I. INTRODUCTION

1.1 Background

"Think of a city and what comes to mind? It's Streets"[1].

Street reflects the identity and image of a city, by looking into details of its street we could interpret the social, culture and political gesture of a city. Across the world, streets take different forms and embrace various issues; these differences construct the sense of place and identity of cities[2]. Urban streets are a space for people to shop, connect, socialize and engage in a very diverse range of social and recreational activities that, for people who are living the city, are what makes urban living enjoyable. Street design impacts the way people interact and connects to the built environment.

As a response to the desire for the better urban environment, planner and designer strive in creating a livable city. There are five basic principles of a livable city, and one of the principles is walkability. Streets have an important role in creating a livable city; good streets promote human interaction and sociability. Beyond the quality of life benefits, streets are designed to support walking activity. A livable city is walkable[3], the quality of the pedestrian experience is closely related to the core principles of a livable city. People walk within the city for a different reason; leisure,

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[1] Jacobs, Jane (1961), The Life and D eat American Cities: The Failure of Town Planning, Penguin, and Harmondswort
[2] Lynch, Kevin. (1960). The image of th
[3] www.livablecity.org

business, or even only for passing through. Walking activity predominantly, influenced by cultural factors, by individual circumstances, preferences, and characteristics and by environmental factors. In general, walking and other street activities are mainly a function of the two variables—cultural and physical environments.

Planning walkable environments in the twentieth century was a response to the motorization of transportation and development of a consumer culture. The walking conditions considered as a space that dominated by pedestrian movement. The concept of Walkable Street is a modern concept that is widely used in the urban area of developed countries like United States of America, United Kingdom, and another European country, and also Asia Developed countries like Japan, South Korea, and Singapore. Some cities, in particular, those that grouped as developing countries, like as follows; Bangkok, Manila, Mumbai, Jakarta and other, got the image of traffic congestion, polluted, health risk to living in compared to some other cities in developed countries. Streets in developing countries, being much complex than those in the developed world because they contain more mixed modes of transport and mixed usage[4].

Fortunate local climate condition encouraged *Karsten*[5] to applied Garden City concept as part of Bogor city structure development. This

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[4] Appleyard, Donald. 1981. *Livable Streets*. Berkeley: University of California Press.
[5] Dutch Town Planner

concept has been made Bogor as a popular vacation destination during the colonial period. Before the establishment of the highway, the street was essential in Bogor City, where all socio-economic activities happened and as a cultural setting where people are interacting each other or even expressing their cultural identity (public space). Bogor is a city that portrays the combination of traditional Sundanese[6] culture, colonial culture, and modernity of the city. However, the automobile-oriented often neglects the unique quality of Bogor City Street as a cultural setting.

In a tally of Heritage City planning, Bogor municipal also has been improving the walkability to transform Bogor into a more livable city[7] by upgrading pedestrian facilities to support walkable lifestyle concept.

Based on a preliminary study on Garden City Concept of Bogor City, Old Bogor has radial pattern street called *Groote Weg*[8] (Juanda Street). This street structured with three grand boulevards, which are (1) *Pabaton Weg* (Sudirman Street); (2) *Dantamer Weg* (Kapten Muslihat Street); (3) *Hadels Straat Weg* (Suryakencana Street). All Boulevards had 18 m width and lay across the city from the city center to its surrounding. Therefore this research will be conducted on four streets that identified as historical street shaped the city since the colonial period.

Streets are public spaces for people and also as a corridor for mobility. In creating walkable environments also has an impact in creating a better

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[6] An ethnic group native to the western part of the Indonesian island of Java.
[7] Regional Mid Term Development Plan (RJPMD) for 2010-2014
[8] Road (Dutch)

ecological condition. Walkable environment incorporates more trees and dedicated vegetation areas they will inherently clean the air, preserving the natural habitat, groundwater recharge and improving urban microclimate. As dynamic space, street supports environmental sustainability, economic activity, and cultural significance. Successful approaches will vary by culture, place and city size. Nevertheless, a few attributes[9] contribute to the quality of path context in the almost urban setting: the scale of street space, the presence of street trees and other landscape elements, views, visible activity and transparency, size and coherence of built form. Shaping safe, comfortable, efficient, and vibrant a city's street are affected how livable the street. The important thing is to engage the pedestrian interest along the route, either as an accessible place or even encourage social interactions.

Concerning that notion, it is important to reconsider an improvement recommendation that incorporates the quality of physical features, street as cultural setting and also considering environmental sustainability.

1.2 Objectives

This study aims to propose ideas to improve streetscape as a place of interaction between the built environment (physical), and it's cultural setting to enhance the quality of the walkable environment. The research objectives, then, are:

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[9] Reclaiming the Walkable City - Frameworks. (n.d.). Retrieved from https://frameworks.ced.berkeley.edu/2006/reclaiming-the-walkable-city/

- To investigate existing city context and physical features to understand the aspects in which built environment and its landscape influences walking.
- To explore the pedestrian activities and particular street culture occurred in the selected streets.
- To investigate the historical milestone to find the possibility rejuvenate Bogor City street character and its culture.

The following research questions were drawn up to achieve research objectives and goals:

- How was the existing condition of Bogor City context and existing physical features on selected study streets?
- What kind of street activities occurred on the selected study streets?
- How to improve streetscape by formulating design strategy and recommendation that incorporates physical features and street culture on Bogor 'Heritage' City?

The result of this research hopefully can provide an initial recommendation on reconsidering the streetscape improvement and also rejuvenate pedestrian street culture on Bogor 'Heritage' City in the direction of creating Bogor City as a Livable City.

II. SCOUPE AND METHODOLOGY

2.1 Scope of Study

2.1.1 Study Site

This study examines the streetscape improvements concept for Bogor 'Heritage' City. This study conducted at four main streets of the City Center (Fig. 1). These study streets have significant meaning to Bogor City as its lies within Old Bogor City. The four streets are (1) Sudirman Street; (2) Kapten Musllihat Street; (3) Juanda Street Network (Juanda-Otista-Jalak Harupat); and (3) Surya Kencana Street.

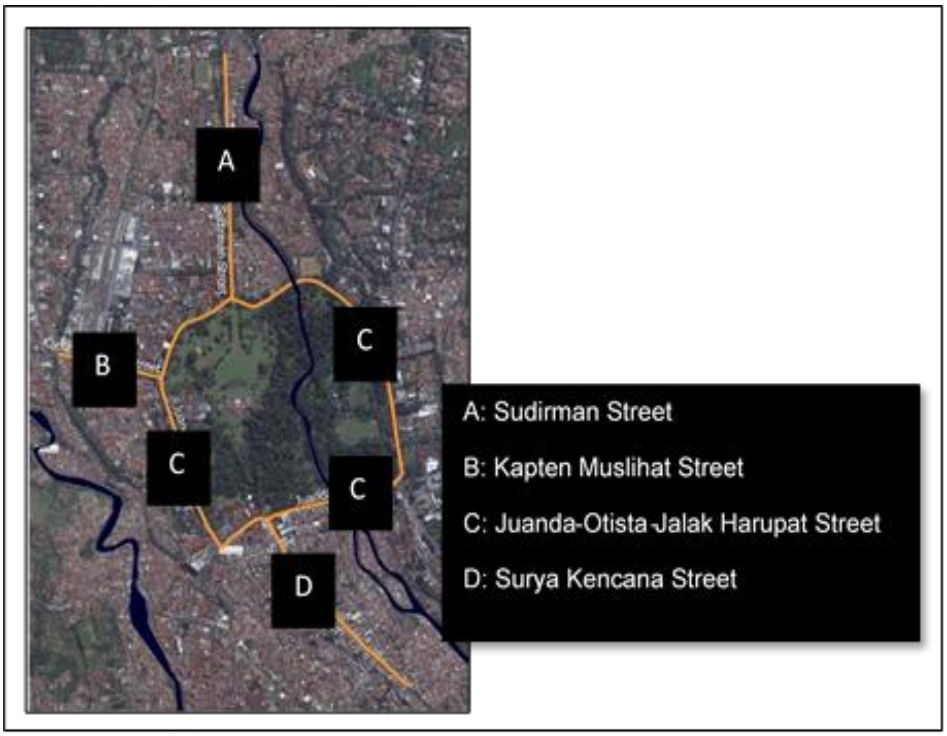

Figure 1. Study Site.

2.1.2 Time of Study

The study was conducted from November 2016 to June 2017, including writing the study plan, literature research, data collection (inventory), analysis, and conceptualizing.

2.1.3 Definitions

Given objectives of this study, it is necessary to clarify some terms and concepts that adjusted related to the purpose of the research.

- **Walkability**

The extent of built environment in which supports and encourages walking by providing pedestrian comfort and safety, connecting people with various destinations within a reasonable amount of time and effort and offering visual interest in journeys throughout the network (Southworth, 2006).

- **Street Culture**

"Street culture" expressed the full range of cultural artifacts and activities that appeared on the street, from shop decorations, signs, folk performances and celebrations to ways of earning a living (Wang Di, 2003).

- **Walkable Environment**

The surrounding physical environment that supports and invite pedestrian to walk in certain areas.

- **Livability**

According Partners for Livable Communities, Livability is the sum of the factors that add up to a community's quality of life, including the built

and natural environments, economic prosperity, social stability and equity, educational opportunity and cultural, entertainment and recreation possibilities.[10]

- **Streetscape Improvements**

An enhancement of streetscape[11] environment that offers safety, lively, accessible and attractive for pedestrian or another roadway user to walk or to conduct other activities on the street.

2.2 Research Method

This study consist of observations collected on site and research through literature, secondary data (historical maps and relics) and also digital media. The observation collected on site and related research, to reveal the current context, street existing physical condition, activity occurred, and history of the city and the site. On the basis of the observations and the research for walkability, the observation adapted GWI walkability index to evaluate the quality of walking physical condition.

The initial analysis performed as the Bogor city context on a large scale analysis and the also the street level analysis.

The final proposal consists of typical schematic design on specific selected areas within study streets area. The areas selected for detailed

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[10] http://livable.org/about-us/what-is-livability

[11] Streetscape is a term used to describe the natural and built fabric of the street, and defined as the design quality of the street and its visual effect, particularly how the paved area is laid out and treated. It includes buildings, street surface, and also the fixtures and fittings that facilitate its use – from bus shelters and signage to planting schemes. (Charlwood, C. "Torbay Streetscape Guidelines." Torbay Council, Torques (2004): 11-13.

recommendations were chosen by the analysis of several locations. The site contains a unique value in the form of street culture, historical landmarks, and natural heritage sites.

This study emphasizing the design process and knowledge through the explorative study of existing physical features of the streets, and street culture investigation.

2.2.1 Literature Review through Literature Research

In direction creating a streetscape to create a livable ‘heritage’ City, series of investigation by doing a literature review of areas under discussion which were considered as critical elements related to study objectives will be carried out. The Key features are Livable City and Street, walkability, Street Culture and Streetscape Improvements.

2.2.2 Analysis Process

The methods of the survey and observation study were chosen to combine different approaches and perspectives. It includes the consideration of the physical environment, and also street as the social and cultural setting.

Data collection will be conducted in two way, by document research and also site observation. Data collection classified into existing street physical features, street activity (street culture) aspects, and historical aspects. The observation collected on site and subsequent research will be helpful to illuminate the scale, history, current context and future

development plans of the location or case study streets. (Table 1).

Table 1. Data Inventory and collecting methods

No	Aspects	Collecting Methods	
		Document	Survey
1.	Existing Physical Aspects (Features)	o	o
2.	Street activity – street culture		
	Passive observation		o
	Historical aspects	o	
3.	Pedestrian Satisfactory		o

a. City context, Existing Street Setting, and Physical Features

Many studies have specified the various factors associated with streetscape influence pedestrian walking activity and other street activity. The existing condition of the streets such as the configuration of the streetscape, street amenities, street trees and landscaping, and also bike lanes existence were explored.

To evaluate the existing physical condition of the walkable environment of the four study street, the methodology adapt evaluation index (walkability index) version based on the GWI that includes a field walkability survey. The Global Walkability Index (GWI), as developed by H. Krambeck for the World Bank, provides qualitative analysis of walking conditions including safety, security, and convenience of the pedestrian environment. Field survey rate the road stretches from 1 to 5 for each parameter (1-5 (highest)) on each street study area. The walkability ratings in the different street

derived by averaging the walkability rating on each street. This analysis provides a better understanding of current walkability on the study street, and identify the issues in improving pedestrian facilities and walkable environment.

b. Study on Archival and Relics (Historical Context)

This study draws on the historical background of Old Bogor City from when the city built, its growth and also the street culture evolution through specified events. Analysis of old photographs, maps, historical literature was conducted to find out street culture evolvement. This result to address and interpret particular environmental condition and unique culture that been going on since Bogor city established. The particular pedestrian culture in the past based on the context investigation.

c. Street Activity and Street Culture Observation

Descriptive interpretation of passive observations functions as a tool that aims to grasp social situation (setting) on four case study streets. By using this approach, fundamental aspects of pedestrian experience are to deal with what people do and what people use in the social situation.

2.2.3 Design Process

By analysis, design strategy and recommendation to improve the street on the four study streets were determined. Analysis and synthesis prepared for two points:

1) To set themes on each area of streetscape improvements;

2) Identification of the concept of streetscape improvements.

A typical schematic proposal idea towards improving the four study street streetscape were created. The design proposal includes, the recommendation of general sitting and layout of street amenities and also street culture enhancement area. A set of tree and planting, paving material selection, and also street furnishing design recommendation were also proposed.

2.2.4 Design Research Flow Chart

The whole process of this study illustrated in Figure 2 diagram.

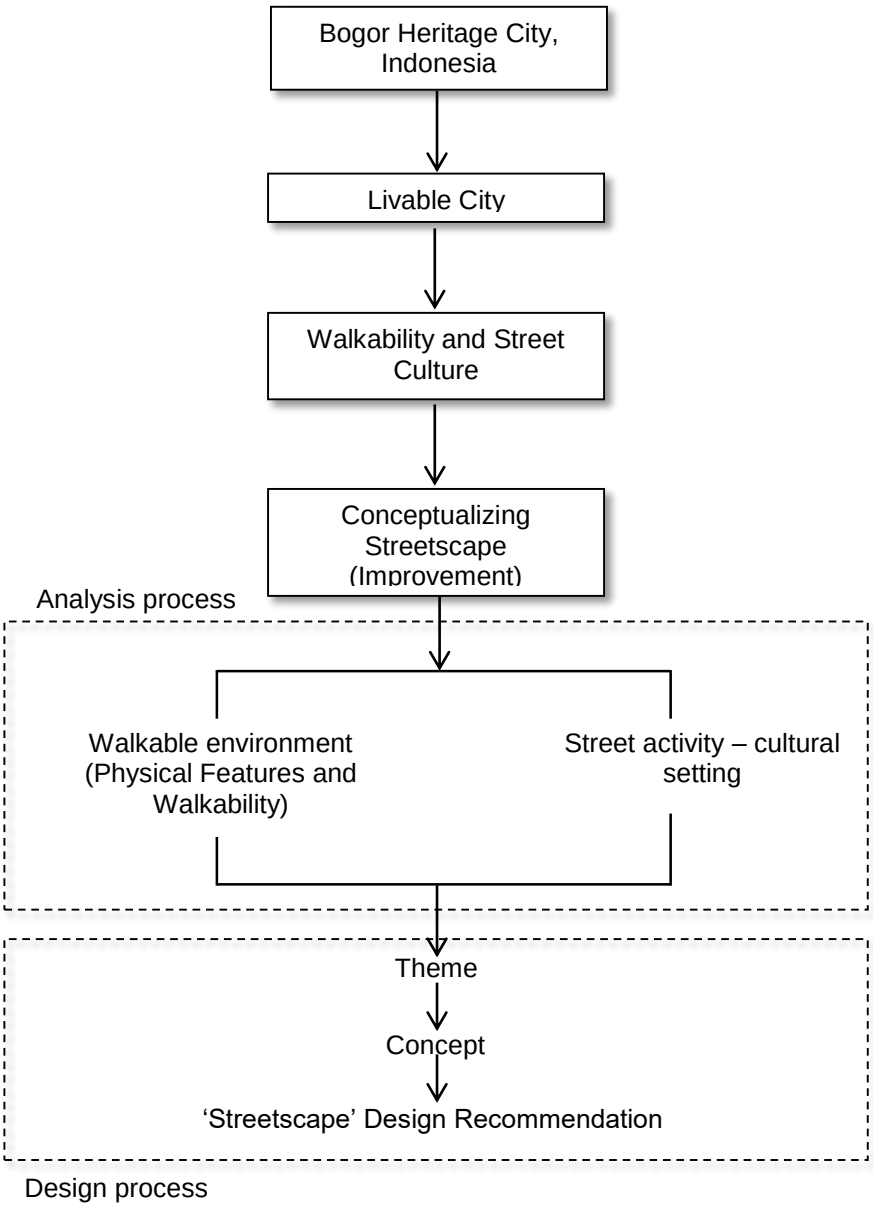

Figure 2. Flowchart Study.

III. LITERATURE REVIEW

3.1 Introduction

To set up the concept on rethinking streetscape for Livability in Bogor 'Heritage' City, there are key elements need to be understood. As the key features on livability and walkability, it is necessary to learn about the streetscape and its relation with the walkable environment. In this chapter, a literature review prepared to addresses the history of streetscape design evolution, livability concept, walkability and also the street culture. The literature review started with tracking the evolution of streetscape design particularly in USA and UK where the concept walkability initiated. The following elements are walkability and street culture that considered as the key elements for designer and planner that would affect the livability of the city.

3.2 Streetscape Design Evolution

In 1898, Howard developed his theory of the Garden City which was going to be "the peaceful path to real reform" (Fishman, 2003). His notion of the Garden City was a new Town-County settlement which included combining the best attributes of both the town and the countryside. Not only was the city center given great thought in its design, but the streets were also well planned. Fifth Avenue was to be lined with trees as were all the roads of the town. Tree planting and the beautification of roads were high

priority list (Howard, 1965). The overall design of The Garden City was a reflection countryside town with meandering roads lined with trees and a strong focus on the beauty of green space and nature.

Streetscape design following World War II, start to change its perception with a rise in automobile use, the focus soon shifted to the efficient movement of vehicles around the cities. The modernist understanding of a street was that function no longer primarily designated for pedestrian usage such as walking to work, shop and socializing. The primary focus in streetscape design became the movement of automobiles. “A city made for speed is made for success” (Le Corbusier, 1996, p. 375). Le Corbusier felt that the corridor of a street should be replaced by a new type of street that would be used exclusively by vehicles and free of pedestrians and building fronts.

In 1960’s as a passionate urbanist, Jane Jacobs opposed Le Corbusier way of thinking. “Streets and their sidewalks are the main public places of a city; they are the most vital organs” (Jacob, 1961). Despite Jacob’s strong notion, as late 1980’s the movement of vehicular traffic continued to dominate the design of the streets. With a strong emphasis on transportation efficiency, many cities began to see the deterioration of their city core. Pedestrian no longer safe in automobile-dominated environments. Today’s urban planners and designer have had shift their focus towards street revitalization in an effort toward the deterioration of the city. Gehl (2008) developed a unique field survey technique that public life survey

helped formulated the city's strategy for improving streets as public spaces. He succeeded in turning Copenhagen into one of the most walkable and bikeable cities in the world.

3.3 Livable City and Streets

According to San Fransisco's Livable City 40-year Plan (2002), Livable City is dedicated to improve transportation, land use, open space, and environmental policies to make city a safer, heathier and more accessible city. Livable streets are essential to the key success of a livable city. Redesigning the streets for livability, where streets have a dual role, as an infrastructure to accommodate movement and as a social space needs a street level gradual change. Green areas and streetscape in the streets and open public space help to enhance the aesthetic quality of a street and the livability of the streets[12].

While Wollongong City council, Australia (2016), define Livable City in the report as a city that offers a variety of attractions and opportunities for people to work, live, play, learn and invest. 'A livable city puts public life at the center of its planning, strengthened by an overall focus on liveliness, health, attractiveness, sustainable and safety'.[13]

Center of Livable Cities Singapore (2013), explained there are ten principles for livable, High-Density Cities: some of the principles are as follows (a) Embrace diversity, Foster inclusiveness; diversity helps make

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[12] https://livablecity.org/
[13] http://www.wollongong.nsw.gov.au/council/governance/Policies/

the city an exciting place to live in; (b) Draw nature closer to people; blending nature to the city provide soft edges for highly built environment and provides the neighborhood experience to get in touch with the nature; (3) Activate spaces for greater safety; A sense of safety and security is an important factor in enjoying a high quality of life.

"Walkability" is an indicator of a community's livability and completeness, not simply its friendliness toward pedestrians (Massangle; Dover, 2013). The walkable street tends to be the environment where the households and business and institution prosper.

3.4 Walkability and Walkable Street

'Walkability' and 'Walkable' are words often showed in the landscape architecture and urban design terms, but their definition is less clear. "Walkability" could be defined as the extent of built environment in which supports and encourages walking by providing pedestrian comfort and safety, connecting people with various destinations within a reasonable amount of time and effort and offering visual interest in journeys throughout the network (Southworth, 2006). While ADB (2011) stated "walkability" is a term used to describe and measure the connectivity and quality of walkways, footpaths, or sidewalks in the cities. The physical environment of a walkable street is the most crucial factor in inviting people walking in the city as it shapes the circulation patterns and contributes to the visual richness and ambiance.

Street and sidewalk compose the public right of way in cities. Like streets, sidewalks are ubiquitous and difficult to avoid. Motorist observes them from their vehicles and pedestrians walk along them from the point of origin to destination of from car to building. But sidewalk differs from the roadbed and have historically accommodated distinct uses. The roadbed is used solely for vehicles, but people have walked and socialized on the sidewalks since sidewalks were first constructed (Loukaitou et.al, 2009).

According to Massangle and Dover (2013), the principles of Walkability are (1) Shaped; (2) Comfortable; (3) Safe; (4) Connected and (5) Interesting.

There are few initiatives to promote the improvement of walking in Asian cities. The civil society organization and non-government organizations working in this area can play key roles in supporting improvements on walkability and pedestrian facilities in their cities (ADB, 2011). The Global Walkability Index (GWI), as developed by Krambeck (2006) for the World Bank, provides a qualitative analysis of walking conditions. The study provides a better understanding of current walkability of Asian cities and can identify ways to improve pedestrian facilities. The walkability index developed to suit the current condition of several developing countries in Asia. This index comprises three components: (1) Safety and security, determine the relative safety of the walking environment; (2) Convenience and Attractiveness, reflects the relative convenience and attractiveness of the pedestrian network; (3) Policy

Support, focus on the degree to which local authority supports improvements.

Table 2. Walkability parameter

NO	Parameter	Description
1	Walking path modal conflict	The extent of conflict between pedestrian and other modes, such as bicycles, motorcycles, and cars on the road
2	Availability of Walking Path	This parameter added to the original GWI index (combined with the initial setting “maintenance and cleanliness”). It reflects the need for, availability, and condition of walking paths.
3	Availability of crossings	The availability and distance between crossings to describe whether pedestrian tend to jaywalk when there are no crossings or when the distances between crossing are too long
4	Grade crossing safety	The exposure of pedestrians to other modes while crossing, the time spent waiting and crossing the street, and the sufficiency of time given to pedestrian to cross signalized intersections
5	Motorist behavior	The behavior of motorist toward pedestrians, which may well indicate the kind of pedestrian environment there is in that area
6	Amenities	The availability of pedestrian amenities such as benches, street lights, public toilets, and trees. These amenities greatly enhance the attractiveness and convenience of the pedestrian environment, and in turn, the city itself
7	Disability infrastructure	The availability, positioning, and maintenance of infrastructure for the disabled
8	Obstructions	The presence of permanent and temporary obstacles on the pedestrian pathways. These ultimately affect the effective width of a pedestrian path and may cause inconvenience to the pedestrians.

9	Security from crime	The general feeling of safety from crime in the street
(Source: ADB, 2011)		

3.5 Street Culture – street as public space

Most of the city's cultural artifacts lie hidden in museums and universities. The potential of the streets and major intersections to act as setting for cultural events, exhibits and displays, as well as more permanent symbols, should be taken into account when they designed or transformed (Appleyard, 1981).

Street culture determines what was accepted on the street and what is expected from it (Mehta, 2013). Rapoport (1987) summarizes that cultural variables are primary for any activity, and culture that structures behavior and explains the use or non-use of the streets. The history of the streets evolvement changing culture and use.

While according to Wang Di (2003), the phrase of "street culture" expressed the full range of cultural artifacts and activities that appeared on the street, from shop decorations, signs, folk performances and celebrations to ways of earning a living. The street culture was an important part of popular culture, and street life was the center of daily lives of people in the city, especially those in the lower class.

The street as public space is an area of participation. It is an arena for the collective voice and shared interest but also space where the differences and conflicts of various group play out (Mehta, 2013).

Drummond (2000) explained that Southeast Asian Street, although appearing unorganized and conflicting, can provide far more activities and serve many more users for a longer period than those in the West. Oranratmanee (2012) identified further functions of Southeast Asian street beside commuting, have various social and cultural functions. Kiang, Liang, and Limin (2010) explained that unclear boundaries between private and public spaces permit an appropriation of nearby space for private use. All over the city vendors appropriate marginal and overlooked sites chosen for their accessibility to passing motorist and pedestrians. Through the types of goods they sell, vendors bring the quality of domestic life to urban spaces. The seller's temporary use hijacks these spaces, changing their meanings. Crawford (1999, 30).

