Transit Integrated Design in Poris-Plawad Tangerang Transit Oriented Development Area: Terminal and Station

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Abstract. Poris-Plawad Terminal and Batu Ceper Station are transit nodes located at Toris Poris Plawad, Tangerang City. There are several criteria to become a transit point for the TOD area listed in the Ministry of Agrarian Affairs and Spatial Planning / Head of the Republic of Indonesia's National Defense Agency No. 16 of 2017; PM. 47 of 2014; PM. 40 of 2015; and ITDP (Institute of Transportation Development Policy), which is one of the criteria is integration. Based on the existing criteria, Poris Plawad Terminal and Batu Ceper Station have not met the current criteria, among others; lack of integration between the terminal and station and integration with the surrounding area; it is difficult for pedestrians and cyclists to move around in the transit node. Circulation mixed with vehicles; and also, the lack of facilities at terminals and stations. This study discusses recommendations in terms of the architectural design of a transit node that can meet the criteria that have not been met in the TOD Poris Plawad area. The method used is to conduct studies such as regional studies, activity studies, and circulation studies. This study will be analyzed and processed to produce a design concept recommendation for a Poris Plawad mix-use building that meets the TOD criteria and government regulations.

1. Introduction
Transit-Oriented Development (TOD) area is an integrated area with a service radius of 400m to 600m. A transit node is one of the essential parts of TOD, which has a high-capacity rail-based mass public transport network and is served by at least two modes of transportation [1].

In the Tangerang City regional transportation master plan in 2018-2038, ten areas will be designated as TOD (Transit Oriented Development) Areas. Of the ten planned areas, which will become a public transportation center in the city of Tangerang, is the TOD Poris-Plawad area. The Poris Plawad TOD area is planned to be a link between Tangerang City and Soekarno Hatta Airport, Jakarta City and surrounding areas to outside Banten Province. TOD Poris-Plawad has two transit nodes, namely Poris-Plawad Bus Terminal and Batu Ceper Station.

Poris-Plawad Bus Terminal is a class A bus terminal that serves Java and Sumatra trips. This terminal accommodates public transportation such as angkot and BRT Tangerang which serve trips within the city, buses inside and outside the city that serve Java to Sumatra trips as well as JABODETABEK BRT which houses Tangerang - Jakarta trips.

Batu Ceper Station is a class 1 train station serving JABODETABEK area travel. This station facilitates travel by KRL mode, which serves the Tangerang - Jakarta area, Railink, which serves the TOD Poris-Plawad area to Soekarno Hatta Airport and LRT development plans that will serve the...
Tangerang - South Tangerang area.

In its role as a transit node for the TOD area, the Poris-Plawad Bus Terminal and Batu Ceper Station are less qualified as a transit node for the TOD area. One of them is due to the lack of integration in the POD - Plawad TOD Transit Node and the lack of facilities provided by the two buildings, which are far from the existing standards. There are also problems with circulation between vehicles and vehicles and passengers contained in the Poris-Plawad Terminal, which overlaps (Cross Circulation). Besides, there are similar circulation problems also found in Batu Ceper Station, where to move the passenger platform to experience Cross Circulation by train.

Based on these problems, Poris Plawad Station and terminals have not fulfilled the principles set by ITDP, such as the unavailability of facilities for cyclists and pedestrians and the lack of integration between terminals and stations as transit points with the surrounding environment. Under these conditions, BPTJ, together with the Tangerang City Government, planned to create an integrated transit node design, namely integration at the Poris-Plawad Terminal with Batu Ceper Station.

2. Theoretical review

2.1. TOD principle

Standards and principles established by ITDP (Institute of Transportation and Development Policy) [2] as policy makers for the TOD standards in collaboration with BPTJ to design the TOD area namely,

a. Walk
   Users can move actively on foot, safely and comfortably in the TOD area

b. Cycle
   Users can create mobility by actively and comfortably biking in the TOD area

c. Connect
   The route for pedestrians and bicycle users must go directly to the location and not be made too long and winding.

d. Transit
   Station transfers must be designed with a short and easily accessible route.

e. Mix
   balance of complementary and complete activities in the local area. Mixing of dwellings, workplaces, and trade activities are not far away to be accessed on foot.

f. Densify
   urban areas must not only be able to accommodate many people and their activities but also can support a very desirable lifestyle. Increased density within 500 m of the distance of the transit station

g. Compact
   TOD Development Locations are in, or in addition to, existing urban areas and are supported by many public transportations serving various destinations

h. Shift
   Reducing needs, such as parking for transportation.

