TRANSIT MODULE

ARCHITECTURE FOR ENHANCING MOBILITY

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Abstract

In a densely populated city like Dhaka, a proper transport solution is a prime demand as well as difficult to achieve. Through years, numerous infrastructural developments took place in Dhaka which is considered as neither a failure nor appropriate. Most of the plans costs great tolls in order to provide facilities. Tangible and intangible tolls. This thesis is about generating a process which will be an answer to the present transport malfunction of Dhaka city by identifying one of these grey infrastructural proposals and an attempt to provide an appropriate system in terms of efficiency, effectiveness, economy and publicness according to the context of a contemporary city. So, this thesis needs a sample site to undergo the research process which is Farmgate since it is a major transitional node of the transportation system in Dhaka city. This thesis envisions the transitional node of Farmgate as a multimodal transportation hub which will be a modular approach for other nodes with same characteristics. This thesis will establish the appropriateness of this idea by analyzing the existing context within 1 km radius as sample and from these data, a thorough comparative analysis will be done from 3 probable possibilities in 3 different location. The outcome will challenge the existing location of MRT station over Sher E Bangla Nagar park and rethinks its position that has not enough open space. The adjacent buildings of the transportation node are all commercial marketplace. This paper will try to find the answer to approximate possibility of merging the multimodal hub with the existing commercial buildings. To achieve the answer, a macro level study and a micro level study of the site is going to be done. In macro level mapping, the connection of farmgate with other transportation hubs will be shown. A structural survey is needed to determine the existing situation of the buildings that adjacent to the node. The total count of existing registered vehicle is needed to determine the vehicular pressure at the node. It will also determine the modal change of people. A thorough survey of pedestrian movement is needed to understand the pedestrian movement pattern and public behavior. A mixed method questionnaire survey will be done on regular passersby of Farmgate to understand the nature of user-friendliness of the transitional node. After analyzing all the gathered data, there will be a designed tangible intervention of the idea which is a multimodal hub containing transportation, recreational, educational, healthcare facilities and civic space.

Acknowledgement

First of all, I would like to thank Prof. Fuad H. Mallick sir for helping me to overcome the academic complexity I went through. Without him, I would not be able to continue my study and I will never forget this generosity. I would also like to thank my friends, seniors and juniors who made this journey of undergraduate Architecture life too much beautiful. I would like to thank my mother (Nasima Anwar) for letting me lead my life in my way for these 4.5 years. I would like to thank my father (Late. A K M Anwar Hossain) for thinking about my educational expenses too farther ahead and managed the whole expense even before his death. I will thank all the faculties of my Department for letting me acquire the knowledge I have today.

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I wish Allah will grant peace to all my well-wishers life.

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Chapter 1: Introduction

1.1. BACKGROUND OF THE PROJECT

From the very beginning of mankind, transportation and trade lead to development of a nation. A nation evolves in different sectors. Amongst all of them, infrastructural development leads towards a constant developing system within a city. Dhaka city itself was generated from the multimodal transportation system. Dhaka was one of the major port of the silk route. The caravanserais were the first version of a multimodal hub which was a transition between two modes, riverway and the road. These caravanserais were multifunctional consisting of the function of port with the functions of a hotel. So, there was a great sense of hospitality involved. However, today the functions are still continuing in an evolved context and At the transportation hub of Farmgate, Dhaka directly connected with the southern, northern and the western part of Dhaka. Thus, this hub faces a great deal of congestion generating several malfunctions. The proposed site of the MRT station is decided clearly avoiding dealing with this situation. Instead of thinking of juxtaposing the station with the public density, it placed over the Sher E Bangla Nagar park. In farmgate, the park is situated just beside the residential fabric. The primary collectors of this residential area open in Indira road and beside Indira road the linear park is situated. So it can clearly be seen that the park have a potential to serve the community. But instead of enhancing that possibility, the government decided to construct the MRT station over this open field. However, the core transportation hub is 700m away from the proposed site. So the concept of multimodal becomes difficult because to change the mode, people have to travel 700m by feet.

The objective of this research is to find the potential site for the MRT station. The most appropriate site would be at the main transportation hub. But the challenge is, MRT

Figure 1 1: Proposed BRT and MRT route plan passing through Farmgate.

route 6 that goes over the main transportation hub at farmgate, do not have any open space

near it. There are a number of old and new commercial buildings right beside of the line. After relocation of the kitchen market of Kawran Bazaar, its character of CBD will become more mature as it is declared as a commercial zone.

1.2. AIMS AND OBJECTIVE

The aim of this thesis is

- Finding a system that can reduce the present congested situation
- Generating a process that can enhance the functionality of the transportation system in Dhaka city
- Finding a process that can solve the congested pedestrian situation
- Finding a modular process in a certain place which can be replicable to maintain the same functional barrier
- Generating inaccessibility to inefficient vehicles to enhance the most efficient vehicle for serving maximum people
- Generating a process of considering urban decisions which acknowledges ultra-dense situation.

Chapter 2: Hypothesis

The transitional node of farmgate needs to transform into a multimodal hub.

2.2. THESIS STATEMENT

The transitional node of Farmgate is appropriate location for a multimodal transportation hub in terms of efficiency, effectiveness, user-friendliness, economy and publicness to improve the present transportation system in Dhaka.

2.2. RESEARCH QUESTIONS

1. Is the transitional node at Farmgate is appropriate location for multimodal hub?
2. Is it possible to generate a multimodal hub using the road, pedestrian and the commercial buildings?
3. Is it possible to generate a civic space through this multimodal hub?

Chapter 3: Thesis Rationale

3.1. IMPORTANCE OF THE IDEA [WHY?]

- Farmgate is now a major unimodal transitional hub that connects the northern, western and the southern part do Dhaka.
- Every part of Dhaka has a bus transit through farmgate.
- This idea proposes a multimodal system that has shorter transfer time.
- This node has adjacent commercial buildings which is high potential for generating activities around civic space. .
- This node has maximum number of transfer points which leads this place into a hi potential location for public function
- Same placement saves the urban open green which has high potential serving the communal neighborhood as a breathing space.
- This node has recreational facility

3.1. THE POSSIBILITY OF THE IDEA [HOW?]

- Creating a multimodal system that complements the existing marketplace by juxtapositioning the both functions
- There may be a need for multi-level pedestrian or vehicular circulation to deal the congested circulation.
- An evidence-based architecture may be introduced to generate healing-built environment.

Chapter 4: Review of Literature

4.1. CONCEPT OF INTERMODAL SYSTEM

"Intermodal Transportation may be defined as the transportation of a person of a load from its origin to its destination by a sequence of at least two transportation modes, the transfer from one mode to the next being performed at the intermodal terminal. The concept is very general and thus, it means many things to many people; transportation of containerized cargo by a combination of truck, rail and ocean shipping, dedicated rail services to move massive quantities of containers and trailers over long distances, main transportation mode for the international movement of goods, central piece in defining transportation policy for the European Community, trips undertaken by a combination of private (e.g., car) and public (e.g., light rail) transport, and so on" (Crainic, 2005).

Human society is shaped by transportation systems in the most significant aspects. The Policy Guide on Surface Transportation (1997) on the American Planning Association website described these aspects as these following points.:

- Land development
- Land use pattern;
- Economic activity
- Product flow
- Trade pattern
- Jobs and wages
- Accessibility to places and work, education, healthcare, social life, and commerce for individuals
- Overall livability of communities and metropolitan areas

These are the most important factors of research on a transportation hub. The challenges towards the success of a transportation system along with its functionality is

result of the balance of the built and the natural environment for people and communities that inhabit them. In hyper dense community' s transportation issues do a great impact on people on every scale and within the everyday life.

The dilemma for solving this issue is either build more roads to accommodate the growth of private and public vehicles or to create multimodal public transit alternatives to deal with the congestion and provide greater access to a wider range of people and working classes. To achieve this, it is needed to take some strategies to solve the broader social issues as housing, employment opportunities and a higher quality of life having broader accessibility. To obtain a better quality of life, people must be able to have accessibility and mobility.

"Traditional transportation planning was based on profiles and characteristics of residential households (family size, income, vehicle owned) and the area itself (population density, distance from the central business district" (Rosenbloom and Black, 2000).

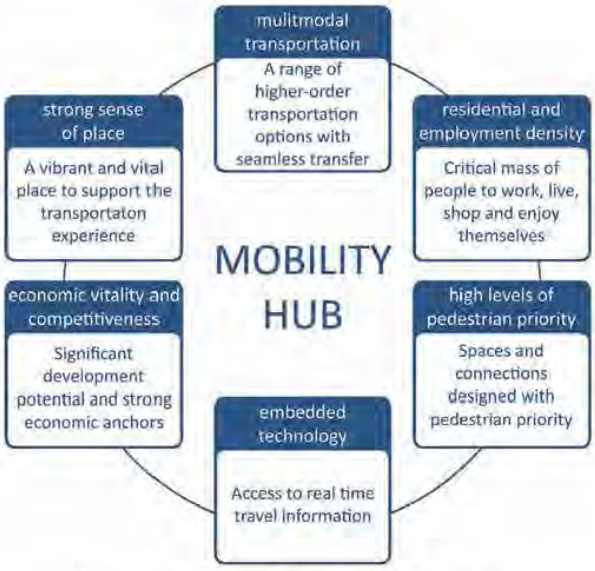


Figure 4 1: Mobility hub cycle.

"The last criticism of failing to create more livable and sustainable communities is a concern that has not gone without notice within federal transportation agencies" (Edwards, 2001).

A mobility hub is more than just a transit station. Mobility hubs not only consist of major transit stations but also it has to complement the contextual elements. They serve a complex function in the transportation system as the origin, destination, or transfer point for a specific portion of trips. These are consisting of different modes of transportation – a transition between walking and riding transit – a continuous interaction and where there is an intensive combination signifying working, living, shopping, and playing.

The multimodal transportation system is the concept of changing the mode of transportation. The modes can be rail, road, waterway, and air. There are connections between each mode as chain and have access to other modes. There are three major parameters of this concept, firstly the waiting time and secondly the transferring/accessing. The waiting time is considered between the arrival of a passenger and the entrance inside the vehicle just before starting the journey. The transfer is considered as the duration between getting out of the previous mode and arriving at the next mode and finally in vehicle travel which is the time duration of the journey.

4.2. NEED OF AN INTERMODAL SYSTEM

Numerous expansive urban areas face the effect of the high use of the mechanized vehicle for hyperdense population and highly increasing of neighborhood economy, especially in the developing nation, which is putting the accessible in a great threat, the

quality and the regular habitat of life. To confront this rivalry of individual mechanized vehicle which only offers agreeable entryway to door travel benefit, multimodal transport, implied as an effective coordination of various transportation modes and administrations in the trek, has turned into an effective condition to encourage open transport and non-mechanized modes and in addition a sensible confinement on the development of individual mechanized vehicle. Also, a sensible arrangement of urban transport ought to be adjusted improvement between all of the transportation modes. In reality, we realize that high proportion of mechanized vehicle is attributed the mechanized vehicle clients who haven't sufficiently paid the trip cost comparing their social responsibility.

4.2. PHYSICAL FEATURES

4.4. PRACTICAL WALKING ROUTES

The planning area should include a reasonable walking distance from the transit station. In general, 500m or 8min walking distance is considered as an acceptable walking threshold. The parameters that are seen or experienced between the practical walking distance are account barriers, streets and block network, natural features, and the walking experience. Studies show that people are willing to walk long distances to reach a transit station if there is a pedestrian-friendly public realm.

Figure-6.6: Concept Diagram of Pedestrian Oriented Development (POD)

Figure 4 2: Concept diagram of pedestrian oriented development (POD)

4.5. EXISTING ENVIRONMENTAL FEATURES

The considered environmental parameters would be the greenbelts, designated open space, and trails, environmentally sensitive areas (ESA), and Areas of Natural or Scientific Interest (ANSI). These features exist a very less amount over the Dhaka city. It is a prime responsibility to save these remaining features that is left all over the city and maintain its condition.

4.6. INFRASTRUCTURE BARRIERS

Barriers and blockade is a parameter for consideration in defining mobility hub planning areas. The example for these parameters are freeways, hydro corridors, and rail corridors, in some cases, define community boundaries. However, a focus of the mobility hub might be to develop strategies to overcome such blocking edges.

4.7. EXISTING LAND USE PATTERNS

A place with developing characters vs. Neighborhoods in equilibrium
Dhaka has 21 major mobility hubs. If all the sites are carefully observed, it can be seen that some sites are more appropriable than others for infill, urbanization, and densification. Farm gate' s transitional hub typically offers greater potentiality for development of the mixed-use neighborhoods or employment areas compared to sites in well-established communities. To rethink a transportation hub near a stable

Figure-6.5: Concept Diagram of Community Neighborhood

Figure 4 3: Concept diagram of community neighborhood

neighborhood, care should be taken for ensuring the continuous integration and sensitivity of transition between the new transportation infrastructure, any new densely populated development, and the existing community.

4.8. Regional Destinations

The site of the transportation hub must incorporate the nearby regional nodes such as universities, colleges, regional shopping centers, hospitals, arenas and arts centers etc. even if they are outside of the initial 500-meter radius. These nodes contain the potential to attract the transit ridership as well as contribution to the sense of place within the transportation hub.

4.9. BUS RAPID TRANSIT

Bus Rapid Transit (BRT) is a "form of fixed route bus service that combines features like bus-only lanes and bus priority at traffic signals to provide faster, more efficient transportation. BRT includes improvements to infrastructure, vehicles, and scheduling in order to provide higher quality bus service for commuters" (National BRT Institute, 2008). Within the metropolitan city of Dhaka, a good number of bus routes connects the northern, southern and the western part. These routes serve the urban and suburban portion facilitating increased reliability, incremental improvement, flexible building, and flexible accessibility complementing the density. These alternative transits besides the private vehicle, contributed to the highly congested cities with increased ridership and lower the usage of fossil fuel that leads to the sustainability of resources an lessen carbon emission offering betterment of the environment. According to Schneider, available transit systems could be better utilized if they were connected with a

"very spatially-dispersed patterns of origins and destinations in our cities" (Schneider, 2008).

In case of farmgate, the transitional hub connects the northern, southern and the western part of Dhaka which makes it a very important BRT hub. The vehicular pressure and populated situation demanded the transformation to multimodal from the unimodal transit system.

4.10. RELATION OF THE TRANSITIONAL HUB PLANNING AREA TO OTHER PLANNING AREAS AND POLICIES

The planning area of transitional hub should be handled with sensitivity regarding the adjacent boundaries developed under existing plans, including Secondary Plans, Community Improvement Plans, local and regional Official Plan designations, and Corridor Studies.

The Growth Plan for Farmgate contains planning legislation, which is particularly not relevant to identifying multimodal hub planning areas. The area itself not properly planned as a result the urban green is not being used by the local people as effectively as its scale and potential. From the structural plan (2016-2035) this area will accommodate a significant share of the employment and population growth, support

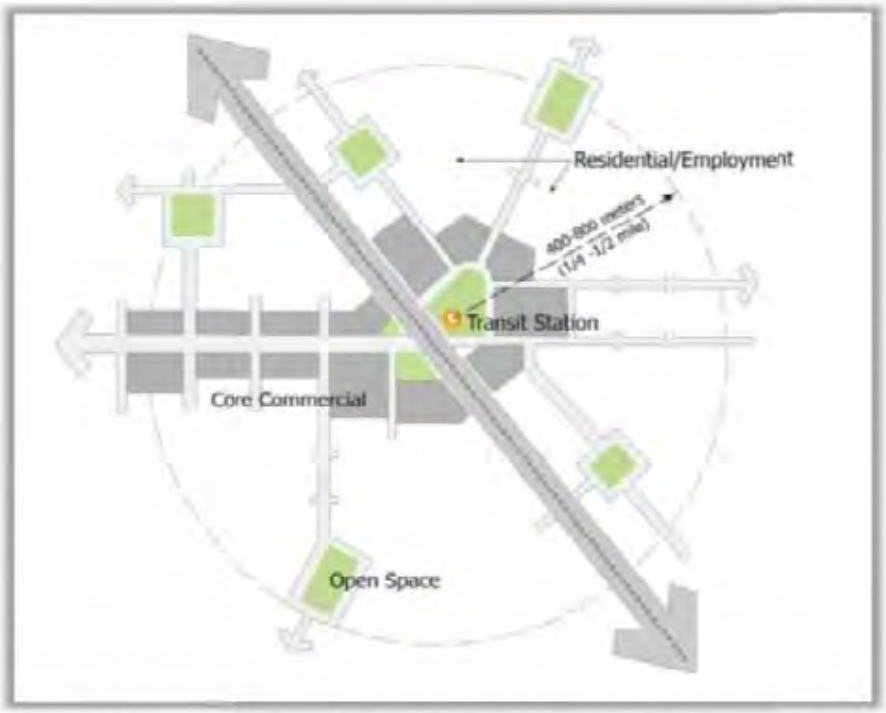


Figure-6.4: Concept Diagram of Transit Oriented Development (TOD)

major transit infrastructure and provide region-wide public services as well as commercial, recreational, and entertainment uses.

Figure 4 4: Concept diagram of transit oriented development (TOD)

4.11. HYBRID ARCHITECTURE

According to Rita Pinto de Freitas hybrid architecture was stated as a combination of form, nature and infrastructure. It is an architectural intervention that simultaneously meets the following conditions,

"_It is a physical intervention that, as a result of a project, proposes an architectural space generated on the basis of human intervention.

_It is an architectural intervention, which is at the same time a landscape: the architectural intervention integrates inseparably into the landscape.

