Urban-Eco-Filter: Introducing New Lungs to the City of Beijing

Carlos Gil
University of South Florida

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Urban-Eco-Filter: Introducing New Lungs to the City of Beijing

by

Carlos Gil

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Architecture
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Urban Eco-Filter:
Introducing New Lungs to the City of Beijing

Carlos Gil

ABSTRACT

It is evident that several cities in China have experienced a variety of global impacts. Beijing for instance, has become synonymous with mass-migration over the years. The immense scale of projected rural migration, the unmanageable intervention of new housing urban developments, and the high levels of air pollution in Beijing have become a global dilemma. In order to alleviate Beijing’s critical ecological conditions, the introduction of “new lungs”, as an urban environmental design to the city should be examined. This thesis project illustrates how urban productive landscape and bike infrastructure can be essential in urban development through the implementation of an innovative dynamic Urban Eco-Filter that would respond to the active circumstances of the city of Beijing. The enormous amount of air pollution, ground-water depletion/pollution and particularly the lack of an ecological footprint are some of the challenges the city of Beijing continually battles. As a potential solution to assist the citizens of Beijing, who continually struggle to maintain a better quality of life, this thesis project proposes a new
Urban Eco-Filter approach that will serve as a green corridor incorporating environmental resources. This innovative urban infrastructure would become the exceptional and unquestionable tool to create a holistic environment including productive urban landscape, bike infrastructure and sustainable themes.

As a solution this project proposes the implementation of an elevated eco-network infrastructure in the center of the city of Beijing. In addition, the proposal would focus on developing a new productive landscape connection prototype at the Guomao Bridge on the 3rd Ring Road. The procedures analyzed are: case observation, case studies, strategies of 3-D modeling, and the design and qualitative investigation through workshops. In order to further validate the proposed solution, an in depth evaluation of the research techniques is necessary.

It is indispensable to analyze the existing hazardous urban conditions and consider the uncontrollable growth of metropolitan cities, while introducing new ecological bike infrastructure. With the limited environmental footprint, constant amount of air pollution and the deficiency of ground-water, the investigation of a new Urban Eco-Filter is encouraged to enhance the social and environmental fabric of the city of Beijing.
Thesis Statement

Through different analysis and investigations in designing urban public spaces, it has been demonstrated of the improvement and development of ecological tissue as well as the incorporation of mass-transit systems in metropolitan cities result in healthier cities.

Understanding that metropolitan cities have been facing a significant demand in automobile and new housing developments are concerns that we have to keep in mind. In Beijing for example, rural migration as well as the easy access to acquire cars have been an issue for the past thirty years. Since then, Beijing has been experiencing a variety of urban conditions that relates back to the overpopulation and the increase of car sales in the area, which need to be taking into consideration. Moreover, the uncontrollable amount of pollution, groundwater depletion, rise of unanticipated urban inner-flow and particularly the lack of ecological footprint have lead to a sequence of analysis to consider the challenges the city of Beijing is currently facing.

In conclusion, it could be corroborated that metropolitan cities in recent times are suffering not only from mass-migration and pollution but they are also facing a lack of productive urban landscapes as well as a deficiency of transportation systems that could be a stepping stone to a better future.
Introduction

It is apparent that Beijing is suffering from excessive urban expansion. If the current trend continues, Beijing may be collapsing to a complicated future. The development of the city is moving away from the monocentric model established by the Tang Dynasty (618-907). From 1953 to 1993 five master plans were submitted for review in order to avoid urban sprawl; however, these schemes have not been able to control the mass-migration to the city. This problem has contributed to air contamination, lack of green urban spaces, decrease of ground-water, and the insufficient supply of natural food products.

Until recently, China was known as one of the most self-sufficient countries in the world. Presently, China is importing natural food products from other countries in order to survive. During the Asiatic Society of Japan in 2001, Professor Makoto Taniguchi stated that, “By 2020, China could be the biggest importer of food after Japan”. New urban developments seem to focus more on the car and not the pedestrians, this is another worry Beijing is dealing with. Likewise, the depletion of ground-water should be taking into consideration because it is rapidly disappearing. Consequently, it has been prognosticated that Beijing in approximately twenty years would no longer be the capital of China. All these concerns could have solutions if new design ideas were implemented. For this reason, this thesis exploration will analyze the possibility of introducing “new lungs” to Beijing in order to improve the dynamic conditions the city has been facing.
This new UEF will deliberate a sequence of outcomes to improve the lifestyle of the residents of the city of Beijing.
Hypothesis

An extensive analysis of successful urban ecological precedent studies and case observations around the world has persuaded a series of explorations interrelated with green elevated infrastructures. By incorporating a similar system in a dynamic urban setting such as Beijing, this thesis project will attempt to alleviate some of the critical urban conditions the city currently faces.

The analysis will begin by researching the history and cultural aspects of the city. This will be developed by implementing a historic time line of the most important political, economical and urban design events that have occurred throughout Beijing's history. In addition, an intensive analysis of existing urban public spaces will be established to display the interactive everyday activities of Chinese people. Furthermore, case observations from different travels around the world will influence the transition of the design qualities this thesis project wants to achieve. Theoretical methodologies will also be analyzed from case studies such as the Ecological Green Belt proposed by Liang Sicheng, The Olympic Sculpture Park by Weiss/Manfedi architects, the Yokohama international port terminal by FOA architects, Sociopolis fomented by the Generalitat Valenciana and the High Line project by Field Operations.

Design and qualitative investigations will be established through the involvement in design workshops. Some of the charrette/workshops to be addressed are: the Line 13-Beijing workshop by Moving Cities and the
Shanghai workshop with Tongji University. Moreover, comparative studies, relationship analysis, and mapping are some of the correlation research methods that would be applied during the evolution of this thesis project. Within the comparative studies will be include the creation of different design schemes which will be analyzed in order to select the most suitable approach. Similarly, as a supplementary and beneficial system of research, the design project integrates mapping analysis which will be utilized as investigations of connectivity, proximity and porosity in relation to the site.
Project Description

Throughout analytical studies of the existing environmental conditions and the effects of the immense urban growth in the city of Beijing, it is vital to develop new urban design ideas that would benefit and enhance the valuable ecological and transit networks of the city. Built in the 1980’s and completed in the 1990’s, the 3rd ring road is one of the seven ring road infrastructures existing in Beijing. It passes through Beijing’s Central Business District and diplomatic communities connecting five of the six principal areas of development within the city including Sanlitun and Haidan districts. The 3rd ring road is the most centralized expressways in the city and is directly interlinked with the most important highways in town. However, since this is the most active and desirable ring road by Beijingers, there is a deficiency in pedestrian amenities, green ecological spaces, public transportation systems, and connections from one to the other side of the highway. Due to the significant importance to automobiles, the 3rd ring road is suffering from more fragmentation and less accessibility which divides the city in two. Therefore, new ways of approaching the negative impacts on this ring road have been the foundation to evolve a conceptual master plan that would revitalize the area.

