

# The Potential of Transit-Oriented Development (TOD) and Its Typology in Block-A Area

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## ABSTRACT

The development of the Jakarta MRT transportation system stimulates Transit-Oriented Development (TOD) at some MRT stations. The selected TOD areas that will be managed by PT.MRT Jakarta are Bundaran HI, Dukuh Atas, Setiabudi, Bendungan Hilir, Istora, Senayan, Blok M, and Lebak Bulus [1]. This development raises a problem related to the unidentified prerequisites for the TOD area, especially for the intermediate station area. Each station has a specific character that requires a study to find the right TOD typology for its development. This research was conducted at Block-A MRT Station, an intermediate station that connects two business centers, SCBD-Sudirman Central Business District, and T.B. Simatupang office area. The strategic location of Block-A makes it the crucial transit point with high accessibility. This study investigated TOD potential in Blok-A MRT Station and identified the suitable TOD typology for it. We analyzed the spatial conditions associated using existing theories, variables, and pre-determined indicators to identify the suitable TOD typology for the Block-A area. We found that urban TOD typology is the most appropriate typology for the area. These results can be used as a reference in making detailed zoning maps of spatial plans related to land use and building intensity in the Block-A area that leads to an integrated and sustainable TOD.

**Keywords:** *The Jakarta MRT, Transit-Oriented Development (TOD), TOD area prerequisites, Block-A MRT Station, TOD typology*

## 1. INTRODUCTION

Urban transportation is one of the most fundamental issues in urban planning [2]. The introduction of the rapid transit system to urban transportation chains has created substantial changes in the flow of traffic and has consequently affected the population attraction and the development of the surrounding areas in each station [3]. A transit station generates activities. It is also a desirable “place” to live, open a business, or to find a workplace [4]. The concept of urban development around the transit station is promoted as Transit-Oriented Development (TOD). Transit-oriented development covers an area within a mile or 1/4 mile of a public transportation station and has a variety of functions whether administrative, recreational, retail, and residential [5]. The high density, compaction in the urban fabric, and the presence of open and public spaces are the other characteristics of TOD [5]. The core purpose of TOD is to improve the quality of life and the creation of livable spaces for the individuals in a society [5].

The transportation network that stimulates the development of the area around the transit station also occurred in DKI Jakarta after the completion of the MRT construction. Unfortunately, city development is usually followed by

various issues of transportation and land use [6]. While there have been plans to develop transit-oriented areas at some station, but in reality, there are some partially done TOD areas. There is no integration between the DKI Jakarta’s spatial plans (*Rencana Tata Ruang Wilayah* or RTRW) with the TOD plan, which are managed by PT.MRT Jakarta.

DKI Jakarta Government has assigned PT.MRT Jakarta as the primary operator of the TOD area in the North-South Corridor (covered in Phase 1 of the MRT construction). This assignment is based on Governor Regulation No. 140 of 2017 concerning the Assignment of PT.MRT Jakarta as the Main Operator in TOD Area Management. Through these regulations, PT.MRT Jakarta was given the task of working with the developers or the building owners to create TOD-based integrated areas.

The TOD areas will be managed by PT.MRT Jakarta is Bundaran HI, Dukuh Atas, Setiabudi, Bendungan Hilir, Istora, Senayan (underground), Blok M, and Lebak Bulus (elevated) [1]. This raised a research problem related to the TOD area's unidentified prerequisites. The existence of the Jakarta MRT as a high-quality transportation system with dense transit activities certainly stimulates transit-oriented development at all station points, including the intermediate stations. Therefore, this study is

aimed to identify the potential and opportunities for the TOD implementation in the intermediate stations located between Blok-M and Lebak Bulus station. We focused on MRT Station Block-A because it connects two business

centers namely SCBD-Sudirman Central Business District and T.B. Simatupang office area (Figure 1). With a supply-oriented approach, this research proved that MRT Station Block-A has the potential for TOD development.

