FINAL PROJECT – RA.141581

TRANSPORTATION HUB – H.P.R.U.C
[HUB, PARK AND RIDE AS THE URBAN CATALYST]

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TRANSPORTATION HUB – H.P.R.U.C
(HUB PARK AND RIDE AS CATALYST)

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Departemen Arsitektur FADP-ITS pada tanggal 6 Juli 2018
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[Hub, Park and Ride As the Urban Catalyst]

Periode : Semester Gasal/Genap Tahun 2017 / 2018

Dengan ini menyatakan bahwa Tugas Akhir yang saya buat adalah hasil karya saya sendiri dan benar-benar dikerjakan sendiri (asli/orisinil), bukan merupakan hasil jiplakan dari karya orang lain. Apabila saya melakukan penjiplakan terhadap karya mahasiswa/orang lain, maka saya bersedia menerima sanksi akademik yang akan dijatuhkan oleh pihak Departemen Arsitektur FADP - ITS.

Demikian Surat Pernyataan ini saya buat dengan kesadaran yang penuh dan akan digunakan sebagai persyaratan untuk menyelesaikan Tugas Akhir RA.141581

Surabaya, 6 Juli 2018

Yang membuat pernyataan

Yonathan Oktavianus
NRP. 08111440000065

PREFACE

Praise are to Jesus Christ the almighty God and the most merciful that because of His blesssings, I could finish my final project proposal titled " H.P.R.U.C [Hub and Park n Ride as the Urban Catalyst.

All the effort put into this final project proposal would not be enough, if I did not have the support of my loving family and friends around me. Therefore I would like to thank my mother, my father, and my sister who have been rooting for me since day one. Also, this proposal would not be complete without the helping hand of my best friends, who did not hesitate to help me with any difficulties I encountered. My friends made sure I had the necessary distraction during the process of research and always came up with handy ideas.

Most of all, i would like to show my highest appreciation and gratitude for the involvement of my lecturer, Dr. Arina Hayati ST., MT , who kept an eye on the shaping of this final project proposal. With her thoroughness and excellent skills, writing of this proposal would never be possible, nor would it be pleasant.

All in all, I am aware of how flawed this final project proposal is that it is so far from being outstanding. Therefore, I invite you as the readers to give comments and suggestion from those who are deeply concerned in such topic. However, I expect that this proposal will give worthwhile contributions to all readers.

Surabaya, 28 June 2018

Author

TRANSPORTATION HUB - H.P.R.U.C [HUB, PARK AND RIDE] AS THE URBAN CATALYST

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ABSTRACT

In urban context, the healthy city must provide easy access to the city dwellers. This project is conducted in Joyoboyo area. The development of Joyoboyo area at presently fails to provide easy access to the pedestrians and mass-transportation's user. The development of infrastructure without integration between transportation system and the city's development leads complex problems. Transit Oriented Development (TOD) is one of concepts to perform an integration urban development scheme that maximizes residential, business and leisure space within walking distance of public transport. This project is proposed to design an architectural building within a city planning scheme that employs TOD concepts with several elements, i.e. land use intensity and people's expectations toward the city's development concept. The design uses Open-act Architecture and Catalyst Architecture as design approach which focuses on active user's participation. The method used is city planning design concept with the guide of city space area design elements. This project yields a planning concept in a form of an architectural design illustration which proposes integrated design and planning between transportation system, buildings, open spaces, pedestrian paths, and other existing activities in targeted.

Keywords: Openact Architecture, Catalyst Architecture, Transit Oriented Development, Infrastructure, Pedestrian, City Design

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CHAPTER 1
INTRODUCTION

1.1. Background

The development of a city is accompanied by the population growth that affects the needs of place for urban activity, infrastructure and supporting facilities, ie. transport infrastructure. This development lead to the other problems, such as the unbalanced growth of transportation infrastructure (roads) and transportation facilities, resulting traffic density (Utomo, 2013). One solution to anticipate the traffic density is by providing pedestrian way that is comfortable for pedestrians.

Pedestrian way is part of the transportation system or the linkage system. Because by walking and using pedestrian way, we can reach all corners of the city that cannot be reached by a vehicle (Adisasmita, 2011). The three things that need to be paid attention to the walking activity is the need for space, need to be integrated with other systems, and need to connect with transportation elements such as parking lot, bus stop, station, land use (Danisworo, 1999).

The city of Surabaya is the second metropolitan city after Jakarta, with a large population and continues to increase, resulting in demand for transportation continues to increase, especially personal transportation. The length of the road in Surabaya over the last three years has increased 0.15% per year, while the number of motor vehicles in Surabaya increased 6.4% per year (Utomo, 2013). To anticipate this the Surabaya City Government made a policy on the infrastructure and facilities for pedestrians that are on the RTRW Surabaya 2016 - 2021.

1.2. Issue and Design Context

The city of Surabaya becomes the study's location because it is the second densest city of traffic conditions in Indonesia. The volume of personal vehicles are larger than the public transportation. This condition is happened because the public transportation is less attractive and the quality of space is not able to accommodate passenger needs with public transportation vehicles.

1.2.1 Site Selection Criteria

According to the survey conducted by the author, where people can gather and transit with a public transport or an intermodal area in Surabaya. Therefore, criterias for site selection as follows:

• Close to the City entrance and transit stop

• Easily accessible and has been planned with a city plan (TOD)

• The area is well known as an area or transit area in the city of Surabaya

• The area can encompass a complex function in this case is the intermodal transit area

• The area can be a median between private transit and public transit conditions

The site selection strategy is based on the location of the development of the MRT (Mass Rapid Transportation) unit. The operation of MRT changes the whole transport routes in Surabaya City. Urban transport will **CONNECTS** MRT corridors with many areas and public facilities in Surabaya city. MRT tracks connects the center of Sub City which is the center of growth and activities on local, regional, and national scale. This is in accordance with the principle of catalyst architecture approach.

Figure 1.1 Public Transport System Plan by Department of Transportation
Source : https://www.slideshare.net/irvanwahyu1/surabaya-mass-rapid-transportation-smart

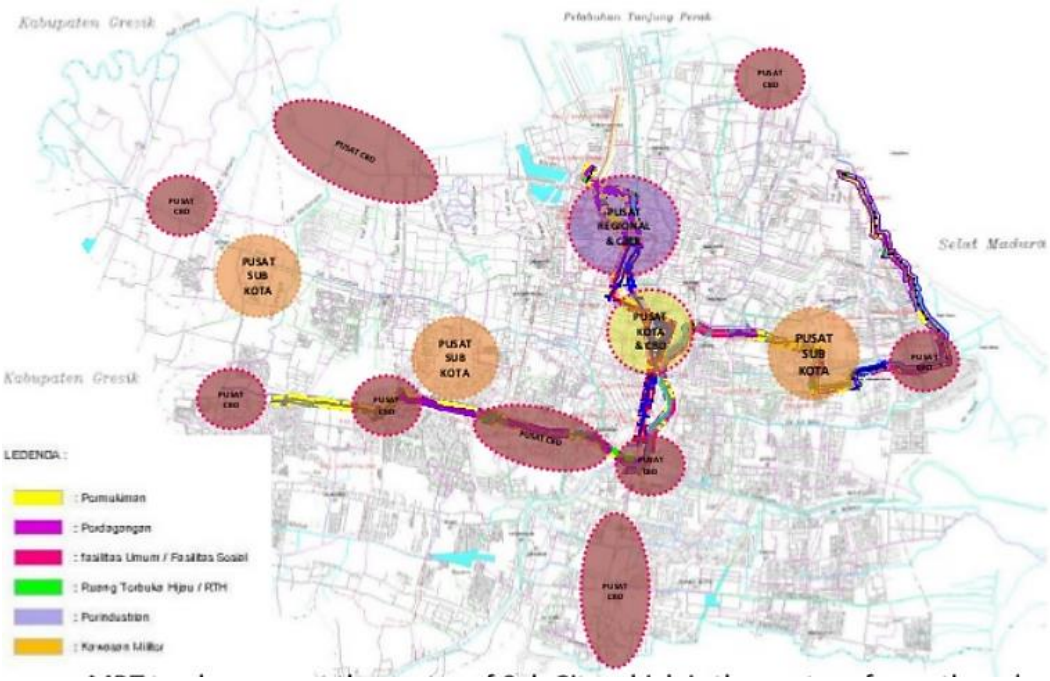

Figure 1.2 Public Transport System Plan by Department
Source : https://www.slideshare.net/irvanwahyu1/surabaya-mass-rapid-transportation-smart

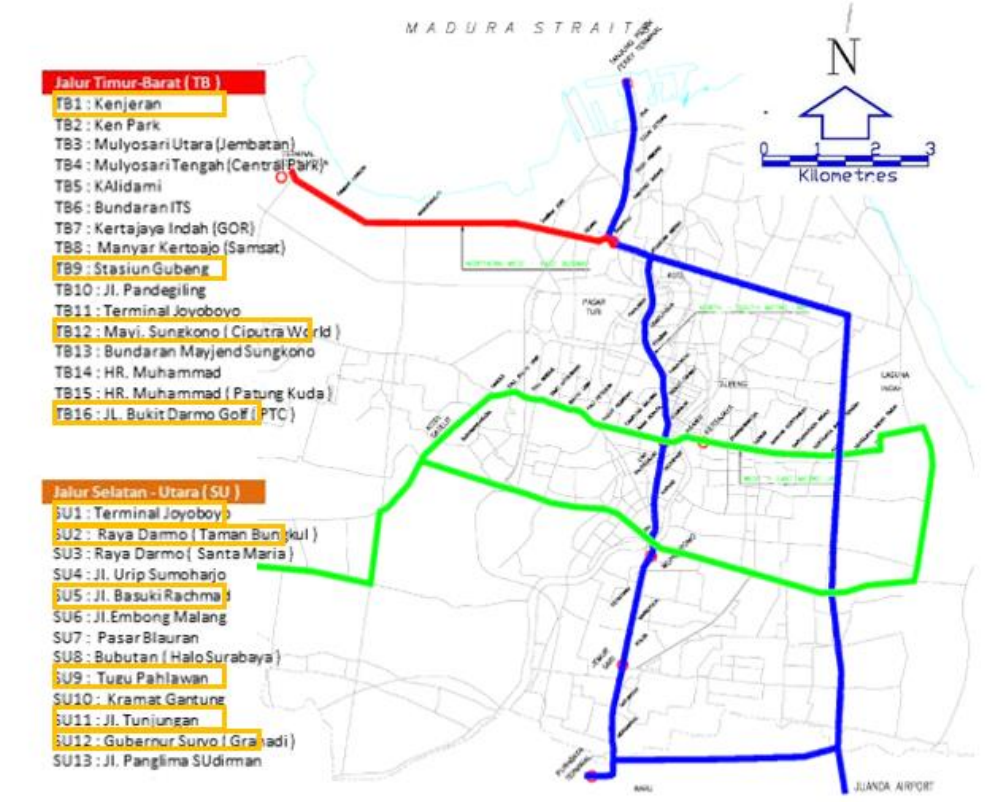

Figure 1.3 The Location of MRT Development Plan
Source : https://www.slideshare.net/irvanwahyu1/surabaya-mass-rapid-transportation-smart

There are several locations related to the MRT development unit plan, east-west route and north-south line. From figure 1.3, it can be seen some of the locations passed by MRT surabaya. There are 9 specified locations that has the highest level of visitation, which are : (1) Kenjeran, (2) Stasiun Gubeng, (3) Mayjend Sungkono (Ciputra World), (4) Jl. Bukit Darmo Golf (PTC), (5) Terminal Joyoboyo, (6) Taman Bungkul, (7) Tugu pahlawan, (8) Jl. Tunjungan (TP), (9) Grand City. Selection of this location is aimed to determine where the starting point of this project. Of the nine selected locations will be analyzed with several criteria determined, namely **(1) Density, (2) Activity, (3) Walking Activity, (4) Infrastructure Condition, (5) View.** Here are the results of the analysis of some of these criteria on the selected locations:

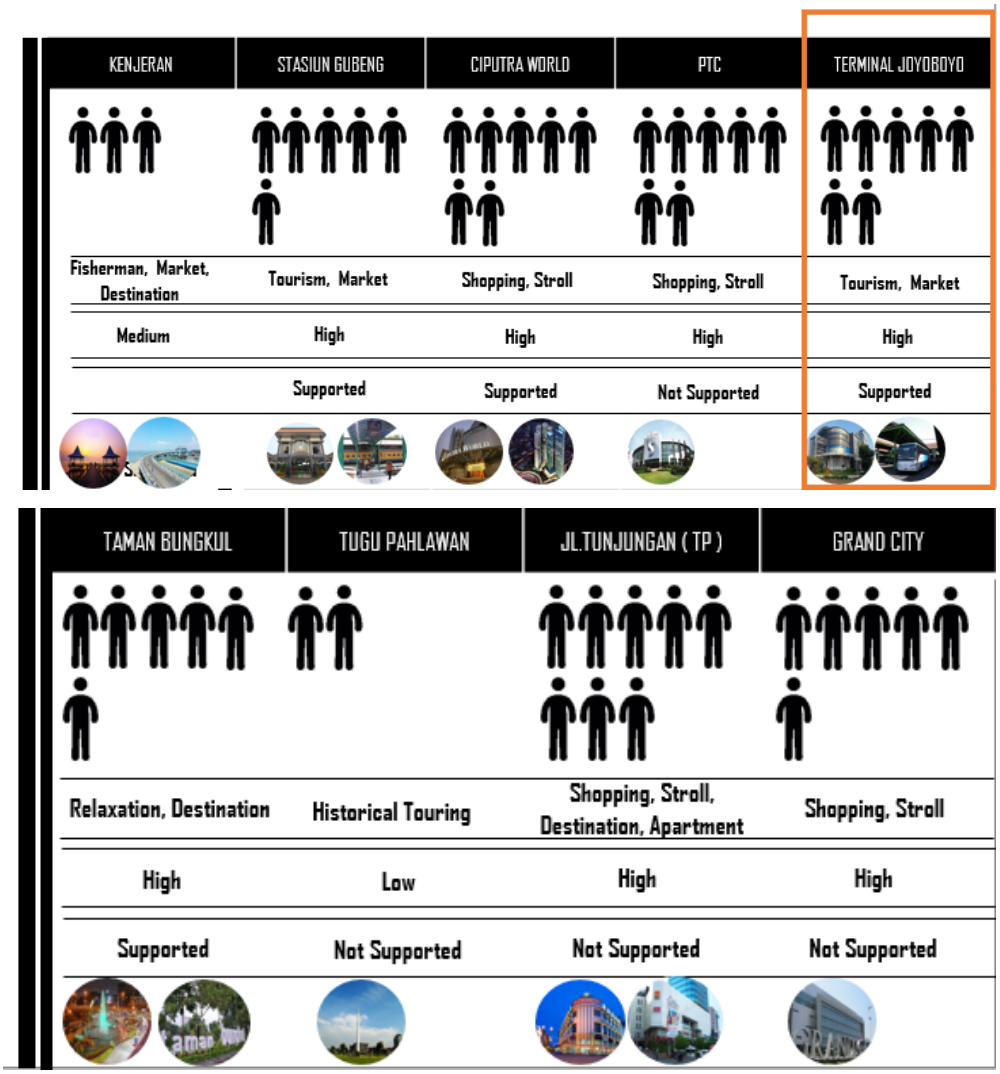

Figure 1.4 The Analysis Result From the Location by the Criteria

From the results of the data show that the location that most supports the criteria is in the Joyoboyo Terminal Area. The results show that the location has the highest level of visitation, has a high level of walking activity, coupled with supporting infrastructure conditions, and has a good view. Besides, this location will most often be passed by the MRT (Mass Rapid Transportation), and passed by residents outside Surabaya who will visit Surabaya. This condition is supporting this project.

1.2.2 General Description of Project's Location

Joyoboyo has potential to be a pedestrian-oriented area by integrating the pedestrian paths, modes of transportation, and land use. This area is surrounded by important places in Surabaya, such as Joyoboyo terminal, Wonokromo Station, DTC, and Surabaya Zoo. The points of activity in this corridors are close together so it will be easier to access by walking (RDTRK UP Wonokromo, 2016). In the future, Surabaya City Government has planned the development of public transportation such as monorail and tram. This planning will make the Joyoboyo region increasingly developed into a pedestrian-oriented area (Jawa Pos, 2007).

1.3. Design Problem and Criteria

The planned pedestrian network in Joyoboyo area had previously been arranged in the RDTRK UP Wonokromo in 2016-2021, but the plan still covered a broad and general scale, while pedestrians were only able to move at short distances and at certain points only, so that the plan was still not detailed to certain movement points, such as the generation of movements on KBS, DTC, Joyoboyo Terminal, and Wonokromo Station. Pedestrian activity can be supported by integrating the mass transportation facilities with surrounding public facilities. But the plan is still far from expectations, where the pedestrian movement in this area is still not optimal. Therefore, there needs to be a solution to optimize this potential. Some criteria are needed to direct the design so that it is right on target with the existing problems.

A. Traffic Requirements:

1. The exit and entry of passengers must be separated from the vehicles circulation
2. Vehicles in the terminal must be able to freely move without obstacles
3. The vehicles circulation system in the terminal is determined based on the number of travel directions and travel frequency.
4. The punctuality

B. Terminal Planning Requirements:

1. Construction of the terminal must consider : Terminal design, traffic impact analysis, and environmental impact analysis
2. Required passenger facilities
3. Clear restrictions between the terminal and the other designation locations
4. Separation between vehicle traffic and movement of people inside the terminal
5. Clear separation between inter-provincial transportation lines between provinces, inter-city transport in provinces, urban transport, and rural transport.

C. Design Criteria:

1. Design is able to accommodate all the requirements required by the terminal
2. Design must be more efficient
3. Design can give effect to users.

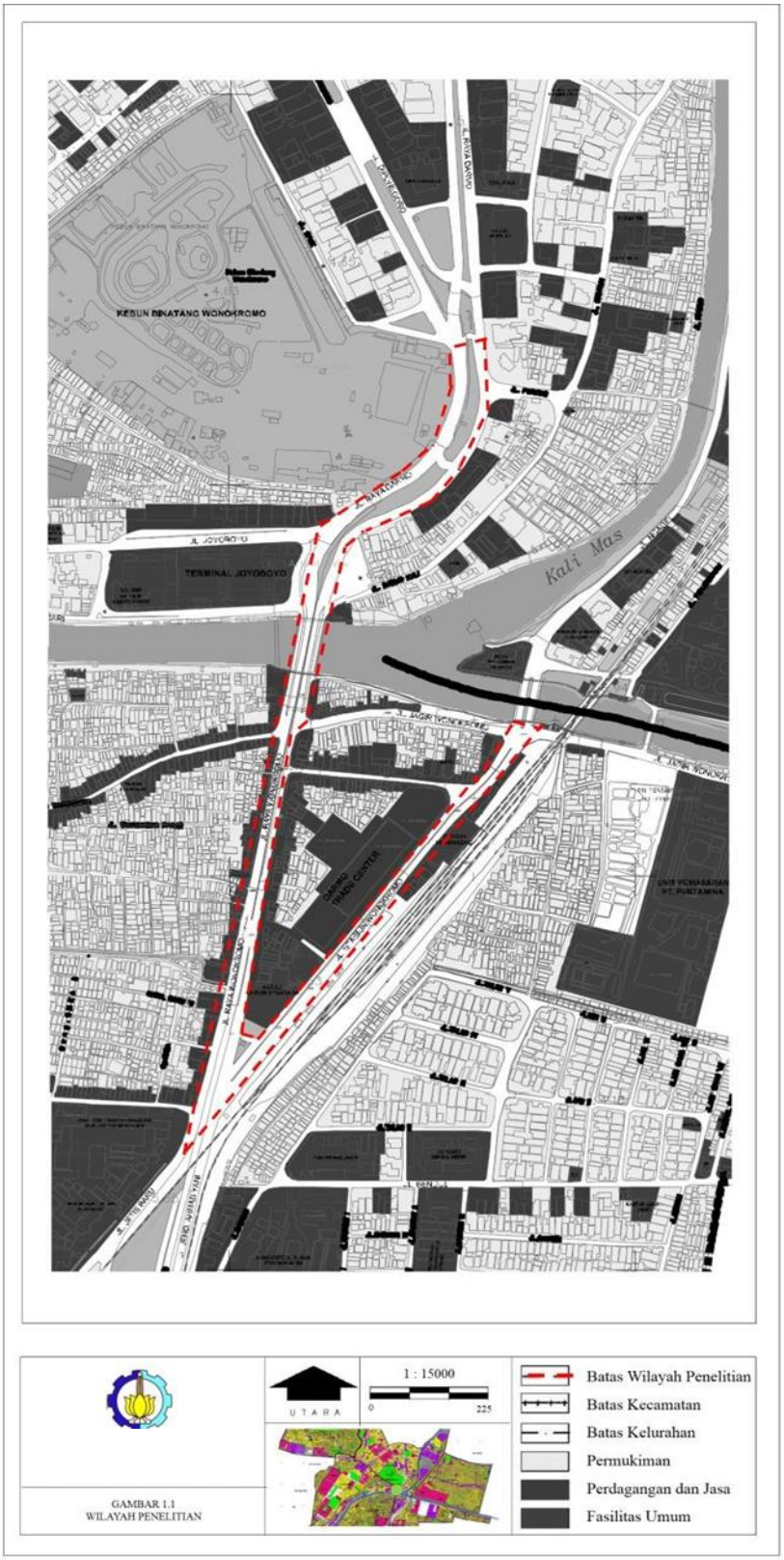

Figure 1.5 The Research Area
(Source : RDTRK UP Wonokromo, 2016-2021)

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CHAPTER 2
DESIGN PROGRAM

2.1 Site Analysis

Joyoboyo has a main function as a trading and service area supported by residential facilities and public facilities, especially in the corridor of Jalan Raya Wonokromo, Jalan Stasiun Wonokromo, and Jalan Raya Darmo (RDTRK UP Wonokromo, 2016 - 2021).