The design proposal for this thesis project is divided in two different scales. In a macro scale, the project suggests bringing the city together. By incorporating a new elevated Urban Eco-Filter over the 3rd ring road will generate new approaches of connectivity not only to the existing transit network but to the existing ecological tissue of the city. The idea is to integrate existing green parks to the new linear landscape organism and give people a
better quality of life. While improving the access to interconnected pedestrian amenities around the city, the proposed UEF would act as the main spine of a new vibrant environmental experience. In order to create a clear importance to become healthier and more sustainable citizens, a projected elevated bike infrastructure would also be implemented to connect to the existing multi-modal transit network. These bike paths give Beijingers a new alternative to commute throughout the city while experiencing an exceptional friendly green atmosphere from one stop to the next. Furthermore, the design approach incorporates a very important feature that has not been developed in the city of Beijing and this is the implementation of a productive urban landscape system. This new scheme would bring a new face to the city and could set up the stone to become a sustainable design model for the rest of the world. The new UEF serves as a rainwater collection machine. It would collect rain water from different surfaces of the green infrastructure, this water will be treated and then use for irrigation purposes as well as a water supplier to the existing streams, canals, and rivers that are at risk of extinction in Beijing.

On the other hand, in a micro scale the new UEF focuses on a main intersection node located in the Central Business District of the city. The new intervention proposes solutions to horizontal and vertical connectivity, making of this important node a prototype design for future intersections throughout the 3rd ring road. In order to develop a pedestrian friendly environment in the area, the development of this node includes pedestrian pathways under and over the existing infrastructure separating people physically from vehicular traffic, while at the same time, preserving a visual connection. Moreover, this thesis project focuses on designing programmatic uses that
would be correlated with the idea of productive urban landscape; this design project incorporates programmatic uses such as a juice refreshing stand to an agricultural museum. The programs are located on the ground, under the existing overpasses, as well as in new proposed structures. Another very important aspect of this new development is the creation of an “Eco-Filter” which would be utilized as the skin system of the overall structure. The idea is to design a bio green skin system which will help to alleviate the uncontrollable air pollution in Beijing and will serve as the surface for the implementation of vertical urban agriculture.

The consolidation of the two scales would generate a unique master plan including not only an extensive observational study of diverse urban characteristics in Beijing, but also a variety of sustainable systems that have never been implemented in the existing highway infrastructures of the city.
Some half a million years ago, Peking man lived in Zhoukoudian, in the southwestern suburbs of Beijing. The climate of that time was warmer and more humid than it is today. Forests and lakes in the area supported large numbers of living creatures. The fossil remains of Peking man, his stone tools and evidence of use of fire, as well as later tools of 18,000 years ago, bone needles and article of adornment from the age of Upper Cave Man are the earliest cultural relics on record in China today” (china.org.cn).

Some of the historic events in the history of Beijing were taken in consideration throughout the development of this thesis project. Several of these events are related to the design of green belts, water systems, and the creation of new sustainable projects in the city. Around four to five thousand years ago, areas to the southwest of Beijing were blooming in agriculture and animal husbandry. Beijing was also known as an important transport hub connecting the farming and nomadic cultural zones. One of the reasons of implementing a new Urban Eco-Filter is to bring the essence of Beijing’s agricultural and transport hub character back to the city. This could be achieved by implementing an urban productive landscape system interconnected with a light rail proposal which would serve and benefit the citizens of the area around it. The Ming Dynasty took place from 1368 to 1644. During this period of time, the Ming-era city wall served as the Beijing city wall until modern times, then it was turn down and the 2nd Ring Road was built in its place. In this scenario, it is noticeable that the city was going thru several urban
changes, from a historic fortified city to a more civilized modern city. Later in 1752, the Summer Palace was constructed. This magnificent green park was developed during the Qing Dynasty and was given the name of Longevity Hill meaning “eternal land”. The Summer Palace incorporates a variety of palaces, gardens, and other classical-style architectural structures which make this public open space one of a kind in the history of Chinese culture. In December of 1998, “UNESCO included the Summer Palace on its World Heritage List. It declared the Summer Palace "a masterpiece of Chinese landscape garden design." It is a popular tourist destination but also serves as a recreational park”. (Unesco.org). This important ecological site is one of the green parks that would be taken into consideration to be connected to the new design proposal. For its history and importance in ancient Chinese culture, it is very significant for the UEF to identify and reach green areas that can be part of a new green belt system throughout the urban fabric of Beijing.

In 1900, during the Boxer Rebellion, Beijing was violently conquered and looted by the Eight Power Allied Force. “For 55 days, they survived with limited food and water until the Eight-Nation Alliance brought 20,000 troops to their rescue”. (wikipedia.org/Boxer_Rebellion). This historic event took place at different locations of Beijing including important green vegetated areas such as the Yuanmingyuan Park, which was destroyed. After the war was over, the Chinese government decided to restore and rebuilt the Yuanmingyuan Park because this 350 acre park represents “a masterpiece of royal gardens in China and is worldly known as a famous scenic spot.” (china-travel-tour-guide.com). Soon after the end of the Boxer Rebellion, around 1950, a new proposal for an ecological
belt on the existing city wall was turned down by the local government of Beijing. The designer of the proposal was the famous urban architect Liang Sicheng. He was “a creative architect who has also been a teacher of architectural history, a pioneer in historical research and exploration in Chinese architecture and planning, and a leader in the restoration and preservation of the priceless monuments of his country.” (pennclubbeijing.com). Liang’s most significant ambition was to preserve the old Beijing in its total. On his proposal, he wanted to restore the city walls of Beijing by introducing a new system of green ecological area on top of the walls. Since back in history, these walls have only been designated for the guards of the government, not for the citizens. However, Liang’s idea was to convert these walls in an elevated urban park for the public and not only for the government. Consequently, Liang’s dreams never came true, ending only in frustration. The conceptual idea of Liang Sicheng became one of the drivers to develop this thesis project. The idea of elevating the public realm with a variety of vegetated areas is one of the design concepts that the new UEF would implement.