_It is at once an architectural intervention and an infrastructure: in transforming into a section of infrastructure itself, the architectural intervention incorporates part of its laws."

When architectural objects bear its potential of incorporating over landscape and infrastructural intervention, it becomes an integral part of an infrastructural system of higher order.

Chapter 5: Precedent Studies

5.1. XIHU STATION MARKET, TAIWAN.

Xihu MRT station is the only station in Taiwan that integrated with a market. Since 1989, Xihu market was one-storied building. The appropriate site for the MRT station was decided over this market. Instead of replacing the market by MRT station, Government of Taiwan decided to combine the two functions since more than hundred stalls were there. The time while the construction was ongoing, the markets were temporarily sheltered nearby.

A traditional market is now a convenient option for everyday supplies and fresh ingredients. Since 2011, the Ministry of Economic Affairs has been advancing the "Project to Elevate Traditional Market Competition" and counseling markets on keeping up with the times while providing a high-quality and comfortable shopping environment.

Figure 5 1: Kitchen market at Xihu MRT Station

In contrast with other cities, Taipei's traditional markets must adopt a more "urban" look in response to the influence of the MRT (Taipei Mass Rapid Transportation) and the many urban renewal projects. In addition, the Taipei City Government has staged the "Taipei Traditional Market Festival" to promote "local food, local life, local culture." This campaign also marshaled local resources in a series of friendly competitions, such as the "World's Best Vendor Event" in order to revitalize the atmosphere around markets in general.

Figure 5 2: The transit path through the market

Xihu station market was a successful attempt and through time, it was declared a 3-star market.

5. 5.2. STADIUM MRT STATION, SINGAPORE.

The design of the Stadium MRT Station was selected from an architectural design competition organized in 2000 by the Singapore Land Transport Authority (LTA) in association with the Singapore Institute of Architects in 2000. The competition was to find a good design and innovation that emerges the Stadium with the Bras Basah MRT Station.

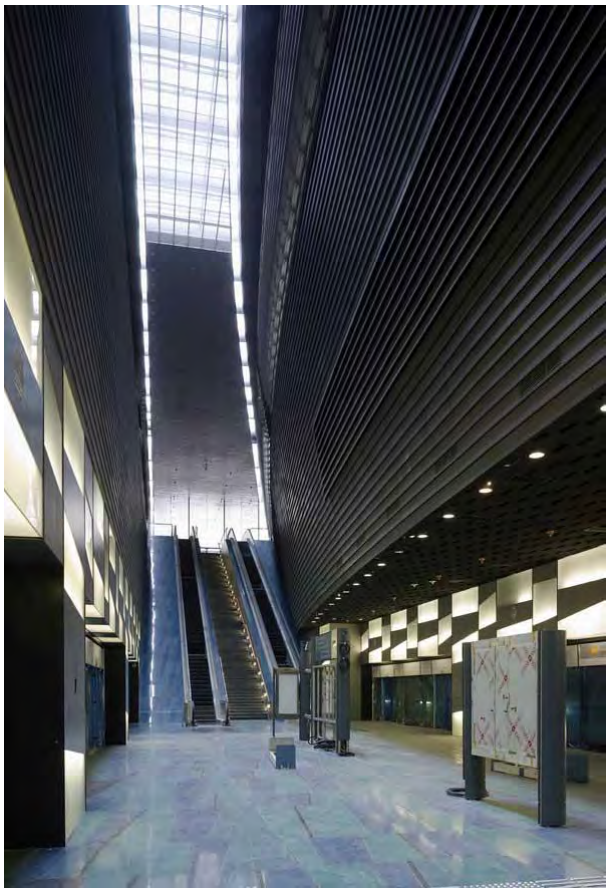


Figure 5 3: Entrance of stadium MRT station

Figure 5 4: Transition path through the threshold

Figure 5 5: The threshold between stadium and MRT station

Jurors Wong Mun Summ and Richard Hassell selected WOHA emerged the winner of

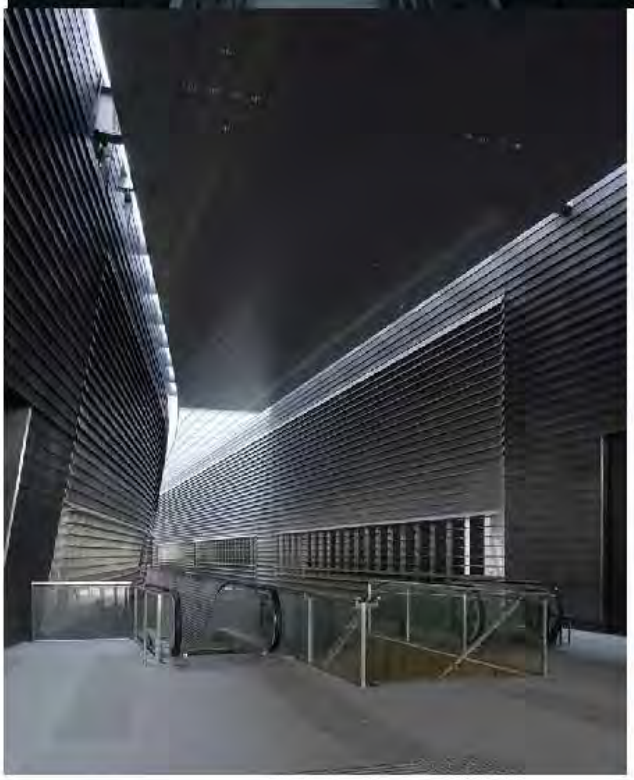


Figure 5 6: The external view of the stadium station.

Figure 5 7: The entry space view of the station.

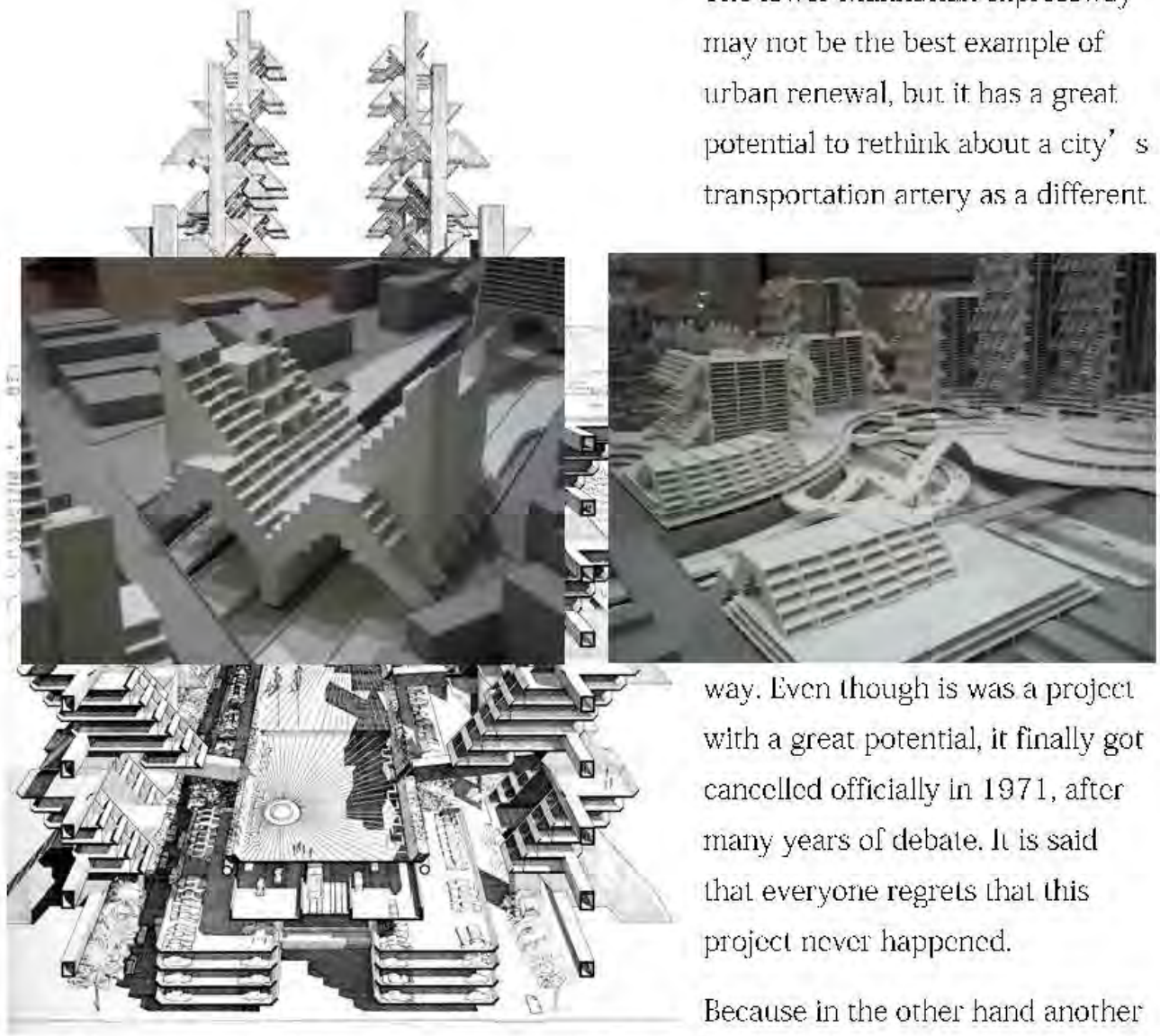
Figure 5 8: The main entrance of the

the competition with its proposed designs for both stations. The team acknowledges the LTA's role both in seeking innovation and in achieving the station's design. The design competition focused purely on good design and innovation, and did not require a proven track record or that a firm is of a certain size. The prime focus of the design was how to achieve a balance with the large-scale crowding from the stadium and MRT station.

WOHA designed using the same principles of a public plaza that has a clear guidance and walkable friendly environment that theoretically solved the pedestrian flow by geometry and simple large elements. The design was a curved plane that played off against a straight vertical plane. The multimodal character of the station was dealt with geometry in this project.

As the station's location is adjacent to the existing National Stadium, the design team had to address the scale of the large buildings in its vicinity and the need to accommodate surge crowds spilling out from events at the Singapore Indoor Stadium and the National Stadium. To cater to large ground-level crowds, the station was designed with a ground-level open-air concourse and plaza, with plenty of space for accommodating the crowds. The shape of the outer wall guides people towards the station maintaining the balance of the crowd. Contrasting a linear element against a curved one, the station was designed as a large-scaled silver canyon.

5.3. LOWER MANHATTAN EXPRESSWAY PROPOSAL BY PAUL RUDOLPH (1970)



The lower Manhattan expressway may not be the best example of urban renewal, but it has a great potential to rethink about a city' s transportation artery as a different way. Even though is was a project with a great potential, it finally got cancelled officially in 1971, after many years of debate. It is said that everyone regrets that this project never happened.

Because in the other hand another architect who was a famous one at that period of time was talking about this project after analyzing that it might had some positive impacts but those were not more then the destructions which would have been created by it.

The idea of introducing multi level road network system in an urban context and to play with the arrangement of the elements of a city with a very bold approach has been previously seen in the works of Le

Figure 5 9: Perspective drafting of lower Manhattan expressway.

Corbusier. In this project Paul Rudolph was inspired by Le Corbusier.

Road network, residence and expressway was intricated all together to rethink and develop a new dimension of urban lifestyle or way of living in an urban context. This project is a very good or one might say a perfect example of hybridizing architecture with infrastructure.

His work was appreciated because of the boldness of his approach, his playfulness of seeing the city as a whole system, a massive interconnected web of physical structure and the transportation modes, all

Figure 5 10: Section of lower Manhattan exoressway

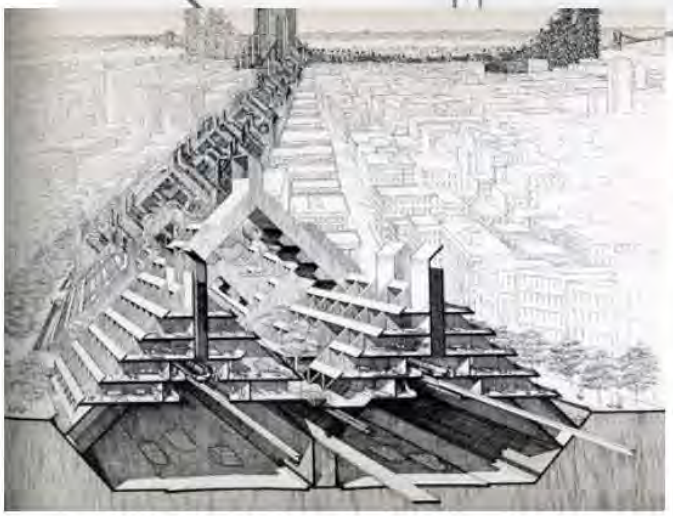


Figure 5 12: 2 point perspective

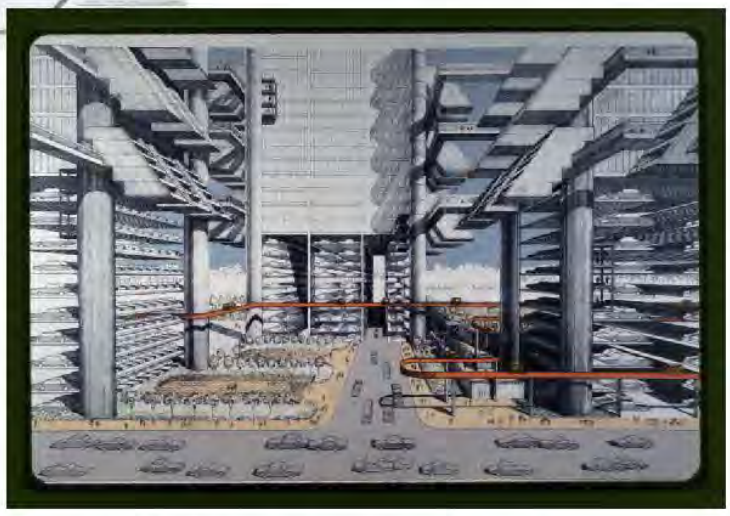


Figure 5 11: Internal color rendered view

these was his ambition to weave together to make a beautiful object in an urban area. Nevertheless, he wanted to solve all these problems together with his multi-dimensional intervention.

In this paper, the possibility of hybridizing multi modal transportation with commercial building is considered as it was considered in the project of Paul Rudolph where he was integrating multi modal transportation system with residential buildings .

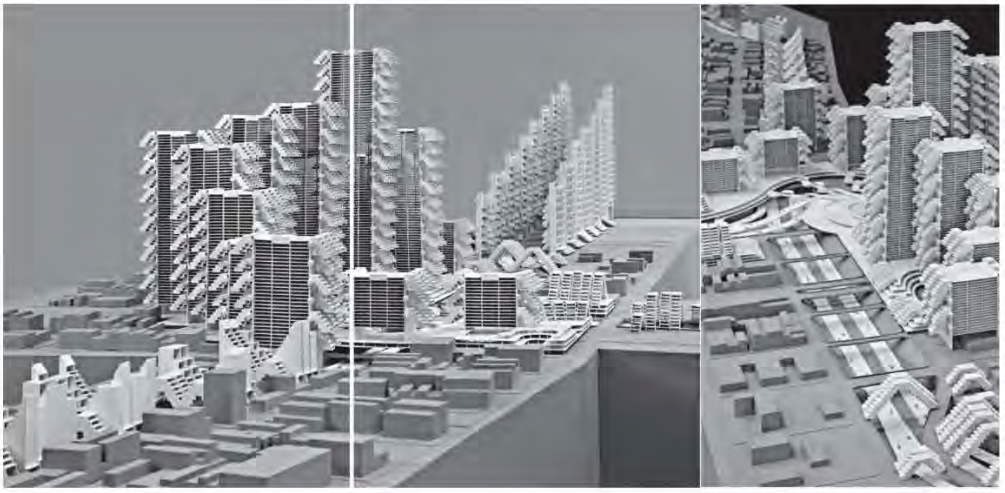


Figure 5 13: Model of lower Manhattan expressway

5.4. NEW CITY PARK, NEW YORK

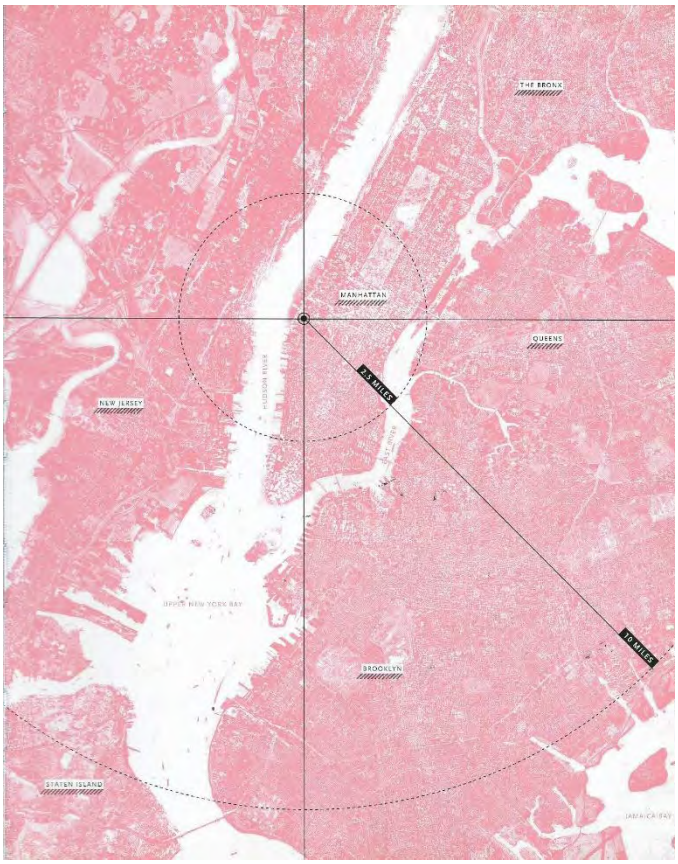


Figure 5 14: New City Park site

The current site and its half-mile surrounds represent a key entry point into Manhattan where many large-scale circulation systems converge. In fact, between Penn Station, Port Authority Bus Terminal, Lincoln Tunnel, and various subway stops, the site collects and redistributes a large majority of the commuters and visitors who enter and leave the city. As such, it holds vast potential to become a prominent gateway and an iconic transportation hub.

iconic transportation hub.