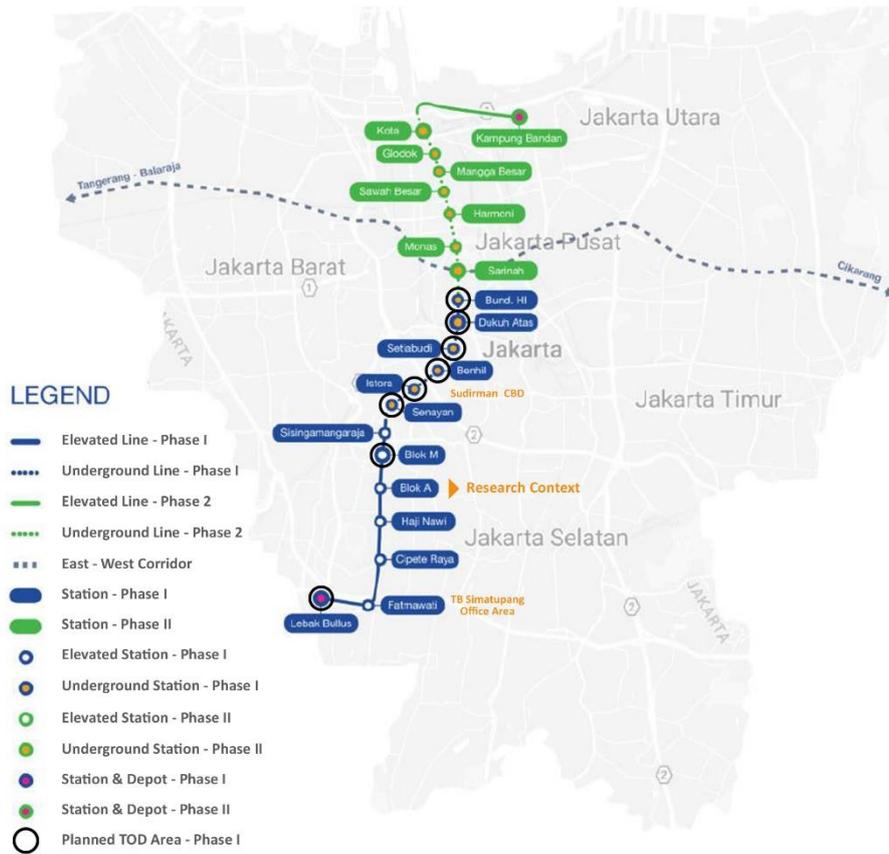


Figure 1 The Jakarta MRT’s network

2. RESEARCH METHODOLOGY

This research was conducted by 1) identifying criteria and indicators to analyze TOD potential location for the DKI Jakarta context, and 2) using the criteria and indicators to analyze the TOD potential and the typology of Block-A area. The research used a descriptive approach to determine the characteristics of the Block-A area and a prescriptive approach to identify problems and to provide recommendations related to the issue of transit-oriented development opportunities in the area.

The research applied a survey-based research method and analytical method (descriptive analysis and content analysis). Content analysis was based on secondary data (Table 1) and used it to assess the feasibility of the Block-A area for TOD. Data collection was obtained from institutional and literature—additionally, government documents and others that can support the analysis process in this research.

Table 1 List of datasets

Datasets	Source	Year
Actual TOD	The Governor of DKI Jakarta’s Regulation Number 140 of 2017	2017
The DKI Jakarta’s detailed spatial plans (RDTR) and zoning regulations	DKI Jakarta’s regional regulations on detailed spatial plans and zoning regulations	2014
The DKI Jakarta’s spatial plans (RTRW)	The DKI Jakarta’s Development Planning Agency at Sub-National Level (BAPPEDA)	2011-2031
Map of DKI Jakarta’s public transportation	PT. MRT Jakarta	2019

The discussion began with a description of TOD typology criteria and the indicators chosen through an extensive review of TOD literature about its concept, land use, and transportation. Then we used them to analyze Block-A area potential as TOD by elaborating its correlation with the area’s existing condition, the spatial plans, and the transportation system plans.