Appleyard (1987) mentioned that street use in Southeast Asia has always been conflicting, in particular between views of those preferring the city to be beautiful and those preferring the streets to be lively and multiple-use friendly.

NACTO (2016) stated many people use the street to conduct daily business. Their front doors line the street edge; their goods and services extend out onto the sidewalks; they run stalls within the street or push cart throughout the city. These people play a fundamental role in shaping vibrant and dynamic streets. Commerce is part of every town and streets should be designed to accommodate formal and informal on-street commercial activity.

Loukaitou (2009) explained street vendors and day laborers, driven by economic need, have negotiated their presence, evading or challenging regulations and asserting claims to the city in the process. The vending wars also reflect a conflict among sidewalk users who compete over the narrow concrete strips.

3.6 Streetscape Improvements

The streetscape is the most prolific public spaces in the urban landscape and is the elemental setting for everyday activity. (Harvey et. al, 2016).

Residents of urban and suburban neighborhoods would benefit from improved pedestrian comfort and safety (Untermann, 1984). Improvements could mitigate the impact of the cumbersome and fast moving traffic, traffic noise, drive-in business, un-landscaped roads and large parking lots. There are ways to alter roadways to reduce the adverse impact of cars.

When a street design properly, many activities can coincide without conflicts among users. Avoiding spatial interference between activities is the key. The primary task of analysis is to identify the identify such dysfunction as vendors obstructing access to and from the roadway; pedestrians denied adequate space at the intersections to wait for traffic lights; and so on (Eichner; Tobey, 1991).

The flexibility of pedestrian movement and the richness of streetscape environment offering a variety of activities.

Curbs and sidewalks are the natural and designable elements that can be used to create a comfortable and pleasurable walking environment.

According to Peter Calthorpe 22 (1993), “Wider sidewalks, limited curbs, street trees, awnings, and arcades, should be used to accommodate this active pedestrian environment, shops should front onto commercial streets with minimal setbacks.” Researchers find that most people would use paths or sidewalk if they are attractive, comfortable, and safe (Saleens and Handy, 2008; Lee and Moudon, 2008).

Cars parked on the road and at the edge of the sidewalk, according to Allan Jacobs (1996) also serve this purpose of separation – “An auto-parking lane at the curb also creates separations, but while some walkable streets have parked cars that are not one of the things you think of to create a walkable street. The requirement for a walkable street that people be able to walk comfortably and safely on it is, on its face, visible and easy to achieve”.

According to Arendt (1999), common elements to design Pedestrian-Friendly Street are:

- Streets that are interconnected, and small block patterns that provide excellent opportunities for pedestrian access and mobility.
- Narrower streets, scaled down for pedestrians and less conducive to high motor vehicle speeds.
- Traffic-calming treatments to help ensure that motor vehicles operated at or below compatible speeds.
- Extensive and continuous sidewalks that are sufficiently accessible that maintain a relatively level can't, and that are well maintained.

- Well-designed intersections to ensure smooth, safe crossings by pedestrians of all ages and abilities.
- Well-designed and marked crosswalks, both at intersections and, where needed, at mid-block locations.
- Appropriate use of signs and signals for both pedestrians and motorists, with equitable treatment for pedestrians.
- Street lighting designed to pedestrian scale (e.g., shorter light poles and lower light fixtures that are designed to be useful in illuminating the pedestrian travel way).
- Planting buffers, with landscaping and street trees that provide shelter and shade without obstructing sight distances.
- Street furnishings and public art intended to enhance the pedestrian experience, such as benches, trash receptacles, drinking fountains, and newspaper stands, placed so as not to interfere with pedestrian travel.

IV. ANALYSIS OF BOGOR STREET

The following part of Chapter 4 will unfold layers by layers and introduced Bogor City context and case study streets condition. The analysis mainly focuses on the case study street which is located in the city center, while keeping the city's context in perspective. The analysis conducted to identifying problems and potentials in each case of the study area to determine the preferable concept and approach for upgrading the existing streetscape.

To assess the quallity of walkable environment, this study adopts Global *Walkability* Index (GWI) as developed by Krambeck (2009) for the World Bank provides a qualitative analysis of walking conditions including safety, security, and convenience of the pedestrian environment.

4.1 An Overview of Bogor City Context

4.1.1 Location

Figure 3. Bogor City Location Map (Source: Individual study).

The four study streets located within the city center of Bogor city. Geographically, Bogor city located at 106º43’30”-106º51’00” EL and 30’30” -6º41’00” SL, situated in the western part of Java island and approximately 60 km from South of Jakarta (Indonesia capital city). Bogor City total area is around 118.50 KM^2 (Fig. 3).

4.1.2 Topography, Water, and Landscape Features

Bogor city spreads over a basin near Salak Mountain (Volcanic Mountain) and Mount Gede. Bogor city has an average minimum elevation around 190 m and a maximum of 330 m above sea level. The terrain is rather uneven given hilly condition and various slopes.

Bogor city has different slopes comprise 1763.94 Hectare of the relatively flat area (0-2%); 891.27 Hectare of the sloping area (2-15%); 109.89 Hectare are bit steep (15-25%); 764.96 Ha of the steep area (15-40%) and 119.40 Ha with more than 40% slopes. The northern part of Bogor is relatively flat, and the south area of the city is hilly. The topography of city center situated on plains. In particular part tends to be a rather steep terrain (East part of Sudirman Street and Juanda Street) where Ciliwung River situated.

Bogor City has two major rivers and seven streams. Two major rivers flow through the city, which is Ciliwung River and Cisadane River, flank the historic city center. These river has ground water surface level below ground level. Therefore Bogor City has low flood risk. Besides surface

water, Bogor city has ground water resources with a depth of around 3 -12 m. The depth of the water table in the rainy season ranges from 3 to 6 m, while in dry seasons reach 10 - 12 m. The land cover changes into build area cause deep infiltration of the rainwater and lead to high runoff possibilities. High runoff is one of the caused ground water table deflation (Bogor Urban Strategic Planning Report, 2014).

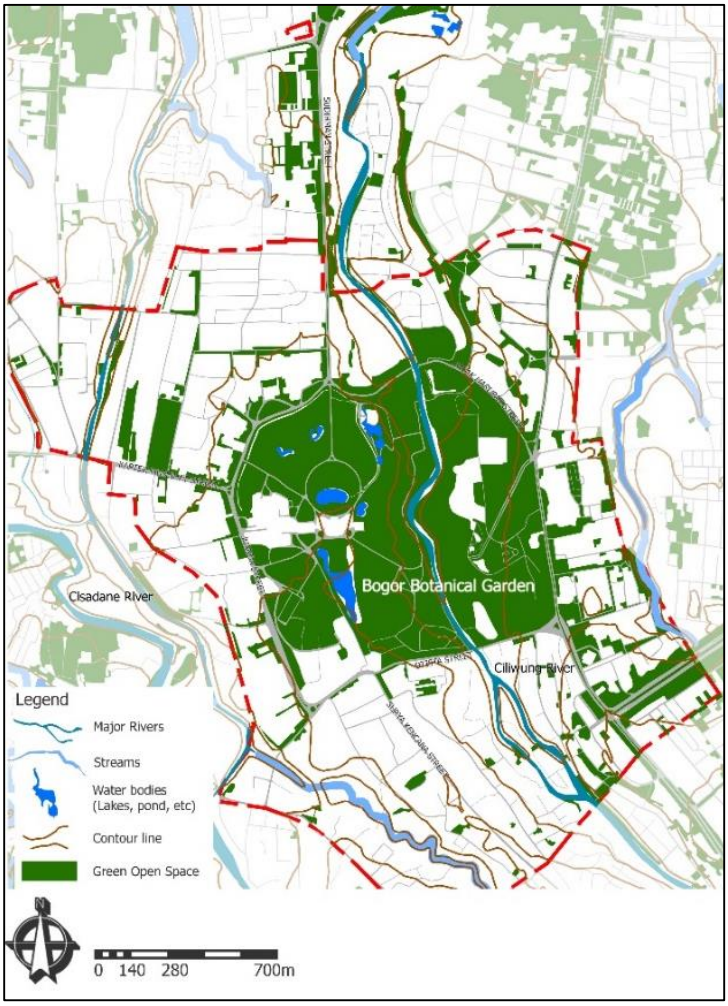


Figure 4. Topography, water, and landscape feature map.
(Source: Individual Study and Bogor Urban Planning Authority).

Bogor city has largest Botanical Garden that lies within the heart of the city. The gardens are located in the city center and adjoin the presidential palace compound of Bogor Presidential Palace. (Fig. 4).

The topography strengthens an image of an actual landscape setting of Ciliwung River with a distinct profile offering essential characteristics of Riverside. Bogor Botanical Garden provides a diversity of recreational possibilities for the people of Bogor City, as such qualities of these natural urban forest park are needed ingredients in a dense city. Although the topography and landscape setting offers a spectacular view, these potential views are underutilized. The topographical challenge is especially present in the East part of Juanda Street (Jalak Harupat) next to Urban Forest Park and Urban Park where the steep topography situated and hidden sidewalk located, the challenge is to connect and create a sense of 'nature' experience between two potential nodes.

4.1.3 Land Use

Land-use diversity is a key factor to the provision of destinations to the quality of walking. Land-use diversity contributes shaping of a given built environment as a setting for walking.

The Land Use of Bogor City within the city center classified into some functions (Fig 5).

Land use in Bogor City is well-mixed; pedestrians mostly can be identified in each case study streets. The commercial area mostly concentrated in the south part of city center. In the city, core lies Bogor

Botanical Garden that classifies as Urban Forest Park. The major land uses within the case study area that identified are commercial and trade, settlement and residential, public facilities and government office, Military zone, and Educational services.

Along the edge of Sudirman Street, the identified major land use is commercial and military area. On commercial and trade area, lies some shops, restaurant, café, workshop, and hotels. Military Educational Institution and Military Museum are located within the Military land uses. Besides two major land use, also founded the other land uses which are educational facilities (school), Health services (general hospital) and green open space (pocket park, neighborhood park, and landscape buffer).

On the Kapten Muslihat Street, Land use along the edge comprises of commercial and trade, service area (Financial and Bank), government complex (Public service and Municipality), educational facilities, police headquarters, transportation services (Railway station) and also green open space (Public park and theme park). This street edge land uses dominated by educational facilities (schools, church, and seminary) commercial and trade zone (retails and business center).

Juanda-Otista-Jalak Harupat Street the major land use that lies on the edge of the streets are urban forest park, service, and government complexes, while commercial area concentrated on the south part of the streets. On the Surya Kencana Street, the land uses mostly dominated by

commercial and trade, identified by the existence of the usual mix of a retail shop and residential along the edge of the street.

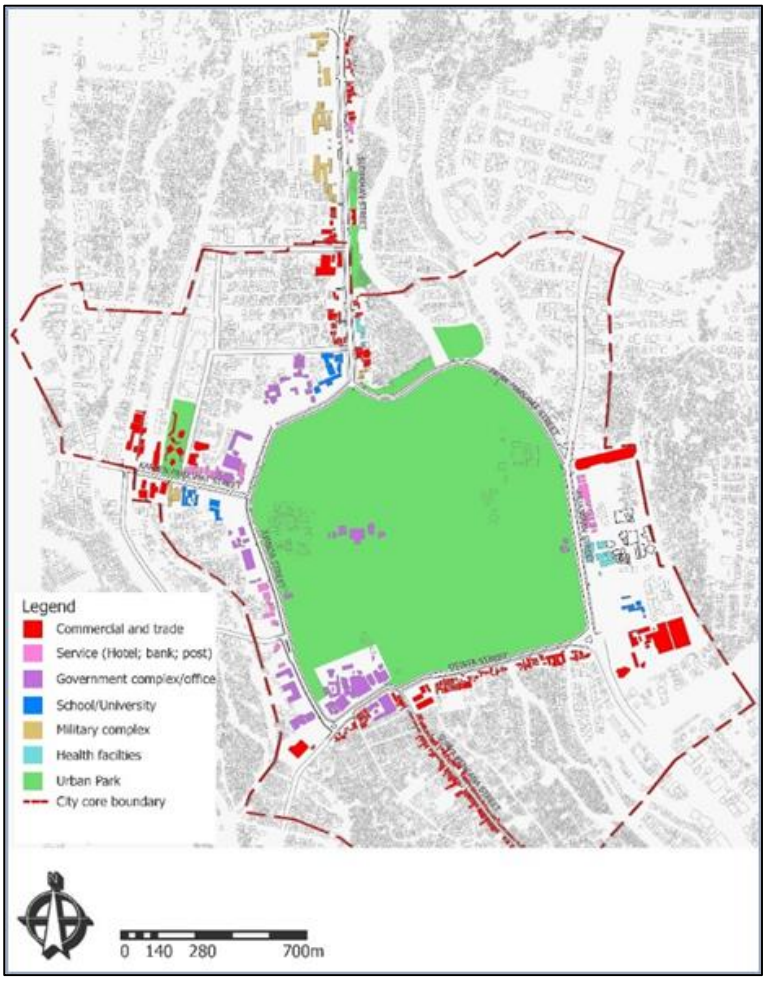


Figure 5. Land Use Map (Source: Individual study; Bogor Urban Planing Authority).

Based on the secondary data, land use within four study streets is well-mixed. Each of study street has dedicated commercial and trade area that keep the street alive. In the other hand, given the land use has a distinct function, it affected the different types of street corridor character and un-unified themes in each street.

4.1.4 Strategic Plan Zone

Bogor municipality developed Strategic Development Zone (Fig. 6), to set priority area within the city to elevate city's economic or income, to protect its natural landscape and also to conserve it's culturally significant. This Strategic Zone has three vital zones, divided to Economic Strategic Zone, Environmental Protection Zone, and Cultural Strategic Zone.

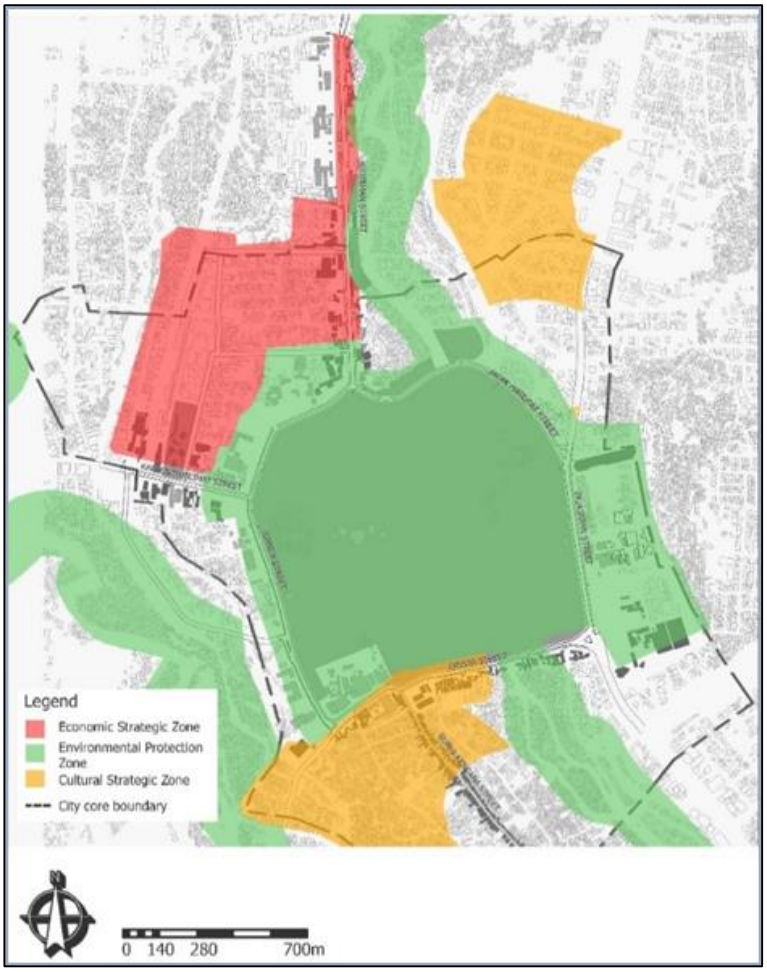


Figure 6. Strategic Plan Map (Source: Individual study; Bogor Strategic Plan).

Based on Strategic Zone map, Juanda Street is part of Environmental Protection Zone, Kapten Muslihat and Sudirman Street are part of

Economic Strategic Zone and Surya Kencana Street is part of Cultural Strategic Zone. These strategic dedicated areas would be a benchmark for setting the theme for each study streets.

4.1.5 Public Open Space

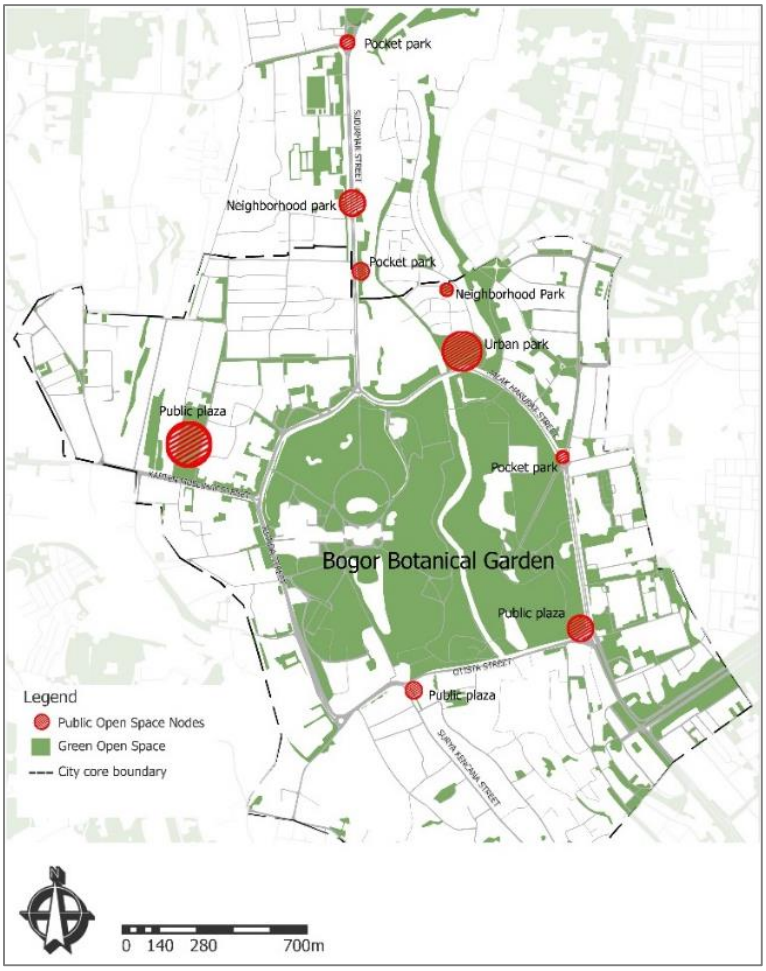


Figure 7. Public Open Space Nodes Map. (Source: Individual Study).

There are some minor public areas in the City Center. Bogor City categorized its public open space as Green public open space and Public

sports ground. In the macro context, several public open space nodes distributed within four study streets (Fig. 7). The largest green open space (Forest Park) is located within Juanda Street, well known as Bogor Botanical Garden. The existence of the Forest Park has attracted not only a local visitor but also tourist who come from other cities.

The other public space as a potential attraction is *Sempur* Park and *Taman Topi* Park, located in Juanda Street Kapten Muslihat Street. Both parks categorized as Urban Park. Sempur Park equipped with Children playground, skate parks, jogging tracks, sports ground and art and performance space, whereas Taman Topi Park equipped with theme parks and plaza. This place is one of the alternative leisure places on the weekend for the pedestrian from outside as well as the resident from the closest neighborhood. Other potential stops are a pocket park. Some pocket parks that identified during observation are pocket parks located within Sudirman Street and Juanda Street.

The public spaces are scattered covering most of the City Center, while the links in-between them are weak. Few dedicated routes act as walking connections between the major urban parks with Urban Forest Park and a public plaza. Hence, the small park and neighborhood parks were not frequently visited.

4.2 Analysis on Street Context

4.2.1 Street Network and Connectivity

Bogor has a concentric radial street pattern, which has certain characteristics. In the city core area, the circular road network is a linkage between 4 different main streets (Juanda, Otista and Jalak Harupat Street), called Bogor Botanical Garden ring road.

Sudirman Street, Kapten Muslihat, and Surya Kencana concentrically linked to Bogor Botanical Garden Ring (Juanda Street) as shown in Figure 8. All Four study streets categorize as the secondary arterial road that connected with local roads.

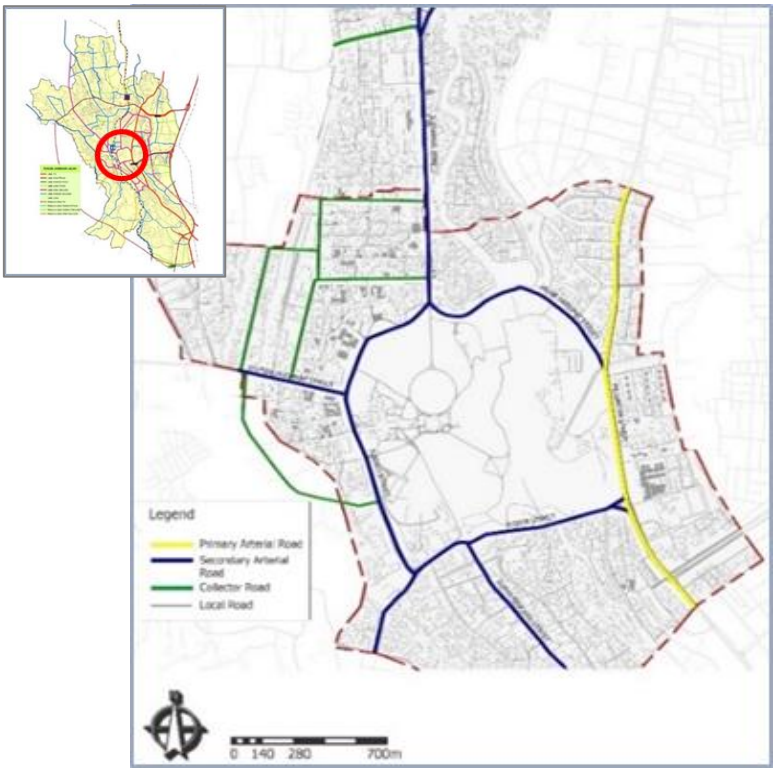


Figure 8. Bogor City Core Street Network System.
(Source: Bogor Transportation Report).

Based on vehicular speed and density table 3. A set data of street traffic flow density. Kapten Muslihat Street has the highest traffic volume density, and Surya Kencana Street has the lowest amongst four case study Street.

Table 3. Traffic Flow Density (Bogor Transportation Report)

NO.	STREET	SPEED (KM/H)	DENSITY (VEHIC./KM)
1	Kapten Muslihat Street	24,71	206
2	Juanda Street	29,02	194
3	Sudirman Street	27,76	186
4	Surya Kencana Street	28,14	179
(Source: Bogor Transportation Report)			

a. Sidewalk

Almost all the case study streets equipped by sidewalks. All paths are located on both sides of the street and stretch along the street. The four study streets are connected not only by the vehicular way but also its sidewalk.

Each street has more than one intersections with other secondary collector road and local road. The local road connects all four study streets with the nearest neighborhood. Based on the observation, the sidewalk lost its connectivity when it intersects with a local road, either change to the form of an alleyway or vehicular priority road. The sidewalk continuous when intersecting with secondary collector road which is mostly connected to commercial and trade area or service area.

The sidewalks existence in four case study streets gives pedestrian its right to walk safely on the streets. Wide planting strips may serve as a barrier between vehicle and pedestrian. At some part of the Sudirman Street, the continuity of sidewalk was interrupted by on-street parking existence. On Surya Kencana Street, in some stretch of the street, the sidewalk was cluttered and congested by pedestrian walks and other streets activities.

b. On-street Parking

Bogor city host some numbers of parking spaces within the city center. There is some amount of parking options in the city center and a significant traffic generator in the city center. Almost the commercial, service and office complexes equipped with car parking that managed by private. Another case Bogor City also equipped with on-street parking mostly located within the secondary arterial road. On-street parking could be found almost within four case study streets commercial and trade zone. Surya Kencana Street as a commercial and trade area, on-street parking were identified along the street edge (Fig. 9 and 10).

Figure 9. On-street car parking (Source: Individual study).

c. Crossing

For the comfort of the pedestrian and the vitality and functional quality of the city, it is important that pedestrian could cross the streets frequently and safely. (Fig. 10).

There are three types of crossing serves pedestrian traffic, identified at four case study streets, a) Uncontrolled crossings such as crosswalk with marked lines; b) Controlled crossings, that is, signals or traffic patrol; c) Grade separations (under passed or overpassed). The common crossing that available within four study street is uncontrolled crossing. Pedestrian crossing often situated in the mid of block and hardly found crossing at an intersection. Many arterial streets have been purposely designed to have long blocks, to minimize the traffic interruptions caused by the intersections along with the high traffic volumes make the road crossing difficult for pedestrian (Mcdonald, 2011). The pedestrian crossing interval is quite far from one to another. This situation often invites people to jaywalk crossing the road.

d. Bike Network

Bogor City has excellent natural conditions (climate and topography) for developing an active bicycling culture. The bike lane was identified along the Kapten Muslihat and Juanda Street. Nevertheless, Bike network and cycle lanes obviously unconnected. (Fig. 10).

