

ANALYSIS OF OPERATIONAL PERFORMANCE OF TRANSJAKARTA PUBLIC TRANSPORTATION CORRIDOR 13 ROUTE PURI BETA 2 - LATUHHARHARI (L13E)

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ABSTRACT

Transportation is one of the state's tools to drive the economy, the Jabodetabek community already has a fairly good means of transportation, one of which is the Transjakarta Bus. Transjakarta buses have also developed their routes and one of the routes that is quite busy is Puri Beta 2 - Latuharhari corridor L13E. Although Transjakarta Route L13E is operated by Express, there are still problems with the frequency of bus arrivals. This is because the L13E route does not fully have a dedicated path. There are still some segments mixed with other traffic. The purpose of this study is to determine and analyze the Transjakarta Bus Performance of Puri Beta 2 – Latuharhari L13E Route. The method used for this research is a survey method to the field to obtain research data. After the data is obtained, then an operational performance analysis will be carried out on performance indicators based on the standards of the Decree of the Director General of Land Transportation No.SK.687 / AJ.206 / DRJD / 2002. From the results of the study of seven operational performance indicators referring to the Decree of the Directorate General of Land Transportation No.687 / AJ.206 / DRJD / 2002 obtained five indicators with category A (Good), namely: 1) Headway (time between), 2) Load Factor (Load Factor), 3) Travel speed, 4) Service Time, 5) Waiting time. While there are 2 indicators with category B (Medium), namely: 1) Frequency, 2) Travel Time. Based on the overall assessment of the Operational Performance of the Directorate General of Land Transportation Decree No.687/AJ.206/DRJD/2002, Transjakarta Bus L13E obtained an A or Good grade. Based on the calculation of the maximum load factor, it is found that the bus stop that has the highest number of passengers or maximum load factor on weekday morning direction 1 towards Latuharhari is Adam Malik stop to Velbak stop, this also happens on weekend morning direction 1 towards Latuharhari, this is because Adam Malik bus stop is a bus stop that is quite busy with universities and densely populated areas and is also one of the stops of choice for the surrounding community to travel to the center city. In this study, it was also found that the maximum load factor on Weekday afternoon direction 2 towards Puri Beta 2 occurred at the Patra Kuningan stop to the Velbak stop, this is because the Patra Kuningan stop is an office area and also the Velbak stop is one of the choices for service users to be able to move to other modes of transportation.

Keywords: Transjakarta, Operational performance, Public Transport Performance Indicators, load factor, Corridor 13.

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INTRODUCTION

Jabodetabek people already have a variety of public transportation options to be able to access areas in Jabodetabek, including Transjakarta, Commuter Train (KRL) (Wartoyo and Prasetyo 2022), Jakarta MRT, Jakarta LRT, Microtrans or City Transportation, Airport Train, Conventional Taxi and Application-based Taxi and also Jabodebek LRT which will be inaugurated by the government (Rizal 2022). With the construction of Public Transport Transportation infrastructure (A. Arifin and Widyaningsih 2021), It is hoped that people can use it wisely, so it is expected to reduce congestion and air pollution (M. A. Arifin, Gemina, and Silaningsih 2015) (SAPUTRI 2019).

Transjakarta itself is one of the transportation chosen by the people of Jabodetabek to be able to travel, this is what makes Transjakarta continue to expand routes or corridors to be able to serve the people of Jakarta and its surroundings (Sandi 2019) (PRAJWALITA 2022). Puri

Beta 2 bus stop is one of the busy transjakarta bus stops and is the beginning of the journey of Tangerang residents to downtown Jakarta, this causes Puri Beta 2 bus stop to become congested, especially on weekdays and during working hours (Shakila and Erli 2022) (Suhendra et al. 2020). One of the routes developed by Transjakarta is the Puri Beta 2 – Latuharhari Corridor L13E (Ekspress) route. The L13E route was opened in September 2022, this is done to make it easier for people to get to their destination faster, especially during peak hours, namely going to work and commuting and also this route does not stop at all stops it passes. Although Transjakarta Route L13E is operated by Express, there are still problems with the frequency of bus arrivals. This is because the L13E route does not fully have a dedicated path. There are still some segments mixed with other traffic. Based on the background above, the author conducted a study entitled "Analysis of Transjakarta Public Transport Operational Performance Corridor 13 Puri Beta 2 Route – Latuharhari". In this study, the author will conduct static and dynamic surveys to obtain research data.

