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PERFORMANCE ANALYSIS OF THE SAMA'UN BAKRIE ROAD SECTION ON WEEKENDS AND WEEKDAYS (SERANG CITY – BANTEN)

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ABSTRACT

Sama'un Bakrie Street is an important road section for the people of Serang City. This is because the road section is widely traversed by residents of Serang City to go to the main market of Rau Trade Center (RTC), besides that the road section is a infrastructure to Serang station and office locations, including the Serang District Public Works Office and Serang Regency DLH. With its proximity to the main market, stations, and office areas, there are many community activities on the road such as pedestrians, stopped vehicles, parking, slow vehicles, and vehicles in and out of the side of the road. This research was conducted for 7 (Seven) days and used the Indonesian Road Capacity Manual method (MKJI, 1997) with the aim of research to analyze the performance of road sections, identify side obstacle problems, road capacity, degree of saturation, and determine the level of service on the Sama'un Bakrie road section Serang City, Banten. The results of the research analysis showed that the highest peak volume in the RTC direction was on Thursday (879 smp / hour) and the highest peak volume in the direction of Serang Station was on Tuesday (769 smp / hour). The road capacity is rated (2535.18 smp/hour) with a very low side obstacle class (Very Low) with an event weight value of <100, and the highest saturation degree value has a value (0.503). This shows that the service level of the performance of the Sama'un Bakrie road section in Serang City, Banten is in category C (0.45-0.74), so that the Sama'un Bakrie road section is in a stable current zone but drivers are limited in choosing speed.

Keyword: Performance Analysis, Sama'un Bakrie, Road Section, Weekends, Weekdays, Serang City – Banten.

1. Introduction

Serang City is the capital of Banten Province. It has a population of 720,362, with a population density of 2,706 per square kilometer (Badan Pusat Statistik [BPS], 2022), and this number continues to grow annually (BPS, 2022). Serang City is a hub for numerous activities, including office, commercial, and educational activities, from morning to night (Prasetyo & Lestari, 2021). Amidst the bustling activity of Serang's residents, the community needs a well-functioning traffic system and other infrastructure, particularly roads (Sutanto & Wibowo, 2020). Furthermore, to expedite the delivery of goods, roads also serve to facilitate the community's daily activities (Hakim, 2019). Serang City has several types of roads, from arterial roads to village roads (Kementerian PUPR, 2020). Due to the increasing population density, Serang's roads are often congested, especially at certain times of the day, causing delays for workers and students (Rahmanto et al., 2023). For traders, congestion can hinder the delivery of goods, preventing them from arriving on time (Putra & Susanto, 2021).

Sama'un Bakrie Street is one of the streets in Serang City, a vital route frequently used by trade activities to the Rau Trade Center (RTC) main market (Wijaya & Astuti, 2022). Furthermore, Sama'un Bakrie Street also serves as a route to government offices, schools, and the Serang train

station (Dewi & Gunawan, 2023). Sama'un Bakrie Street faces several daily challenges, including illegal parking, public transportation pick-ups, and street vendors who disobey the roadside ban (Handayani, 2020). To improve the performance of Sama'un Bakrie Street, research and analysis are being conducted to improve the traffic system and reduce congestion (Yulianto et al., 2023).

2. Materials and Methods

2.1 MKJI 1997 Method

This study adopts the Indonesian Highway Capacity Manual (Manual Kapasitas Jalan Indonesia/MKJI, 1997) as the primary methodological framework for evaluating road performance. The MKJI 1997 method is widely used in Indonesia to assess road capacity, saturation level, side friction, and the level of service (LOS) based on standardized traffic engineering parameters (Directorate General of Highways, 1997). Through this method, the analysis focuses on evaluating the performance of the Sama'un Bakrie road section, identifying significant side barriers, calculating road capacity, determining the degree of saturation, and classifying the level of service.

