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ANALYSIS OF THE EFFECTIVENESS OF PEDESTRIAN CROSSING BRIDGE (JPO) FACILITIES IN BANJARBARU CITY

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ABSTRACT

People crossing bridges serve as a means to reduce conflicts between pedestrians and vehicles, which can interfere with the smooth flow of traffic, as well as improve safety and comfort when crossing. One of the roads in Banjarbaru that uses access to cross people, namely on Ahmad Yani KM 34 street, precisely adjacent to the Banjarbaru City BNI office. This pedestrian crossing bridge is newly built by the government, this is done based on consideration of the need for transportation crossing facilities/infrastructure in the city of Banjarbaru.

This study was conducted to evaluate the performance of the use of pedestrian bridges in Banjarbaru City by considering the frequency of crossings (P), traffic intensity (V), and evaluations from participants. The level of effectiveness of the use of pedestrian bridges is classified as "highly effective." Based on the results of the analysis, the PV^2 value obtained exceeded $2x10^8$. The number of crossers (P) is in the range of 50-100 people per hour, while the volume of vehicles (V) is in the range of >750 vehicles per hour. Referring to the standards of the Directorate General of Highways in 2023, the most suitable crossing facility for the location being studied is Pelican with waiting stalls and pelican only. Based on the assessment of pedestrians using the Likert scale, a total average score of 3.085 was obtained, which shows that its effectiveness is relatively low. Based on observations and measurements at the site, several parameters were found that did not meet the applicable guideline standards. For example, the height of the climb (0.1 m) is less than the stipulated (it should be a minimum of 0.15 m and a maximum of 0.18 m). In addition, the width of the step (0.25 m) is not in accordance with the Bina Marga regulations which require a minimum width of 0.3 m. And the ramp width does not meet.

Keywords : Pedestrian, Effectiveness, Crossing Facilities

ABSTRACT

People crossing bridges serve as a means to reduce conflicts between pedestrians and vehicles, which can interfere with the smooth flow of traffic, as well as improve safety and comfort when crossing. One of the roads in Banjarbaru that uses access to cross people, namely on Ahmad Yani KM 34 street, precisely adjacent to the Banjarbaru City BNI office. This pedestrian crossing bridge is newly built by the government, this is done based on consideration of the need for transportation crossing facilities/infrastructure in the city of Banjarbaru.

This study aims to measure the effectiveness of the use of pedestrian bridges in Banjarbaru City by considering the number of crossings (P), traffic volume (V), and respondents' views. The level of effectiveness of the use of pedestrian bridges is categorized as "highly effective." Based on the results of the analysis, the PV2 value obtained exceeded 2x108. The number of crossers (P) is in the range of 50-100 people per hour, while the volume of vehicles (V) is in the range of >750 vehicles per hour. Referring to the standards of the Directorate General of Highways in 2023, the most suitable crossing facility for the location being studied is Pelican with waiting stalls and pelican only. From the results of the pedestrian assessment using the Likert scale, a total average score of 3,085 was obtained, the effectiveness of which was categorized as low. Based on observations and measurements at the site, several parameters were found that did not meet the applicable guideline standards. For example, the height of the climb (0.1 m) is less than the stipulated (it should be a minimum of 0.15 m and a maximum of 0.18 m). In addition, the width of the step (0.25 m) is not in accordance with the Bina Marga regulations which require a minimum width of 0.3 m. And the ramp width does not meet.

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1. INTRODCTION

The growth of the urban population increases the need for transportation. As an infrastructure to support human activities, transportation requires comprehensive handling, including the provision of safety facilities for pedestrians. The People Crossing Bridge (JPO) is one of the facilities built to meet the aspects of safety, security, and comfort for pedestrians when crossing roads with heavy traffic.

In Banjarbaru, the JPO was built on Jalan Ahmad Yani KM 34 near the BNI office. However, there are still pedestrians who cross carelessly without using the JPO. This poses a risk of accidents and congestion

However, even though the JPO has been built, pedestrians can still be seen crossing the road carelessly, without using the available JPO facilities. This of course poses a risk of traffic accidents and traffic jams.