2.1.1 The Development of Project's Area Become A Pedestrian-Oriented Area

The activity in this area has a close proximity so it will be easier to reach on foot or become pedestrian-oriented area. In fact the movement of pedestrians is still minimal, so it need research to see things that affect the movement of pedestrians to support the design.

In the early stages will identify what is the factors that affect the movement of pedestrians. The three factors that affect the movement of pedestrians are **travel time, land use public facilities and the availability of main transport**. In the next stage, will analyze the performance of factors affecting the movement of pedestrians. Final analysis is obtained the concept of pedestrian movement optimization, there are **Integrated** all systems that support pedestrian movement such as, transit points, mass transit modes, and land activities.

2.1.1.1 Criteria and Characteristic of Pedestrians

Pedestrian as a flexible and easy-to-use mode of transportation should have certain criteria, such as slow speed of movement, relatively light weight average (40-70 kg), have an open or no means of safety equipment, and feelings and lives felt directly by pedestrians (Syaifudian, 1988). While the location criteria that require pedestrian facilities are, in urban areas with high population, roads that have fixed routes of public transport, areas that have activities that continue and high, locations that have high needs with short periods, locations that have high demand for certain days.

2.1.1.2 The Factors that Trigger People to Walk

There are many things that can affect the pedestrian movements, in general these factors are, permeability, connectivity, legability, safety and perceived safety, comfort, variety, and amenities (Kolody, 2002). Meanwhile, according to Iswanto (2006) factors of pedestrian movement are pedestrian accessibility, users, frequency of activity, pedestrian relations with the surrounding environment, and psychological factors. Ryan (2009) suggests that there are two important things that influence in the formation of pedestrian paths, security and comfort. If there is something interesting or pedestrian has a certain purpose can also be a factor that trigger the movement. It can be concluded that the factors that form the pedestrian path consists of connectivity, security, comfort, diversity of activities, physical condition of the path, and the relationship of the pedestrian to the environment.

2.1.1.3 Pedestrian and the Site Context

The road network system aims to integrate and link growth centers of urban activity. The division of the road according to its function is divided into 4 (four) kinds namely: artery road, collector road, local road, and environment road.

Figure 2.1 Road Network Pattern of the Research Area
Source : the diagram is the personal data, the data is from the government

Table 2.1 Long Roads in the Research Area

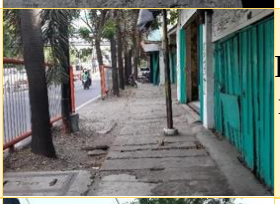
No.	Corridor	Distance (m)
1	Jl. Stasiun Wonokromo	+-607 m
2	Jl. Raya Wonokromo	+- 583 m
3	JL Raya Darmo	+- 488 m
	TOTAL	+- 1678 m

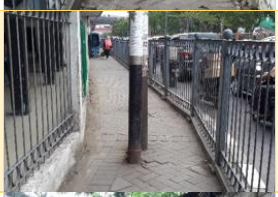
(Source :BAPPEKO 2016-2021, UP Wonokromo)

From the data on the table 1 it is known that Joyoboyo area is an area that supports walking activities. The length of the road is in the range that pedestrian can pass through. But the opposite happened, the number of pedestrians in the area Wonokromo little. Why does this happen ?

Figure 2.2 Long Roads in the Research Area
Source :BAPPEKO 2016-2021, UP Wonokromo

Table 2.2 an Obstacle alongside the Research Area

Corridor	Obstacles	Picture	Information
Jl. Raya Wonokromo	A		There is a pedestrian path that is disconnected.
	B		Finishing the pedestrian pavement is not smooth
	C		Poles and trees that are not restricted so it will disturb the pedestrian
	D		Many motor vehicles are parked in pedestrian way so that it will cause disturbance to the pedestrians
	E		Finishing pedestrian avement is not smooth and there are too many street vendors
	F		Street vendors area consume the pedestrian way so it will disturb the movement of pedestrians
	G		Information board are in the pedestrian way. It makes pedestrian way area lesser
	H		Altitude difference in the pedestrian way due to ceramics released
	I		The surface road it's not smooth

	J		Pedestrian way perforated so it will be the dangerous point to pedestrians
Jl. Raya Darmo	K		Finishing the pedestrian pavement is not smooth
	L		Street vendors are in the pedestrian way so it will disturb the pedestrians to move
	M		There is a big tree in the pedestrian way. It makes pedestrian way area lesser
	N		There are plant holes that are not closed so that endanger the pedestrians
Jl. Stasiun Wonokromo	O		There are a tree in the pedestrian way. And it makes the structure of the pedestrian way is broken
	P		The surface road it's not smooth and have a sand
	Q		There is a power plant in the pedestrian way. It's very endanger the pedestrians
	R		The pedestrian way is not smooth and there is a trash can that place carelessly

	S		Pedestrian way is disconnected because there are a street vendors selling alongside the street

From the table above it can be seen what are the pedestrian barriers in all road corridors in Joyoboyo, to see how many obstacles are, then in Table 3 will be described the number of obstacles from each type of obstacle.

Table 2.3 the Street Obstacle in the Research Area in Number

No	Category	Element	Obstacle	Condition
1	Information System	Power Pole	13	good
		Signing	8	Very good
2	Infrastructure System	Open drain	9	Very good
		Pedestrian Way	45	Very bad
		Stair	7	Very good
		Parking	34	Very bad
3	Supporting Activity	PKL	29	bad
4	Plant	Tree	17	good
Total Obstacle Object			160	**Need to be fixed**

(Source: Personal Data, 2017)

From the data shown in table 3, the most need considerable elements of the street scape are pedestrian way, illegal parking, street vendors. This is what give the idea to the proposed building function that will exist in the area.

Besides, the thing that causes the least interest in walking is scattered public transportation around the terminal area. From 2010 to 2017 the number of vehicles and passengers passing by made a significant decrease and a significant increase. The following is the number of public transports in the form of Lyn, mini bus and city bus that passes Joyoboyo terminal until 2017.

Table 2.4 Routes Public Transport Angkot, City Bus and New City Bus at Joyoboyo Terminal year 2010 - 2017

Lyn Code	Route	Amount
BJ	Benowo – Kalimas Barat PP	157
BK	Bangkingan-Karang Pilang PP	13
BM	Menangal-Bratang PP	41
C	Pasar Loak Sedayu - Karang Menjangan PP	108
D	Jayoboyo - Pasar Turi - Sidorame PP	151
DA	Kalimas Barat – Citra Raya PP	105
DKB	Dukuh Kupang -Benowo PP	7
DK	Dukuh Kupang - Menanggal PP	37
DP	Kalimas Barat / Petekan – Manukan	85
E	Petojo - Sawahan - Simorukan - Balongsari PP	99
F	Joyoboyo - Pegirian - Endrosono PP	143
G	Joyoboyo - Karang Menjangan/ Karang Pilang PP	312
GL	Pasar Loak - Gadung PP	51
GS	Gunung Anyar - Sidorame PP	56
H2	Pasar Wonokromo - Pagesangan PP	34
H2P	Pasar Wonokromo - Terminal Menanggal PP	48
I	Dukuh Kupang - Benowo PP	112
IM	Benowo - Simokerto PP	44
J	Joyoboyo - Kalianak PP	84
JBM	Joyoboyo – Gunung Anyar PP	44
JK	Joyoboyo - Kalijudan - Kenjeran PP	32
JMK	Kenjeran – Kenjeran Kalimas Barat PP	54
JTK	Joyoboyo - Tambak Klanggri PP	32
JTK 2	Joyoboyo – Medokan Ayu PP	103
K	Ujung Baru – Koblen Kidul PP	87
KIP 1	Kutisari Indah - Petojo	23
KIP 2	Kutisari Indah – Petojo PP (lewat timur) PP	25
L2	Ujung Baru - Sasak - Petojo PP	53
LK	Manukan Kulon – Pasar Loak - Kenjeran PP	86
LMJ	Lakarsantri - Manukan Kulon - Kalimas Barat PP	108
M	Joyoboyo - Dinoyo- Kayun – Kalimas Barat PP	133
N	Kalimas Barat - Menur - Bratang pp	109
TWM	Tambak Wedi-Petojo- Keputih PP	20
O	Kalimas Barat – Keputih PP	133
P	Joyoboyo-GubengPutih Kenjeran/Petojo-Ketintang/ Joyoboyo- Karang PP	162
Q	Kalimas Barat - Bratang PP	116
R	Kalimas Barat - Kapasan - Kenjeran PP	88
R1	Kalimas Barat - Nambangan – Kenjeran PP	39

R2	Kalimas Barat - Teluk Langsa – Kenjeran PP	4
RBK	Rungkut Barata - Kenjeran PP	40
RDK	Dukuh Kupang - Benowo PP	56
RT	Rungkut - Pasar Turi PP	80
S	Joyoboyo - Bratang -Kenjeran PP	87
T1	Margorejo - Joyoboyo - Sawahan - Pasar Loak PP	25
T2	Joyoboyo - Mulyosari - Kenjeran PP	82
TV	Joyoboyo - Citra	145

(Source: Badan Pusat Statistika Surabaya)

Table 2.5 Number of Public Transport of Angkot, City Bus and New City Bus at Joyoboyo Terminal in 2010 - 2017

Transportation type	Year	Transportation		Passanger	
		Arrival	Depart	Arrival	Depart
Urban transport	2010	190,546	190,546	1,333,822	2,286,552
	2011	140,119	113,113	700,595	1,131,120
	2012	154,788	154,017	1,083,516	1,386,453
	2013	665,760	612,400	3,328,800	4,286,800
	2014	590,969	589,792	3,192,982	4,227,318
	2015	713,933	708,657	4,913,245	6,325,102
	2016	533,563	533,250	4,268,504	4,799,250
	2017	9,803	9782	215,666	185,858
City Bus	2010	5,928	5928	71,136	148,200
	2011	11,952	11593	179,280	289,825
	2012	12,559	12051	288,857	36,560
	2013	7,855	6891	164,955	165,384
	2014	5,562	5421	139,050	216,840
	2015	15,320	14,729	320,834	336,413
	2016	5,582	5495	150,714	192,325
Inter-city Bus	2010	89,185	96,418	1,023,989	1,259,288
	2011	87,072	94,048	873,365	1,090,700
	2012	78,559	88,884	776,803	937,503
	2013	75,789	47,199	1,136,835	934,980
	2014	36,316	34,598	746,220	502,881
	2015	31,637	31,751	532,781	346,911
	2016	26,670	26,611	453,390	399,165
	2017	24,171	24,101	435,078	457,919

(Source: Badan Pusat Statistika Surabaya)

The amount obtained from the table above, how many possible Joyoboyo terminal forward with the comparison method from several years back and projected for the next few years. As marked in the table 5 that in 2016 until 2017 the number of fleets and passengers Lyn or Angkot decreased drastically by 50% more which started amounting to 4797 units to 2150 units. Future plans of angkot amount will be limited to 1100 units only because it will be replaced by tram transport modes that can reduce the intensity number of vehicles.

This terminal will experience a lot of restoration, based on the statement of the mayor of Surabaya Tri Rismaharini that Joyoboyo Terminal will be integrated with the location of KBS. The first floor for the bus parking. It can accommodate as many as 53 buses. Second floor for car park and motorbike. The third floor will be integrated with the monorail project. While the three floors above it again planned as a place of dwelling. However, this dwelling is only limited to citizens who are ID card Surabaya and not yet have a place to live. (Source: Koransuararakyat.org).

Table 2.6 Plan area of Station and Intermodal area

Koridor Monorail Timur -Barat			
1	THP Kenjeran		Aset Pemkot
2	Jl. Kertajaya Indah	24.375m2	
3	UPTSA & Kantor DKP		Aset Pemkot
4	Pasar kertajaya		Aset PD. Pasar Surya
5	Jl. Panglima Sudirman	3.720 m2	
6	Jl. Embong Sawo	14.655m2	
7	Jl. Mayjen Sungkono 63	4.200 m2	
8	Jl. Mayjen Sungkon o 42	12.000m2	
9	Jl. Mayjen Sungkono No.	1109,5 m2	Aset Pemkot
10	Jl. Mayjen Sungkon o No (Timur Universitas 45)	19.000m2	
11	Jl. Mayjen Sungkono (depan Ciputra World)	21.750m2	
12	Jl. Dukuh Pakis	6.300 m2	
13	Jl. HR.Muhammad 375	9.500 m2	
14	Jl. HR.Muhammad 241	3.920 m2	
15	Jl. HR.Muhammad	23.000m2	

Stasiun Intermoda			
1	Pasar keputran		AsetPD. Pasar Surya
2	Stasiun Gubeng- Intermoda Kereta Api		
3	Terminal Joyoboyo		Aset Pemkot
Koridor Trem Utara-Selatan			
1	Jl. Basuki Rahmat samping McDonald	9.996 m2	
2	Jl. Tegal Sari(dep an Gedung Arsip)	4.094 m2	
3	Jl. Basuki Rahmat (samping dealer Suzuki)	3.875 m2	
4	Jl. Embong Wungu No. 35-37	3.302 m2	
5	Pasar Tunjungan		AsetPD. Pasar Surya

(Source: The Government of Surabaya)

2.1.1.4 Joyoboyo Site Analysis Based on the Space Syntax Method and Contextualism Method

Contextualism is to respond the specific physical characteristics of its site. Unlike any specific architectural style, contextualism can be seen as a set of values, which help distinguish the architectural work. Any site, location or a place includes number of natural features that characterize it and create the context of this place. This city context will create the urban forms. And from the space syntax analysis will create the urban forms also. This method will influence the project also from the movement of the visitors, movement of the vehicles, land use, urban performance. The space syntax will be influenced by the context of the city. But both of them will create the urban forms which be the focal factor to design this project.

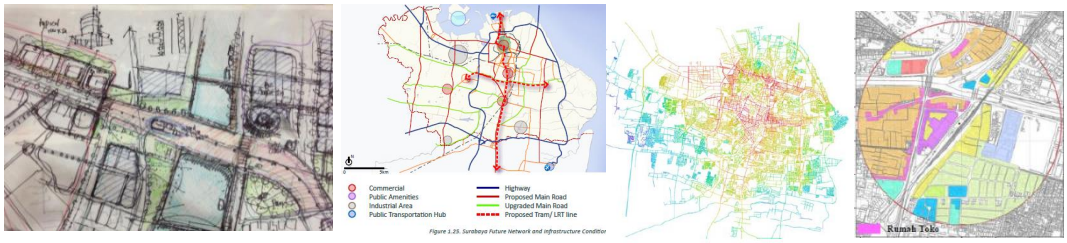


Figure 2.3 The Context and the Space Syntax Methods
Source : http://www.acsu.buffalo.edu.pdf

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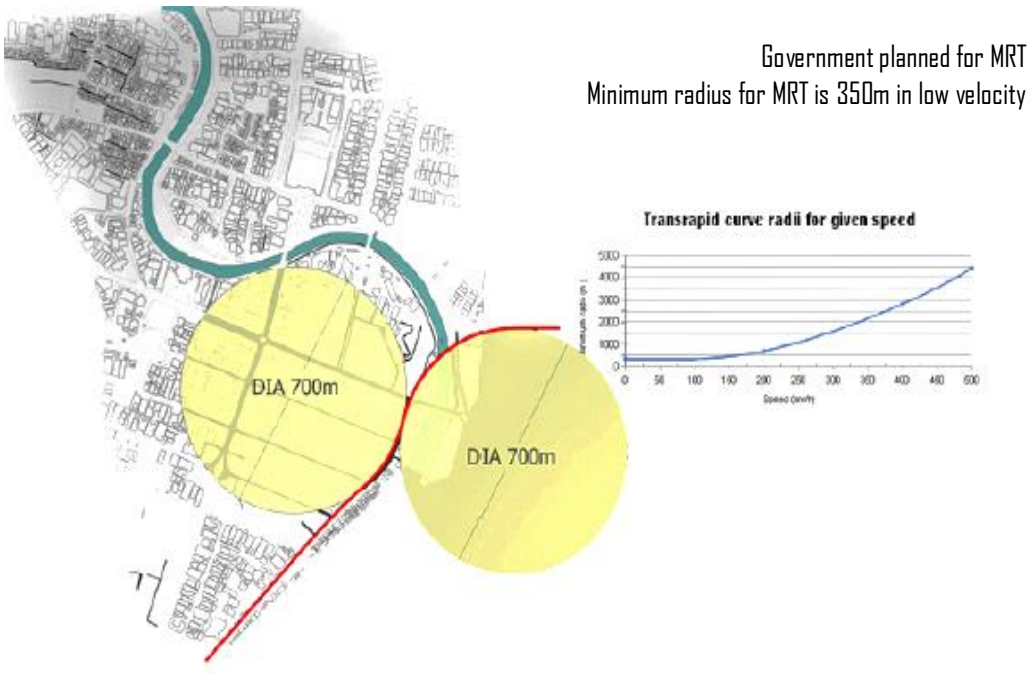
2.1.1.5 Joyoboyo Site Analysis

The land analysis technique is based on Harvey M. Rubenstein's book " A guide to site and Environmental Planning. " Site and environmental planning guidelines can be divided into 3 major factors ie Natural Factor, Culture Factor, and Aesthetic Factor. Natural factors can be divided into several criteria, among others: a. Landform, b. Hydrography, c. Vegetation, d. Climate. For culture factor is divided into: a. Land Use Land b. Relationships (circulation) c. Density d. Utilities e. Traffic f. Buildings surround the land. And for the aesthetic factor is divided into: a. Natural form b. Outer space and sequences.

A. Natural Factors of Joyoboyo Area

Here is a classification of natural factors analysis that will be presented in the form of diagrams. For landform points, the project uses the joyoboyo area as the chosen location. In this point the thing to note is how the urban forms are formed in the area. From the hydrographic side, every building is there, its waterways are connected with the Wonokromo River. In terms of climate, the direction of the movement of the sun is from east to west, while the wind speed that crosses the area is about 40 m / s. For the type of soil is the old – grey aluvial.



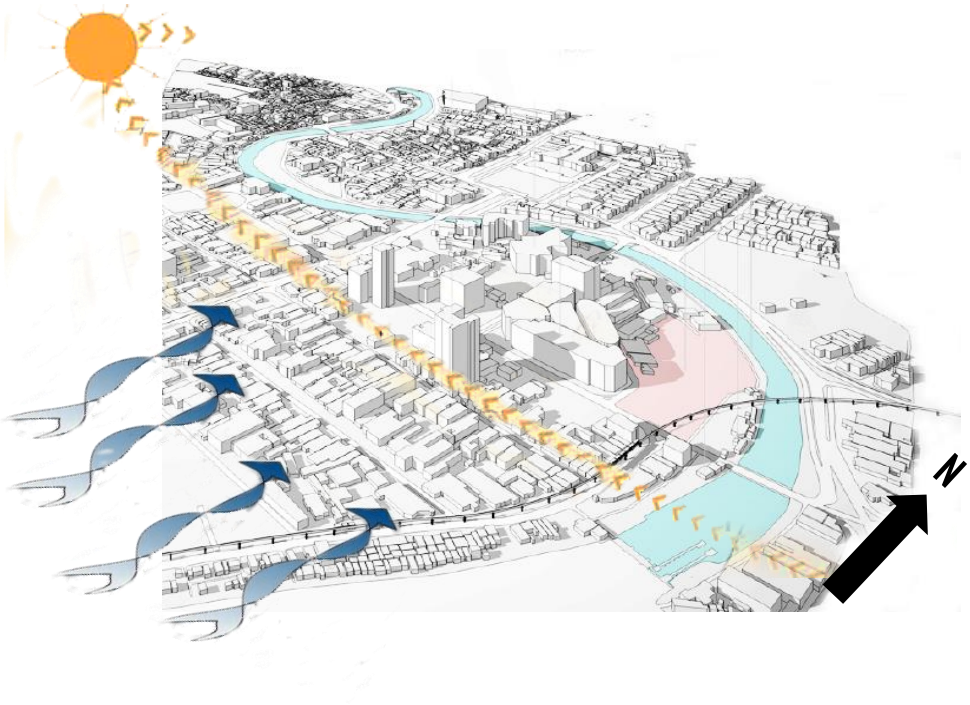


Figure 2.4 Natural Factors of Joyoboyo Area - Sun Movement, wind velocity,
Source : the diagram is the personal data, the data is from the government

B. Cultural & Aesthetic Factor of Joyoboyo Area

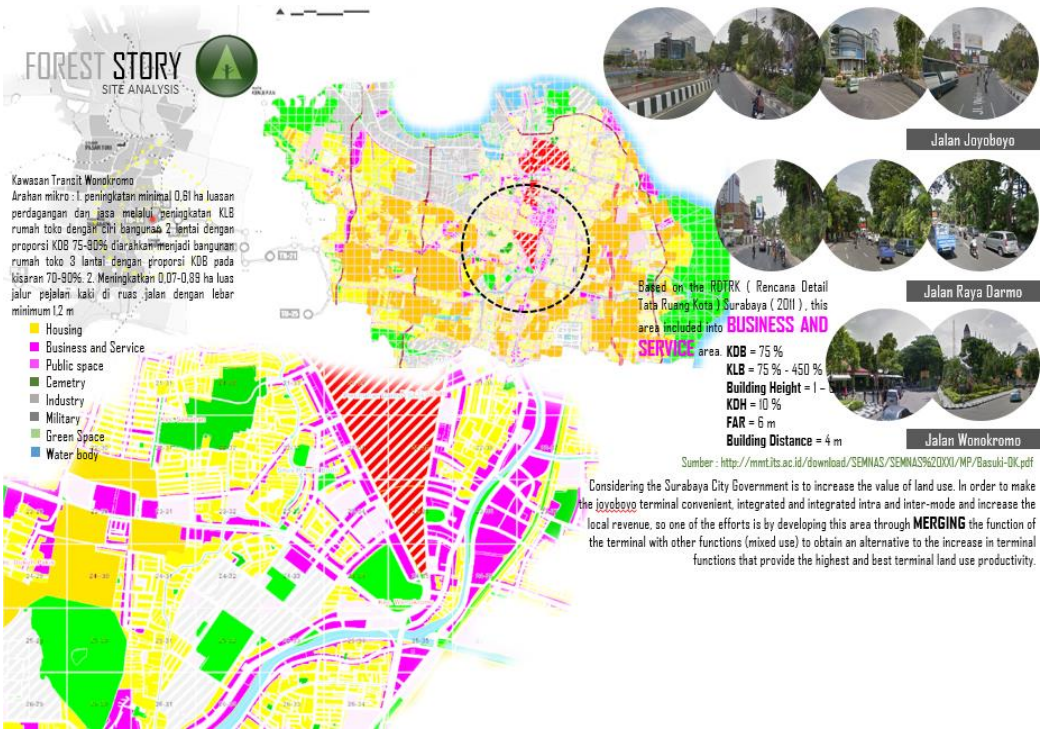


Figure 2.5 Cultural Factors of Joyoboyo Area – Land use, circulation, surround

Source : the diagram is the personal data, the data is from the government

2.2 Recapitulation of Space Program and Space Organization

This sub-chapter describes the plan for the building space that will occupy this area. There are three stages, determine the type of room and any function, calculation of user movement analysis and the extent of space inside and outside.