In 1957, a regulation plan was proposed. This plan proposed that a large number of fields of the urban environment should be dedicated to green spaces to preserve a healthy ecological setting of Beijing. This plan also implemented a new Ecological Green Belt on the 5th ring road similar to the one in Moscow. The idea was to give oxygen to the city of Beijing; however, the plan remains on paper. During the first modernization in 1976-1992 in Beijing, the first important reform was the "rural reform", which aimed to increase agricultural production. Agriculture, if we go back to the ancient history of the city, was an important methodology of food production.
Beijing needs to go back to its days of production and recover some of its history that has been buried down. For that reason, the new UEF wants to develop the beginning of a new future of productive urban landscape in the city of Beijing. In order to benefit the neighbors of the area, the new scheme suggests an adequate area for production of vegetables, fruits, etc. The idea is to teach the neighborhoods of the districts to be self sustainable and to be able to produce their own food.

Right after the end of the first modernization era, in 1992, a map of the city of the principal areas in Beijing was published to the use of the citizens and tourists. This map emphasizes the six most important zones from a green park to a business district. The six areas shown in this map are: Haidan, Olympic green, airport zone, sanlitun, the historic center and the central business district (CBD). This final zone is the area of focus where the UEF project would be zooming in. The new design would improve the existing features at the intersection of Guomao Bridge, which would serve as a prototype example for future nodes of different scales on the 3rd ring road. The CBD is “geographically situated to the east of the city center, sandwiched between the 3rd Ring Road and the 4th Ring Road, the Beijing CBD is currently undergoing large-scale development.” (Greco, pg 137). This region is becoming one of the most important international financial centers in China and worldwide. Furthermore, there are some proposals for the future of the CBD in Beijing and most of the existing empty lots are going to be developed by new office, commercial, mixed-use and residential towers.
In 2001, the Olympic committee named Beijing as the site for the 2008 Olympics. This was a significant challenge for the Chinese government as well for the citizens. Their main goal was to convert this Olympics into the greenest in the history of this worldwide event. Within the Olympic park is a forest park which architectural design was led by Hu Jie, director of the Landscape Planning and Design Institute at the Urban Planning and Design Institute of Tsinghua University. “As with many architecture companies in the People’s Republic of China, landscape architecture firms operate as design arms of university departments. (gardenvist.com). The Beijing Olympic Park has an area of 680 hectares and was built between 2003 and 2008. It is located at the north end of Beijing’s central axis, which most people compare it to the Grand Axis in La Defense, Paris. Over the 5th ring road which crosses the park has been designed a green ecological bridge which links the southern and northern areas of the forest park. This green bridge would be utilized as a case observation because of its function and unique characteristics regarding ecology and pedestrian connectivity. Even though Beijing was categorized as the most polluted Asian city in 2005, the Chinese government officials were trying to make of the 2008 Olympics the greenest in history. “According to ADB data for 2005, the most polluted city is Beijing with 142 micrograms of particles of pollution dust per cubic meter, compared to Paris with 22, London 24 and New York 27. It was such findings that prompted the International Olympic Committee to warn the Chinese capital that it "risks losing the Games if it doesn’t do something to improve its air quality." (speroforum.com). The air pollution in Beijing is very critical due to the rise in economic growth and the decrease in quality of life. 64% of the air pollution comes from
automobiles and people are purchasing more and more cars every day. Beijingers have left their bicycles in their backyards because for middle class people are easier to acquire a car than it was 30 years ago. In order to provide a safer environment for people who ride their bicycles to work, the new Urban Eco-Filter would incorporate elevated bicycle lanes away from traffic lanes avoiding hazardous congestions.

Finally, after a meeting of more than three hours with Ron Henderson a landscape designer and professor at Tsinghua University in Beijing, explained that in approximately 40 years, Beijing will no longer be the capital of China, because of its ground-water depletion. Beijing, China’s capital city, and one of its fastest-growing municipalities, is running out of water. “Although more than 200 rivers and streams can still be found on official maps of Beijing, the sad reality is that little or no water flows there anymore. Beijing’s springs, famous for their sweet-tasting water, have disappeared. Dozens of reservoirs built since the 1950s have dried up. Finding a clean source of water anywhere in the city has become impossible.” (chinaheritagequarterly.org). As recently as 30 years ago, Beijing residents regarded ground-water as an inexhaustible resource; now hydrogeologists warn it too is running out. Beijing’s ground-water table is dropping approximately 1 meter every year, water is being pumped out faster than it can be replenished, and more ground-water is becoming polluted. “China’s wastewater pollution may increase as much as 290% by 2020”. (Guardian.co.uk). For this reason, the new UEF project wants to implement a new water collection machine system. The rainwater would be collected from different surfaces of the elevated landscape in order to supply gray water for irrigation purposes. Likewise, the water collection machine will be
working as a water filter, providing clean water to the rivers, streams and canals that jointed the new green infrastructure. The general idea is to clean the water supply systems of the city and unify them in a way that water gets collected from the new development and then, it will be treated before it runs to the ecological water systems of the city.
After an intensive analysis of various maps, this thesis project evaluated and generated a series of maps displaying the footprint area of the city of Beijing since 1949 to the future subway network plans. “The development of the city of Beijing is moving away from the monocentric model established by the Tang Dynasty (618-907)” (Mars, pg.320). The built footprint has dramatically increased in the past sixty years while the green footprint environment of the city has been slowly improved. There is a need for introducing “new lungs” to the city by developing innovative urban and architectural projects that can establish eco-friendly environmental solutions. The plan would help to alleviate the difficult anti-ecological sceneries Beijingers are facing currently. Also, it is important to evaluate the lack of “no more let over lots” in the center of the city, meaning that there is a massive urban sprawl of new residential developments on the outer areas of the city. Two maps were implemented to explain the existing and future developments of the city. The first map demonstrates how the existing built environment has been spread out from the monocentric model of the ancient city. People want to live as close as possible to the center of the city so they can have easy access to work environment as well as being close to more options of public transportation. Sixty years ago, Beijingers were using bicycles as a way to access different points of the city; the city was accessible due to its proportional size and the few people living in it. However, sixty years later the city has grown approximately four times its size and the demand of vehicles increased as well as the amount of people. “Beijing is much bigger that you think and expanding much faster than officials admit.” (Mars pg. 354). The second
map expresses the new and future housing developments in the outer part of Beijing. The city used to be just one strong independent city for many years, however, at the moment, Beijing is reaching other small towns (villages) that once were suburban areas and now they belong to a new mega city.

On the environmental aspect of Beijing, two maps were created to express the existing conditions of the green vegetated areas as well as the existing water systems throughout the city. During this thesis process, some of the most important ecological parks were highlighted in order to identify the built environment areas that were missing green vegetation as well as water systems. After the analysis was visualized, proposed conceptual ideas came up to suggest where the new UEF could take place. Moreover, the last two maps display the existing traffic network as well as the existing and future subway stations in Beijing. These two maps help to understand the location of the most active areas and intersections throughout the city.

