layer of development



Neighborhood Park, and possible floor plans



The new street: Separation of Bypass traffic and Local traffic



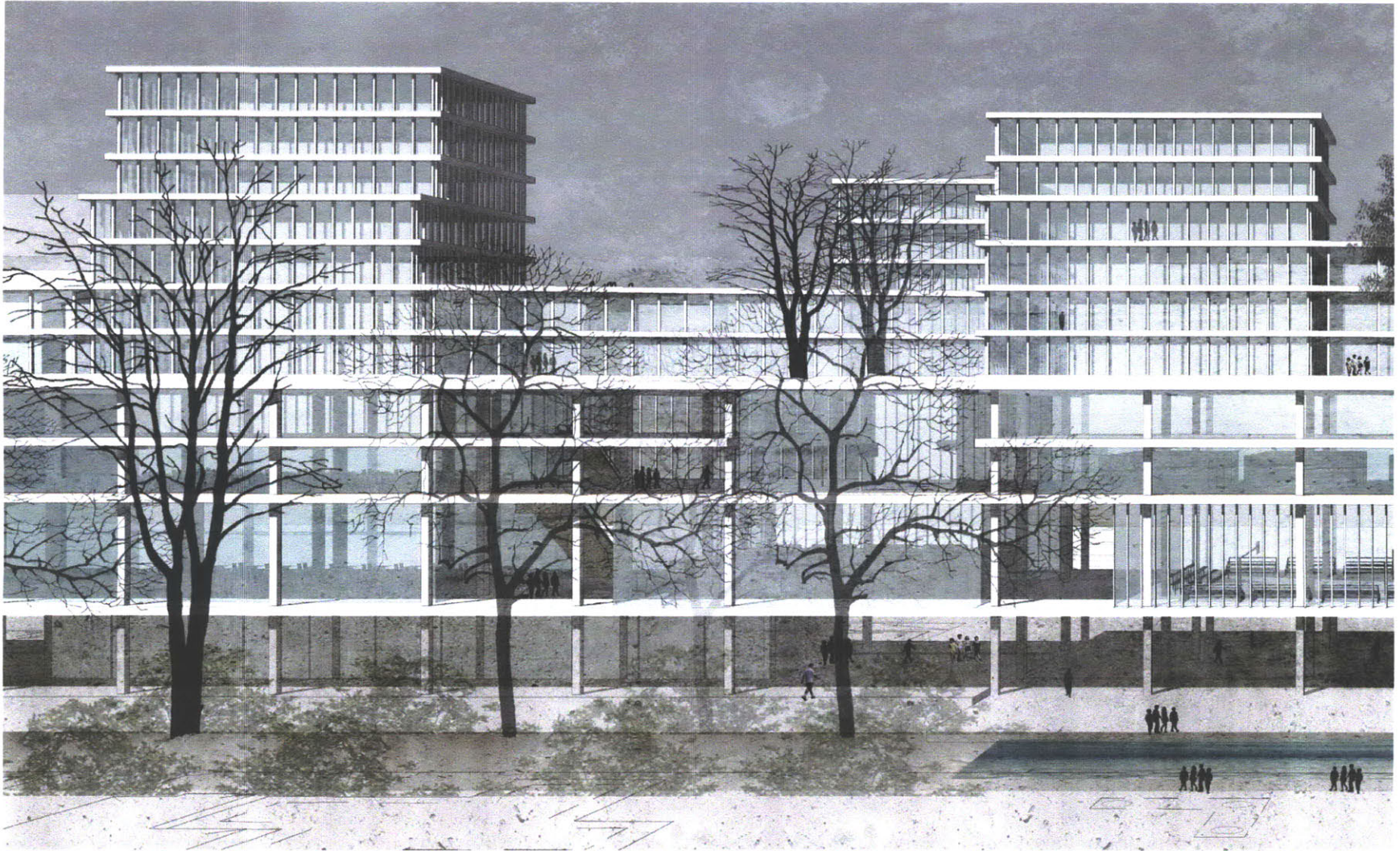
The green avenue: Located next to the new urban development