2.2.1 Building Function

From the results of observation the element that causes the area is less desirable to walk is due to various obstacles in pedestrian way. This demanded to be repaired immediately and supported by the proposed. H.P.R.U.C as the best answer of the problems. Proposed Hub function is to answer about the main problem that happened there that is about pedestrian way. Proposed Transportation Hub - Park and Ride is to answer about the problem of illegal parking and street vendors. This building become the meeting point area of all activities by combining several program activities. This corresponds to the Openact Architecture which need an active participations.

Figure 2.6 Park n ride and hub

2.2.2 Activity Program, Space Quantity and Dimension Needed

As an intermodal staging location for transfers between numerous transport modes, Transportation Hub – park and ride facilities have traditionally been viewed as only a component of the larger transit or highway auto-oriented modes.

2.2.2.1 Transportation Hub – Park and Ride Program Activity and Dimensions

As a unique mode of transportation, the Transportation Hub – park and ride system provides increased opportunities over other modes of transit for private investment and private-public partnering. A healthy park-and-ride system can be used strategically to encourage urban development in lower density suburban environments. It can, however, also lead to continued sprawl, depending upon the location and design of the individual facilities within the system. In addition to loading parking facilities, this building will be combined with other programs that become meeting point of all activities contained in the area.

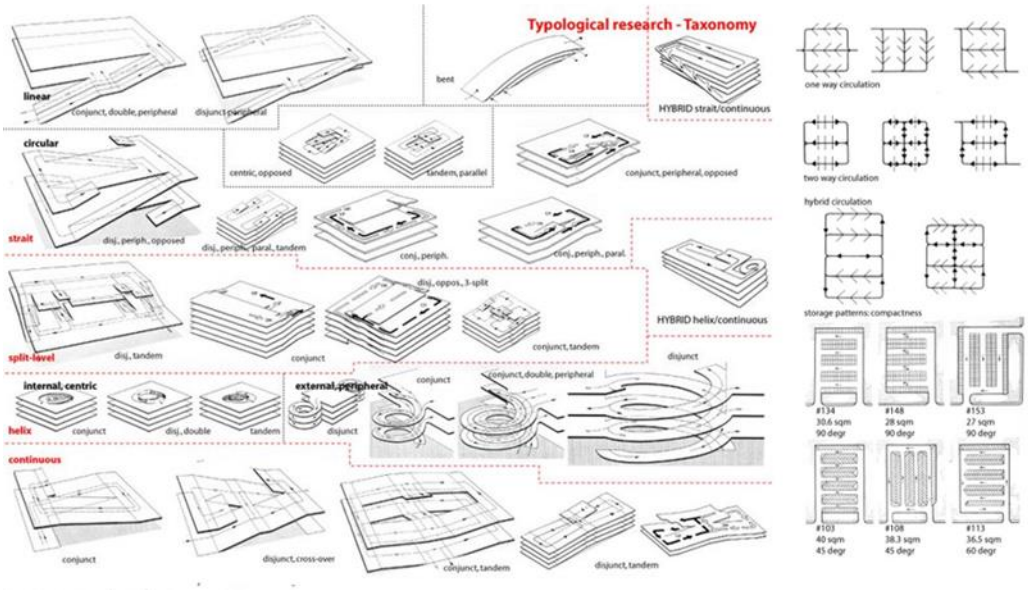


Figure 2.7 Space standard of Parking Building
(Source : Neufert, Architectural Standard)

This project combines two major functions, station typology and typology of terminal. Here are some of these analyzes.

Table 2.7 Analysis of activities and space dimensions needed

FACILITIES	PERSON	MAIN ACTIVITIES	SPACE
Main Facilities			
Transit facilities angkot, bus, monorail, tram, etc.	visitors	Switching between modes of transportation	
Support Facilities			
Administration and management	Head of management	Manage	65 m2

	Employees	Receive host meeting	120 m2 40 m2
Operational	Employees	Control the state of the terminal platform	60 m2
Bus and angkot passenger service	Security Employees Security Service	Control the ticket machine Maintain security Service in information room concourse	64 m2 24 m2 10 m2
Complementary Facilities			
Restaurant	Visitors	Eating/ Drinking	200 m2
Café	Visitors	Rest	
	Manager	Serve visitors order	
Retail	Visitors	Shopping	

Here some user movement analysis such as passengers, general visitors and managers. This is to determine initial estimates.

Table 2.8 User analysis movement

USERS	TENDENCY	ANALYSIS
Passenger	Want to walk as short as possible and spend as little as possible	A clear and close connection between modes
	Looking for a place to sit if waiting	Provided a waiting room and there is a clear marker
	Walk while looking at the view	Available seating is available
	Need information	There should be a signing between spaces.
	If waiting, will see the shops	Provided paths for people with disabilities
Visitors	Need a clear orientation or sign	providing an attractive door preparation
	If you wait too long you will find a place for food vendors, books, or want to see the modes that come and go	Need a clear and interesting sign Creation of sequences Process the environment to be integrated with the building

		Clear division of area between free area and paid area
Driver	ease of obtaining information Ease of viewing arrival and departure of passengers	There is a comfortable waiting area
Employees	At rest looking for a place to eat Can see the movement of transportation modes easily Can control visitors who come or go	Provided dining room, work space effective and efficient
Traders	Located in the passenger area Easy to unload stuff	Be on the circulation path

Source: Personal data, 2018)

Calculation of Spatial Area. This calculation is more specific to the extent and closer to the actual extent. Stages of calculation are divided from:

Table 2.9 Dimensions of the transportation type

Transportation Type	**Length (m)**	**Width (m)**	**Height (m)**
City Bus (Medium)	7.57 – 7.80	2.130	2.950
City Bus (Big)	12.120 – 13	2.460	3.35
Angkot	3.875	1.345	1.915
Monorail	37.66	3.13	2.43
Tram	20.30	2.480	3.960

Source: Personal data, 2018

Private vehicle parking analysis: The accumulation of visitor data that may come from BPS data in 2016 and 2017 (Table 7) on the decline in the number of freights is directly proportional to a 75% decline in the user from the original 4,799,250 persons to a maximum likelihood of 1,200,000 per year.

The visitor's data per month around:

*1,200,000: 12 months: 100,000 people per month.*100, 000 people will be possible in 2017 - 2020 divided into 3 kinds of modes of transportation with an equal ratio:

50% ride private vehicle
25% ride the monorail
25% tram ride

It can be concluded the possibility per month:
50,000 per month = ***1667*** people per day

Figure 2.8 Personal vehicle growth rate
(Source : The Government of Surabaya)

So visitors per day possibly 1,667 people with private transportation sharing such as:
Based on the above chart the possibility of visitors or passengers:
80% using motorcycle = 80% x 1667 people = 1.337 people (with approximate 1 motorcycle 2 people)
Thus, it can be obtained:
1337: 2 = 669 motorcycle (most likely parking)
20% car use = 20% x1667 people = 330 people
(With the consideration of 1 car 3 people, car off 60% off and parking by 40%)
It means, *330: 3 = 110 cars (most likely parking)*
110 x 40% = 44 car (most likely the smallest parking)
Percentage of parking per one car: 15 m2. So, parking area maximum likelihood of entry car:

Most likely car parking x 15m2 = 110 x 15m2 = 1.650 m2

Thus, the maximum possible parking area of motor entry:

Most likely motor parking x 2 m2 = 669 x 2 m2 = 1.338 m2

Parking area of private vehicle: = Car Parking Area + Parking Area Motor + Circulation area (70% parking area) = 1.650 m2 + 1.338 m2 = 2988 m2 + (100% x 2988 m2) = 2.988 m2 + 2.988 m2 = ***5,976 m2***

The number of angkot departure routes accommodated by the Joyoboyo terminal are about 16 routes with different fleet numbers for each route. The number of temporary parking spaces for angkot required:

- Percentage of development / decrease of angkot
- Waiting time for each angkot
- Headway time (change of incoming and outgoing angkot)

In the angkot public transportation area, the angkot percentage in Surabaya tends to decrease. This also includes the effect of regulation from dishub to reduce the number of angkot initially (2016) as many as 4,797 units will be trimmed to 1100 units (2017-onwards (source: The Government of Surabaya)). This could be a benchmark for the main parking reserves and reserves of public transportation which decrease 51.1 %. And will be changed with the tram and monorail. Here some data about area Platform Terminal and Peron Stasiun Monorail & Tram:

Table 2.10 List of Tram route plan Surabaya

Departure Station	**Arrival Station**	**Length of track**
Joyoboyo Trem	KBS	0,53
KBS	Taman Bungkul	0,58
Taman Bungkul	Bintoro	0,60
Bintoro	Pandegiling	0,70
Pandegiling	Keputran	0,45
Keputran	Kompepol M Duryat	0,48
Kompepol M Duryat	Tegalsari	0,58
Tegalsari	Embong Malang	0,49

EmbongMalang	Kedungdoro	0,69
Kedungdoro	Pasar Blauran	0,45
Pasar Blauran	Bubutan	0,45
Bubutan	Pasar Turi	0,55
Pasar Turi	Kemayoran	0,40
Kemayoran	Indrapura	0,75
Indrapura	Rajawali	0,65
Rajawali	Jembatan Merah	0,62
Jembatan Merah	Veteran	0,58
Veteran	Tugu Pahlawan	0,55
Tugu Pahlawan	Baliwerti	0,60
Baliwerti	Siola	0,40
Siola	Genteng	0,40
Genteng	Tunjungan	0,40
Tunjungan	Gubernur Suryo	0,50
Gubernur Suryo	Bambu Runcing	0,50
Bambu Runcing	Sonokembang	0,60
Sonokembang	Keputran	0,35
Keputran	Pandegiling	0,50
Pandegiling	Bintoro	0,60
Bintoro	Taman Bungkul	0,60
Taman Bungkul	KBS	0,60
KBS	Joyoboyo Trem	0,55

Source: Pemkot Surabaya: 2016

From the above data Joyoboyo entered the tram line that was integrated with KBS Surabaya. A more detailed explanation of the Tram Mode:

• At grade at median position (double track or single track on one-way lane)

• Track width (gauge) 1435 mm / 1.435 m

• The type of rail is grooved rail

• Tram train on double track running on the left

• The station on the double track is on the left, but on a single track can adjust

• High floor tram 100% Low-floor

• Distance between tracks on double track from as to as between 3.55 m s / d 4 m

• The width of ROW tram on double track is minimum 6 m and max 7 m (straight position, not on station)

• The width of single track row tram (on a one-way road) is minimum between 3.35m and max 3.5m (straight position, not station)

• Vertical clearance min 4.1 m s / d 4.5 m

• Station platform width of 2 m

• Platform length (Wait area) is about 20-30 m. adjust to the number of the tram carriage arrangement.

• Minimum bend radius (R min) is maximum 30 m

• Bi-directional mode passengers (in a series) and it is possible to develop its capacity without difficulty

• Tram can be operated with minimum 2 minute headway without technical difficulties

• Headway minimum peak hour at opening time: 5 minutes

• Headway maximum off peak hour: 20 minutes

• The number of passengers that can be transported about 400 people (once transport)

• Width Platform station 2.5-3 m. this is estimated by the presence of waiting areas along the platform and temporary seating for passengers.

• The platform length / platform of the monorail station is about 50 m (comparable to 3 carriages along 37 m if 4 cars are about 48 m) Total a platform (Wait area) = *3 x 50 = 150 m2*

• The number of seats for passengers in the platform area (Wait area), 50% of the platform area. *50% x 150 m2 = 75 m2*

Table 2.11 Headway Table 2013-2024 various sizes of Monorail mode

Years	Monorail Type		
	Small type (316 Passengers)		
	Minutes	*Second*	*Monorail Frequency*
2013	2.12	127.23	28
2014	2.02	121.33	30
2015	1.93	115.95	31
2016	1.85	111.03	32
2017	1.78	106.51	34
2018	1.71	102.34	35
2019	1.64	98.48	37
2020	1.58	94.91	38
2021	1.53	91.59	39
2022	1.47	88.49	41

2023	1.43	85.59	42
2024	1.38	82.88	43
	Standard type (580 Passengers)		
	Minutes	*Second*	*Monorail Frequency*
2013	3.89	233.53	15
2014	3.71	222.69	16
2015	3.55	212.82	17
2016	3.4	203.78	18
2017	3.26	195.48	18
2018	3.13	187.83	19
2019	3.01	180.76	20
2020	2.9	174.2	21
2021	2.8	168.1	21
2022	2.71	162.41	22
2023	2.62	157.1	23
2024	2.54	152.12	24
	Large type (693 Passengers)		
	Minutes	*Second*	*Monorail Frequency*
2013	4.65	279.02	13
2014	4.43	266.08	14
2015	4.24	254.28	14
2016	4.06	243.49	15
2017	3.89	233.57	15
2018	3.74	224.43	16
2019	3.6	215.98	17
2020	3.47	208.14	17
2021	3.35	200.85	18
2022	3.23	194.05	19
2023	3.13	187.7	19
2024	3.03	181.75	20

Source: www.its.ac.id

Table 2.12 Program unit and Need of spaces

Program	Area	Unit	Source	Program	Area	Unit	Source
Parking	$12.5m^2$ $1.8m^2$ $1.8m^2$ Bus	20unit 50unit 30unit 2unit	Data Analisa	***Urgent care***	$160m^2$	1unit	Bima Microlibrary

Street vendors	9m^2	10 unit	Data Analisa	***Food court***	100m^2	1unit	Carpediem Restaurant / Sidharta Architect
Information centre	9m^2	1unit	Jelly Button Games and Hamutzim Studio / Roy David Studio	***Cafe***	50m^2	2unit	Yuanyang Express
Basketball court	420m^2	1 unit	NAD	***Playing Space***	20m^2	2unit	Jelly Button Games and Hamutzim Studio / Roy David Studio
Jogging track	1.2m	1unit	NAD	***Pantry***	15m^2	2 unit	Yuanyang Express
Lavatory	48m^2	2unit	MIT Manukau & Transport Interchange	***Locker***	80m^2	2unit	Jelly Button Games and Hamutzim Studio / Roy David Studio
Nap station	40m^2	1unit	MIT Manukau & Transport Interchange	***Meeting room***	12m^2	2unit	Yuanyang Express
Waiting Lounge	60m^2	1unit	MIT Manukau & Transport Interchange	***ME Room***	100m^2	1unit	MIT Manukau & Transport Interchange
Retail	100m^2	10unit	*VÈLO7 Cycle Shop*	***Store room***	400 m^2	1unit	MVRDV House

2.2.2.2 Hub Program Activity

The activity contained in the hub is adopt the activities in Sky Garden MVRDV, where in the hub there is a different activity different from each point. Facilities cafe, sun deck, street market, flower shop, street library, fountain, LED flower, Observatory, Street Exhibition, Green house. There is no provision of how much area each program needs. This is adjusted to the size of the hub that will be in the area.

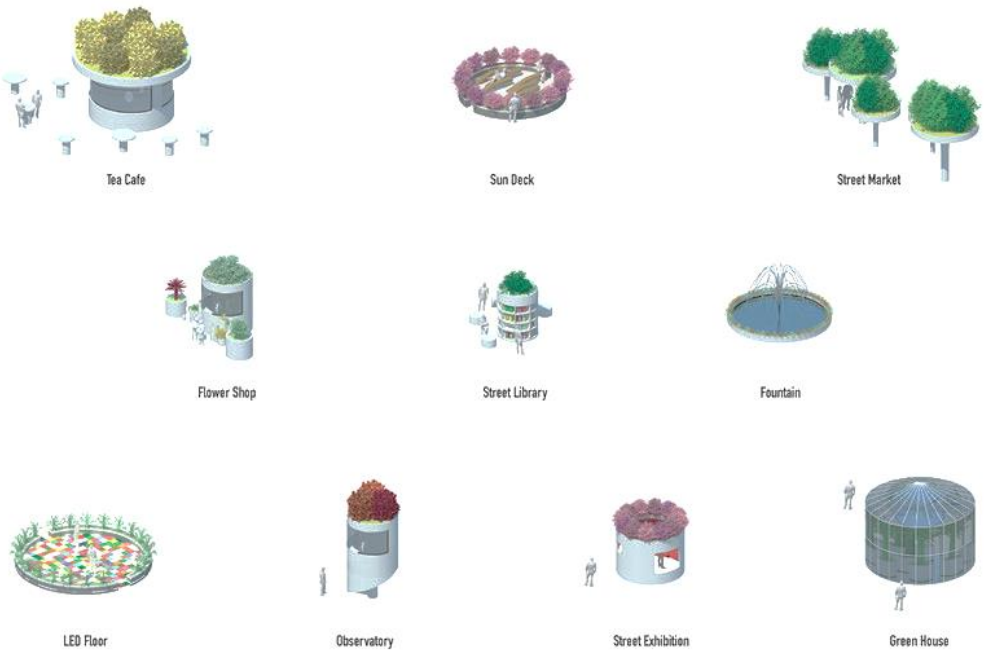


Figure 2.9 Hub Program Activity
Source : https://www.arch2o.com/seoul-skygarden-mvrdv/

Figure 2.10 Perspective Plan of the Hub
Source : https://www.arch2o.com/seoul-skygarden-mvrdv/

2.2.3 The Requirements between Space and Activity

In a mergering, it is necessary to use parameters that reflect a form and work system of a program. Parameters are lifted and used in determining how well a program can function is the parameter of the space extent, the level of privacy, enclosure, material, and the time at which space is used for the move. But there are some things to note about how to combine two or more program functions into a new program container, such as:

1. The level of program performance in fulfilling each activity in it.
2. The potential for impact of conflicting activities.
3. Preparation of the depth of a program from the direction of entry.

Table 2.13 Level of program privacy

Public	Semi Public	Semi Private	Private
Parking	Auditorium	Pantry and Bar	Office
Street Vendors	Public space	Locker	
Information Centre	Retail	Meeting room	
Basketball court	Library	ME Room	
Garden	Food court	Playing Space	
Jogging track	Cafe		
Lavatory	Urgent Care		
Nap Station			

Table 2.14 Program Spesification as the place of activity

`	**Floor**			**Wall**			**Plafond**	
	Material	Angle	Pattern	Material	Opener	Angle	Height	Plafond
Parking	H	0	●	-	1	0	1	1
Street Vendors	H	0	●	H	0	0	0	0
Information centre	H	0		H	1	1	0	1
Basketball Court	H	0	●	H	0	0	0	0
Garden	C	1	●	S	0	0	0	0
Jogging track	H	1	●	-	0	0	0	0
Lavatory	H	0		H	1	1	1	1
Waiting Room	H	1		H	1	1	0	1
Auditorium	H	2	●	H	2	1	2	1
Meeting room	H	2		H	2	1	1	1
Retail	H	0	●	H	1	1	1	1
Library	C	2		H	2	1	1	1
Food court	C	0		H	1	1	1	1
Cafe	C	1		H	1	1	1	1
Nap Station	C	2		H	1	1	1	1
Pantry and Bar	H	0		H	1	1	1	1
Locker	H	0		H	2	1	2	1
Meeting Room	H	0		H	2	1	2	1
ME Room	H	0		H	2	1	1	1
Playing Space	C	2	●	C	1	0	0	0
Store Room	H	0		H	2	1	1	1

Pantry	H	0		H	1	1	1	1
Office	H	0		H	2	1	1	1

Table 2.15 Program Spesification as the place of time

Program	Time							
	00.00 - 03.00	03.00 - 06.00	06.00 - 09.00	09.00 - 12.00	12.00 - 15.00	15.00 - 18.00	18.00 - 21.00	21.00 – 00.00
Parking	●	●						
Street Vendors			●				●	●
Information centre			●	●	●	●	●	
Basketball Court			●			●		
Garden			●	●	●	●	●	
Jogging track			●			●		
Lavatory			●	●	●	●	●	
Waiting Room		●	●	●	●	●	●	●
Auditorium				●			●	
Meeting room				●	●	●	●	
Retail			●	●	●	●	●	
Library			●	●	●	●		
Food court			●	●	●	●	●	
Cafe			●	●	●	●	●	
Nap Station		●	●	●	●	●	●	
Pantry and Bar			●	●	●	●	●	
Locker			●	●	●	●	●	●
Meeting Room			●	●	●	●	●	
ME Room	●	●	●	●	●	●	●	●
Playing Space			●	●	●	●	●	
Store Room			●	●	●	●	●	
Pantry			●	●	●	●	●	

CHAPTER 3
ANALYSIS AND DESIGN STRATEGY

3.1 Design Approaches

This project uses open act architecture and catalyst architecture as design approaches.

