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INTEGRATION OF TRANSIT AND MIXED-USE FUNCTIONS IN THE TANAH ABANG TOD AREA

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Abstract

Rapid urban sprawl in Jakarta has led to an extreme dependence on private vehicles and spatial fragmentation around major transit hubs. The Tanah Abang area, home to Southeast Asia's largest textile trading center and the busiest station on the Commuter Line network, is experiencing a severe spatial capacity crisis within the 400-meter radius (R.400) surrounding the station. This study aims to evaluate land suitability, qualitatively assess the area's environmental carrying capacity, and formulate design criteria for an integrated 24-hour urban district. Employing a qualitative descriptive research method, the findings reveal severe pedestrian space saturation and significant overlap between commercial and transit functions. The proposed revitalization strategies include the development of a Transit Plaza and enhanced Skybridge connectivity to improve accessibility, ensure public safety, and sustain the district's vitality throughout the day. The findings are expected to serve as a design reference for the development of high-density, transit-oriented development (TOD) districts in metropolitan cities.

Keywords: Transit-Oriented Development (TOD); Tanah Abang; 24-Hour Zone; Multimodal Integration.

INTRODUCTION

The rapid pace of urbanization and urban sprawl has intensified dependence on private vehicles, resulting in persistent traffic congestion in urban centers. Meanwhile, areas surrounding major transit hubs possess significant potential to function as catalysts for urban activities through the implementation of Transit-Oriented Development (TOD). However, a major challenge lies in the mismatch between land-use planning and transportation infrastructure, where accessible and efficient mobility systems do not adequately support the high intensity and diversity of land uses. Consequently, a substantial imbalance has emerged between the volume of pedestrian and vehicular movements generated by these areas and the capacity of the existing circulation network (Burton, 2002; Rochman, 2019).

In response to this mobility crisis, the Provincial Government of the Special Capital Region of Jakarta (DKI Jakarta) introduced a new urban development paradigm through Governor Instruction No. 66 of 2019, which prioritizes pedestrians and public transport users within the urban circulation hierarchy. Within this transformation framework, the Tanah Abang district has become both the most strategic and the most critical transit node, integrating Southeast Asia's largest textile wholesale market with the Commuter Line rail station. The planned expansion of the station's capacity to accommodate up to 380,000 passengers per day underscores the urgent need for an integrated spatial planning strategy. Accordingly, this study aims to formulate design criteria capable of reconciling the massive movement demand with the site's spatial constraints by focusing on the optimization of

pedestrian infrastructure (Walk Principle) and the management of intermodal circulation integration (Shift Principle).

LITERATURE REVIEW

Transit-Oriented Development and Mixed-Use Development

Transit-Oriented Development (TOD) is an urban planning approach that integrates compact, high-density, mixed-use development around public transportation hubs to promote sustainable mobility and reduce dependence on private vehicles. Located within a comfortable walking distance of approximately 400–800 meters from transit stations (Calthorpe, 1993), TOD improves accessibility and creates pedestrian-oriented urban environments. The ITDP (2017) framework further defines TOD through eight principles Walk, Cycle, Connect, Transit, Mix, Densify, Compact, and Shift which collectively enhance multimodal connectivity, encourage public transport use, and support environmental sustainability and urban quality. Mixed-use development is a fundamental component of TOD, integrating residential, commercial, office, public, and recreational functions within a single district to improve land-use efficiency and reduce travel demand (Grant, 2002). Functional diversity also strengthens urban vitality by activating streets throughout the day and increasing natural surveillance (Jacobs, 1961). In high-density commercial areas such as Tanah Abang, the integration of mixed-use development with TOD supports efficient mobility, accommodates intense commercial activities, and enhances both economic productivity and the overall quality of the urban environment.

