

Analysis Management of A Need People Crossing Bridge Facility (JPO) on Ahmad Yani Street Batam City

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Abstract

This study aims to determine the effectiveness of the use of pedestrian bridge facilities in Batam City. As we know that the increase in the volume of vehicles, it causes congestion on the streets in Batam City. busy in the morning when they go to work and school or in the afternoon when they come home from work or school. Pedestrian movement includes movements along roads, cutting roads, and intersections. As is common in many big cities, due to the demands of economic development, trade, and ease of service coverage for the community, public facilities such as hotels, shops, and so on are usually clustered in a certain area, because of the location of one building with another building spreads throughout the area, then one day pedestrians have to cross vehicular traffic to get to their destination. However, often the presence of such pedestrians at a certain level will result in sharp conflicts with the flow of vehicles resulting in traffic delays and high accident rates. This type of research is descriptive with the method used being a qualitative method. This research was carried out at the People's Crossing Bridge in Batam City, while the data collection technique in this study was a direct review method. Then the data was analyzed through three stages, namely calculation and data analysis, data presentation, and concluding.

Keywords

Batam city; cutting road; bridge



I. Introduction

In the city of Batam today, pedestrian bridges have become a necessity for smooth traffic. Since the construction of the Kepri Mall shopping center, the surrounding economic growth has grown rapidly. Economic growth is still an important goal in a country's economy (Magdalena and Suhatman, 2020).

Transportation has several road crossing facilities such as the People's Crossing Bridge (JPO), where the JPO is installed if it is required that there is no intersection between the flow of pedestrians and the flow of traffic. So that pedestrians want to use the JPO, security must be guaranteed and the walking distance is not too far away (Malkamah 1995: 58).

The crossing facilities are divided into 2, namely level crossing facilities including sidewalks, zebracross, pelican, waiting stalls, and non-level crossing facilities including JPO and tunnels. JPO is a crossing medium that is needed by humans and crosses traffic lanes.

Walking is one of the modes of transportation, so that a mode of transportation has several facilities that have been determined according to the mode. According to the procedures for planning pedestrian facilities in urban areas by the Department of Public Works, in 1995 "all buildings are provided for pedestrians to provide services to pedestrians so as to improve the smoothness, safety and comfort of pedestrians.

Riau Islands Mall, which is right next to Jalan Ahmad Yani, is a location with high accessibility, where Riau Islands Mall has facilities, namely as a trading center, offices, hotels, banks, and schools, based on a preliminary survey conducted by researchers in the area around Jalan Ahmad Yani which has high currents.

During peak hours such as when going to work and children going to school, traffic activity at that location is a lot of road users on foot who will cross without using crossing facilities so it is very risky when traffic is crowded, in that area as well there are stops for public transportation such as angkot and trans batam buses that drop off passengers.

The increase in both vehicular and pedestrian traffic in an area is strongly influenced by the growth of the surrounding economy. As vehicular and pedestrian traffic increases, there will be a big conflict between the two, namely the need to use roads for vehicles to pass and pedestrians to cross these roads. Problems between vehicles and pedestrians that often occur are traffic jams and accidents that take many victims. Usually this kind of problem is caused by crossing facilities that are not in accordance with the development of the area.

In addition, Ahmad Yani Street is the main route to access public places such as malls, schools, shops and offices. This makes the characteristic of the road on weekdays that it looks like it is never empty and has a high volume of vehicles that tends to remain constant. Likewise, on weekends or national holidays, vehicles crowd this road.

According to Dharwandhani (1977), the pedestrian path defined as movement or circulation or movement of people or people from one place to another point of origin (origin) to another place as a destination (destinations) on foot. pedestrian system which is good for the city, especially the trading area can have a good impact and stimulate trading activity, reduce dependency to vehicles and improve quality environment and air, due to reduced pollution vehicles (Judge, Rustam. Hardi Utomo. 2003).

To get a good pedestrian path, the pedestrians must have several criteria important, namely safety, fun, comfort and attractiveness. Pedestrian Line which is on the Letjend road section Soeprapto Batam City has an important role for workers who work in Industrial Estates Batamindo Batam City. Based on Law No. 22 of 2009 article 45, the definition sidewalk is one of the supporting facilities traffic management. In article 131 it is regulated that pedestrians have the right to the availability of facilities support in the form of sidewalks, places crossings and other facilities.