3.1.1 Open act and Catalyst Architecture

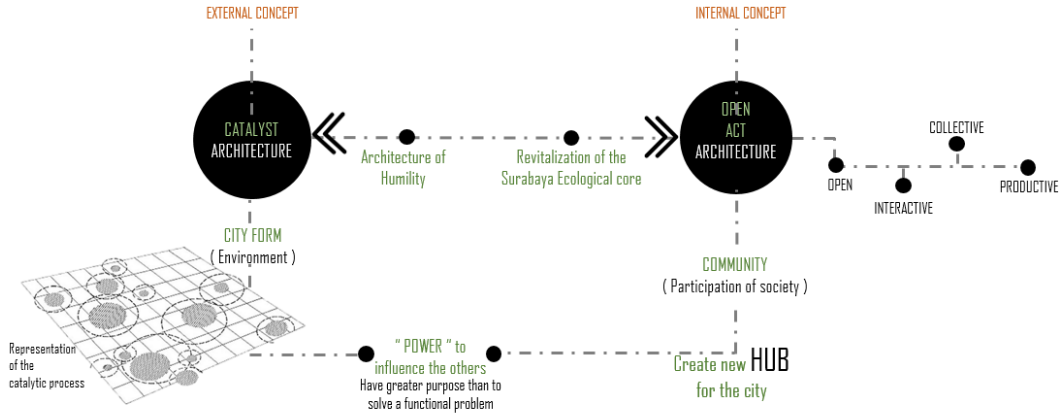


Figure 3.1 Openact and Catalyst Architecture as an Approaches

Open act architecture is involve all the people to work together to reach the goal. All these entities share one target : to be opened. To create comfort and trust, safety and orientation. The other criteria of this approach is to be interactive, collective and also productive. After open act architecture successfully applied, it will continue to develop to other surabaya area. This plan used catalyst architecture. Catalyst architecture as **"Activity Generator" and "Anchor"**. Sternberg (2002) relates catalysts to "activity generator" and "anchor". A catalyst is essentially an activity generator, but not all activity generators act as catalysts.

Ways Catalysts can Encourage Development. Sternberg (2002) identifies five ways in which catalysts can encourage surrounding developments. Creating pedestrian traffic is the most important way that a project can encourage development. Secondly, the development needs to be properly designed and linked to its surroundings visually and physically. Third, a development attracting pedestrian traffic

can serve as an amenity even if the pedestrians do not enter it. A development's character integrated with its ability to complement a streetscape helps create an amenity that spurs development. A development can also influence a one's perception of an area if it survives in an area previously noted as derelict. Lastly is the relevance of the project relative to its location for example, an art theater in a district known for its artisans.

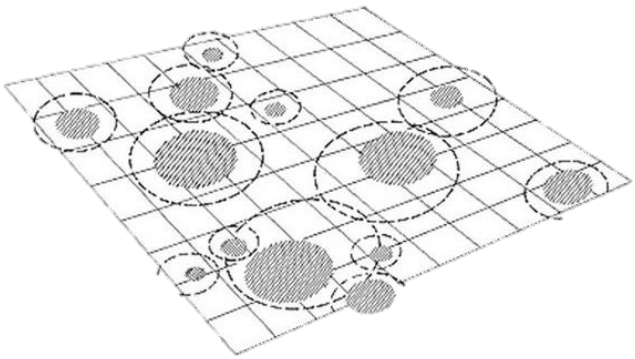


Figure 3.2 Representation of the catalyst process
Source: Bohannon_thesisbook_journal.pdf

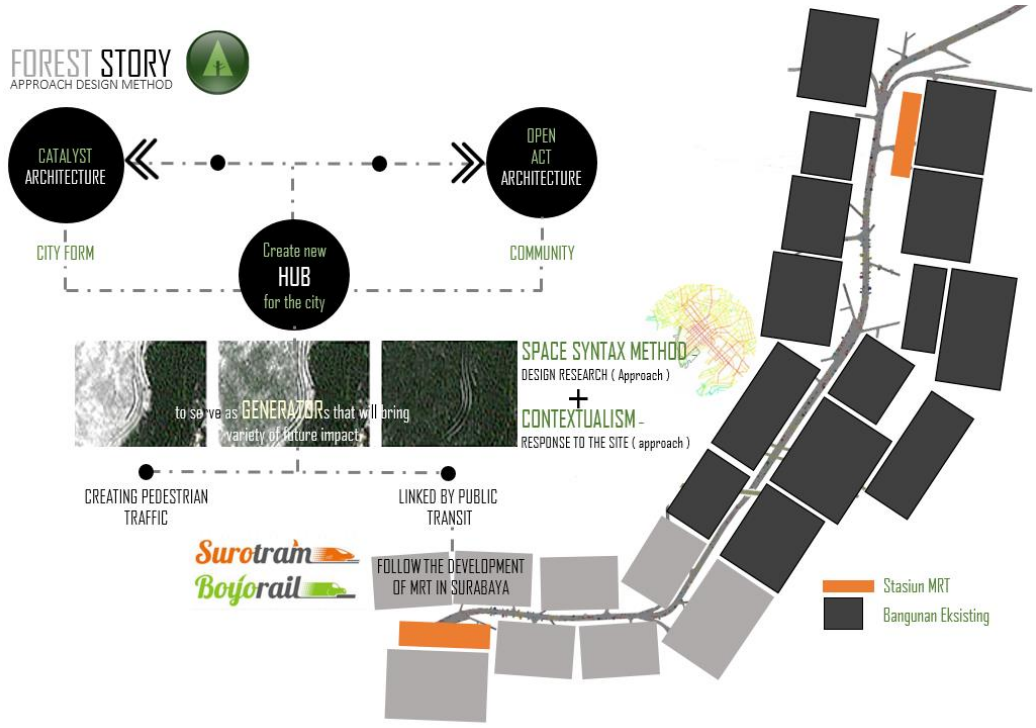


Figure 3.3 The relation between two approaches

3.2 Design Method

The chapter explains the contextualism as the design method and space syntax as method to understanding the city design.

3.2.1 Contextualism as the Design Method

Contextualism is the architecture method that responds to the specific physical characteristics of its site. This contextual architecture respones to the site. How to develop the site. In the other hand, Contextualism movements focus on theories of city form, language patterns, urban space development, and original ideas of urban space. It means that context of the site is influence the urban forms.

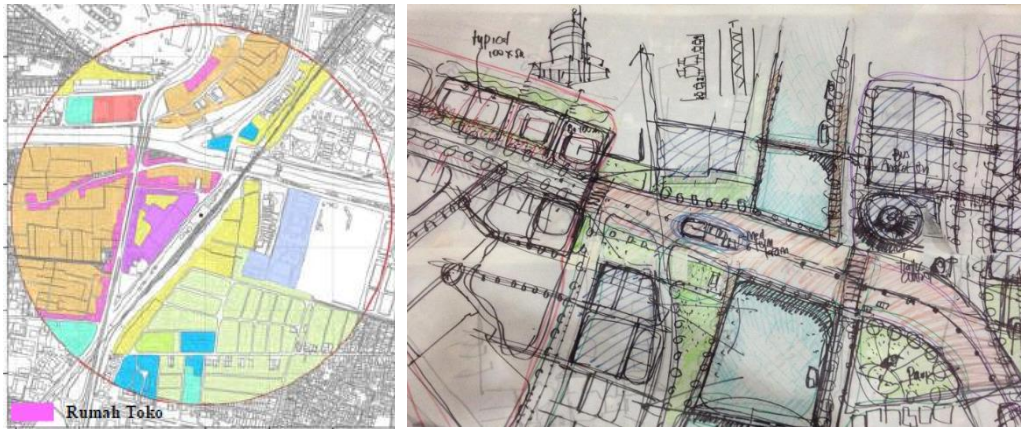


Figure 3.4 (a) land use map and (b) the sketch of the area
Source: a. http://petaperuntukan.surabaya.go.id/cktr-map/ b. Personal sketch

3.2.2 Space Syntax, a way for understanding and analyzing the context-oriented in urban spaces.

Space syntax is a collection of theories and methods which explains spatial configuration. Space syntax would analyze the connections between whole urban spaces together and will illustrate results by graphic-mathematics parameters. Research using the space syntax approach has shown:

1. the state of movement patterns
2. the state of security patterns in the city
3. the state of relations between main and subsidiary urban centers
4. revising the state of spatial segregation in cities

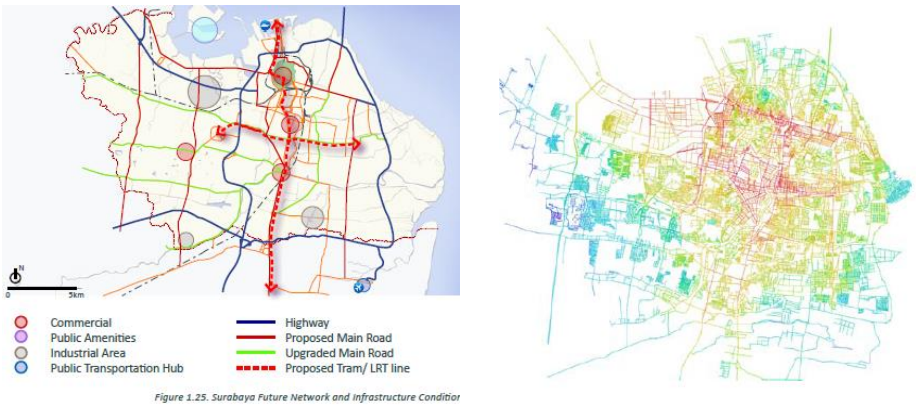


Figure 3.5 Space Syntax Anlysis on Surabaya Future condition
Source : http://www.acsu.buffalo.edu.pdf

Figure 3.5 explain to us that from the space syntax analysis will create the urban forms. This method will influence the project also from the movement of the visitors, movement of the vehicles, land use, urban performance.

3.2.3 Precedent of Space Syntax Analysis

Figure 3.6 Seullo space syntax methods

"The idea here is to connect city dwellers with nature, while at the same time also offering the opportunity of experiencing these amazing views". The new park to connect together different parts of the area, improving the experience pedestrian for pedestrian users of the city.

CHAPTER 4
DESIGN CONCEPT

4.1 Formal Exploration

The chapter explains the forms exploration, function exploration, and the meaning exploration of the Transportation Hub – park and ride and The Hub.

4.1.1 Forms Exploration

Forms exploration is based on the consequence of the surrounding environments. The form embodied in the design requires an exploration process that involves the implementation of concepts and how to form influences human activity.

4.1.1.1 Transportation Hub - Park and Ride Form Concept

The proposed function of Transportation Hub - Park and Ride is to answer about the problem of illegal parking, street vendors, so that make a pedestrian way there will be more narrow. This building is not just a regular parking building but also as the meeting point of all activities by combining several program activities. This concept corresponds to the Openact Architecture which need an active participation of users.

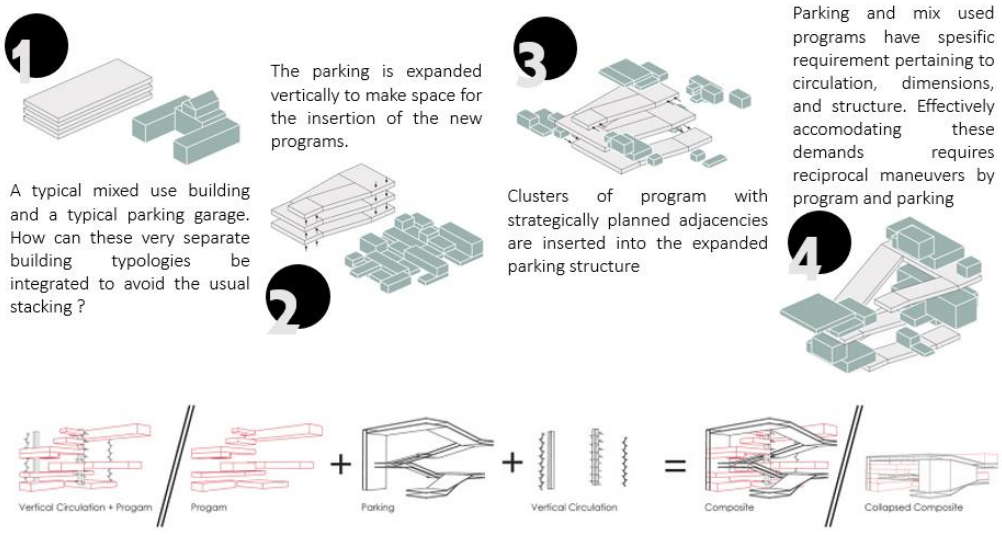


Figure 4.1 Concept of the Park and Ride Building

A. Wet grid Method

This method is used for how to linking the research area and surrounding area. The wet grid, Frei Otto's grid, is one in which movement is structurally absorbed by the system; it is a combination of intensive and extensive movement, of flexibility and motion. Different with wet grid, the dry grid is always segmented and Euclidean, while the wet grid is always a continuous network, topological and curved.

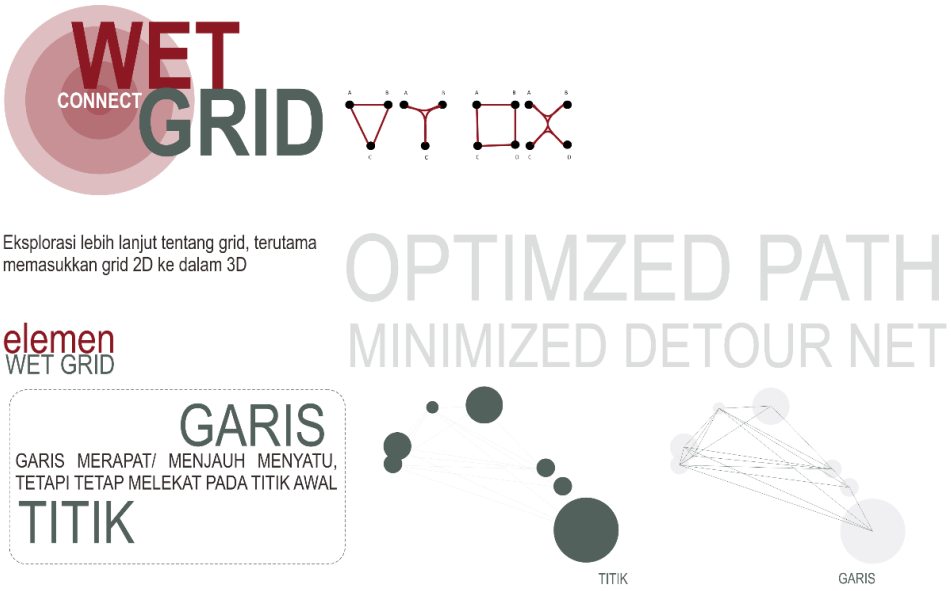


Figure 4.2 Wet grid general concept

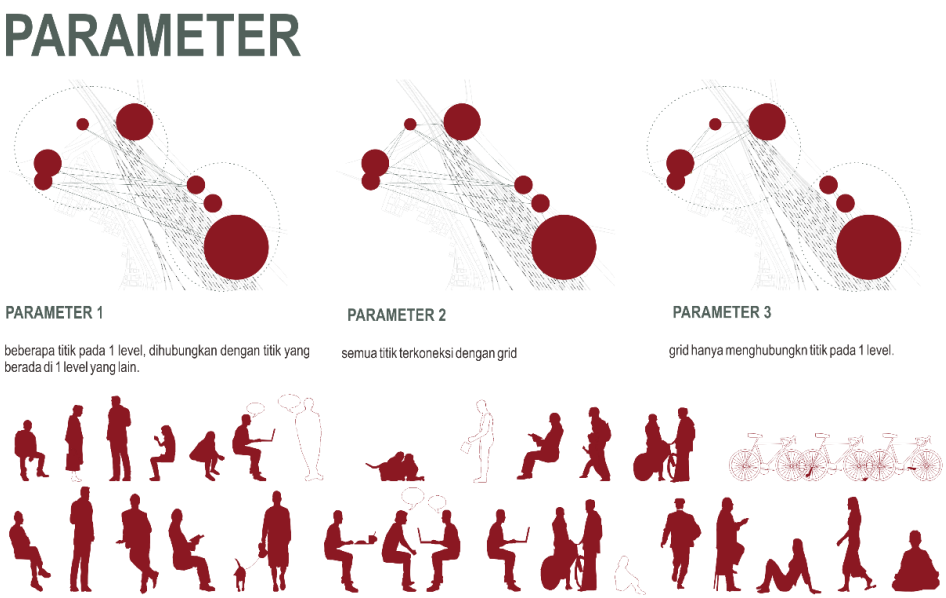


Figure 4.3 Wet grid system parameter

Transportation Hub is proposed as a solution of the problem in that area. The station allows passengers to change from one route to another route. Unlike the usual typology, an interchange station summarizes various concepts that have macro modes into an order that provides convenience and clarity connections in the city. The Implementation of the wet grid theory to the design. First the architect determine where the transit point in this area is. After a point is determined each transit point after it is connected with a line. After it is also determined fatigue point that becomes the point attractor area. Next form 3 different types of wet grid.

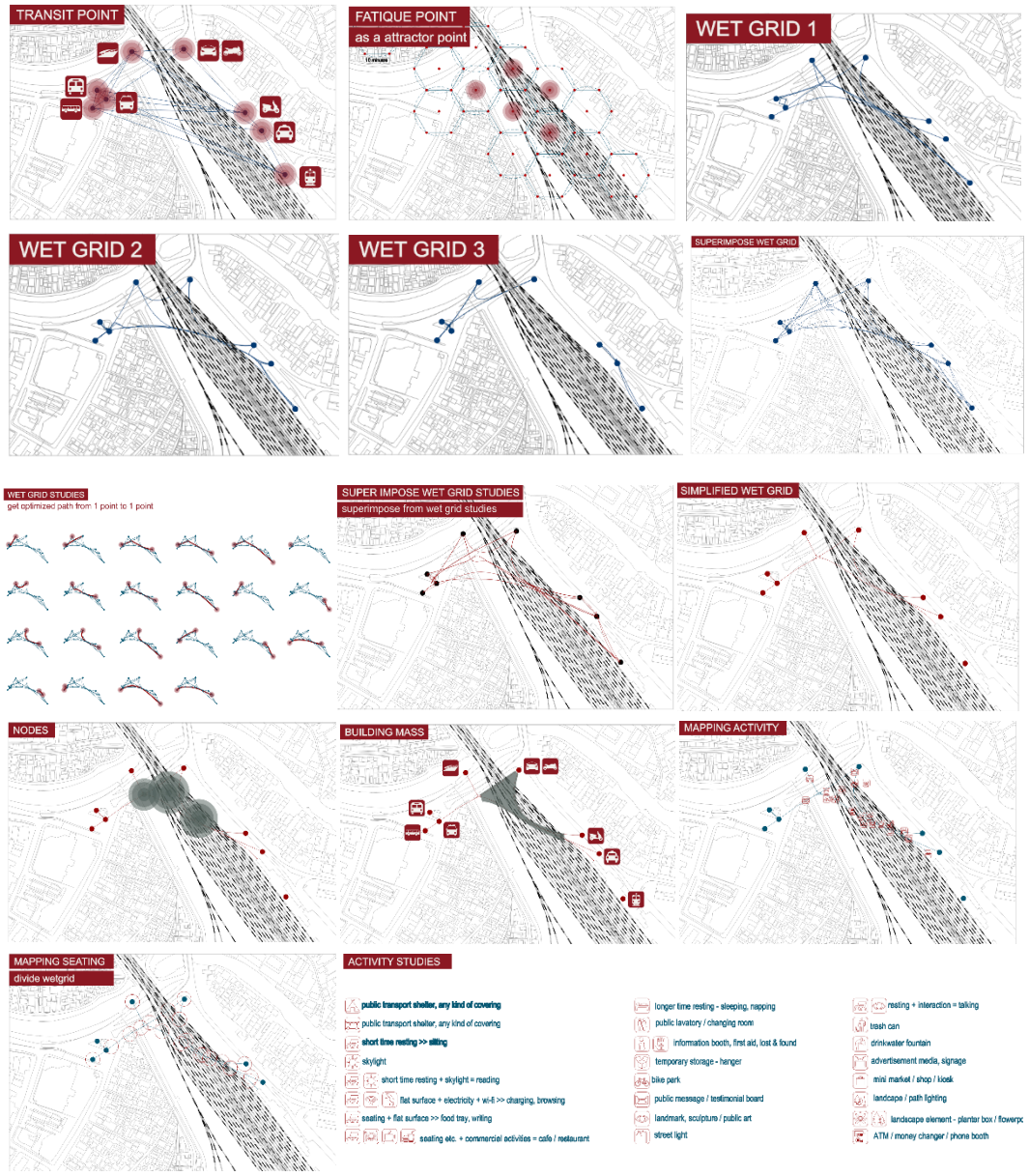


Figure 4.4 Wet grid study

The three different points are then combined into one type of wet grid. This technique is called superimposed grid. After forming 1 type of wet grid, the grid is then simplified. And then the architects determine the nodes of the area. From the nodes formed the mass of buildings that became a consequence of the environment.