2.2. Principles of Integrated Transport Hub

Good integration with Transport Hub is one that benefits public transport managers and users. Passengers can have a good, easy and comfortable travel experience and are more profitable than using private vehicles. Effective integration can also reduce costs by attracting many users by reducing overlapping [3]. There are principles for integrated transportation, namely,

a. Network Structure
   The network structure is included in the location of the stop (drop-off / pick-up) and Vehicle Circulation Alignment

b. Coordinate Schedules
Coordination of arrival and departure schedules between public vehicles

c. Transfer
short distance for shifting passengers, Inclusive, improved lighting and weather protection (sun, rain, wind) in walking and waiting areas, a platform that adequately accommodates the number of passengers waiting/boarding, security, drop-off/pick-up facilities -road and facilities for passengers.

d. Ticket Integration
Integrated ticket payment mechanism

e. Information Services
Schedule and arrival info and signage info

3. Design Location Study
The design location is the transit node of the Poris-Plawad TOD area, which requires a redesign to support the TOD area. The transit node, Poris-Plawad Terminal, is a class A terminal located on Jl. Benteng Betawi, Kel. Poris Plawad, Kec. Poris, Kota Tangerang and Batu Ceper Station are class 1 stations situated in Jl. KH. Agus Salim, Poris Plawad, Kec. Cipondoh, Kota Tangerang, Banten.

Figure 1. Design Location
4. Method
The methods that will be applied to the design problem solving are as follows:

![Design Method](image)

**Figure 2. Design Method**

5. Result and discussion
The main building of the terminal and station is the Private area because humans can only access this area. While semi-public and public areas are areas that are accessed by vehicles.

![Flow chart on the site](image)

**Figure 3. Flow chart on the site.**

Based on a comparative study of the Malaysian TBS terminal with Tirtonadi, it is known that the most effective circulation is linear in order to avoid crossing between vehicle modes that can inhibit terminal activities. Therefore, the circulation is divided linearly so that no crossing circulation occurs. Determination of zoning on the site Based on considerations:

- Tread is only passed by one arterial road which has only 1 direction so that the entrance and exit are placed on the same side.
- The entry area of each vehicle mode is distinguished so that no crossing circulation occurs
- Private vehicles are placed at the front because of the concept of kiss and ride and park and ride.
- The angkot platform is placed on the second layer because the angkot has a short transit time of 5 minutes and a maximum of 10 minutes waiting for passengers
The Trans Tangerang platform is placed on the second layer because the BRT comes every 15-20 minutes. With a long service time on the platform is 5-10 minutes.

Bus parking area and departure platform AKAP and AKDP are placed at the rear because they are the most spacious to accommodate vehicles and also take a long time from arrival to departure.

A comparison of the old terminal circulation with the new one is that in the old terminal there is a lot of cross-circulation between modes because there is no separation of circulation in each mode. There is also no area for angkot to raise and lower passengers at the terminal. While in the new terminal, circulation uses a linear circulation that separates each mode so that it does not occur cross circulation.

Figure 4. Zoning

Procurement of integration between stations and terminals with a sky bridge, which can only be accessed by passengers.
Concept of Building Circulation

Arrival and departure areas Buses that are semi-public and can only be accessed by AKAP and AKDP bus passengers that are connected to commercial spaces that are public areas that can be accessed by anyone. The Station area and terminal area are connected to the sky bridge, and the Transjabodetabek area will be connected directly to the sky bridge.

Figure 5. Flowchart of building circulation

Vehicle circulation and human circulation are separated so that no circulation occurs; vehicles dominate zoning on the ground and floors 2, 3, and 4 are human circulation.

Figure 6. building vertical zoning
6. Conclusion
Poris-Plawad Terminal and Batu Ceper Station are the transit points of the Tangerang City Poris Plawad TOD that have not fulfilled the principles and rules of the law, among others. There is a lack of integration between the terminal and station and integration with the surrounding area; it is difficult for pedestrians and cyclists to move around in the transit node, circulation mixed with vehicles; and also, the lack of facilities at terminals and stations. So that requires redesign that can meet the criteria that have not been met before.

The concept of integration is divided into three parts, namely integration between humans and vehicles; terminal - station; and transit node - the surrounding area. which is applied in the concept of integration, namely:

1. Human - Vehicle
   how to make it easier for users to switch modes by dividing the area into arrival and departure areas. Also, by separating circulation between humans and vehicles where human circulation is limited to buildings.
2. Terminal - Station
   Connecting the two buildings separated by arterial roads using the sky bridge taking into account
   the intensity of the vehicle that runs on the arterial road.

3. Transit node - The surrounding area
   Making access to the transit node from various directions that have the most intensity of
   population movements due to the nature of the TOD that must be accessible from anywhere,
   The redesign of the Poris-Plawad Transit Knot is expected to facilitate users and vehicles in
   mobility and increase interest in using public transportation to reduce the number of private
   vehicles in the city.

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