Therefore, it is necessary to conduct an analysis of the effectiveness of the JPO in Banjarbaru to evaluate the extent to which this facility functions as it should and provides benefits for pedestrian safety and smooth traffic.

This analysis is important to identify factors that affect the effectiveness of JPO in Banjarbaru, including:

1. JPO Location,
2. The level of utilization of JPO,
3. Socialization and education,
4. The impact of JPO.

By analyzing these factors, shortcomings or problems in the JPO in Banjarbaru can be identified. Furthermore, appropriate solutions can be proposed, such as more intensive socialization programs to the community and JPO development planning as needed. Therefore. The author chose the title in this final project with the title "Analysis of the Effectiveness of People Crossing Facilities (JPO) in the City of Banjarbaru".

2. THEORETICAL FOUNDATIONS

Crossing Facilities

Fundamentally, the activity of walking aims to achieve the shortest distance between two locations in a comfortable and safe way from various distractions. Crossing facilities are the means provided for pedestrians to cross the road.

Flats Crossing

The level crossing is designed for pedestrians who are at the same level as the road. This type of plane crossing includes the following types:

- Zebra Cross
- Pelican Cross
- Zebra Cross and lapak wait
- Pelican Cross with waiting stalls

1. Based on formula (PV^2), P is the flow of pedestrians crossing the road as far as 160 m every hour (pedestrians/hour), while V is the flow of vehicles per hour in both (vehicles/hour).
2. P and V are the flow of pedestrians and vehicles during the peak 4 hours, based on the initial recommendations listed in Table 1.

Table 1. Criteria for determining the Flats crossing facility

P.V2 (hours)	**P (Person/hour)**	**V (Kend/hour)**	**Facility Type**
> 108	50-100	300-500	Zebra cross or pedestrian platform
> 2 x 108	50-1100	400-750	*Zebra Cross* with stalls waiting
> 108	50-1100	> 500	Pelicans
> 108	> 1100	> 300	Pelicans
> 2 x 108	50-1100	> 750	Pelican with stalls waiting
> 2 x 108	>1100	> 400	Pelican with stalls waiting

Figure 2. 1 Example of a waiting stall

Unflated Crossings

A single-level crossing facility is a means provided for pedestrians to cross, both above and below the road surface. Based on the 2018

and Public Housing, this facility can be in the form of a pedestrian bridge that is above the road or a tunnel that is under the road. The main purpose of this facility is to maintain the continuity of the pedestrian path and facilitate the movement between paths of different elevations. Table 2. Criteria for determining the crossing of people not to be on the same plane

P.V $^{\cdot 2}$	P (person/hour)	V (Kend/h)	Recommendations
2x108	1100	>750	Non-level crossings

3. METHOD

Research Location

The location of the JPO Research is on a road in Banjarbaru, namely on Jalan Ahmad Yani KM 34, precisely adjacent to the BNI Banjarbaru City office. To the road JPO that are the of the research, it can be seen Figure 1.

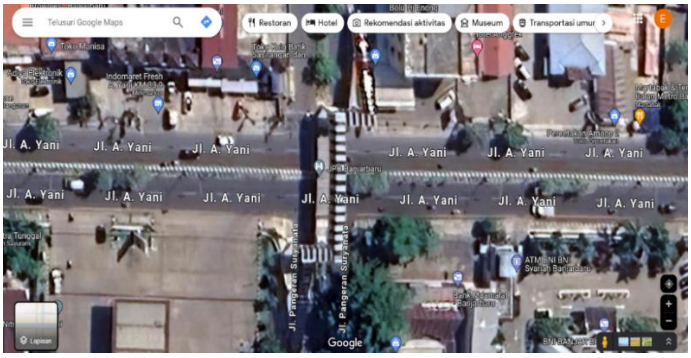

Figure 3. 1 Research location

Data Collection

Primary Data

Primary data is obtained directly researcher through surveys or observations at the research site. This method involves direct interaction with information sources in the field. Examples of primary survey forms include:

1. Observation of vehicle volume pedestrian volume,
2. Questionnaire Distribution, and
3. Physical condition of the pedestrian crossing bridge.