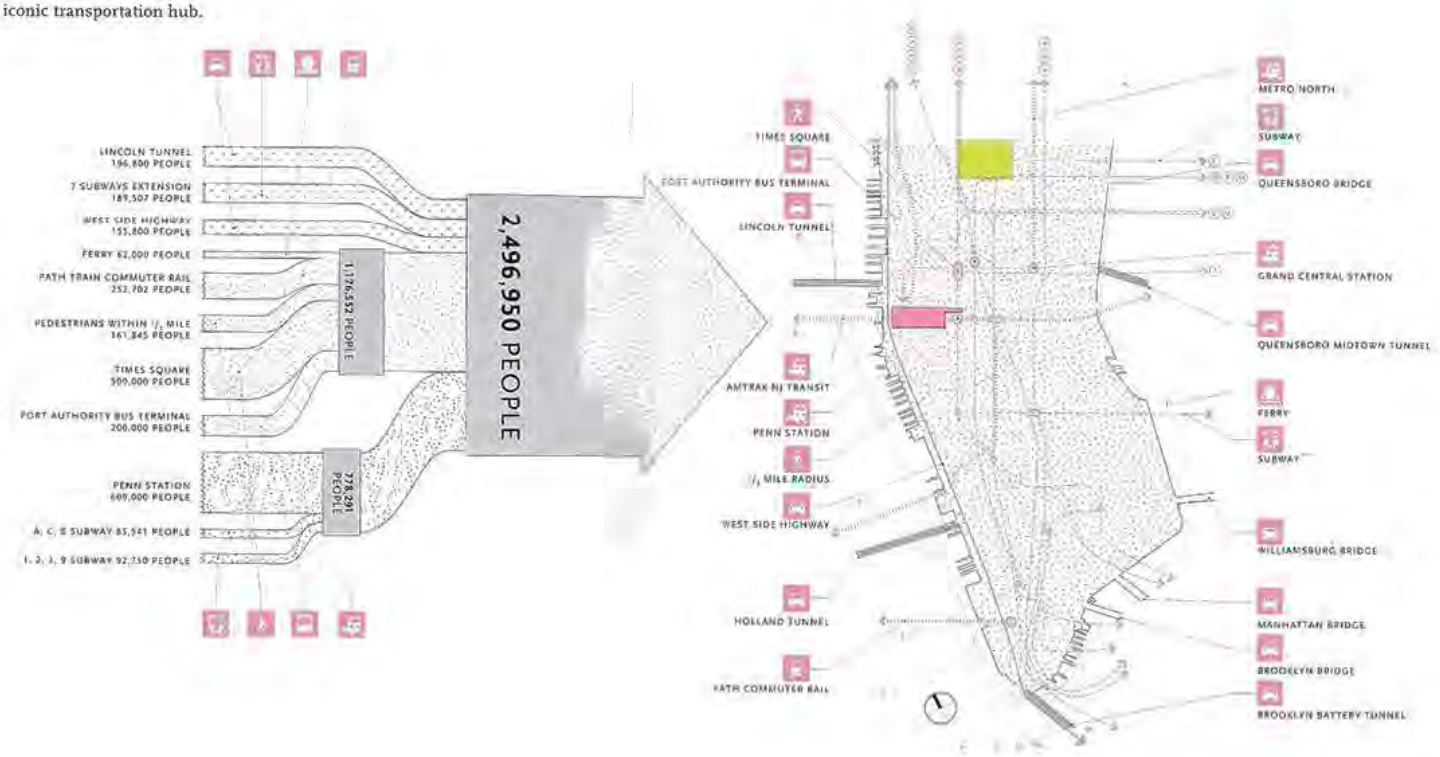


Figure 5.15: User basis tree diagram.

FLEXIBLE URBANISM: RECOMBINANT TYPOLOGIES

NEW CITY PARK offers multiple visions for the development of a new district of Manhattan using a master plan that provides coherency to the urban environment while accommodating various functional and conceptual possibilities that emerge over time.

Here we highlight three conceivable outcomes that are shaped by projected

or ongoing city needs and demands. With radically varied program from campus to park to entertainment hub—each of the three scenarios localizes and distributes functions and focuses activity on a different area of the site: its inner-city edge, middle area, or coastal periphery. These highly differentiated densities connect the proposed program to a responsive context for a strategy that more closely aligns with the complexities of the contemporary urban condition, replete with diversity, indeterminacy, and ambiguity.

All three scenarios relieve the pressure on Midtown by catalyzing a new hub of growth atop the train tracks of the Metropolitan Transportation Authority (MTA) Rail Yards and creating a linear public park that runs from Pennsylvania (Penn) Station to the Hudson River. A new east-west axis is formed, enhancing lateral connections across western Manhattan and activating the edge.

Each of the three scenarios relies on a steadfast public armature of core programs and infrastructure—a connective tissue—to which secondary functions adhere. A set of morphologies are employed that match functions to forms through site-specific zoning envelopes that build in flexibility with their capability to negotiate unforeseen exigencies as they materialize.

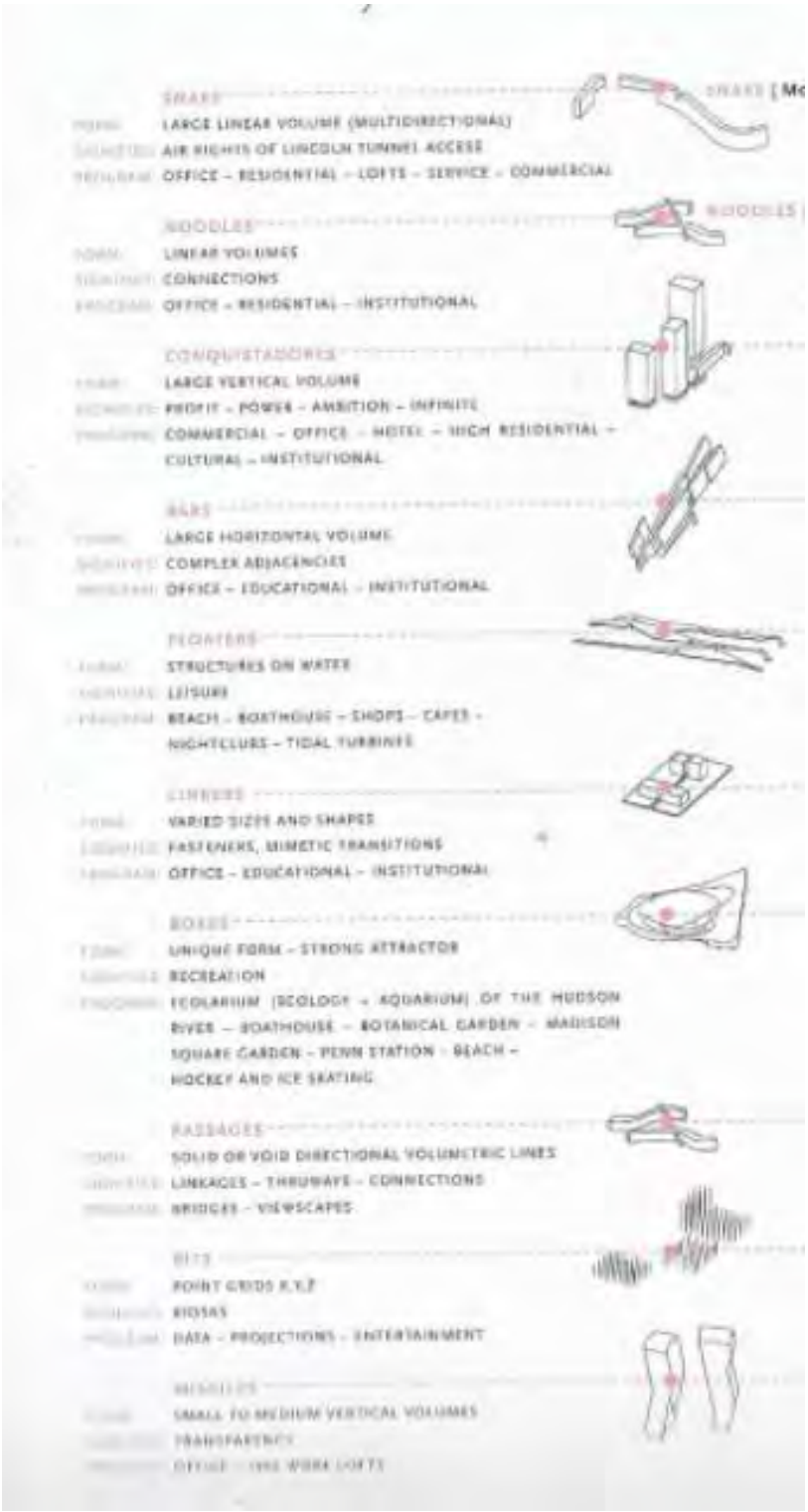


Figure 5 16: Taxonomy of morphologies

OPEN-ENDED MORPHOLOGIES AND THEIR FORM GENERATORS

Off of the public armature, forms amass, assembled in various configurations based on continually shifting programmatic demands. Without precluding what the city, developer, or resident might want for the site at the outset of a many-year construction process, we devised an infrastructure preloaded with architectural components that can be implemented when and as needed. Representative of different programs, functions, and uses, these three-dimensional zoning envelopes are chosen for their inherent spatial and functional qualities. Formal parameters limit the

range of their functions, determining what form is most conducive to a desired outcome. For example, while a low mass might accommodate large-scale retail or a convention center, a tall tower is better suited for office or residential uses. Architecture thus diversifies to accommodate a growing variety of population groups, flexible enough to support individual (private) strategies of development. As scenarios employ specific typologies, according to their functional characteristics, these are then plugged into the public armature, taking advantage of and enhancing it.

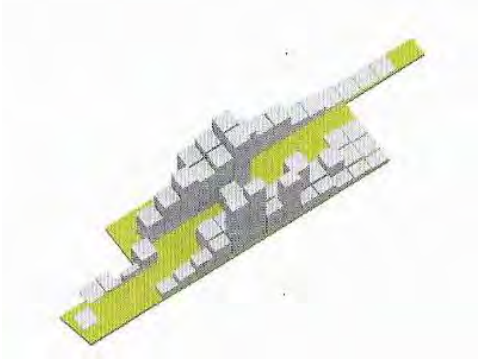


Figure 5 18: midsite program intensification

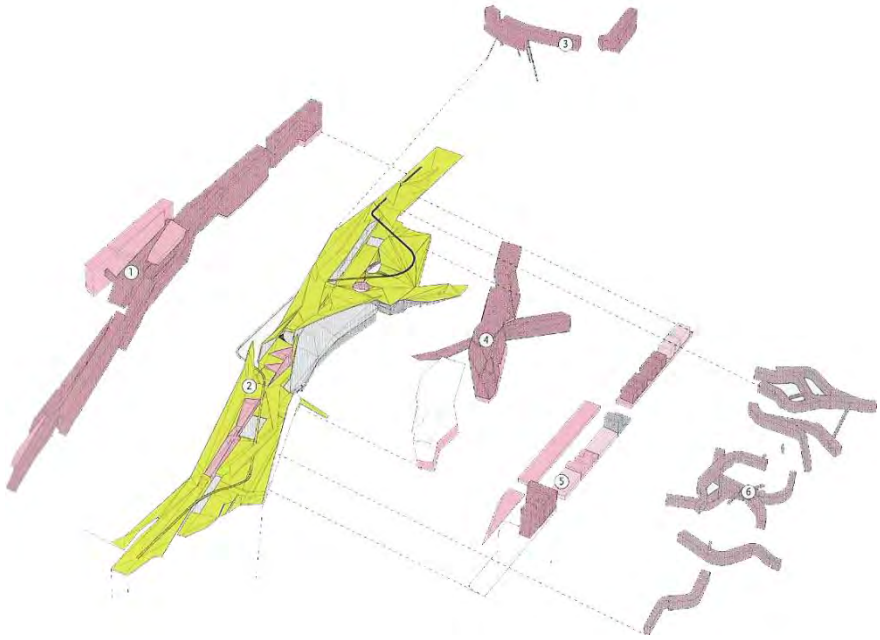


Figure 5 17: academic zoning

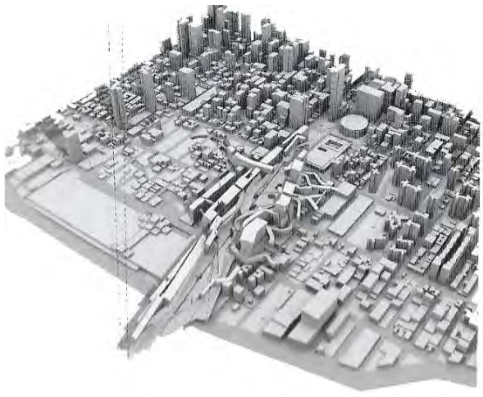


Figure 5 19: Aerial view of site

A CAMPUS PLAN

Intensely public but on a local scale, this scenario activates the public armature as a unique blend of purposeful open space, while overlapping educational programs configure the selection of specific morphologies to define the architecture.

A university plan weaves the strata of the city together to create a dynamic field of programs that infiltrate surrounding material, in-formation, and infrastructural flows into a proposal that redefines the college experience. The plan is at once an autonomous entity and inextricably woven into its surrounds. Superimposition, augmentation, and layering produce a manifold surface that integrates campus housing and educational buildings with recreational, cultural, and community-oriented programs.

This strategy increases the utility of the site without sacrificing open space. A great lawn connects Manhattan's interior with the river, where it terminates in a floating platform of landscape an amenity for students. This scheme provides the possibility of establishing a new university or expanding an existing one while utilizing the generative material already present on the site, making the inevitable accessible and coterminous with the new.

AN ENTERTAINMENT HUB

The many surrounding infrastructural systems form a connective tissue throughout the city and around the site. This scenario har-nesses these flows of people, development, and energy, directing them through the site and into nodes of intensity. Additional lines of transport as well as programmed activity are added for a most concentrated interface. As with Times Square or Chelsea Piers, this multitude of programs and stimuli accommodate many interests, all coming together to form a vibrant node of activity and a distinct portal into the city. No longer a place to pass through, the site becomes a destination to explore.

A new street-based light-rail loop and an automated people mover connect the site to trains, subways, buses, and ferries, linking the inner city with the river. The light-rail

system to the north of the site expands farther than the current subway system, forming a two-way loop along Thirty-fourth Street, Second Avenue, Forty-second Street, and the West Side Highway, providing an east west connector and a strong counter axis to the existing Seventh Avenue infrastructure

AN URBAN BUSINESS PARK

With the most square feet of developed space and, at the same time, the largest park, this scenario aims to release the development pres-sure valve at the center of Midtown Manhattan.

Scenario 48 ambiguously condenses the development footprint so as to maximize the new public park space for the city. The in-creased development potential incentivizes private investment, while the additional parkland creates a public asset for generations to enjoy. The result is a park the third largest open space in Mid. town after Central Park and Riverside Park—that provides the city with more than fifty-two acres of public areas and greenery.

Surrounding the public park, additional private structures generate density, interest, and funding for the public spaces. Flanking the park, zoning envelopes, points of connection, and border conditions set design parameters for additional private office, commercial, and residential structures.

5.5. TIMES SQUARE, NEW YORK

Figure 5 20: Times square before and after.

Time square in the Midtown Manhattan section of New York City at the junction of Broadway and Seventh Avenue. This was generated directly from a busy road. The process was clean. The road was by passed not disturbing the surface so the result was a huge pedestrian plaza. This is a great example of converting street into a civic space and the usability is successful.