2.2 Data Collection

The study employs both primary and secondary data to support the analysis.

a. Primary Data

The following primary data were collected directly through field surveys conducted on-site:

1. Road Geometric Conditions
   This includes measurements of lane width, number of lanes, shoulder conditions, road surface type, and the presence of medians. Geometric characteristics are essential for calculating base capacity and adjusting factors (Sukirman, 1994).
2. Traffic Flow Volume
   Traffic volume data were collected using manual traffic counts during peak hours and averaged to determine the Average Daily Traffic (ADT). These values are converted to passenger car units (PCU) to align with MKJI standards (Directorate General of Highways, 1997).
3. Side Barriers (Side Friction)
   This refers to disturbances such as illegal parking, pedestrian activity, roadside vendors, and public transport stops along the corridor. Side friction is classified using MKJI's predefined categories, which affect effective road capacity (Rahmanto et al., 2023).
4. Road Capacity
   Road capacity is computed based on MKJI's base capacity values adjusted by correction factors derived from field conditions such as lane width, shoulder type, and side friction (Directorate General of Highways, 1997).
5. Degree of Saturation (DS)
   The degree of saturation is the ratio of actual traffic volume to road capacity (Q/C). This indicator helps determine whether the road section operates within stable or unstable traffic flow conditions (Sutanto & Wibowo, 2020).
6. Level of Service (LOS)

LOS is assigned based on the calculated DS value and categorized from A (free flow) to F (forced or breakdown flow), following MKJI's classification thresholds. This parameter is essential in understanding user comfort and operational efficiency (Wicaksono & Yulianto, 2022).

b. Secondary Data

The study also utilizes secondary data obtained from institutional sources and literature reviews:

1. Population Statistics of Serang City in 2022, obtained from the Central Bureau of Statistics (Badan Pusat Statistik [BPS], 2022), which provides demographic context for traffic demand.
2. Online Data Sources, including maps, satellite imagery, and transportation datasets relevant to the study area.
3. Transportation Engineering Literature, such as textbooks and journals, used to support theoretical understanding and calculations.
4. Supporting Theories, including concepts of traffic flow, side friction impact, and urban mobility trends relevant to mid-sized cities in Indonesia (Tamin, 2000; Putra & Susanto, 2021).

3. Result and Discussion

3.1 Physical Characteristics of Road Sections

In general, the characteristics of Sama'un Bakrie Street are as follows:

Figure 1. Physical Condition of the Sama'un Bakrie Road Section, Serang City – Banten
Source: Data Analysis, 2025

Table 1. Existing Geometric Conditions of Roads and Road Facilities on Road Sections Sama'un Bakrie, Serang City, Banten

DATA	INFORMATION
City Name	Serang City
Total population	720,362 (BPS, 2022)
Road Section Name	Sama'un Bakrie Street
Length of Road	1200 m (Serang City PUPR Service)

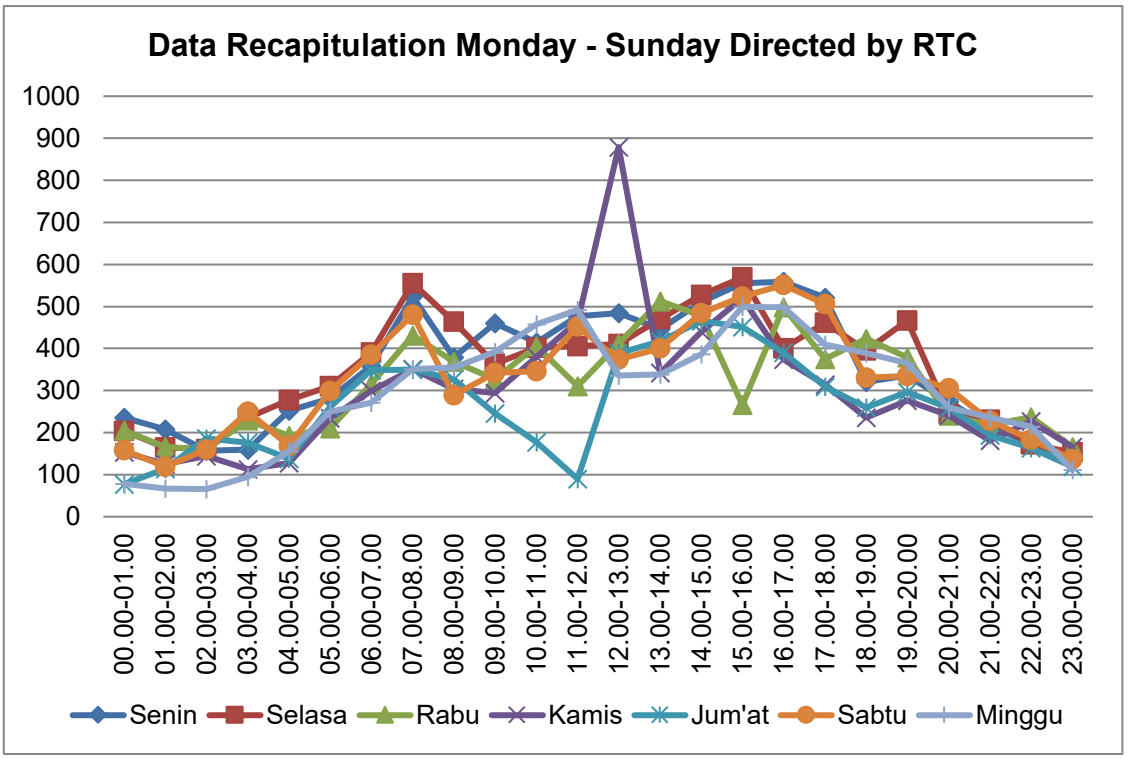
Number of Lanes, Routes, and Directions	Two lane two-way undivided 2/2 UD
Lane Width	700 cm
Sidewalk Width	150 cm
Road Function	Secondary collector road