Secondary Data

The purpose of secondary collection is to obtain information data related to theorist relevant to the main research problem. Sources such as journals, literature, and the internet are used to obtain the data. The use of various sources of literature also aims to build a strong theoretical foundation, so that it can support the scientific validity of research results

Data Analysis Stage

The data collected from the survey for further analysis to achieve the right score. Data validation is carried out in accordance with the survey method that has been carried

out, namely by taking and determining samples. The sample was randomly selected the people and vehicles passed on the bridges roads in specific locations.

Analysis of Road Crossing Flow and Vehicle Volume

Flow and crossing volume data were collected at the JPO location, with the calculation of traffic and pedestrian volumes (both using the JPO and not) within a radius of 80 meters to the west and east of the JPO.

Effectiveness Assessment Based on Percentage of Road Crossing

The effectiveness of the JPO is assessed using the percentage formula from the following previous researchers

$$(\%) = \frac{A}{B} x\ 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(2.5)$$

Determining the level of effectiveness based on pedestrian behavior

To assess the effectiveness of the use of pedestrian bridges at a research site, one of the methods that can be used is to analyze the behavior of bridge users collected through a questionnaire that is distributed.

4. **RESULTS AND DISCUSSION**

Determination of Crossing Facilities Based on P.V²

In order to evaluate the effectiveness of the crossing facilities at the study site, data collection was carried out directly in the field. Observations were focused on an area of 160 meters. The data collection process was carried out in three different time periods - morning, afternoon and evening - with an observation duration of one hour in each of these periods, which is assumed to be peak or peak hours.

$$P\ (rata-rata) = \frac{\Sigma \text{ arus penyeberangan jalan (orang)}}{\Sigma\ jam\ tersibuk\ selama\ 1\ hari\ (jam)}$$
$$= 56{,}333 \approx \text{person/hour}$$

$$V\ (rata-rata) = \frac{\Sigma \text{ Volume Kendaraan (Kendaraan)}}{\Sigma\ jam\ tersibuk\ selama\ 1\ hari\ (jam)}$$
$$=$$
$$= 5686 \text{ Vehicle / Hour}$$

After calculating the average value of the number of crossers (P)the volume of vehicles (V), the next step is to apply the formula $P.V^2$. This formula is used as a parameter to determine for crossing facilities, referring to the standards that have been set by the Directorate in 2023

PV^2 =56 x 5686 ^{2}

= 1,810,513,376 = 18 x 108

Based on the results of the analysis, the PV^2 value obtained exceeded $2x10^8$. The number of crossers (P) is in the range of 50-100 people per hour, while the volume of vehicles (V) is in the range of >750 vehicles per hour. Referring to the standards of the Directorate General of Highways in 2023. The most suitable crossing facility for the location studied is Pelican with waiting stalls and pelican only.

Analysis of Road Crossing Questionnaires at JPO

The results of a survey of 30 users of the People Crossing Bridge (JPO) show that the majority of users are male students under 15 years old, work as students, and live in North Banjarbaru on average. They generally use bridges for travel from home to school. Respondents reported that they often use pedestrian bridges, mainly for safety reasons to avoid road accidents. These findings indicate the important role of the JPO in providing safe access for young students in the region.

