

**ANALYSIS FACILITIES PEDESTRIAN AND BICYCLE LANE LANES AS FACILITIES INTEGRATION MODES OF PUBLIC TRANSPORT IN THE CITY OF BEKASI****Dea Ayu Karlinda, Rulhendri Rulhendri, Tedy Murtejo**

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E-mail: [deaayukar@gmail.com](mailto:deaayukar@gmail.com)**ABSTRACT**

Analysis facilities pedestrian and bicycle lanes as facilities integration modes of public transport in the city of bekasi (Case Study: Bekasi Terminal and BTC Bus Stop). The city of bekasi located in west java province which has an area of areas 210,49 km<sup>2</sup>. The city central being as business and commerce , and activities services so that be an attraction for newcomers to look for a job and to shelter Terminal bekasi and bus stops btc is located in kecamatan bekasi timur , in the city of bekasi the rate of population growth in the year 2019 as much as 1,4 % . Walking is a mode of transportation. All buildings are provided for pedestrians in order to provide services to pedestrians so as to improve the smoothness, safety and comfort of pedestrians. The purpose of this study is to analyze the performance of pedestrian facilities in Bekasi Terminal and BTC bus stops. The method used is conducting direct field surveys and data processing using Microsoft Excel. The results of the author's research include the minimum width of the sidewalk in 2020 and 2025 of 1.5 - 1.6 meters and the service level of pedestrian facilities is classified as A, which means that pedestrians can walk freely, including being able to determine the direction of walking freely, at speed. relatively fast without causing interference between pedestrians. The existing condition of sidewalks in 2020, namely there are several obstacles for pedestrians such as the presence of street vendors, several motorbikes parked carelessly, buying and selling activities in markets close to Bekasi Terminal and limited integration facilities around the place. Planning that the authors do is to increase the width of the sidewalk to 3 meters, arrangement of closed drainage on the shoulder of the road, and the addition of street lighting facilities.

**Key word:** pedestrian facilities; growth; performance; planning; provide services.

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**INTRODUCTION**

Bekasi City is located in West Java Province which has an area of 210.49 km<sup>2</sup>, with an area boundary in the north bordering Bekasi Regency, in the south bordering Bogor Regency and Depok City, in the west bordering DKI Jakarta Province. It shifted to become the center of business and trade, as well as service activities so that it became an attraction for migrants to find work and to live in. Therefore, this city has a fairly high growth. Based on data from the Population and Civil Registry Office of Bekasi City in 2015, Bekasi City has a population of 2,384,413 people. This means that the transportation used is also increasing. Therefore, to reduce traffic congestion a solution is needed,

Over time, the existing transportation infrastructure is unable to accommodate these needs and causes traffic jams with all its implications, such as solutions, decreasing the quality of life of the community and the level of road safety, waste of fuel and wasted productive time on the road.

As for overcoming this problem, many cities, both in developing and developed countries, have begun to change their transportation policies and create a sustainable transportation system that promotes a culture of walking and cycling, one of the facilities needed is a pedestrian.

**Pedestrian Facilities**

According to Law No. 22 of 2019, a pedestrian is every person who walks across road facilities. Based on this definition, it can be interpreted that a pedestrian is one of the road users who must be accommodated on a road with a special facility, namely what is called a pedestrian facility, because walking is the main mode of transportation for humans to move places. Pedestrian facilities are

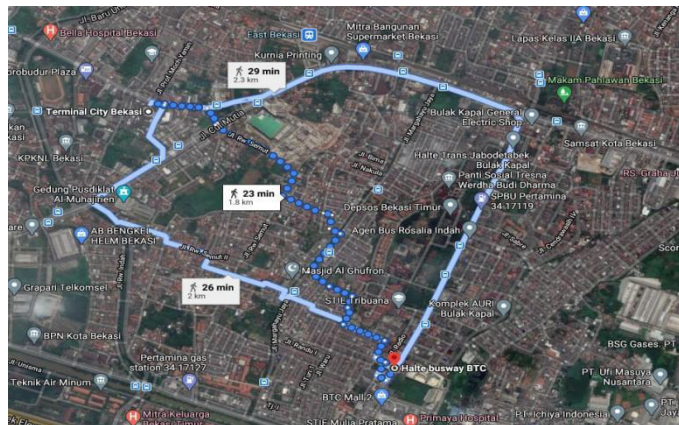
traffic support facilities that are part of the road equipment that must be provided on a road. This facility can be used specifically by pedestrians or simultaneously with bicycle users on one road.