B. Form Transformation

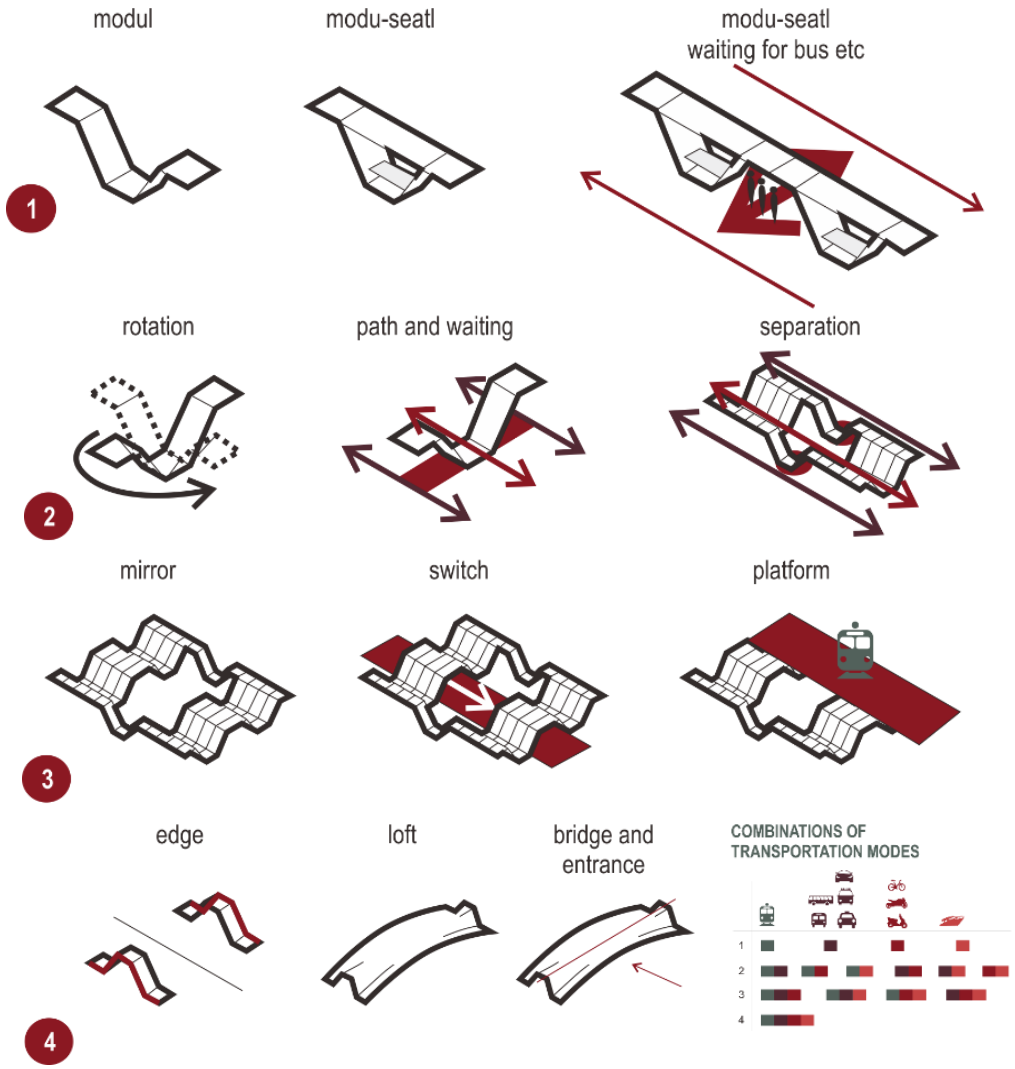


Figure 4.5 Form transformation influenced by wet grid studies

Wet Grid as a form could means many different nodes can connected into an integrate composition. Therefore, the form is determined by using the concept of wet grid as a guide.

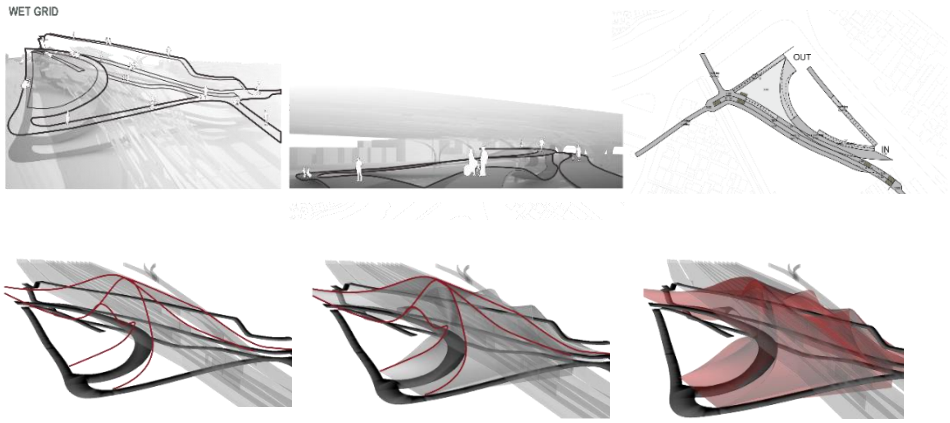


Figure 4.6 Wet Grid Result

4.1.1.2 Hub Form Concept

Proposed Hub is to answer the main problem that happened there that is about pedestrian way. Because it is considered the pedestrian way is very far from the hope to be used for walking, it is proposed a function that will accommodate the pedestrians in the area that is with the presence of Hub. Where this hub will accommodate pedestrian activity by connecting the point of crucial point contained in the area. Such as Joyoboyo Terminal, DTC, KBS, Wonokromo Station, etc will be accessible on foot.

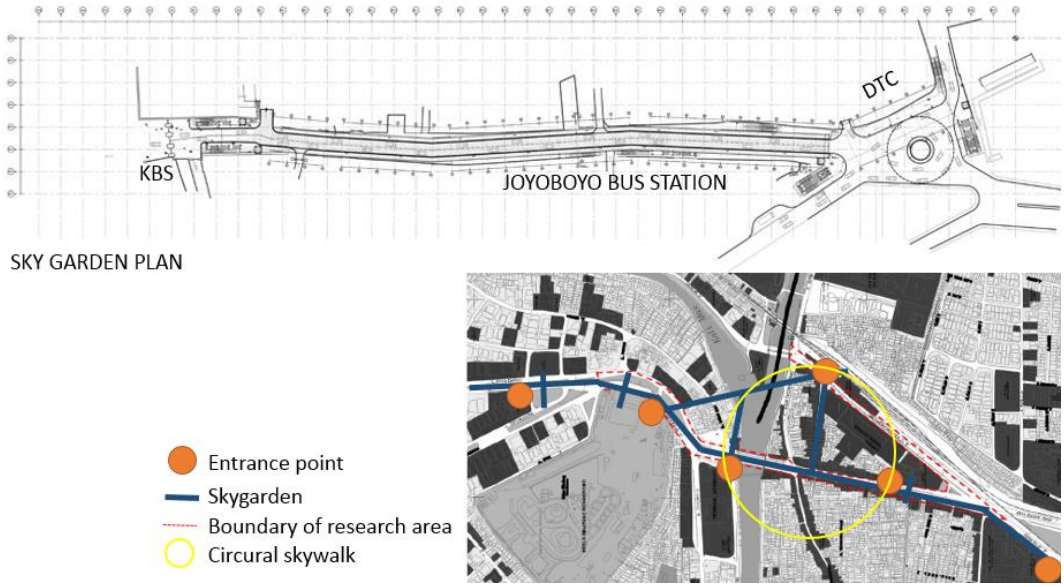


Figure 4.7 Concept of the Hub

Figure 4.8 Concept of the Hub Illustration

In addition to overcoming pedestrian way problems, this hub plan will provide some other activities such as:

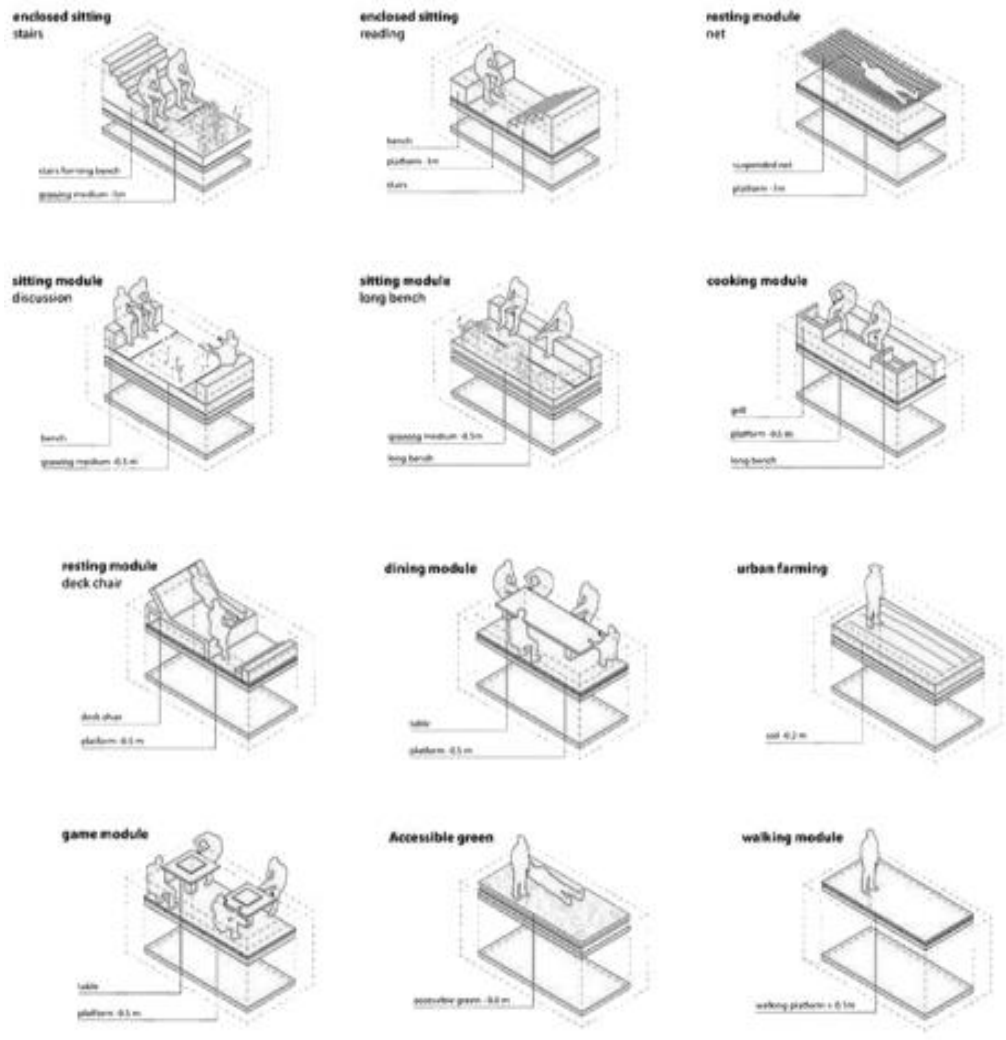


Figure 4.9 Activities Concept of the Hub

Some of these activities will be combined with each other in accordance with the environmental conditions in which the hub will be placed. For example, if the hub is placed in an area with high pollution levels caused by the high activity of motor vehicles there, it needs a hub that can make the pedestrians comfortable. It takes more green space on the hub.

4.1.2 Function Exploration

Function is the most important thing in this project. Which can be explained on the matter of zoning, circulation, and the intrinsic function.

4.1.2.1 Transportation Hub - Park and Ride Functional Concept

Circulation and zoning solved by the concept-based Transit Oriented Development (TOD). Circulation is described by using a 3D diagram shows to be horizontal and vertical circulation. The method uses the wet grid concept. In addition to the circulation problem, noise is also an issue that will affect into the building comfort. Concepts used in the settlement is how to controlling acoustic reflection and absorption of noise sources that would affect the shape of the building and the comfort of the space.

A. Transit Oriented Development Concept For Circulation and Zoning Determination

Transit Oriented Development is the exciting fast-growing trend in creating vibrant, livable, sustainable communities. Also known as TOD, it's the creation of compact, walkable, pedestrian-oriented, mixed-use communities centered on high quality train systems. This makes it possible to live a lower-stress life without complete dependence on a car for mobility and survival. Transit oriented development is regional planning, city revitalization, suburban renewal, and walkable neighborhoods combined. Transit oriented development is also a major solution to the serious and growing problems of climate change and global energy security by creating dense, walkable communities that greatly reduce the need for driving and energy consumption. This type of living arrangement can reduce driving by up to 85%.

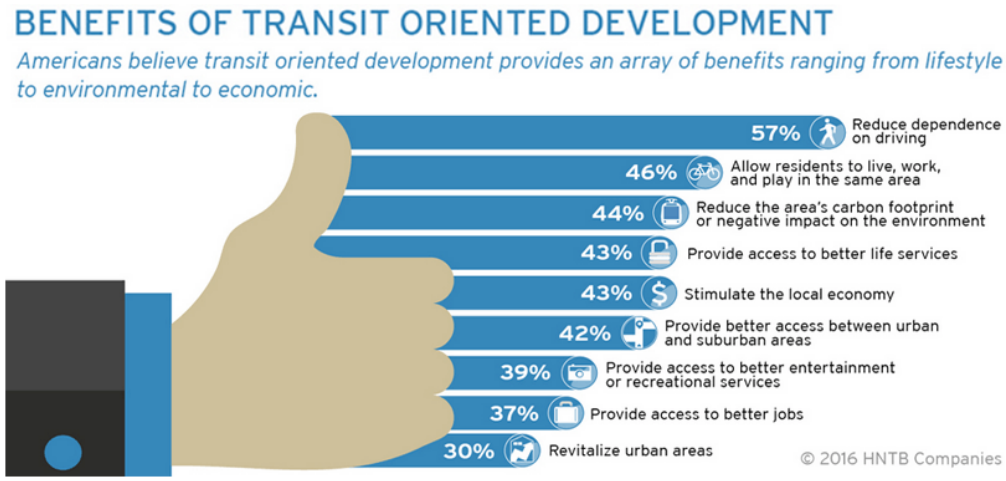
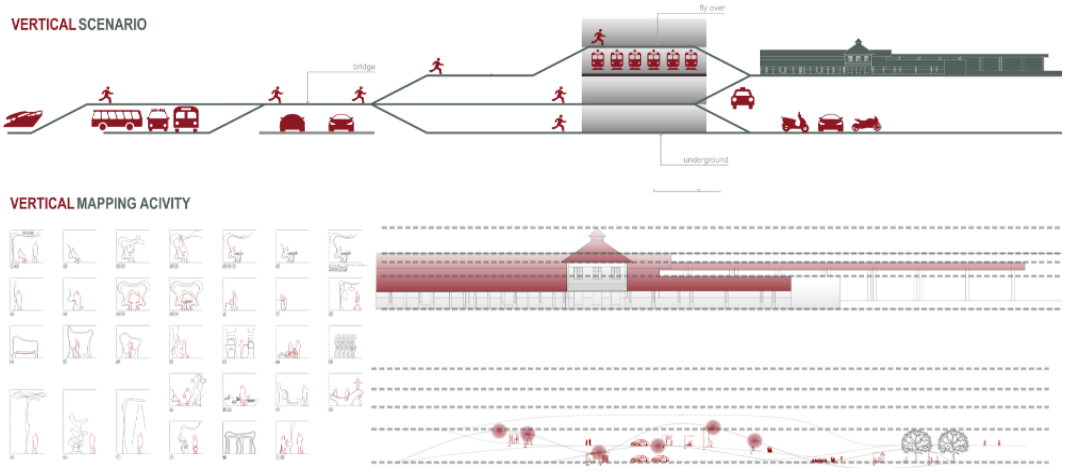


Figure 4.10 Benefit of Transit Oriented Development
Source : www.TOD.org

How about the circulation concept in this project? To determine the circulation of this transportation hub, need to know about the requirement of the terminal. Terminal construction should be equipped with: Terminal design, traffic impact analysis, and environmental impact analysis. In the design of the passenger terminal must pay attention: The required passenger facilities. Clear restrictions between terminal work environment and other designated locations, for example: shops, offices, schools, and so forth. Separation between vehicle traffic and movement of people inside the terminal. Clear separation between inter-city transport routes between provinces, inter-city transport within provinces, urban transport, and rural transport. Traffic management within the terminal and in the terminal surveillance area.



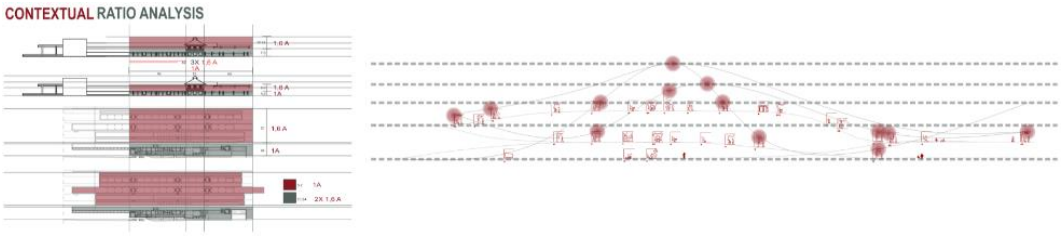


Figure 4.11 Circulation and Zoning Determination Concept

B. Transit Oriented Development Concept for Noise Reduction Determination

In addition to the circulation problem, noise is also an issue that will affect into the building comfort. Concepts used in the settlement is how to controlling acoustic reflection and absorption of noise sources that would affect the shape of the building and the comfort of the space.

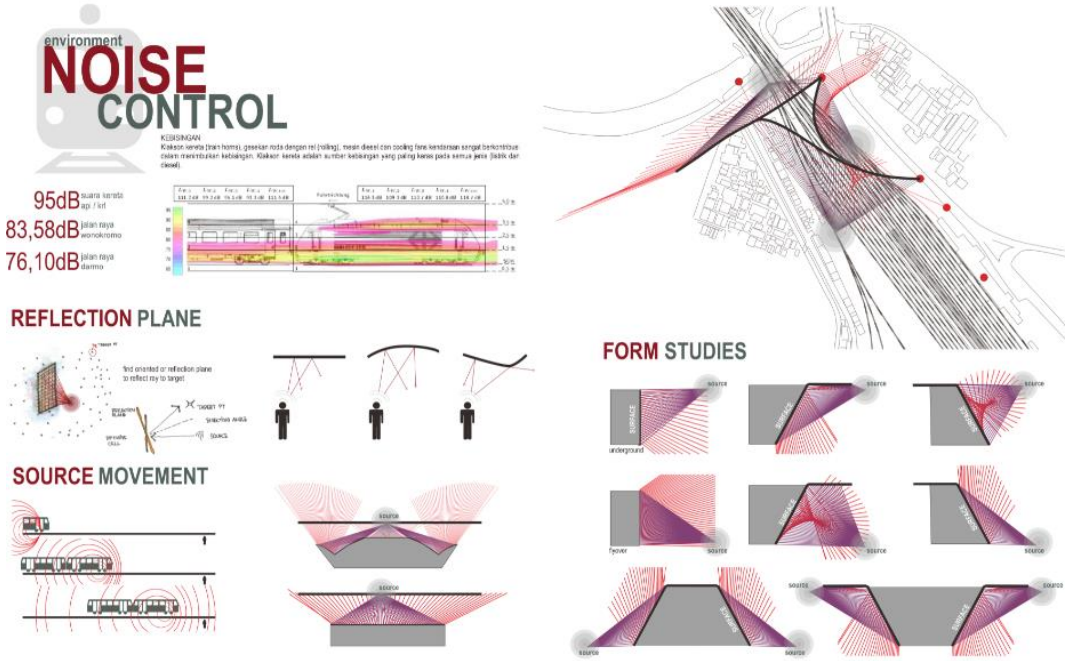


Figure 4.12 Noise Reduction Concept

The results of a study on the influence of the façade shape on the incoming sound are evaluated with reference to a great number of different typologies of buildings facades. The study has been carried out by means of a prediction software based on the modified theory of the ray tracing (pyramid tracing).

4.1.2.2 Hub Functional Concept

A. Multi-Layer Concept

The function of the Hub is to connect the crucial points in the area. Therefore, whatever is happening, the hub should still be usable as it should be. For example, suppose the condition is hot, generally people are reluctant to walk. Therefore, provided two layers, top and bottom layer so that even in hot weather conditions people still want to pass through the hub. The activities contained in the top and bottom layers adjust to the needs and point attractor what is provided environment in the area. The concept for the multi-layer bridge includes partial shelter from the elements and greenery all along the way, with grassy areas alongside a boardwalk-like surface. The concept is actually much more park-like than one would immediately think, with spaces to lounge and enjoy the scenery, and a variety of different levels, steps, and viewing platforms to break up the monotony and lend to the complexity of the structure. Walkers and bikers would have separate lanes to use, making it an efficient route for cyclists and reducing danger for pedestrians who may want to enjoy a more leisurely jaunt across the footbridge.