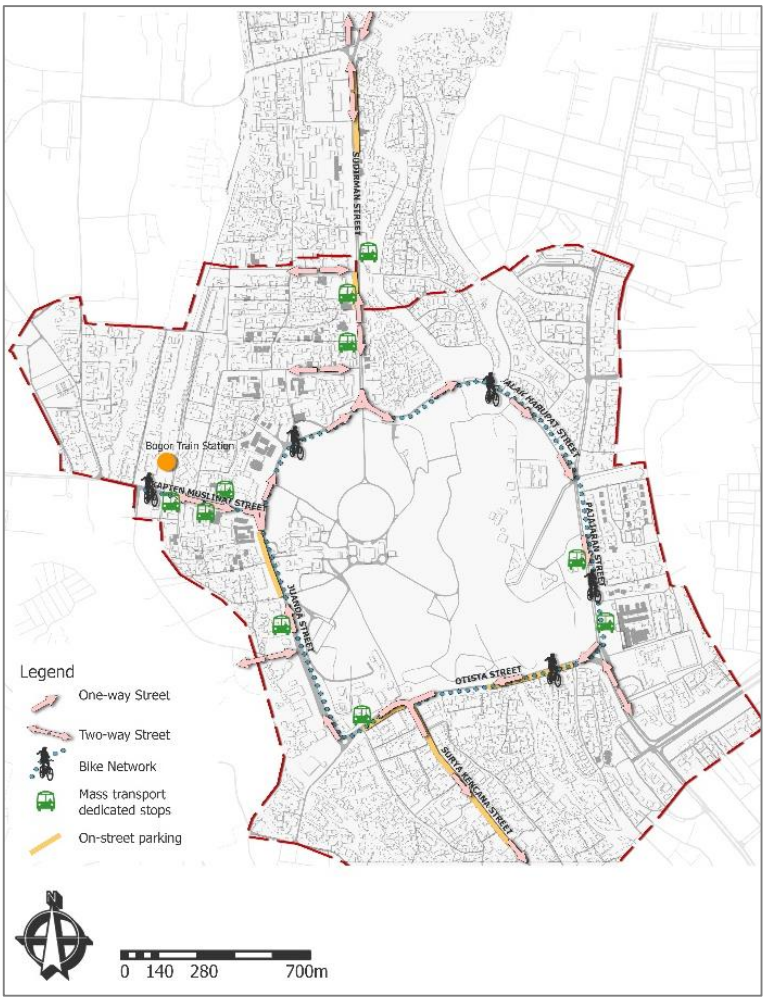


Figure 10. Street Network and Connectivity map (Source: Individual Study).

4.2.2 Street Configuration

In general, the typical streetscape divided into setbacks, sidewalks, travel lane, transit facilities, on-street parking, and landscaping strip. The four case study streets have various right of way (ROW) stretched around 12 - 30 meter wide and efficient sidewalk width are 1.8 – 3 m wide. Both sidewalks are in the form of raised paving path that is adjacent to buildings, vacant lots, and parking area.

The street edge defined by its sidewalk, given the variation of the setback. Since arterials change in character over distance, some part of the streets are adjacent to the commercial area, other land uses, urban parks and landscape features. Each Street typical existing context explained as follows.

a. Sudirman Street

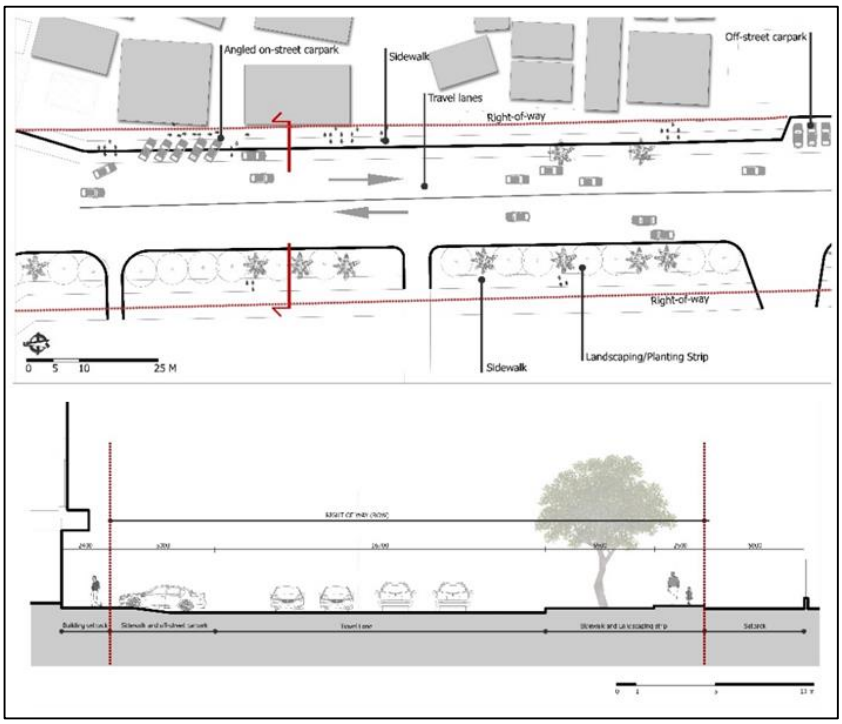


Figure 11. Plan and typical sections of Sudirman Street existing condition. (Source: Individual Study).

The section and plans of existing as shown in Fig. 11, illustrates that Sudirman Street is a two-way street that designed for motorized traffic. Pedestrians facilitated by sidewalks on both sides of the travel lane. Discontinuous sidewalks found in the commercial area on the North part of the Sudirman Street. Unidentified road markings and crossing level of

spacing lead pedestrians to cross the street in the undetermined and unsafe zone. Street vendor's informal territory often found on the edge of the sidewalks and invaded upon pedestrian space. Travel lane widths are consistent along the stretch, with approximately 17 meters wide width. On-street parking is allowed on the edge of the sidewalk zone with 5 meter wide regulated standard width.

b. Kapten Muslihat Street

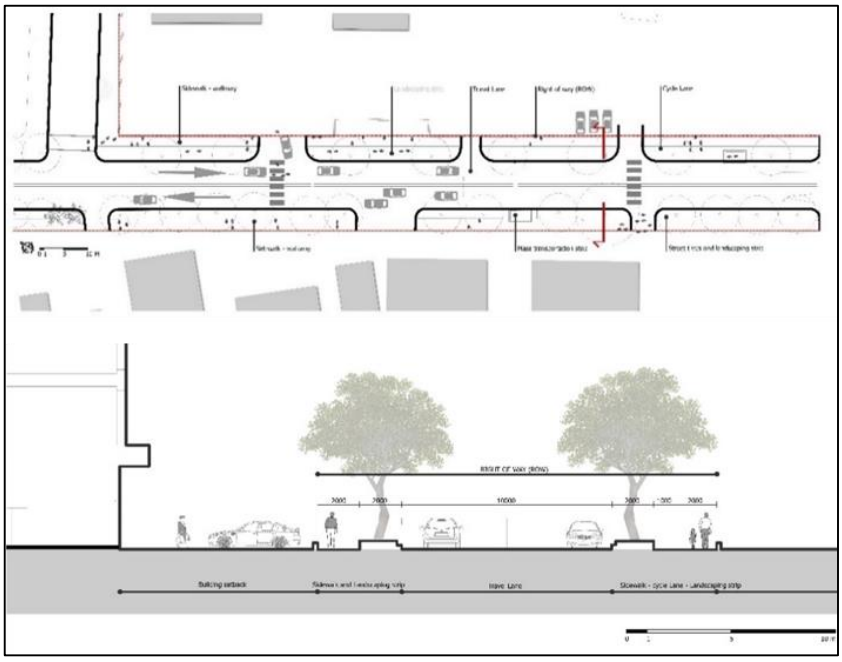


Figure 12. Plan and typical sections of Kapten Muslihat Street existing condition. (Source: Individual Study).

Kapten Muslihat Street is a two-way street that has high traffic volume (see Bogor Transportation report on Chapter 4). Kapten Muslihat Street is connected to train station (traffic nodal point), the sidewalk is frequently used by commuters, as a route for daily commute to work from Bogor to

Jakarta or the other way around. Landscaping strip in the form of raised planters (2 meter wide) separates sidewalk (2 meter wide) and 10 meter wide travel lane. On the West and Northwest part of the streets are equipped with barriers to restrict pedestrian crossing. Even though this street facilitated by a pedestrian bridge, the level of crossing spacing are more than 100 meter and often found jaywalking activities. (Fig. 12).

c. Surya Kencana Street

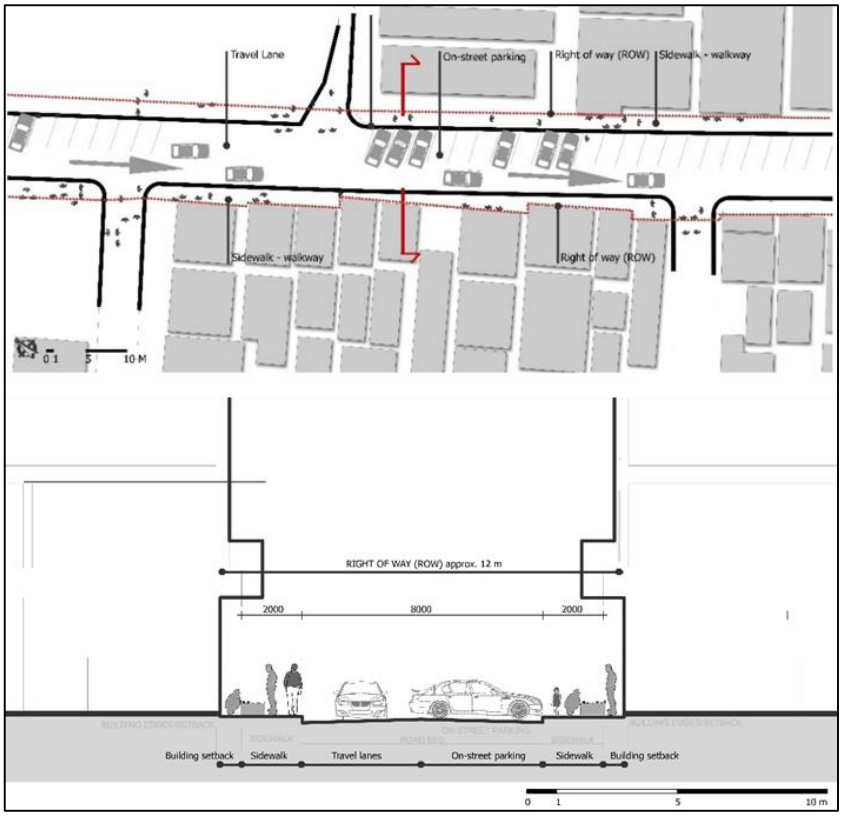


Figure 13. Plan and Section of Surya Kencana existing configuration of space. (Source: Individual Study).

This street is located in between shop houses and parked motorized vehicles. The situation creates disserved effect on walkability as

pedestrians only have limited space in such busy commercial streets. Due to the limited space, this street has narrow and inaccessible sidewalks, in some contexts, sidewalks are occupied by street vendors and informal parking, forcing pedestrian onto the road. (Fig. 13). The streetscape comprise of one way travel lane with narrow width around 8 meter, 2 meter sidewalk on both sides, and regulated angled parking (5 meter wide).

d. Juanda Street

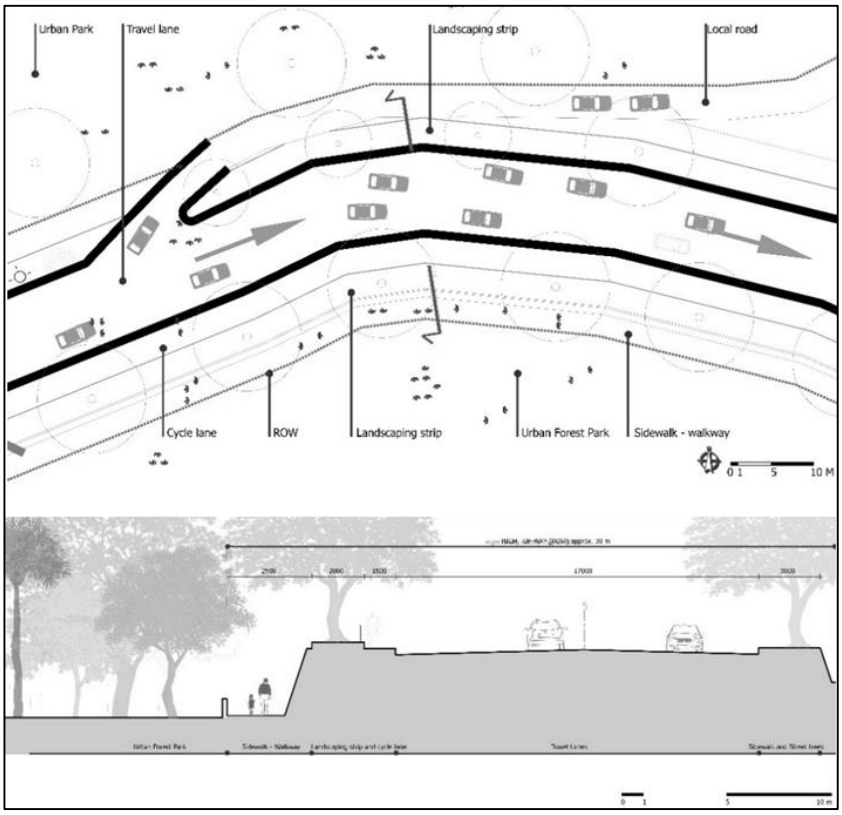


Figure 14. Plan and Section of Juanda Existing configuration of space. (Source: Individual Study).

Radial pattern one-way street, located around the edges of Bogor City's green lungs (Bogor Botanical Garden). This street has moderate

traffic volumes given its location that connected with other secondary arterial road. Equipped with cycle lanes, street trees, street furniture and connectivity to the nearest Bogor City's urban park (Fig. 14). Juanda street has various right of way (ROW), width. The travel lane width is varied from 10-17 meters wide, and sidewalk zone varied from 2-10 meters wide. Some part of the street landscaping strip act as a grade separation between travel lane and walkway.

4.3 Analysis of Existing Physical Features

4.3.1 Street Facilities and Amenities

a. Walking Surface (Pavement)

Most of the sidewalk within four case study areas surfaced with concrete paving blocks and concrete slabs. Some segments of Juanda Street, sidewalk were decorated with a tile pattern. Unit pavers were set parallel to the curb side (Fig. 15).

The condition of paving in the Juanda Street sidewalk mostly in good condition and well maintained. In another hand, the condition in some stretch of Sudirman Street, Kapten Muslihat, and Surya Kencana streets was not in good shape. \The surfacing in some part of the Juanda Streets are in good condition and well maintain. The condition of surfacing or paving design might encourage people to walk and increase the pleasurability within the stretch. Raised curb intended to create safety measure for a pedestrian to avoid contacts with the vehicle.

Figure 15. A typical surfacing on four study area. (Source: Individual study).

b. Street Furniture

Figure 16. Street Furniture at Four study streets. (Source: Individual study).

Almost of four case study streets equipped with some street furniture elements (Fig 16). The most common street furniture that founded in this street is a street light, planters, and bollards. While seating or bench only identified in the part of the street that located next to Public Park. There is two type street light, street lights for amenities purposes and also lights in the context of the road utility. Lighting for facilities purposes only founded

in some part of the street, mostly located near the military complexes, School range, and Public Parks.

Some streets are equipped with street furniture to support pedestrian activities. Street lighting apart from its aesthetical function, it also worked as a safety measures for walking activity in the nights. Seating along the street stretch allows a pedestrian to have a resting place for the different type of walking activities.

c. Street Trees and Landscaping Strip

Besides functioned as a shade and microclimate protection, street trees also functioned as amenities and street character enhancement. Boulevard and uniform row of canopy trees are spotted along the edge of Sudirman, Juanda and Kapten Muslihat Street, while Surya Kencana Street was not equipped with street trees (Fig 17).

Figure 17. Street Trees and Landscaping strip on four study streets.

Trees may block the view of some shops and commercial areas, so it could be easy to understand some part of the street where the commercial area located, the uniform of trees are unidentified. While to emphasize or to mark some significant places like museums and military complexes entrance, there were also rows of palms as a place identifier.

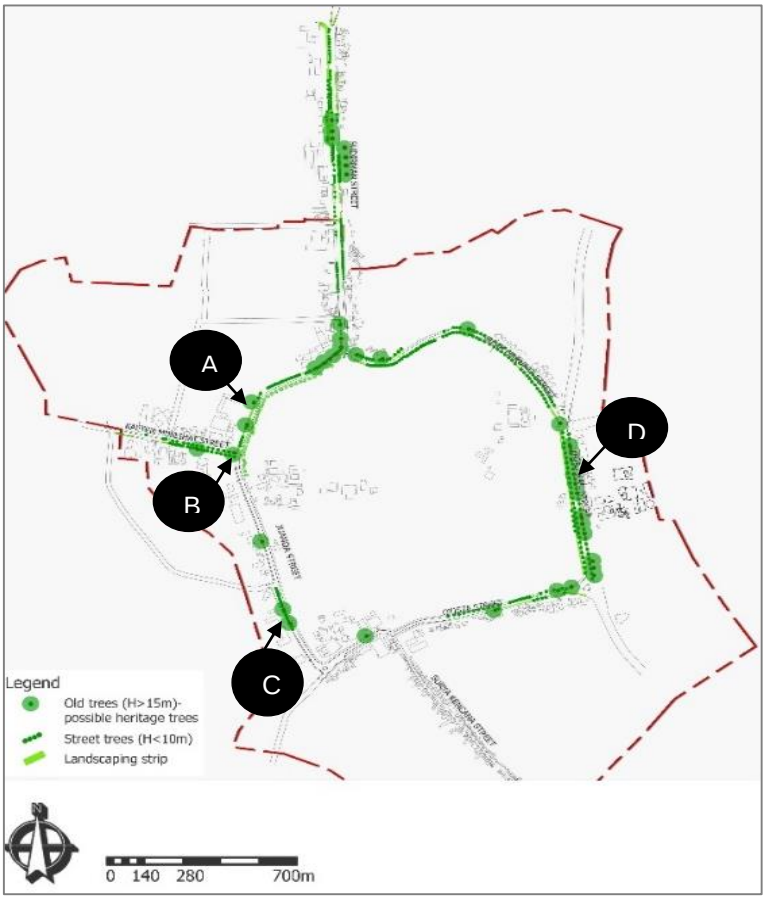


Figure 18. Street Tree Analysis Map. (Source: Individual Study).

The landscaping strip functioned as a divider between travel lane and sidewalk. The landscaping strip has formed a uniformity along the Sudirman Street, Juanda Street and Kapten Muslihat Street comprise with Medium-Heavy tree group, palms, and a group of ornamental shrubs.

At Surya Kencana Street, tree planting is difficult to identify given the street profile are quite narrow and supplemented by awnings.

Existing street trees identification along the four study streets, categorized as Old trees (H>15 m) and also typical Heavy – Semi-mature street trees (H<10 m) and landscaping strips (Fig.18).

As historically important streets, in all four study streets were identified some Old trees that planted during the colonial period. The particular tree species that often found in almost case study streets are *Kenari (Canarium indicum), Mahoni (Swietenia Mahogani)* and *Beringin (Ficus Benjamina)* trees (Fig. 19).

Figure 19. Old Trees planted during colonial period (Source: Individual Study).

4.3.2 Walkability Index

A livable city street needs to be safe and convenient to walk on, to perceive safety and convenience, the observation of walkability index conducted. This qualitative survey assessed nine key or parameter as illustrated in Table 4.

Table 4. Global Walkability Index (GWI) Parameter.

Parameter	Component
1. Walking Path Modal Conflict	Safety and Security
2. Security from crime	
3. Crossing safety	
4. Motorist Behaviour	
5. Amenities	Convenience and Attractiveness
6. Disability Infrastructure	
7. Maintenance and Cleanliness	
8. Obstruction	
9. Availability of crossing	
Source: Krambeck (2006)	

Adapting Field Walkability Survey guide by Krambeck (2006), the evaluation of 9 parameters on each case study streets (Sudirman Street, Kapten Muslihat Street, Juanda Street and Surya Kencana Street), the index scores obtained from the average levels in each variable of overall area were classified into 5 levels – from 1 to 5 (1= awful, 2= many problems, 3= some problems, 4= high, 5=very high).

The result illustrated in the index form with one decimal precision. Then the index score was projected to analysis map, that shows which part of the street segment has the best and the lowest score to set priority area.

According to analysis map (Fig. 20), the lowest index score on walkability shows awful walkability index. The lowest walkability score index (awful = 1) located at North East part of Sudirman Street and South part of Surya Kencana street, the issues mostly related to conflicts with vehicular movement and the existence of obstruction while walking on the dedicated walkway. While the highest level (4=high) of walkability based in the East and West part of the Juanda Street.

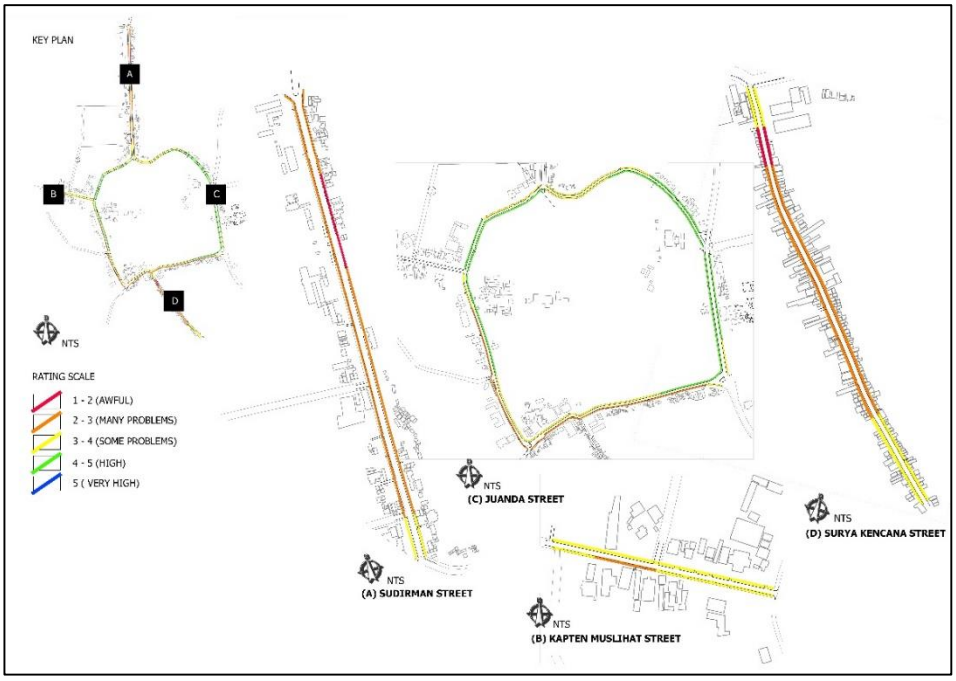


Figure 20. Walkability Index Analysis Map (Source: Individual study).

Based on the table Juanda Street has the highest average score of walkability index, while Surya Kencana Street has the lowest score of walkability index. The general problem on overall streets is related to the availability of crossing and disability infrastructure. Although all four streets were equipped with certain degree of disability infrastructure, the common

problems were discontinuity and unseemly sitting and layout of the facilities (as shown in appendix assessment tables).

Table 5. Walkability Index score at four study streets.

Parameter	Score Index			
	Sudirman Street	**Kapten Muslihat Street**	**Juanda Street**	**Surya Kencana Street**
Walking Path Modal Conflict	3.6	3.7	4.5	3.0
Security from crime	2.3	3.2	3.4	1.6
Crossing safety	2.0	3.7	3.4	3.2
Motorist Behavior	2.3	3	3.5	2.1
Amenities	2.1	4	3.6	1.6
Disability Infrastructure	2.0	3.4	3.2	1.4
Maintenance and Cleanliness	3.1	2.7	2.9	1.2
Obstruction	3.0	3.7	4.0	2.3
Availability of crossing	2.8	3.6	4.5	1.7
OVERALL AVERAGE	2.6	3.4	3.7	2.1

Based on the walkability index table 5, all four study streets has minor problem with conflicts with vehicular way; it means there are visible protection and separation between the pedestrian way of right with vehicular way. Some streets equipped with amenities, like trees, landscape buffer and street furniture.

Although each four study streets has own particular issues, based on the walkability index most of the problems occurred were the availability of crossings and its grade crossing safety. This aspect may encourage and hinder people to travel from one place to another location that still in the range of walking distance.

4.4 Analysis of Historical context, Street Activity, and Street Culture

People perceived urban streets as a place for mobility, stationary activities, for leisure purposes or work or even a place of attachment. Street user experience streets in various ways and necessities. Streets allow people to be outside, whether walking, sitting, cycling, interacting and another kind of activities. The various activities that happened on the streets shape the livability of the city.