This research was conducted to determine the function of pedestrian paths for pedestrians and for know the aspects of comfort that are on the pedestrian path on Jalan Letjend Soeprapto Batam city. The stages of the survey carried out. In this study includes a survey of the physical condition of the track pedestrian, pedestrian survey and interview pedestrian. Processing data based on results research with a percentage description, especially first qualify the score of each choice result respondent.

II. Review of Literature

2.1 Type of Pedestrian Path

Wide variety of outdoor walking paths buildings can be distinguished according to their function and form. According to the function are as follows: 1. Pedestrian path that is separated from the lane public transportation (sidewalk or sidewalk) usually located next to or close together so that facilities that are safe against danger are needed motorized vehicle and has a surface flat, in the form of a pedestrian path and located on the edge of Highway. Pedestrians do walking activity as a means of transportation which will connect the destination.

Pedestrian paths used as lanes cross to overcome/avoid conflict with other modes of transportation, namely the road crossing, pedestrian bridge or underground crossings. For This activity requires facilities in the form of a zebra cross, skyway, and subway.

Pedestrian paths that are recreational and fill free time apart altogether from the motorized vehicle lane and usually can enjoy leisurely without being disturbed by the vehicle motorized. Pedestrians can stop and rest on the benches provided, this facility is in the form of a plaza in city parks Pedestrian paths used for various activities, to sell, to sit back, and while walking while looking at the window shops that are commonly called Malls. Footpath or path, pedestrian path the legs are quite narrow and just enough for one pedestrian.

Alleyways or pathways (alleys) are paths that relatively narrow behind the main road, which formed by the density of buildings, specifically pedestrians because it cannot be entered vehicle. Pedestrian paths (pedestrian sidewalks) are the part of the city, where people move on their feet, usually along the side of the planned road or formed by itself which connecting one place to another

In other words the pedestrian path in terms of The planning is divided into two, namely the planned and the planned unplanned. Planned pedestrian path formed from a pedestrian path that has been planned to connect one place to other places that pedestrians need. Meanwhile, the unplanned pedestrian path formed by itself from the usual path used by pedestrians in their movement from one place to another.

2.2 Pedestrian Path Facilities Protected

Differentiated pedestrian path facilities into two namely:

- a. Facilities for pedestrian paths in the vertical direction, namely pedestrian path facilities that connect the ground floor and the floor above in the building or high rise buildings, such as stairs, ramps, etc
- b. Facilities for horizontal pedestrian paths, such as corridors, halls, and so on. Circulation system and pedestrian system The function of the pedestrian system has at least two general rules, namely space to walk legs and a place to sit. As a place for walking, conditions vary according to with the use of the land provided and environmental quality. System planning objectives pedestrians should focus on:
 1. Development of a pedestrian system that function as a liaison and provide pleasant experience.
 2. Design of a customized pedestrian system with the context of the surrounding environment that has there is.
 3. The design of the path that can increase the sense of place from the site.

Pedestrian path as an alternative urban transportation existence designed in fragments and become very depending on the needs of the road as a means circulation. Pedestrian paths in big cities have a function of development city life. Such as:

- a) Pedestrianization can foster activity healthy so as to reduce vulnerability crime.
- b) Pedestrianization can stimulate various economic activity so that it will develop attractive business district.
- c) Pedestrianization is very beneficial as promotional activities, exhibitions, advertising, campaign and so on.
- d) Pedestrianization can be attractive to activities social, mental and spiritual development.
- e) Pedestrianization can create an atmosphere and specific, unique and dynamic environments in downtown environment.
- f) Pedestrianization also has an impact on efforts reduction in air pollution levels.

III. Research Method

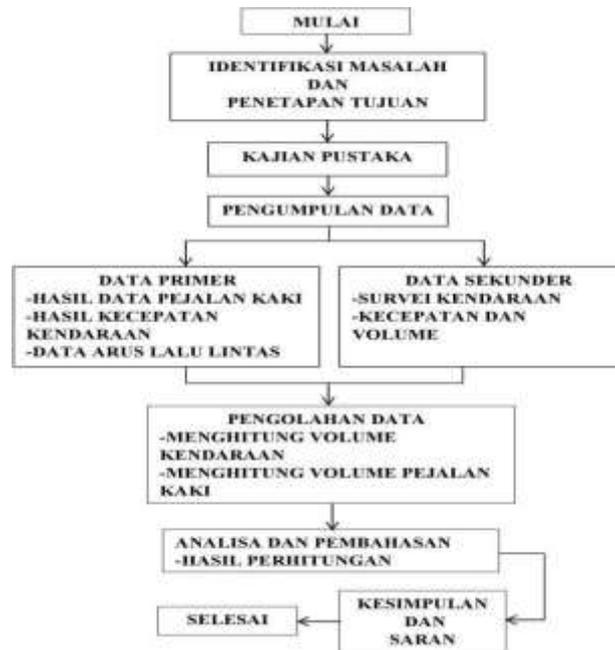


Figure 1. Method Flowchart.