5.6. KINGSCROSS STATION

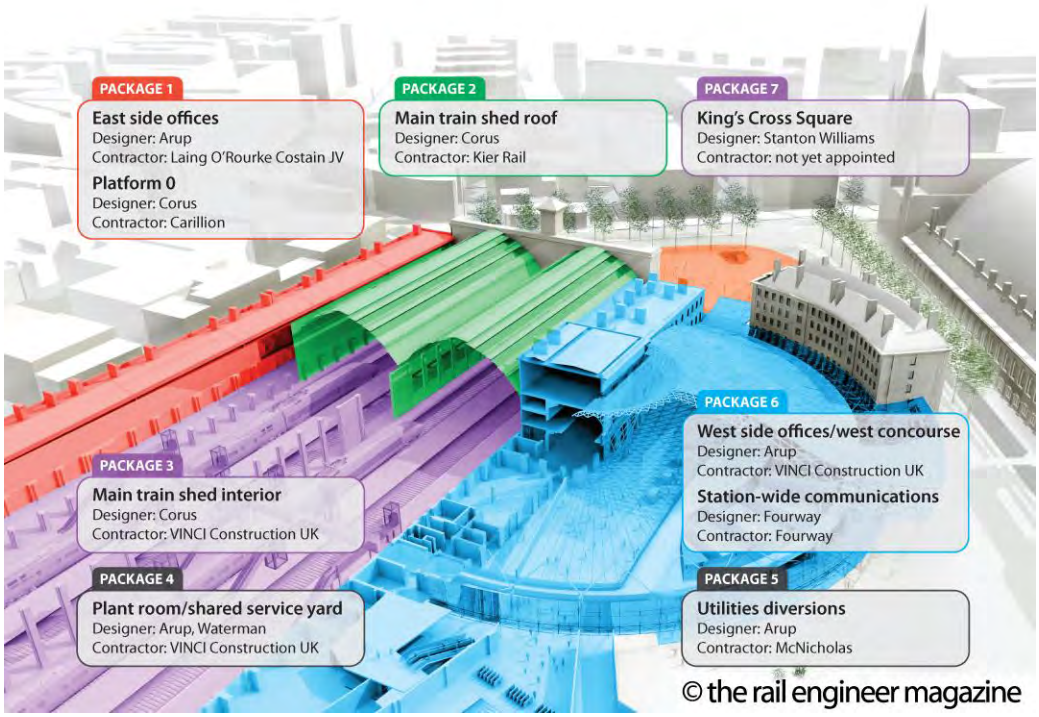
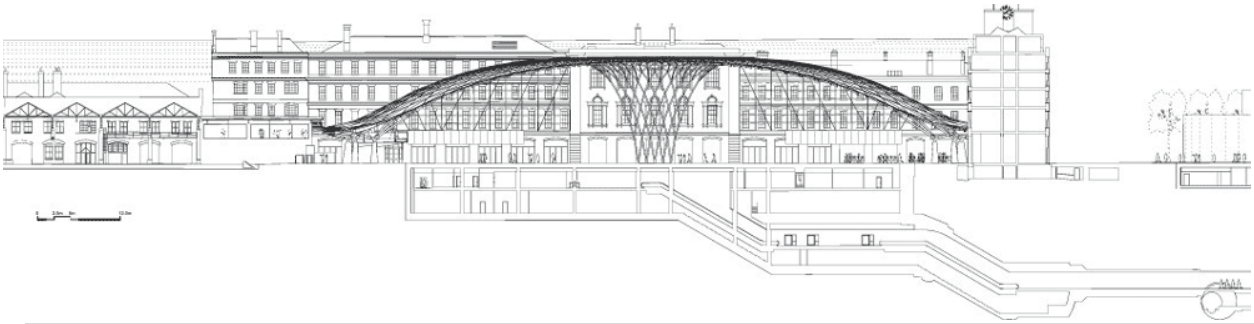


Figure 5 22: Vehicular flow diagram of Kings cross station

Figure 5 21: Section



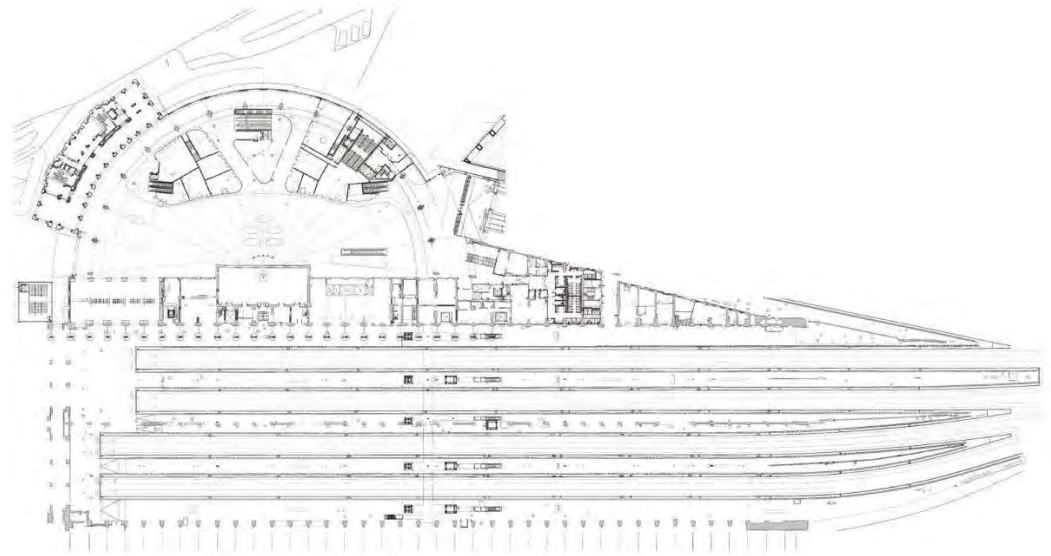


Figure 5 23: Plan at 0’ -0”

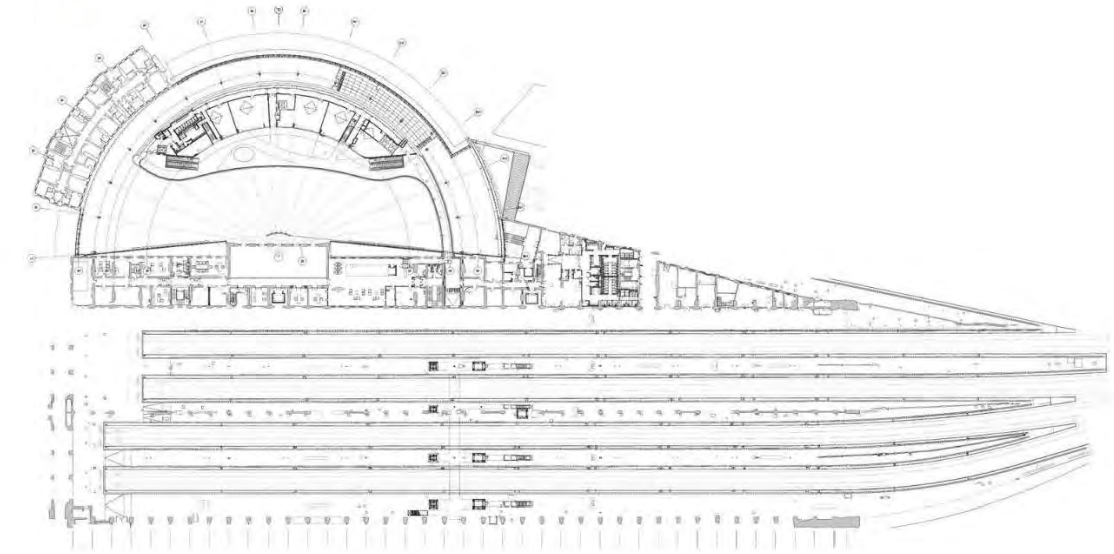


Figure 5 24: plan at 15’ -0”

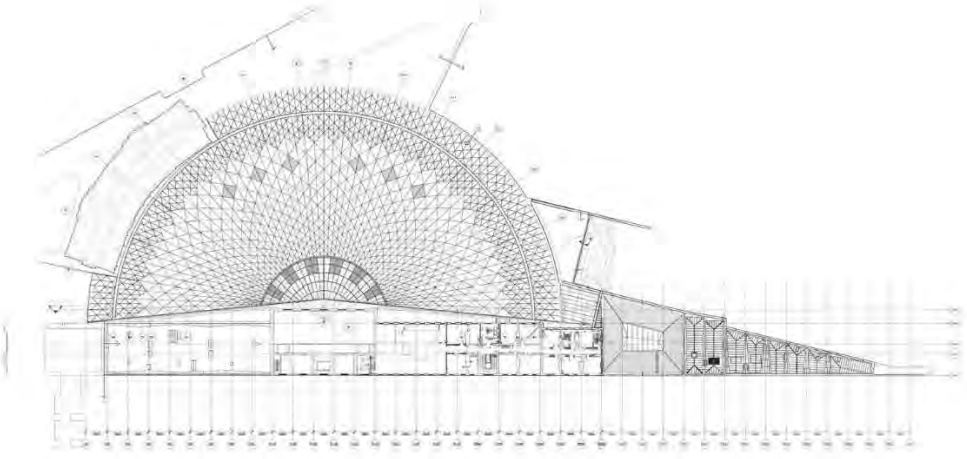


Figure 5 25: Roof plan

Kings Cross station is a successful example of underground train service that dealt with the busy city . The concept of multimodal system partially visible here since it emerges two mode of transport roadway and the railway. Both of these modes are connected with sufficient pedestrian so there are no spillover present.

Chapter 6: Methodology

6.1. MAPPING THE EXISTING CONDITION

Figure 6 1: Catchment area for vehicular accessibility from the transit node of Farmgate.

The very first approach of this research is to find out the existing condition for 1km radius fron the node of the site through mapping.

Figure 6 2: Existing landuse pattern and bus root.

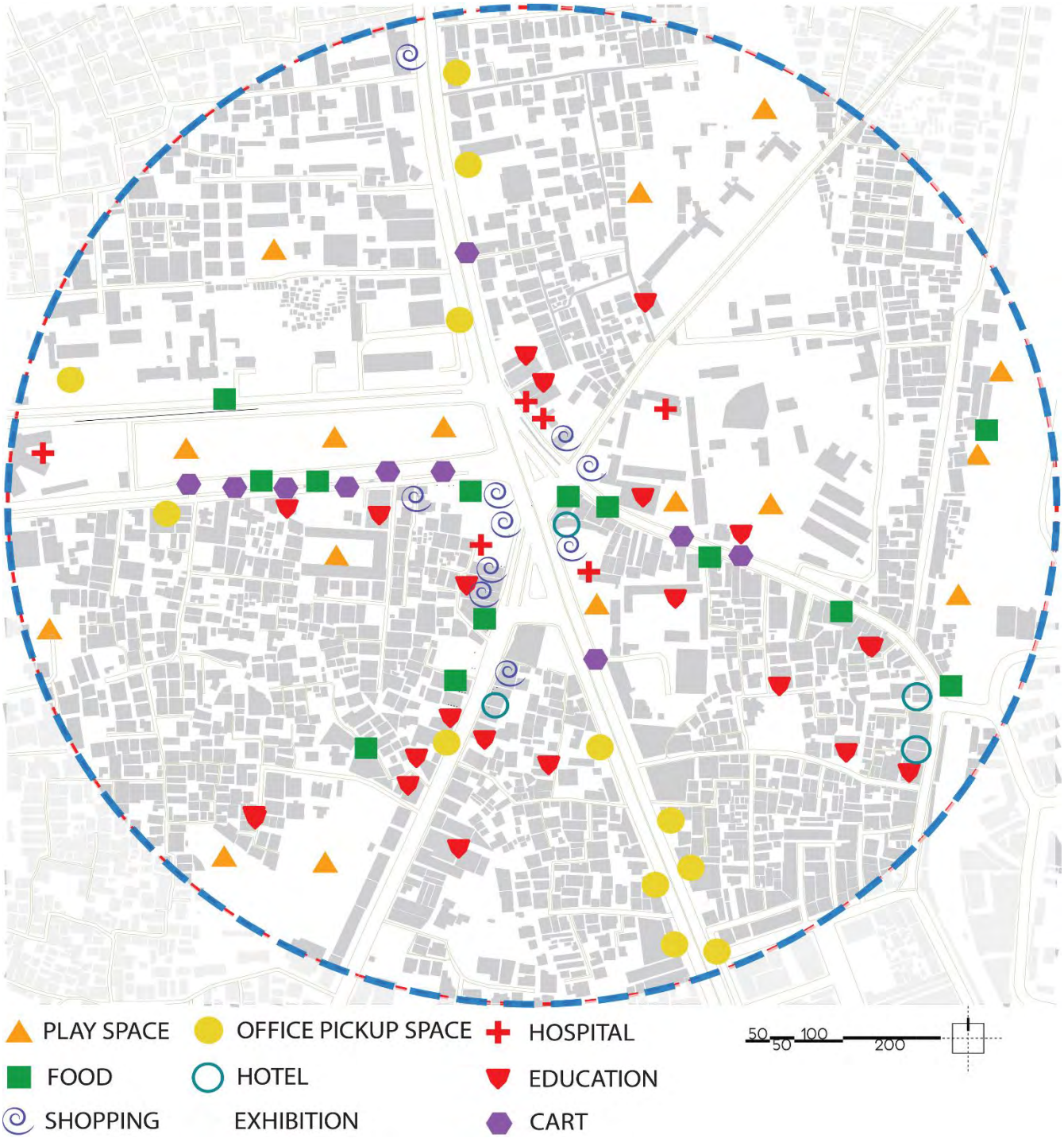


Figure 6 3: Existing activity pattern map.

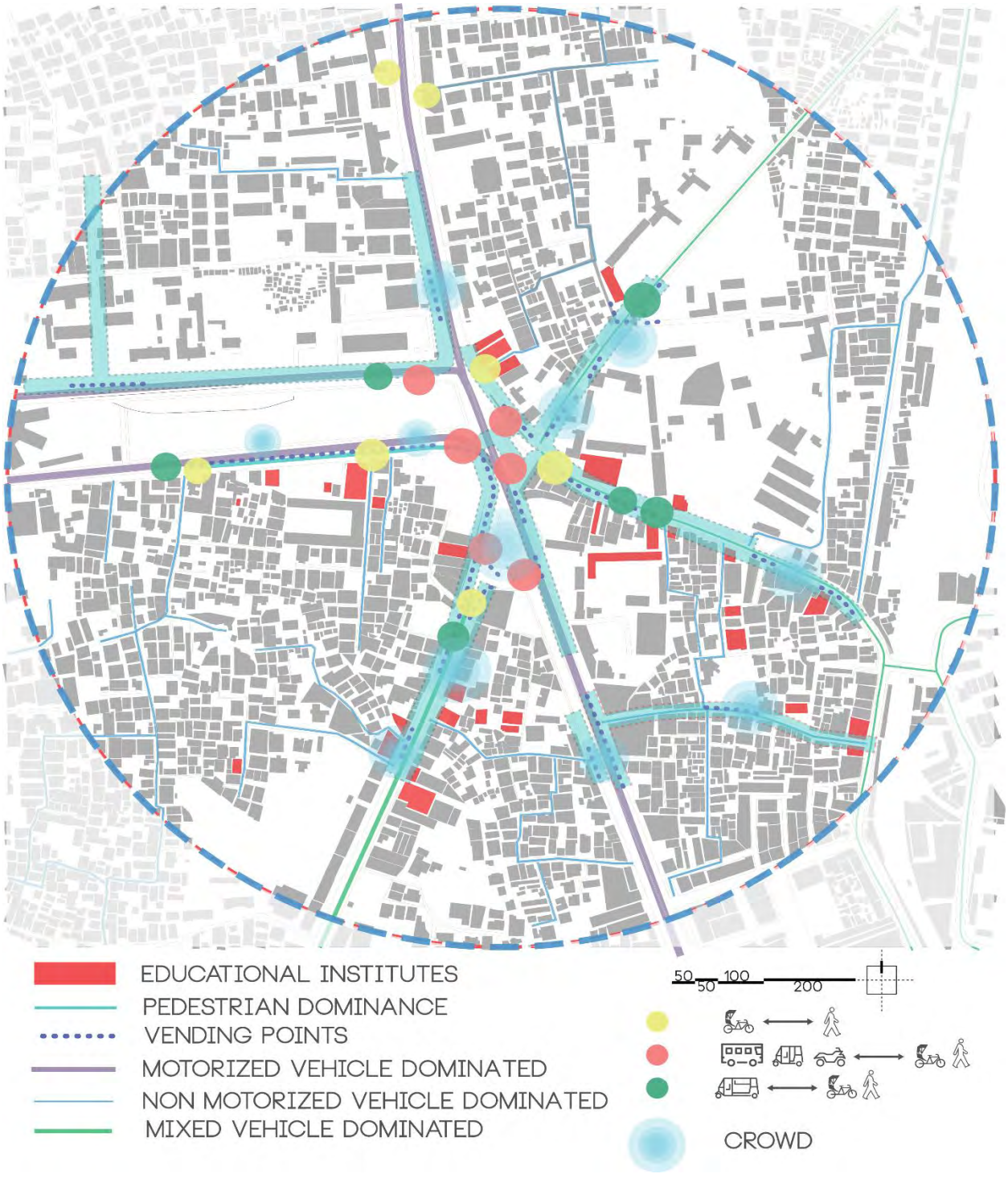


Figure 6 4: Existing transfer points, vehicle type map, pedestrian, vending point and crowd map.