Source: Researcher, 2025

3.2 Traffic Flow Volume

Traffic flow characteristics consist of traffic volume data, side obstacles, road capacity, and degree of saturation.

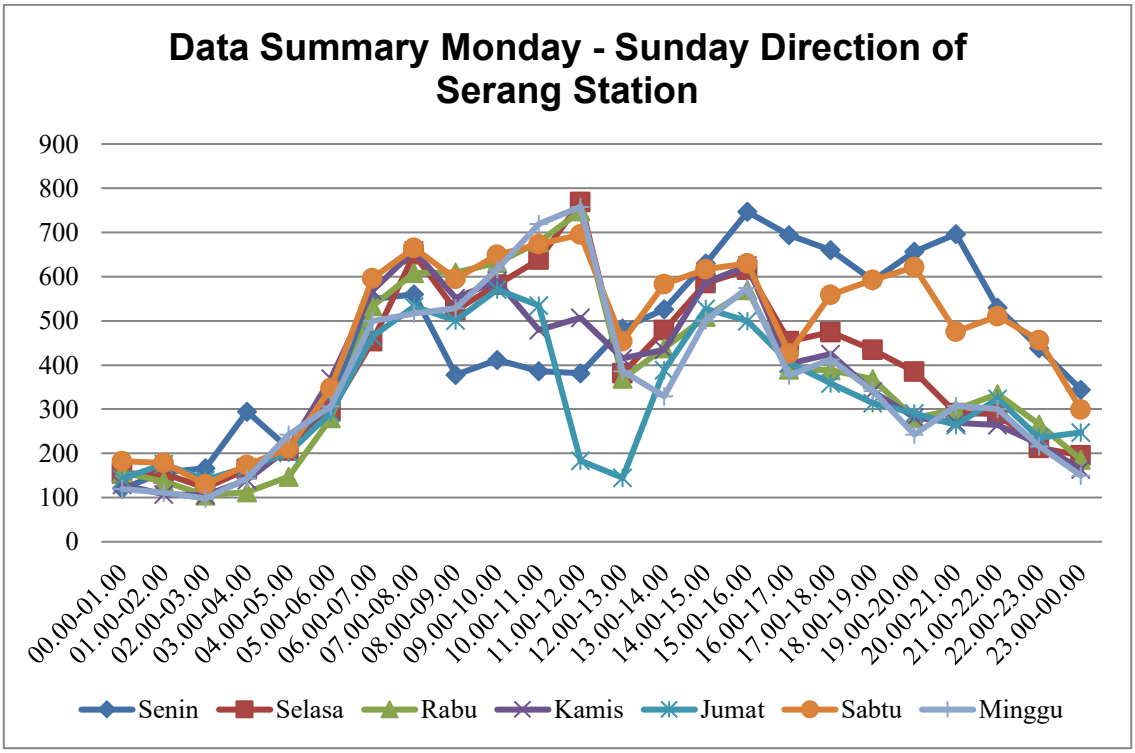
Traffic volume based on the 1997 Indonesian Road Capacity Manual (MKJI), the unit value for passenger cars (SMP) for motorcycles (SM) = 0.25, light vehicles (KR) = 1.00, and heavy vehicles (KB) = 1.2. Thus, the traffic volume values obtained are as follows:



Graph 1 Vehicle Volume Over Seven Days RTC Direction

Source: (researcher, 2023)

From the results of the recapitulation of vehicle volume calculations during the seven days of the RTC direction survey, the highest vehicle volume was on Thursday with a total of 879 vehicles per hour, while the lowest vehicle volume was on Friday with a total of 466 vehicles per hour.



Graph 2 Vehicle Volume Over Seven Days Towards Serang Station

Source: (researcher, 2023)

From the results of the recapitulation of vehicle volume calculations during the seven days of surveys towards Serang Station, the highest vehicle volume was on Tuesday with a total of 769 vehicles per hour, while the lowest vehicle volume was on Friday with a total of 571 vehicles per hour.

Table 2 Total Traffic Flow Volume Peak Hours Monday – Sunday

	Vehicle Type	**Heavy Vehicles**		**Light Vehicles**		**Motorcycle**		**Total Current (Q)**	
Day	**RTC Direction (T)**	**KB : 1.2**		**KR : 1**		**SM : 0.25**			
	St. Serang direction (B)	**KB : 1.2**		**KR : 1**		**SM : 0.25**			
	from the direction	**vehicle/hour**	**smp/hour**	**vehicle/hour**	**smp/hour**	**vehicle/hour**	**smp/hour**	**vehicle/hour**	**smp/hour**
	RTC (T)	21	25	208	208	1302	326	1531	559

Monday	Serang Station (B)	9	11	480	480	1023	256	1512	747
	(T) + (B)	30	36	688	688	2325	582	3043	1306
Tuesday	RTC (T)	36	43	276	276	1001	250	1313	569
	Serang Station (B)	5	6	551	551	846	212	1402	769
	(T) + (B)	41	49	827	827	1847	462	2715	1338
Wednesday	RTC (T)	18	22	218	218	1035	259	1271	499
	Serang Station (B)	11	13	521	521	855	214	1387	748
	(T) + (B)	29	35	739	739	1890	473	2658	1247
Thursday	RTC (T)	10	12	723	723	576	144	1309	879
	Serang Station (B)	6	7	354	354	1054	264	1414	625
	(T) + (B)	16	19	1077	1077	1630	408	2723	1504
Friday	RTC (T)	21	25	177	177	1054	264	1252	466
	Serang Station (B)	13	16	292	292	899	225	1204	533
	(T) + (B)	34	41	469	469	1953	489	2456	999
Saturday	RTC (T)	19	23	208	208	1281	320	1508	551
	Serang Station (B)	8	10	296	296	1266	317	1570	623
	(T) + (B)	27	33	504	504	2547	637	3078	1174
Sunday	RTC (T)	7	8	239	239	1001	250	1247	497
	Serang Station (B)	3	4	546	546	833	208	1382	758
	(T) + (B)	10	12	785	785	1834	458	2629	1255

Source: (researcher, 2025)