Pedestrian Survey

- From the survey results obtained the highest volume of pedestrians at peak hours
- The average waiting time results across from point A to point B.
- Average pedestrian crossing speed.

Vehicle Survey

- From the survey results obtained the highest volume of vehicles at peak hours.
- The average travel time from point A to point B surveyed is 30 samples (15 samples when there are no pedestrians and 15 samples when there are pedestrians)
- Average headway at off-peak hours: when there are no waders and when there are waders. Meanwhile, during peak hours: when there are no waders and when there are waders.

The primary data collection method in this study was conducted by surveying pedestrians, as well as interviews and filling out questionnaires to the selected respondents. Observations, interview surveys, and filling out questionnaires were carried out directly to 108 respondents.

The results of the questionnaire were analyzed to get the level of satisfaction of Eco JPO Gladhag Panti Husada users by using the Customer Satisfaction Index (CSI) method, as well as to get recommendations for handling priorities based on the factors that influence the use of Eco JPO Gladhag Panti Husada by using the Importance Performance Analysis (IPA) method. Pedestrian Bridge (JPO) According to the Procedure for Planning a Pedestrian Bridge for Pedestrians in Urban No. 027/T/Bt/1995,

“A pedestrian crossing bridge is a bridge that is only intended for pedestrian traffic which functions to pass traffic that is interrupted at both ends of the road due to obstacles in the form of rivers, channels, canals, straits, valleys and crossing roads and railroads.”

In the research of Harahap, H.H (2014), John J. Fruin (1971) said "In planning facilities for pedestrians, including crossing facilities, seven main objectives must be considered, namely: safety, security, convenience, continuity, comfort, system coherence, and attractiveness. The seven factors are interrelated and mutually overlapping. Changes in one factor will affect changes in other factors. Pedestrian Bridge Facility Technical Planning According to the Guidelines of the Ministry of Public Works and Public Housing Pd 03 – 2017 – B Technical Planning Pedestrian Facilities, Pedestrian Bridges (JPO) are included in pedestrian facilities which are classified as non-level pedestrian crossings. The use of the crossing is not on the same level if has met the specified criteria.

Several provisions must be considered in planning non-level crossing facilities:

- a) Non-level crossings must be easily accessible by persons with disabilities, for example by adding ram (grading) or by elevator;
- b) The crossing facilities must be equipped with good lighting which can increase the safety of pedestrians;
- c) Locations and buildings must pay attention to the aesthetic value and the needs of pedestrians.

The technical aspects of the pedestrian bridge planning are as follows:

- 1) The technical provisions of the pedestrian bridge construction follow No. 027/T/Bt/1995 regarding Procedures for pedestrian bridge planning in urban areas;
- 2) Pedestrian crossing bridge is a bridge-building intended to cross pedestrians from one side of the road to the other side of the road. A pedestrian bridge must be built with strong construction and easy to maintain.

IV. Results and Discussion

4.1 Pedestrian Volume Analysis

Pedestrians are people who carry out walking activities and are one of the elements of road users. (Decree of the Director General of Land Transportation: SK.43/AJ 007/DRJD/97). This research is located on Jalan Ahmad Yani, precisely in front of the Kepri Mall Kota shopping center Batam, which JPO will be planned, will facilitate road users, namely pedestrians who will pass from the bus stop to the shopping center.

The number of pedestrians is known from the data obtained from direct observation at the research location which was carried out during peak hours, namely in the morning 08.00 – 09.00 and in the afternoon at 16.00 – 17.00 for one week. From this direct review, the following data were obtained:

Table 1. Pedestrian Volume

Day and date	Busy timeMorning (08:00 - 09:00)	Afternoon Rush Hours (16:00 -17:00)
Monday 26 – 08 – 2019	101	122
Tuesday 27 – 05 – 2019	103	129
Wednesday 28 – 05 – 2019	112	127
Thursday 29 – 05 – 2019	115	118
Friday 30 – 05 – 2019	113	138
Saturday 31– 05 – 2019	109	125
Sunday 01 – 05 – 2019	119	141

Pedestrian peak hours can be seen in Table 1, namely:
 Morning peak hours occur on Sundays with 119 pedestrians.
 The afternoon peak hour occurs on a Sunday with 141 pedestrians.