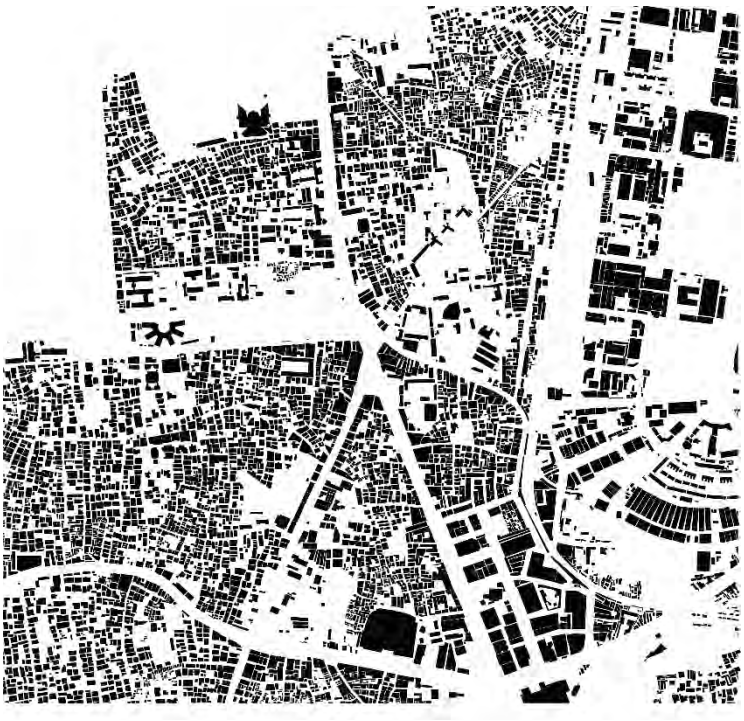


Figure 6 8: Nolli map

Figure 6 7: Road network

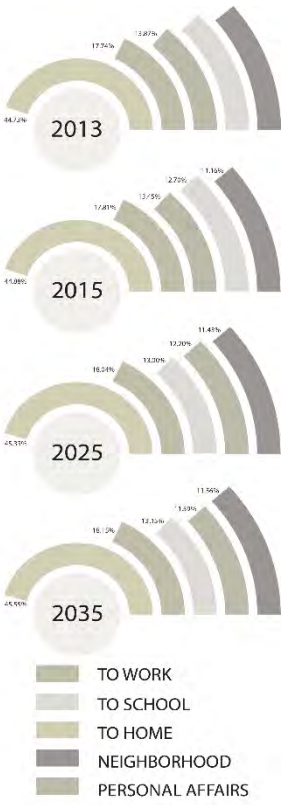


Figure 6 6: population trip rate by purpose

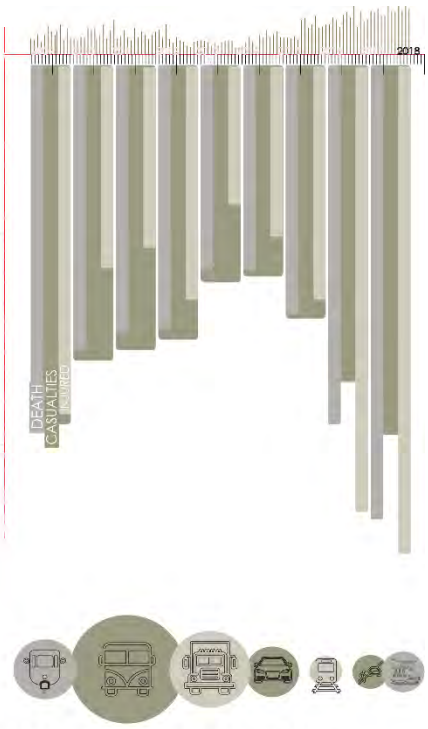


Figure 6 5: Road accident and casualties statistics

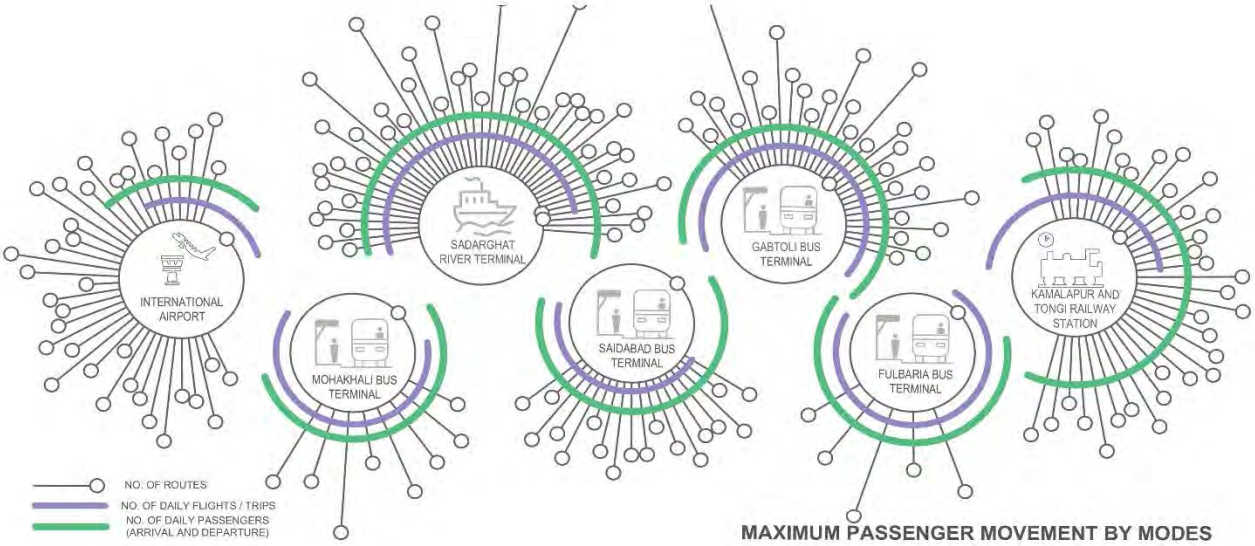


Figure 6 10: Maximum passenger movement by modes

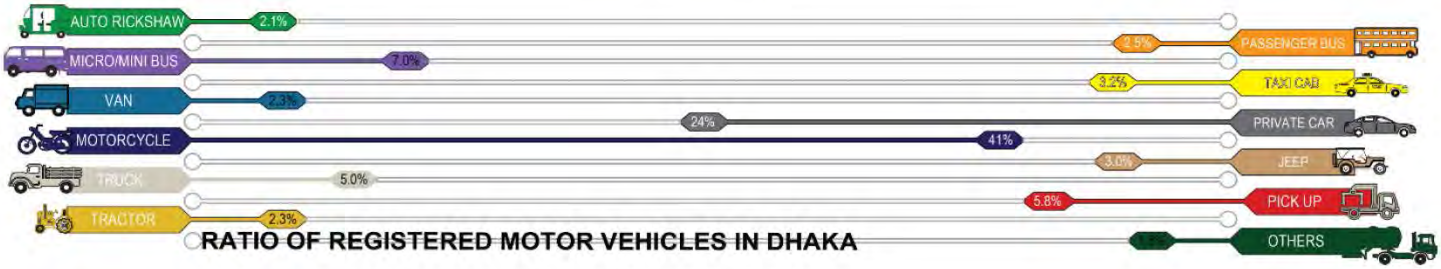


Figure 6 9: Ratio of registered motor vehicle in Dhaka

6.2. PROBABLE LOCATION FOR THE MRT STATION OVER FARMGATE

From the knowledge of all the mappings, the following master diagram is generated where it clearly shows that the transitional node of farmgate is the appropriate location for MRT station and eventually it is proven by the parameters and operators that this place have those characteristics which a multimodal transportation hub has.

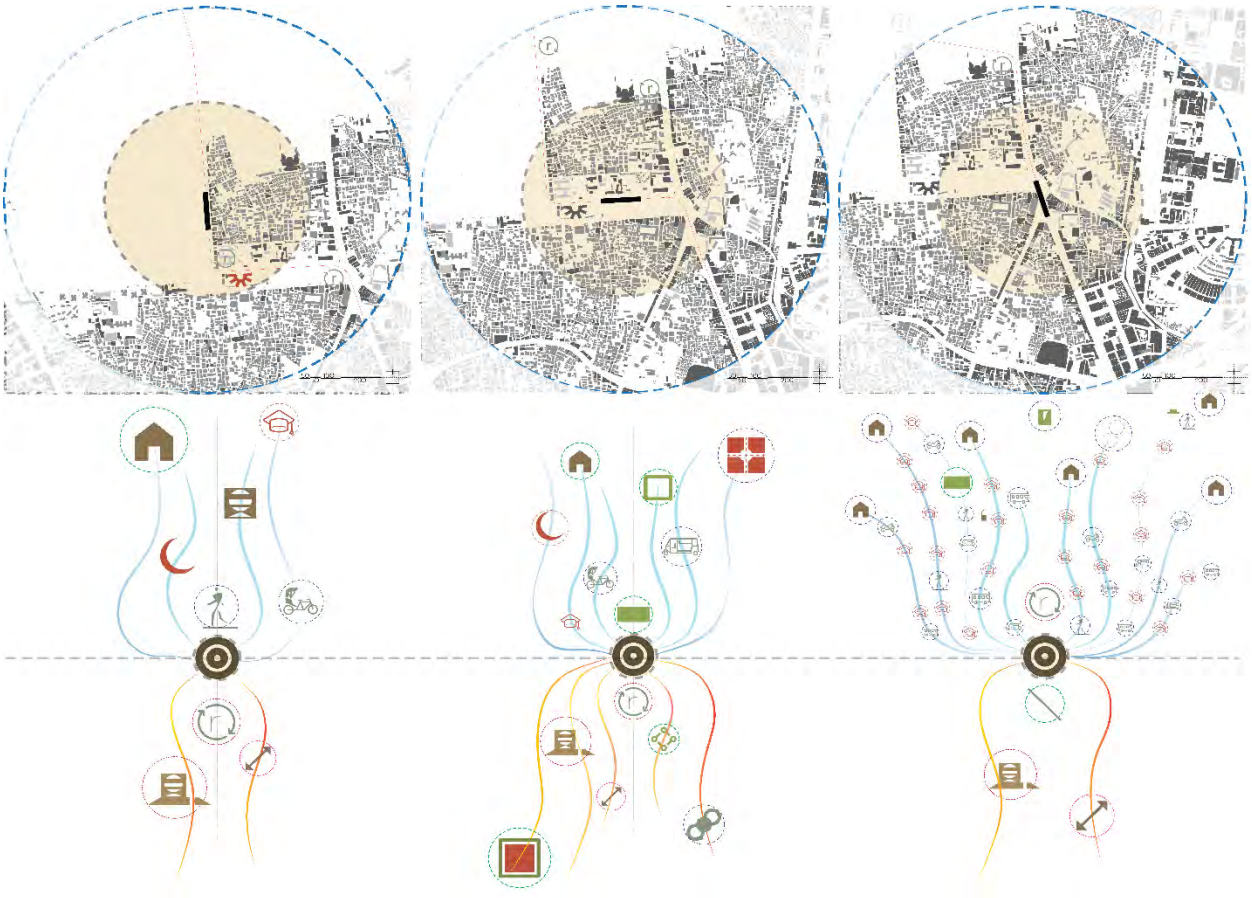


Figure 6 11: Master analysis of the three location based on facilitative comparison

5.3.8 Projected Travel and Traffic Demand

The values in the **Table-6.3** show trip production by each trip purpose. All-purpose trips will increase gradually in the future with trip "To Work" and trip "To Home" always being dominant.

Table-5.3: Population Trip rate by Trip Purpose in RAJUK Area

Year	Total trip (1,000 trips)	To Work	To School	To Home	NHBB	Private
2013	29,580	17.74%	12.59%	44.73%	11.07%	13.87%
2015	32,595	17.81%	12.70%	44.88%	11.16%	13.45%
2025	45,540	18.04%	13.00%	45.33%	11.43%	12.20%
2035	54,340	18.15%	13.15%	45.55%	11.56%	11.59%

Source: Compiled by Consultants, 2014

The trips by mode will increase steadily in the future particularly car and bus trips will increase significantly whereas rickshaw trips will reduce significantly.

Table-5.4: Present and Future Trip Rate By Each Mode (Unit: %)

Year	Total trip (1,000 trips)	Car	Bus	Rickshaw	Etc	Railway& Harbor	Walk	Total
2013	31,355	6.43	34.15	40.58	0.12	0.21	18.51	100.0.
2015	34,877	7.22	36.97	37.69	0.14	0.25	17.72	100.0
2025	46,639	11.12	41.78	30.90	0.19	0.33	15.69	100.0
2035	59,774	16.29	41.46	27.37	0.20	0.34	14.35	100.0

Source: Compiled by Consultants, 2014

During next 20 years there will be substantial increase in population, number of vehicles, and number of trips for Dhaka which will increase traffic congestion and reduce traffic speed at peak hour (from 8 km/hour at present to about 4 km/hour by 2035).

Figure 6 12: Year wise vehicular demand and future prediction.