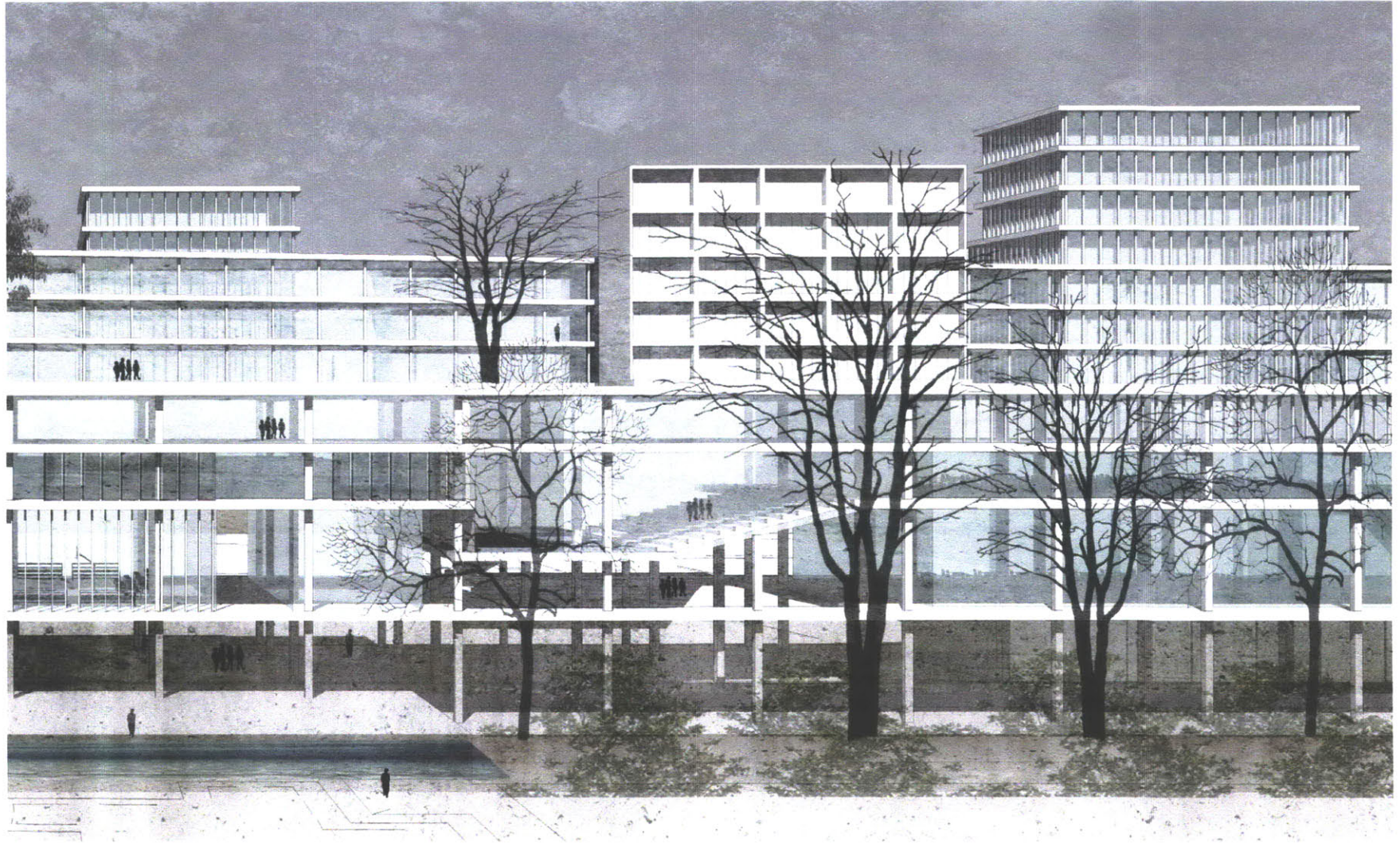
The Green Avenue







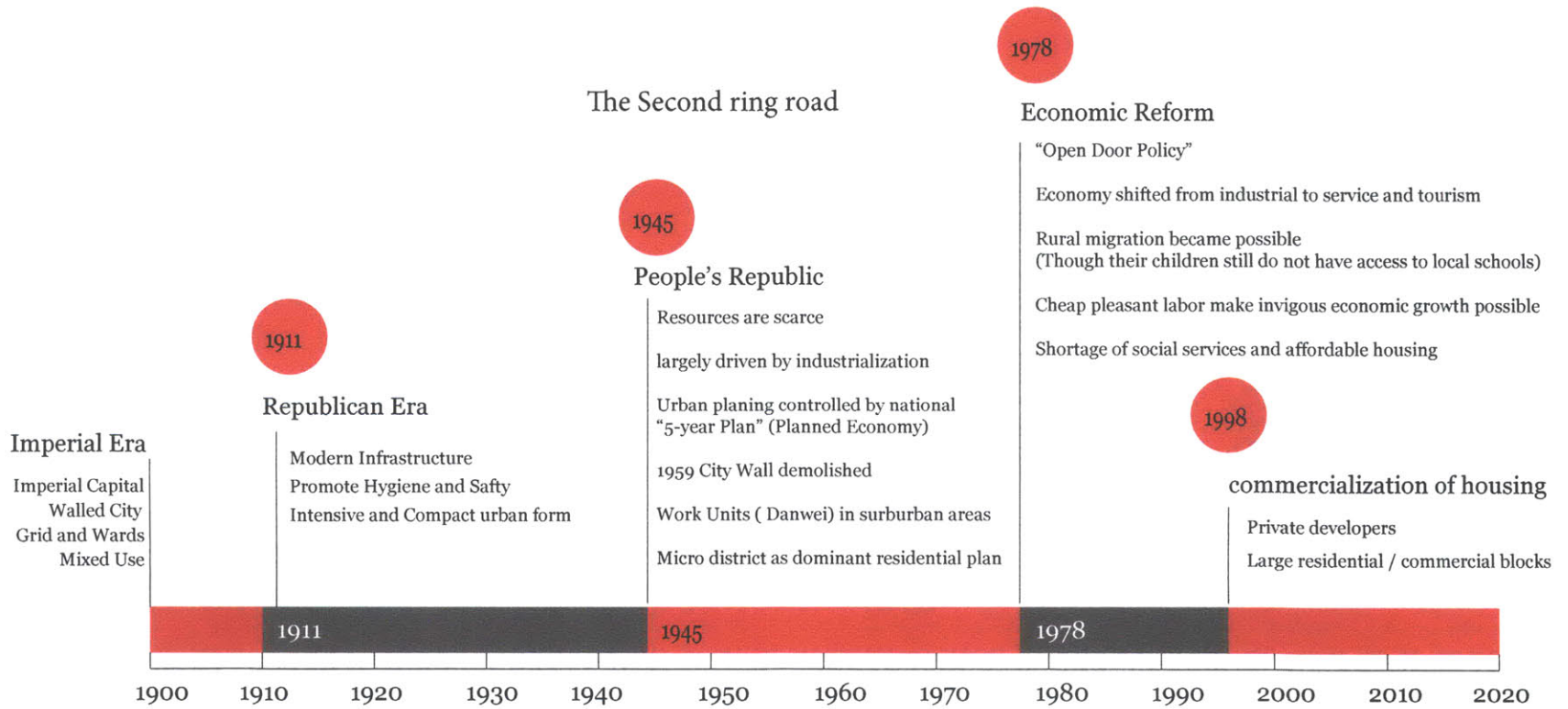
The New Developments



## **Appendix 1 : Urban expansion in Beijing**

# POLITICAL TIMELINE: CHINA 1900-2010

Forces behind that shaped Beijing's urban form



# People's Republic

## City within the city : Examples of “ Work Units”

a) Closed walls and gates b) Individual identity and self-contained c) Intergrated workplace, residence, and social services **Production+Consumption**

1950s-1970s  
Early founding of PRC

Work units as basic  
planning

“Planned Economy”

Resources are scarce

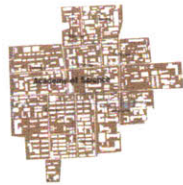
Planning largely driven  
by industrialization

Urban planing con-  
trolled by national “5-  
year Plan”

1959 City Wall demol-  
ished

Work Units ( Danwei)  
in surburban areas  
Micro district as domi-  
nant residential plan