One of the most important keys on the development of the new design proposal is to connect the new bike infrastructure system with the existing conditions of the city. In addition, the existing ecological footprint was taken into consideration in the process of selecting a site. The deliberation was made in order to create a new cohesive green infrastructure that will be reaching existing ecological footprint and water systems of the city. Before the site was selected, all the different layers of maps conceived were placed one on top of the other to finalize the location of the Urban Eco-Filter. Because of its location and the importance to the citizens, the 3rd ring road was the best
suitable site for the new design project. The 3rd ring road is located basically in the center of Beijing. It is the most active vehicular traffic oriented and its potential to connect existing environmental resources of the city give the site an opportunity to unify the ecological fabric of the city.

A visit to the planning exhibition museum in the city of Beijing facilitated the understanding of the development and history of the city. At the museum, a broad exhibition of historic plans and physical models demonstrate the different layers that compose the city. From the introduction of executed master plans to projected design ideas of the city, this exhibition helped in understanding the urban development of Beijing. “Since the founding of the People’s Republic of China, the Beijing Municipal Government has paid special attention to urban planning. From 1953 to 1993, five master plans were submitted for review, in each of which there are different characteristics.” (Planning exhibition museum, Beijing). In 1953, a set of master plans were designed to predict the development and redevelopment of Beijing. Some of the characteristics suggested by the government were “neither to demolish the historic heritages left on ancient sites nor to preserve all of them because this might restrain the city’s development.” (Planning exhibition museum, Beijing). They also suggested that the capital city which is Beijing, “should serve as the national political, economic and cultural center, and in particular, be a strong industrial base and a scientific and technological center for the country of China.” (Greco, pg. 119). In 1958, a revised preliminary master plan for the development of Beijing was submitted to the central government. This new plan was considering the issue of urban sprawl, so they designed a master plan that would “divide the urban areas
into more than 20 relatively independent construction districts separated by green belts.” (Greco, pg. 126). In the urban areas, extensive territories were dedicated to green spaces in order to maintain a good environment and also to reserve spaces to further urban developments. A new comprehensive master plan for Beijing municipality was established in 1993 in order to implement a demographic control especially in the urban area, and appropriated consideration given to the immigration. Also, the government wanted to suggest that the capital of China function as the nation’s political and cultural center and develop it as a modern international metropolis opening widely to the outside world.

Lastly, to the development of the city of Beijing, water conservancy maps were implemented. One of the first and most important water conservation plans is the scheme of Yuan Dadu from the Yuan Dynasty. “Water supply for Dadu was from south, and some river and canals built then help lay the foundation for the river systems in today’s Beijing.” (Planning exhibition museum, Beijing).
Urban Public Spaces

“Public space relates to all those parts of the built and natural environment where the public has free access. It encompasses: all the streets, squares and other rights of way, whether predominantly in residential, commercial or community/civic uses; the open spaces and parks; and the ‘public/private’ spaces where public access is unrestricted (at least during daylight hours). It includes the interfaces with key internal and external and private spaces to which the public normally has free access.” (Carmona, pg. 5). Urban public spaces can be classified into parks, squares and scenery spots, which originated from Europe and extended all around China. In Beijing for example, citizens gather in a range of urban public spaces from pocket parks next to subway infrastructures to big open plazas surrounded by historic walls.

After a three month study abroad program in the cities of Beijing and Shanghai, this thesis project investigated an extensive analysis of a series of urban public spaces at different scales with special types of activities. All the open public spaces were evaluated at different days and different times of the day. The idea behind this study was to explore the diverse social activities of Chinese citizens within open spaces and how they take advantage of every designated area as places to encounter social, cultural, and environmental relationships. The social and cultural principles of an urban public space consist of approaches towards nature and the desire to get in contact with it. It has been suggested that the urbanity of public open space is threatened by the increase in
technology, obviating the need for real, social interaction. However, there is also evidence that use of new communication technology can enhance the use of public open space. This may include engagement in the productive aspect of our landscape.

The urban public spaces that were analyzed are: Zhangzizhonglu pocket park, park at workers stadium, park at Longze subway station and the Temple of Heaven. In order to further develop the final resolution of this thesis project, an in depth investigation of the previously mentioned urban public spaces was essential.
Pocket Parks

The Zhangzizhonly pocket park is a small urban public space located on the south east corner of Dongsi Shitiao Street and Zhangzizhonly Street. This park welcomes people who are getting out from the Zhangzizhonly subway station of line 5, gate C. It is a very interesting pocket park because of its particular pedestrian activities happening throughout the different times of the day. An evaluation of this open space was done through a series of observations of the behavior of the neighbors in the area. The analysis was divided in three important times of the day. Beginning at 7:00am, the pedestrians of the area utilize the pocket park as a path connector to reach the subway entrance. People commute through the center and the sides of the park while the vehicular traffic on both streets is very active. Even though bicycles are not the main transportation system in the city as it used to be, people in this community use them to reach short travel distances. This process happens until 9:00am; however, it is very interesting to notice that the same type of activities happens also from 4:00pm to 6:00pm, rush hour time.

The second observational study of the pedestrian behavior was done from 5:00am to 7:00am and from 6:00pm to 9:00pm. On this occasion, the pedestrians keep using the pocket park as a connector device to reach the subway entrances; nevertheless, this urban public space is transformed into a communal setting. The elder citizen come to the park early in the mornings and when the sun sets in order to practice Tai Chi which is an internal Chinese martial art often practiced for health reasons. “Tai chi is typically practiced for a variety of other personal reasons: its hard and soft martial art technique, demonstration competitions, health and longevity. Consequently, a multitude
of training forms exist, both traditional and modern, which correspond to those aims. Some of tai chi chuan’s training forms are well known to Westerners as the slow motion routines that groups of people practice together every morning in parks around the world, particularly in China.” (wikipedia.org/Tai_chi_chuan). In addition to the Tai Chi practice, the neighbors gather together to gossip, play cards, and mostly to get away from the monotony routine of work-home. Citizens not only gather to chitchat, but they also come together with their dogs so the animals can interact with others of their nature. Dogs play a very important role in Chinese culture; they are more than just pets; they are part of the nuclear family. The analysis of the Zhangzizhonly pocket park finalizes with a particular case of how this urban public space becomes not only a linker, a gathering area, or a gossip place but a destination for illegal prostitution activities. Even though, this type of activates are illegal in mainland China, prostitution is still happening all around the city.