Walkability, Multimodal Integration

Walkability is a fundamental indicator of successful Transit-Oriented Development (TOD), as it determines the quality of pedestrian movement between transit facilities and surrounding urban functions. Effective walkable environments provide continuous sidewalks, adequate walkway widths, weather protection, universal accessibility, and direct connections between destinations (Lamour et al., 2019; Serra-Coch et al., 2018). Equally important is multimodal integration, which enables seamless transfers among rail, buses, feeder services, ride-hailing, and pedestrian networks. In Jakarta, successful TOD implementation relies on integrated transportation systems supported by pedestrian-friendly public spaces and coordinated land-use planning (Hasibuan & Mulyani, 2022).

Placemaking complements TOD by transforming transit areas into vibrant public spaces through features such as transit plazas, pedestrian decks, and skybridges that enhance comfort, social interaction, and district identity. However, limited research has examined the integration of mixed-use development, multimodal connectivity, and pedestrian-oriented public spaces in dense commercial transit districts such as Tanah Abang. Therefore, this study proposes integrated design criteria combining mixed-use development, Transit Plaza, Skybridge connectivity, multimodal transport

integration, and pedestrian-first principles to improve mobility, public space quality, and the long-term sustainability of metropolitan transit districts.

METHOD

This study adapts the spatial analysis framework of the 400-meter transit catchment area (R.400) surrounding Tanah Abang Station. It transforms it into a qualitative research approach to better understand user behavior and spatial dynamics.

Field Observation

The initial stage of the study was conducted through field observations and spatial mapping within a 400-meter radius (R.400) of Tanah Abang Station. The establishment of this radius was intended to delineate the pedestrian catchment area surrounding the transit node while simultaneously identifying the spatial characteristics and movement patterns formed within its surroundings. The analysis was conducted by integrating three main parameters, namely area delineation, pedestrian activity density and multimodal movement, as well as land-use and building-function characteristics.

First, area delineation was conducted to determine the boundaries of the study area and evaluate the optimal pedestrian catchment from and toward the transit node. This approach is important because the quality of the connection between the station and its surrounding environment is determined not only by the availability of transportation facilities but also by spatial connectivity that enables movement to be undertaken safely and comfortably. In the context of Jakarta's spatial planning, a transit-based approach has also become part of the direction of spatial development. The Government of the Special Capital Region of Jakarta explains that the 2022 RDTR adopts the paradigm of “transit- and digital-oriented urban development” (Government of the Special Capital Region of Jakarta, 2022).

Second, spatial density analysis was used to identify locations with high pedestrian activity intensity, particularly during peak hours when pedestrian movements interact with various modes of transportation. These interactions may include transfers between trains, buses, private vehicles, ride-hailing vehicles, and walking. Therefore, density mapping serves not only to identify activity concentrations but also to recognize points that have the potential for movement conflicts and require improvements in pedestrian infrastructure quality and multimodal integration management.

Third, the functions of buildings located within the study area, such as offices, commercial establishments, and service facilities, were verified based on the provisions of the Jakarta Detailed Spatial Plan (RDTR Jakarta) 2022. The RDTR was officially established through Governor Regulation of the Special Capital Region of Jakarta No. 31 of 2022 concerning the Detailed Spatial Plan for the Provincial Spatial Planning Areas of the Special Capital Region of Jakarta. The regulation covers “WP delineation; WP planning objectives; Spatial Structure plan; Spatial Pattern plan;

provisions for Spatial Utilization; Zoning regulations; and institutional arrangements" (Government of the Special Capital Region of Jakarta, 2022).

Verification of building functions against the RDTR is necessary to determine the consistency between the existing spatial utilization conditions identified in the field and the applicable spatial planning framework. The diversity of land uses around the station can generate variations in trip purposes and influence the intensity of pedestrian movements. Areas with concentrations of commercial, office, and service functions, for example, tend to generate different travel patterns compared with areas dominated by residential uses. Therefore, information on land-use functions constitutes an important component in understanding the relationship between spatial structure, urban activities, and travel demand.