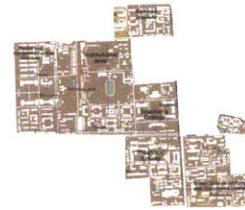
### Institutional



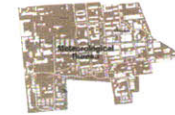
Academy of Science



Beijing University



Postal Institute+Theatrical School+Railroad Institute



Meorological Bureau



Nationalities Institute

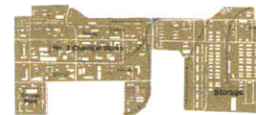
### Industrial



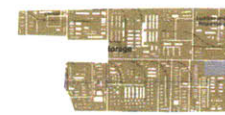
No.1 Lathe Plant



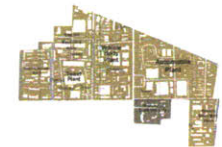
Light Industry



No.2 Chemical Works








Lumber and Wood Plant

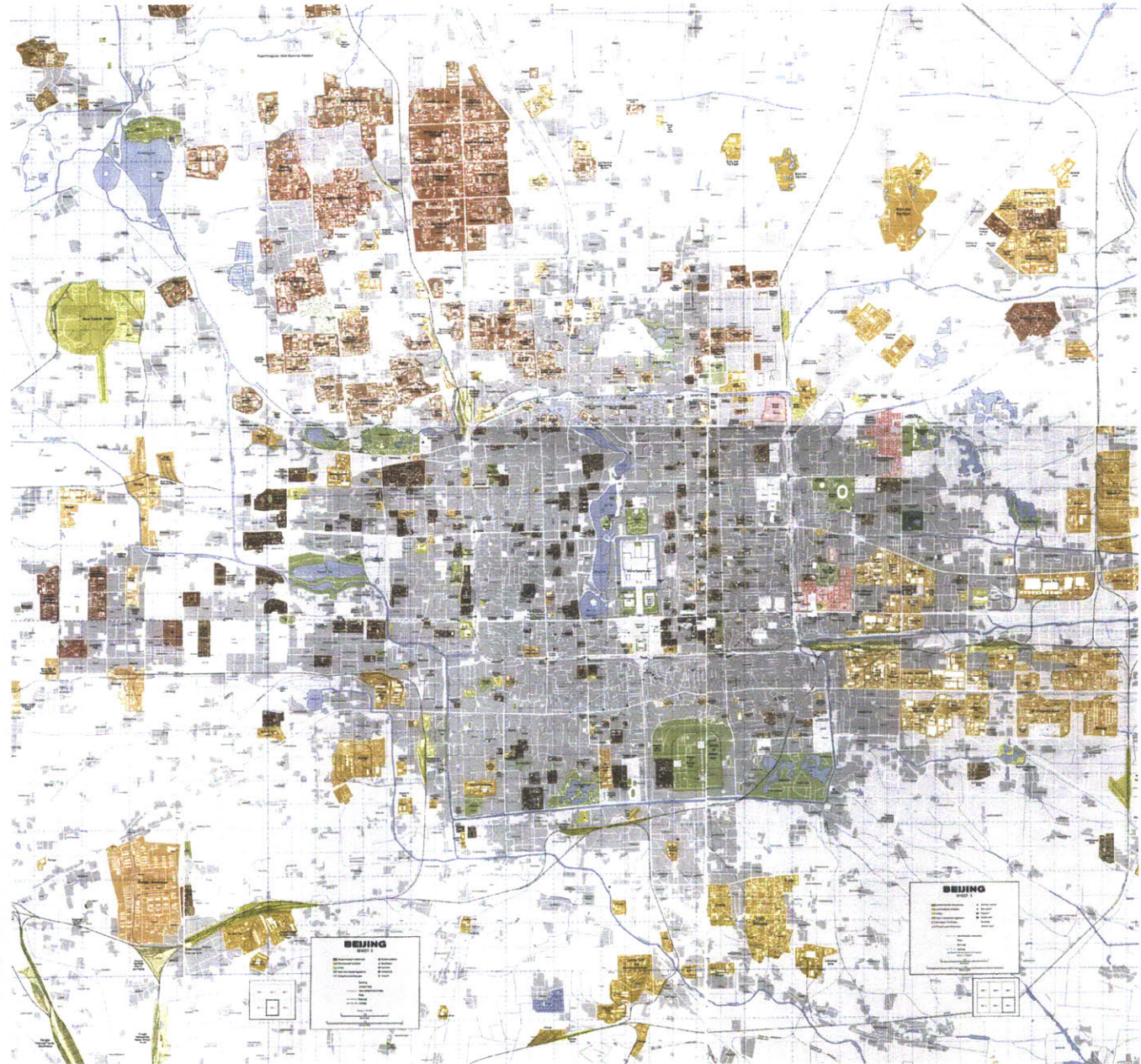


Automobile Plant

# Political Map

Beijing 1988

-  Densely populated
-  Institutional
-  Governmental
-  Park/Vegetation
-  Industrial/Commercial



## Economic Reform

1978

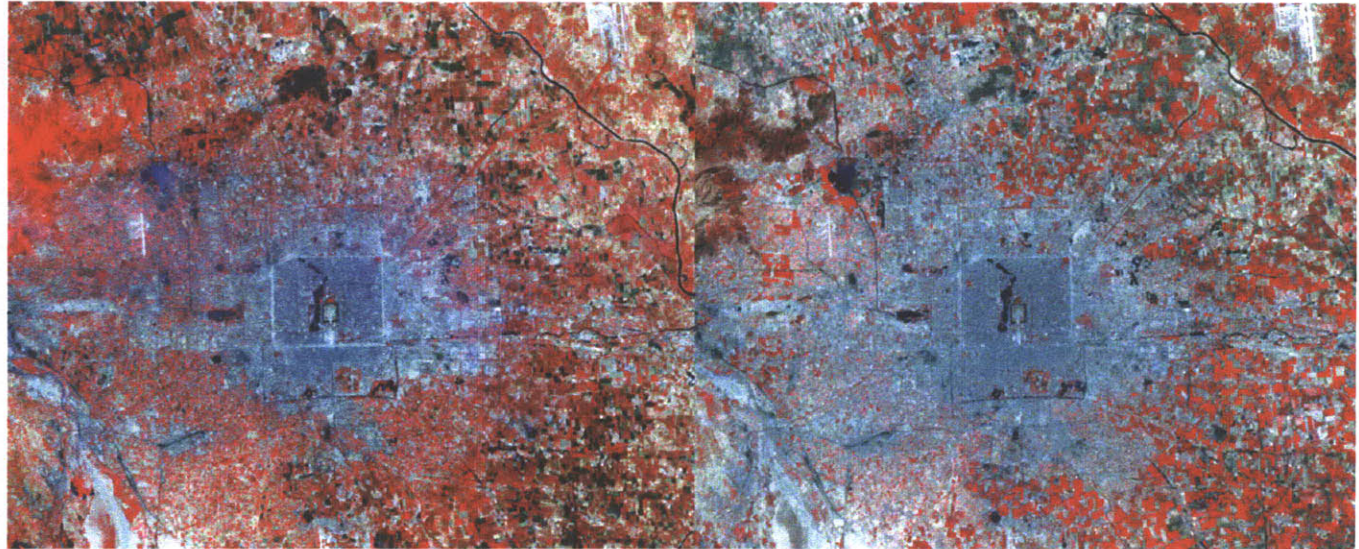
“Open Door Policy”

Economy shifted from industrial to service and tourism

Rural migration became possible  
(Though their children still do not have access to local schools)