METHOD

This research began with data collection conducted by means of static and dynamic surveys along the Transjakarta bus route corridor 13 Puri Beta 2 – Latuharhari. Data collection was done with a two-person surveyor boarding a bus from the departure stop to the final stop. Done by recording the number of passengers boarding and disembarking, travel speed, travel time, waiting time (ARAYNIRI 2020) (VANI 2019) (Fiansyah and Widyaningsih 2023). The survey was conducted on busy Monday morning and evening and Sunday busy morning and afternoon. Secondary data is needed to obtain location maps and operational data of Transjakarta.

In this study, the data obtained was analyzed to obtain operational performance data for Transjakarta bus corridor 13 route Puri Beta 2 - Latuharhari.

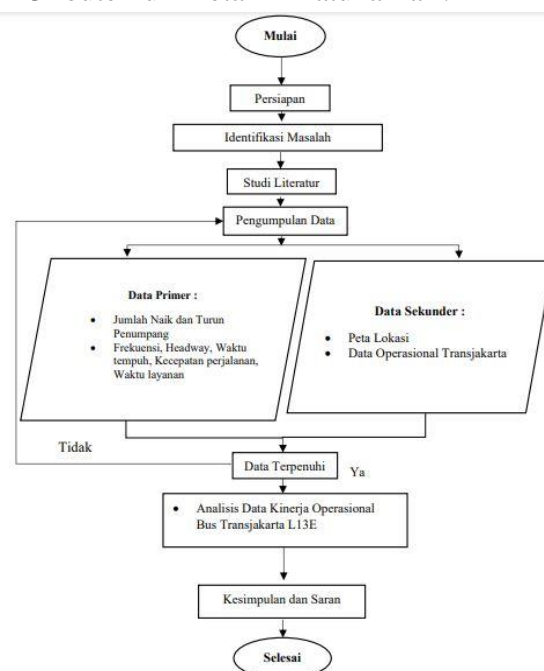


Figure 1. Research Methodology Flow Chart
(Source: Processed Author, 2024)

RESULTS AND DISCUSSION

A. Operational Performance Analysis

This research was conducted along the Transjakarta bus route corridor 13 Puri Beta 2 – Latuharhari to conduct static and dynamic surveys. Surveyors take data on Monday morning and evening and also Sunday in the morning and evening. The surveyor calculated the number of passengers getting on and off by taking the Transjakarta L13E Puri Beta 2 – Latuharhari bus. Travel time, waiting time, and travel speed are also recorded (Kresnadi, Narendra, and Dwinovan 2023).

Table 1. Passenger Boarding and Disembarking Data Direction 1 AM Latuharhari Weekdays Bus 1

No	Halte/ Pemberhentian	BUS 1	JARAK (KM)	Kapasitas	PNP Naik	PNP Turun	On Board	LF
1	Halte Puri Beta 2	07:06	0,45	73	73	0	73	100%
2	Halte Puri Beta 1	07:08	2,9	73	13	0	86	118%
3	Halte Adam Malik/ Petukangan Utara	07:34	4,5	73	7	0	93	127%
4	Halte Velbak	07:41	1,6	73	10	14	89	122%
5	Halte CSW	07:45	4,35	73	15	26	78	107%
6	Halte Kuningan Barat/ Simpang Kuningan	07:55	0,75	73	3	34	47	64%
7	Halte Patra Kuningan	08:00	0,55	73	1	10	38	52%
8	Halte Dapertemen Kesehatan /Kuningan	08:02	0,9	73	0	5	33	45%
9	Halte Gor Sumantri / Rasuna Saïd	08:03	1,3	73	0	8	25	34%
10	Halte Karet Kuningan	08:05	0,55	73	0	5	20	27%
11	Halte Kuningan Madya	08:07	0,5	73	1	3	18	25%
12	Halte Setia Budi Utara Aini / Setia Budi	08:09	0,9	73	0	5	13	18%
13	Halte Latuharhari / Flyover Kuningan	08:12	0	73	0	13	0	0%
		66 menit	19,25		123	123		65%

Table 2. Passenger Boarding and Disembarking Data Direction 2 Pm Weekdays Puri Beta 2 Bus 1