We have some important notes regarding this research. First, this research was supply-oriented, not demand-oriented. It means this research was focusing on the idea of implementing the TOD in the Block-A area based on the

existing conditions and the detailed plans of transportation systems and spatial plans. Nevertheless, a field survey was conducted in 2009. Second, this research only focused on three TOD center (not neighborhood level) typologies, namely Regional TOD, Urban TOD, and Sub-Urban TOD.

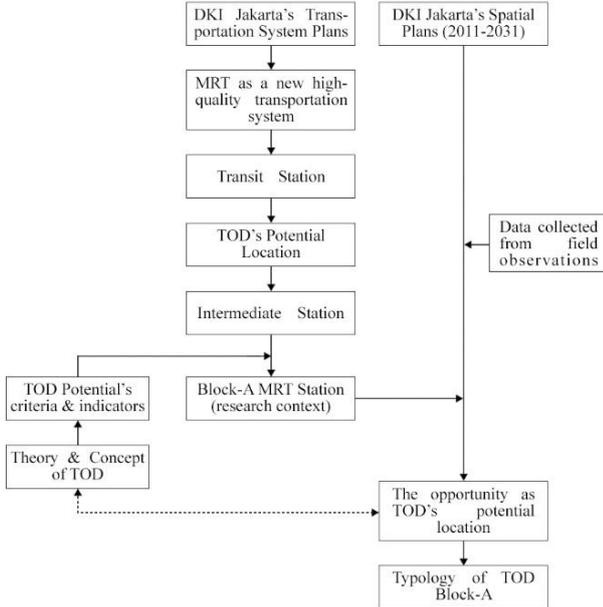


Figure 2 Research framework

### 3. TOD TYPOLOGY, CRITERIA, AND INDICATORS

There are several studies related to TOD typology. Sung and Oh [7] introduced the TOD typology into Urban & Neighborhood TOD [8]. Then, the typology was developed by various researchers such as Certero & Sullivan, Vale, and Mafame [9-10]. Widyahari & Indradjati [11] proposed the TOD typology called Regional Center TOD, Urban

Center TOD, Sub-Urban Center TOD, and Transit-town Center TOD when they studied Bandung Metropolitan Area. We then chose typology criteria and indicators through an extensive review of TOD literature and the assessment of data availability. We found Regional, Urban, and Suburban TOD suitable for Jakarta Metropolitan Region (JMR). It is done by grouping transit areas according to existing conditions so that it is useful to identify potential TOD [12].

We limit the research to Regional, Urban, and Suburban TOD because Regional TOD is the regional service centers. It is the center of economic activity and regional community [12]. The TOD creates synergy between community and the region, work and settlement, the level of density and service, and the individuals and the society [12]. Jaiswal [13] identified the TOD Regional with the presence of thematic land-use mix and with the dominant presence of the built environment served by various modes of transportation networks.

Urban TOD is the city service scale that serves as the economic center that is located in the city's main circulation such as intercity bus stops or train stations, whether they are light rail or heavy rail [12]. Urban TOD is developed in conjunction with high-intensity commercial areas, office blocks, and high-density dwellings [12]. The TOD plan focuses on high-density settlements because it allows direct access to transit points without changing other modes of transportation [12].

Suburban TOD is the sub-city center. It serves local residences and helps develop housing for the low class and the middle class [12]. Sub-urban TOD is equipped with public facilities and green open spaces to provide easy access through various modes of transportation [12].

Within the scope of these three typologies, we identified the potential of Block-A as TOD using the criteria and indicators compiled by Widyahari & Indradjati [11] with additional criteria from Taki & Maatouk [12]. The criteria and indicators are listed in the following tables (Table 2).