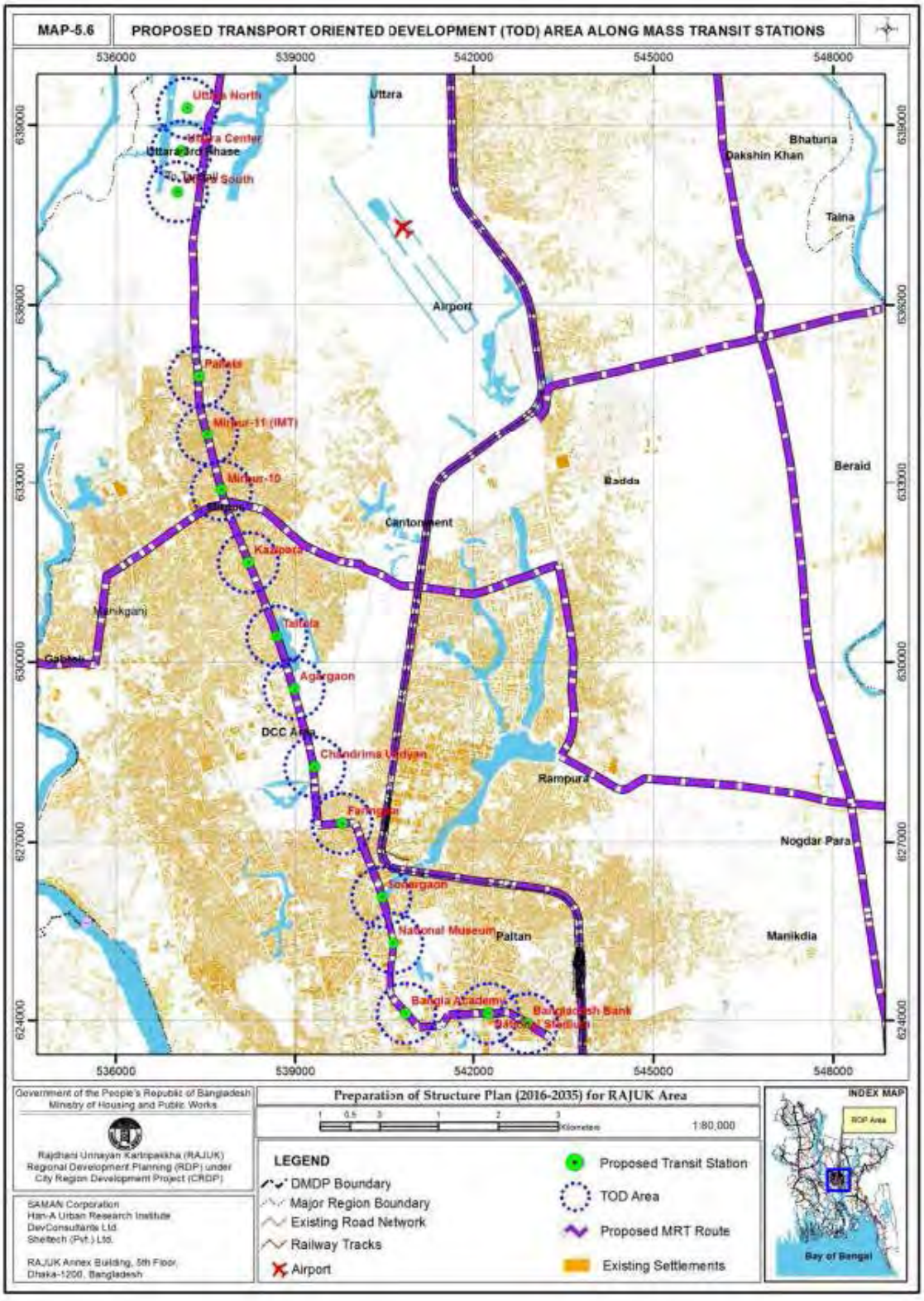


Figure 6 13: Proposed transport oriented development along mass transit station

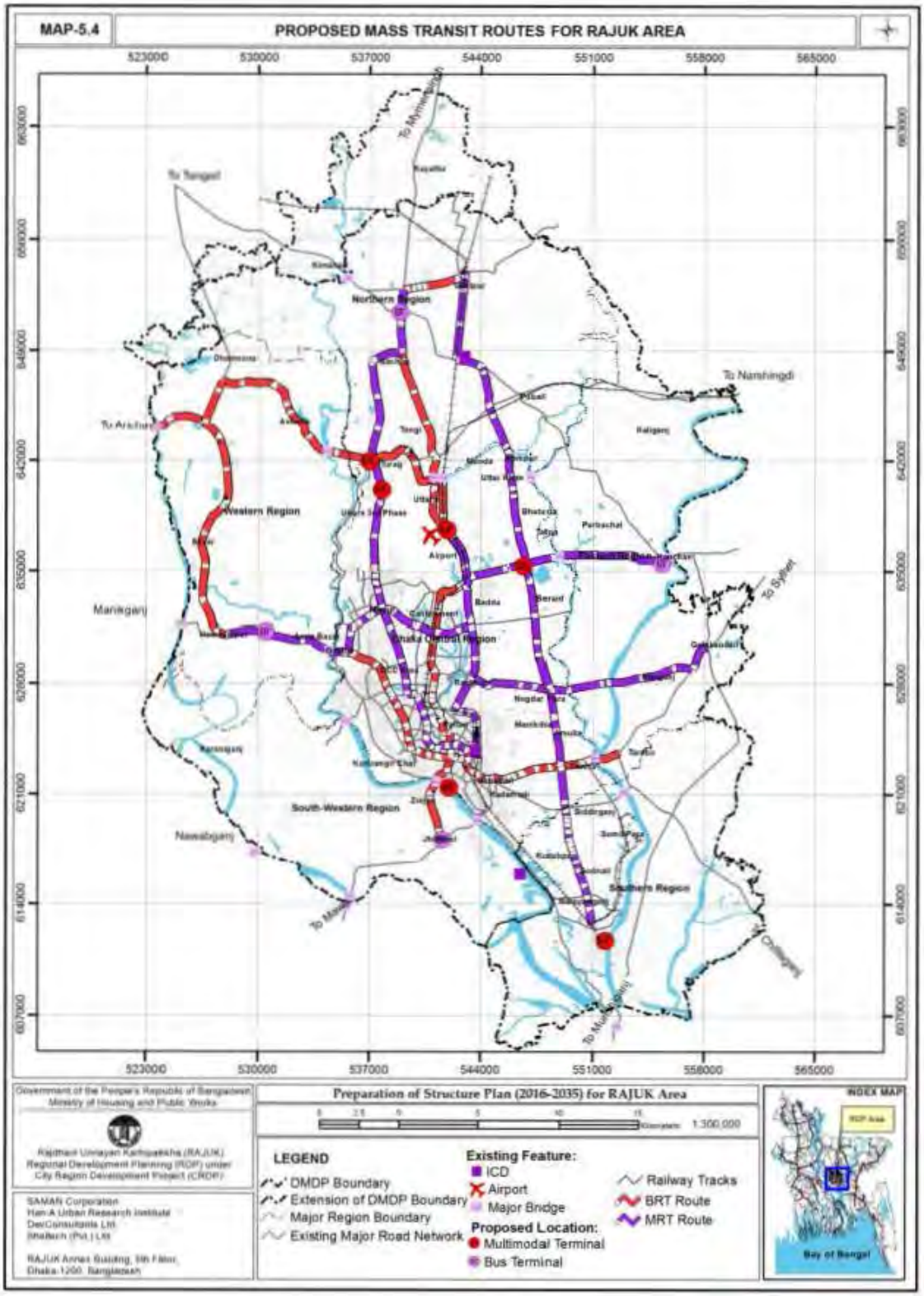


Figure 6 14: Proposed mass transit route for RAJUK area

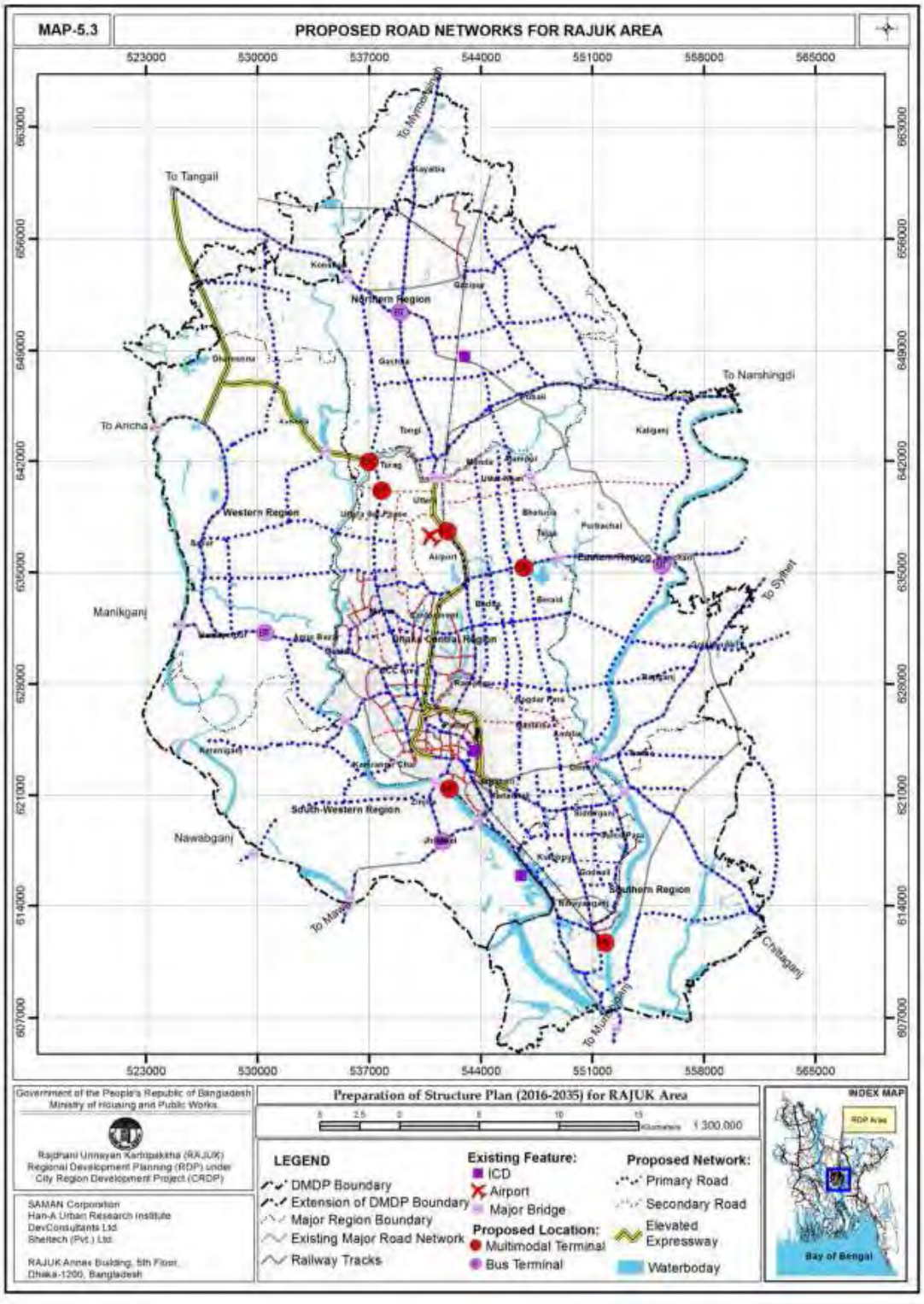


Figure 6.15: Proposed road network for RAJUK area

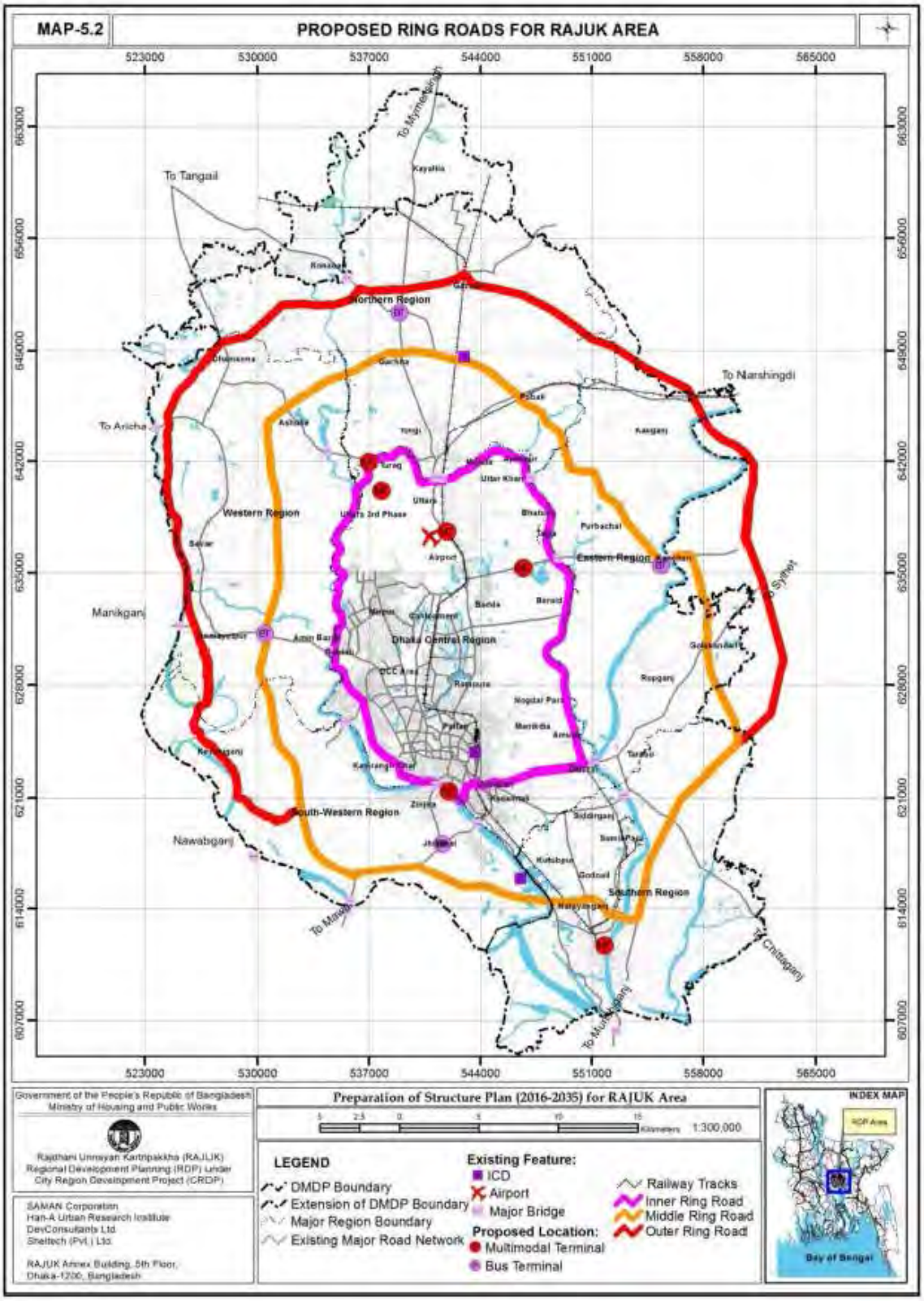


Figure 6 16: proposed ring roads for RAJUK area

6.3. IDENTIFYING THE PUBLIC MOVEMENT

An observation-based survey is needed to understand the present pedestrial pattern. It has to be done in various period of times of a day as well as night. It needs to be done both in peak hours and off-peak hours.

Table-5.1: Daily Passenger Movement in Dhaka (Estimated)

Terminals	Number of Routes	Number of Daily flights/Trips	Number of Daily Passengers (Arrival and Departure)
International Airport	37	160	15,000
Kamlapur and Tongi Railway Station	39	101	120,000
Sadarghat River Terminal	45	404	170,000
Gabtoli Bus Terminal	30	960	50,000
Mohakhali Bus Terminal	8	410	20,000
Saidabad Bus Terminal	19	790	35,000
Fulbaria Bus Terminal	5	1000	32,000
Total			442,000

Source: RDP Survey, RAJUK, 2013

Figure 6 17: Daily passenger movement in Dhaka

6.4. STUDY OF THE NODAL PRESSURE

A detailed study of the nodes which connects the roads has to be studied. It will be studied on different interfaces. It can also be studied from the google traffic congestion diagram.

Table-5.5: Modal share with consideration to MRT (in thousands)

Item		Car	Bus	Rickshaw	Others	Rail & water	Walk	MRT	Total
No MRT	2013	2,016	10,708	12,724	38	66	5,803		31,355
	2015	2,518	12,894	13,145	49	87	6,184		34,877
	2025	5,520	20,739	15,338	94	164	7,784		49,639
	2035	9,737	24,782	16,360	120	203	8,572		59,774
5 MRT	2013	2,016	10,708	12,724	38	66	5,803		31,355
	2015	2,518	12,894	13,145	49	87	6,184		34,877
	2025	5,054	19,387	14,549	90	159	7,665	2,735	49,639
	2035	8,772	21,745	14,698	113	195	8,356	5,895	59,774

Source: Compiled by Consultants, RDP, RAJUK, 2014

Figure 6 18: Predicted modal share with consideration to MRT

6.5. STRUCTURAL SURVEY

A structural survey will determine the present structural pattern of the existing buildings as well as the building conditions.

Figure 6 19: Structural surey

6.6. QUESTIONNAIRE SURVEY

A thorough quantitative questionnaire survey was done to determine the present and expected conditions from the public point of view and to fine out the sense of user-friendliness. The outcome of this survey was

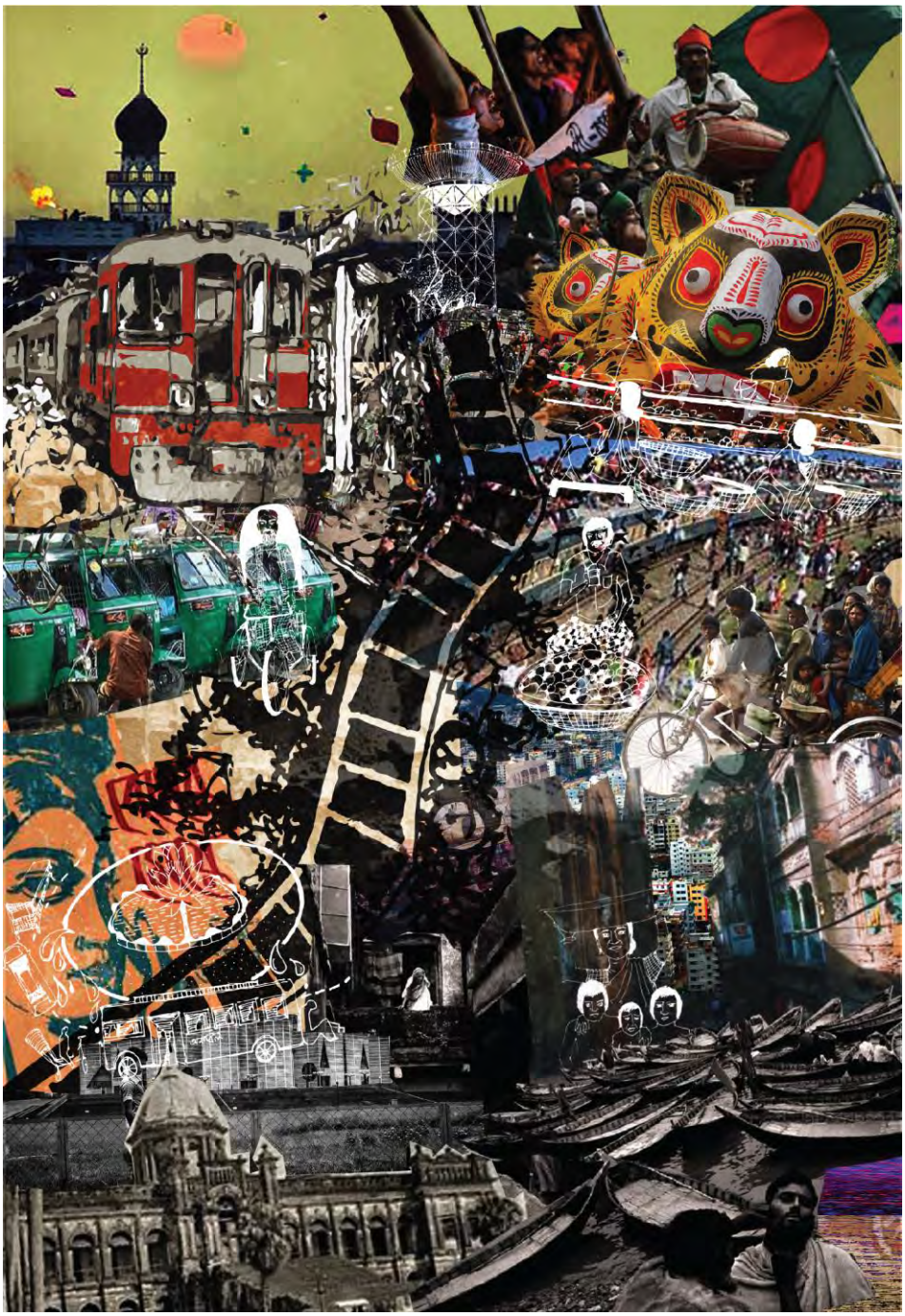
6.6. OBSERVATION SURVEY ON PUBLIC BEHAVIORAL PATTERN

This survey formulates a map of pedestrian pressure through time

Chapter 7: Design development

7.1. CONCEPTUAL DEVELOPMENT

7.1.1. Concept of chaos versus complexity



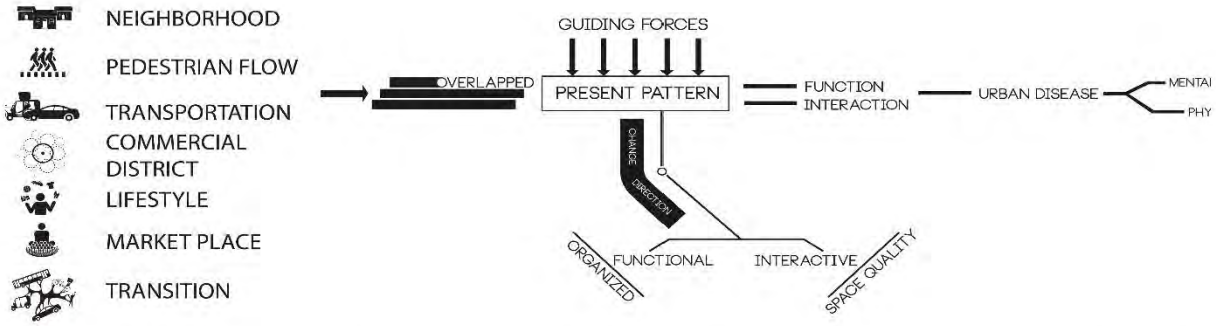


Figure 7 1: Function and space relation pattern considering present situation and the modified.