Figure 4.13 Hub Module Composition

Hub module above is composed of 3 horizontal areas and 4 vertical areas. Furthermore, if the intersection line drawn between the dots, then each layer will form 12 pieces of hub. Where the activities and the function of that hub will adapt with the environmental condition.

B. Hub Zoning Concept

"Our design creates a literal intersection and a dynamic, multi-layered amenity for both sides of the river," "It simultaneously functions as a gateway to both sides of the river, a lookout point with expansive views, a canopy that can shelter programs and a public plaza where the two paths meet.

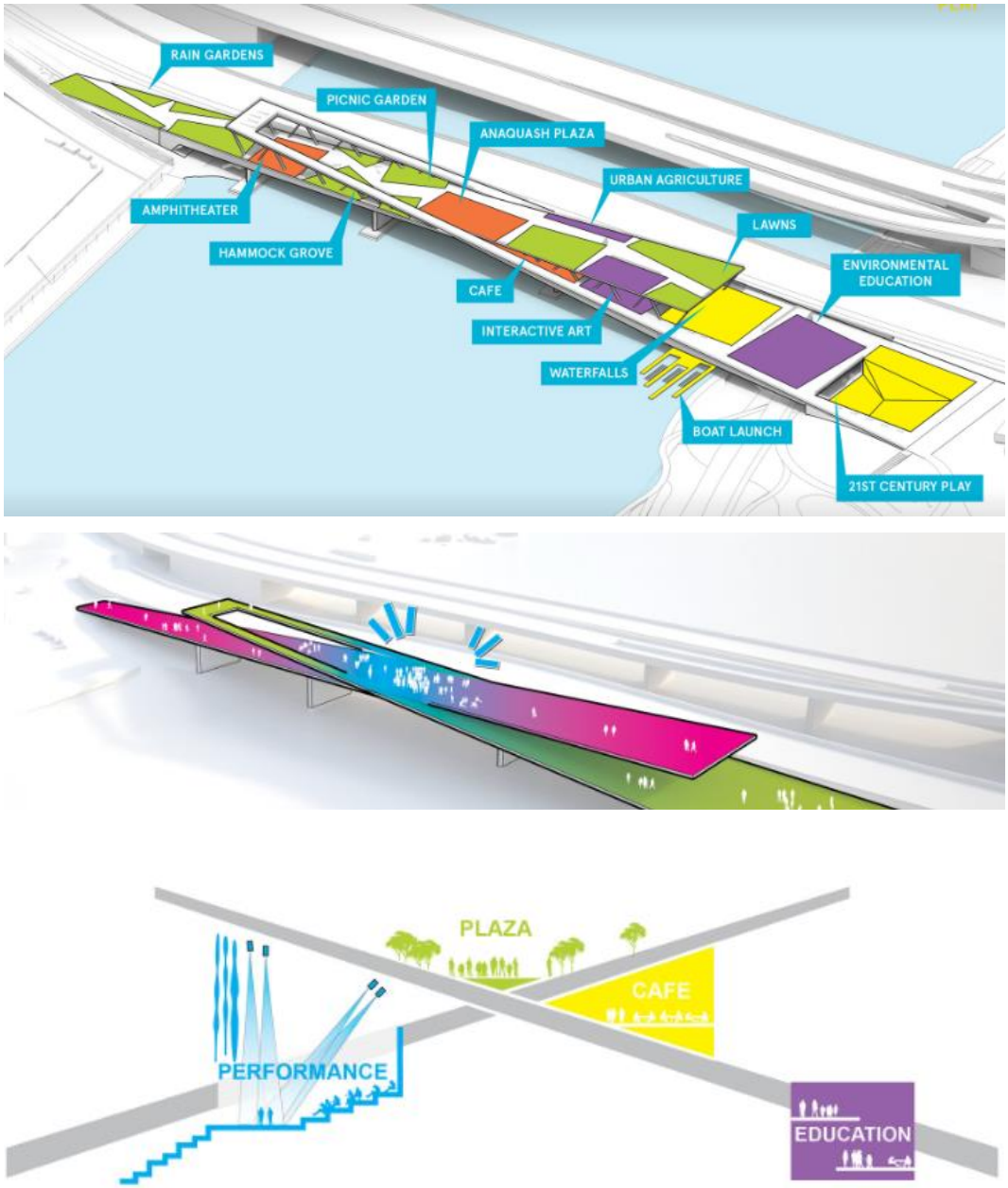
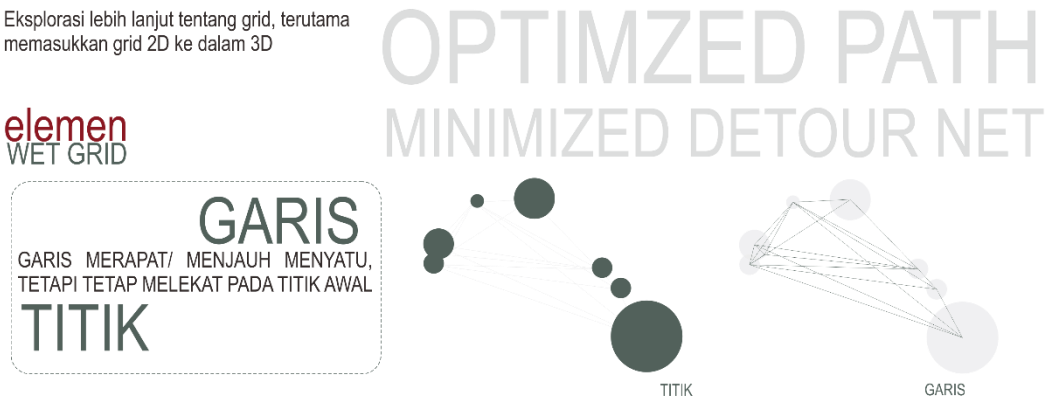


Figure 4.14 Hub Zoning Concept

4.1.3 Meaning Exploration

The meaning in design is important as far as the axis of human perception. Humans can enjoy a space through the meaning that provided by a space.

4.1.3.1 Transportation Hub - Park and Ride Meaning Concept



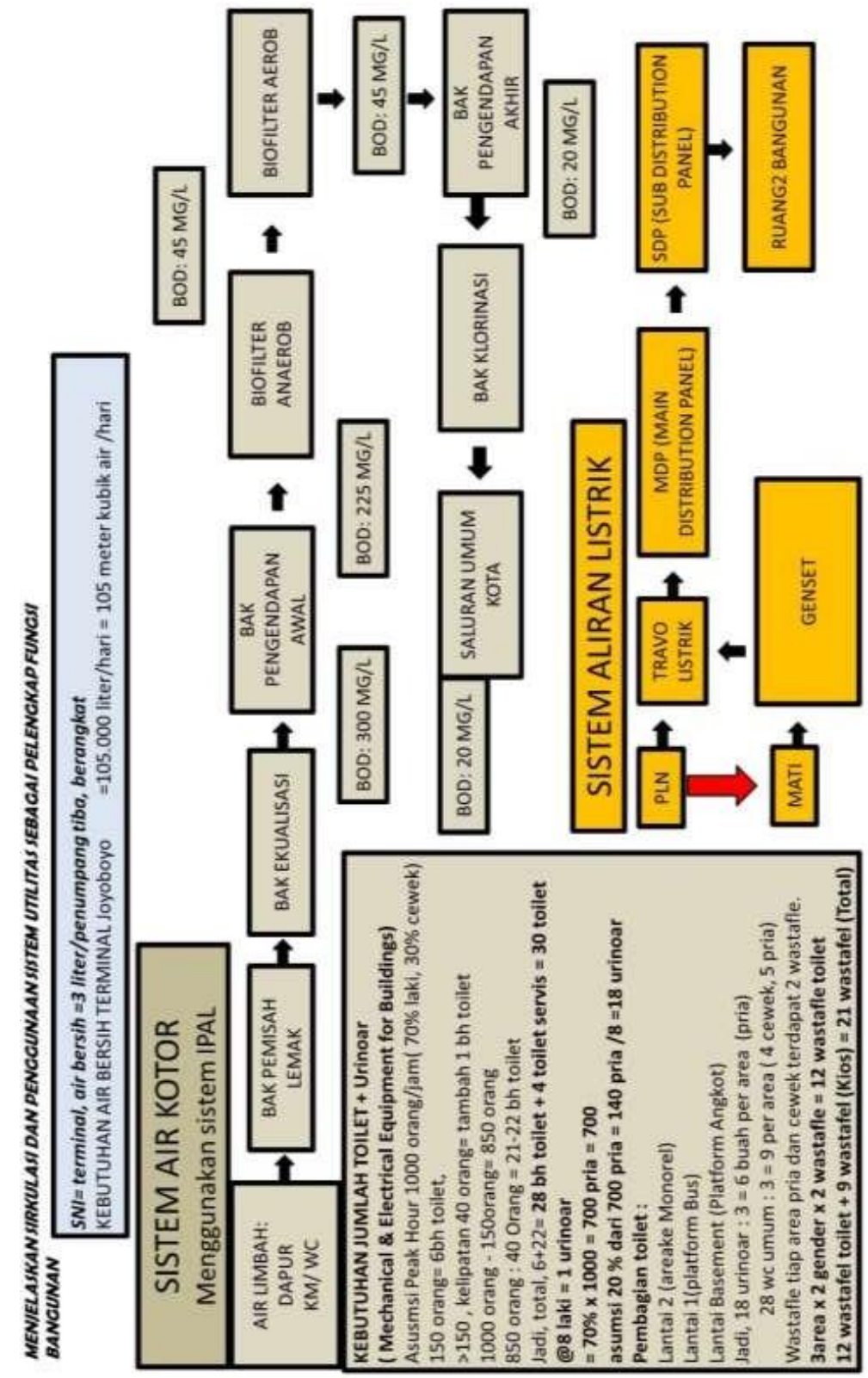
This project uses point and line philosophy. Where according to the architect the point is to symbolize something silent, immobile. This illustrates how the situation on existing land. Somewhere potentially a pedestrian area, but the opposite is happening, pedestrians are reluctant to walk in the region. Next is to use line philosophy. Where the line is a combination of two or more points. This illustrates the purpose of this project: to generate activity in the region. From something motionless that is symbolized by the point of being the line representing something that moves.

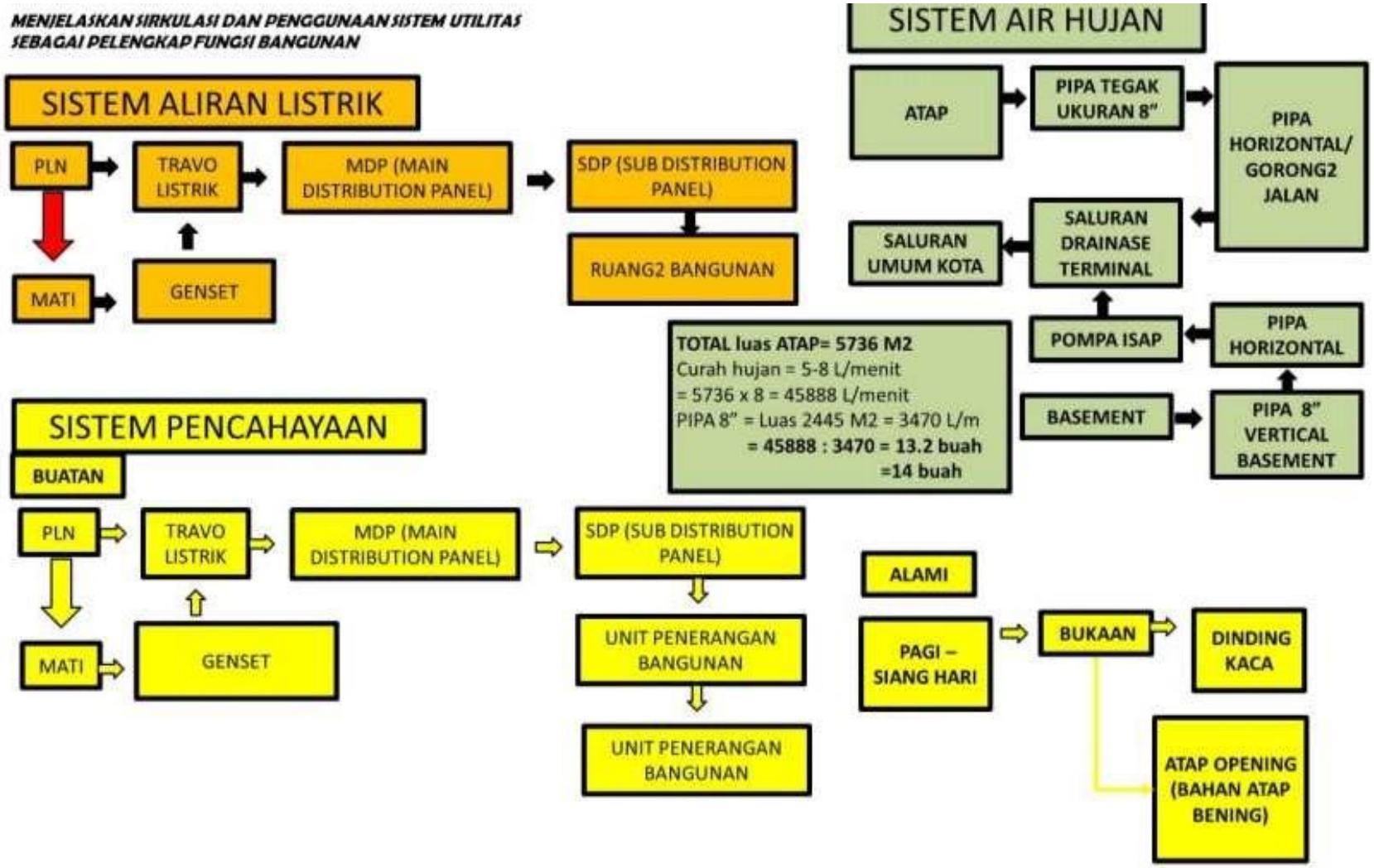
4.1.3.2 Hub Meaning Concept

The design of the bridge pulls the two ends of the bridge upward to form an X-shape, providing shelter for programs such as a performance space and a cafe, as well as plenty of open space for plazas, lawns and urban agriculture plots. This manipulation of the form also turns the thoroughfare into a destination all of its own above the river. The bridge would provide an elevated park experience with unprecedented access and views of both cities for commuters, residents and tourists alike.

4.2 Technical Exploration

4.2.1 Transportation Hub - Park and Ride Technical Concept




MENJELASKAN SIRKULASI DAN PENGGUNAAN SISTEM UTILITAS SEBAGAI PELENGKAP FUNGSI BANGUNAN
SISTEM ALIRAN LISTRIK
PLN
TRAVO LISTRIK
MDP (MAIN DISTRIBUTION PANEL)
SDP (SUB DISTRIBUTION PANEL)
RUANG2 BANGUNAN
MATI
GENSET
SISTEM AIR HUJAN
ATAP
PIPA TEGAK UKURAN 8"
PIPA HORIZONTAL/ GORONG2 JALAN
SALURAN UMUM KOTA
SALURAN DRAINASE TERMINAL
POMPA ISAP
PIPA HORIZONTAL
BASEMENT
PIPA 8" VERTICAL BASEMENT
TOTAL luas ATAP= 5736 M2
Curah hujan = 5-8 L/menit
= 5736 x 8 = 45888 L/menit
PIPA 8" = Luas 2445 M2 = 3470 L/m
= 45888 : 3470 = 13.2 buah
=14 buah
SISTEM PENCAHAYAAN
BUATAN
PLN
TRAVO LISTRIK
MDP (MAIN DISTRIBUTION PANEL)
SDP (SUB DISTRIBUTION PANEL)
MATI
GENSET
UNIT PENERANGAN BANGUNAN
UNIT PENERANGAN BANGUNAN
ALAMI
PAGI – SIANG HARI
BUKAAN
DINDING KACA
ATAP OPENING (BAHAN ATAP BENING)

MENJELASKAN SIRKULASI DAN PENGGUNAAN SISTEM UTILITAS SEBAGAI PELENGKAP FUNGSI BANGUNAN

SISTEM AIR BERSIH

SISTEM AIR BERSIH

PAM PDAM → METERAN → POMPA → RESERVOIR BAWAH (BAK TAMPUNG) → POMPA DISTRIBUSI → RESERVOIR ATAS (TANDON) → UNIT-UNIT BANGUNAN (WC/KM, KANTIN, MUSHOLAH, PENYIRAM TANAMAN, SPRINKLER)

SNI= terminal, air bersih =3 liter/penumpang tiba, berangkat

KEBUTUHAN AIR BERSIH TERMINAL Joyoboyo
= SNI 3 liter/penumpang Tiba dan Berangkat
= 3 liter x (survey BPS 2012, jumlah tertinggi penumpang, 9 tahun terakhir)
= 3 liter x (15800 + 19201) penumpang
= 3 liter x 35000 penumpang

TANKI RESERVOIR ATAS MAKS = 105.000 liter/hari = 105 meter kubik air /hari

SISTEM KEBAKARAN

JUMLAH TITIK SRPINKLER
JARAK MAKS SPRINKLER= ***3.7 M (NFPA 15)***
LUAS JANGKAUAN: $\pi X D = 3{,}14 X (R)2$
= 3,14 X 1.85X185
= 10 M2
MAKS JUMLAH TITIK
= LUAS BANGUNAN / LUAS JANGKAUAN
= 4000 M2 / 10 M2
= ***400 TITIK SPRINGKLER***
JUMLAH TITIK HYDRANT halaman
AREA 1000 m2 ada 2 buah hydrant halaman (SNI)
Ditambah 1000 m2 = tambah 1 hydrant
4000 m2 = 2 +1+1+1= ***5 TITIK HYDRAN PILLAR***

DETEKTOR KEBAKARAN:
- DETEKTOR ASAP
- DETEKTOR PANAS

→ ALARM

- SRINGKLER TIPE CABANG 3, PUSAT ALIRAN DI TENGAH
- HYDRANT BOX → STAFF KEAMANAN, PEMADAM KEBAKARAN
- HYDRANT PILLAR *(OUTDOOR)*
- PORTABLE ESTINGUISER
- PENUMPANG, STAFF

→ PINTU, TANGGA DARURAT

4.2.2 Hub Technical Concept

The bridge is envisioned as a pair of interwoven paths contained within a box truss frame. The paths are unique in their use and materiality with concrete handling direct, express movement for commuters and wood accommodating more leisurely outings. The paths are woven together horizontally and vertically with their relationship to each other reinforcing their use. The lower level concrete path is partially protected from the elements by the upper level wood path to help facilitate more pleasant, weather protected commuting. Meanwhile, the more exposed wood path takes advantage of dramatic views and an outward focus. Strips of vegetation and integrated seating would provide inviting buffers between the mixed uses while intermittent cafes and shops would generate additional vitality.

For the construction of the hub would require structures that support the building structure of the hub. Laying out the construction will definitely connect to the road. How to put the structure on the road but without disturbing the activity of the vehicle under it? To determine what kind of structure will be used in this area, it is necessary to observe how the road segment. After the observation, the results obtained

Figure 4.15 Road Network Pattern

There are different path pattern different each region. Therefore it takes several options to choose the structure pattern that will be used. In general, the structure used is the type of space frame. Where this structure is very flexible because it can be adjusted according to road conditions.

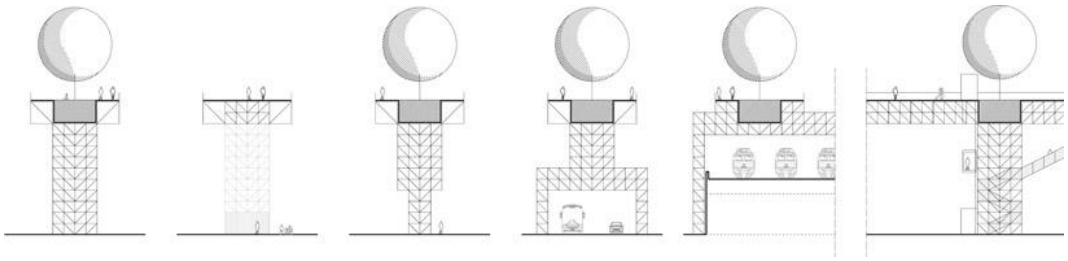


Figure 4.16 The Hub Structure

The use of the structure can be adjusted to the road conditions, if the location to place the structure has a wide enough span can use the structure of type A, but if only has a span that is not too wide can use the type of structure C, if the road will be passed by various types of vehicles can use structure D, etc. So what if the structure is applied to the road body in the area of research object?

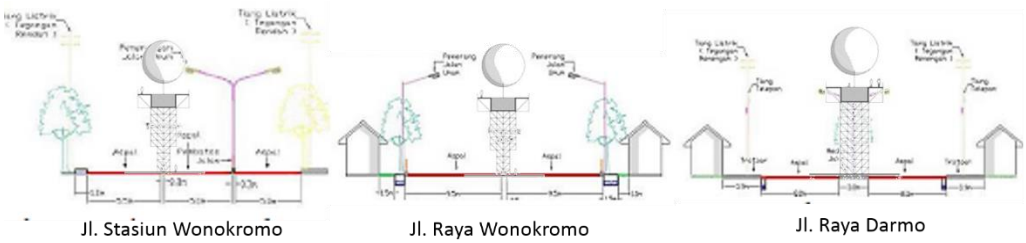


Figure 4.17 The application of the hub Structure in the observation site

In the figure 4.17, we see the road network map and the application of the structure. We use the structure type C in the Stasiun Wonokromo street and Raya Wonokromo street, becaure the location to place the structure is not big enough. And then for the Raya Wonokromo street can use the structure type A because it has the big enough space to place the structure.