Another pocket park that was carefully analyzed is the park at the Workers Stadium. This is a linear pocket park located along the Dongsi Shitiao Street near the Sanlitun District. This public space in particular is very interesting because it shows how it could be transformed from a very pleasant green area of a neighborhood to a parking lot. The observational study of the pedestrian activities at the workers stadium park was done in two sections. On the first part of the study, the analysis was mainly focused on the recreational activities of the neighbors of the area in this urban public space. There is a significant amount of pedestrian movement along the north edge of the site, pedestrian traffic commute through this area mainly because there are two bus stops.
Generally, the park serves as a transitional space where cars, buses, bicycles, and pedestrians transit through. Moreover, the park possesses a series of display boards where pedestrians can come in contact with. These billboards serve as information devices where news, advertisement, etc are posted on. The workers stadium park is not only a transitional space but a congregation area. People, especially men, come to the pocket park to play Xiangqi which in English is known as Chinese chess. “The game represents a battle between two armies, with the object of capturing the enemy’s "general" piece.” (wikipedia.org/Xiangqi). Xiangqi is one of the most popular board games in China. In addition to all the activities taking place in this urban public space, this incorporates an Italian restaurant which helps as an anchor structure to bring more neighbors and tourists to the area. On the other hand, this pocket park has a different face during the night time. The neighbors do not spread out on the park as they do it during the daytime; they only use the small open plaza in front of the restaurant as a street ballroom. Approximately 60 citizens come together to practice and show off their dancing skills while other people commute through the park. Street dancing in china is very popular within people on their 40’s and up. They dance individually as well as in big synchronize groups. A particular feature of this pocket park at night time is that this public space is near the workers stadium which during most of the weekends it holds either performances or sport events. This means that the park not longer is an urban public space; it becomes a vehicle parking which in a way is valid to give the park a different use when this is not being used by people.
The last pocket park that forms part of the observational study is the park at Longze subway station. This urban public space has its own qualities; it is very different from the other two parks previously mentioned because it has an elevated transit infrastructure which creates special characteristics for the pedestrians of the area. Located along the east edge of the Bandaling expressway and underneath the line 13 Longze subway station, this pocket park includes two features, connection and transition. On the connection aspect, this public space serves as a link to bring people from the southwest and southeast parts of the site to the subway station entrance. Pedestrians walk on top of existing train rails due to the lack of connection on the ground level. People have to climb a 13 feet hill up to the train rails and walk approximately more than 60 feet on the elevated surface and then walk 13 feet down on the other side of the hill to where the subway station is located. This area lacks pedestrian connectivity, so the neighbors have developed their own ways to commute from one side of the hill to the other. One of the particular scenarios taking place at this pocket park is the street vendors. All kinds of food are sold along the main street facing the subway station. Street vendors are spreading under the elevated infrastructure where most of the pedestrians transit.

After the necessary observational analysis of the Zhangzizhonly park, the park at the Workers Stadium, and the part at Longze subway station, it could be concluded that there are positive and negative qualities implemented by each of these public open spaces. These three pocket parks have unique characteristics that generate human and social interaction with nature. It is important to analyze people’s behavior during different times of the day at
different times of the week to grasp the important aspects of each urban public space. Likewise, most of the successful characteristics in pocket parks should be implemented in future urban developments. These three pocket parks are essential in the design of the new Urban Eco-Filter since this would include a variety of human social activities in relationship to the proposed green infrastructure.
Historic Parks

Historic Parks are somehow the roots of a nation’s culture. Historic Parks invite you to engage with the past, present and future of the region. They provide an extraordinary opportunity for recreation and education in the heart of each city. They not only hold recreational activities but also historic buildings that are related to the cultural past of the people who lived in the region for many years.

Beijing is a city of history and culture; therefore, it is important to recognize those two features and to closely analyze one of the most important historic parks of the city and even of China. The Temple of Heaven is one of the most important urban parks in Chinese history. “The Temple of Heaven was inscribed as a UNESCO World Heritage Site in 1998 and was described as "a masterpiece of architecture and landscape design which simply and graphically illustrates a cosmogony of great importance for the evolution of one of the world’s great civilizations..." as the "symbolic layout and design of the Temple of Heaven had a profound influence on architecture and planning in the Far East over many centuries." (Unesco.org). This historic park is a complex that includes not only vegetation but Taoist buildings situated in the southeastern part of the center of the city of Beijing. The masterpiece of historic structures “was visited by the Emperors of the Ming and Qing dynasties for annual ceremonies of prayer to Heaven for good harvest. It is regarded as a Taoist temple, although Chinese Heaven worship, especially by the reigning monarch of the day, pre-dates Taoism.” (wikipedia.org/TemplofHeaven). Park visitors can wander pathways and
enjoy several historical buildings that are within walking distance as well as discover and celebrate the natural and cultural heritage of Beijing.

Sundays on the Temple of Heaven represents community; people come together to bring and receive positive energy to their bodies. The historic park was strategically studied in three different times on a Sunday. The first observational analysis of the pedestrian behavior was done during the early morning hours. From the young to the old, pedestrians come to the park to celebrate a variety of activities. The elder people play Jian Zi which in English is known as shuttlecock. This game is played in pairs or big groups of people; it is played mostly where there is no obstruction of trees and pedestrian traffic. Another activity pedestrians usually encounter is the visitors to the historic temples. People from all over the world come to this magnificent park to enjoy and learn from the history of Beijing. While some individuals walk through the monuments, others are practicing Tai Chi. This type of exercise mainly takes place on shaded areas; groups from 10 to 60 people congregate to participate in this famous and cultural relaxation technique. Since some people are not so flexible with their bodies, they have the option to join other crowds where their purpose is to relax and take all the negative energies out of their bodies. There are two particular activities that not many people practice; they are: knee fighting and forehead massage which consist of massaging ones forehead with a tree trunk in order to closely get in contact with nature for cure purposes.
The second observational study took place in the early afternoon hours. During these hours there are more small group activities; from chitchatting to playing air ping-pong. There are couples of people playing badminton, air ping-pong, and tui tie huan, which is basically playing with a rubber rope. Moreover, there are activities for individual people; some of these activities are walking around the open spaces of the park and playing Jian Sheng Qiu, which in essence is exercising ones hands and fingers with two quartz balls. Lastly, the analysis ended up by studying pedestrian behavior during the late afternoon hours. Women from all ages come together to do group dancing. They especially dance Chinese traditional music in crowds of more than 20 people. This type of activity generally takes place at the entrances of the historic park in order to welcome visitors to a new enjoyable atmosphere. During the late afternoon hours, besides group activities, there are two other activities dedicated to single individuals; these are: Taichi qiu which is basically a one person game played with a racquet and a bouncing ball. The other activity is the Kong zu, which is played with two sticks on each hand of the individual and another stick that bounces around.