3.3 Side Obstacles

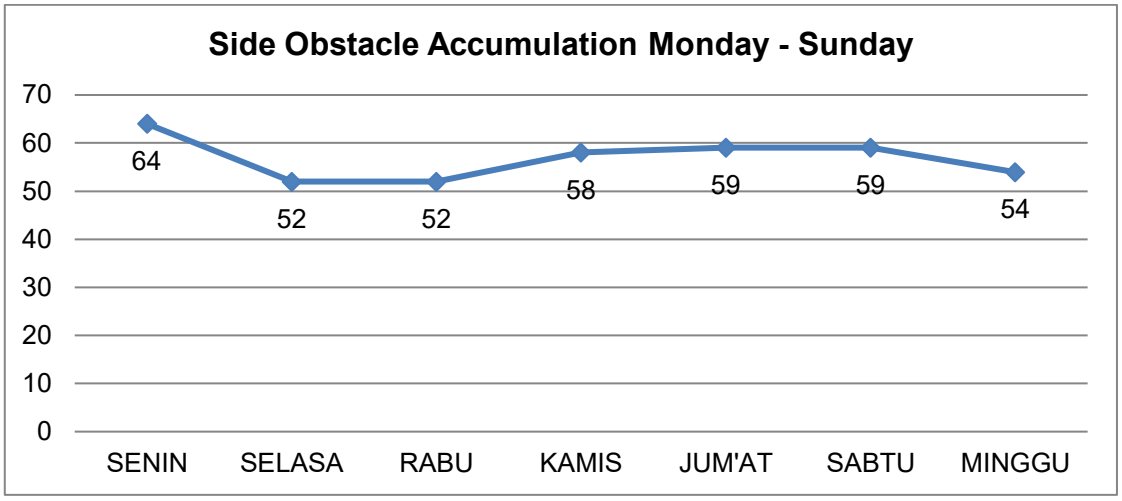
Side barriers are the effects of activities along the roadway on traffic performance, such as pedestrians, stopping public transportation or other vehicles, vehicles entering and exiting roadside areas, and slow-moving vehicles. This study used the accumulated side barriers during peak hours from Monday to Sunday.

Table 3 Accumulated Side Resistance Monday – Sunday

Main Types of Side Obstacles/ Weight Factor	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Accumulated Average Value
	Kej/ Hour	Hs/ Hour	Kej/ Hour	Hs/ Hour	Kej/ Hour	Hs/ Hour	Kej/ Hour	Hs/ Hour	Kej/ Hour	Hs/ Hour	Kej/ Hour	Hs/ Hour	Kej/ Hour	Hs/ Hour	
Pedestrians on the road and crossing / 0.5	30	15	15	8	8	4	15	8	26	13	12	6	10	5	8
Public Transportation and Other Vehicles That Stop/ 1	25	25	11	11	20	20	26	26	24	24	29	29	21	21	22
Vehicles Entering / Exiting the Side or Land Beside the Road/ 0.4	29	12	20	8	27	11	25	10	18	7	15	6	20	8	9
Slow Traffic (Non-Motorized Vehicles) / 0.7	18	13	37	26	25	18	20	14	21	15	26	18	28	20	18
	102	64	83	52	80	52	86	58	89	59	82	59	79	54	57

Source: (researcher, 2023)

From the data (Table 3), it can be seen that the side resistance value can be calculated by multiplying the weight factor value by the incident value. It is then concluded that the side resistance falls into the very low category with a total accumulated average side resistance value during peak hours of 57.



Graph 3 Accumulation of Side Barriers Monday-Sunday

Source: (researcher, 202)

Based on graph 3, it can be seen that the largest side resistance occurs on Monday, with a value of 64 HS/HOUR, while the smallest side resistance occurs on Tuesday and Wednesday with a value of 52 HS/HOUR.

Table 4 Side Obstacle Classes for Urban Roads

Side Barrier Class (SFC)	Code	Weighted Number of Events Per 200 M Per Hour (Two Sides)	Special Conditions
Very low	VL	<100	Residential area; road with side roads.
Low	L	100 - 299	Residential areas; some public transportation etc.
Currently	M	300 - 499	Industrial area, some shops on the side of the road.
Tall	H	500 - 899	Commercial Area, high roadside activity.
Very high	VH	>900	Commercial area with market activity beside the road.

Source: (MKJI, 1997)

Based on (Table 4), side obstacles on the Sama'un Bakrie road section are categorized as very low class *(VL),* this is because the side resistance class on that section is <100.

3.4 Road Section Capacity

a. Basic Capacity (C_0)

The ability of a road segment to channel vehicles expressed in units of pcu/hour for a particular road condition includes geometric, traffic flow patterns and environmental factors.

Table 5 Basic Capacity of Urban Roads

Road Type	Basic Capacity (Smp/Hour)	Notes
four-lane divided or one-way road	1650	per lane
four-lane undivided	1500	per lane
two-lane undivided	2900	two-way total

Source: (MKJI, 1997)

The basic capacity value is obtained from the data (Table 5), the basic capacity for urban roads in this study uses the road type (2/2 UD) or two-lane undivided road which has a basic capacity value of C_0 of 2900 (smp/hour).

b. Bandwidth Factor (FC_w)

Figures to correct basic capacity as a result of differences in traffic lane width from the ideal traffic lane width.