4.4.1 Historical Context

a. Milestone – The Beginning of Bogor Urban Morphology

Historical aspects of urban form investigation to identify significant events on how each case study streets developed and identity of each study street places in the city particularly within the study street and also to interpret particular street culture in the past based on the historical context.

Bogor city area was the center of the government since June 3, 1482, when Prabu Siliwangi as the leader the Kingdom crowned. The coronation day nowadays celebrates as Bogor anniversary and celebrated every year (Tohjiwa, 2013).

Bogor is one of the largest inland cities in the colonial era. Bogor (*Buitenzorg*) once served as the capital of colonial rule since the Governor-General Van Alting (1780). In the year 1687, Dutch authority starts to established cropland and start to construct accessibility road. Given the

establishment of farmland and road, the new settlements called “Kampong Baroe” (districts) begins to grow.

The city began to evolve significantly since Post Roadway (*Groote Postweg*) built in 1811 by *Deandels*[14]. In this period, capital structures start to develop, marked by Bogor Palace and military zone establishment. Along with these establishments, the primary access to formal structure also designed connects military zone as a gateway to Bogor Palace. Groote Postweg known as Sudirman Street has high axis connection with Bogor Palace (Indonesia Presidential Palace) as shown in Figure 21.

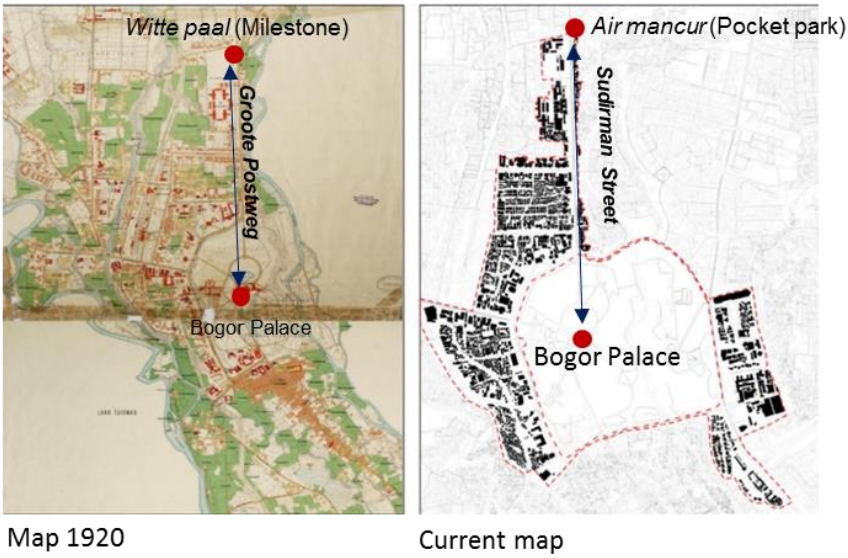


Figure 21. Axis connection between Bogor Palace and Groote Postweg access point. (Source: KITLV; Bogor Local Plan).

On May 18, 1817, Governor General Godert Alexander Gerard Phillip van der Capellen officially built Lands *Plantetuin te Buitenzorg* (Bogor

[14] A Dutch politician who served as the 36th Governor General of the Dutch East Indies between 1808 and 1811.

Botanical Garden). Today, 87 Ha botanical garden that located within Juanda Street well known as the largest botanical garden in Southeast Asia and become a natural artifact that formed Bogor City.

Like other colonial cities, Bogor City morphological character determined by its ethnicity settlement segregation zone called *Wijkenstelsel.* The Dutch East Indies society is divided into three major ethnicity groups: (1) *Europeanen* (European class); (2) *Vreemde Oosterlingen* (Eastern foreign) and (3) *Inlander* (native). (Fig. 22).

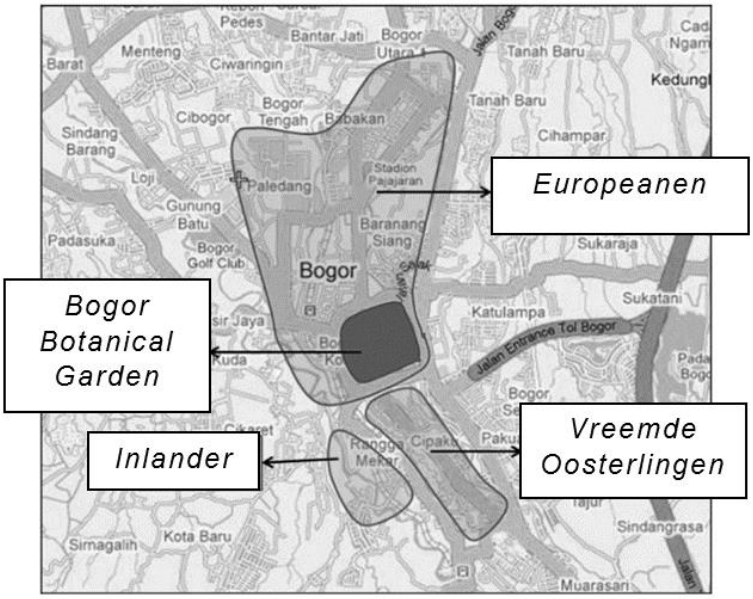


Figure 22. Settlement based on Ethnicity (Source: Ari & Prabawasari, 2000).

The Chinatown area lies along *Handelstreet* (Surya Kencana Street) serves as the center of economic (Fig. 23). Chinese society classified in social classes, which were symbolized by their dwellings located. Group of trader gathers around *Pasar Bogor* (Bogor market), while second-degree class settled on the rental shop and tenement. (Tohjiwa, 2013).

In the historical phase 1808-1872 colonialism period, *Preanger Lijn* (Bogor Station) railway existence became one of the significant points for *Buitenzorg* land use development. In the very first beginning, this railway was used for transporting plantation crops. This railway development triggered public facilities establishment. Most of the Public facilities were built concentrated in the west part region.

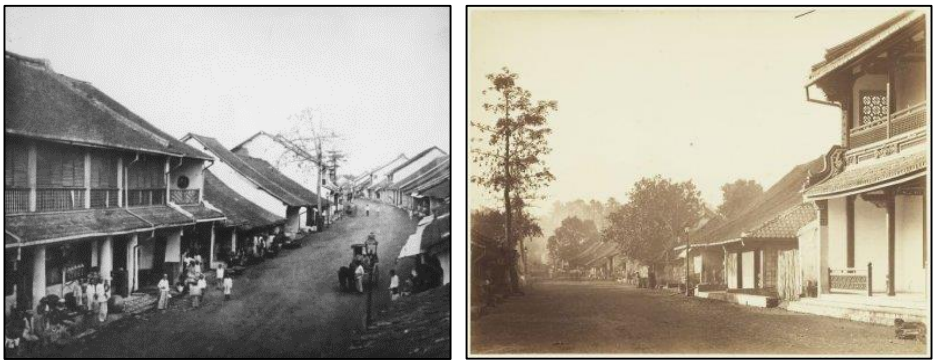


Figure 23. Image of Chinatown in Handelstraat (Surya Kencana Street). (Source: KITLV).

In 1917-1920, Ir. Thomas Karsten as an urban planner, he designed Dutch settlement development and concentrated in the east part region. The settlement was characterized by grid pattern road and Neighborhood Park. Some significant buildings located on the main streets, Sudirman, Kapten Muslihat and Paledang Street. From urban morphology, it can be identified at that time after the establishment of Groote Postweg, some settlements of the city began to grow. Built environment development as shown in Figure 24. In 1945, Indonesia was declared as an independent nation by Sukarno. After independence, the city was gradually lost its central position as in the colonial period. (Tohjiwa,2013).

Since 1950 the city of Bogor is a city recommended by Jabodetabek team to be incorporated into the metropolitan area of Jakarta. Bogor City is projected to be a satellite city of Jakarta. After the construction of Indonesia's first highway project in 1978, Bogor City is designated as one of the satellite cities of the Jakarta Metropolitan region as a residential city (dormitory town). Based on the context, between the metropolitan city and its satellite cities are equipped with mass transportation facilities in order to meet the needs of the commuters. A commuting phenomenon in the city of Bogor seen from the high number of trips to Jakarta every day. Many residents in Bogor City spend more time in Jakarta every day (RPJPD, 2005).

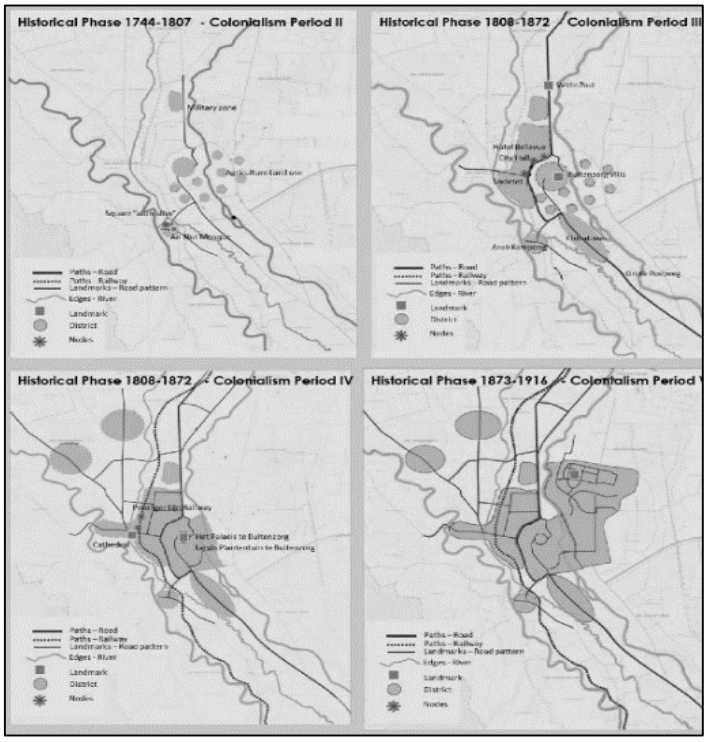


Figure 24. Bogor City's Built Environment Development.
(Source: Individual Study).

The historical remnants that existed as a form of historical buildings (Bogor palace, City hall, General hospital church, museum, etc), cultural properties (temples, mosque, gateway and landmark), and natural heritage properties (Bogor Botanical Garden and Urban Park) were identified along the four study streets as shown on the analysis map. (Fig. 25). The architectural character was mix architectural character between Europe (Colonial) and local architectural influence called as '*Indische'* architecture style.

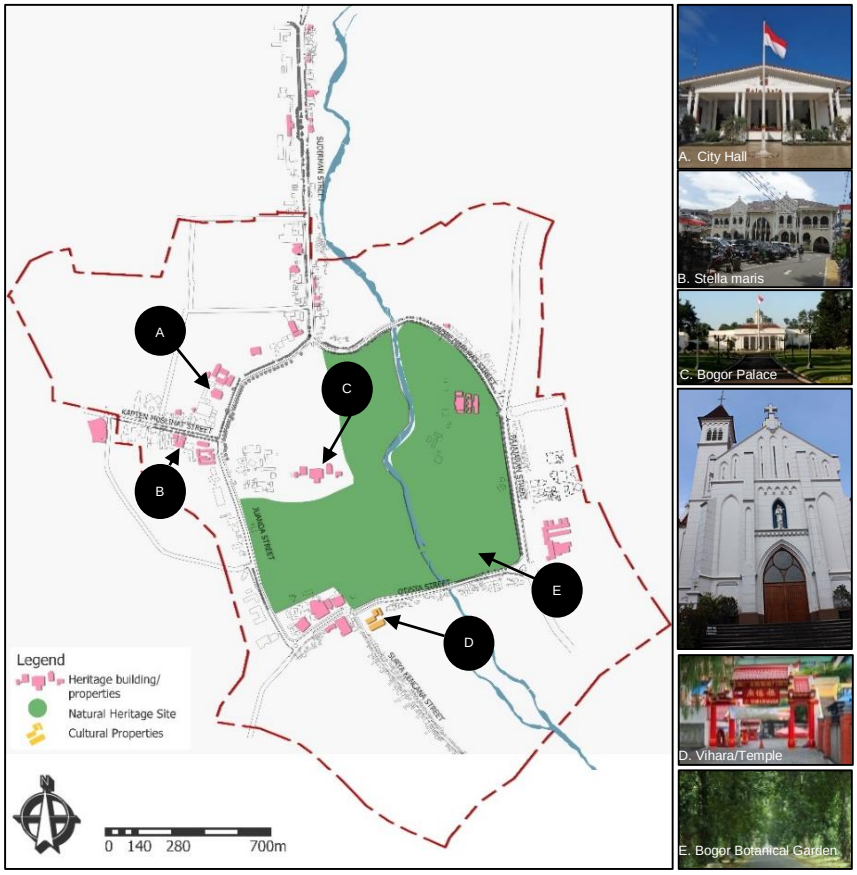


Figure 25. Historical, cultural and natural heritage remnants map.
(Source: Individual Study).

4.4.2 Street Activities and Street Culture

a. Day and Night Activity

Sidewalks play an important role in accommodating various kind of activities. Designing for street user's mean understanding different users and activities that occurred. In order to understand different user and activities within four case study streets, different types of activities occurring on the street were documented (as shown in Table 6).

Table 6. Four Study Street Activities

Postures	Behavior and activities
Sudirman Street	
Walking	Talking
Standing	Eating and drinking
Sitting	Sharing time with other people (socializing; gathering; lingering)*
Ambling	Cleaning and maintaining surrounding landscape
Lying	Patrolling
	Collecting garbage
	Queuing
	Stopping public transportation*
	Crossing the road
	Selling drinks and food*
	Talking on mobile phone
	Observing other people and other activities
	Waiting for passenger*
	Smoking
	Street busking
	Purchasing food from street vendors*
	Cooking*
	Serving the customers*
	Keep the parking*
	Hawking the merchandise*
	Repairing motorcycle
Postures	**Behavior and activities**

Kapten Muslihat	
Walking	Talking
Standing	Eating and drinking
Sitting	Sharing time with other people (socializing; gathering; lingering)*
Ambling	Cleaning and maintaining surrounding landscape
	Patrolling
	Selling newspaper
	Making ring from gemstone
	Stopping public transportation*
	Crossing the road
	Selling drinks and food*
	Talking on mobile phone
	Observing other people and other activities
	Waiting for passenger*
	Smoking
	Purchasing food from street vendors*
	Cooking*
	Serving the customers*
	Keep the parking*
	Hawking the merchandise*
	Repairing motorcycle

Juanda Street	
Walking	Talking
Standing	Eating and drinking
Sitting	Sharing time with other people (socializing; gathering; lingering)*
Ambling	Cleaning and maintaining surrounding landscape
Bicycling	Patrolling
	Making ring from gemstone
	Stopping public transportation*
	Crossing the road
	Selling drinks and food*
	Talking on mobile phone
	Observing other people and other activities
	Waiting for passenger*
	Smoking
	Purchasing food from street vendors*
	Cooking*
	Serving the customers*
	Keep the parking*

	Hawking the merchandise*
	Repairing motorcycle
	Street busking*
Surya Kencana Street	
Walking	Purchasing goods
Standing	Serving the customers*
Sitting	Cooking*
Ambling	Vending
	Hawking the merchandise*
	Gathering
	Talking on mobile phone
	Keeping the parking
	Selling Vegetables, Fruits, and Flowers
	Observing other people
	Smoking*
	Crossing the road*
	Eating and drinking*
	Shouting
	Fixing the tent
	Cleaning the store
	Bargaining*

*****General activities occurred

On the Sudirman, Kapten Muslihat, Surya Kencana, and some part of Juanda Street, path and place compete for the space on the street; gathering and lingering behavior occurs simultaneously. It is shown by vendors that emphasizing the end of the linear space of the street, as shown in Figure 26.

Non-commercial daily activities are assigned with the commerce-related activities. The street space, in particular, the sidewalk is a place for walking, sitting, standing, cooking, eating, hawking, gathering, smoking and so on.

Figure 26. Typical street vendors sitting on the edge of the street.
(Source: Individual Study).

The slow moving walks (ambling) and crossing (Fig. 27) often seen in some part of the street. Short walking distance also spotted in all study streets, mostly related to stopping the mass public transportation.

Figure 27. Ambling walk while stopping the mass transportation.
(Source: Individual Study).

As train station located within Kapten Muslihat Street, where people were commuting from Bogor to Jakarta or the other way around. The pedestrian concentration mostly identified along the side of the train station to the nearest intersection. Traffic nodal point (train station) play an important role on this street, highest mobility spotted here, as the only train station in Bogor City that serves people who commute from Bogor City to Jakarta City. Similar with an occurrence that identified within Sudirman

Street, street vendors were also discovered at the edge of sidewalks as shown in Figure 28.

Figure 28. Typical street vendor founded along Kapten Muslihat Street.
(Source: Individual Study).

From the street activity and street sidewalk spatial setting observation, it was apparent that pedestrian streets in four study streets have identical spatial characteristics on user territory. They are very much associated with economic and social economic. Figure 29 shows typical user spatial setting on four study streets. This typical setting shows the general activities that occurred in almost four study streets. As mentioned before, street peddler or street vendors constituted the sidewalk on every edge or corner.

The use of the space highly changes over time. There is extensive use of time to differentiate the use and purpose of space. Studying the street over the passage of the day reveals the variety activities occurred on any space on the street. In the weekdays, the four study streets generally used for commute and everyday activity purposes. During weekends, all four

study streets changed its role as a place for leisure or even recreation activity purposes.

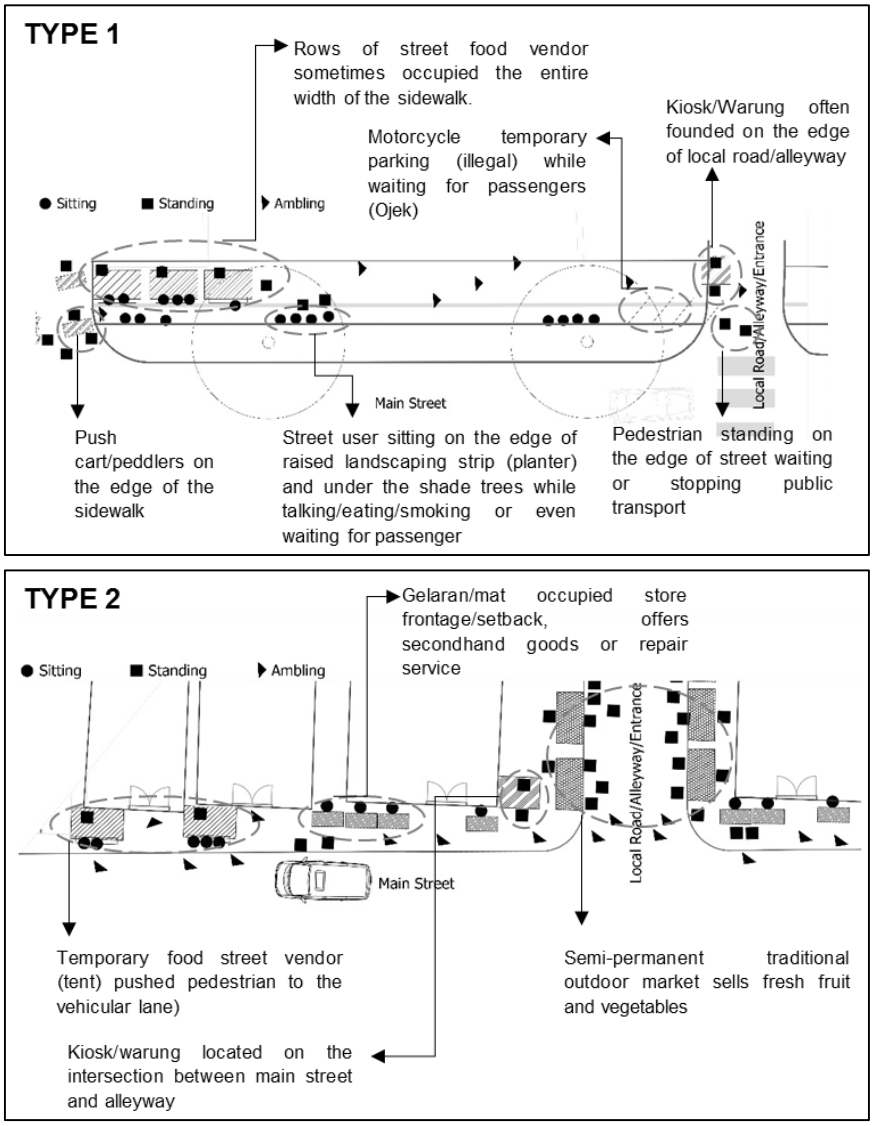


Figure 29. Typical Sidewalk spatial setting showing user territory and their activities. (Source: Individual Study).

Other activities and behavior related to commerce include making and mending goods, including activities as diverse as making a ring from

gemstone, repairing and making footwear also identified along Kapten Muslihat Street.

The street activity map (Fig. 30) highlight the evening activity nodes that happened on the four study street and adjacent land use.

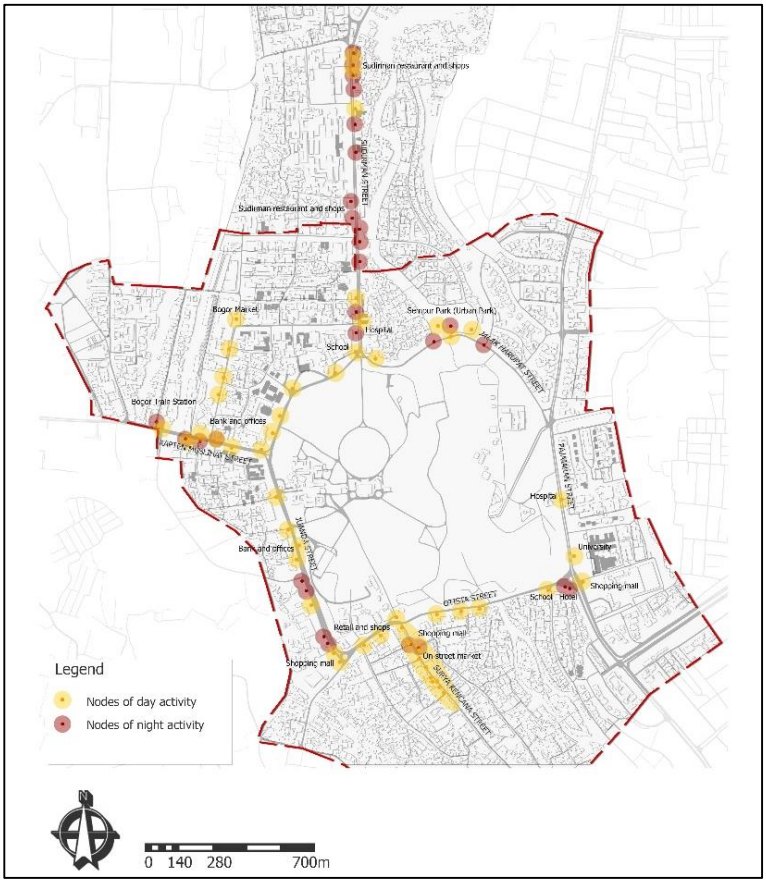


Figure 30. Street activity mapping. (Source: Individual Study).

On the night time (evening) there were pedestrian concentrations that congregate at street vendor spots. Vendors play a significant role in creating nodes to anchor stationary activities that seem to randomly only appear on the street in the evening time. While some street vendors that spotted in the daytime were not hawking their food. The number of evening

activities and their location are important factors for the vitality of the city and the perception of safety. If there is only few evening activities concentration gives the street user as an impression of a deserted place and avoids to go there in the evening.

Based on the records of field notes, shows that night activities on Sudirman Street, Juanda Street, and Kapten Muslihat Street are concentrated where the street food stalls are located (Fig. 31).

Figure 31. Typical food street vendor at night time.
(Source: Individual Study)

Figure 32. Night market at Surya Kencana Street.
(Source: Individual Study).

While at Surya Kencana Street, night time activities associated with night open market that spills out onto the roadside as shown in Figure 32.

b. Street Culture – Street Vendor and Night Market

One of the prominent characteristics of street vendors is their mobility and flexibility in their everyday operation. Various types of street vendors exist in Indonesia cities" (Yatmo, 2008). Various type of stationary street vendor grouped in three typical structures, such as (1) *gelaran/emperan* or mat; (2) *tenda* or tent; and (3) *warung* or kiosk. (Fig. 33).