In conclusion, every single activity on the Temple of Heaven has a particular relationship to its space where it takes place. This urban public space is an example of how big green areas can be utilized to its maximum and how people designate territories to specific activities throughout the whole open space. The new Urban Eco-Filter would incorporate an enjoyable urban landscape space that would integrate most of the activities as generators of
public spaces, meaning that each activity would require its own scale depending on its use and unique characteristics.
Urban Plazas

According to National Institute of Building Sciences, a public plaza is a community amenity that serves a variety of users including building tenants, visitors and members of the public. This type of space may function as pedestrian site arrival points, homes for public art, settings for recreation and relaxation, and inconspicuous security features for high profile buildings. “Urban Plazas are beneficial features of any lively streetscape.” (wbdg.org). Public plazas could also serve as transitional spaces meaning that people can use the area to commute from one side of the plaza to the other.

A successful example with this characteristic is the Wu Jiao Chang plaza located in Shanghai’s Yangpu District. This plaza is a remarkable example of urban improvement for the benefit of pedestrians because of its unusual location as well as the gigantic art piece wrapping an elevated highway. This sunken plaza is located in one of the most important intersections in Shanghai; it connects five main roads of the city with its underground pathways. Every day, tens of thousands of pedestrians ride the escalators here to shop in the underground; the plaza leads to one of the most dynamic underground shopping systems in the world. This urban plaza is a transitional space as well as a recreational area for adults, children, and even pets of the neighborhood near the area. In addition to the sunken plaza, there is an iconic structure that brings everyone’s attention as soon as one comes across with it. Designed by the artist Zhong Song, this urban masterpiece is an installation that dynamically merges architecture with lighting as a holistic composition. In an interview done by Architectural Records, Zhong
expresses: “There are five roads leading to the plaza, and then a highway overpass on top, and a subway line underneath,” he continues. “There are three different levels of infrastructure, creating a complex fabric that affects the pedestrian nature of the area. So, the question was, how do we add the pedestrian element so people will animate the five different streets?” (archrecord.construction.com). In order to accomplish this task, the artist encircled the existing 105-foot-wide elevated highway in an ovular steel frame clad with aluminum. “Measuring 348 feet long, 157 feet wide, and 82 feet tall, it cloaks cars speeding along the overpass.” (archrecord.construction.com). The pedestrian experience with this magnificent artifact is indescribable; when people come to the site especially at night time, they are blown away because of its unique feature of displaying a harmonious composition of artificial lighting.

The Wu Jiao Chang plaza is an excellent example of how to separate vehicular traffic from pedestrians. This urban plaza demonstrates that people could experience a desirable natural environment even though they are surrounded by highways from every corner. In a way, this becomes a composition of different layers without interfering with each other. This thesis proposal investigates how pedestrians and vehicles could share a common sociable urban public space without any hazards and obstructions to stop any kind of flow under the same conditions. As it was previously mention at the beginning of this document, this design project proposes a new Urban Eco-Filter which means filtering a variety of aspects. Some of the aspects are palpable and others are more
hypothetical. For instance, pedestrians would become as air pollutants, meaning that individuals will be filtered by the new UEF from one side of the 3\textsuperscript{rd} ring road to the other.
Different forms of agriculture are being implemented within the limits and suburban areas of cities around the world. Products are being acquired from farming, fishing, forest activities, as well as ecological themes that coexist in multiple agricultural and horticultural systems. This type of agriculture or urban agriculture can contribute to the nourishing security in many forms. It increases the amount of foods available for families of low income of urban zones and can increase the nutritious value of foods available. The author of CPUL’s (continuous productive urban landscapes) André Viljoen states, “We should view our cities as much in terms of being productive spaces as we view our rural areas” (Vijoen, pg.36). Viljoen’s book on urban design extends and develops the extensively accepted “holistic city” solution. It provides a design technique for a new type of sustainable urban landscape which is known as urban agriculture. By growing food within an urban setting rather than exclusively in rural environments, productive urban landscapes would reduce the need for industrialized production, packaging and transportation of foodstuffs to the city dwelling consumers. The innovative and ground-breaking concepts described in this book have potential to shape the future of our cities and the life quality of the people living in it. Viljoen also identified the non-renewable energy consumption associated with the remote production and transport of food into cities, as a significant contributor to greenhouse gas emissions. This led to research exploring the environmental case that can be made for the integration of productive landscape, in particular urban agriculture, into urban environments and the design implications arising from this.
One of the most successful case studies around the world is the Cuban urban agriculture achievement. Right after the Soviet Union collapsed; the production of Cuban oil was diminished basically to the lowest level in Cuba’s history. Even though Cuba suffered a big economic crisis, the government and citizens implemented a rigorous agriculture system, that later became a model for worldwide urban communities. Cuban productive urban landscapes produce almost half of the most essential vegetables and fruits that are consumed in the cities; from green roofs to community productive backyards; Cuba is one of the models to be followed for the future of metropolitan cities in the world.

Urban agriculture could be implemented not only on a community ground base but it could also be applied on private balconies, walls, public buildings, or river edges. Urban agriculture practices could also generate diverse type of social activities resulting from food production. Productive urban landscape contributes to the nourishing security and safe foods in two ways: increasing the amount of foods available for people occupying the cities, and provides fresh vegetables and fruits for the urban consumers. Because the production of food promotes energy saving of local food production, urban agriculture is a sustainable activity that should be implemented for the future of mega cities.

In conclusion, the idea of this thesis project is to develop an intensive productive urban landscape with gardens bringing fresh affordable food into Beijing, improving the climate, creating new farming job opportunities and unquestionably embellishing the city with vibrant lands. This project would also benefit not only the city but the
farmer immigrants who live in the area by being able to own a lot within the proposed green community. One of the other advantages from designing this green infrastructure is to develop agricultural study areas in order to make research/explorations for improvement of fields. In addition, the use of live projects in the area for education purposes such as teaching/learning strategies could also expand the participation/engagement of the community and visitors to the site. It could be stated that if metropolitan cities become producers of plentiful agricultural products, then metropolitan cities would be called exporters rather than importers.
Fig. 1. Conceptual idea proposed Urban Eco-Filter
Fig. 2. Historic Timeline Beijing
Fig. 3. Existing environmental conditions in China
Fig. 4. Three important issues to be taken in consideration
[16 of the most polluted cities in the world are in China]
by: Co-Evolution

air pollution
Solutions:
- enhance bike infrastructure
- bring agriculture back to the city
- provide new sustainable approaches

[China’s bike fleet declined by 36% from 670 million to 435 million, while private car ownership more than doubled]
by: Sustain yourself
Fig. 6. Absences of Eco-footprint