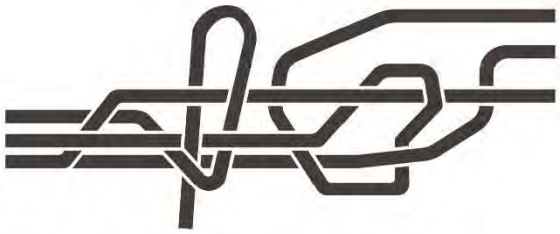


Figure 7 2: Dhaka seems chaotic

Figure 7 3: Arrangment of collective function are juxtaposed

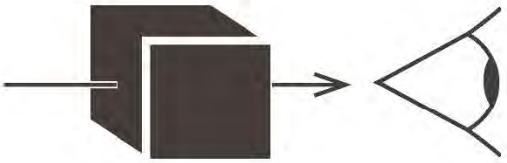


Figure 7 5: This arrangeement of collective form looks chaotic from the outside

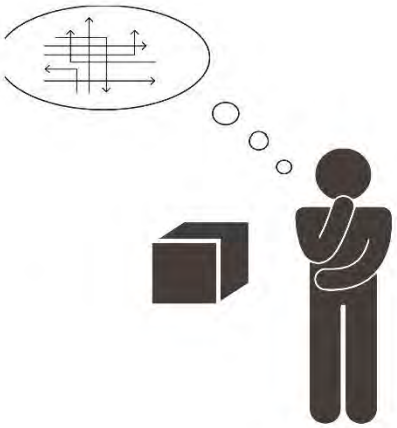


Figure 7 4: The system looks chaotic!

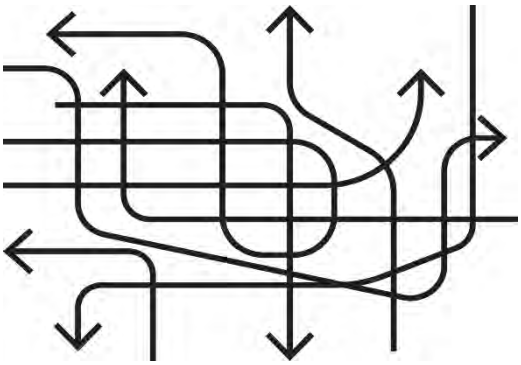


Figure 7 6: The system is just complex.

7.1.2. Concept of strategic megaform

Never static, the contemporary city is dynamic, unstable, and increasingly difficult to trace as a linear process. While cities have traditionally provided stable and hierarchical spatial organizations appropriate to the once relatively uniform nature of social composition and concentrated political power, the contemporary city has liquefied into a dispersed urbanity—a constellation of polynucleated attractors, or downtowns. in which architecture is but one more network with infrastructure as its vector of mobility. Minoring biological evolution, which produces increasingly complex life forms over time, the city is a field of permanent genesis. The constant flux of its social structure evolves with greater complexity. Systems never gets simpler.

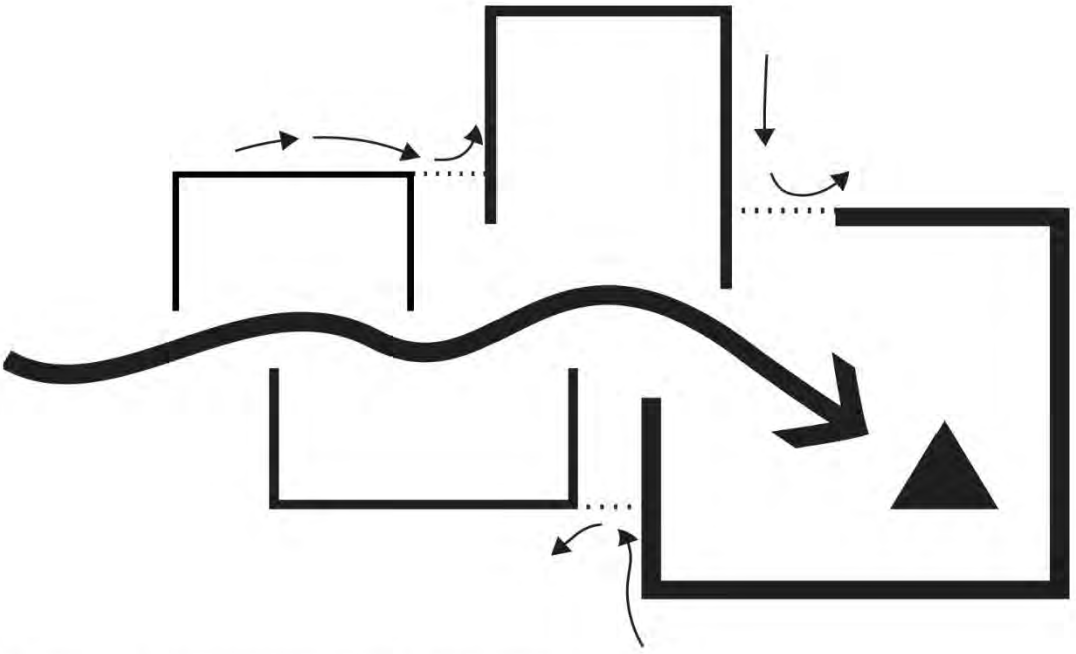


Figure 7 7: concentrated political power

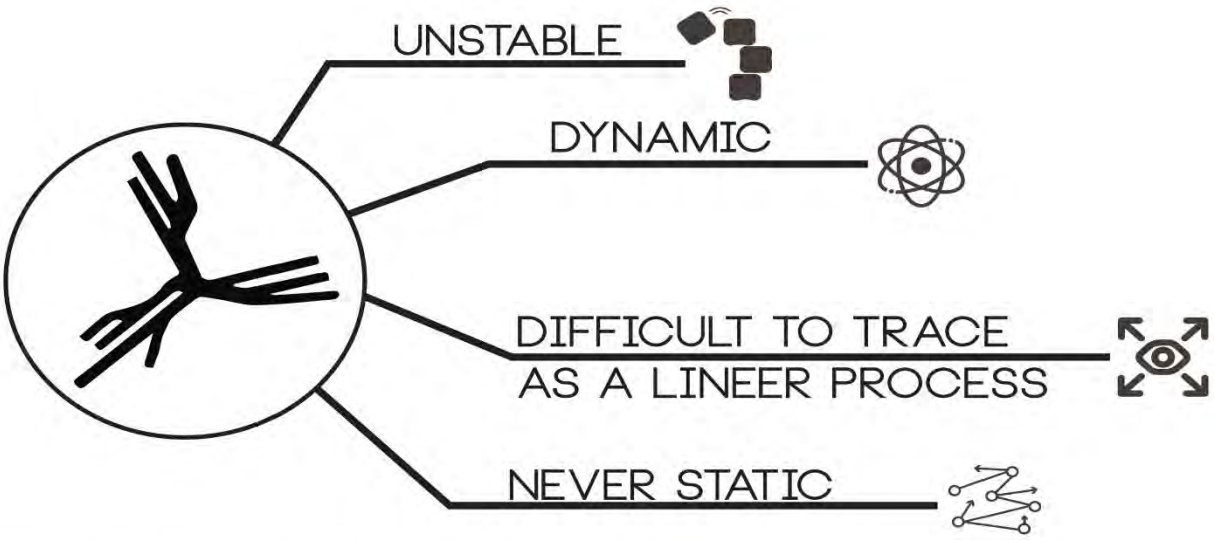


Figure 7 8: Complex behaviour of collective form

Figure 7 9: Strategic megaform

7.1.3. Concept of combinatory urbanism

"The true territory for innovation in urban architecture, then, is not in the production of platonic solids, but rather in the design of operational strategies that deal with the multiple and overlapping forces of a highly complex and entirely uncertain 'collective form.'" (Maki, 1964)

Combinatory urbanism offers an alternative method of urban production that designs flexible frameworks of relational systems within which activities, events, and programs can organically play themselves out. As such, combinatory urbanism engages the premise of continuous process over static form and, in doing so, presents fresh ways to activate the city.

"If the sameness of use is shown candidly for what it is—sameness—it looks monotonous. Superficially, this monotony might be thought of as a sort of order. however dull. But esthetically, it unfortunately also carries with it a deep disorder: the disorder of conveying no direction." (Jacobs, 1961)

7.2. PROGRAM DEVELOPMENT

The programs were generally developed from the functions of multimodal hub and from the adjacent functions

Transportation

- MRT station
- Bus stoppage
- Car ride sharing stand
- Motorcycle Ride sharing stand
- Path towards other transfer points

Recreational

- Multiplex
- Foodcourt
- Sports club

Educational

- Library
- Book shop

Commercial

- Shops
- Kitchen market
- Vendor's plaza
- Bank booth

7.3. DESIGNED OUTPUT OF THE RESEARCH

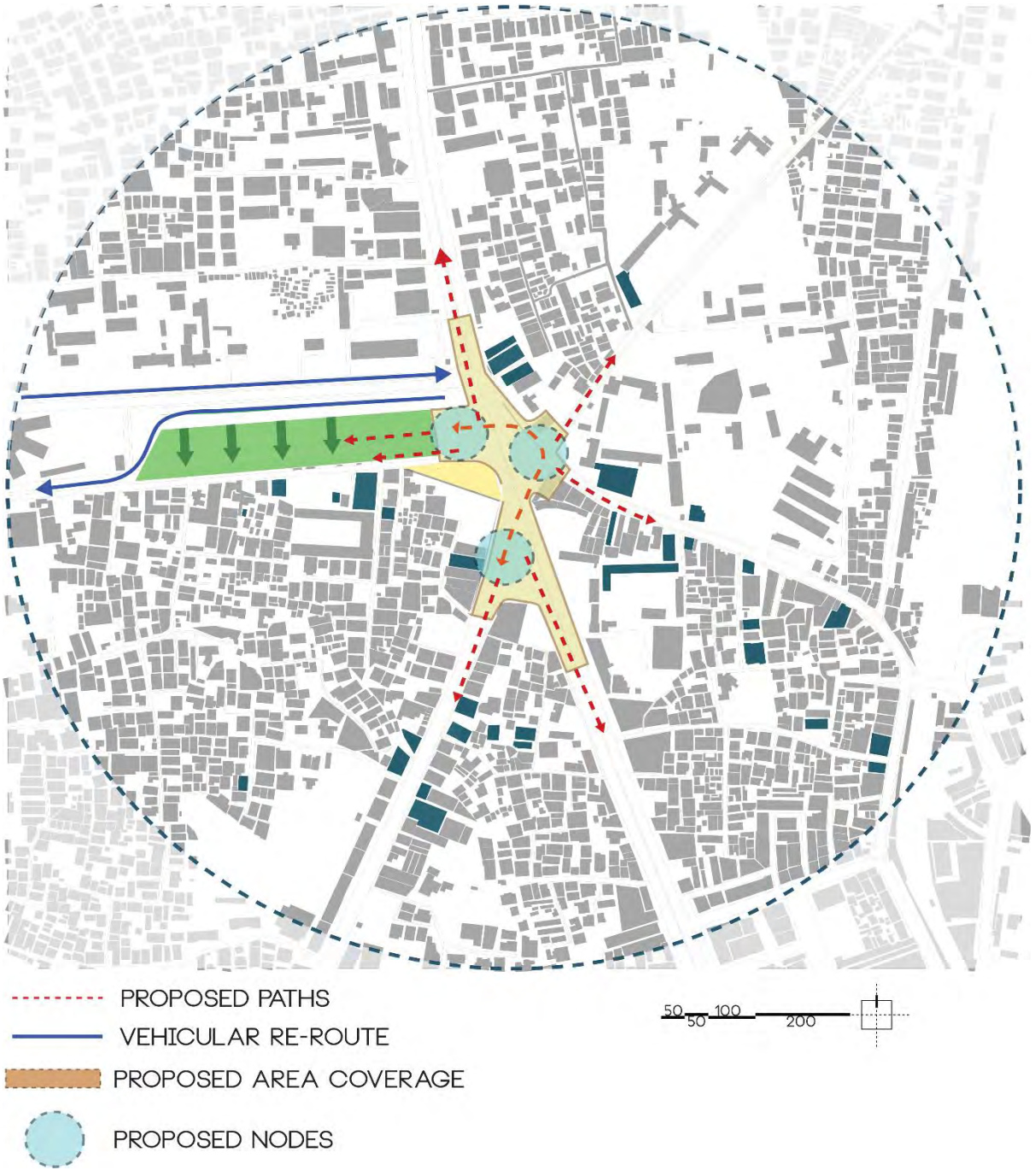


Figure 7 10: Proposed design considerations

Figure 7 12: Plan at 0'-0"