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CHAPTER 5
THE DESIGN

5.1 Formal Exploration

Formally design produces the Transportation Hub by integrating all the concepts, such as the open act architecture, catalyst architecture, the contextualism and space syntax method, the wet grid method, the multi-layer method.

5.1.1 Transportation Hub – Park and Ride Design

This form is actually affected by wet grid method which connect the surrounding area. First the architect determines where the transit point in this area is. After a point is determined each transit point after it is connected to a line. After it is also determined fatigue point that becomes the point attractor area. Next form 3 different types of wet grid. The three different points are then combined into one type of wet grid. This technique is called superimposed grid. The grid is then simplified. From the nodes formed the mass of buildings that became a consequence of the environment.

Figure 5.1 Ground Floor Plan

Figure 5.2 Second Floor Plan

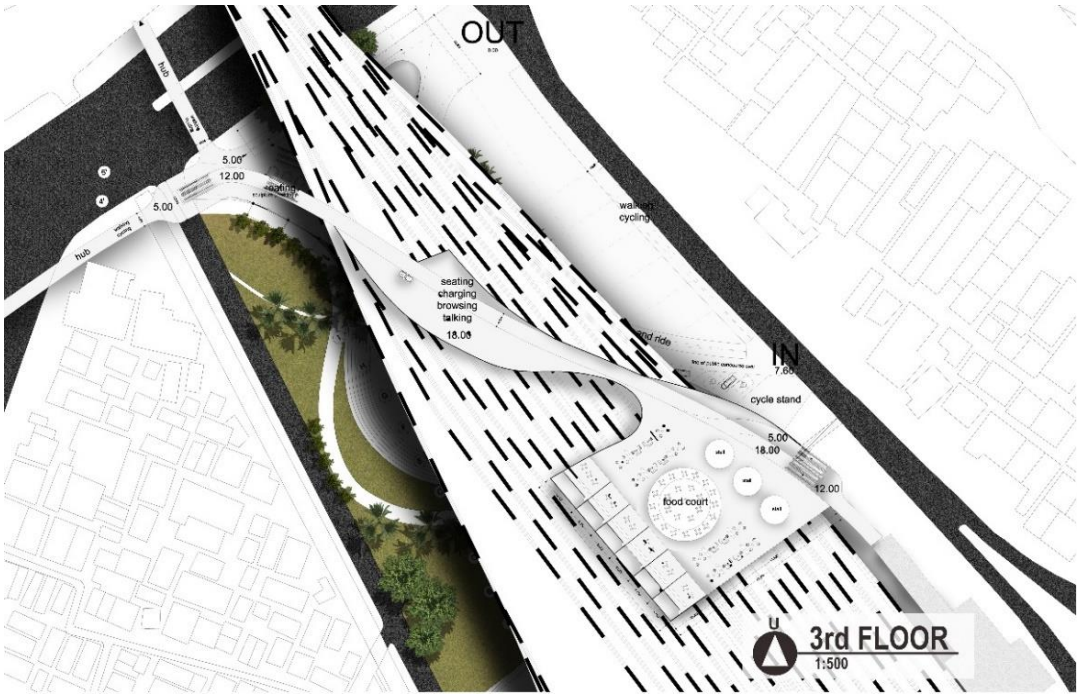

Figure 5.3 Third Floor Plan

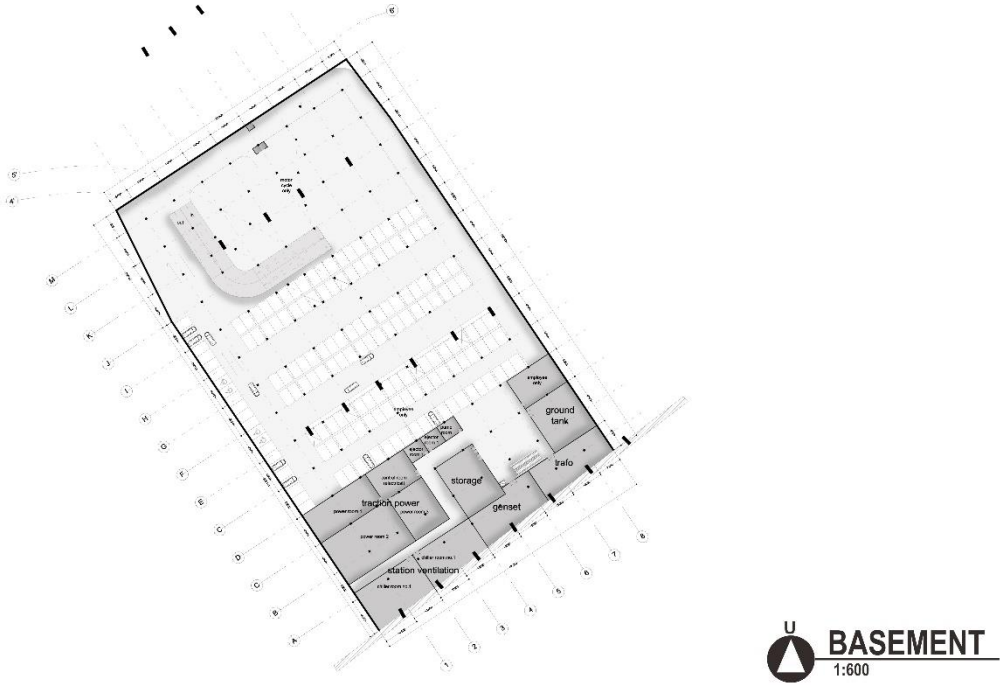

Figure 5.4 Basement Floor Plan

Figure 5.5 Site plan

Figure 5.6 the Top View – Situation

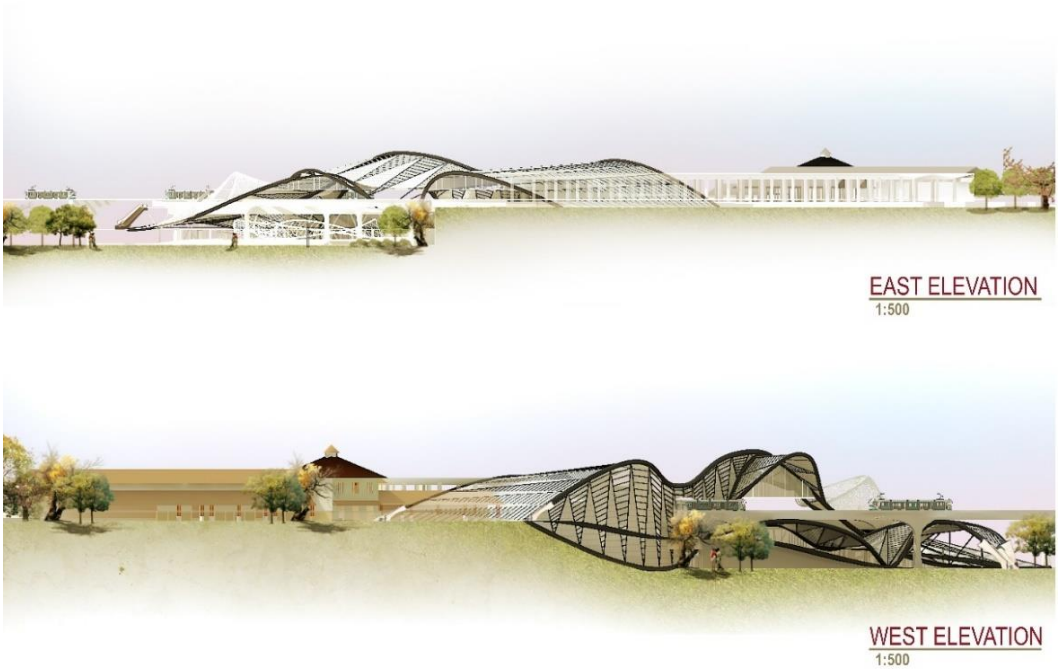

Figure 5.7 East and West Elevation plan

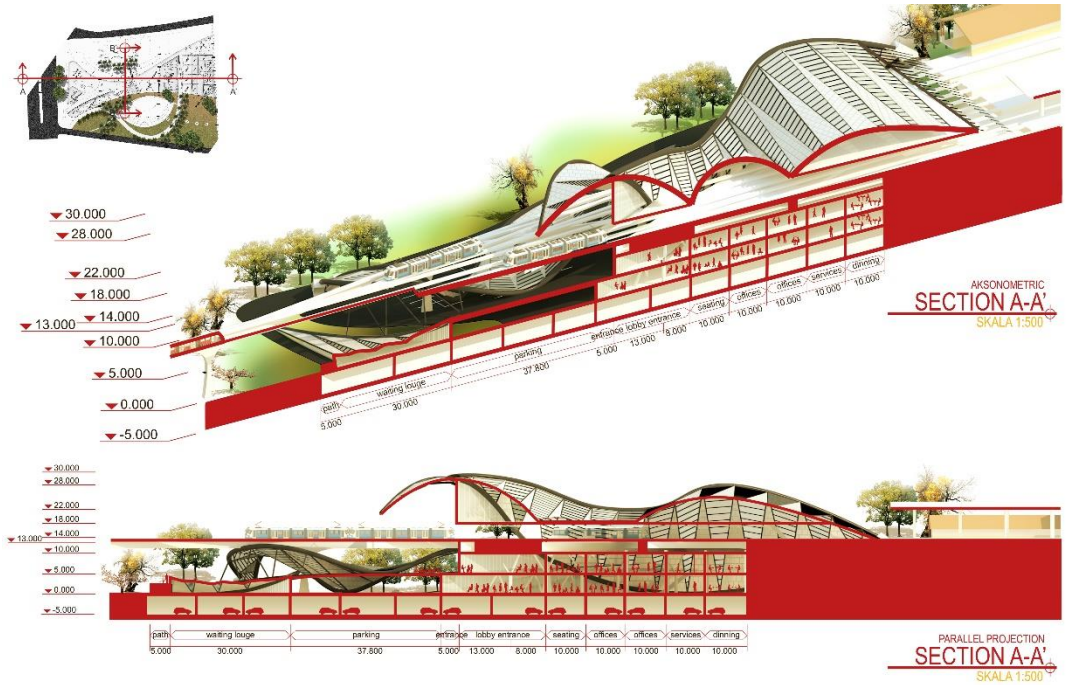

Figure 5.8 Sectional plan AA'

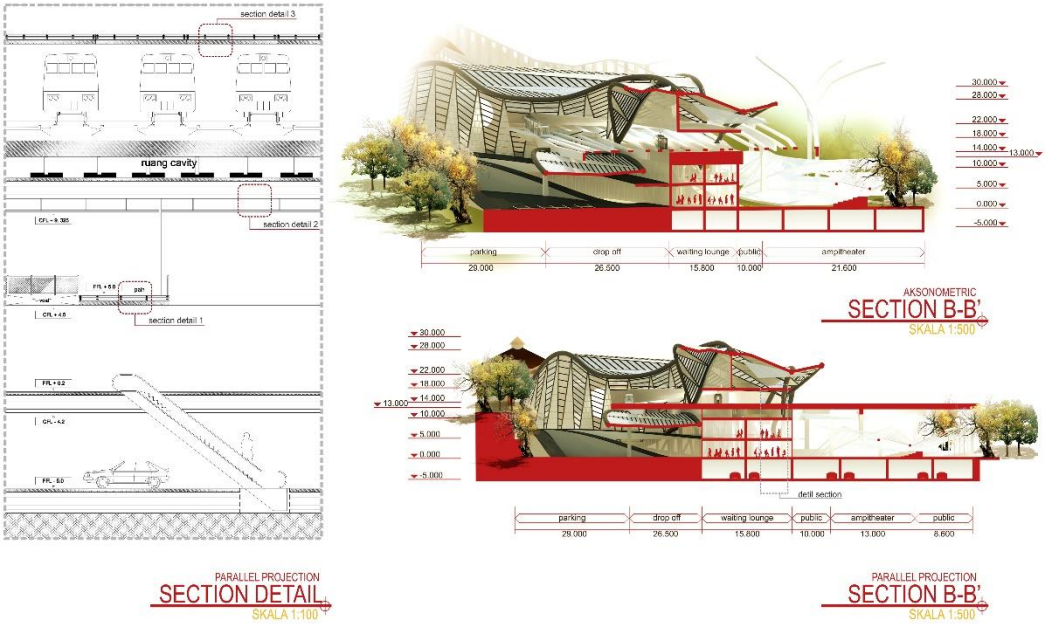

Figure 5.9 Sectional plan BB'

Figure 5.10 Exterior View

Figure 5.11 Exterior View – Urban Park

Figure 5.12 Interior View Illustration

5.1.2 Hub Design

The bridge is envisioned as a pair of interwoven paths contained within a box truss frame. The paths are unique in their use and materiality with concrete handling direct, express movement for commuters and wood accommodating more leisurely outings. The paths are woven together horizontally and vertically with their relationship to each other reinforcing their use. The lower level concrete path is partially protected from the elements by the upper level wood path to help facilitate more pleasant, weather protected commuting. Meanwhile, the more exposed wood path takes advantage of dramatic views and an outward focus. Strips of vegetation and integrated seating would provide inviting buffers between the mixed uses while intermittent cafes and shops would generate additional vitality.

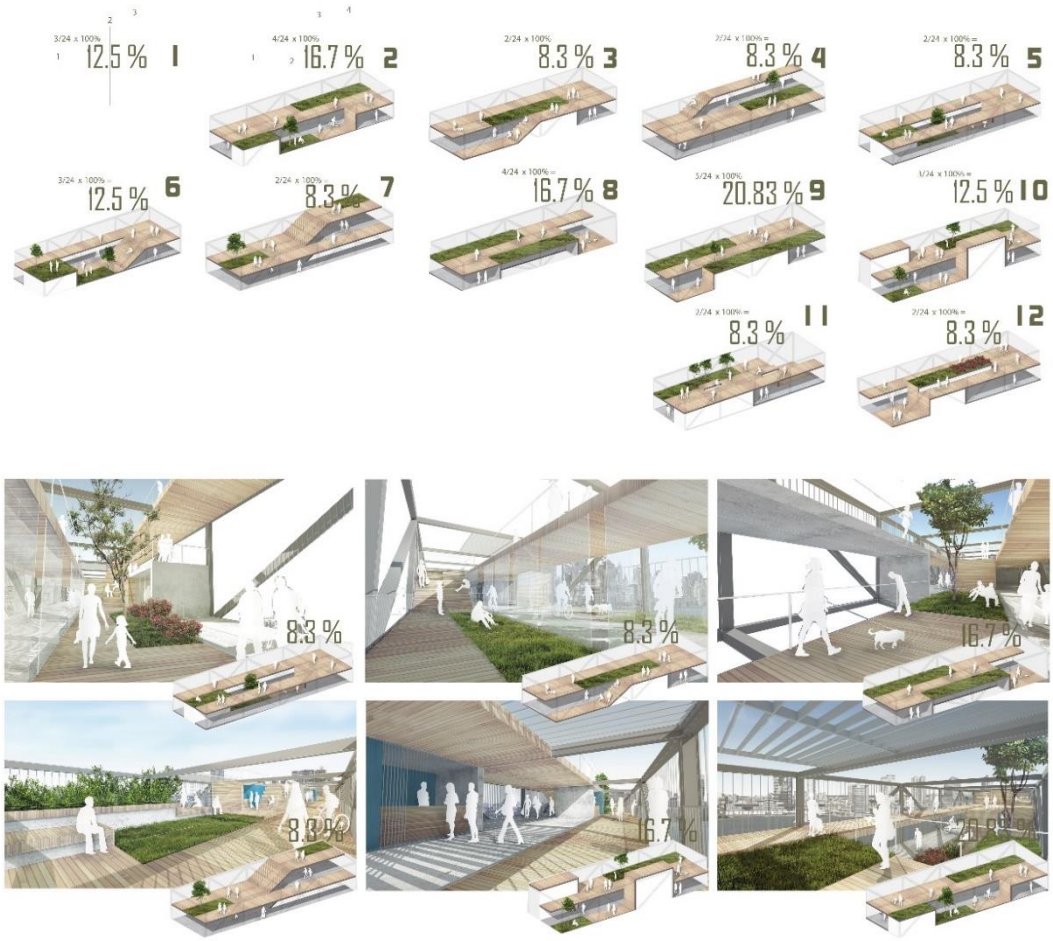

Figure 5.13 Module Hub Illustration

5.2 Technical Exploration

In technical exploration, ie design as an architectural object, the integration of design elements ie formal aspects (shapes), internal space, structure, and also utility are points to be considered. The steps taken for integrated design are at the beginning of the design process, by directly incorporating the structure and utility considerations in the design construction. In terms of integration with structures, as mentioned in the design methods section (chapter3) and also the exploration section of design (chapter4), the structure becomes a consideration in the elucidation and selection of results from geometric exploration. So that geometry and structure are bound elements.

5.1.1 Transportation Hub – Park and Ride Design

A. Structure System

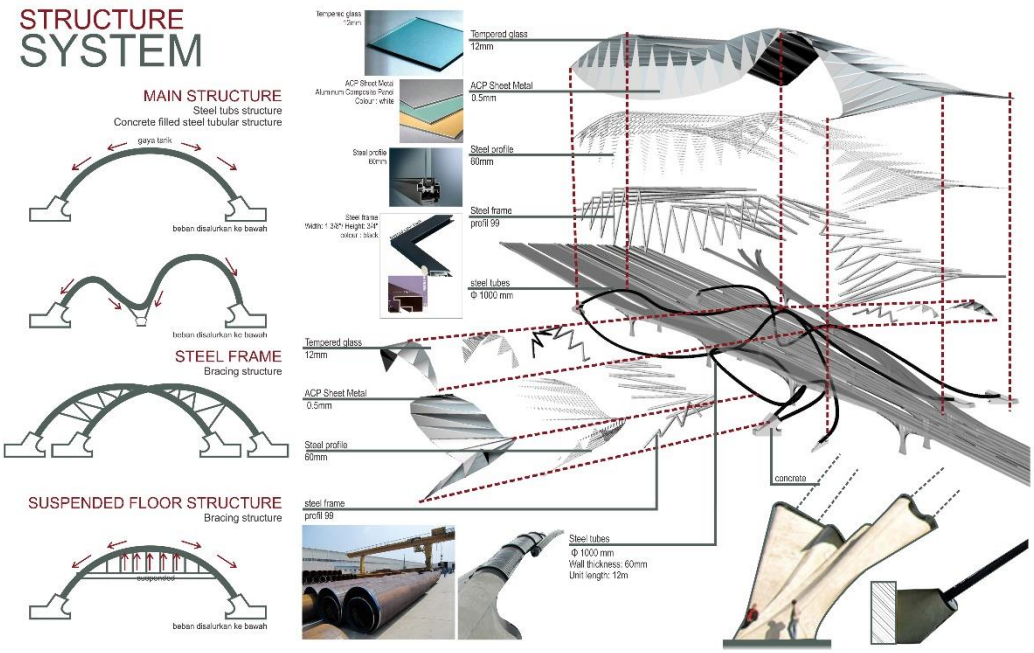

Figure 5.14 Structure System

Integration with the utility has also been created in the group section of the activity and the placement of the enclosure, so the enclosure, structure, program, geometry, and utility become 1 part intact and become an integrated design