No	Halte/ Pemberhentian	BUS 1	JARAK (KM)	Kapasitas	PNP Naik	PNP Turun	On Board	LF
1	Halte Latuharhari / Flyover Kuningan	17:09	1,5	73	13	0	13	18%
2	Halte Setia Budi Utara Aini / Setia Budi	17:13	0,5	73	20	3	30	41%
3	Halte Kuningan Madya	17:15	0,55	73	10	0	40	55%
4	Halte Karet Kuningan	17:17	0,4	73	9	0	49	67%
5	Halte Gor Sumantri / Rasuna Saïd	17:19	0,8	73	15	0	64	88%
6	Halte Dapertemen Kesehatan /Kuningan	17:22	0,55	73	10	1	73	100%
7	Halte Patra Kuningan	17:24	0,75	73	21	6	88	121%
8	Halte Kuningan Barat/ Simpang Kuningan	17:29	0,5	73	11	16	83	114%
9	Halte Tegal Parang	17:31	2,7	73	3	1	85	116%
10	Halte Tendaan	17:48	3,7	73	13	10	88	121%
11	Halte CSW	17:57	1,6	73	6	6	88	121%
12	Halte Velbak	18:01	4,5	73	5	10	83	114%
13	Halte Adam Malik/ Petukangan Utara	18:11	2,9	73	0	35	48	66%
14	Halte Puri Beta 2	18:21	0	73	0	48	0	0%
		72 Menit	20,95		136	136		81%

Table 3. Passenger Boarding and Disembarking Data Direction 1 AM Sunday Latuharhari Bus 1

No	Halte/ Pemberhentian	BUS 1	JARAK (KM)	Kapasitas	PNP Naik	PNP Turun	On Board	LF
1	Halte Puri Beta 2	07:56	0,45	73	31	0	31	42%
2	Halte Puri Beta 1	07:58	2,9	73	15	0	46	63%
3	Halte Adam Malik/ Petukangan Utara	08:05	4,5	73	21	0	67	92%
4	Halte Velbak	08:12	1,6	73	6	12	61	84%
5	Halte CSW	08:16	4,35	73	22	27	56	77%
6	Halte Kuningan Barat/ Simpang Kuningan	08:24	0,75	73	9	38	27	37%
7	Halte Patra Kuningan	08:27	0,55	73	1	6	22	30%
8	Halte Dapertemen Kesehatan /Kuningan	08:28	0,9	73	0	9	13	18%
9	Halte Gor Sumantri / Rasuna Said	08:30	1,3	73	0	6	7	10%
10	Halte Karet Kuningan	08:31	0,55	73	0	4	3	4%
11	Halte Kuningan Madya	08:32	0,5	73	0	1	2	3%
12	Halte Setia Budi Utara Aini / Setia Budi	08:33	0,9	73	0	0	2	3%
13	Halte Latuharhari / Flyover Kuningan	08:36	0	73	0	2	0	0%
		40 Menit	19,25		105	105		36%

Table 4. Passenger Boarding and Disembarking Data Direction 2 PM Sunday Puri Beta 2 Bus 1

No	Halte/ Pemberhentian	BUS 1	JARAK (KM)	Kapasitas	NP Naik	NP Turun	Boar	LF
1	Halte Latuharhari / Flyover Kuningan	17:00	1,5	73	3	0	3	4%
2	Halte Setia Budi Utara Aini / Setia Budi	17:05	0,5	73	1	0	4	5%
3	Halte Kuningan Madya	17:07	0,55	73	1	0	5	7%
4	Halte Karet Kuningan	17:09	0,4	73	0	2	3	4%
5	Halte Gor Sumantri / Rasuna Said	17:10	0,8	73	2	0	5	7%
6	Halte Dapertemen Kesehatan /Kuningan	17:11	0,55	73	2	0	7	10%
7	Halte Patra Kuningan	17:13	0,75	73	3	0	10	14%
8	Halte Kuningan Barat	17:15	0,5	73	10	1	19	26%
9	Halte Tegal Parang	17:16	2,7	73	2	1	20	%
10	Halte Tendean	17:25	3,7	73	0	2	18	25%
11	Halte CSW	17:30	1,6	73	6	6	18	25%
12	Halte Velbak	17:34	4,5	73	1	3	16	22%
13	Halte Adam Malik	17:42	2,9	73	0	11	5	7%
14	Halte Puri Beta 2	17:51	0	73	0	5	0	0%
		51 Menit	20,95		31	31		12%