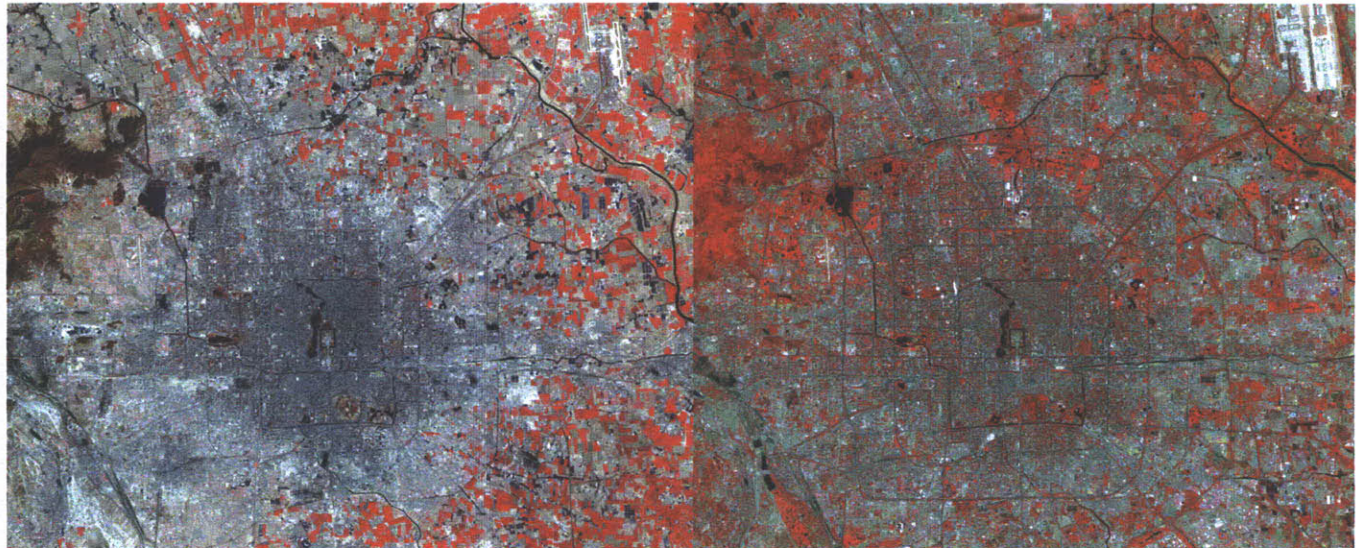
Cheap labor make invigous economic growth possible

Shortage of social services and affordable housing



1977

1983



1995

2011

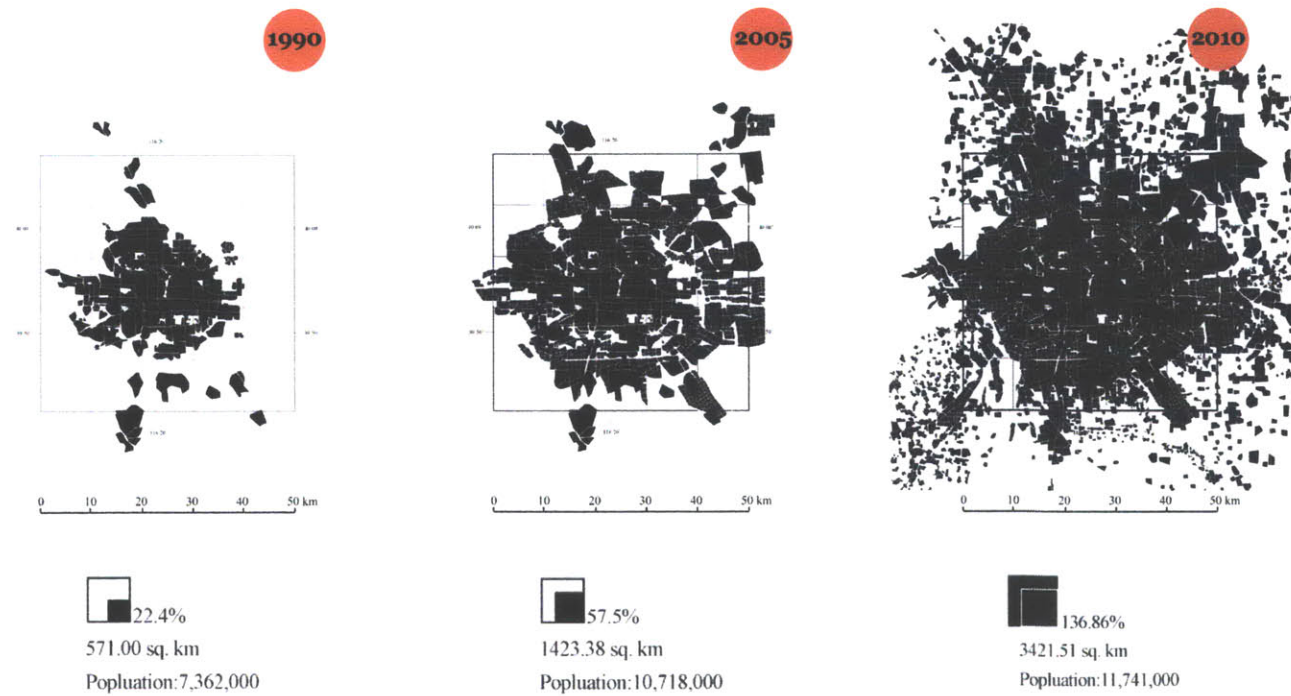


## Commercialization Of Housing

1990s  
Economy Reform

Large residential /  
commercial blocks

Private developers



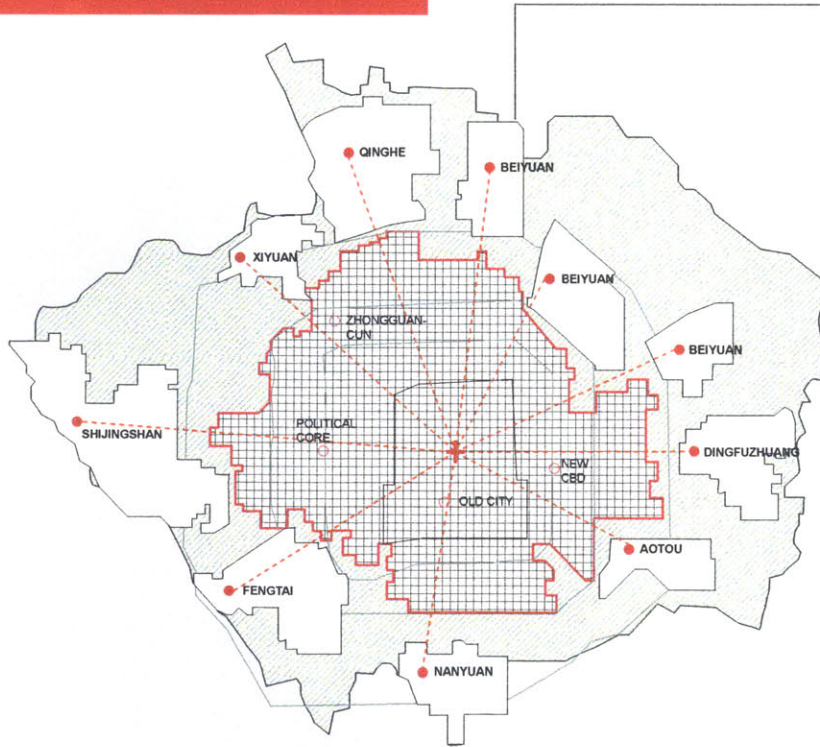
Central Built-up Area: Surrounding the historic core is the 300 square km city center that has been developed gradually since the 1950s. After the market for land use rights was established in the 1980s, this area has been redeveloped rapidly and in the process has changed the physical image and socioeconomic life of Beijing. Most industrial land has been converted into a central business district of commercial and residential neighborhoods.