[1980-2004, nearly 44,000 sq/miles of agriculture land were lost due to new developments in China]

by: Dynamic City

Absences of eco-footprint

Solutions:
- provide new lungs to the city
- incorporate urban productive landscapes
- implement new guidelines to new structures adjacent to the site

[China can realize its dreams, if only they are visionary enough]

by: Dynamic City
[China’s wastewater pollution may increase as much as 290% by 2020]

by: Independent-media.tv

Solutions:
provide a new aqueduct
incorporate a new rainwater collection system
enhance the quality of the water in the city

[90% of urban groundwater in Beijing is polluted]

by: Dynamic City

Fig. 7. Groundwater depletion/pollution
Fig. 8. Air Pollution in Beijing

Fig. 9. Urban and Rural Population
Fig. 10. Mapping Growth of Beijing
Fig. 11. Existing Built Environment of Beijing
Fig. 12. Future Developments in Beijing
Fig. 13. Existing Vegetation in Beijing
Fig. 14. Existing Water Systems in Beijing

Hunyuan Lake
Wangfujing Avenue
Zhuanghu Lake
Yuquantan Lake
Shichahai Lake
Longtan Lake
Qing River
Tongzhou River
Yongding River
Olympic Forest Park
Fig. 15. Existing Road Network in Beijing
Fig. 16. Existing Subway Network in Beijing
Analysis of Public Spaces

Park @ Zhangzizhonglu Station

Fig. 17. Existing Conditions Park @ Zhangzizhonglu Station (early morning)
Fig. 18. Existing Conditions Park @ Zhangzizhonglu Station (afternoon)
Fig. 19. Existing Conditions Park @ Zhangzizhonglu Station (late night)
Fig. 20. Existing Conditions Park @ Workers Stadium (daytime activities)
Fig. 22. Existing Conditions Park @ Longze Station (daily activities)
Temple of Heaven Park

Fig. 23. Existing Conditions Temple of Heaven, Sunday Activities (early morning)
Fig. 24. Existing Conditions Temple of Heaven, Sunday Activities (late morning)
Fig. 25. Existing Conditions Temple of Heaven, Sunday Activities (afternoon)
Site Observations

Fig. 26. Existing Conditions Guomao Bridge

Fig. 27. Existing Conditions Madian Bridge

Fig. 28. Existing Conditions West Haping Bridge
Site Analysis

*Principal Areas of Development*

Fig. 29. Existing Principal Areas of Development
Fig. 30. Existing Node Conditions (macro scale)
Fig. 31. Existing Node Conditions (micro scale)
Fig. 32. Proposed intervention diagrams
Fig. 33. Pedestrian movement (week days)
Fig. 34. Pedestrian movement (weekends)
Fig. 35. Pedestrian movement (Nighttime)
Central Business District Future Development

![CBD Future Development Diagrams](image)

Fig. 36. CBD future development
Central Business District Existing Conditions

Fig. 37. CBD Existing Conditions
Case Observations

Olympic Forest Park
by Hu Jie

This project represents an the heart of the ecology at the north end of Beijing’s central axis.

The park includes a manmade lake with water collection systems, a variety of local plants and beautiful landscape for a magnificent experience for visitors.

Fig. 38. Olympic Forest Park
The Emerald Necklace
By Frederick Law Olmsted

Boston’s Emerald Necklace consists of a chain of nine parks linked by parkways and waterways.

Trees as shading devices make of this project a very pleasant ecological environment for the residences and visitors in the middle of the city.

Fig. 39. The Emerald Necklace
The green roofs in the city of Toronto is a great example of developing sustainable cities. This green roofs consisted on a system where a vegetated area becomes part of the building’s roof and includes vegetation, a growing medium, a filter layer, a drainage layer, a root resistance layer and a waterproof membrane.

Fig. 40. Green Roofs in Toronto, Canada
The High Line Project
by James Corner Fields Operations

The High Line project is a singular linear urban landscape experience that includes a lot of distractions to slow the flow of pedestrians down. This project was designed on top of an existing infrastructure and transformed into an elevated linear park which includes different types of plants, water features, and amenities for the users.

Fig. 41. The High Line Project
Olympic West Bridge
by Hu Jie

The green bridge was designed to connect the southern and northern sides of the park that is divided by the 5th ring road expressway. The infrastructure is a green ecological corridor and it is intended to be a landmark for the city of Beijing.

Fig. 42. Olympic West Bridge
The kindergarten at the linked hybrid project is a demonstration of how architects could integrate nature and sustainable features in structures. It also has the quality of integrating natural light to the interior spaces by using skylights that are part of the overall design.

Fig. 43. Linked Hybrid Kindergarten
The Linked Hybrid is a project that integrates the ground level as well as the air rights by incorporating different programmatic uses. It also includes a geothermal energy system which makes it one of the eco-friendly projects in the world.

Fig. 44. Linked Hybrid Project
Case Studies

Ecological Green Belt
by Liang Sicheng

Liang Sicheng wanted to give to the city of Beijing a splendid green necklace that would have been the world’s only city ring park in the sky, as it was not only to be a civic place, but would also serve the fine Chinese habit of climbing high to inspect the horizon. The government then tore down the entire city wall to give way to roads, an act which was seen as a symbol of industrialization, and indeed modernity.

Fig. 45. Ecological Green Belt
Envisioned as a new model for an urban sculpture park, the project is located on a industrial site at the water’s edge. The design creates a continuous constructed landscape for art, forms an uninterrupted Z-shaped green platform, and descends 40 feet from the city to the water, capitalizing on views of the skyline and Elliot Bay and rising over the existing infrastructure to reconnect the urban core to the revitalized waterfront.

Fig. 46. Olympic Sculpture Park
Yokohama International Port Terminal
by FOA

The proposal for the project starts by declaring the site as an open public space and proposes to have the roof of the building as an open plaza, continuous with the surface of Yamasita Park as well as Akahaneba Park.

The project is then generated from a circulation diagram that aspires to eliminate the linear structure characteristic of piers, and the directionality of the circulation.

Fig. 47. Yokohama International Port Terminal
The idea was to construct a new model neighbourhood of accessible housing, in line with the modern tradition of investigating and proposing new habitable environments that reflect the social reality of the time.

The project promotes the construction of housing that responds to the needs of the new types of family unit (young people, the elderly, single-parent families, etc.), both owner-occupied and rented, in a quality urban setting in which the landscaped areas, social amenities and good architecture generate urban excellence.

Fig. 48. Sociopolis
The High Line Project
by James Corner Fields Operations

The High Line is a project that reflects the rehabilitation of existing infrastructure and convert it in an open public space for the use of residents and visitors of the area. This elevated landscape project incorporates a variety of activities and different levels connecting the ground level with the level of the structure. The connections as visual as well as physical.