Table 2 The Criteria & Indicators (To identify Block-A as potential locations of TOD and its typology)

Criteria & Indicators	Regional Center TOD	Urban Center TOD	Sub-Urban Center TOD	Source
<b>1. Transit Mode</b>				
<b>Short Distance Commuter:</b>				
Microbus (Metromini)	✓	✓	✓	
APB (four-wheeler auto-rickshaw)	✓	✓	✓	
BRT (Transjakarta)	✓	✓	✓	
MRT/LRT/Commuter rail	✓	✓	✓	
<b>Medium and Long Distance Non-commuter:</b>				
Inter-Region Bus	✓	✓	✓	
<b>2. Transit Frequency</b>	< 5 minutes	5-15 minutes	5-30 minutes	
<b>3. Mixed of Land-Use</b>	Minimum 5 types of land-use (office, residential, retail, entertainment, and civic uses)	Minimum 4 types of land-use (office, residential, retail, and entertainment)	Minimum 2 types of land-use (residential, and neighborhood retail)	[11-12]
<b>4. Building Intensity</b>	<b>Density (Very high)</b> Existing - FAR 3-6 Intervention - Maximum FAR 10 <b>Number of floors</b> Existing - 10 <sup>th</sup> floor Intervention - open <b>Building Coverage Ratio</b> Existing - 70% Intervention - 80%	<b>Density (High-medium)</b> Existing - FAR 1.2-3 Intervention - Maximum FAR 5 <b>Number of floors</b> Existing - 5 <sup>th</sup> floor Intervention - 15 <sup>th</sup> floor (up to FAR limit) <b>Building Coverage Ratio</b> Existing - 50% Intervention - 60%	<b>Density (Medium)</b> Existing - Maximum FAR 1.2-2 Intervention - Maximum FAR 4 <b>Number of floors</b> Existing - 2 <sup>nd</sup> floor Intervention - 10 <sup>th</sup> floor (up to FAR limit) <b>Building Coverage Ratio</b> Existing - 40% Intervention - 50%	
<b>5. Retail Characteristics</b>	Regional and local scale	Regional, local, and community scale	Local and community scale	

\*FAR: Floor Area Ratio

#### 4. BLOCK-A AREA PROFILE

Block-A is a part of The Kebayoran Baru area, a settlement that was built after Indonesian independence to fulfill the urgent need of settlement [14]. The Kebayoran Baru area was built with the garden city concept. Based on the original plan, it consisted of 19 blocks, Block-A to Block-S [14]. There are only three blocks remain, namely, Block-A, Block-M, and Block-S [14].

The main access to the Block-A area is Fatmawati Street, a secondary collector road [15]. This road is traversed by the Jakarta MRT line with Block-A MRT Station as one of the area's transit stations. Based on these conditions, the Block-A area has reached the primary criteria and indicator of the potential location of TOD, which required it to have a primary transportation mode to access the city downtown [5, 16-18], and it has a collector road to access the station

[5, 16-18]. The main access to Block-A MRT Station is via Fatmawati Street. At the beginning of the planning stage, proper development location is the main requirement for TOD [19].

Fatmawati Street connects two business centers, namely the Sudirman Central Business District and TB Simatupang Office Area. This road strip is a congestion point in the South Jakarta area. During peak hours, the vehicle volume is up to 3,424 units/hour [20]. A location with road congestion or traffic jam at peak hours is one of the main criteria for TOD potential locations [5, 16-18]. The decline in citizens' quality of life due to their dependencies on private vehicles are the main reason for the birth of TOD [21].