Image Source: Global Metropolitan Observatory



**IWAN BAAN: 10,000 workers for the CCTV/TVCC construction**

## THE PROBLEM OF HOUSING



Official Masterplan: 10 Major Residential Development zones



Typical "Affordable Housing" Project: Tiantongyuan 2005  
 FAR = 1.0  
 Planning Area: 8,000,000 Sqm  
 Built Area: 8,000,000 Sqm (5,720,000 Housing)  
 Residents: 150,000 (planned: 300,000)

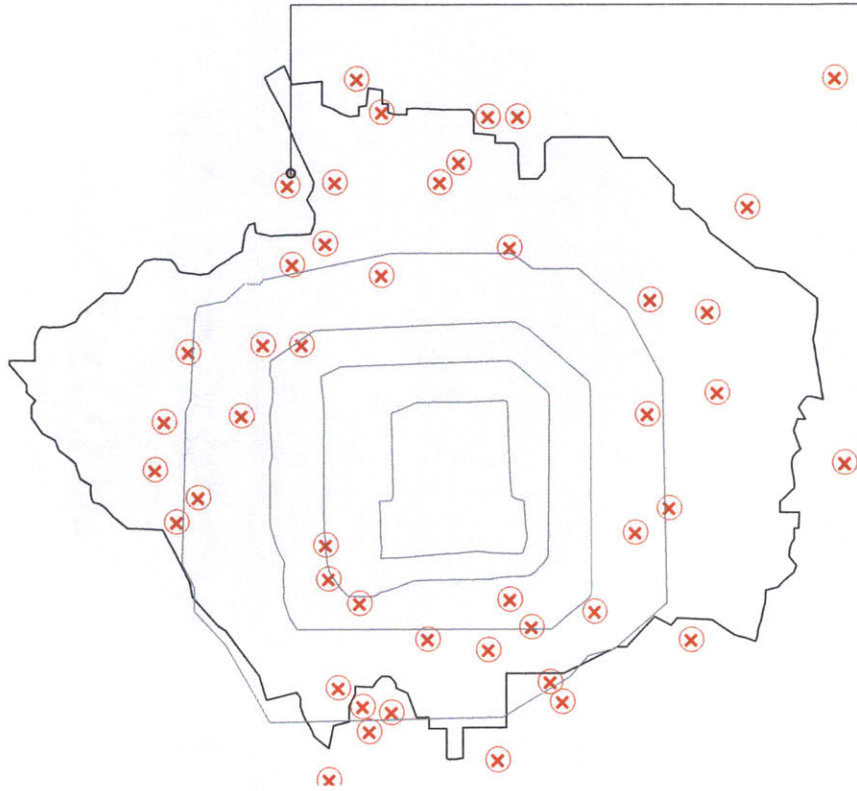
Aimed for "low-income Beijing citizens", but most units have become rental homes for migrant workers.  
 Some apartments are large and shared by 10+ people  
 Curiously because of corruptions it did not become the huge agglomeration of very income neighborhood (MEGA SLUM) as it was planned, which might created bigger problems of social segregation. 89