Based on the four tables above, it can be concluded that many Transjakarta L13E bus passengers ride from Puri Beta 2 bus stop in the morning and Patra Kuningan bus stop in the afternoon. There is a difference *in headway* on the Puri Beta 2 – Latuharhari route (L13E) between *weekdays*, which is with an average of 9 minutes while on *weekends* it is with an average *headway of* 14 minutes. *Headway* increases in the period on *weekends*, because on weekends *the headway* is getting bigger. This is because on weekdays or *weekdays* there is a buildup of passengers who want to go to the Kuningan area or the middle of the city who want to work (Muzammil, Koesoemawati, and Kriswardhana 2019). Based on the Decree of the Director General of Land Transportation, *headway time* is categorized

as good on *Weekdays* and categorized as moderate on *Weekends*. This is reasonable considering the load factor value on average weekends is only 27%, so headway time is made more tenuous. As for the frequency obtained by means of an average headway time of 9.3 minutes, the frequency of the Transjakarta bus corridor L13E:

$$f = \frac{60}{9,3} = 6 \text{ buses/hour}$$

Based on the Decree of the Director General of Land Transportation, the amount of frequency is included in the Medium category.

B. Load Factor

The load factor survey time was conducted during the morning rush and afternoon rush hours from the direction of Puri Beta 2 – Latuharhari and Latuharhari – Puri Beta 2. With a passenger capacity of 73 people, with details of 4 priority seats, 37 seats and 36 handles for standing passengers.

For example, the calculation of LF for each Transjakarta L13E Puri Beta 2 – Latuharhari bus is below:

$$LF = \frac{\text{Number of Feeders}}{\text{Capacity}} \times 100\% = \frac{73}{73} \times 100\% = 100\%$$

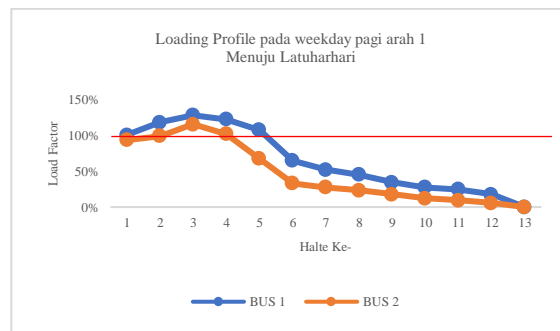


Figure 2. Image Loading Profile on Weekday Morning Direction 1 towards Latuharhari

Based on graphic figure 2, it is found that the busiest stop on weekday morning direction 1 towards Latuharhari is Adam Malik stop or stop 3 to Velbak stop or stop 4 with a Loading Profile value of 127% on bus 1 and 115% on bus 2. At the Adam Malik bus stop with a maximum load section which is the beginning of the departure of residents of Tangerang and its surroundings to the city center or who want to change modes of transportation at the Velbak stop.

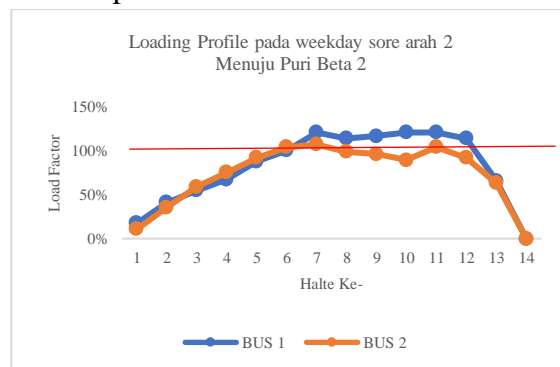


Figure 3. Image Loading Profile on Weekday Afternoon Direction 2 to Puri Beta 2

Based on the graphic image 3, it is found that the busiest stop on weekday afternoon direction 2 to Puri Beta 2 is the Patra Kuningan stop or the 7th stop to the Velbak stop or the 12th stop with a Loading Profile value of the Patra Kuningan stop of 121% on bus 1 and 107% on bus 2. At the Patra Kuningan bus stop, a maximum load section is obtained which is the center of office activities, shopping in the Kuningan area.

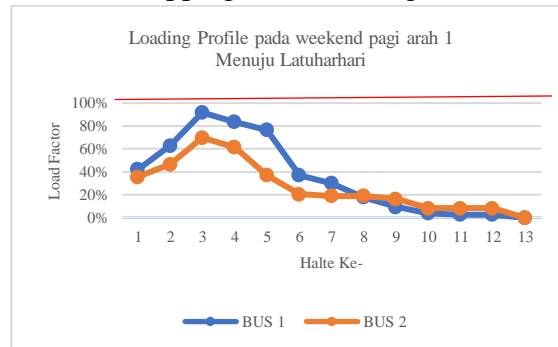


Figure 4. Image Loading Profile on Weekend Morning Direction 1 to Latuharhari

Based on figure 4, it is found that the busiest stop on weekend morning direction 1 to Latuharhari is Adam Malik stop or stop 3 to Velbak stop or stop 4 with a Loading Profile value of 92% on bus 1 and 70% on bus 2. On holidays there is also congestion at the Adam Malik bus stop with a maximum load section which is the beginning of the departure of residents of Tangerang and its surroundings to the city center or who want to change modes of transportation at the Velbak bus stop.