Table 6 Capacity Adjustments for the Influence of Traffic Lane Width for Urban Roads (Fc_w)

Road Type	Basic Capacity (Smp/Hour)	FCw
four-lane divided or one-way road	3.00	per lane
	3.25	
	3.50	
	3.75	
	4.00	
four-lane undivided	3.00	per lane
	3.25	
	3.50	
	3.75	
	4.00	
two-lane undivided	5	two-way total
	6	
	7	
	8	
	9	

	10
	11

Source: (MKJI, 1997)

The lane width factor value is obtained from the data (Table 6), where in this study using a 2/2 UD road type or a two-lane, two-way undivided road which has an effective traffic lane width (C_W) of 3.5 m, then the capacity adjustment factor value due to the difference in lane width or traffic lane (FC_W) is 1.00.

c. Capacity Adjustment Factor for Directional Separation (FC_{SP})

Table 7 Directional Separator Adjustment Factor (Fc_{sp})

Direction Separator SP %-%		50-50	55-45	60-40	65-35	70-30
FC_{SP}	two-line 2/2	1,00	0,97	0,94	0,91	0,88
	four-line 4/2	1,00	0,985	0,97	0,955	0,94

Source: (MKJI, 1997)

The value of the direction separation factor is obtained from the data (Table 7), for the division of traffic directions, the direction division value is the same, namely 50 – 50, so the value of the capacity adjustment factor related to the separation of traffic directions (FC_{SP}) is 1.00.

d. Capacity Adjustment Factor for Side Resistance (FC_{SF})

Table 8 Capacity Adjustment Factors for the Influence of Side Obstacles and Barrier Distance (Fc_{SF}) of Urban Roads with Kerbs.

Road Type	Side Obstacle Class	Adjustment Factors for Side Obstacles and Barrier Distance			
		Distance: Barrier W_K			
		≤ 0,5	1,0	1,5	≥ 2,0
4/2 D	VL	0,95	0,97	0,99	1,01
	L	0,94	0,96	0,98	1,00
	M	0,91	0,93	0,95	0,98
	H	0,86	0,89	0,92	0,95
	VH	0,81	0,85	0,88	0,92
4/2 UD	VL	0,95	0,97	0,99	1,01
	L	0,93	0,95	0,97	1,00
	M	0,90	0,92	0,95	0,97
	H	0,84	0,87	0,90	0,93
	VH	0,77	0,81	0,85	0,90
	VL	0,93	0,95	0,97	0,99

2/2 UD or One Way	L	0,90	0,92	0,95	0,97
	M	0,86	0,88	0,91	0,94
	H	0,78	0,81	0,84	0,88
	VH	0,68	0,72	0,77	0,82

Source: (MKJI, 1997)

The value of the side resistance adjustment factor is obtained from the data (Table 8), where in this study using a 2/2 UD road type with a very low side resistance class (KHS) which has a distance value from the curb to the nearest obstacle of ≤ 0.5 m, then the value of the capacity adjustment factor due to the side resistance class (KHS) on the curb road with a distance from the curb to the nearest side obstacle as far as 0.93.

e. Capacity Adjustment Factor for City Size Adjustment (FC_{CS})

Table 9 Capacity Adjustment Factors for City Size (FC_{CS}) on Urban Roads

City Size (Millions of Population)	**Adjustment Factor for City Size**
< 0,1	0,86
1,0 – 0,5	0,90
0,5 – 1,0	0,94
1,0 – 3,0	1,00
> 3,0	1,04

Source: (MKJI, 1997)

The value of the capacity adjustment factor related to city size is obtained from the data (Table 9), which has a city size or population of 720,362 people in 2022 according to the Central Statistics Agency (BPS), so the value of the adjustment factor for city size (FC_{CS}) is 0.94.