The integration of these three parameters catchment area delineation, activity density and multimodal movement, and land-use functions provides an analytical basis for formulating adaptive pedestrian infrastructure design criteria. This approach is intended to strengthen the Walk Principle, which promotes connectivity and the quality of walking as an essential component of the urban transportation system, as well as the Shift Principle, which encourages a shift toward public transportation through more effective multimodal integration. Thus, the analysis of the Tanah Abang Station area considers not only the physical conditions of the space but also the relationship between land use, pedestrian activities, and the transportation system in shaping an integrated transit-oriented area.

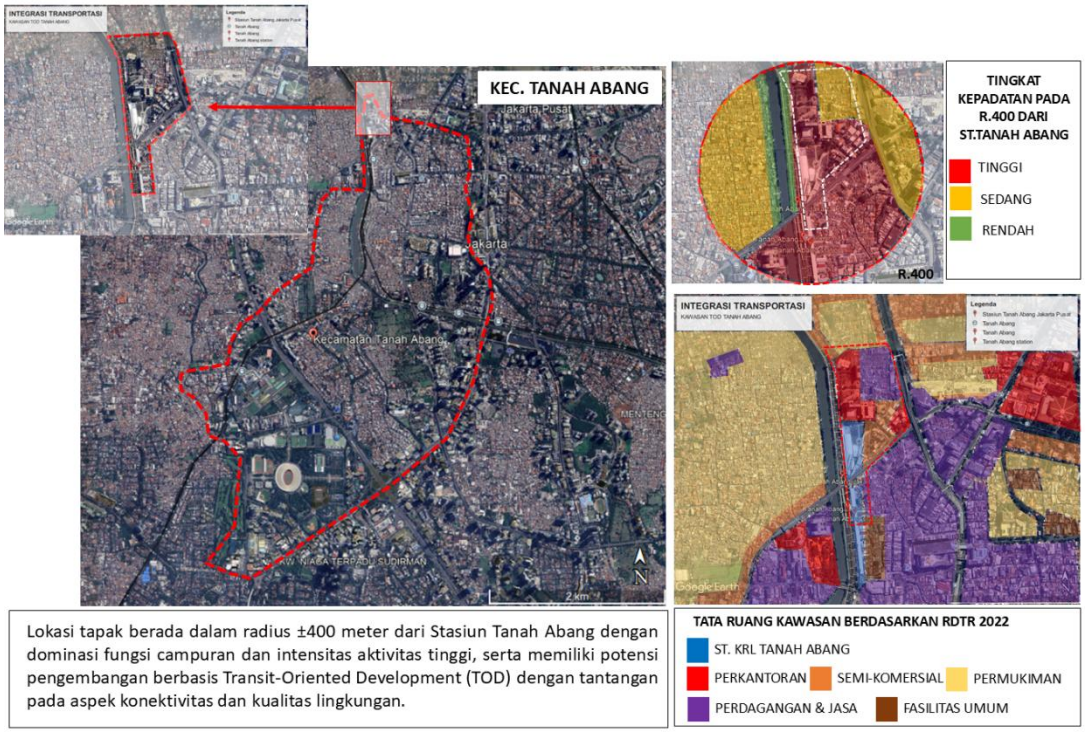


Figure 1 Areas with high density in Tanah Abang TOD Kawasan Tanah Abang.

Figure 2. Areas with high density in Tanah Abang.

DATA COLLECTION AND ROURCES

Integration of Spatial Data and Institutional Regulations

Data collection commenced with the compilation of secondary spatial and regulatory data to establish the legal framework and physical parameters of the study. The primary data sources included the Jakarta Detailed Spatial Plan (RDTR Jakarta) 2022, which provides information on land-use zoning and building intensity regulations, including the Floor Area Ratio (FAR) and Building Coverage Ratio (BCR), within the Tanah Abang area. These data were integrated with remote sensing data derived from satellite imagery to accurately analyze building density through spatial development indices. Collectively, these institutional datasets served as the normative reference for evaluating the extent to which the existing physical conditions of the Tanah Abang Transit-Oriented Development (TOD) area align with the prevailing transit-oriented development policies and planning regulations.