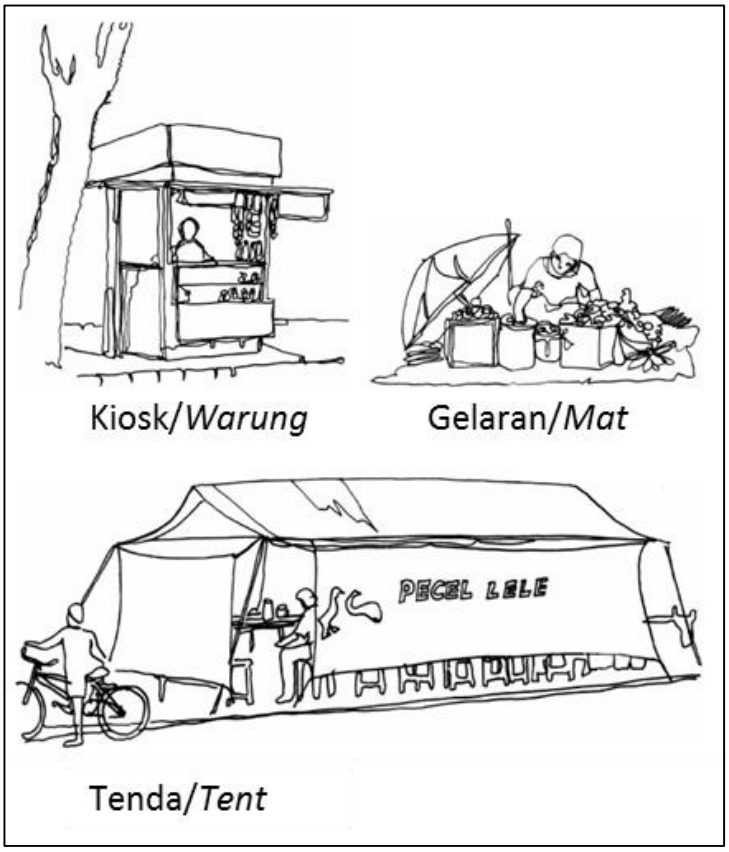


Figure 33. Typical Stationary Street vendor. (Source: Yatmo, 2008).

On the other hand, the presence of street vendors in many locations also creates some conflicts with other public groups. Their presence on the commercial street or in shopping areas is often considered as a threat to the existing business that occupies the legal trading area since they have to compete to attract costumers (Devie, 2002).

Whilst another street vendor that depends on mobility also exists, such as *Pikulan and Gerobak* (pushcart) as shown in Figure 33.

Based on the observation the typical structures as *Tenda* or Tent mostly seen during the night, whilst *Pikulan* and *Gerobak* (Push-cart) operated during the day.

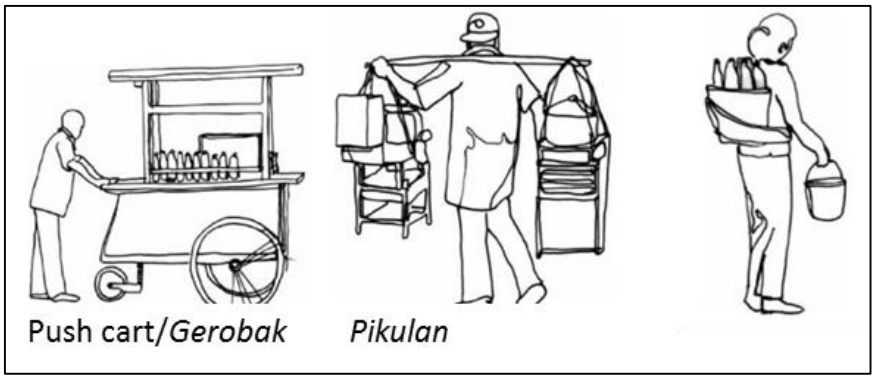


Figure 34. Typical Mobile Street vendor. (Source: Yatmo, 2008).

It is very important to strengthen night activities as they make a distinct characteristic of Bogor City livable street. The main challenges of promoting this street culture are often associated with aesthetic, sanitary and cleanliness.Despite the fact that street vendors are generally considered as disrupting of the city, they also have potential to give positive character to the city (Yatmo, 2008).

Street vendors who are regulated, ordered, and clean and represents local uniqueness have the potential to make the city more interesting (Sidharta, 2000).

To achieve a more even spread and diversity of evening activities throughout the city and to improve public perception of safety it is recommended to develop and implement a promotion of evening activities throughout the city center.

c. Street Culture – Car Free day and Street Festival

Bogor Car Free Day was established since December 2008, as a pilot initiative to transform Bogor to a walkable city, Juanda Street, Jalak Harupat, and Kencana Park stretch were fully closed to vehicles every Sunday from 6 to 9 am, for roads to be used freely by pedestrians and cyclist (Fig. 35). The event well-received, though in 2016, the car-free day location was shifted to Sudirman Street.

Figure 35. Bogor “Car Free Day”. (Source: http://www.infocarfreeday.net).

Car-free Sunday initiative is a major step towards a car-free lifestyle and promotes active mobility options.

Bogor City has an annual street festival that held since 100 years ago (Bogor Heritage Local Plan, 2012). This festival associated with Chinese New year celebration called “Cap Go Meh” (Fig. 36). Nowadays, this festival not only known as Chinese New Year celebration but also as Bogor Street Culture Festival, that celebrated with various cultural performances and rituals.

Figure 36. Cap Go Meh celebration at Handelstraat (Surya Kencana Street). (Source: KITLV; Harian Kompas, 2017).

V. STREETSCAPE IMPROVEMENT

Streetscape improvement expected to be a design tool to enhance street character, and are able to increase pedestrian safety and comfort. Includes changes to street space configuration, upgrade the physical features and also safety and comfort measures.

This chapter offers the analysis summary based analysis study, subsequently some design strategy and recommendation were prepared to improve the street on the four study streets.

A typical schematic proposal concept towards improving the four study streetscape was made. The proposal focused on the major elements include the creation of the theme, improvement of physical features, safety and comfortability enhancement and also accommodating the street culture. The design proposal includes, recommendation of general sitting and layout of street amenities and street culture accommodation. A set of tree and planting, paving material selection, and also street furnishing design recommendation were also prepared. As part of street culture recommendation, precedent of successful street culture for understanding the applicability of strategies were included.

5.1 Analysis Summary

Based on the analysis result from the existing physical features, walkability index, and street culture observation and investigation. The

analysis result and subsequent design focused on the elements. The key elements analysis result summary described as follows:

Table 7. Summary of Analysis.

Elements	Analysis	
	Opportunities	**Constraints**
City Context		
Topography, Water, and Landscape Features	A strong landscape setting and landscape contours on Sudirman Street and Juanda (Jalak Harupat) Street providing a significant character as well as providing great views to key destinations. Bogor Botanical Garden as Urban Forest Park existence offers such environmental benefit and quality for the heavily built areas within the city center.	Although the topography and landscape setting offers spectacular view this potential element was underutilized The topographical challenge is especially present in the East part of Juanda (Jalak Harupat) Street next to Urban Forest Park and nearby urban park where the sidewalk located, the challenge is to connect and create a pedestrian experience in that area.
Land Use	Land use within 4 study streets is well-mixed. Each study street has dedicated commercial and trade, and also service area that keeps the street alive.	Land use along the edge of study streets has diverse functions, it affected the different types of street corridor character and un-unified themes in each street.
Public Open Space	There are a few dedicated routes that act as walking route between major urban park with urban forest park and public plaza	The public open space are scattered cover most of the city center, but the link on the network in between them are weak

Street Context		
Street Network and Connectivity (Sidewalk, On-street parking and Bike Network); Street Configuration	Two case study streets facilitated with bicycle lanes to support leisure activity and “bike to work program”	Street generally serve the same purposes as transport corridors, primarily for vehicular traffic, service roads and parking space, pedestrian priority is quite low in spite of sidewalk existence Bike network and cycle lanes obviously unconnected
	The existence of on-street parking could reduce the traffic flow. Sudirman street, Juanda Street, and Surya Kencana Street were equipped with on-street parking, while Kapten Muslihat street as a transit-oriented street was not equipped with it.	Most of the case study street, issues are regarding unregulated on-street parking in street stretches push pedestrian to walk within the travel lane or the parking sometimes blocking the sidewalk.
	All street equipped with sidewalk on both sides of the street, the width varies from 1.8 to 2.6 m	Surya Kencana and some stretch of Sudirman street sidewalks width are not enough to accommodate pedestrian given space were occupied by street vendors and informal parking, forcing pedestrian onto the road
Existing Physical Features		
Walking surface	The condition of paving in the Juanda Street sidewalk mostly in good condition and well maintained. The condition of surfacing or paving design might encourage people to walk and increase the pleasurability within the stretch.	The surfacing condition in some stretch of Sudirman Street, Kapten Muslihat, and Surya Kencana streets was not in good shape.

Street trees and landscaping	At three case study streets, covered with street trees and landscaping space to provide shade and valuable buffer between the pedestrian and vehicle realm. Existing trees along the stretch of Sudirman and Kapten Muslihat Street gives its distinctive green corridor (Avenue) that was part of character/identity since the colonial period.	At Surya Kencana Street, street tree planting is difficult given the street is generally quite narrow and supplemented by awnings.
Street Amenities (Street Furniture)	Three case study streets (Sudirman, Juanda and Kapten Muslihat) were already equipped with certain street amenities. Each street has its own function and significant, therefore to characterize each street could be done by individualizing the streets with specific amenities.	As a commercial street, Surya Kencana Street only equipped with street amenities on the gateway part.
Safety and Comfort (Walkability Index)		
Clear path	Based on walkability index there is no significant conflict between pedestrian and vehicles. There was a clear separation between travel lanes and sidewalk.	Occasionally, entrances and exits of buildings and parking structures lead to conflict with pedestrians. Another impediment is the existence of on-street parking that become issues for a pedestrian to walk comfortably.
Crossings	Some of the streets are facilitated by pedestrian bridge and underpass, This kind of facilities reduce safety issues between crossed pedestrian and vehicles.	Crossing streets were hard to achieve. The main problem crossing the streets was vehicles that do not yield while pedestrian crossing the street
Amenities		Based on field survey, Juanda Street has the

		appropriate street amenities, in terms of type and the amount.
Obstruction	Some part of Juanda Street in particular on the Bogor Botanical Garden perimeter are free from obstruction.	The main obstruction on the sidewalk during walking was mostly related to on-street parking and street vendor existence.
Disability Infrastructure	Some stretch of Sudirman street, Juanda Street and Kapten Muslihat street equipped with disability infrastructure.	The issues, mostly related to discontinuity of the facilities, poorly placed.
Street Culture and Historical Significant		
Historical significant	As heritage city, Bogor has distinct characteristics, either by its urban fabric or even some historical building remnants. Sudirman street and Surya Kencana Street has strong historical value for Bogor City morphological development.	Despite with the historical value, this character was not visible enough on its streetscape features.
Street Culture – street activity (day and night)	The field notes shows certain activity that active during the nights, mostly related to food street vendor (almost founded in all case study streets) and night market (Surya Kencana Street), Leisure activity such sports and jogging identified in Juanda Street.	Most of the street activity is related to a street food vendor. The observation record shows there is no significant activities occurred during the night.
Street Culture – street vendor	A street vendor in the street made the street more vibrant. The existence of street vendors in all case study streets gives the street as a complete street where people doing the socio-economic activity.	Street vibrancy does not get along with street cleanliness and beautiful image, therefore street vendor was also a threat for city's image.

Street Culture – Festival and special events	Current festivals and special events that held on the streets has positive responses by the street user	

5.2 Design Theme, Strategy and Concept

5.2.1 Theme

Pedestrian experiencing a street through walking on the sidewalk. Walkable Street is the vital elements to support the pedestrian movement to and from the city.

Bogor has a significant setting created by its natural landscape features and historical remnants. Much has changed since the early settlement but the structure of its urban fabric and social interaction within the street remained. Livable Street should not serve only as travel route but also support a diversity of activities to meet the demand of the social composition. (Fig. 37).

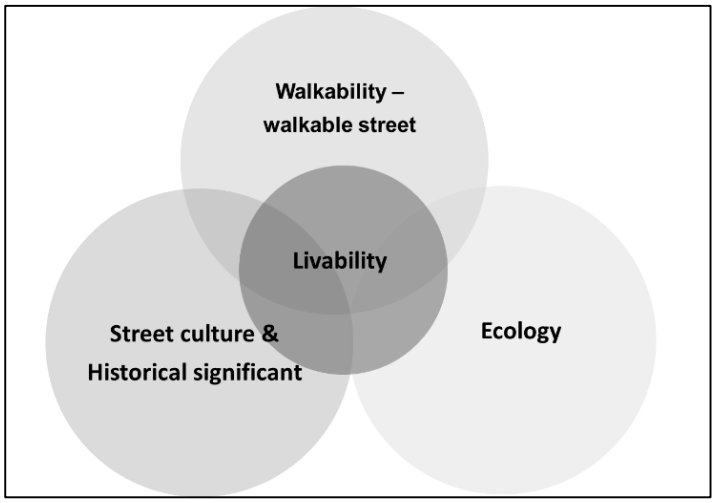


Figure 37. Theme Diagram

Each case study streets has its own characteristic that formed the neighborhood. Based on analysis and findings on each case study streets defines its theme. Sudirman Street has strong historical significance and identity by its axial structure with Bogor Palace (Fig. 38) and also identified certain street culture point as socio-economic places that run day and night time. So the improvement theme on Sudirman Street is emphasizing street culture and historical identity.

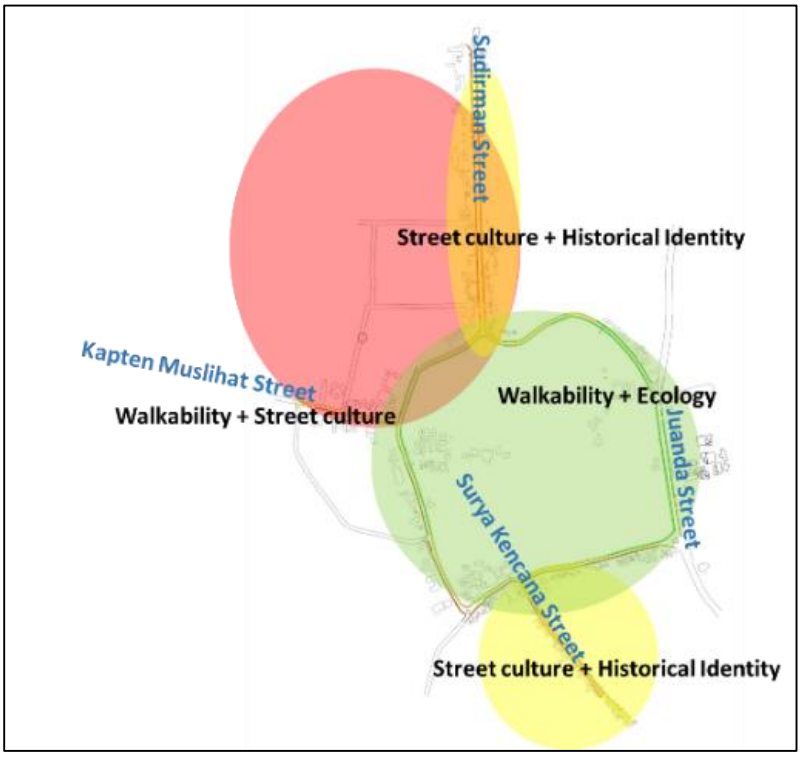


Figure 38. The theme on each case study streets.

Landscape features such as rivers and urban forest areas can be integrated into streetscape improvements for landscape enhancement purposes not only as recreational areas but also as a place for an ecological function. Juanda Street located next to Bogor Botanical Garden

has strong landscape features character offer such environmental benefit and quality for the heavily built areas, thus the preferable theme is walkability and ecological enhancement. As a street with strong commercial and trade area since the colonial period, Surya Kencana Street has a strong character on its historical and cultural identity and also its role as a marketplace street, therefore the theme for Surya Kencana Street is street culture and historical identity enhancement. Kapten Muslihat Street located within the transit nodal point, where the fast pace movement was identified, safe and comfortable walkable environment is needed here, but in the other hand as typical street on Bogor City some part of the street were congregated with street vendor, thus the theme will be incorporate walkability and street culture enhancement.

5.2.2 Design Strategy

A variety of street activities, both formal and informal, should be encouraged. On the street, there are various types of social activities and functions. The street space functions as a contact place where people from the very wide range background are meet. Various business and service, social and cultural street activities should be a parallel balance to encourage people to walk and also promote the street vibrancy. In order to achieve the general recommendations, the key principles and concept of the design strategy can be explained as follows:

Table 8. Key principles and design criteria

Theme	Design Criteria	Key Principles	Program
Walkability – Walkable Street	Reconfiguration of Streetscape space	Improvement key for space configuration to elevate function of the sidewalk or pedestrian priority area	Shared space street and Pedestrian Plaza, and Pedestrian priority area
	Physical Features Improvements (Safety and Comfortability Enhancement)	Provide certain measures to reduce conflicts between pedestrian who crossed and vehicles; add facilities to support vulnerable street user; Improve sidewalk amenities ; Provide rest and stop node sequences to allow pedestrian pause movement.	(1)Safe Crosswalk; (2)Traffic calming measure (3) Street Furniture Enhancement (4) Potential rest and stop nodes (5) Cycle lane
Street culture and Historical Significant	Accommodating the Street Culture	Situate dedicated space and facilities within the case study street appeal to a variety of activities while keeping the space accessible, clean, and vibrant.	(1) Commercial Enhancement Zone (2) Street Fairs and market (3) Open Street Events
Ecology	Natural landscape enhancement	Support local ecosystem and foster biodiversity by constructing habitats within the street, by providing connectivity through landscape streets for fauna movement and replace the hard infrastructure with “Natural” infrastructure	(1) Urban Forest extension park (2) Bio swale (3) Green corridor

5.2.3 Design Concept

a. Sudirman Street Concept

Based on historical significant findings, Sudirman Street has historical value on Bogor City's morphological development. This street act as an axis line to Bogor Palace, in which was strengthen by the form of Trees Boulevard along the way to Bogor Palace. Given the urban transformation, this connection already lost its strong character. Thus, to enhance this character, the design strategy will be re-Boulevard Sudirman Street as a Gateway Statement. In the other hand, Sudirman Street has been developed as Bogor City's Strategic Commercial Zone, in terms of street culture concept, Street will be dedicated to accommodate any kind of commercial activities, includes street commercial enhancement zone (street sidewalk for doing business). (Fig. 39).

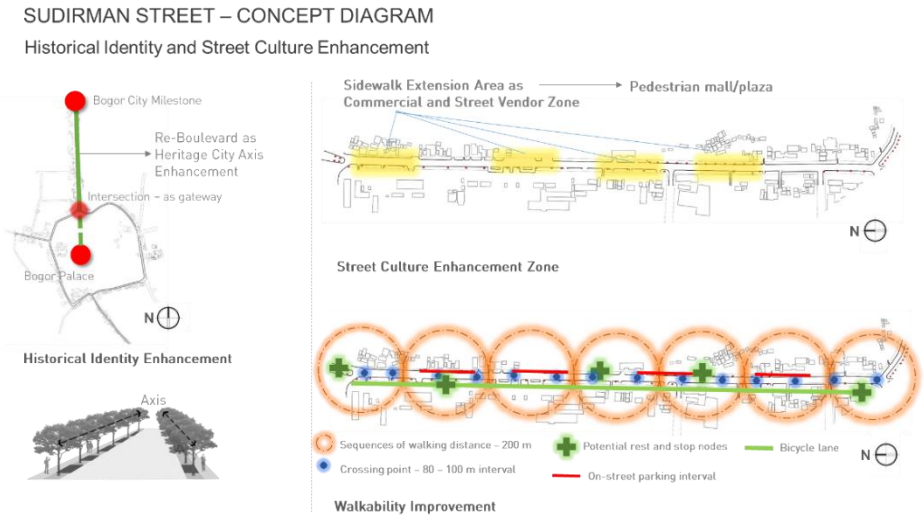


Figure 39. Sudirman Street Concept diagram (Source: Individual).

b. Kapten Muslihat Street Concept

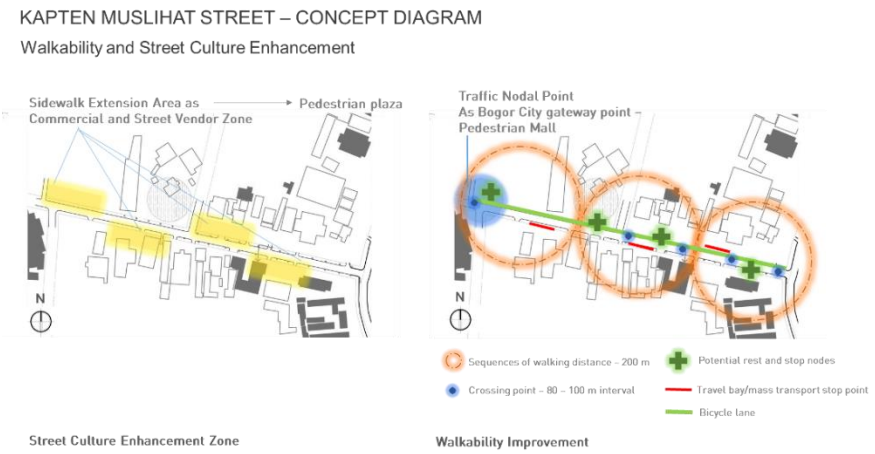


Figure 40. Kapten Muslihat Concept Diagram (Source: Individual Study).

Located near Traffic nodal point and Commercial and Market area, Fast walking behavior were identified here. The constant route was in between traffic nodal point-market point-mass transportation stopping point. In this street also spotted street vendor activities on some part of the sidewalk edges.

Thus, the concept will be focused on improving the walkable environment for fast pace walking and characterize street as gateway point of Bogor City. (Fig. 40).

c. Juanda Street Concept

Located within Bogor Botanical Garden perimeter, Juanda Street get its benefit in terms of comfortability. The street was active during the weekend as leisure and recreation place for Bogor City's people as it also connected with the largest urban park (public open space). Therefore, the

suitable concept will be street as ecological experience, by providing "Natural Extension" between Bogor Botanical perimeter with nearest urban park and Public space, as shown in Figure 41.

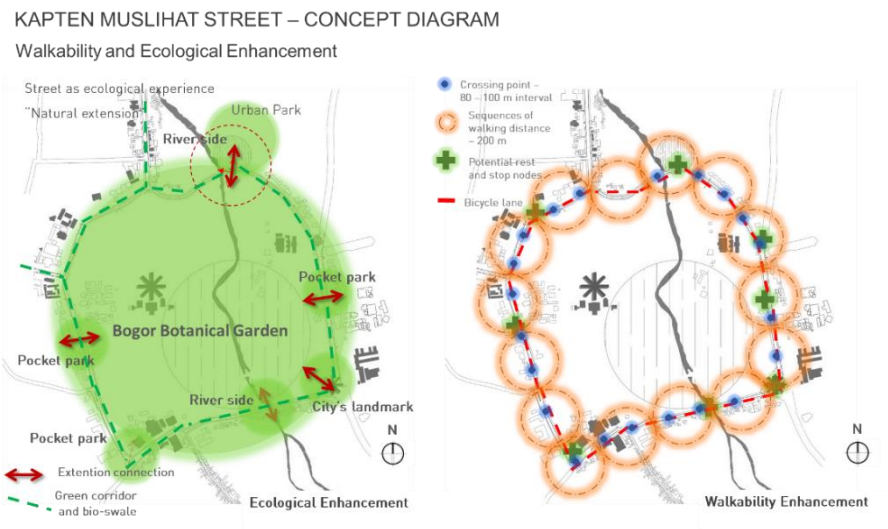


Figure 41. Juanda Street Concept Diagram (Source: Individual Study).

d. Surya Kencana Street

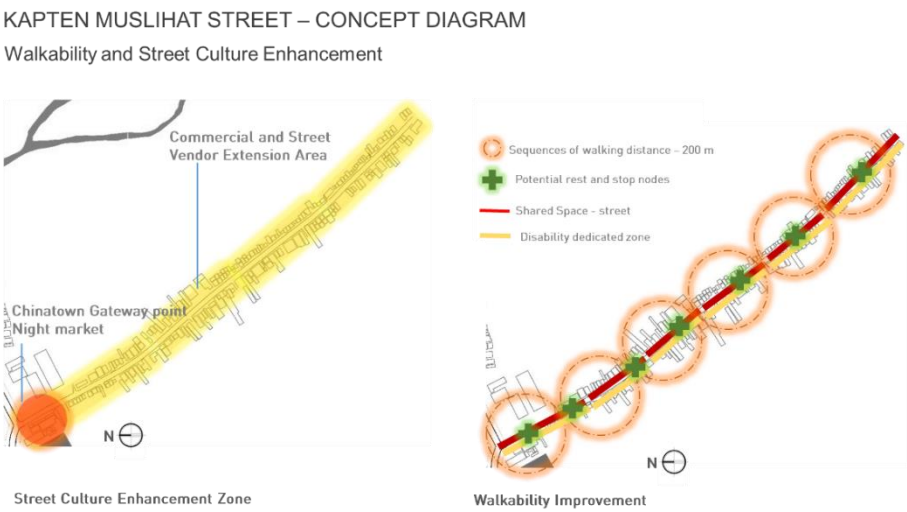


Figure 42. Surya Kencana Street Concept Diagram
(Source: Individual Study).

According to historical aspect investigation, Surya Kencana is a street that has cultural and historically significant. Being the first market being

built in Bogor City's, this street is a place where cultural setting and tradition of the night market, street vendor, and retail and shops were getting along for years. Since the automobile advancement, the street cluttered and the street user ompeting for its te itory. So, the design strategy for this area will be d dicated pedestria zone, in which the street will be accommodating all pedestrian user as shared street. (Figure 42).