#### 5. ANALYSIS OF TOD POTENTIAL AND ITS TYPOLOGY IN BLOCK-A AREA

##### 5.1. Transit Mode

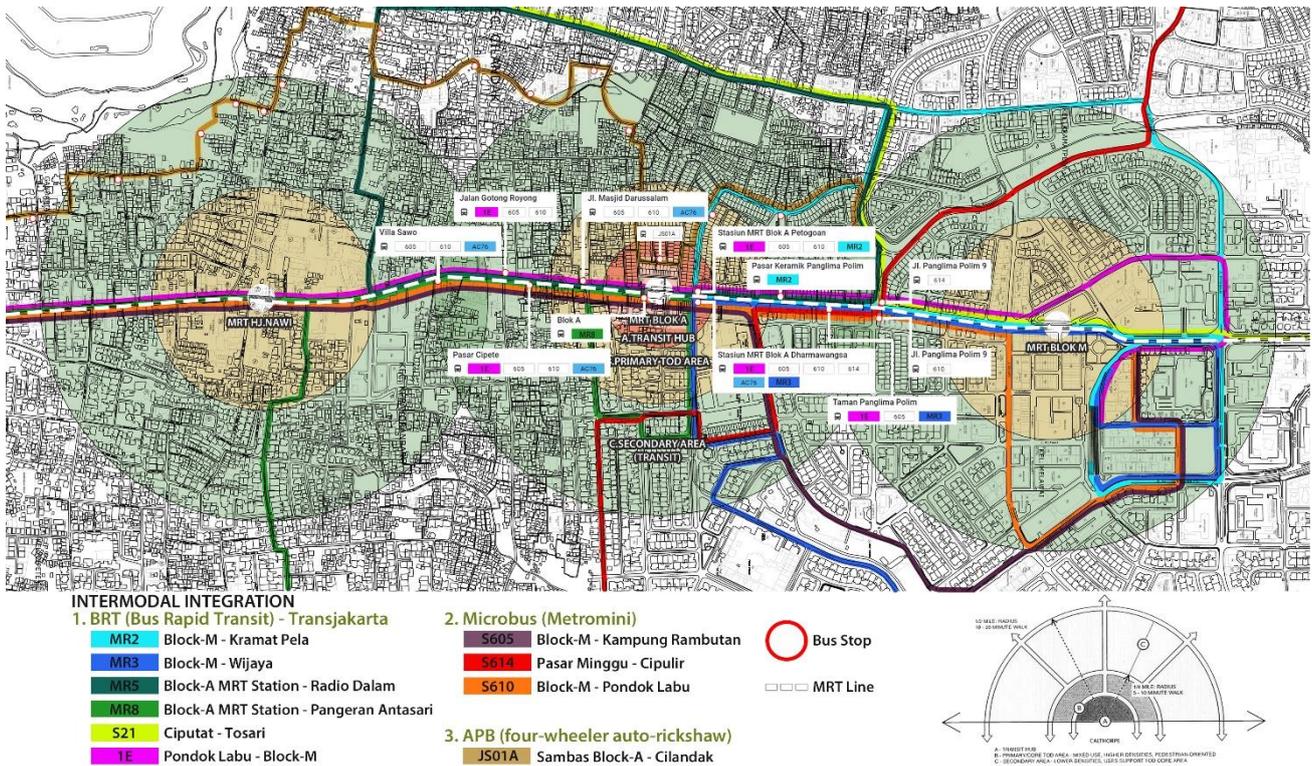


Figure 3 Intermodal integration in the Block-A area

The Block-A area has reached the primary criteria and indicator of the TOD potential location, which must have a primary transportation mode (MRT) to access the city downtown [5, 16-18]. It also has a collector road to access the station [5, 16-18]. Center for Transit-Oriented Development [17] and Glickman [19] revealed that the TOD potential location requires a maximum 700m radius

(10 minutes walking) to the primary mass transit station. It means, Block-A MRT Station must be developed as a transit hub. It facilitates direct accessibility for MRT users to carry out transit activities between transportation modes. The transit hub is a TOD core area with a radius of 175m [5].

For the transit modes diversity and services criteria, TOD locations must have a short distance commuter (microbus, city bus, BRT, MRT/LRT/Commuter Rail) and medium-long distance non-commuter (inter-region bus) transportation network [16, 17, 19]. The data collected reveals that within a 700m radius of the transit hub (the Block-A MRT station), there are 15 bus stops for Transjakarta buses, Metromini, APB buses (*Angkutan Pengganti Bemo* or four-wheeler auto-rickshaw), and inter-region buses. The public transportation network that transits in the Block-A MRT Station is explained in Figure 3 and Table 3.

Transjakarta tracks within this area also have 3 Metromini stops, namely S605 (Blok-M - Kampung Rambutan), S614 (Pasar Minggu - Cipulir), and S610 (Blok-M - Pondok Labu). APB JS01A is also one of the public transportations with access to the Block-A area, which stops at Block-A Market located right beside the station. Block-A area is also crossed by inter-region buses such as AJA P AC138 (Blok-M - Poris Plawad), Mayasari Bakti AC05 (Blok-M - Bekasi) and Sinar Jaya AC151 (Blok-M - Alam Sutera). Transit activities in Block-A are also supported by the existence of transportation modes such as online taxis and electric scooters that rented for access between stations.