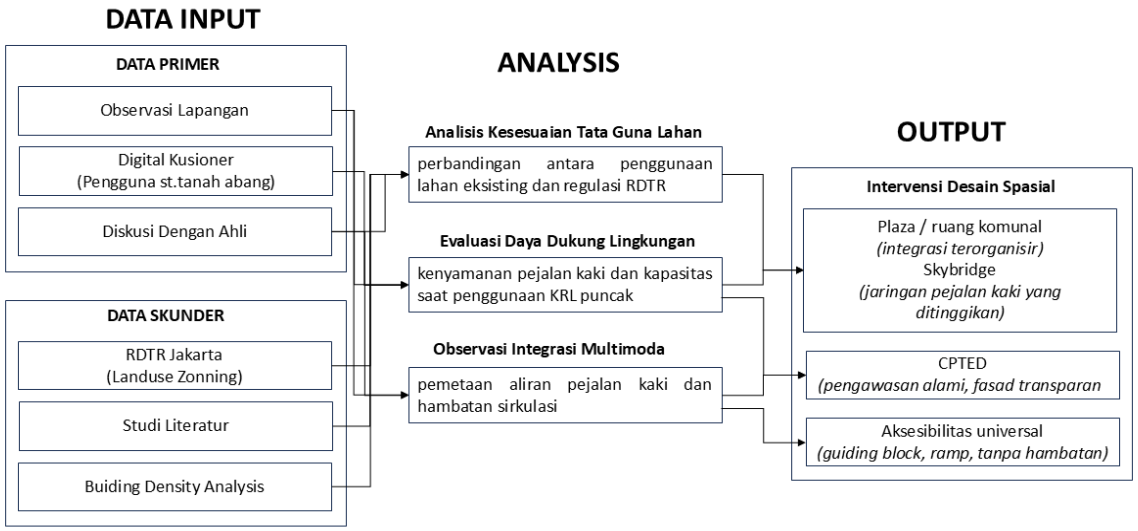


Figure 3. Integration of Spatial Data and Institutional Regulations

Field Validation and User Perception

To complement the secondary data, primary data were collected to capture the site's actual conditions and users' behavioral dynamics. The first instrument was an online questionnaire (Google Forms) distributed to public transportation users to gather their perceptions regarding the comfort of multimodal integration and the safety of the area as a 24-hour urban environment. The second instrument consisted of expert discussions and direct field observations conducted to validate the spatial analysis against actual user behavior at the transit node. The integration of user perception data and expert validation ensured that the proposed design criteria were not only technically sound but also responsive to the practical needs and experiences of users within the Tanah Abang area.

Table 1. Field Validation and User Perception

EVALUATION ASPECT	EXISTING CONDITIONS (KEY ISSUES)	USER EXPECTATIONS (FACILITIES & DESIGN)	TOD DESIGN IMPLICATIONS
Mobility & Multimodal Integration	Intermodal transfer distances are perceived as excessively long. Vehicular traffic is mixed with pedestrian movement, resulting in circulation conflicts and reduced transportation efficiency.	Intermodal transfer distances are perceived as excessively long. Vehicular traffic is mixed with pedestrian movement, resulting in circulation conflicts and reduced transportation efficiency.	Intermodal transfer distances are perceived as excessively long. Vehicular traffic is mixed with pedestrian movement, resulting in circulation conflicts and reduced transportation efficiency.
Pedestrian Infrastructure	Sidewalks are narrow, uneven, and inadequate, creating an unsafe pedestrian environment, particularly during peak hours due to overcrowding.	Sidewalks are narrow, uneven, and inadequate, creating an unsafe pedestrian environment, particularly during peak hours due to overcrowding.	Sidewalks are narrow, uneven, and inadequate, creating an unsafe pedestrian environment, particularly during peak hours due to overcrowding.