Effectiveness Level Based on Pedestrian Behavior

The JPO evaluation used two parameters: "frequency of people crossings" (2.8 < 3.085, "Low" category) and "desired crossings" (3.37 > 3.085, "High" category). Despite the categorical differences, the evaluation method establishes that inconsistencies in the level of effectiveness of the parameters result in lower overall assessments. In conclusion, the effectiveness of JPO in general is classified as "Low"

Effectiveness of People Crossing Bridges Based on Pedestrian Volume

The efficiency of bridges can be measured using the formula (2.5) from the previous study, namely from (in Nadjam, A., et al., 2018)

$$(\%) = \frac{\text{Jumlah penyeberang menggunakan jembatan penyeberangan}}{\text{Total keseluruhan penyeberang jalan}} x\ 100$$

The effectiveness of a pedestrian crossing bridge is calculated using a predetermined formula. This calculation produces a percentage that shows the level of effectiveness of the bridge at the site being studied based on the data that has been collected.

$$\%Efektifitas = \frac{153}{169}\ x\ 100\%$$

= 90.53 %

The on-site pedestrian crossing bridge (JPO) shows a high level of effectiveness, with an effectiveness percentage of 90.53%. This figure puts the JPO in the "Very Effective" category.

Physical Condition of the Bridge

No.	Parameters	JPO Physical Condition	Highway Guidelines in 2023	Information
1	Bridge height	5.5 m	Minimum 5.1 m	Meet
2	Bridge width	2,16 m	Minimum 2 m	Meet
3	Ramp height	0,09 m	Min 0.15 and Max 0.18 m	Not meeting
4	Tread width	0,18 m	0,30 m	Not meeting
5	Ramp width	0,70 m	0,75 m	Not meeting
6	Vine handle	0,88 m	0,80 m	Meet
7	Length of ramp	8.5 m	Maximum 9 m	Meet
8	Rest space between ramps	1.7 x 2 m	1.5 x 1.5 m	Meet

Based on observations and measurements at the site, several parameters were found that did not meet the applicable guideline standards. For example, the height of the climb (0.1 m) is less than the stipulated (it should be a minimum of 0.15 m and a maximum of 0.18 m). In addition, the width of the step (0.25 m) is not in accordance with the Bina Marga regulations which require a minimum width of 0.3 m. And the ramp width does not meet. However, the physical condition of the People Crossing Bridge (JPO) is very well maintained. This JPO is even equipped with adequate lighting. The cleanliness of the JPO is also well maintained, and there is CCTV which is an added value in itself. This is quite special considering that the JPO facility located on Jalan Ahmad Yani is the only JPO in Banjarbaru.

5. CONCLUSION

Based on the results of the analysis and calculations that have been carried out in the previous chapters, it can draw some main conclusions as follows:

1. Based on the results of the analysis, the PV^2 value obtained exceeded 2 x 108. The number of crossers (P) is in the range of 50-100 people per hour, while the volume of vehicles (V) is in the range of >750 vehicles per hour. Referring to the standards of the Directorate General of Highways in 2023, the most suitable crossing facilities for the location being studied are pelican and waiting stalls and pelican only.
2. The results of the analysis of the volume of pedestrians on the pedestrian bridge showed an effectiveness rate of 90.53%. Referring to the classification that has been

established in the Table of People Crossing Bridges, this percentage places the crossing bridge in the category of highly effective crossing facilities.

3. Evaluation of pedestrian habits in JPO using the Likert scale method resulted in an average score of 3.085. where the total average value obtained is less than the average value of the "desired crossing" parameter in the JPO, therefore, the assessment of the effectiveness of the JPO based on the behavior of crossing bridge users is relatively low.
4. The results of a survey of 30 users of the People Crossing Bridge (JPO) show that the majority of users are male students under 15 years old, work as students, and live in North Banjarbaru on average. They generally use bridges for travel from home to school. Respondents reported that they often use pedestrian bridges, mainly for safety and convenience to avoid road accidents. These findings indicate the important role of the JPO in providing secure access. Where the physical condition of the People Crossing Bridge (JPO) is appropriate and very well maintained. This JPO is even equipped with adequate lighting. The cleanliness of the JPO is also well maintained, and there is CCTV which is an added value in itself. With this, the pedestrian crossing bridge in Banjarbaru City can provide safety and comfort for pedestrians in the area.

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