Block-A area meets the criteria and indicators of potential TOD locations in terms of the existence of transit modes. For this aspect, the Blok-A region meets the prerequisites for the three TOD typologies.

### 5.2. Transit Frequency

Jakarta MRT operates 16 trainsets to improve the quality, convenience, and punctuality of the train schedule [22]. The operational evaluation done in April 2019 proves that the train schedule and commuting length are 99.8% accurate [22]. Jakarta MRT operates for 19 hours, from 05.00 until 24.00 [22]. It makes headway per 5 minutes during peak hours, which are 7-9 AM and 5-7 PM [22]. This data reveals that the Block-A area had fulfilled the criteria and indicators for 15 minutes maximum transit mode headway frequency [16, 17, 19]. It also meets the TOD location prerequisites for the 17 hours' minimum service time of the transit mode in the area that (05.00–22.00) [16, 17, 19]. In the Block-A area, there are other modes of transportation. Transjakarta operates from 05.00-24.00, Metromini from 05.00-24.00, APB operates from 05.00-16.00, and the inter-region buses operate from 04.30-22.00 (see Table 3).

Based on surveys and field simulations, the required transit time to move from the MRT to other transportation modes is around 5-15 minutes. It reveals that for the aspect of transit frequency, the Urban TOD typology is suitable for the Block-A area.

**Table 3** Public Transportation Network that Operates in MRT Station Block-A

Modes of Transportation	Route	Operational Time	Transit Time
<b>1. MRT</b>	Lebak Bulus - Bundaran HI	05.00 - 24.00 (19 hours)	5minutes (headway) (during rush hours: 07.00-09.00 and 17.00-19.00)
<b>2. BRT (Bus Rapid Transit) - Transjakarta</b>			
MR2	Block-M - Kramat Pela		
MR3	Block-M - Wijaya		
MR5	Block-A MRT Station - Radio Dalam		
MR8	Block-A MRT Station - Pangeran Antasari	05.00 - 24.00 (19 hours)	5 - 15 minutes
S21	Ciputat - Tosari		
1E	Pondok Labu - Block-M		
<b>3. Microbus (Metromini)</b>			
S605	Block-M - Kampung Rambutan		
S614	Pasar Minggu - Cipulir	05.00 - 21.00 (16 hours)	15 - 20 minutes
S610	Block-M - Pondok Labu		
<b>4. APB (four-wheeler auto-rickshaw)</b>			
JS01A	Sambas (Block-A) - Cilandak	05.00 - 16.00 (11 hours)	
<b>5. Inter-Region Bus</b>			
AJA P AC138	Block-M - Poris Plawad	05.00 - 22.00 (17 hours)	20 - 30 minutes
Mayasari Bakti AC05	Block-M - Bekasi	04.30 - 21.00 (16,5 hours)	
Sinar Jaya AC151	Block-M - Alam Sutera	04.30 - 16.30 (12 hours)	

### 5.3. Mixed of Land-Use

Based on the DKI Jakarta RDTR 2004, the existing Block-A area within the TOD radius has seven land-use zones, including City/Neighborhood Scale Park Zone, Local Government Zone (civic uses), Mixed-Use Zone, Zones for Terminal Infrastructure, National Government Zone (civic uses), Residential Zone, and Commercial Zone (for office, trade, and service) (Figure 4). It means, for mixed of land-use aspects, the Transit-Oriented Development in the Block-A area meets the prerequisites for Sub-Urban, Urban, and Regional TOD typologies.

The existing condition of the Block-A area, according to its land-use, has indeed fulfilled the criteria of minimum types of land-use, but its zoning pattern in the spatial plan (RTRW) needs to be rearranged. The land-use zoning in the Block-A area is currently a linear strip (Figure 5). It has not yet formed a unified land use composition, as developed by Calthorpe [5].