According Syaiful S, Prama Y (2019) and Syaiful (2017) the development of road-based land transportation is always being improved. The government, in this case the Ministry of PUPR, is active in improving public transportation services as a means to travel well and comfortably.

So that passengers will switch modes of transportation from private to public transportation. Transportation services are also supported by public facilities such as bus stops/shelters, pedestrians, pedestrian crossings, clear traffic signs (Syaiful S, Fadly A. 2020; Akbardin J. et.al 2020; Syaiful S. 2017; Alfanani MAM et al. 2021).

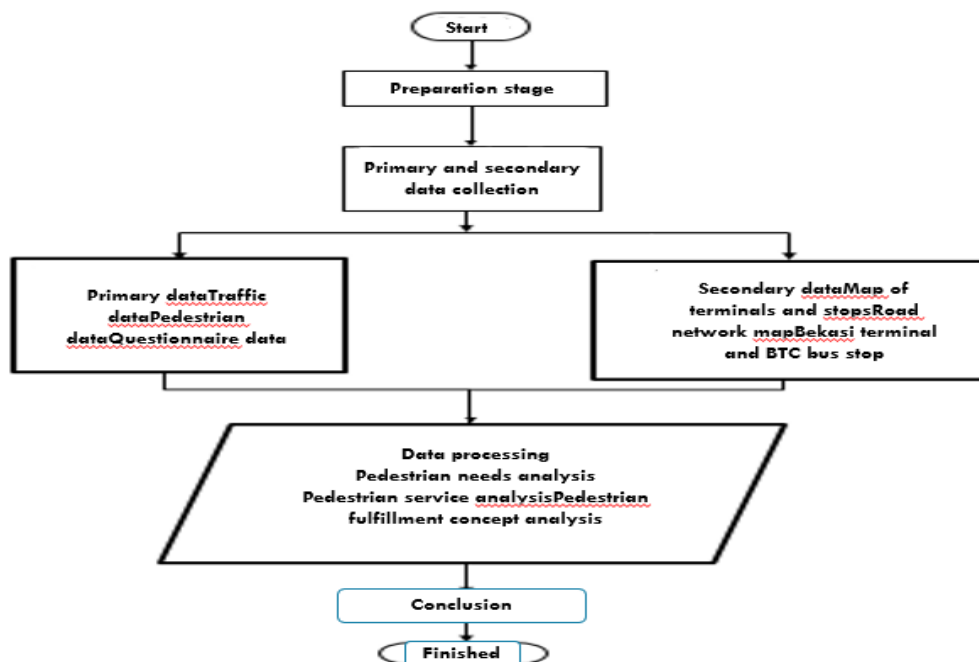
**RESEARCH METHODS**

The location of this research was carried out in Bekasi Terminal and Bekasi City BTC Bus Stop. When the research was carried out in July 2020.



**Figure 1.** Research sites (Source: Google earth)

The stages of this research are shown in the form of a flow chart as follows:



**Figure 2.** Research flow chart

**RESULTS AND DISCUSSION****Pedestrian Characteristics Data at Bekasi Terminal**

Pedestrian performance can be seen from surveys and observing conditions in the field directly. The pedestrian count data that is calculated is the data per 15 minutes during peak hours in a day. The location under review is Bekasi Terminal on Prof. Intersection Street. Moch. Yamin which is divided into six points. The following is the data on the number of pedestrians from 13 to 14 July 2020 at Bekasi Terminal is shown in Table 1.