P = The highest pedestrian value is on Sunday as many as 141 people/hour.

4.2 Pedestrian Characteristics

Pedestrian characteristics on the Ahmad Yani road section are the number of pedestrians only for crossing purposes to the Kepri Mall shopping center or vice versa and use only during peak hours for work purposes and weekend needs. (Decree of the Director General of Land Transportation: SK.43/AJ007/DRJD/97).

4.3 Vehicle Volume

Traffic volume is the number of vehicles that pass a certain point or line on a cross section of the road. Traffic volume enumeration data is the necessary information for phase planning, design, management to road operation (Sukirman 1994).

According to Sukirman (1994), the traffic volume shows the number of vehicles crossing one observation point in one unit of time (days, hours, minutes). In relation to determining the number and width of lanes, the units of traffic volume commonly used are the average daily traffic, the volume of planning hours and capacity. Types of vehicles in this calculation are classified into 3 types of vehicles, namely:

1. Light vehicles (Light Vehicles = LV) Index for motorized vehicles with 4 wheels (passenger cars),
2. Heavy vehicles (Heavy Vehicles = HV) Index for motor vehicles with more than 4 wheels (Bus, 2 axle truck, 3 axle truck and combination), with more than 4 wheels (Bus, 2 axle truck, 3 axle truck and suitable combinations).
3. Motorcycle (Motor Cycle = MC) Index for motorized vehicles with 2 wheels.

The data on the number of vehicles is then calculated in vehicles//hour for each vehicle, with a correction factor for each vehicle, namely:

$$LV=1.0; HV = 1.3; MC = 0.40$$

The total traffic flow in smp/hour is:

$$Q_{smp} \text{ or } v_{smp} = (emp \text{ LV} \times LV + emp \text{ HV} \times HV + emp \text{ MC} \times MC)$$

Tables 2. Volume of two-lane light vehicles

Table 3. Volume of left-hand two-wheeled light vehicles

Table 4. Volume of light vehicles for right-hand passenger cars

Table 5. Volume of light vehicles for left-hand passenger cars

Table 6. Volume of right-hand minibus vehicles

Table 7. Volume of left lane Minibus vehicles

4.4. Determination of Feasibility of Bridge Construction

The survey results have known the results of P (person/hour) and V (vehicle/hour). We know from table 4.1 that the P results for seven days using the highest number of pedestrians, namely on Sunday afternoon = 141 people/hour with a data error rate or percentage of error of 10%. And the V results are also obtained from the highest data at peak hours for seven days, namely on Monday mornings at 08:00 - 09.00 = 11.103.20 vehicles/hour as shown in table 4.11 with a data error rate or percentage of error of 10%. Therefore, we can determine what facilities are suitable for use according to the selection table for the type of crossing facility. To find out what facilities are suitable for use, we must also know the value:

$$\begin{aligned} PV2 &= [P \times (V2)] \\ &= [141 \times (11,103,202)] \\ &= 17,382,628,083.84 \\ PV2 &= 1.73 \times 10^{10}. \end{aligned}$$

So it is known that PV2 is 1.73×10^{10} , from the results seen from Table 2.2, we can conclude that the pedestrian bridge crossing facility (JPO) is feasible to build with the following conditions:

$$\begin{aligned} PV2 \text{ (pjlkaki.kend/hour)} &: 1.73 \times 10^{10} > 1.010 \\ P(\text{walking distance/hour}) &: 100 < 141 < 1250 \\ V(\text{drive/hour}) &: 11.103,20 > 7000 \end{aligned}$$

4.5 Selection of Types of Crossing Facilities

Furthermore, for the construction of pedestrian bridges in terms of the overall width of the Ahmad Yani road, which is 40 m, the recommended pedestrian bridge can be built with a bridge width of up to 45 m with construction using reinforced concrete bridge construction or composite bridge construction types.

V. Conclusion

In this study it was concluded that:

1. Based on the results of the calculation of the number of pedestrians using the pedestrian bridge, the most people amounted to 141 people/hour, which fell on Sunday afternoon;
2. The highest number of vehicle volumes fell on Thursday mornings at 08:00 - 09.00 a number of 11.103.20 vehicles/hour and from the calculation results, the volume of vehicles/hour (PV2) was 1.73×10^{10} vehicles/hour;
3. Based on the provisions set out in (Table 2.2), it is concluded that the pedestrian bridge is feasible to build.

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