B. Circulation System

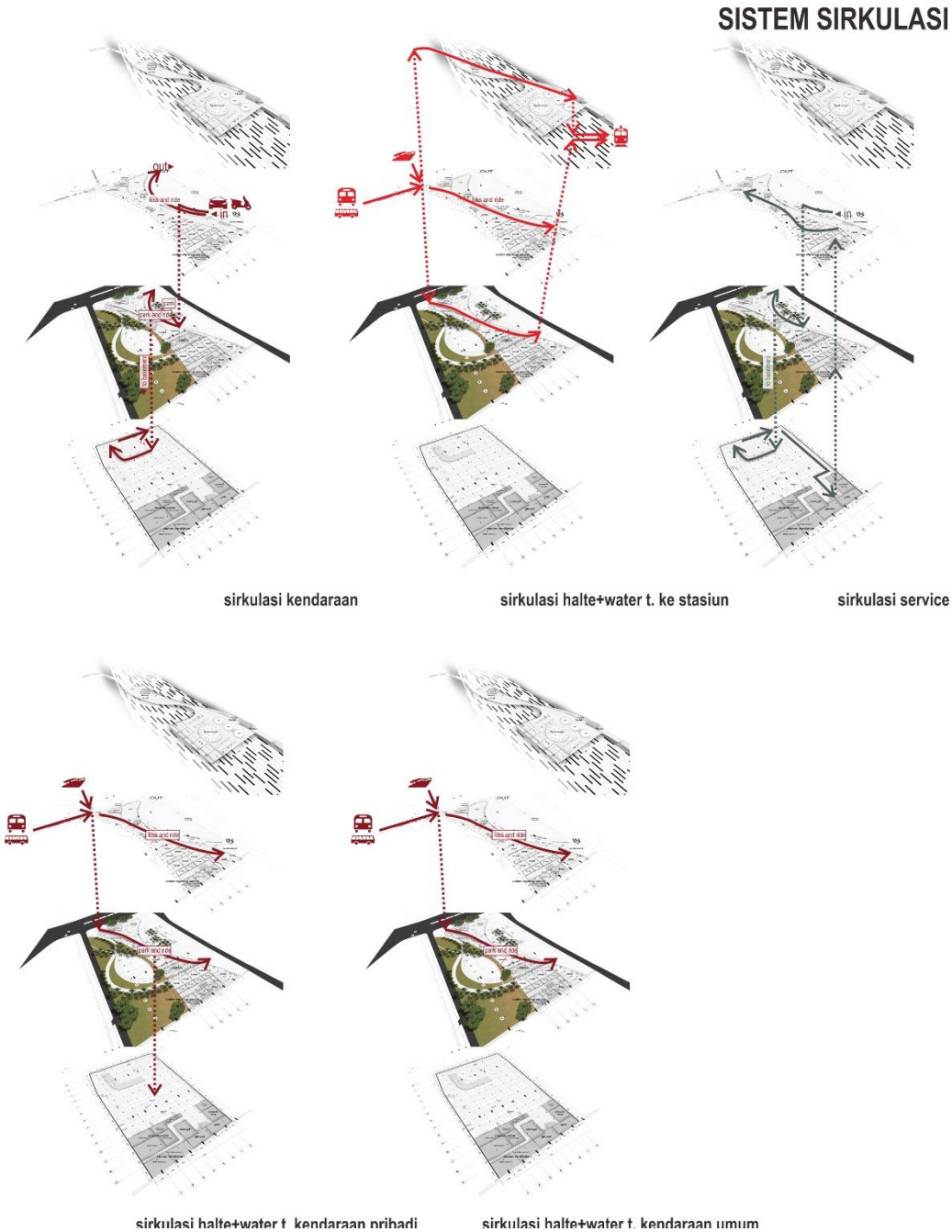

Figure 5.15 Circulation System

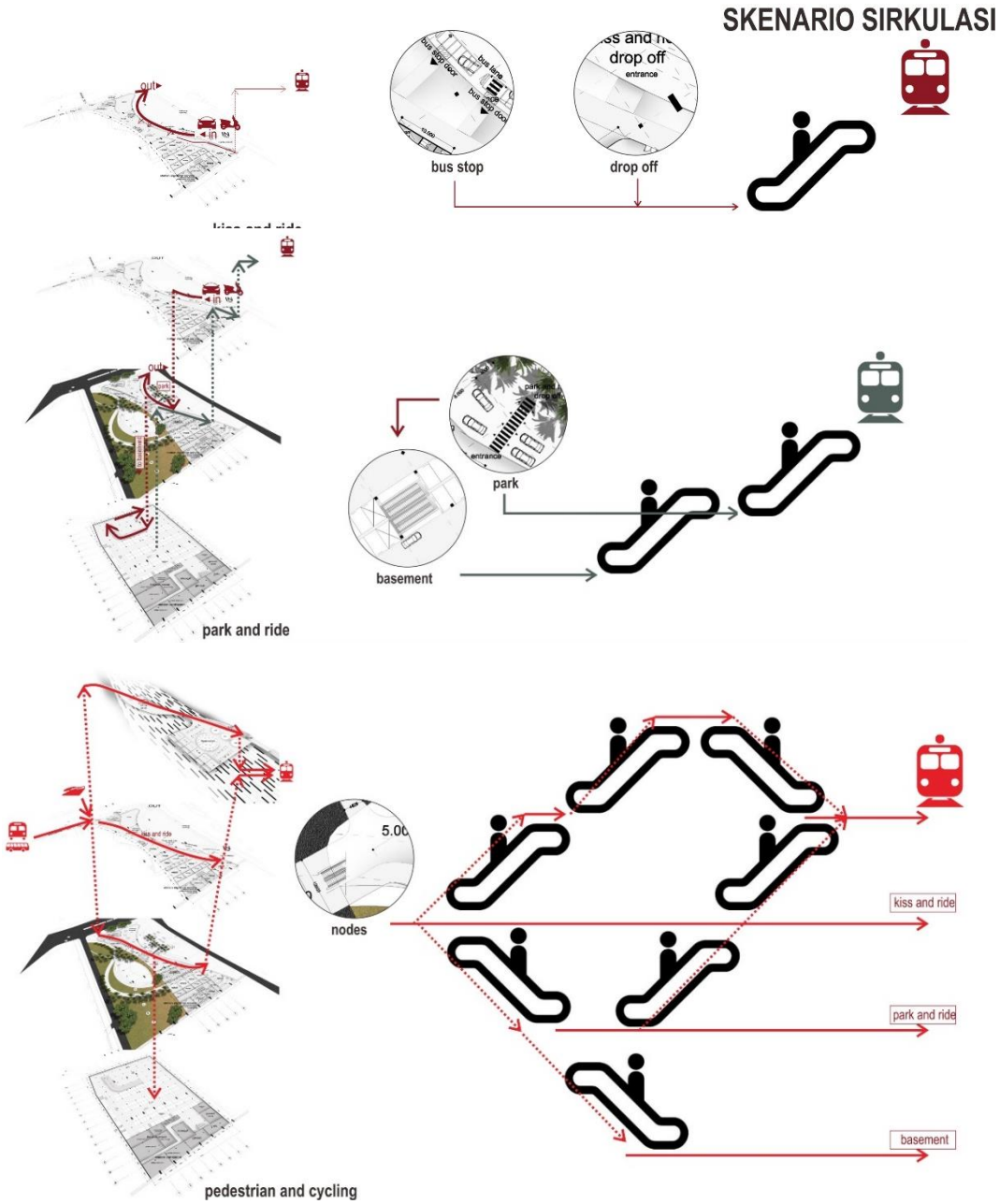

Figure 5.16 Scenario Circulation System

C. Utility System

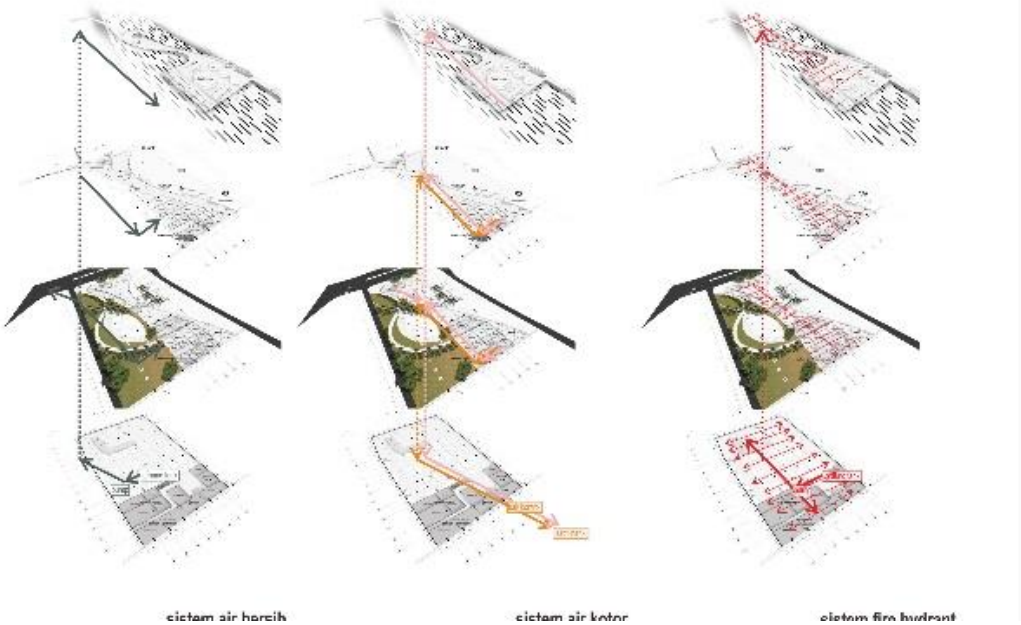

Figure 5.17 Clean, Dirty, Hydrant Water Utility System – Axonometric view

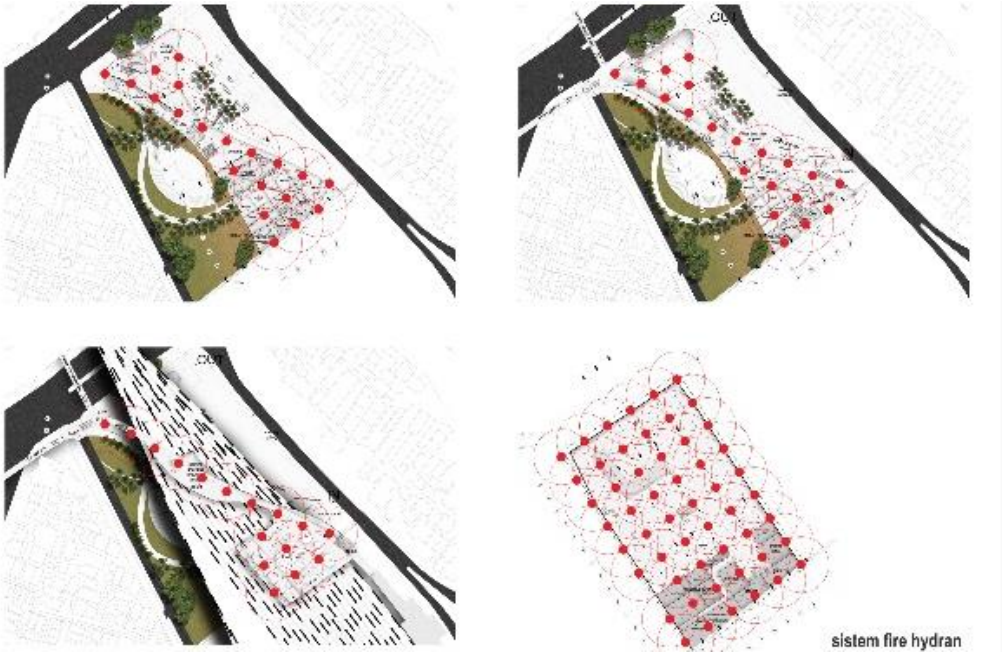

Figure 5.18 Sprinkler System

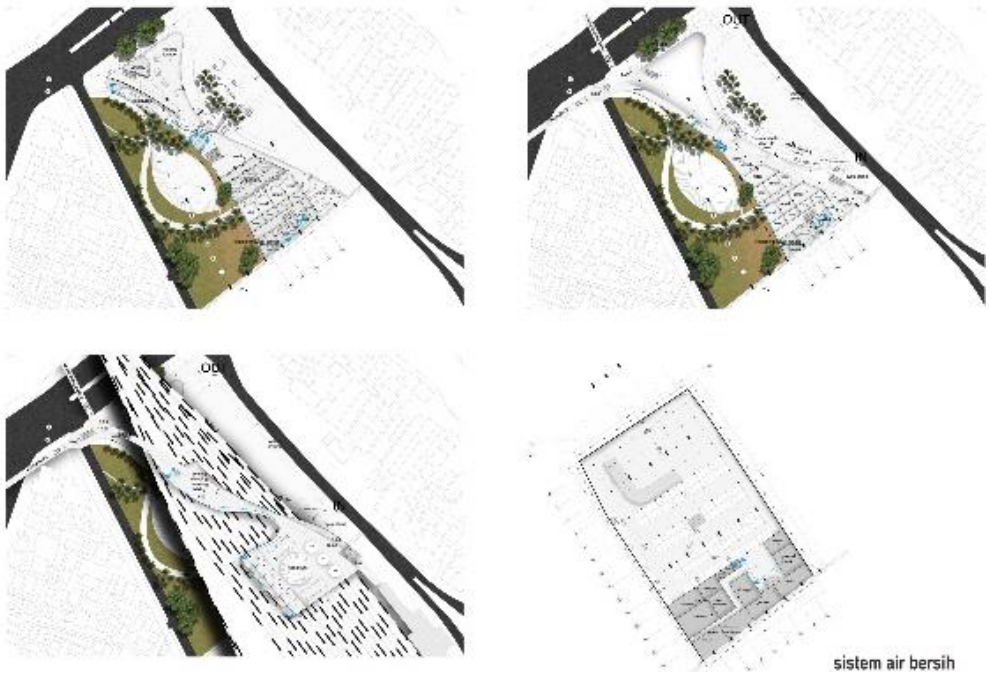

Figure 5.19 Clean Water System – Plan

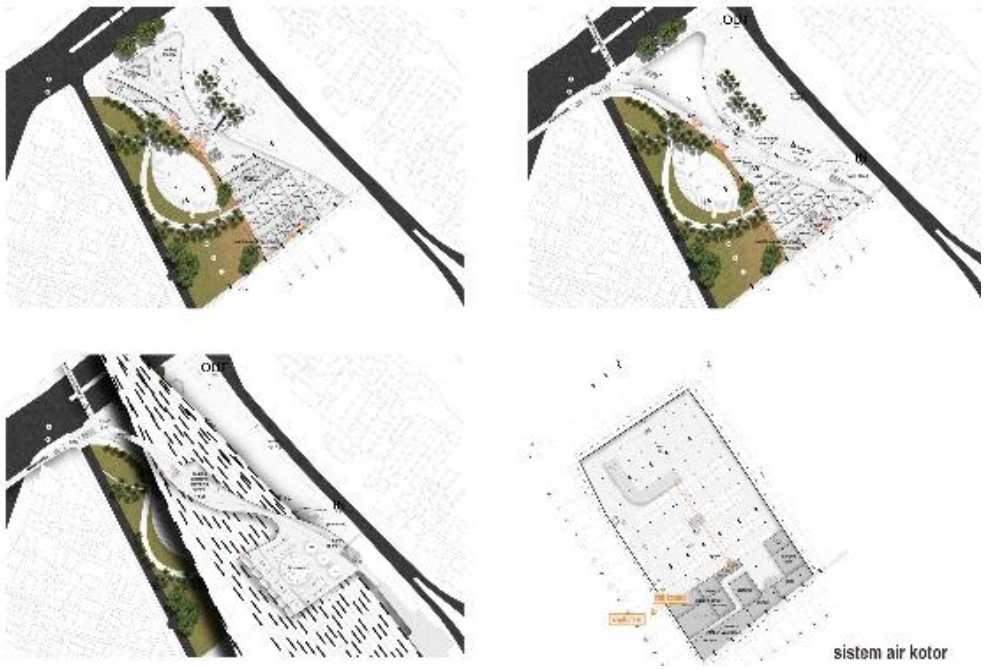

Figure 5.20 Dirty Water System - Plan

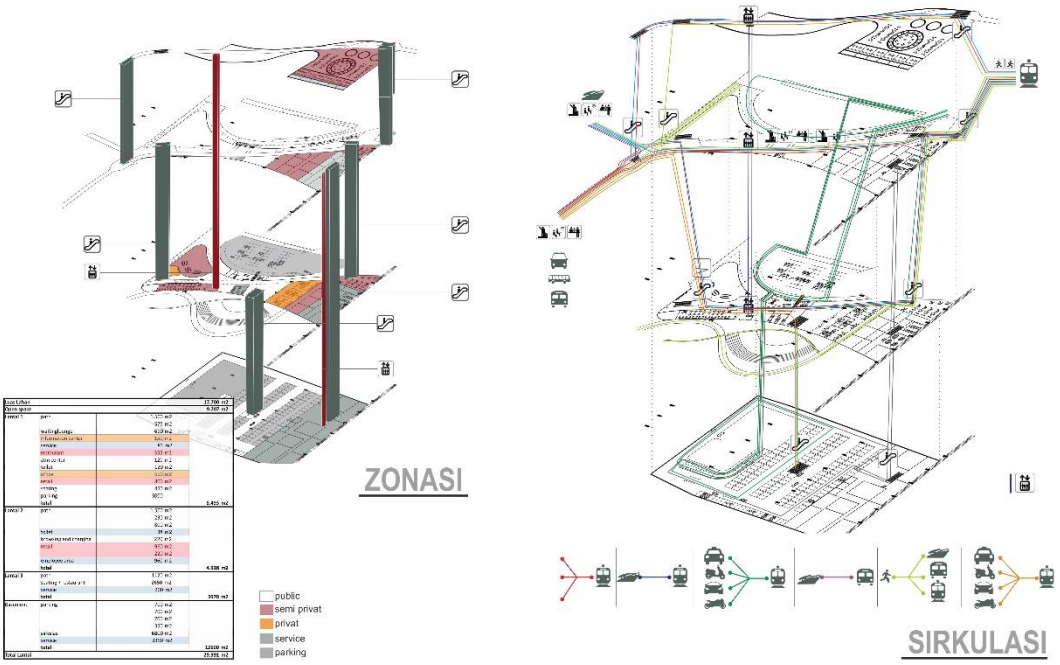

Figure 5.21 Axonometric Plan

B. Noise Reduction System

Noise reduction techniques can be broadly classified as passive and active methods. Passive control involves reducing the radiated noise by energy absorption, while the active method involves reducing source strength or modifying acoustic field in the duct to obtain noise reduction. Active noise control is being used only at low frequencies. At middle and high frequencies, active noise control is hard to implement because there are different phenomena of sound propagation. Thus, the main purpose of the active sound control is to provide higher noise reduction at low frequencies. While at higher frequencies standard solutions are applied, and they are based on the application of absorbing properties of the materials. The absorbing materials, as such, are passive mediums that lower noise by disseminating energy and turning it into heat. Acoustic absorption depends on the frequency of the sound waves.

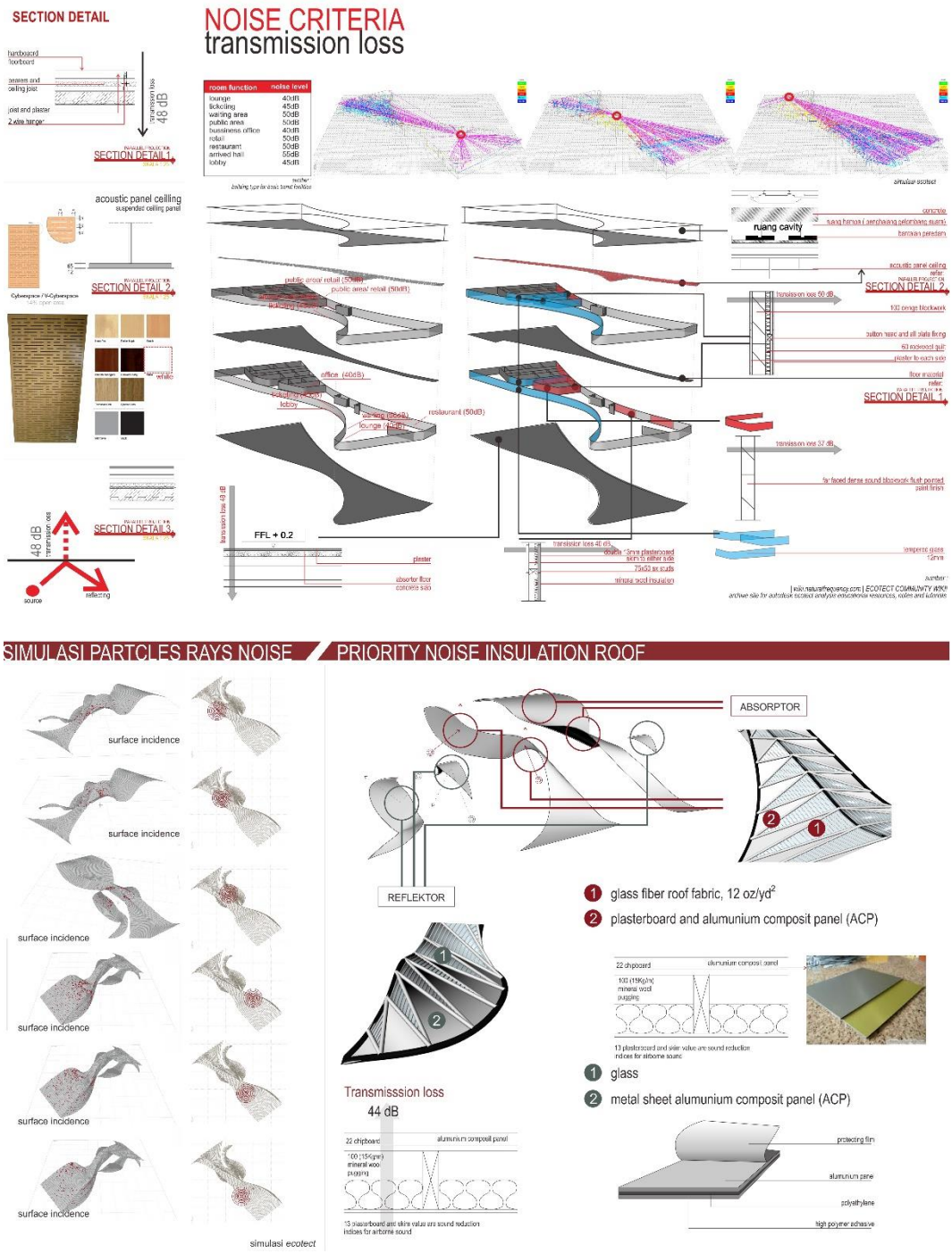

Figure 5.22 Noise Reduction System

CHAPTER 6
CONCLUSION

From the results of the above study on pedestrian way it can be concluded that the pedestrian path in the area wonokromo still far from expectations and plans that have been made. To support this project goes along with the redesign of the joyoboyo terminal become a friendly area for pedestrians. This object is designed based on the issue of additional modes of transportation in the city of Surabaya which is a major project of Surabaya city government to divert the users of private vehicles to move to public transportation. This architectural object is designed with the purpose of accommodating the user of this terminal / hub station area so that they are not difficult to adapt and with the ease of zoning circulation and space division so as to help the functioning of this object to be used by the public. The authors hope, this design object can give economic and social benefits to the community in the area of Surabaya.

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