**Table 1.** Data on the Number of Pedestrians in Bekasi Terminal

Location	Morning Peak					
	A	B	C	D	E	F
6.00 - 6.15	3	2	1	2	0	0
6.15 - 6.30	5	1	3	8	5	1
6.30 - 6.45	2	4	2	8	4	1
6.45 - 7.00	1	1	2	8	3	0
7.00 - 7.15	1	2	3	7	1	3
7.15 - 7.30	3	1	1	8	1	1
7.30 - 7.45	4	5	2	6	2	1
7.45 - 8.00	3	10	0	16	1	1
8.00 - 8.15	6	2	2	7	4	3
8.15 - 8.30	1	3	2	9	4	0
8.30 - 8.45	2	1	3	5	4	1
8.45 - 9.00	1	0	0	14	0	2
	32	32	21	98	29	14
Location	Afternoon Peak					
	A	B	C	D	E	F
16.00 - 16.15	3	27	1	12	1	0
16.15 - 16.30	1	13	0	12	2	0
16.30 - 16.45	7	18	2	7	4	1
16.45 - 17.00	0	18	0	8	3	1
17.00 - 17.15	1	16	0	12	6	1
17.15 - 17.30	2	20	4	11	2	0
17.30 - 17.45	3	22	3	11	1	1
17.45 - 18.00	3	18	1	11	4	0
18.00 - 18.15	0	6	1	10	2	1
18.15 - 18.30	1	12	3	17	4	1
18.30 - 18.45	0	5	2	7	3	5
18.45 - 19.00	1	10	1	10	3	3
	22	185	18	128	35	14

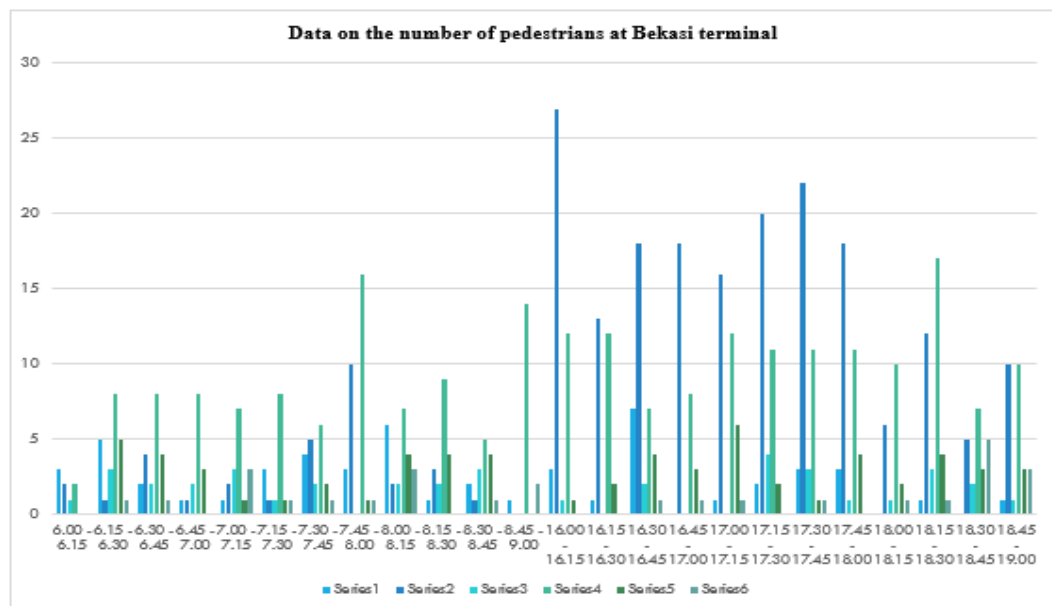
(Source: Results of survey and analysis)

**Table 2.** Data on the number of pedestrians at the BTC stop

Location	Morning Peak						
	A	B	C	D	E	F	G
6.00 - 6.15	4	1	2	9	12	2	1
6.15 - 6.30	6	3	3	7	6	0	2
6.30 - 6.45	4	7	1	4	4	2	3
6.45 - 7.00	3	3	2	4	6	4	5
7.00 - 7.15	2	0	0	5	4	0	4
7.15 - 7.30	3	3	2	6	3	0	1
7.30 - 7.45	2	7	3	5	1	3	2
7.45 - 8.00	0	2	1	0	2	1	10
8.00 - 8.15	1	4	0	3	2	3	5
8.15 - 8.30	4	3	3	6	5	3	7
8.30 - 8.45	4	1	0	1	2	5	7
8.45 - 9.00	1	0	3	4	5	7	8
	34	34	20	54	52	30	55
Location	Afternoon Peak						
	A	B	C	D	E	F	G
16.00 - 16.15	1	4	7	4	16	10	1
16.15 - 16.30	0	0	1	2	3	10	11
16.30 - 16.45	1	0	3	2	7	20	1
16.45 - 17.00	6	5	5	4	7	19	10
17.00 - 17.15	0	4	9	2	17	28	20
17.15 - 17.30	0	2	6	4	19	18	15
17.30 - 17.45	0	3	2	5	13	9	15
17.45 - 18.00	0	3	1	3	17	16	18
18.00 - 18.15	0	1	1	4	9	20	9
18.15 - 18.30	1	1	5	9	20	13	13
18.30 - 18.45	1	0	1	2	15	14	14
18.45 - 19.00	0	1	1	3	5	12	5
	10	24	42	44	148	189	132