Current Urban Exclusion

Living on the Edge

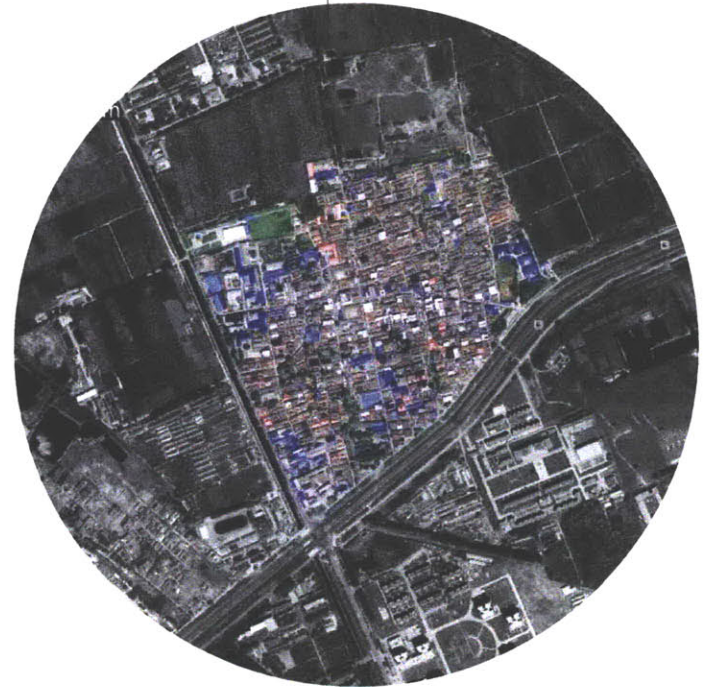
## URBAN VILLAGES

Actual sites for the new developments



Villages Demolition Plan 2007

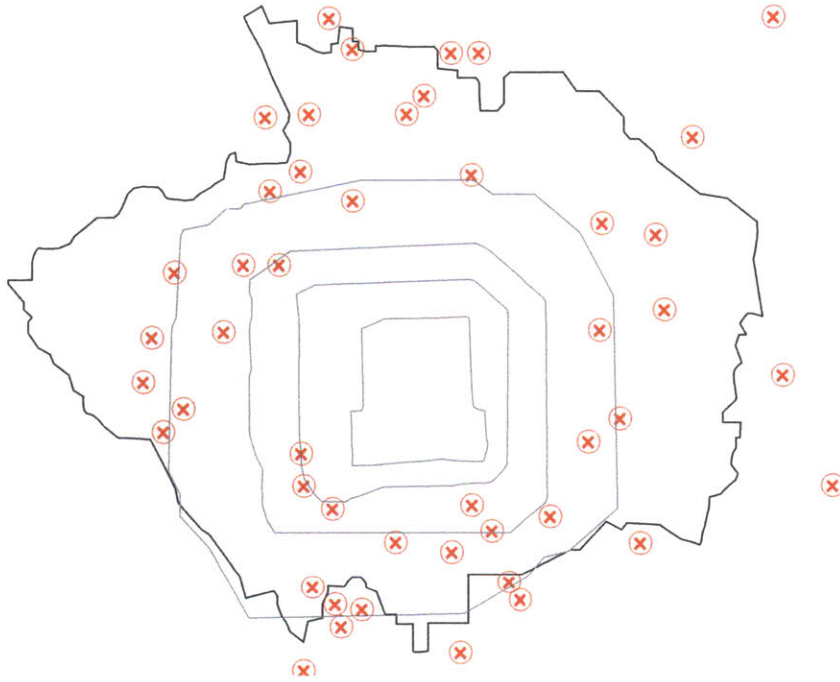
50 Key Urban villages to be demolished for development



Tangjialing Village (Demolished 2010)  
FAR = 4.0

Area: 4,800 Sqm  
registered population : 3,000  
migrant population: 50,000 (17,000 recent college graduates)

PARADOX



BEIJING-  
50 KEY URBAN VILLAGES  
DEMOLITION OF AFFORDABLE HOMES

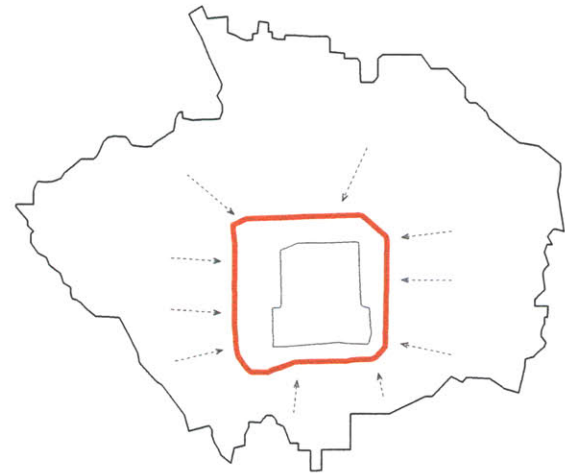
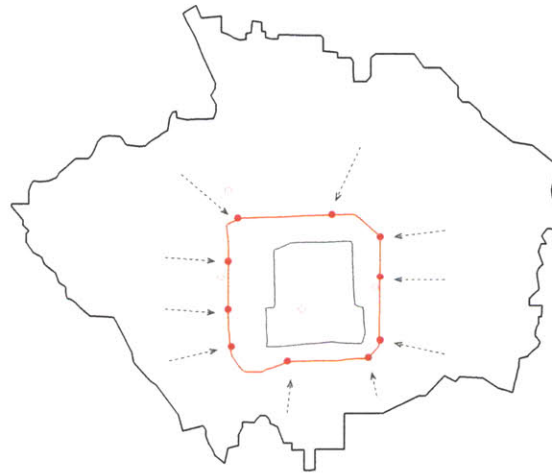
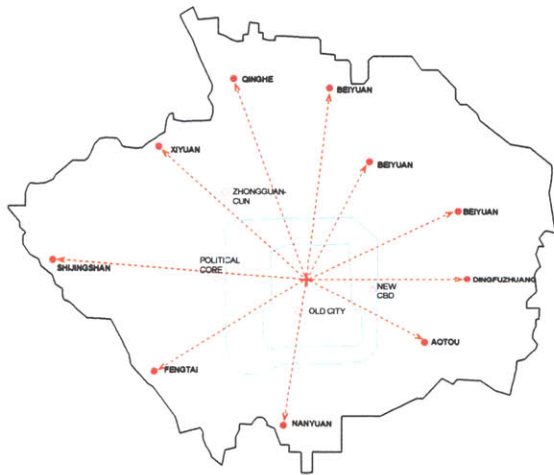
SOCIALISM MODE?



VIENA-  
40 PER-CENT  
SOCIAL HOUSING + NON-PROFIT DEVEL-

CAPITALISM MODE?

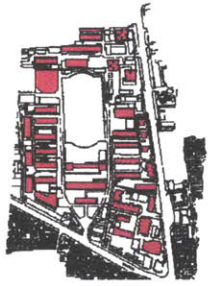
HYPOTHESIS 01



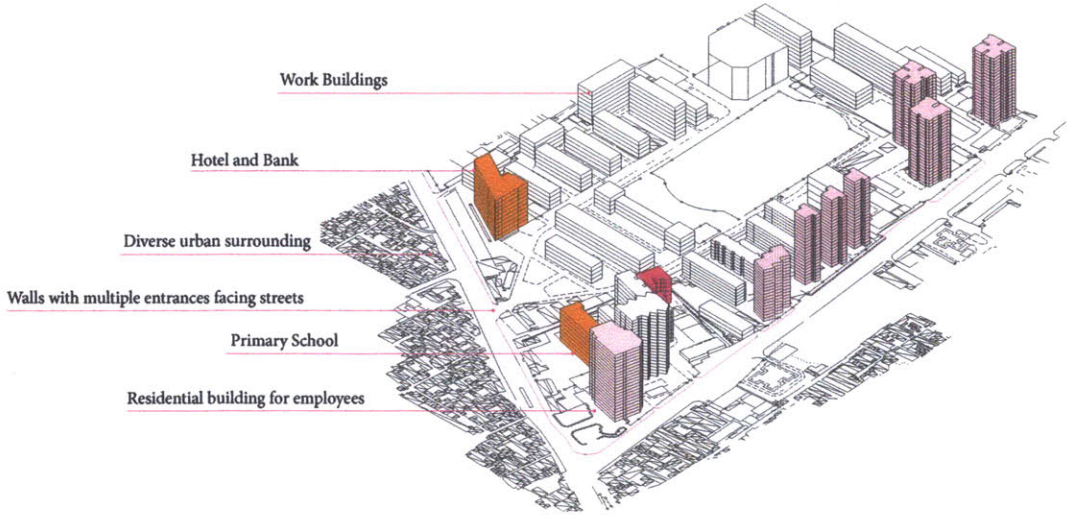
Towards a System of Centralities

**BLOCKS**

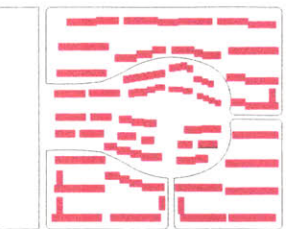
BEFORE 1990  
Typical layout of a "WORK UNIT"