5.3 Design Proposal

To maintain a continuous and uninterrupted pedestrian movement, wide sidewalks will be required along the four study streets. Sufficient buffer from the thoroughfare and shade features (trees, artificial canopies, covered walkways) along the sidewalks are crucial components to support the pedestrian movement. The design proposal also provides multiple layers of pedestrian corridors which supported with raised table crossings and pedestrian bridge to promote walking habits. To strengthen the community atmosphere in the streets, creating a pedestrian-oriented spatial environment is essential. Streetscape elements and landscape features (such as regularly spaced trees, lighting fixtures, street vendors and street furniture) will support street livability.

5.3.1 Reconfiguration of Streetscape Space

The typical reconfiguration of streetscape space is located within the proposed stopping places, sidewalk enhancement zone and shared space that applied at different case study streets. Stopping places require a strong

demarcation, simple, clear, geometrically regular shapes, and the layout is more than pedestrian way (Harrison, 1991).

a. Sudirman Street

Sudirman Street functioned not only as an essential street for travel connectivity but also a commercial strategic zone. The street present a possibility for improvement that increases the street's capacity to serve multiple users.

The proposed idea of reconfiguration (Fig. 45, 46) is to create pedestrian priority sense. Sidewalks are widened around 10 meters to allocate space for trees and landscaping (2.5-3 meter), the configuration of street amenities such as street lighting, outdoor seating, wayfinding and litter bin while securing a clear pedestrian path with minimum clear walking zone around 2.4 Meter wide. Street vendor enhancement zone interval in every 50 Meter with minimum clear zone around 3 Meter. Cycle path will be provided on the one side of the street (West side), planting strip divides the cycle path and travel lane gives safety measure.

As on-street parking is essential for mobility, regulated curbside parking intervals are provided in order to avoid obstructed car parking. Curbside parking lanes serve as flexible zones to accommodate small collective transit, dedicated motorcycle parking, and tree pits. The cycle lane is implemented on one of sidewalks side, landscaping as buffer gives a grade of separation and safety between cyclist and pedestrian.

b. Kapten Muslihat Street

Kapten Muslihat Street is connected to train station (traffic nodal point), the sidewalk is frequently used by commuters, as a route for the daily commute to work from Bogor to Jakarta or the other way around. Based on the observation this street serves the sole purpose of commuting to work and other commerce related activities. (Fig. 47, 48).

As a transit-oriented street, the proposal is to widen the sidewalk in order to allow pedestrian movement from or to the train station. By removing one travel lanes in each direction and provide accessible and wider sidewalks to support the clear pedestrian movement and on-street commercial activity. The streetscape sidewalk will maintain 6.5 meters wide, in which comprise 2-2.5 m street trees and landscaping strip, outdoor seating and street vendor enhancement zone (min. 3 m) while keeping minimum clear walkway around 2.4 meters. A bicycle lane will be provided on one of the sides of the sidewalk with minimum width around 1.8 m.

At the traffic nodal point (Bogor train station) street edge act as Bogor gateway point. The streetscape Plaza is shown in varies width with minimum wide around 6 meters. At its narrowest width, the traffic nodal plaza allows for a public shelter and double row of trees for N-S pedestrian movement. The plaza intended to create grand, civic space that can be activated by a range of events and street vendor enhancement zone.

c. Juanda Street Network (Juanda-Otista-Jalak Harupat)

Recorded observation results show high-pedestrian activity occurred on the weekend. Pedestrian concentration founded within the urban park location proximity.

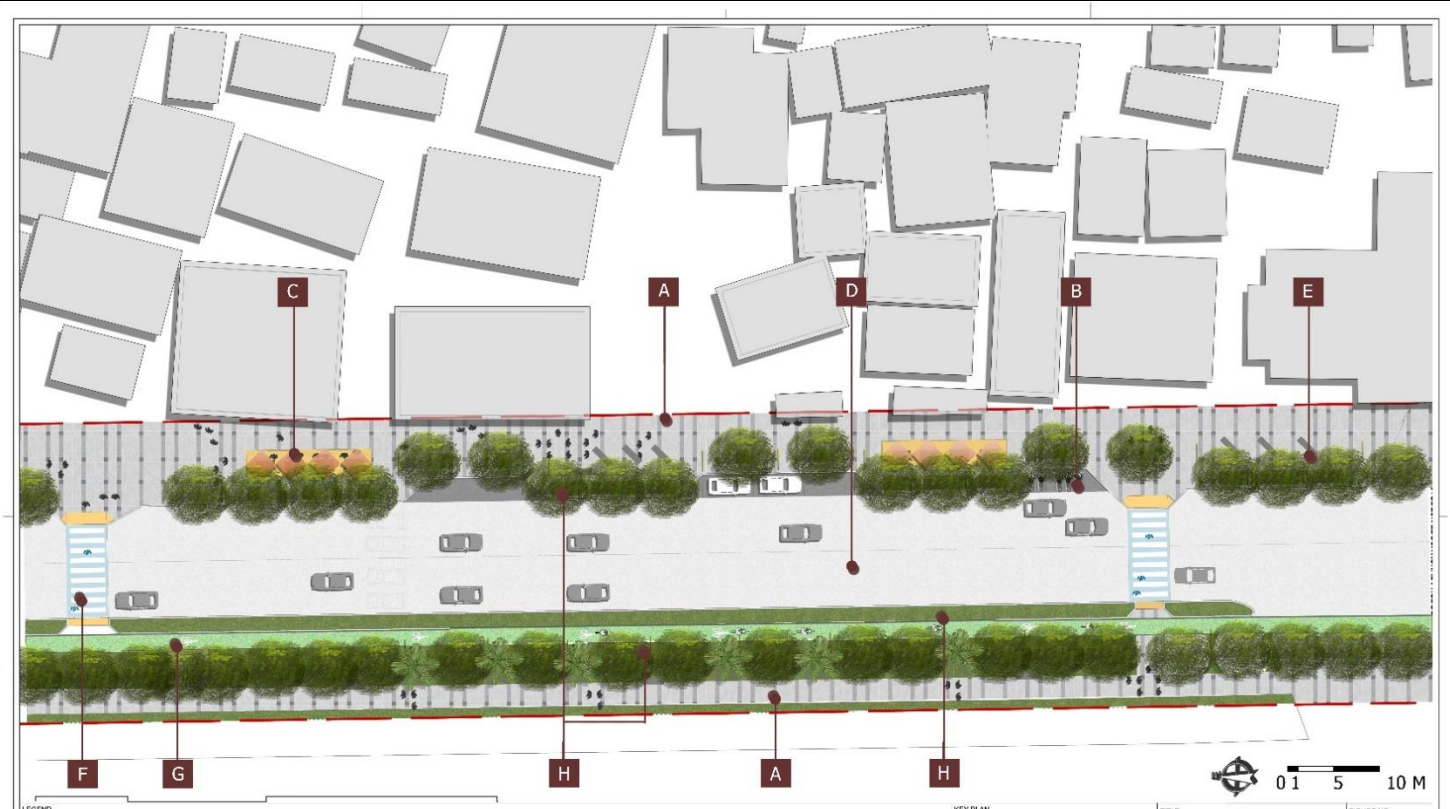
Sidewalk-extension zone, this proposal creates a larger pedestrian realm through widening the sidewalk along the length of Bogor Botanical Garden perimeter. Landscape connectivity with Bogor Botanical Garden and nearest Urban Public Park, pocket park, and identified major landscape features are part of designing streets that respond to the surrounding environment. (Fig. 49, 50).

d. Surya Kencana Street

Shared Commercial Street designed to slow down traffic speeds utilizing pedestrian volumes, design and other indication. The reconfiguration is removing the formal distinctions between spaces dedicated to pedestrians, cyclist, and motorized vehicles within the right of way (ROW). As the existing context and condition, this street authorized informal street vendor territory to street vendor enhancement zone. Texture and pavement as an indicator, act as curb replacement to reinforce pedestrian priority with travel lane. Street furniture such as public seating, street lighting, and bollards gives a traffic calming definition and delineation of travel lane from pedestrian priority area. (Fig. 51, 52). Shared streets are often the default condition in historic cities with narrow rights-of-way. One narrow travel lanes may be shared between cars, motorcycles and loading

vehicles. Macdonald (2011) explained the design elements, such as strategically placed trees, planted areas or parking spaces, are typically used to create meandering paths for vehicle travel, to ensure that vehicle movement will be slow.

Located at the cultural heritage and commercial area, this street could be more freed up and be more porous, providing all existing street as street culture activities to revive within the oldest commercial street in the city. The proposed idea is to make the streets limited access or car-free, Street trees for traffic calming or shade purposes and also the introduction of the setting of street vendor strips and seating spaces that weave to commercial buildings improve the streetscape and connection between buildings and streets.



LEGEND

A - SIDEWALK
B - ON-STREET PARKING
C - STREET VENDOR/COMMERCIAL ENHANCEMENT ZONE
D - TRAVEL LANE
E - PUBLIC SEATING/BENCH
F - CROSSING
G - BICYCLE LANE
H - STREET TREES AND LANDSCAPING STRIP

KEY PLAN

TITLE

Typical Plan -
Sudirman Street
Proposed Streetscape
Reconfiguration of Space

FIGURE NO.

45

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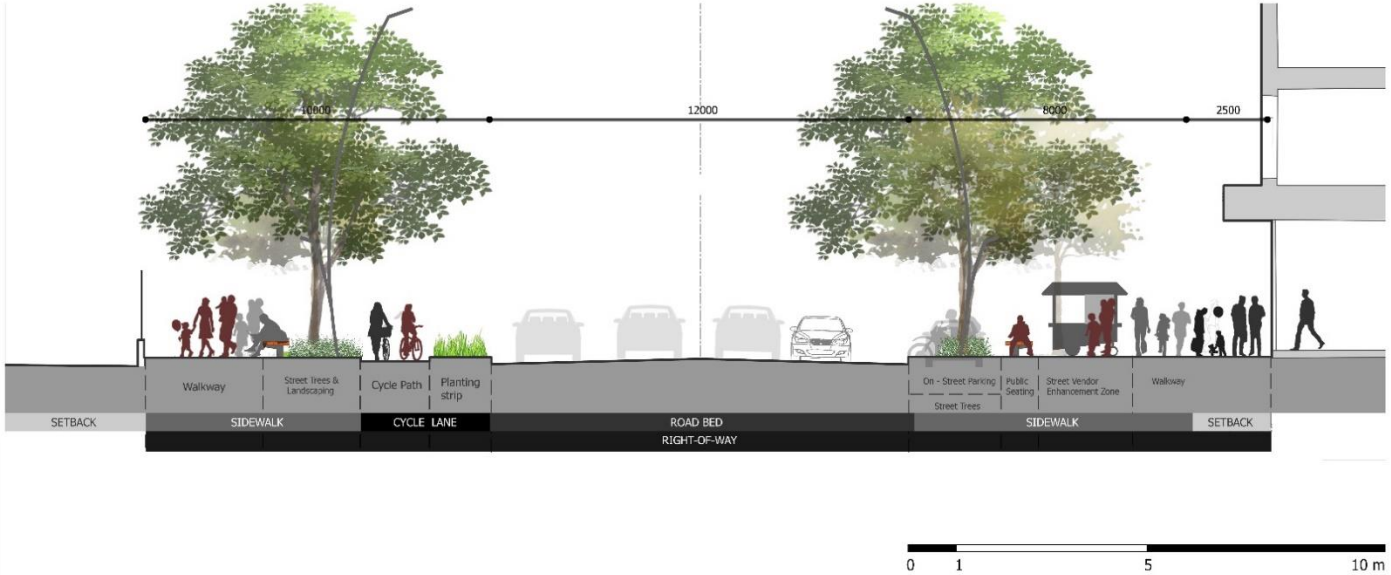
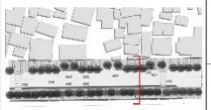
조경·지역시스템공학부



LEGEND

KEY PLAN



TITLE

Typical Section Facing North - Sudirman Street Proposed Streetscape Reconfiguration of Space

FIGURE NO.

46

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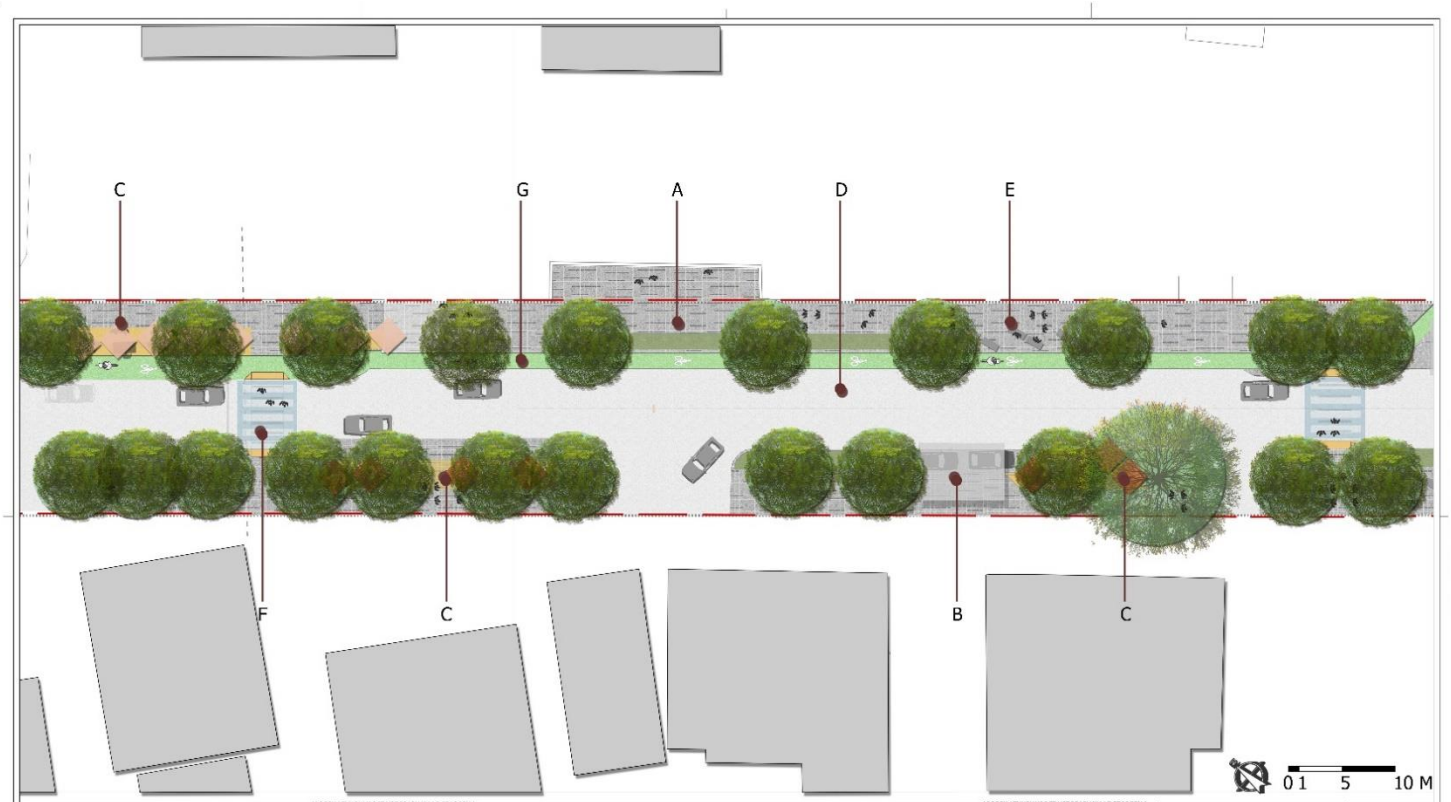

LEGEND

A - SIDEWALK
B - LAY BAY / MASS TRANSPORTATION STOPS
C - STREET VENDOR/COMMERCIAL ENHANCEMENT ZONE
D - TRAVEL LANE
E - PUBLIC SEATING/BENCH
F - CROSSING
G - BICYCLE LANE

KEY PLAN

TITLE

Typical Plan -
Kapten Muslihat Stree
Proposed Streetscape
Reconfiguration of Space

FIGURE NO.

47

서울대학교 농업생명과학대학
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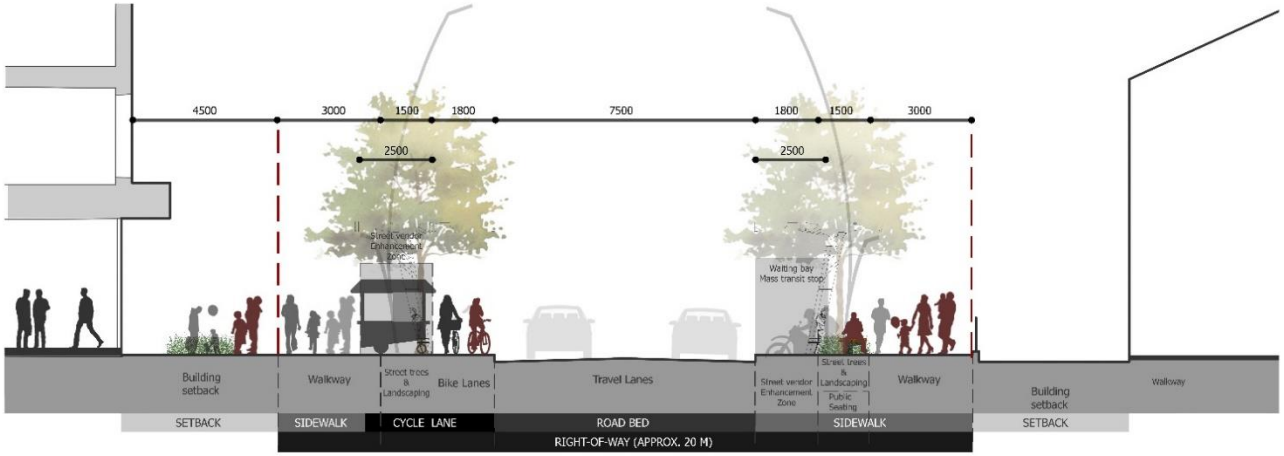
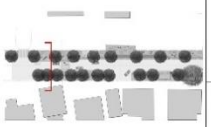


0 1 5 10 m

LEGEND

KEY PLAN



TITLE

Typical Section Facing South - Kapten Muslihat Stree Proposed Streetscape Reconfiguration of Space

FIGURE NO.

48

서울대학교 농업생명과학대학
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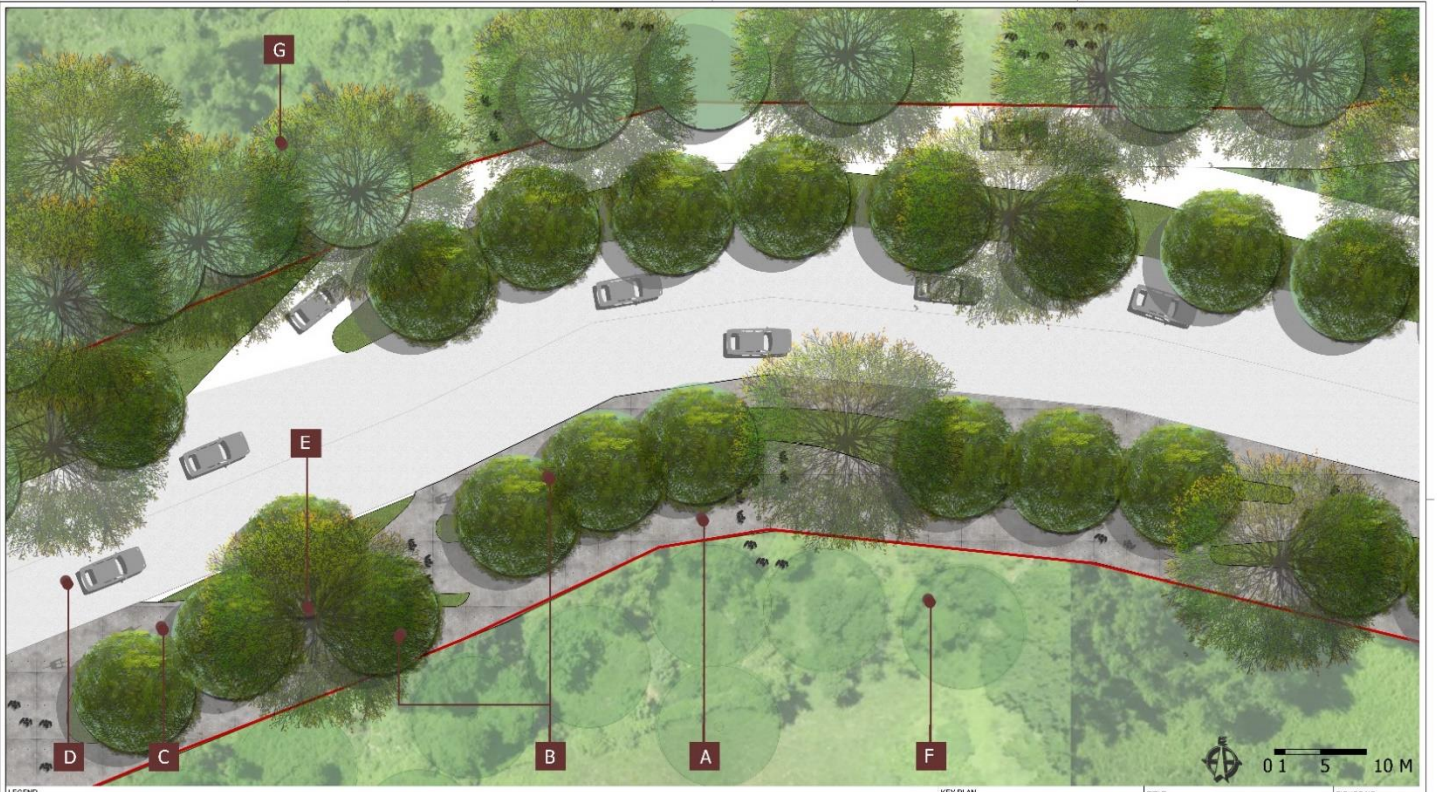

LEGEND

A - SIDEWALK
B - URBAN FOREST 'EXTENSION'
C - CYCLE LANE
D - TRAVEL LANE
E - PUBLIC SEATING/BENCH
F - URBAN FOREST
G - URBAN PARK

KEY PLAN

TITLE

Typical Plan -
Juanda Street
Proposed Streetscape
Reconfiguration of Space

FIGURE NO.