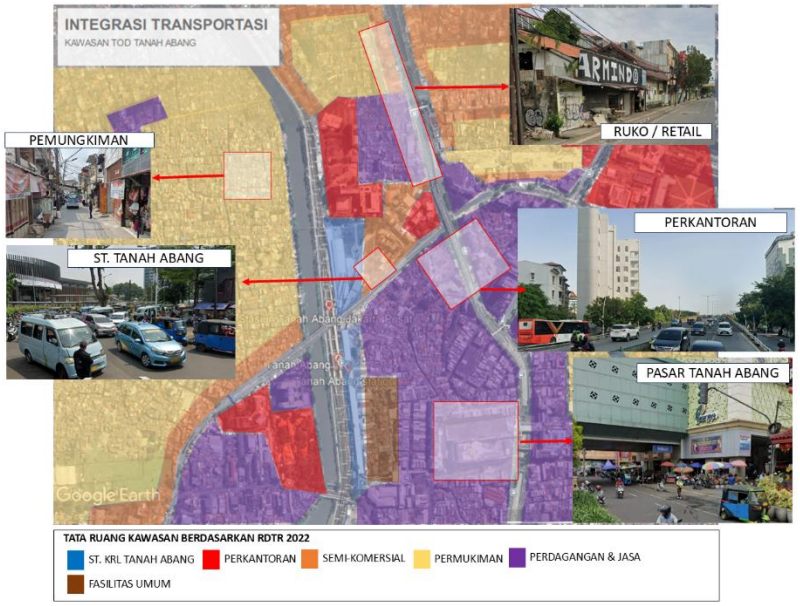
The area is also characterized by the disorganized presence of ride-hailing motorcycle pick-up points, which further contributes to circulation conflicts and pedestrian inconvenience. In addition, respondents identified a significant shortage of public open spaces within the district. Therefore, the proposed revitalization strategy should prioritize the integration of protected pedestrian circulation, the provision of designated pick-up and drop-off zones for ride-hailing services, and the development of green public spaces to transform the area from a mere transit corridor into a comfortable and vibrant public realm.

DISCUSSION AND RESULT

Based on the qualitative analysis and field observations conducted within the primary 400-meter transit catchment area (R.400) of Tanah Abang Commuter Line Station, several key findings were identified that underpin the proposed revitalization strategy.

Land Use Conformity Analysis

The study area is characterized by a high-density urban environment with a diverse mix of land uses, including office buildings, public facilities, residential areas, and open spaces. Among these land-use categories, commercial activities constitute the predominant typology, occupying the majority of the corridor frontage. The close spatial integration of commercial and office functions generates an exceptionally high intensity of urban activity, making the area a primary activity generator that attracts substantial pedestrian and vehicular flows on a daily basis.



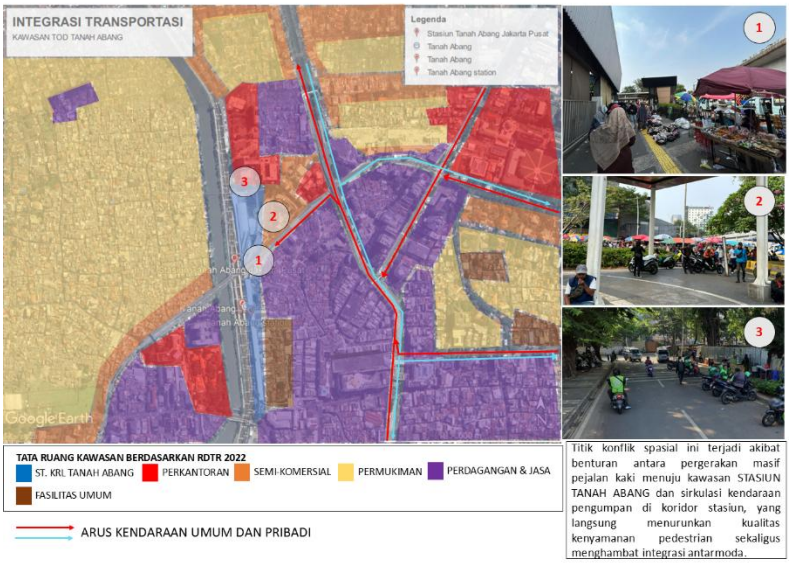


Figure 4. Comparison of Existing Land Use Conditions Contributing to Congestion Around Tanah Abang Station