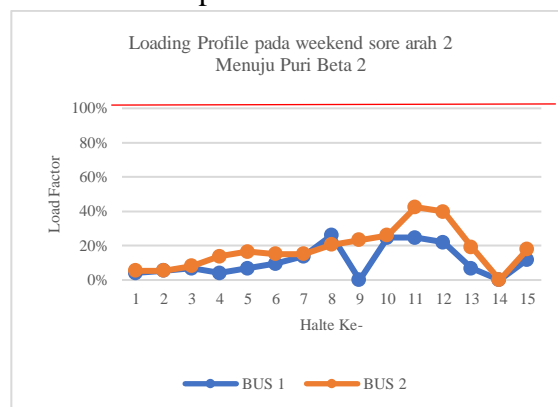


Figure 5. Image Loading Profile on Weekend Afternoon Direction 2 to Puri Beta 2

Based on graphic figure 5, it is found that the busiest stop on weekend afternoon direction 2 to Puri Beta 2 is the Tegal Parang stop or the 9th stop to the CSW stop or the 11th stop with a Loading Profile value of the Tegal Parang stop of 27% on bus 1 and 23% on bus 2. In this survey, it was found that there was no significant density because on holidays the activity along the bus stop was very low.

C. Traveling Time

Travel Time is obtained by measuring travel time on the bus trip from departing to arriving at the destination using a time measuring device (stop watch). The longest travel time from Puri Beta 1 Stop to Adam Malik Stop in the morning is 26 minutes and also from Tegal Parang Stop to Tendean Stop in the afternoon which is 17 minutes due to heavy traffic

mixed with other vehicles. So that the Transjakarta Bus travel time on the morning weekday of the Puri Beta 2 - Latuharhari / brass flyover route is 66 minutes, while on the afternoon weekday from Latuharhari / brass flyover - Puri Beta 2 is 72 minutes. Based on the Decree of the Director General of Land Transportation, the travel time obtained is categorized as B or Medium.

D. Travel Speed

The travel speed of the Transjakarta L13E bus for the Puri Beta 2 – Latuharhari route is based on a survey to the field where the distance between the Puri Beta 2 – Latuharhari bus stops is 19.25 km. For example: The travel distance of Transjakarta Bus L13E Puri Beta 2 – Latuharhari is 19.25 km and the travel time made on Weekday morning or Monday morning is 66 minutes rounded up in units of hours (66/60 minutes = 1.1 hours) then we get how to calculate the travel speed based on the formula (2.2) as follows:

$$V \frac{S}{T} = \frac{19,25}{1,1} = 17,5 \text{ km/ hours}$$

E. Service Time

From the results of data obtained through the official website of the Transjakarta Bus on the L13E corridor, the Transjakarta bus service time is from 05:00 – 22:00 or 17 hours a day. Based on the Decree of the Director General of Land Transportation, the length of service is categorized as Good (DARMAWAN 2022).

F. Passenger Waiting Time

The average passenger waiting time is 9 minutes and the highest waiting time is at Puri Beta 2 Stop and Puri Beta 1 Stop which is 12 minutes, because buses queue with other corridors to raise passengers at the first departure stop. Based on the Decree of the Director General of Land Transportation, the waiting time for passengers obtained is categorized as Good.

G. Overall Operational Performance Results

The following are the Transjakarta Bus L13E Operational Performance Results, Minimum Service Standards used to compare the overall Operational Performance results based on the Table below:

Table 5. Public Transport Service Standard Indicators

No	Indikator Pelayanan	Satuan	Standar Pelayanan		
			Baik (A)	Sedang (B)	Kurang (C)
1	Load Faktor	%	<80	80 s/d 100	>100
2	Frekuensi	Kend/Jam	>6	4 s/d 6	<4
3	Kecepatan Perjalanan	Km/Jam	>10	5 s/d 10	<5
4	Waktu Antara	Menit	<10	10 s/d 15	>15
5	Waktu Tempuh	Menit	<60	60 s/d 90	>90
6	Waktu Tunggu	Menit	<20	20 s/d 30	>30
7	Waktu Pelayanan	Jam	>15	13 s/d 15	<13