(Source: Results of survey and analysis)

Based on the table, a graph shows the volume of pedestrians at Bekasi Terminal.



**Figure 3.** Graph of Pedestrian Volume Against Bekasi Terminal (Source: Analysis Results)

Based on the table, a graph shows the volume of pedestrians at the BTC Stop.

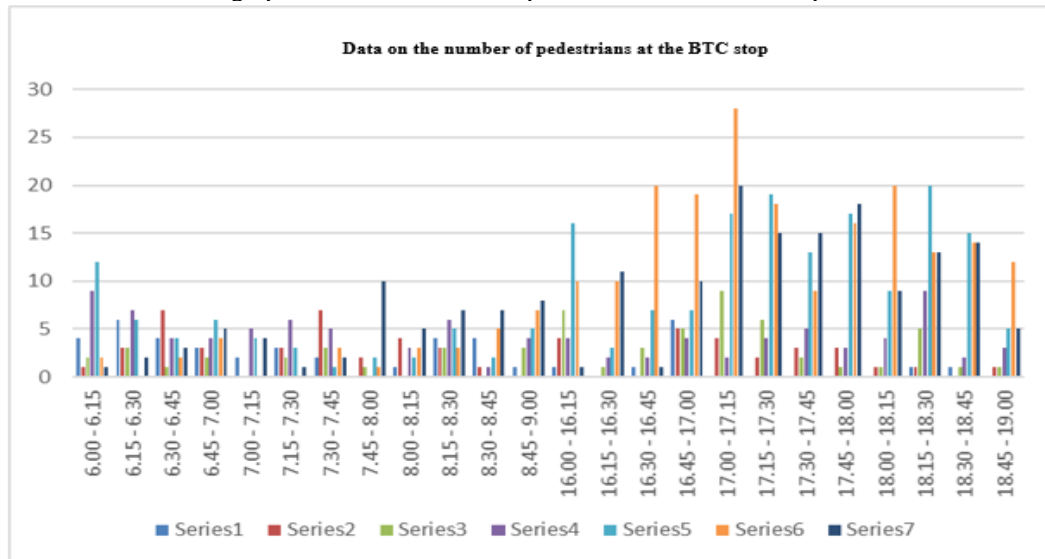


Figure 4. Graph of Pedestrian Volume Against BTC Stop (Source: Analysis Results)

**Analysis of Pedestrian Facility Space Requirements**

Based on the data on the number of pedestrians in Bekasi Terminal and BTC Bus Stop, the analysis of pedestrian space requirements for 2020 and 2025 is shown in the table below:

Table 3. Analysis of Projection of Sidewalk Needs in 2020 and 2025

Location	Total pedestrians per day (2020)	Hourly pedestrians (2020)	Walks per minute (2020)	Minimum sidewalk width (2020)	Pedestrians per minute (2025)	Minimum sidewalk width (2025)
A	44	8	1	1.5	2	1.6
B	58	10	1	1.5	2	1.6
C	62	11	1	1.5	2	1.6
D	98	17	1	1.5	2	1.6
E	200	34	1	1.5	2	1.6
F	219	37	1	1.5	2	1.6
G	187	32	1	1.5	2	1.6

(Source: Analysis results)

**Information;**

1. The total number of pedestrians per day is the data on the number of pedestrians in Bekasi Terminal and BTC bus stops in one day.