All public transportation services including TransJakarta routes, JakLingko feeder services (public minibuses), app-based motorcycle taxis, and conventional motorcycle taxis converge at Tanah Abang Station as their primary destination and transfer point. This substantial convergence generates significant pedestrian spillover due to the limited capacity of the existing sidewalks, where pedestrians are forced to share constrained road space with queuing public transport vehicles and private traffic. The resulting overlap of pedestrian and vehicular circulation creates persistent and severe congestion, highlighting the urgent need to redesign pedestrian infrastructure and improve multimodal integration management.

Pedestrian Infrastructure

The existing pedestrian network surrounding the Tanah Abang Station corridor exhibits a significant decline in walking environment quality due to the imbalance between facility capacity and user demand. Physically, the effective sidewalk width has been substantially reduced by the occupation of informal street vendors, poorly organized urban utilities, and loading and unloading activities associated with the surrounding commercial developments. These pedestrian obstacles considerably restrict the available walking space amid the high volume of commuters entering and exiting the station.

As a consequence, during peak hours, the pedestrian facilities frequently exceed their carrying capacity, forcing pedestrians to spill over onto the adjacent roadway. This overlap between pedestrian and vehicular movements within the same traffic space not only degrades walkability but also poses significant safety risks. These findings underscore the urgent need for barrier-free, inclusive, and adequately sized pedestrian infrastructure to improve both accessibility and user safety within the Tanah Abang TOD area.

Figure 5. Ride-Hailing Motorcycles and JakLingko Vehicles Occupying the Sidewalk, Obstructing Safe Pedestrian Movement

Multimodal Integration Observation

The intermodal transfer process surrounding the station entrance is highly inefficient due to the uncoordinated convergence of feeder transport services, including TransJakarta, JakLingko, ride-hailing motorcycles, and private vehicles. The absence of integrated supporting facilities, such as designated pick-up and drop-off zones, forces public transport vehicles to wait for passengers along the roadside, creating traffic bottlenecks and contributing to persistent structural congestion. This unmanaged accumulation of transport modes highlights the critical need to redesign circulation management in order to achieve safe, efficient, and seamless multimodal connectivity within the Tanah Abang TOD area.

Figure 6. Ride-Hailing Motorcycles and JakLingko Vehicles Stopping Along the Sidewalk, Disrupting Pedestrian Circulation and Multimodal Integration

RESULT

Development of a Transit Plaza as a Pedestrian Decompression Space

To address the issue of pedestrian spillover at the station exits, this study proposes the development of a Transit Plaza that functions as an open transitional and pedestrian decompression space. The plaza is designed to create a wider buffer between the station entrances and the adjacent roadway of partially setting back existing building frontages. It incorporates continuous weather-protected canopies (arcades), inclusive wayfinding facilities such as tactile guiding blocks, and shaded green landscaping to mitigate the urban heat island effect. By providing an adequate pedestrian holding area, the Transit Plaza enables pedestrian flows from the station to surrounding office and commercial districts to disperse safely and efficiently before entering the main pedestrian corridor, thereby preventing conflicts with vehicular circulation.