Figure 7 11: Longitudinal section

Figure 7 13: Transverse sections

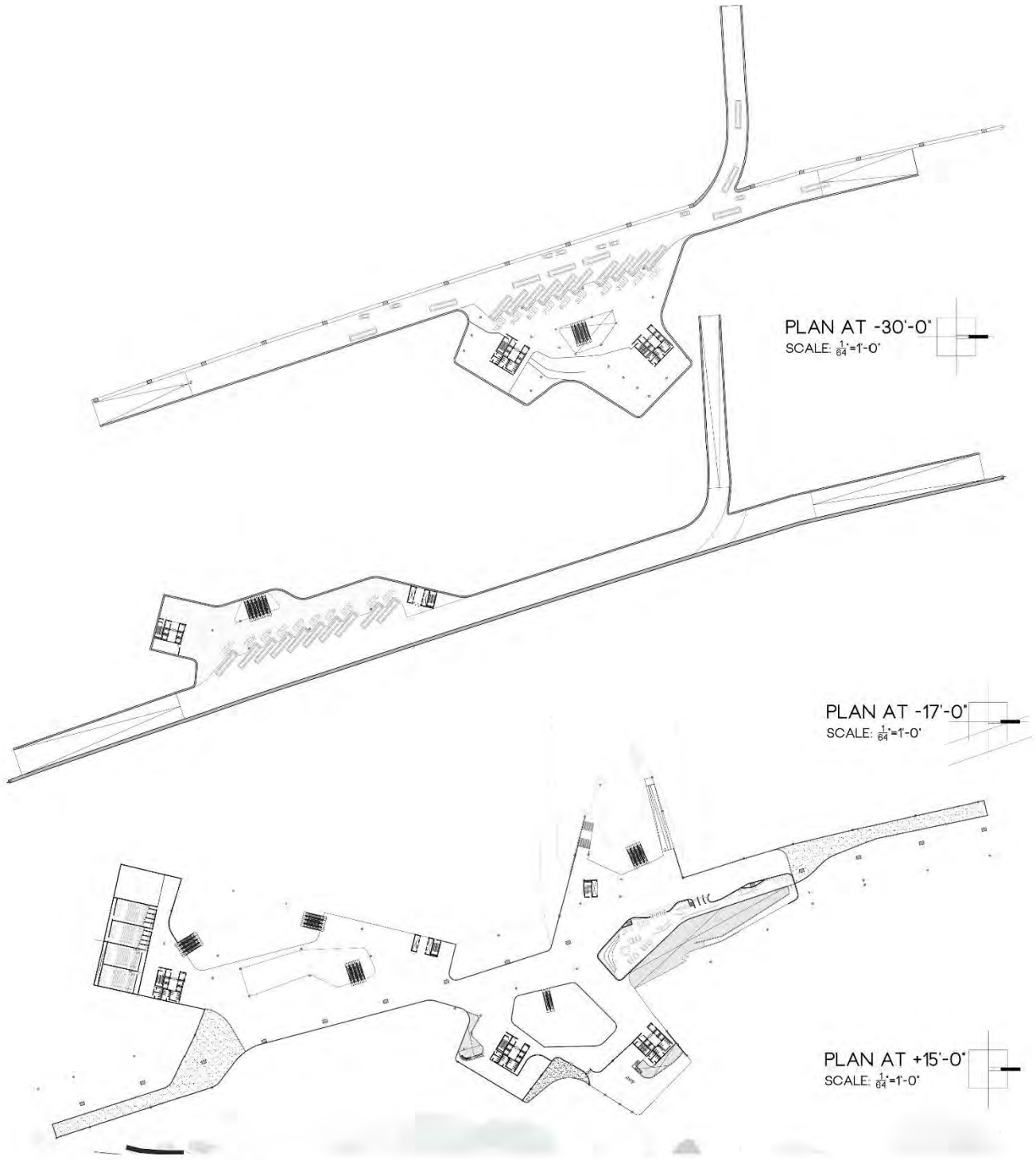


Figure 7 14: Floor plans

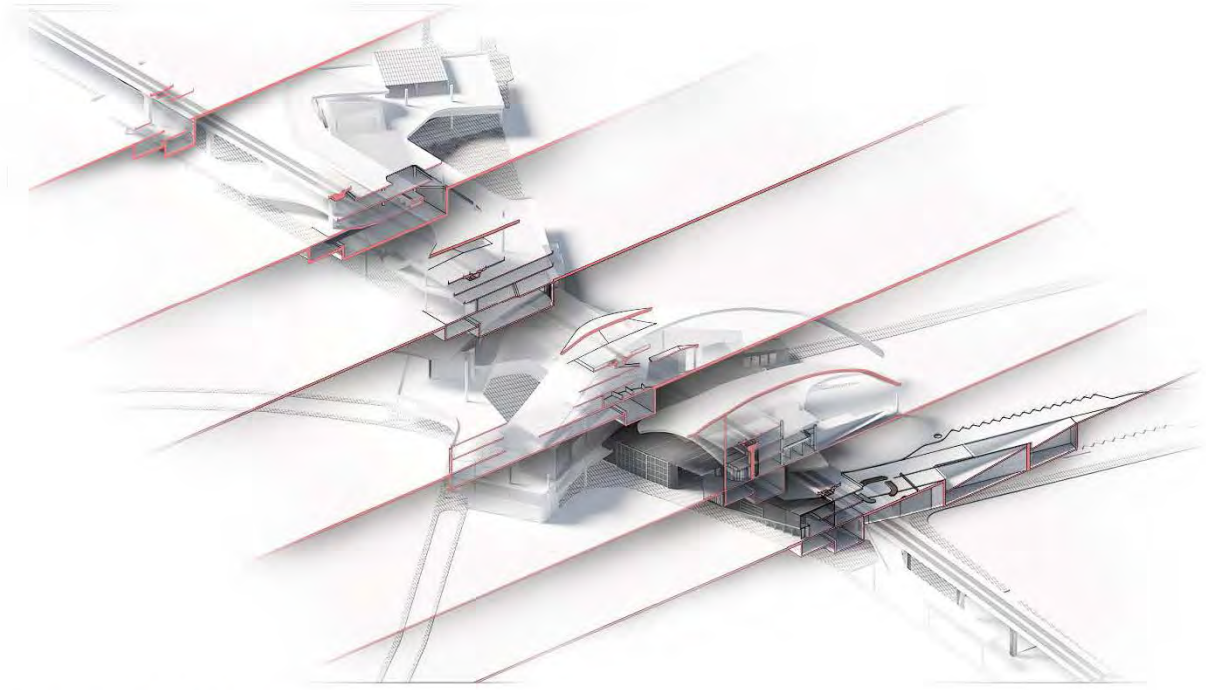


Figure 7 15: Multicut section

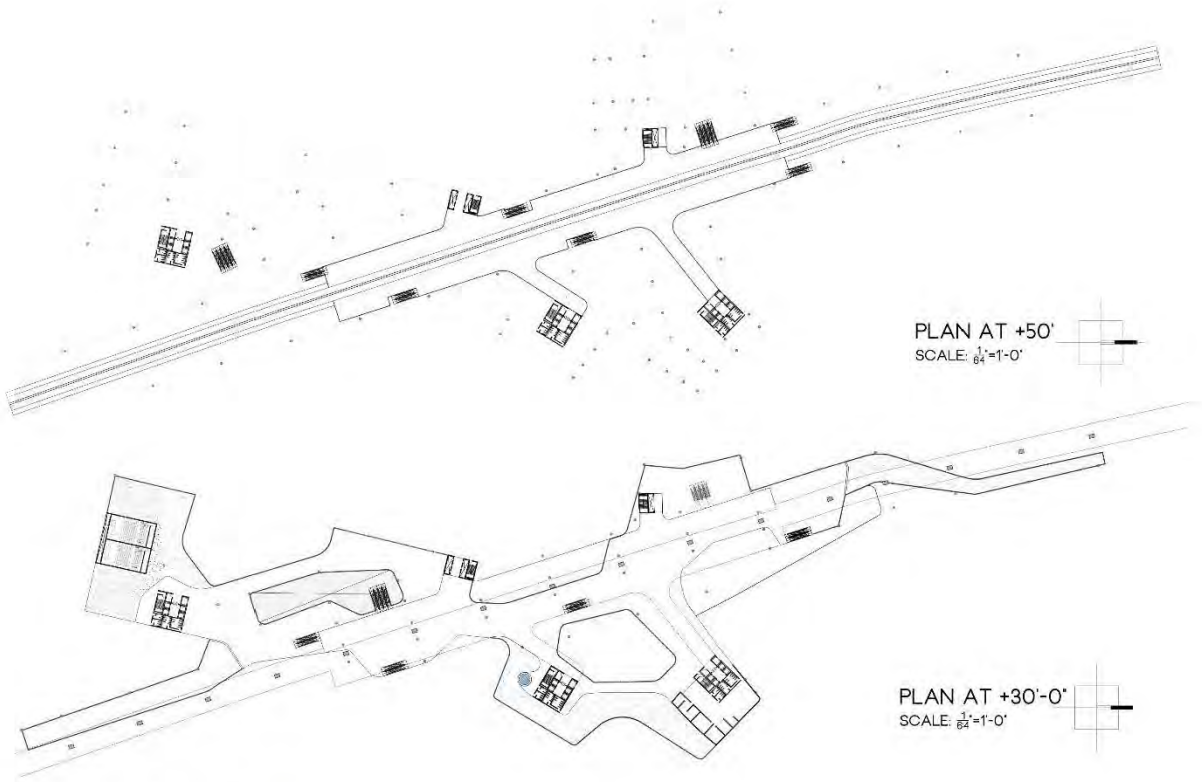


Figure 7 16: floor plans

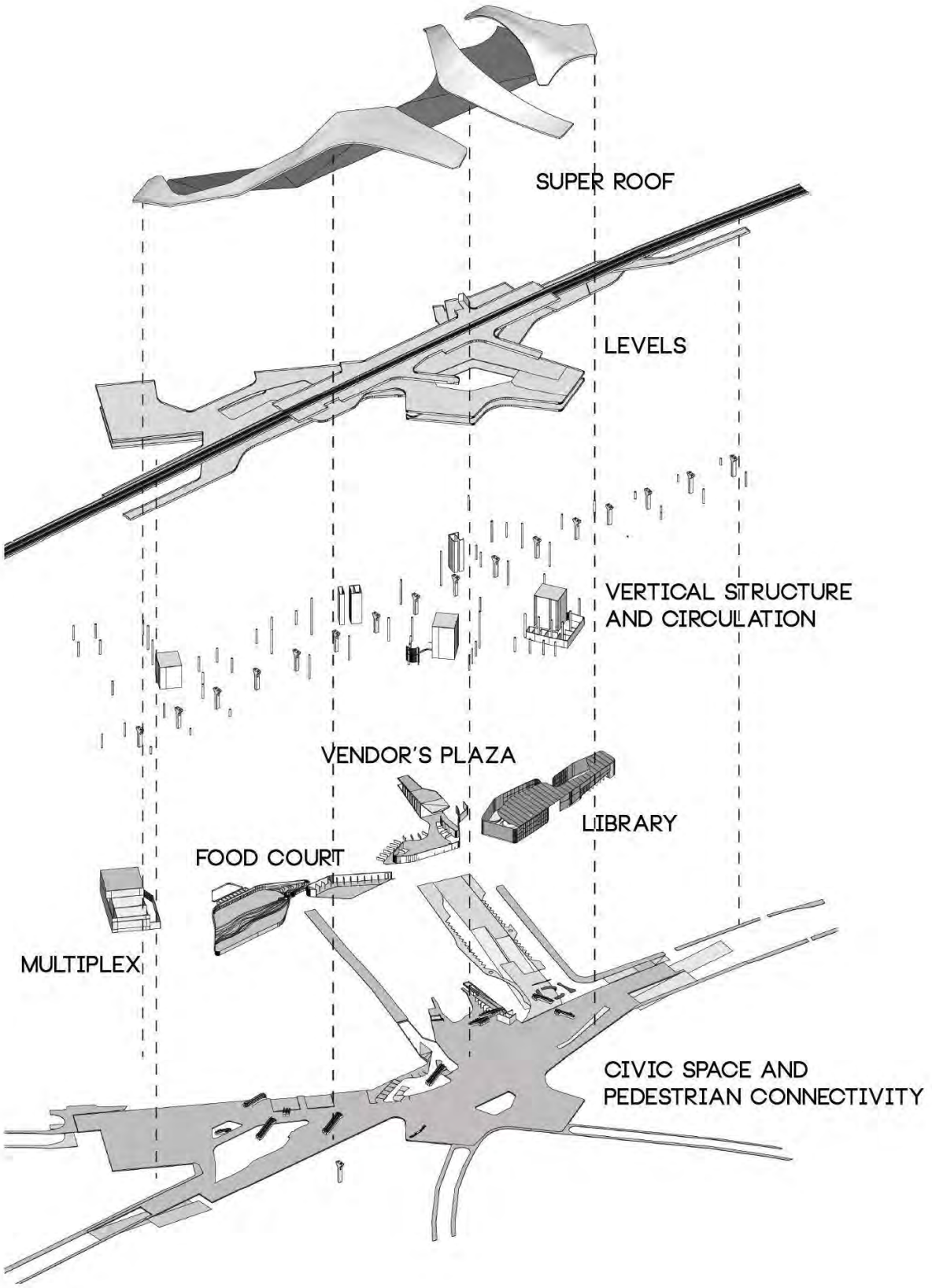


Figure 7 17: Exploded axonometric diagram

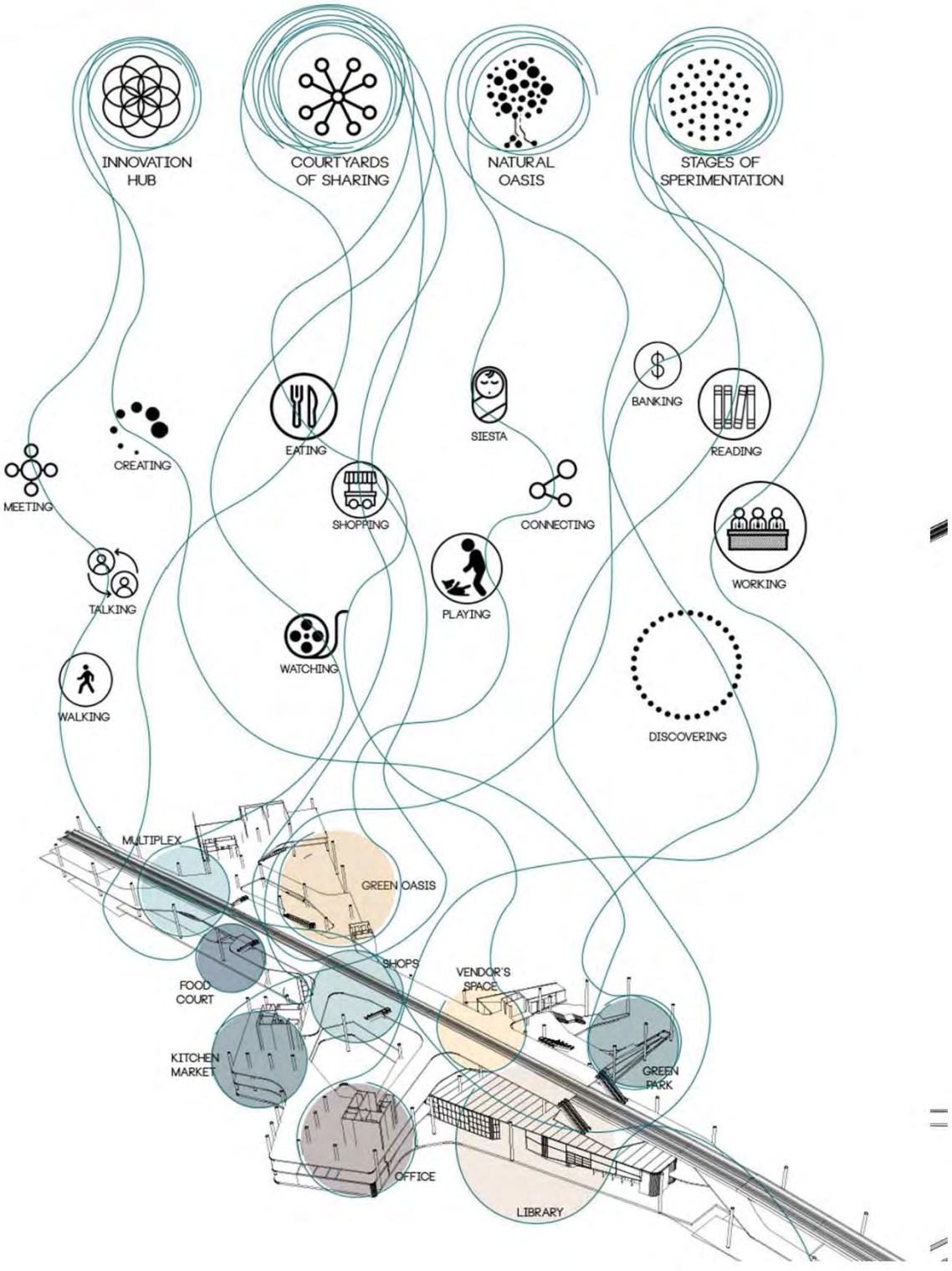


Figure 7 18: Proposed functional diagram

Figure 7 19: Axonometric view with activity blow up.

7.4. MODEL PHOTOGRAPHS

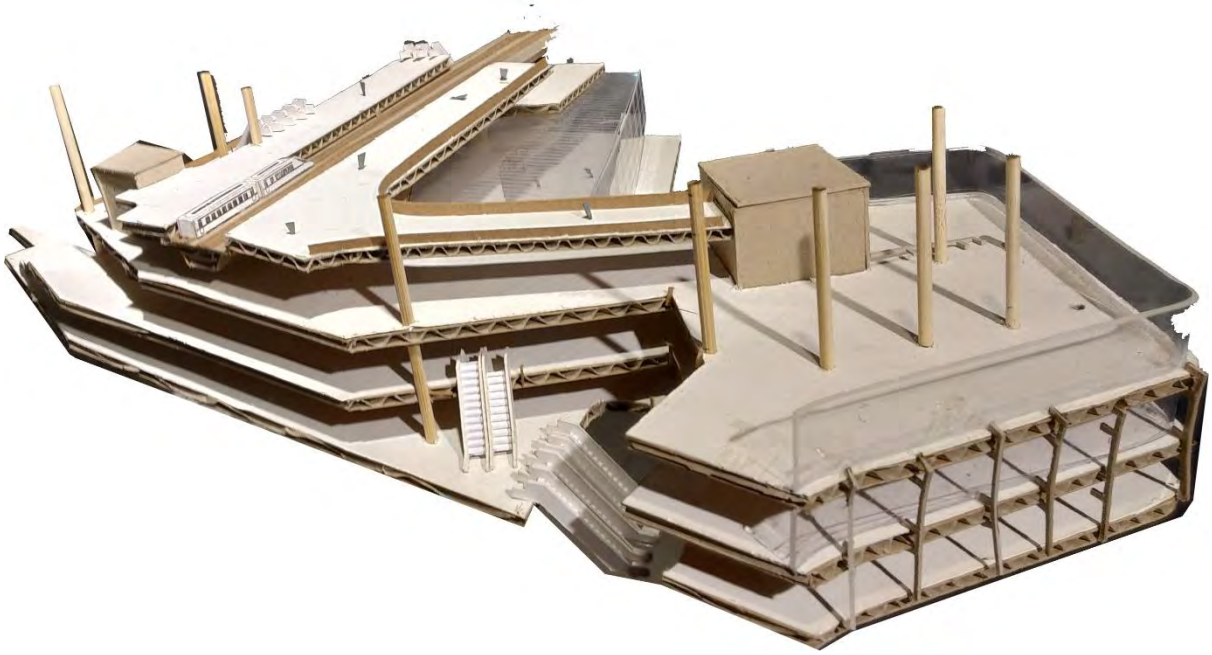


Figure 7 20: spot section model

Figure 7 21: Aerial view

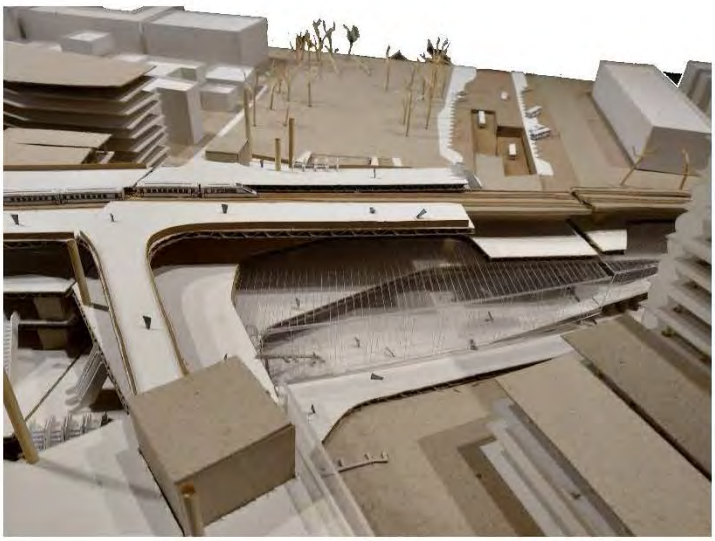


Figure 7 23: Library view

Figure 7 24: Aerial view towards existing green

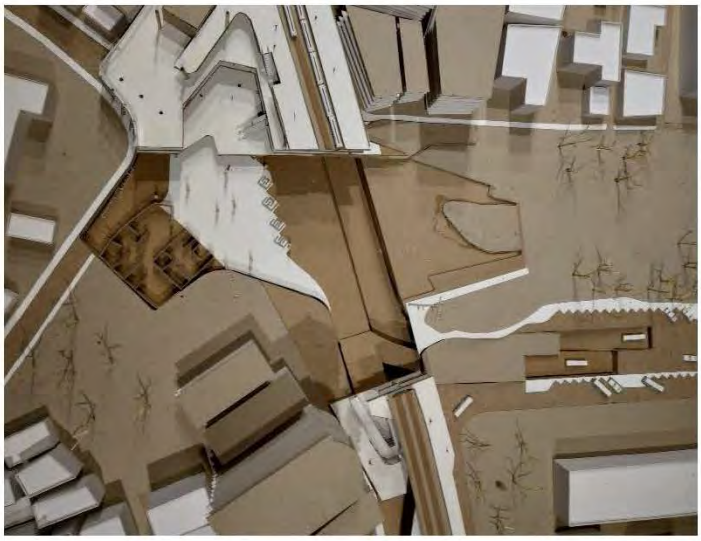


Figure 7 22: Underground bus stoppage

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