Table 6. Public Transport Service Performance Standards

Kriteria	Total Nilai	Bobot
Baik (A)	18.00 - 24.00	3
Sedang (B)	12.00 - 17.99	2
Kurang (C)	< 12.00	1

From the results of the survey conducted, it was noted that at certain stops, especially Adam Malik Stop or North Petukangan to CSW Stop, there was a surge in passenger density,

but after the West Kuningan Stop / Simpang Kuningan the bus experienced a decrease in passengers to the final stop, namely the Latuharhari Stop / Kuningan Flyover. So that the results of the Operational Performance Assessment are obtained as the table below:

Table 7. Results of Public Transport Operational Performance Assessment

NO	Indikator Pelayanan	Weekday Pagi	Kategori	Bobot
1	Load Faktor	65%	A	3
2	Frekuensi	6	B	2
3	Kecepatan Perjalanan	17,5 km/jam	A	3
4	Waktu Antara	9	A	3
5	Waktu Tempuh	66	B	2
6	Waktu Tunggu	12	A	3
7	Waktu Pelayanan	17	A	3
	Total			19
	Penilaian Kinerja Operasional			Baik

Based on Table 7 it can be concluded that the highest Load Factor occurs on weekdays or Weekday mornings, with an average of 65%. So based on the Decree of the Director General of Land Transportation, the load factor below 80% is categorized A or Good. The frequency is obtained by means of an average headway time of 9.3 minutes divided by 60 minutes = 6 buses / hour, so based on the Decree of the Director General of Land Transportation the frequency of more than 6 buses / hour is categorized B or Medium. The speed of travel is obtained based on direct surveys to the field, which is 17.5km / hour. Based on the Decree of the Director General of Land Transportation, travel speeds of more than 10 km / h are categorized A or Good. The average intermediate or headway time is 9.3 minutes or 9 minutes, categorized A or Good, because the headway obtained is less than 10 minutes. Travel time is obtained by direct survey with the help of using a Transjakarta Bus stopwatch on weekday morning route Puri Beta 2 – Latuharhari / flyover kuningan is 66 minutes, while on weekday afternoon from Latuharhari / flyover kuningan - Puri Beta 2 is 72 minutes. Based on the Decree of the Director General of Land Transportation, travel time of more than 60 minutes and less than 90 minutes is categorized as B or Medium. The average waiting time is 9 minutes and the highest waiting time is at Halte Puri Beta 2 which is 12 minutes due to alternating with buses with other routes. So that the waiting time for the Puri Beta 2 – Latuharhari/Kuningan flyover route is less than 20 minutes, categorized A or Good. The service time obtained from the Puri Beta 2 – Latuharhari / Flyover Kuningan route is 17 hours. Based on the Decree of the Director General of Land Transportation, the service time of more than 15 hours is categorized A or Good. Based on the Operational Performance Assessment, "Good" results are obtained by referring to the Service Performance Standards of the Director General of Land Transportation.

CONCLUSION

Based on the results of the performance analysis that has been carried out, it can be concluded as follows from the seven indicators of Operational Performance referring to the Decree of the Directorate General of Land Transportation No.687 / AJ.206 / DRJD / 2002 obtained five indicators with category A (Good), namely: 1) Headway (time between), 2) Load Factor (Load Factor), 3) Travel speed, 4) Service Time, 5) Waiting time. While there are 2

indicators with category B (Medium), namely: 1) Frequency, 2) Travel Time. Based on the overall assessment of the Operational Performance of the Directorate General of Land Transportation Decree No.687/AJ.206/DRJD/2002, Transjakarta Bus L13E obtained an A or Good grade. From this study, it was found that the bus stop that has the highest number of passengers or maximum load factor on weekday morning direction 1 to Latuharhari is Adam Malik stop to Velbak stop, this also happens on weekend morning direction 1 to Latuharhari, this is because Adam Malik bus stop is a bus stop that is quite busy with universities and densely populated areas and is also one of the stops of choice for the surrounding community to travel to the city center. In this study, the maximum load factor on Weekday afternoon direction 2 towards Puri Beta 2 occurred at the Patra Kuningan stop to the Velbak stop, this is because the Patra Kuningan stop is an office area and also the Velbak stop is one of the choices for service users to be able to move to other modes of transportation.

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