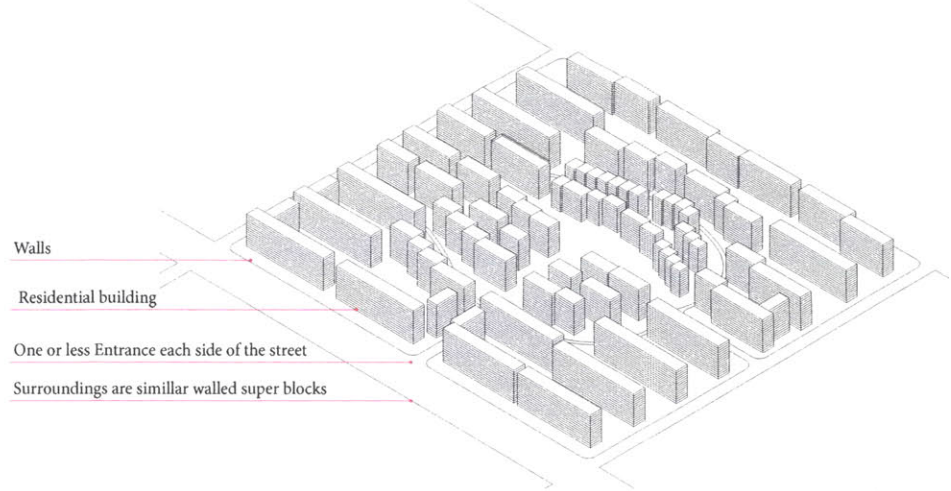
superblock in 1960s



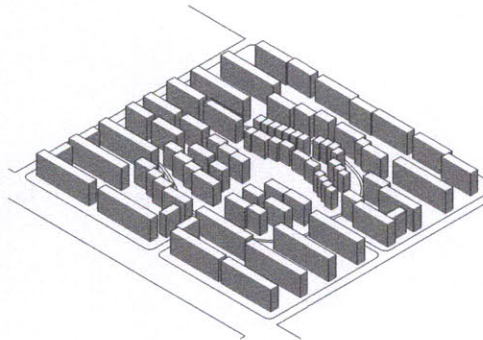
1990-PRESENT  
Typical layout of a "SUPERBLOCK"



superblock in 2000



## PARADOX



New Beijing Surburban? Urban?

### SIX FUNDAMENTAL RULES THAT DISTINGUISH CITY FROM SPRAWL:

1. THE **NEIGHBORHOOD CENTER**
2. THE **5-MINUTE WALK**
3. THE **STREET NETWORK**
4. **NARROW**, VERSATILE STREETS
5. **MIXED USE**
6. **SPECIAL BUILDINGS** (CIVIL BUILDINGS REPRESENT THE COLLECTIVE IDENTITY)

### THE FIVE COMPONENTS OF SPRAWL:

1. **HOUSING CLUSTERS** (CONSIST OF ONLY RESIDENCES)
2. **SHOPPING CENTER**
3. **OFFICE PARKS** AND BUSINESS PARKS
4. **CIVIC INSTITUTIONS**
5. **ROADWAYS** (CONNECT THE OTHER FOUR DISSOCIATED COMPONENTS)

Duany: "Suburban Nation"

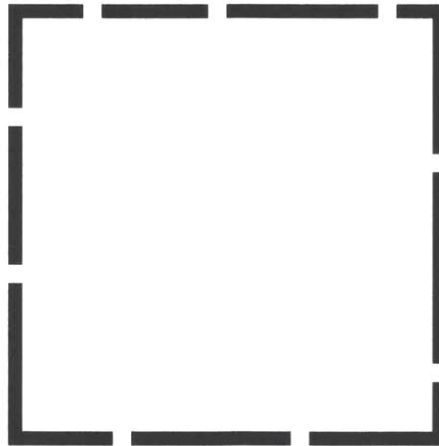


HYPOTHESIS 02



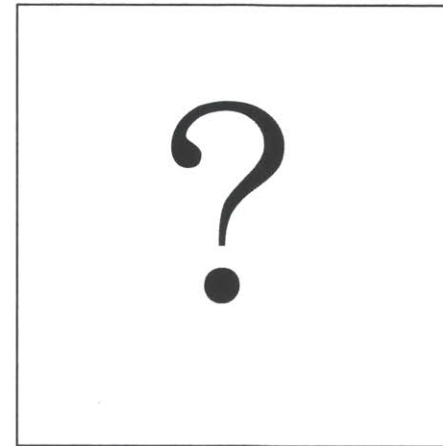
SIZE is not the major problem of  
a block

Actual Issue:  
lack of variety of activities  
+  
the disassociation of components



The idea of the wall is deeply  
rooted in Beijing

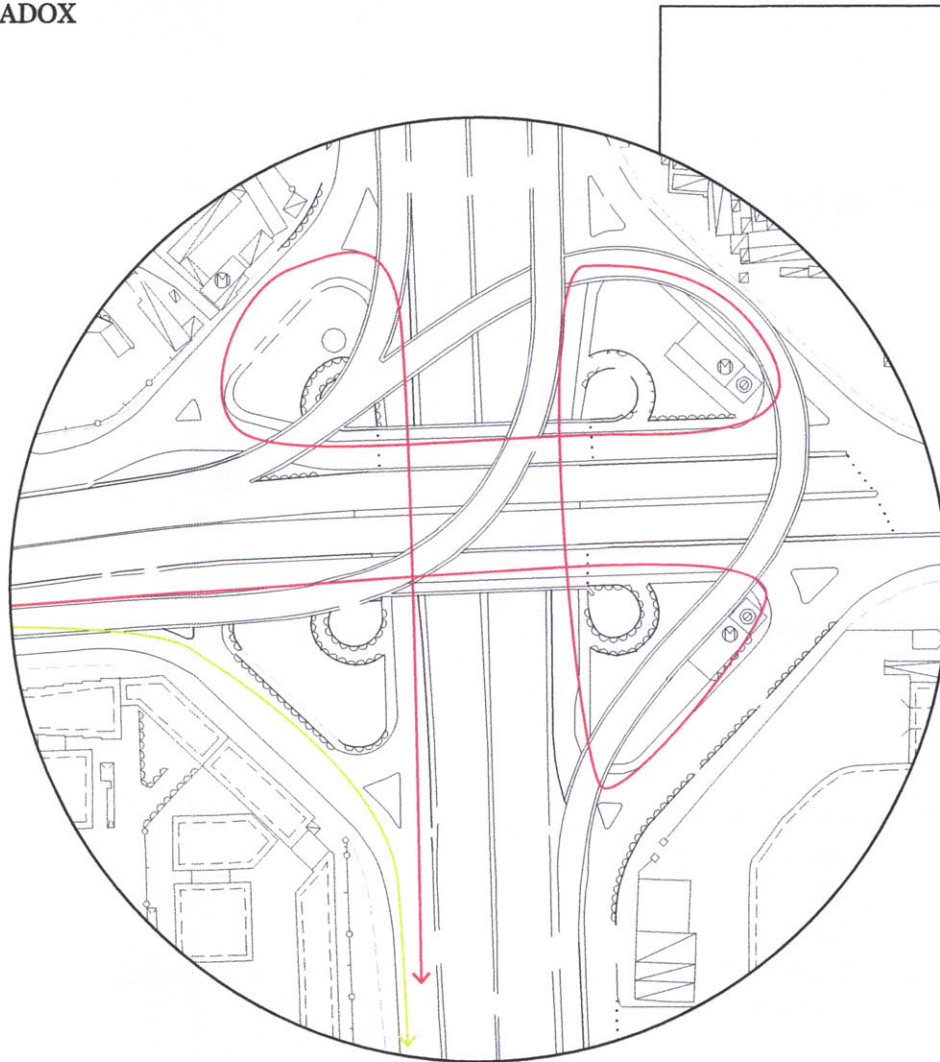
It still works today  
provided there are enough gates  
and openings