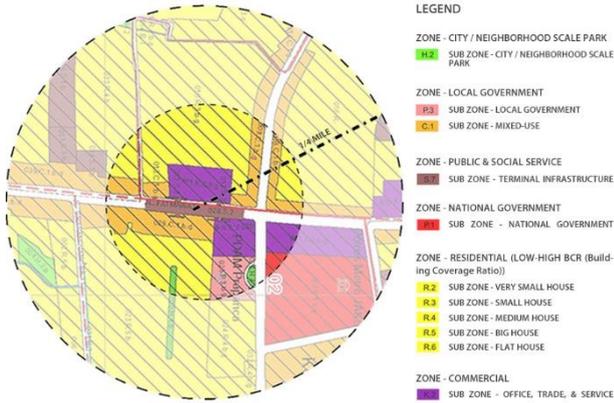


Figure 4 The existing land-use of the Block-A area within TOD radius



Figure 5 The linear zoning in the Block-A existing area

5.4. Building Intensity

Block-A area is located in the outer ring of the Flight Safety Area (KKOP) of Jakarta’s main three airports. In this area, the allowed building heights is up to +150 m or equivalent to 30-36 floors (Figure 6). It means the location of the Block-A area is appropriate for high-rise building development. It means this area is suitable for Regional TOD typology development. We also need to analyze the existing condition of the building intensity. The regulation of the building intensity enacted by the local government in the spatial plan (RTRW DKI Jakarta) can be found in (Figure 7).

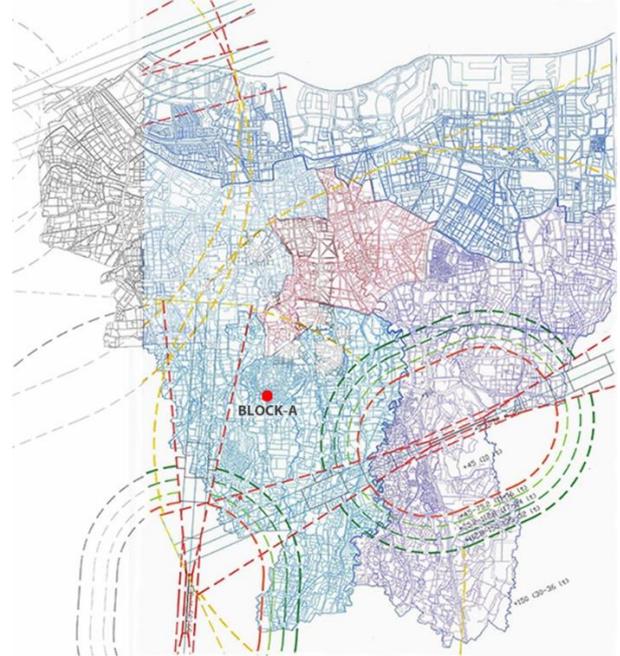


Figure 6 Analysis of the Block-A area regarding its location to the Flight Safety Area (KKOP) of Halim Perdanakusuma Airport, Pondok Cabe Airport, and Soekarno-Hatta International Airport

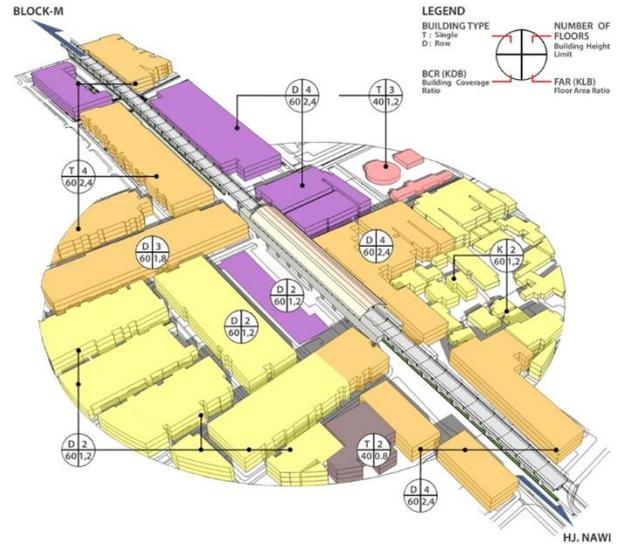


Figure 7 The existing building intensity of the Block-A area

The existing FAR (Floor Area Ratio) of the Block-A area ranges from 1.2-2.4 (Urban TOD typology), with the number of allowed floors ranging from 2-4 floors (Urban and Sub-Urban TOD typology). The existing BCR (Building Coverage Ratio) of the Blok-A area ranges from 40-60% (Urban and Sub-Urban TOD typology). Based on the spatial planning data, from the aspect of existing building intensity, the development of the Block-A area leads to Urban and Sub-Urban TOD typology.