2. Hourly data is data on the number of pedestrians at Bekasi Terminal and BTC Bus Stop in one hour.
  3. Data on the number of pedestrians per minute is the number of pedestrians in Bekasi Terminal and BTC Bus Stop in one minute.
  4. The minimum sidewalk width (2020) is the minimum sidewalk width based on the Minister of Public Works and Housing Regulation No.3. 2014 in 2020.
  5. Permenit (2025) is data on the number of pedestrians in one minute for projections in 2025.
  6. The minimum curb width (2025) is the minimum curb width for the projection by 2025.
- The calculation of road capacity based on MKJI 2017 is stated in the following table:

**Analysis of Pedestrian Service Levels in Bekasi Terminal**

Based on the data on the number of pedestrians that have been described, the analysis of pedestrian service levels carried out for 2020 and 2025 is shown in the table below:

**Table 4.** Service Level Analysis in 2020

Category (2020)	Location					
	A	B	C	D	E	F
Pedestrian path (m <sup>2</sup> /person)	67	20	100	20	67	100
Average speed (meters/minute)	79	81	80	82	80	81
Volume/flow (person/meter/minute)	1	1	2	1	1	2
Volume/Capacity ratio	0.0127	0.0123	0.0250	0.0122	0.0125	0.0247
LOS	A	A	A	A	A	A

(Source: Analysis Results)

**Table 5.**Service Level Analysis in 2025

Category (2025)	Location					
	A	B	C	D	E	F
Pedestrian path (m <sup>2</sup> /person)	67	20	101	20	67	101
Average speed (meters/minute)	80	82	81	83	81	82
Volume/flow (person/meter/minute)	1	1	2	1	1	2
Volume/Capacity ratio	0.0126	0.0123	0.0248	0.0121	0.0124	0.0245
LOS	A	A	A	A	A	A

(Source: Analysis Results)

Based on the analysis of pedestrian service level analysis in 2020 and 2025, the Bekasi Terminal service level has met the provisions of PM PUPR NO.3 2014.

### Pedestrian Fulfillment Concept Analysis at Bekasi Terminal

In this research, analysis results can be obtained to determine the concept of pedestrian fulfillment in Bekasi Terminal, namely by knowing the existing conditions in Bekasi Terminal which can be used as a reference before carrying out the construction of a good road mode integration facility.

#### Existing Condition of Bekasi Terminal

The existing condition in Bekasi Terminal still has a very low volume of pedestrians, this of course affects the desire of people to walk to Bekasi Terminal from public transportation stops to Bekasi Terminal or vice versa. These conditions can be seen in the image below:



**Figure 5.** Existing Condition in front of Indomaret, Bekasi Terminal (Source: Google Earth)

The existing condition that will be used as an integration facility, of course, needs to be affirmed by the officers because there are many street vendors selling stalls selling on the sidewalk and several motorbikes parked carelessly around the sidewalks. This makes it difficult for people to walk to or from the Bekasi terminal and to get to the Bekasi terminal junction.

#### Sidewalk Space Dimension Planning

Based on the analysis of pedestrian space requirements, analysis of pedestrian service levels, and current conditions around Bekasi Terminal and BTC bus stops, the authors plan the dimensions of sidewalk space as an alternative pedestrian facility around Bekasi Terminal and Hate BTC. The planning is based on the provisions of PP. 34 of 2006 concerning Roads, Guideline Pd T - 13 - 2004 B Guidelines for Installation of utilities at Road Owned Facilities, guideline No. 33/T/BM/1996 regarding Road Landscape Engineering procedures, and Guideline No. 011/T/Bt/1995 concerning Planning Procedures for Pedestrian Facilities in Urban Areas.

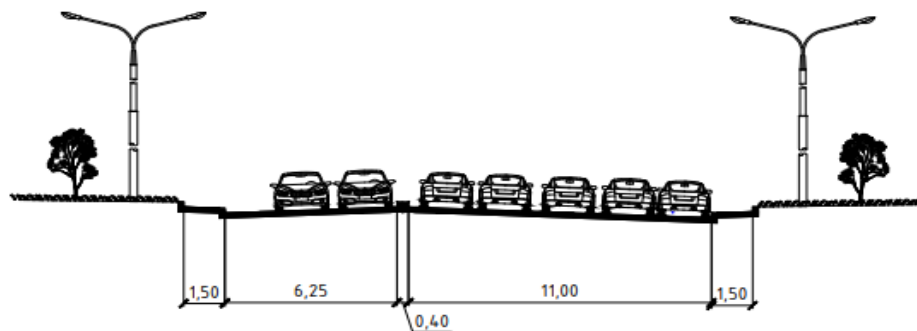
Pedestrian facilities are planned based on the following conditions:

1. The road classification is type II Class I roads, the highest standard for roads with 4 or more lanes, providing fast transport services for intercity or inner city transport, with control.
2. Sidewalks can be planned on roads where the volume of pedestrians is more than 300 people per 12 hours (6.00 - 18.00 hours) and more traffic volume and 1000 vehicles per 12 hours (6.00 - 18.00 hours).
3. The sidewalk free space is not less than 2.5 meters and the free depth is not less than one meter and the pavement surface. Side freedom of not less and 0.3 meters. The utility installation plan must not only fulfill the sidewalk free space, but also must comply with the provisions in the utility installation manual.
4. The width of the sidewalk must be able to serve the volume of existing pedestrians. The minimum width of the sidewalk is listed in Guideline No. 011/T/B /1995 can be seen in table 6 in accordance with the road clarification as follows:

**Table 6.** Minimum Sidewalk Width

Classification of the road plan		Minimum standard (m)	Minimum width (exception)
Type II	Class I	3.0	1,5
	Class II	3.0	1,5
	Class III	1.5	1,0

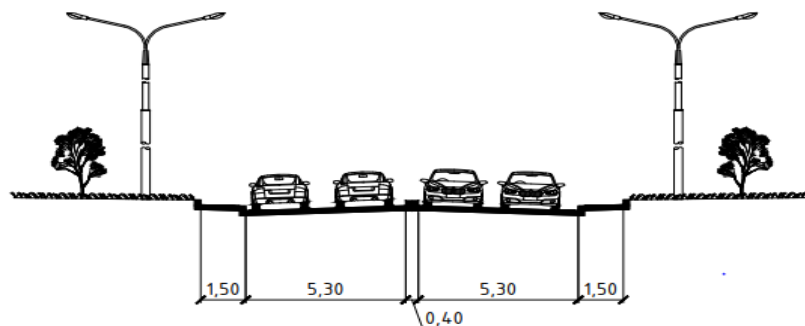
(Source: Public Works Department of the Directorate General of Highways, Directorate of Technical Development No. 011 / T / Bt / 1995)



**Figure 6.** Existing Condition of Segment A Road Access Prof. Intersection. Moch. Yamin  
 (Source: Analysis Results)

The planning of sidewalk space dimensions for segment A at Bekasi Terminal takes into account the number of users of the facility. This is marked by widening the sidewalk to 1.5 meters and adding street lighting facilities, the specifications are described as follows:

- Left Pedestrian : 1.5 m
- Right Pedestrian : 1.5 m
- Total Shoulder : 0 m
- Median : 0 m
- The Road : 7 m



**Figure 7.** Existing Condition of Segment A Jl. HM. Juyo Martono (Source: Analysis Results)



The planning of sidewalk space dimensions for segment A at BTC stops takes into account the number of users of the facility. This is marked by widening the sidewalk to 1.5 meters and adding street lighting facilities, the specifications are described as follows:

Left Pedestrian	: 1.5 m
Right Pedestrian	: 1.5 m
Total Shoulder Road	: 0 m
Median	: 0.4 m
The Road	: 10.6 m

## CONCLUSION

From the need for sidewalk space in Bekasi Terminals and BTC Shelters in 2020 is a minimum of 1.5 m and the projection analysis of space requirements in Bekasi Terminals and BTC Shelters in 2025 is a minimum of 1.6 m. The service level of pedestrian facilities at Bekasi Terminal and BTC Shelter in 2020 and 2025 is categorized as service level A, which means that pedestrians can walk freely, including being able to determine the direction of walking freely, at a relatively fast pace without causing interference between pedestrians. feet. The existing conditions in Bekasi Terminal and BTC Bus Stop, there are several obstacles for pedestrians such as the existence of street vendors, several motorbikes parked carelessly, buying and selling activities in markets close to Bekasi Terminal and limited integration facilities in the vicinity. The planning that the authors do on the dimensions of sidewalk space includes the addition of the width of the sidewalk to 1.5 m and pedestrian facilities.

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