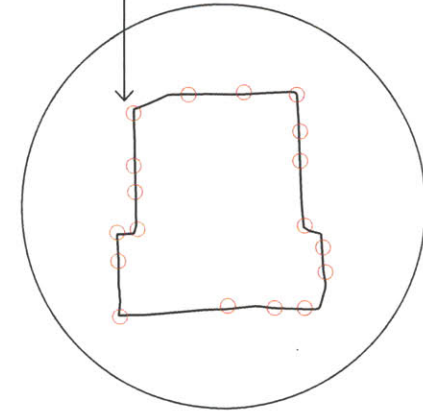
Beijing should be built as a

“Real City”,  
not as suburban

PARADOX



THE XIZHIMEN BRIDGE-MAZE



MAJOR INTERSECTIONS ON THE SECOND RING



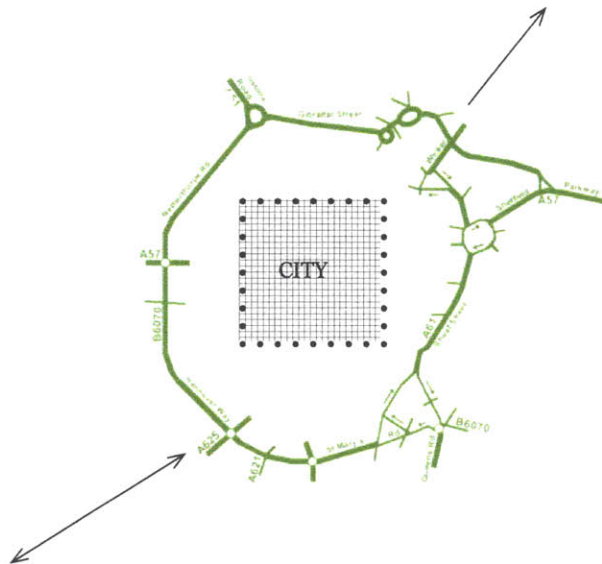
THE CITY SCAPE UNDER THE BRIDGE

extreme complication in crossing; and degenerated urban quality next and under the rings.

## DEFINITION OF RING ROAD

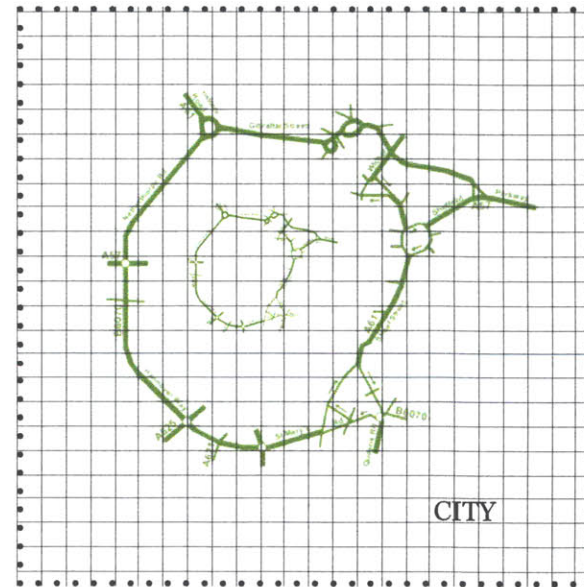
“A ring road (also beltway, circumferential (high)way, loop or orbital) is a road or a series of connected roads encircling a town or city.

Most orbital motorways (or beltways) are purpose-built major highways **around** a town or city, typically **without** either signals or road or railroad **crossings**. In the United States, beltways are commonly parts of the **Interstate Highway System**.”



KEY WORDS:

BYPASS, FEW CROSSING, PERIPHERY, INTERSTATE



RINGS INSIDE THE CITY

MAJOR CROSSROAD CONGESTIONS

## **Appendix 2 : Beijing Roadways in the last 30 years**



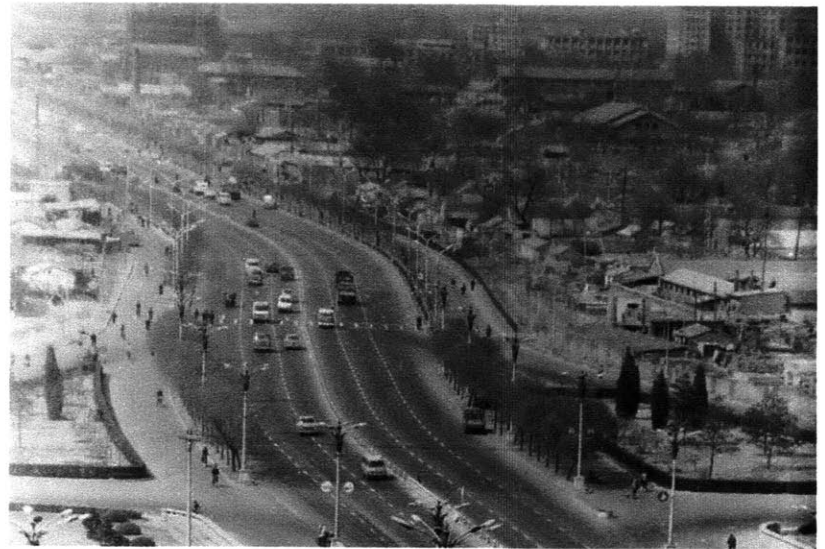
1918 City Wall



1984 Chang'an Avenue



1978 Typical Street



1986 Second Ring Road



1990 A total of 7.3 Million Bicycles



2000 Congestion



1994 Traffic Control



2004 Excessive Infrastructure