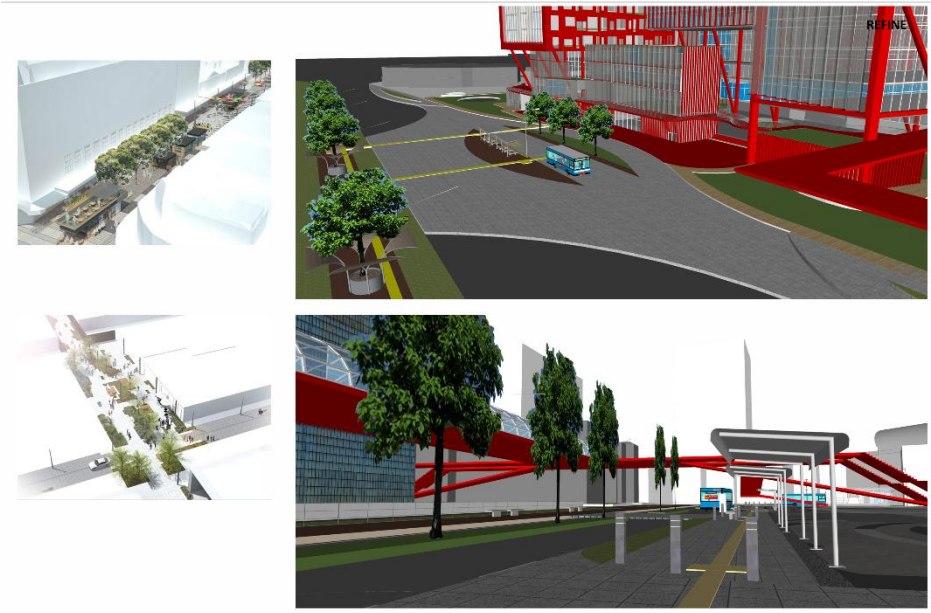


Figure 7 : visioning share street

Integrated Skybridge Network Connectivity

The proposed design includes the implementation of a multifunctional pedestrian skybridge (pedestrian deck) that directly connects Tanah Abang Station with the surrounding major market blocks. This elevated pedestrian network separates commuter movement from ground-level vehicular traffic, thereby reducing circulation conflicts and improving pedestrian safety. In addition, the skybridge provides a safe, accessible, and inclusive walking environment while enhancing seamless connectivity between transit facilities, commercial areas, and surrounding urban destinations. As a result, the integrated skybridge network strengthens multimodal accessibility and supports the realization of a more efficient, pedestrian-oriented Transit-Oriented Development (TOD) district.

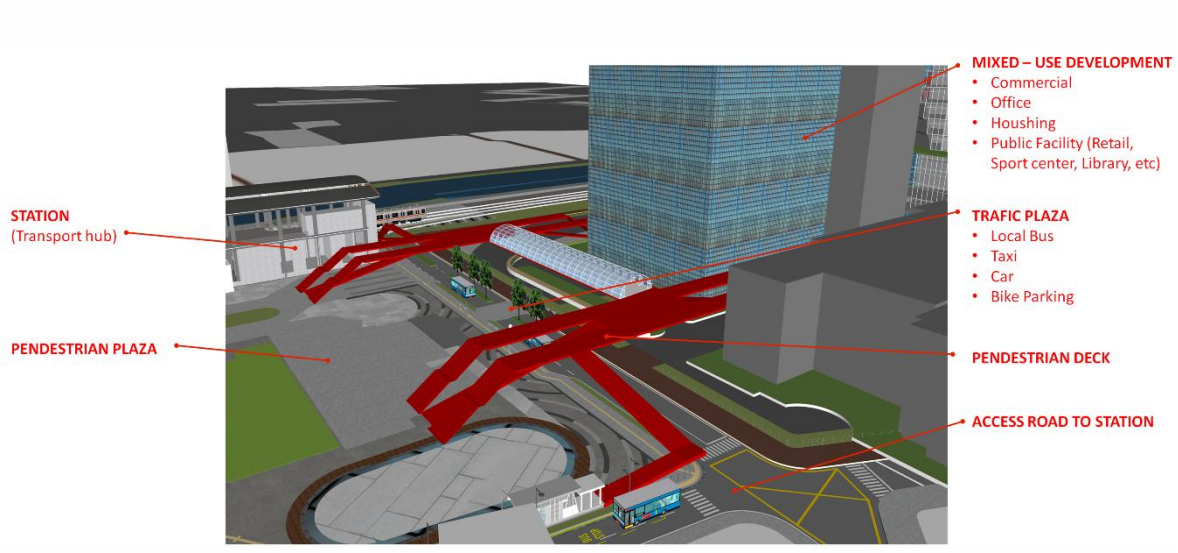


Figure 8: illustration of the area's complementary facilities (visioning)