49

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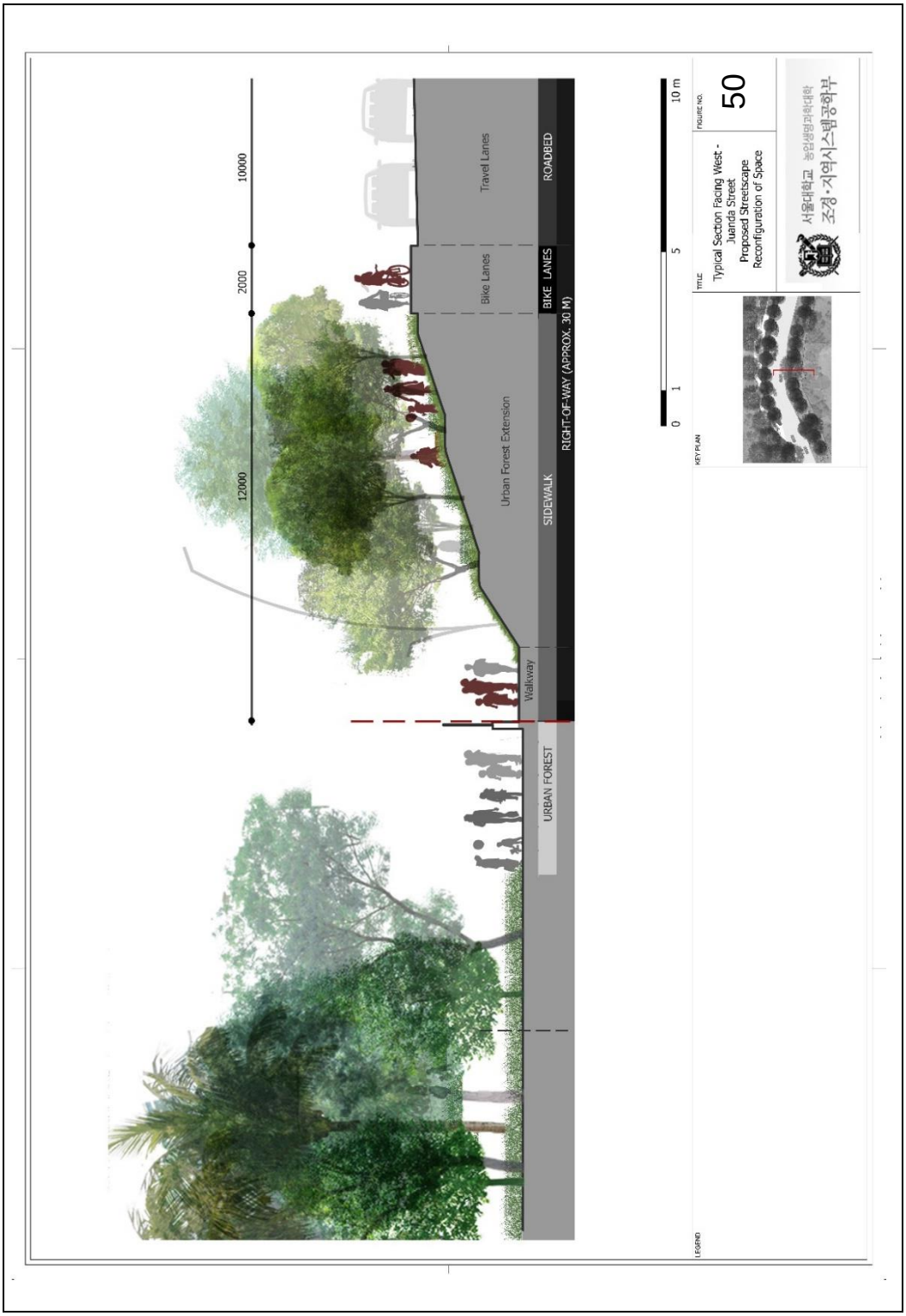
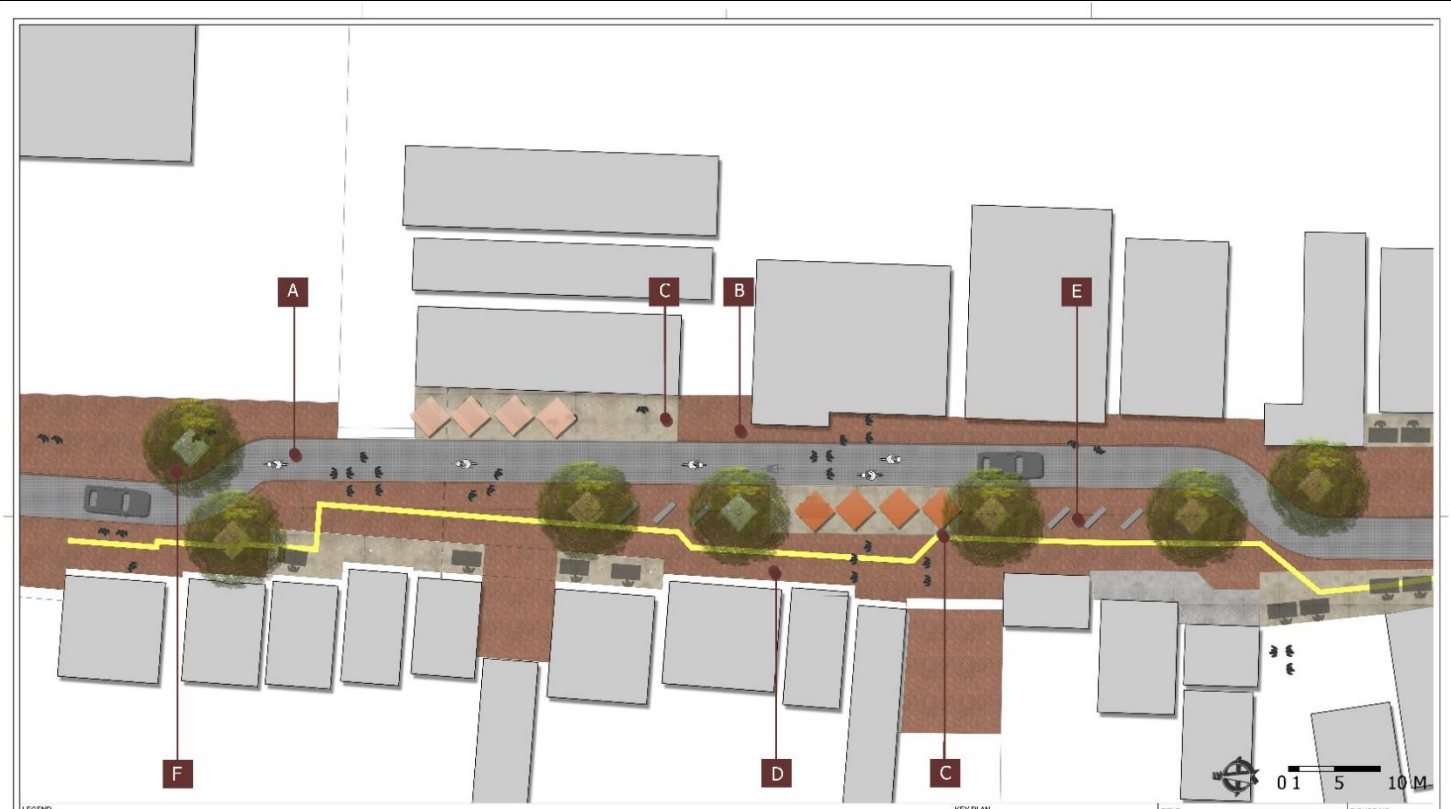


Figure 48. Typical Section Facing West-Juanda Street Streetscape Reconfiguration of space



LEGEND

A - SHARED SPACE
B - LOADING BAY
C - STREET VENDOR/COMMERCIAL ENHANCEMENT ZONE
D - DISABILITES PRIORITY ZONE
E - PUBLIC SEATING/BENCH
F - STREET TREES AND LANDSCAPING STRIP

KEY PLAN

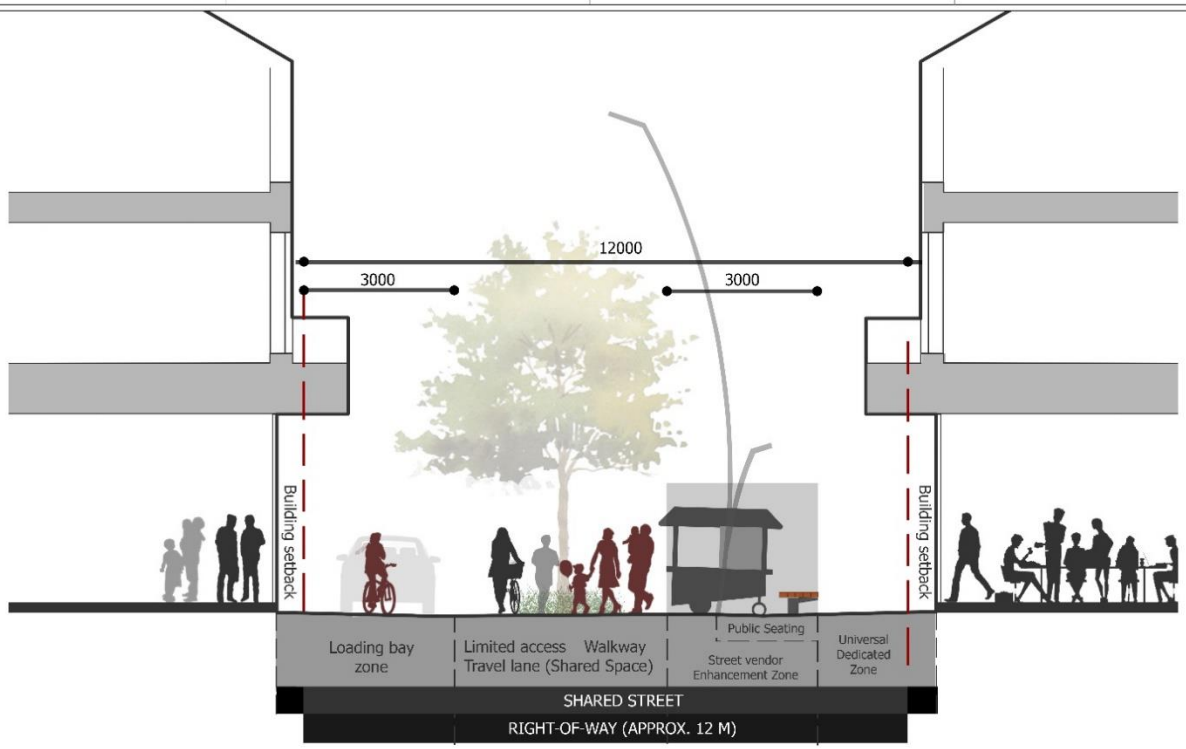
TITLE

Typical Plan -
Surya Kencana Street
Proposed Streetscape
Reconfiguration of Space

FIGURE NO.

51

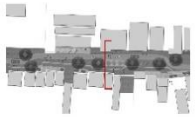
서울대학교 농업생명과학대학
조경·지역시스템공학부



0 1 5 10 m

LEGEND

KEY PLAN



TITLE

Typical Section Facing South - Surya Kencana Street Proposed Streetscape Reconfiguration of Space

FIGURE NO.

52

서울대학교 농업생명과학대학
조경·지역시스템공학부

5.3.2 Accommodating Street Culture Recommendation

Accommodating commercial activity should balance the various users in a given location and always support safe and vibrant street environment. According to Global Street Design Guide (2016) there are several considerations to apply in order accommodate street commercial activities, for this study of design recommendation, will include consideration as such: (a) Siting and location with regard to local context; (b) Critical distances to maintain clear pedestrian path and crossing; (c) Scale and design of any fixed or temporary structures.

On Sudirman Street and Kapten Muslihat Street, dedicated space for the street vendor will be allocated to avoid crowded and narrow sidewalk. While on Surya Kencana Street will be allocated along the shared streets.

a. Commercial Enhancement Zone

The design recommendation for Commercial Enhancement Zone (Street vendors Zone), as follows:

Kiosk and stalls have positively activated the streets. As it exists in all study streets. The recommendation will be proposed the typical kiosk siting and layout on the scale and design of the kiosk that not exceed 2.5 x 3.5 x 3.5 (w x d x h). The cart vendor's area should be at a maximum 2 m and allow at least 1 m of space for vendor customer. Located on designated zone along the sidewalk and need to maintain minimum clear walkway around 2.4 meters. To maintain cleanliness bins should be located nearby. Seat benches will be placed in between vendors.

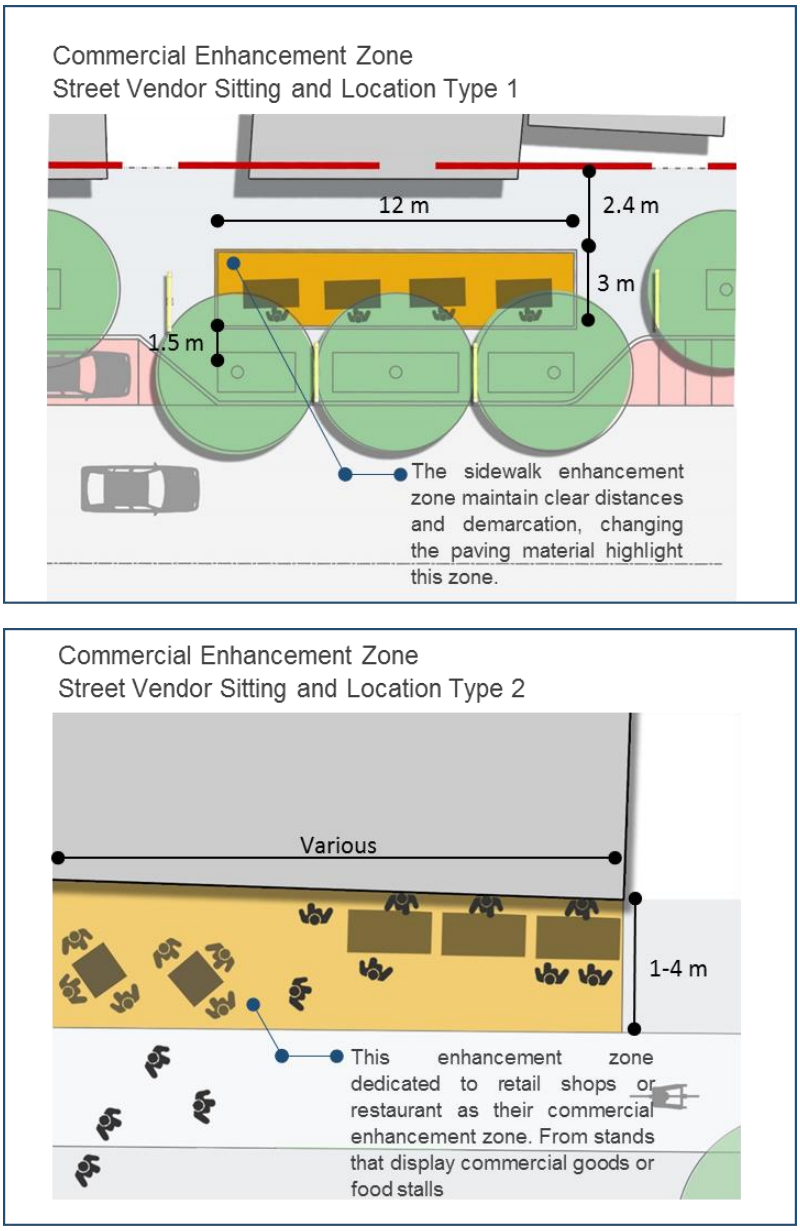


Figure 51. Typical Commercial Enhancement Zone Sitting and Layout Recommendation.

b. Special Events

People are willing to walk more if they are compensated by and entertaining experience. Promoting vibrant an experience where people

have opportunities to socialize, enjoying sidewalk, or even shopping. Special events on the street have potential side effects to improve those experience. In order to create the even more active pedestrian environment. The special events could be as a form of certain activities that held by the municipality, as follows:

(1) Car-Free days,

These closures typically closed on the weekends to motorized traffic. Allow pedestrian to utilize the street for leisure or recreational activity. Sudirman Street and Juanda Street, in which the activity has been going on are the suitable places to constantly hold this program.

(2) Market Street,

Streets adjacent to public space, commercial zones or key corridors can be fully or partially closed for a food fair or traditional markets. Markets may be seasonal and open only during daylight hours or on some days of the week. As tradition has been going on since Colonial period, the existence of night market gives Surya Kencana its strong identity. Introducing Regulated seasonal street market festival could function as a heritage promotion for this Bogor Chinatown Street.

(3) Street festivals,

Support local festivals, celebrations, parades, concerts, and other events by closing multiple for a single or a few days.

c. Precedents

Figure 52. Silom Road Pedestrian Street (Left) and Waterloo Street (Right) as Commercial Enhancement Zone.
(Source: http://www.ghettosingapore.com/the-religious-melting-pot-of-waterloo-street/; https://thumbs.dreamstime.com/).

(1) Waterloo Street, Singapore,

Singapore manage more than 100 dedicated street food or food markets, with organized vendors and interconnecting seating facilities. Waterloo Street is the example of the street that have been pedestrianized to accommodate pedestrian along with the existence of street vendors. Waterloo Street located close to temples and other city's attraction. The constituted street vendors sell various goods and foods to promote their local culture. The street vendors existence is organized by the Local Urban Redevelopment Authority. (Global Street Design Guide, 2016). (Fig. 52)

(2) Silom Road, Thailand,

The 'Pedestrian Street' or temporary street closure for a market is a typical form of street use in Southeast Asia. In Thailand, this terms was introduced in Bangkok in the year of 2002, and the application expanded to other cities across the country. Silom Road was the first pedestrian street developed in Bangkok city. The idea was to close one of the most congested streets in Thailand, to deliver the message that streets were not

built only for cars. This street was dedicated for street market, vendors and other activity. (Fig. 52)

5.3.3 Landscape and Ecological Enhancement Recommendation

Blending nature into the city helps people to connect with the natural environment directly, to encourage them to value and as a result take better care of the environment. Based on the analysis, a strong landscape setting and landscape contours on Sudirman Street and Juanda Street provide a significant landscape character; the recommendation will be connecting the features as part of the pedestrian realm to enhance the pedestrian experience. Creating soft edges on the street as urban forest extension support local ecosystem and foster biodiversity through landscape connectivity.

Based on the review of Bogor City Planning report, the land cover changes caused low capability of rainwater infiltration that could lead to high runoff possibilities and caused ground water table deflation. In response to this issue, the design recommendation will propose the bioswale planter as part of the streetscape.

The goal is to increase stormwater infiltration to the groundwater. The cycle concept adapted from ABC Water Guidelines Singapore (2014) as shown in Figure 53 and 54.

The idea is to utilize the landscaping strip function as a bio swale that infiltrates the stormwater runoff.

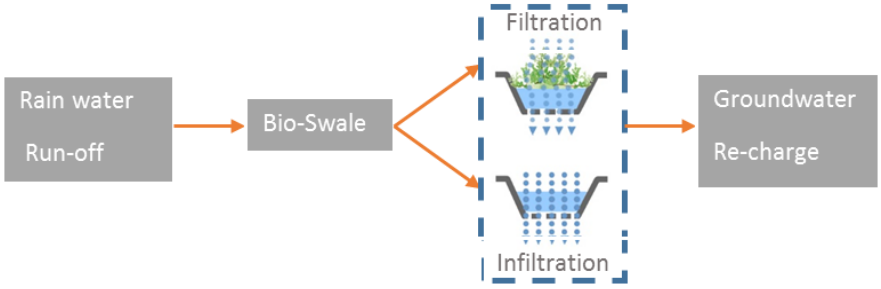


Figure 53. Bio-swale water re-charge diagram adapted from ABC water guidelines, Singapore. (Source: Individual Study; ABC water guidelines Singapore).

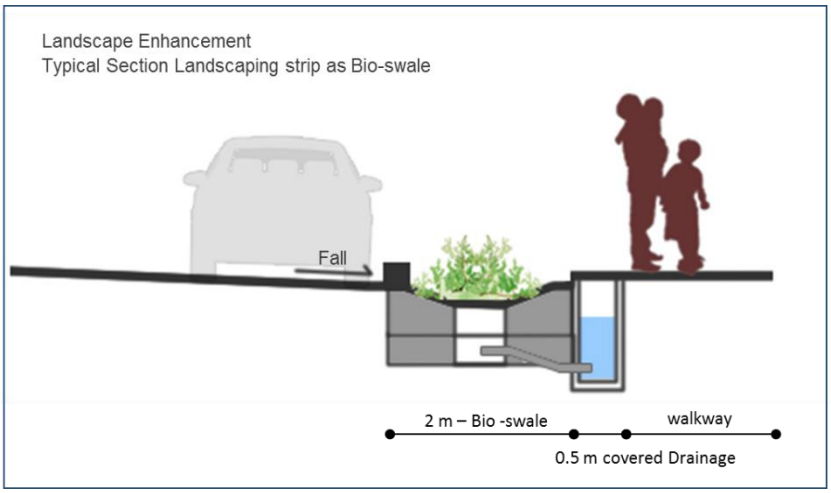


Figure 54. Typical section of landscaping strip as bio-swale adapted from ABC water guidelines, Singapore.

5.3.4 Safety and Comfort Recommendation

Safety and comfort on walkable street related to sidewalks design that reconsider capacity of people (clear path), pedestrian spaces and network that safe (crossing; crime), Equipped with certain degree of amenities (street furniture, street trees, landscaping lighting, wayfinding, etc.) in scale

and rhythm in order to make walking distances feel shorter also part of sense of comfort improvements in the street.

a. Crossing and Traffic Calming Recommendation

Based on walkability assessment, un-yielded motor vehicles while crossing the road, forcing the pedestrian to wait in favor. The lack of level crossing spacing caused people tend to jaywalk to reach their point of destinations.

To improve a crossing safety, pedestrian crossing design has potential to shape pedestrian behavior. Design strategy and recommendation related to crossing spacing, marking (paving pattern or material), and traffic calming strategies. The uncontrolled crossing will be provided at each intersection or mid-blocking within the level of spacing 80-100 m (Global Street Design Guide, 2016). While according to Indonesian traffic standards, stated that every bus stop should have a pedestrian crossing point within 20 m. The location for the pedestrian crossings should be closely related. To avoid jaywalking and give clear visibility on crossing the road, crossing marking designed in an attractive way and also by providing sidewalk extensions for reducing pedestrian crossing distances and enlarging pedestrian space. Sidewalk extension type that recommended to be adopted for four study streets are: (1) Corner alignments (designing sidewalk in the intersection with the tightest radius; (2) Bulb-outs (installed along with interval on-street parking, to provide extra waiting space and allow seating layout and planting strip) (Fig. 54).

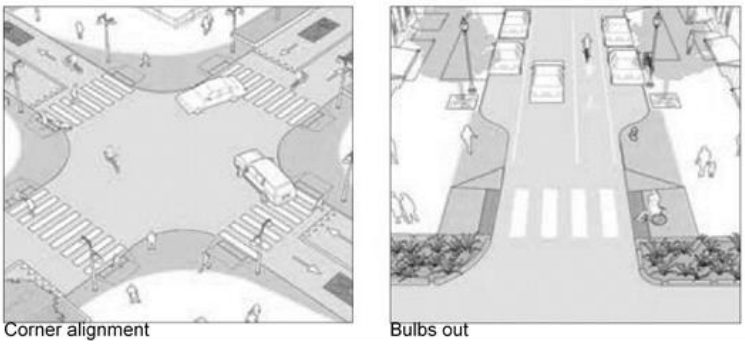


Figure 55. Sidewalk Extension as crossing measure.
(Source: NACTO; Global Street Design Guide, 2016).

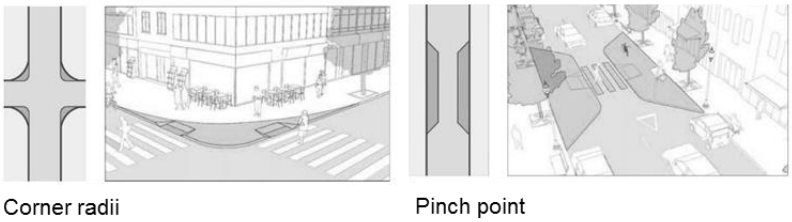


Figure 56. Traffic calming strategies recommendation. (Source: NACTO, Global Street Design Guide, 2013).

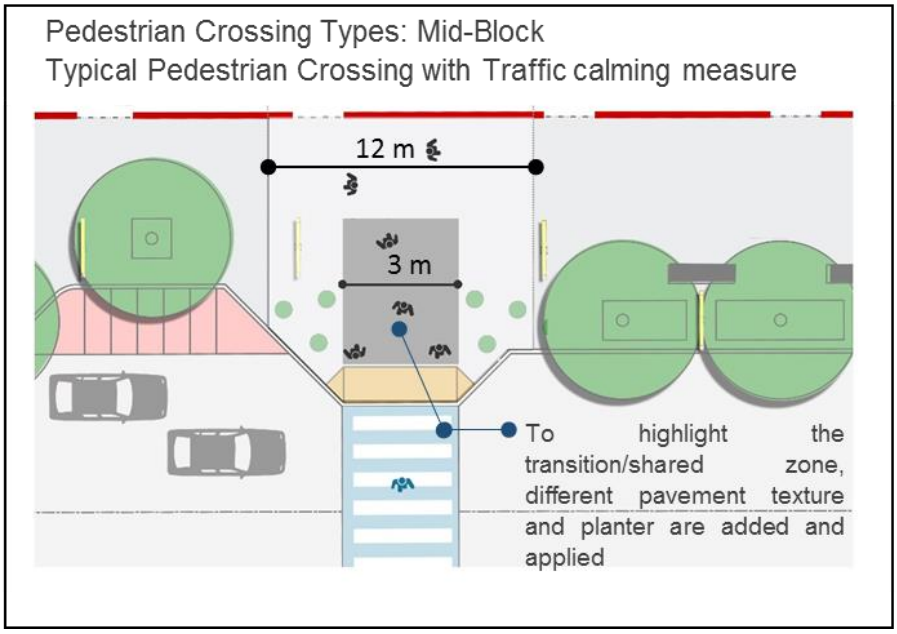


Figure 57. Design recommendation for Crossing and traffic calming measure.
(Source: Individual Study).

While Traffic calming strategies that adopted to the design are: a) Pinch-points; and b) corner radii. (Fig. 55).

The typical pedestrian crossing types on the mid-block recommendation proposed transition zone between walkway, cycle lane, and crossing zone area by defining the area by contrast pavement. Pinch point measures applied in order to force the motorist to slow the speed or even yield for a pedestrian. (Fig. 56).

b. Street Amenities Sitting and Layout Recommendation

Street amenities need to be functional as well as act as aesthetic components on the street. They provide respite, comfort, safety and functionality to public spaces, punctuating the landscape with item of interest. The following points, addressed the recommendation:

Pedestrian walk at speeds ranging from 0.8 to 1.8 meters per second or 5-7 km/h (Global Street Design Guide, 2016). People walk and move at low speeds have more opportunity to observe street around them, it is important to understand how the pedestrian reaction on the travel distance. Based on Indonesian Transportation Board, the people able to walk in the tropics is about 200 meters in distance, so it is necessary to plan potential stops and nodes in every 200 m within the street. The proposed design recommendation for potential stops and nodes provides with benches, litter bin and also shade trees (Figure 58).