### 5.5. Retail Characteristics

The trading and services areas along Fatmawati Street, especially in the Block-A area, cover regional, local, and community-scale services [15]. This broad-scale service can be seen from the variety of trading and service activities throughout the Block-A area. Block-A area is well-known as a trading area for building materials, interior, and sanitary ware. This area is also known as an automotive area due to the famous Block-A market. Based on this service scale, the Block-A area is suitable for Urban TOD typology

### 6. CONCLUSION

This research found that the urban TOD typology is appropriate for transit-oriented development in the Block-A area. Table 4 shows the assessment of each criterion and indicators. Urban TOD typology has some characteristics, namely 1) high diversity of activities (land-use) and transit modes; 2) high mobility and stated as 'destination' area for the worker with sub-regional service scale; 3) dominated by mid-rise building type and some high-rise, and 4) supported by a population of dwellers [12]. These characteristics lead to the need to revise the spatial plans (RTRW) in the Block-A area to support development with high intensity. Land-use regulation should optimize and stimulate transit activities that lead to the use of space with vibrant ambience (large scale commercial, office/co-working space, housing, and park) so it can eliminate private vehicle usage. To

optimize development intensity and transit activities, we recommend a 'redevelopment' of the Block-A area.

We need to further examine the urgency to develop Block-A Area MRT Station as an urban scale TOD and its transit capacity as well as its optimal density. It can be done through research related to (1) the benefit of the development for Jakarta or the ones who most benefit from the development and also how the development might differ from other developments; 2) the carrying capacity of the environment to adjust the building intensity during the process of re-visioning RDTR of DKI Jakarta; 3) study related to the type of connectivity at the Block-A TOD transit hub that supports the success of transit activities and accessibility. This discussion is important to formulate the spatial plans (RTRW) for the Block-A TOD area and also to create integrated and sustainable TOD area.

The development of TOD typology as an analytical method, which has been demonstrated in this study, is suitable for analyzing the potential development of transit-oriented areas at intermediate station points that connect two interchange stations. The intermediate station point area is a transition area between two downtowns. This method helps to analyze the suitable TOD typology for the transition area. This method is suitable for supply-oriented research, research that focuses on the idea of implementing TOD based on existing conditions, and plans related to transportation and spatial systems.

**Table 4** The assessment for each criterion and indicator related to the appropriate TOD typology for the Block-A area

Criteria & Indicators	Regional Center TOD	Urban Center TOD	Sub-Urban Center TOD	Source
<b>1. Transit Mode</b>				
<b>Short Distance Commuter:</b>				
Microbus (Metromini)	√	√	√	
APB (four-wheeler auto-rickshaw)	√	√	√	
BRT (Transjakarta)	√	√	√	
MRT/LRT/Commuter rail	√	√	√	
<b>Medium and Long Distance Non-commuter:</b>				
Inter-Region Bus	√	√	√	
<b>2. Transit Frequency</b>	-	√	-	[11-12]
<b>3. Mixed of Land-Use</b>	√	√	√	
<b>4. Building Intensity</b>	<b>Density (Very high)</b>	<b>Density (High-medium)</b>	<b>Density (Medium)</b>	
	-	√	-	
	<b>Number of floors</b>	<b>Number of floors</b>	<b>Number of floors</b>	
	-	√	√	
	<b>Building Coverage Ratio</b>	<b>Building Coverage Ratio</b>	<b>Building Coverage Ratio</b>	
	-	√	√	
<b>5. Retail Characteristics</b>	-	√	-	

√ : Corresponding

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