Integrated Multimodal Transport Hub and In-Plot Drop-Off Zoning

To eliminate circulation bottlenecks caused by public transport vehicles and ride-hailing motorcycles waiting along the roadside, the third strategy proposes the development of an Integrated Multimodal Transport Hub within the building site (in-plot facility). This design relocates all passenger pick-up and drop-off activities from the public roadway into dedicated and well-managed internal circulation areas. The hub is organized into three separate linear circulation zones: a dedicated lane for TransJakarta and JakLingko buses, a designated pick-up and drop-off zone for ride-hailing motorcycles, and an independent lane for private vehicles. This physical integration provides feeder transport services with dedicated waiting areas that prevent interference with the main traffic flow while reducing transfer times and improving the efficiency of intermodal transfers for public transport users.

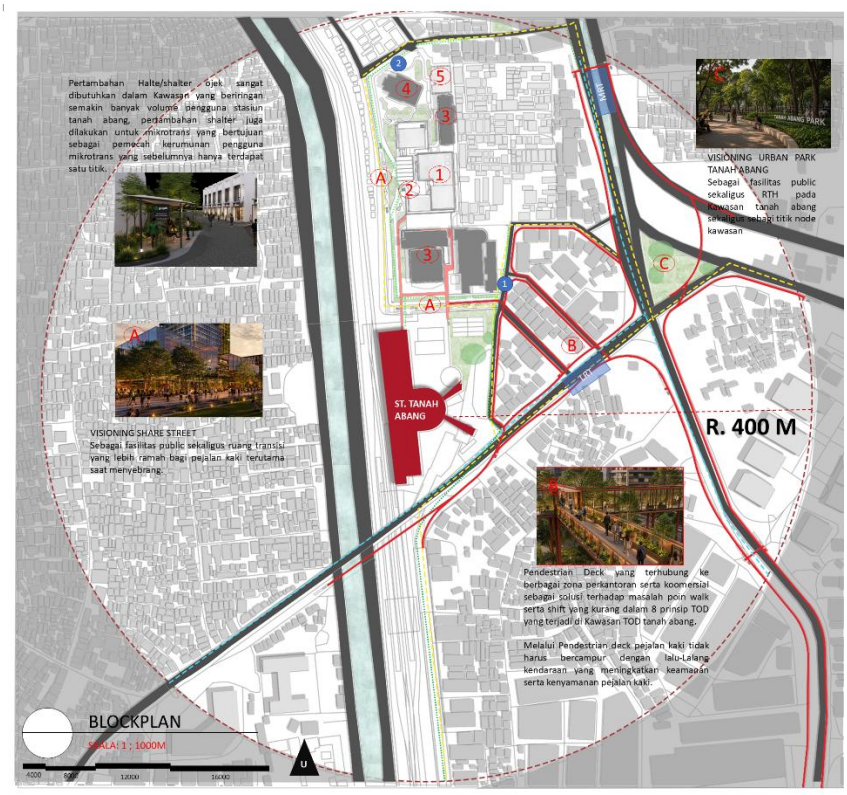


Figure 9 : illustration of the area's complementary facilities (visioning)

CONCLUSION

The qualitative evaluation of the 400-meter transit catchment area (R.400) surrounding Tanah Abang Commuter Line Station demonstrates that the existing spatial capacity is no longer sufficient to accommodate current mobility demands, let alone projected increases in passenger volumes. Spatial

fragmentation and the encroachment of pedestrian infrastructure have emerged as the primary barriers to achieving an effective Transit-Oriented Development (TOD) district.

The proposed design synthesis comprising the development of a Transit Plaza, an integrated Skybridge network, an Integrated Multimodal Transport Hub, and the application of Crime Prevention Through Environmental Design (CPTED) principles to support a safe 24-hour urban environment offers a comprehensive strategy for transforming Tanah Abang into a safe, inclusive, and sustainable transit district. In this context, architecture should catalyze the reconciliation of the district's intensive commercial activities with efficient multimodal mobility within the critical 400-meter transit catchment area.

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