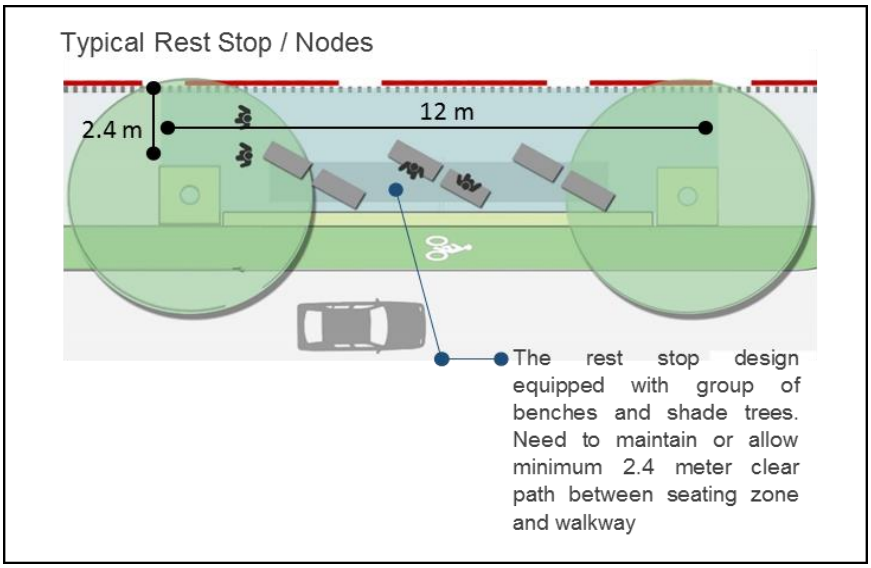
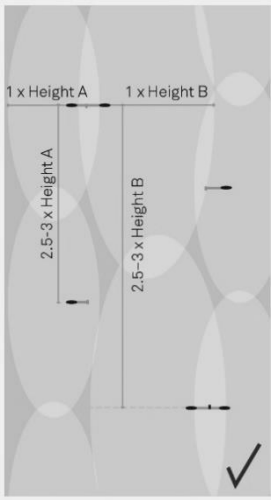
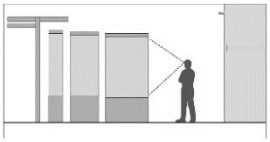


Figure 58. Typical rest stop/nodes sitting and layout recommendation (Source: Individual Study).

The general sitting, layout and geometry as explained on the table 9, and the design and material selection shown on Figure 61, 62 and 63 Panel.

Table 9. Street Furniture General Sitting, Layout and Geometry Recommendation.

Street Furniture	Location	Size and Design materiality	Geometry
Street Lighting	Street lighting will be located in each sidewalk in four case study streets.	Height: Standard poles for sidewalk and bike facilities are around 4.5-6 m. while taller poles (8-10 m) will be provided for commercial and historically significant areas. Spacing: The spacing distance will be approximately 2.5-3 x light pole height. Design: the design and materiality will	

		match the character area (commercial or historical significant area)	(source: NACTO; Global Street Design Guide, 2016)
Wayfinding	Wayfinding will be located near traffic nodal points (train station, transit stop, urban parks and gateway point of each street.	Scale of wayfinding need to suit the human body, eye, and height	 (Source: NACTO; Global Street Design Guide, 2016)
Public seating	Public seating will be located every 0.8 km (10 minutes travel distance as a resting point), at traffic nodal point, pedestrian plaza and gateway point	Scale of wayfinding need to suit the human body, eye, and height	
Litter bin	Litter bin along with public seating and the location of street vendor enhancement zone, at traffic nodal point, pedestrian plaza and gateway point	Scale of wayfinding need to suit the human body, eye, and height	

5.3.5 Street trees and Planting Recommendation

Planting is an essential component of Bogor City, not only as amenity and safety measures tools but also has an ecological function such as shade, reduce noise, pollution and help to recharge groundwater table. Thus, in this design recommendation street trees and planting has two

improvement function as follows: (1) Street amenities as character strength, and as (2) Landscape enhancement for ecological function.

Street trees and planting to strengthen the character of historical significance will be specifically applied to Sudirman Street, by strengthening the historical boulevard and create an iconic urban transformation that is desired. While street trees and planting as Landscape enhancement will be applied to Juanda, Kapten Muslihat, and Surya Kencana Street. Street trees planting is selected from the native street trees species identified along the Bogor City streets and also existing species that identified as species that used as boulevard trees during the colonial period. Specific planting recommendation as shown in Figure 59 and 60.

5.3.6 Paving Material Recommendation

Design proposal incorporates a range of paving types that reflect on each street concept. In response to historical remnants, character, neighborhood and street context in different locations, paving types will be categorized into three main themes, which is historically significant, street culture enhancement and also ecological purposes. Paving selection incorporates both concrete sidewalks, as well as pavers that provide a sense of pedestrian scale and texture along the streets.

Some part of Sudirman Street and some part of Juanda Street will have similar pavers because both have a typical historical colonial building. Neutral color such as light gray to dark gray accent to match the existing

historical building. While some part of Sudirman Street that located within the commercial plaza will have its own material selection. The paving selection Sudirman Street will be similar to street culture enhancement zone on Kapten Muslihat Street. The paving selection for street culture enhancement zone is a combination between concrete pavers and paving markers to create vibrancy and sense of regulated zone for a street vendor. Some part of Bogor Botanical Street (Jalak Harupat Street), where located near the urban park, proposed paving material are a combination of pervious concrete green pavement and travertine stone paver. It captures runoff, absorb it and clean it during the process. The material selection needs to avoid slippery material given the Bogor macroclimate condition. Surya Kencana Street as the oldest Commercial Street and Chinatown in Bogor City, paving selection will match the theme of the Chinatown characteristics.

Paving Material selections for four study streets shown on Figure 61, 62 and 63 Panel.

5.3.7 Street Furniture Recommendation

Visual diversity and amenity ease boredom, obscure unpleasant aspects of a trip make a walk more enjoyable (Untermann, 1994).

Providing series of necessary street furniture in the sidewalk realm is the part of street amenities recommendation to enhance comfortability. Street furniture along the sidewalk provides places for four case study streets users to congregate and enhance the area’s livability. In general,

proposed street furniture four study streets are public seating, street lighting, street trees, litter bin, and wayfinding.

Street lighting is selected based its two main functions for safety and amenities purposes. Pedestrian pole mounted lighting is standard street lighting that needs to be provided to create a sense of safety, while accent lighting will be proposed to enhance the street vibrancy in particular at street culture enhancement zone.

The experience of being walking in the specific street or site should provide a strong enough and unique enough character that it is naturally the way people choose to traverse around the streets. The illustrative view as shown in Figure 64, illustrate the proposed streetscape improvements on the study streets.

As the existing context, only Juanda Street that equipped with a bench or public seating, while other streets some pedestrian were utilizing edge roadside planter as a place a place for sit. To create livable streets it is necessary to provide pleasant spots in which to linger.

STREETSCAPE PLANTING STRATEGY

Historical Characteristic Enhancement

The Historical Characteristics enhancement planting strategy Street trees and planting to strengthen the character of historical significance will be specifically applied to Sudirman Street, by strengthening the historical boulevard. Street trees planting is selected from the native street trees planting identified along the Bogor City streets and also existing species that identified as species that used as Boulevard trees during the colonial period

Key Species

Canarium Indica
(Kenari)

Swietenia mahagoni
(Mahogany)

Ficus benjamina
(Beringin)

Ficus lyrata
(Biola cantik)

Lagerstromia indica
(Bungur)

Roystonea regia
(Royal palm)

Cerbera manghas
(Bintaro)

LEGEND

KEY PLAN

TITLE

Street trees and planting selection

FIGURE NO.

59

서울대학교 농업생명과학대학
조경·지역시스템공학부

STREETSCAPE PLANTING STRATEGY

Landscape/Ecological Enhancement

An ecological function such as to provide relief from local microclimate, reduce noise, pollution and help to recharge groundwater table. Street trees and planting selection reflects its function and its adaptability to local condition. Particular planting species selection for bio-swale function, is species capable of tolerating the temperature and soil conditions.

Key Species - Trees

Terminalia catappa (Ketapang)

Dillenia indica (Sempur)

Muntingia calabura

Syzigium sp

Mimusops elengi

Bauhinia blakeana

Lagerstromia indica (Bungur)

Key Species – Shrubs and Groundcover

Mirabilis jalappa

Iris sp

Barleria cristata

Alocasia sp

Pennisetum sp

Calathea sp

Saccharum sp

LEGEND

KEY PLAN

TITLE

Street trees and planting selection

FIGURE NO.

60

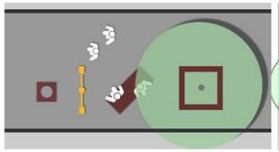
서울대학교 농업생명과학대학
조경·지역시스템공학부

STREET AMENITIES AND MATERIAL SELECTION STRATEGY

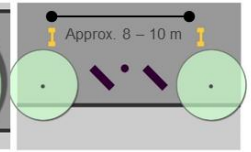
Historical Characteristic Enhancement

DESIGN INFLUENCE

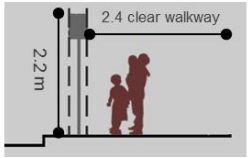
Indische Architecture



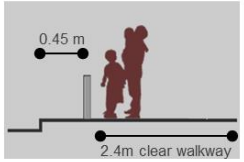
Typical Street Furniture Sitting Layout



Typical Lighting Sitting Layout



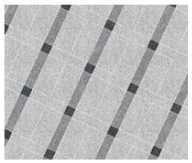
Typical Wayfinding Sitting Layout



Typical Bollards Sitting Layout

COLOR SCHEME

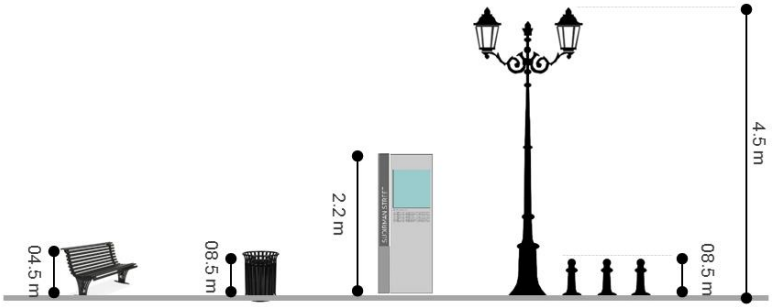
PAVING



Some part of Sudirman Street and some part of Juanda Street will have similar pavers because both have a typical historical colonial building. Neutral color such as light gray to dark gray accent to match the existing historical building

KEY PLAN

STREET FURNITURE



LEGEND

KEY PLAN

TITLE

Street Amenities and Material Selection (01)

FIGURE NO.

61

서울대학교 농업생명과학대학
조경·지역시스템공학부

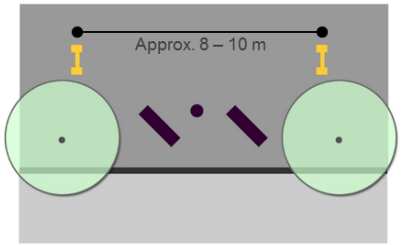
STREET AMENITIES AND MATERIAL SELECTION STRATEGY

Cultural Characteristic Enhancement

KEY PLAN

DESIGN INFLUENCE

Indische Architecture



Typical Sitting Layout

COLOR SCHEME

MATERIAL - PAVING

Surya Kencana Street is a cultural significant area. Neutral color such as red brick pavement indicate pedestrian priority area while dark grey hard texture is for dedicated loading bay or vehicle limited access, while yellow paving marker to indicate the street vendor enhancement zone. Colour and texture to match accent existing Temple and Gateway

MATERIAL – STREET FURNITURE

LEGEND

KEY PLAN

TITLE

Street Amenities and Material Selection (02)

FIGURE NO.

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서울대학교 농업생명과학대학
조경·지역시스템공학부

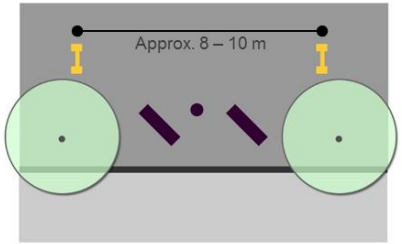
STREET AMENITIES AND MATERIAL SELECTION STRATEGY

Walkability and Street Culture Enhancement

KEY PLAN

DESIGN INFLUENCE

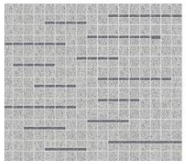
Modern façade and festivity



Typical Sitting Layout

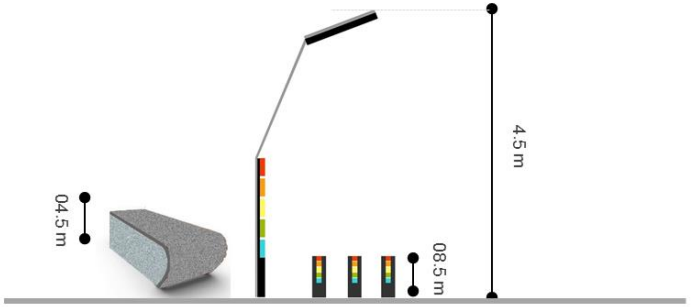
COLOR SCHEME

MATERIAL - PAVING



Kapten Muslihat and some part of Sudirman Street has walkability and street culture enhancement concept. Neutral color such as grey color while dark grey hard accent concrete pavers as a proposed pavement material for sidewalk

MATERIAL – STREET FURNITURE



LEGEND

KEY PLAN

TITLE

Street Amenities and Material Selection (02)

FIGURE NO.

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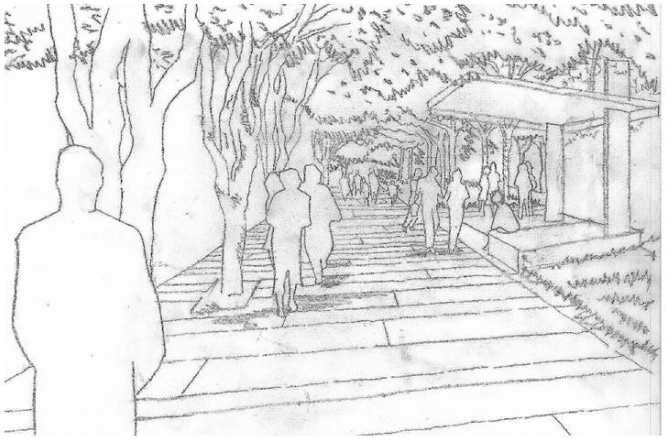
ILLUSTRATIVE VIEW

A – SUDIRMAN STREET STREETSCAPE ILLUSTRATIVE VIEW

C – SURYA KENCANA STREET STREETSCAPE ILLUSTRATIVE VIEW



B – KAPTEN MUSLIHAT STREET STREETSCAPE ILLUSTRATIVE VIEW

KEY PLAN

TITLE

Illustrative Streetscape view of study streets

FIGURE NO.

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VI. CONCLUSION

The street is a complex ecology; the street has been a place for people to come to gather, to meet, and to enjoy for being part of the community and also space of expression. A Street as a cultural setting shown range of activities and experiences occurred. Across context and cultures, the street user is naturally participating in and creating street life. This quality creates vibrancy on cultures and local economies that could lead to livability. Therefore, livable streets are essential to the key success of a livable city. As a Heritage City, Bogor has a particular street culture that distinguishes it from other place or another city. The four study site is precious given its history of the urban morphological development and as a place for the cultural setting.

The investigations on the existing condition assist the researcher in finding out the opportunities and constraints in study street. Based on the investigation the physical features have the significant impact on people to walk. Issues related to safety, the attractiveness of the streetscape and also the presence of the destinations were the vital elements that motivated people to walk. In the other hand, observation, and investigation of street culture, issues related to the conflict between walking pedestrian and street vendor (informal commercial activity) were identified.

The physical features and appearance of four study streets reflected its structure of the street (configuration), historical remnants (building and

city structure), and its surrounding landscape and other aesthetic qualities (street amenities) and also people who constituted the street in the form of street activities. As a heritage city, Bogor has distinct characteristics, either define by its urban fabric or even some historical building remnants. Albeit, this character were not visible on its streetscape physical features or even gradually lost its strength. Particularly, Sudirman Street and Surya Kencana Street that has strong historical value for Bogor City morphological development.

Based on the analysis of existing physical features on Bogor City's street, one of the noticeable features is the existence of particular informal activities along the four study streets. Informal street activities (street vendors), intermingling with other general activities in the streets. This street culture activity are proved to be the one of the elements that make the four study streets livable. Although, to some extent, this informal activity obstructs on people who actually walk along four study street. Other problem is maintenance and cleanliness problem.

This thesis proposes different recommendations and solutions to address some of the challenges on improving the streetscape for the livability of Bogor 'Heritage' City on each four study streets. The problems involve upgrading the existing physical features to elevate safety and comfort for walking activity and also accommodating other pedestrian activities.

The recommendation reveals and improves existing potentials and try to reduce some constraints along the four study streets. Likely both regarding improving the physical features to enhance the walkable environment and allow socio-economic activities without interfering walking activities. The patterns of activity that occurred in one place on the streets offer the outcomes and theme in which the four study streets planned.

Based on the issues, this study tried to respond by proposing design recommendation on four study streets, mainly offers streetscape reconfiguration, safety and comfort improvements, and provides street culture rejuvenation.

The design recommendation main theme is to create a livable street that characterized Bogor 'Heritage' City streets, which incorporate street as walkable street, as historical and street culture significant and also as a place that has environmental values. All of the values are necessary to create a vibrant street life.

All four study streets are the centers on the daily pattern of social life, business activity, personal mobility and people are being allowed to feel comfortable within it. This design proposal gives direction to plan streets to support and enhance the existing street culture setting, where people or pedestrian put in the first place.

So it is vital to understand that creating a livable and walkable city is not only provides the citizen an appropriate place to walk only but also need

to accommodate other street activities. Richness on the street as a cultural setting might encourage people to walk even more around the vicinity.

This study focus on street level physical features, sense of comfort and street as the cultural setting. Walkable places on the cities need more compact, dense with mixed uses. Streets have to be well connected and also the quality of public space itself. Therefore future study will focus on larger perspective to achieve compact Bogor walkable city.

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APPENDIX

WALKABILITY INDEX FIELD SURVEY ASSESSMENT - SAMPLE

Site – Kapten Muslihat Street

RTG	Description	ROAD SEGMENTS							
		1		2		3		4	
		L	R	L	R	L	R	L	R
A. Walking Path Modal Conflict									
1	Significant conflict that makes walking impossible								
2	Significant conflict that makes walking possible, but dangerous and inconvenient								
3	Some conflict – walking is possible, but not convenient		o					o	
4	Minimal conflict, mostly between pedestrians and non-motorized vehicles	o		o	o	o	o		o
5	No conflict between pedestrians and other modes								
Average score	3.75								
B. Availability of Walking paths (with maintenance and cleanliness)									
RTG	Description	1		2		3		4	
		L	**R**	**L**	**R**	**L**	**R**	**L**	**R**
1	Pedestrian walkways required but not available								
2	Pedestrian walkways available but highly congested, badly maintained, and not clean					o		o	

3	Pedestrian walkways available, need better maintenance, and cleanliness maintained	o	o	o	o		o		o
4	Pedestrian walkways available, which are sometimes congested but clean and well maintained								
5	Pedestrian walkways not required as people can safely on roads								
Average score	2.75								

C. Availability of crossings (count number of crossings available per stretch)

RTG	Description	1		2		3		4	
		L	R	L	R	L	R	L	R
1	Average distance of controlled crossings is greater than 500 m and average speed is high								
2	Average distance and controlled crossings is between 500 m and 300 m and average speed is around 40km/hour								
3	Average distance of controlled crossings is between 200 m and 300 m and average speed is 20-40km/h	o	o			o	o		
4	Average distance of controlled crossings is between 100 m and 200 m And average speed is 20-40 km/h			o	o				o
5	There is no need to controlled crossings as pedestrians are safe to cross wherever they like and vehicles and pedestrians coexist							o	
Average score	3.62								

D. Grade Crossing Safety

RTG	Description	1		2		3		4	
		L	R	L	R	L	R	L	R
1	Very high probability of accident with very high crossing time								
2	Dangerous-Pedestrian faces some risk of being hurt by other modes and crossing time is high								

3	Difficult to ascertain dangers posed to pedestrians but the time available for crossing is less and people have to hurry	o	o			o	o		
4	Safe-pedestrian is mostly safe from accident with other modes and exposure time is less and more time available for crossing			o	o				
5	Very safe-other modes present no danger to pedestrians							o	o
Average score	3.75								
E. Motorist behavior									
RTG	Description	1		2		3		4	
		L	R	L	R	L	R	L	R
1	High traffic disrespect to pedestrians								
2	Traffic disrespect and pedestrians rarely get priority	o	o						
3	Motorists sometimes yield			o	o	o	o	o	o
4	Motorists usually obey traffic laws and sometimes yield to pedestrians								
5	Motorists obey traffic laws and almost always yield to pedestrians								
Average score	3.00								
F. Amenities									
RTG	Description	1		2		3		4	
		L	R	L	R	L	R	L	R
1	No amenities					o			
2	Little amenities at some locations								
3	Limited amenities for pedestrians							o	
4	Pedestrians are provided with some amenities for major length	o		o					
5	Pedestrians have excellent amenities such as lighting, and cover from sun and rain making walking a pleasant experience		o		o		o		o

Average score	4.00								
G. Disability Infrastructure									
RTG	Description	1		2		3		4	
		L	R	L	R	L	R	L	R
1	Infrastructure for disabled persons is not available								
2	Limited infrastructure for disabled persons is available, but not in usable condition								
3	Infrastructure for disabled persons is present but in poor condition and not well placed						o		o
4	Infrastructure for disabled is present, in a good condition, but poorly placed					o		o	
5	Infrastructure for disabled persons is present, in a good condition and well placed.	o	o	o	o				
Average score	4.35								
H. Obstruction									
RTG	Description	1		2		3		4	
		L	R	L	R	L	R	L	R
1	Pedestrian infrastructure is completely blocked by permanent obstructions								
2	Pedestrian are significantly inconvenienced. Effective width is <1m								
3	Pedestrian traffic is mildly inconvenienced; effective width is < or = 1 meter					o	o	o	o
4	Obstacle presents minor; effective width is > 1m	o		o					
5	There are no obstructions		o		o				
Average score	3.75								
I. Security from crime									
RTG	Description	1		2		3		4	
		L	R	L	R	L	R	L	R

1	Environment feels very dangerous-pedestrian are highly susceptible to crime								
2	Environment feels dangerous-pedestrians are some risks of crime								
3	Difficult to ascertain perceived degree of security for pedestrians	o		o		o	o	o	o
4	Environment feels secure-pedestrians at minimal crime risk		o		o				
5	Environment feels secure-pedestrians at virtually no risk of crime								
Average score	4.25								
Overall average score	3.70								

초록

보행친화적인 거리들은 살기좋은 도시를 구성하는 요소에 속하기 때문에 거리는 도시의 거주성 측면에서 중요한 역할을 담당한다. 또한 살기좋은 거리와 도시는 보행자들에게 높은 수준의 보행경험을 제공하기도 한다. 보고르(Bogor)는 지역의 전통문화, 식민지 시기의 문화, 근대 주요도시로서의 문화 등을 포함하고 있다. 이러한 문화적 배경에서 보고르의 거리는 보고르의 독특한 성격을 구성하는 역할을 담당한다.

보고르 도심의 도로는 다양한 사회-경제학적 활동들이 일어나는 장소이며 사람들이 서로 상호작용하는 문화적 장소이다. 또한 사람들이 문화적 정체성을 표현하는 장소이기도 하다. 이러한 측면에 착안하여 본 연구는 보고르 도심 내 활력적인 거리의 조성을 디자인적으로 접근하여 제시하고자 한다. 연구를 위해 보고르 도심 내 4 곳의 거리에서 사례조사가 이루어졌으며 해당 4 곳의 거리는 각각 수디르만 거리(Sudirman Street), 캡텐 무슬리핫 거리(Kapten Musllihat Street), 주안다 거리 네트워크(Juanda-Otista-Jalak Harupat) 그리고 수르야 캔카나 거리(Surya Kencana Street)이다.

본 연구는 세가지 주요 프로세스로 구성되어있다.

1. 문헌조사를 통한 이론적 고찰

2. 분석 프로세스; 현장조사를 통해 수집한 데이터에 대한 분석, 보고르 도심의 4 개 거리들의 물리적 상황과 거리에서 이루어지는 문화에 대한 분석

3. 디자인 프로세스; 분석을 통해 발견한 사항들을 바탕으로 4 개 거리의 거리 풍경을 개선하기 위한 디자인 권장사항 개념화

본 연구에서 제시하는 각각의 구상개념은 스트리트 레벨에서의 면밀한 관찰을 통해서 정립되었다.

스트리트 레벨을 관찰함으로써 안전성, 편의성, 매력요소가 확인되었다. 또한 스트리트 레벨 안에 존재하는 문제점과 발전가능성의 확인은살기좋은 보고르를 위한 가로경관 개선에 기여하는 개념을 이끌어냈다.

본 연구에서 제시하는 디자인 제안의 주요 테마는 보고르의 역사문화적 도심거리의 특징을 반영한 활력적인 거리를 조성하는 것이다.

이 테마는 거리 걷기가 가능한 거리 개념, 역사 및 거리 문화 정체성을 포함하며 생태적 가치가있는 장소이기도 하다. 활기 넘치는 거리 생활을 만들기 위해서는 언급한 모든 가치들이 필요하다.

살기 좋은 도시를 만들기 위해서는 도보친화성 요소 그 이상이 필요하다. 이 연구는 걷기 쉽고 사회경제적인 곳으로 기능하는 거리에 제한하여 가로경관 개선을 통한 해결책을 제시한다.

이러한 한계점이 존재함에도 불구하고 이 연구는 보고르의 정주성 개선을 위한 가로경관의 재조정에 관심이 많은 여러 관계자들 및 학자들에게 유용할 것이다.

키워드 : 살기좋은 도시, 걷기좋은 거리, 거리 문화, 가로경관 개선

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