By taking the values of several factors above, we obtain the calculation as below:

$C = C_0 \times FC_W \times FC_{SP} \times FC_{SF} \times FC_{CS}$

Information:

C_0 = 2900 (Table 5.36, Source MKJI 1997)

FC_W = 1 (Table 5.37, Source MKJI 1997)

FC_{SP} = 1 (Table 5.38, Source MKJI 1997)

FC_{SF} = 0.93 (Table 5.39, Source MKJI 1997)

FC_{CS} = 0.94 (Table 5.40, Source MKJI 1997)

$C = C_0 \times FC_W \times FC_{SP} \times FC_{SF} \times FC_{CS}$

$= 2900 \times 1 \times 1 \times 0.93 \times 0.94$

= 2,535.18 smp/hour

It can be concluded from the calculation above that the capacity value (C) is 2535.18 smp /hour.

3.3 Degree of Saturation

By taking the traffic flow during peak hours, the calculation of the degree of saturation and level of service of Sama'un Bakrie Road, Serang City, Banten is as follows:

$D_S = \frac{Q}{C}$

Information:

D_S = Degree of Saturation
Q = Traffic Flow / Volume (smp/hour)
C = Capacity (smp/hour)

Table 10 Calculation of the Degree of Saturation and Level of Service of Road Sections

Day	Vehicle volume (Q) (smp/hour)	Capacity (C) (smp/hour)	Degree of saturation (DS)
Monday	1306	2535.18	0.515
Tuesday	1338	2535.18	0.527
Wednesday	1247	2535.18	0.491
Thursday	1504	2535.18	0.593
Friday	1037	2535.18	0.409
Saturday	1246	2535.18	0.491
Sunday	1257	2535.18	0.495

Source: (Researcher, 2025)

It can be concluded that the saturation degree value ($DS_)$ obtained on Monday was **0.515**, on Tuesday was 0.527**,** on Wednesday was **0.491**, on Thursday was 0.593, on Friday was 0.409, on Saturday was 0.491**,** on Sunday was **0.495. From the results of the data above,** if averaged, it will get an average value of **0.503.**

3.4 Road Service Level

Table 11 Road Section Service Levels

Service Level	Information	Degree of Saturation (DS)
A	Free-flow conditions with high speeds and low traffic volumes allow drivers to choose their desired speed without hindrance.	0.00 – 0.20
B	In a stable flow zone, drivers have sufficient freedom to choose their speed.	0.21 – 0.44
C	In a stable flow zone, drivers are limited in their speed	0.45 – 0.74
D	Approaching unstable traffic. Where almost all drivers will be restricted	0.75 – 0.84

	(disturbed). Service volume is related to tolerable capacity.	
E	Traffic volume is near or at capacity. Flow is unstable with frequent stoppages.	0.85 – 1.00
F	Forced or congested traffic at low speeds. Long queues and major bottlenecks.	>1.00

Source: (MKJI, 1997)

From the saturation degree data above, an average value of 0.503 was obtained, so it can be seen in (Table 5.40) that the level of service on the Sama'un Bakrie road section is at level C with a saturation degree value of (0.45-0.74), this shows that the Sama'un Bakrie road section is in a stable flow zone but drivers are limited in choosing speed.

4. Conclusion

A conclusion is the final paragraph of a research paper. It serves to help the reader understand why the author's research should matter to them—the conclusion a conclusion should: Restate the author's topic and why it is essential.

From the results of the research that has been conducted, there are several conclusions that can be drawn, including the following:

1. The highest side barrier value was on Monday with a side barrier value of 64, dominated by pedestrians crossing and vehicles entering/exiting the side of the road. The average accumulated side barrier value was 57 or <100, this indicates that the road has a very low side barrier class *(Very Low).* The average Degree of Saturation (DS) value was 0.503, and the Road Service Level on the Sama'un Bakrie road section was included in the C category (0.45 -0.74).
2. The peak traffic volume in the RTC direction occurred on Thursday, at 12.00 – 13.00 WIB with a total of 879 smp / hour while the direction of the station The attack occurred on Tuesday at 11.00 - 12.00 WIB with a total of 769 smp / hour. The densest traffic volume (Q) showed a figure of 1504 smp / hour with a capacity value (C) of 2,535.18 smp/hour.

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6. Author's Note

The author declares that this article is an original work written based on data and analysis conducted independently and without any plagiarism. All citations and references have been

cited in accordance with scientific writing standards. This article has not been published in any other media or journal and is not currently under review elsewhere. The author hereby ensures that the published article will not give rise to any conflicts of interest or future disputes.

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