Fig. 49. The High Line Project
Fig. 50. Conceptual Idea
Conceptual Diagram

Fig. 51. Conceptual UEF Diagram
Fig. 52. Conceptual Planting Strategy
Proposed Vertical Node Connections

Fig. 53. Proposed Vertical Node Connections
Existing and Proposed Elements

Fig. 54. Existing and Proposed Elements
Fig. 55. Existing and Proposed Green Elements
Fig. 56. Exploded Axonometric existing and proposed infrastructure
Fig. 57. Proposed Activities
Fig. 58. 3rd Ring Road General Info.

Fig. 59. Chaowai Soho
how much rain will u.e.f. harvest? [per mile]
catchment area = 47600 sq.ft approx..

514000 gallons +/- when 24" of rain

Fig. 62. Proposed Aqueduct
Fig. 63. Preliminary sections (Section A-D)
Fig. 64. Preliminary sections (Section E-F)
Fig. 65. Preliminary sections (Section G)
Fig. 66. Planting Strategy by season
Fig. 67. CBD Site Plan
This model displays the three node prototypes that were selected in order to show three different scale of intervention throughout the 3rd ring road. Each node has its own qualities and characteristics.
This site is located on the northern part of the 3rd rind road. It was selected because of its proximity to existing ecological footprint and the existing underground pedestrian connections to commute people from one side of the highway to the other. This site is very close to the Olympic Forest Park.
This is the most simplistic site because it does not have any more than one bridge and it is an intersection where most of the building uses are dedicated to residential communities. This node is located on the northeast side of the 3rd ring road.
This site is located on the Eastern side of the 3rd ring road. It is very significant because this node is located on the Central Business District of Beijing. This site brings a big amount of people from the four corners of the intersection. On this site, subway line 1 and 10 meet and the flow of people is high.
The idea on this node was to have different pedestrian and bike access points from the four corners bringing people up the new Urban Eco-Filter. The UEF in this site is centralized and at some points it reaches some of the existing buildings adjacent to it in order to influence and convert the city into a more sustainable environment.
On this node, the UEF is shifted from one side of the 3\textsuperscript{rd} ring road to the other. The conceptual idea is to reach people from areas where there is more density on each side of the highway. There is also an example of proposing a new structure which becomes part of the overall ecological system providing vertical agriculture along the main façade.
This is the site where there is not a significant amount of people; however, there is a need for providing better opportunities for the people to commute along the 3rd ring road. In this area, green roofs are introduced to demonstrate that existing buildings could become sustainable and be part of a new urban master plan. Green roofs are one of the new opportunities this thesis project proposes in order to alleviate hazardous conditions in metropolitan cities.
Fig. 82. Site Plan

Fig. 83. Second Level

Fig. 84. Ground Level
Fig. 85. Exploded Axo
Fig. 86. Pedestrian Circulation

Fig. 87. Bike Circulation
This is a new landscape approach which incorporates pedestrians, bicycles and productive landscapes in one holistic environment. This example shows how the new UEF is elevated across one of the adjacent roads next to the 3rd ring road. The new design incorporate light wells to have visual and tangible connections to the ground plane.
This section model was taken through in the Central Business District. It shows the big amount of vehicular lanes and the lack of pedestrian amenities. In this area the Urban Eco-Filter is located on top of the 3rd ring road connecting pedestrian and bike flow from both sides of the highway.
Matrix guidelines

Sustainable themes

Solar energy

- 50% of the lighting network functions with solar energy collected by solar panels.

Biogas energy

- 100% of the waste collected on the urban Eco-filter would be treated with biogas plants and used to generate the energy for the new urban system.

Titanium dioxide (TiO2)

- Each new building should include an air surface of at least 50%.

The urban Eco-filter contains 10% as the base infrastructure to reduce air pollution.

Rainwater collection systems

- Approximately 50% of the roof area of the urban Eco-filter participates in a water collection system that acts as an absorbent providing rainwater back to the city.

Living wall

- Every building that is set aside to the urban Eco-filter must incorporate green roofs or at least one of the exterior walls.

Ccosystem

- 30% of the rainwater collected is reemployed to operate the ecosystem on the new infrastructure.

Fig. 92. Matrix Guidelines
Fig. 93. Key Plan
Fig. 94. Flow (section a)
Fig. 95. Jungle (section b)
Fig. 96. Habitat (section c)
Fig. 98. Interaction (section g)
Fig. 99. Framing Views (section i)
Fig. 100. Air Rights (section j)
Fig. 101. Shift (section k)
Fig. 102. Shading (section I)
Fig. 103. Verticality (section m)
Fig. 104. Kuatic (section n)
Fig. 105. Pocket Park (section o)
Fig. 106. Wrapping (section p)
Fig. 107. Interweaving (section e)
Fig. 108. Side Bridge (section h)
Fig. 109. Underlighting (section f)
Fig. 110. Clean the polluted air diagram
Fig. 111. Harvest the wind diagram
Final Models

Fig. 112. Final Section Model
Fig. 113. Final Section Model
Fig. 114. Final Section Model (UEF merging with building)

Fig. 115. Final Section Model (Void in relationship with landscape)

Fig. 116. Final Section Model (UEF between highway and cantilever)

Fig. 117. Final Section Model (Ramping system)
Fig. 119. Final Model
Fig. 120. Final Model View looking South

Fig. 121. Final Model (Building Typology #1)

Fig. 122. Final Model (Building Typology #2)

Fig. 123. Final Model (Building Typology #3)
Fig. 124. Bridge connecting sidewalk with UEF
Fig. 125. UEF passing through a building
Fig. 126. Activities and landscape together
Fig. 127. UEF merging with a green building
Fig. 128. UEF shifting
Fig. 129. Ramping system (view from the ground)
Conclusion

Because of a complex observational analysis of urban settings in China as well as research studies of conceptual programmatic prototypes along the 3rd ring road in Beijing, the new UEF should be considered in order to improve existing hazardous conditions in infrastructures.

Spatial characteristics of Beijing’s urban tissue such an elevated bike infrastructure, productive urban landscapes, water collection machine and a bio green filter are conceptualized along a highly congested highway which is the base of the design process. The new proposed Urban Eco-Filter becomes the connective fabric system that creates effective urban public spaces, alleviates air pollution, generates water inner network and produces urban agriculture fields. This design approach aims to revitalize the dangerous conditions of a major highway in Beijing.

In order to strengthen the social activities and the necessary pedestrian links to enhance the existing urban fabric of Beijing, this thesis proposal seeks a new way of urban living throughout a dynamic elevated green infrastructure system.
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Image References

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