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Analysis of the Level of Road Service on the Srijaya Negara Bukit Besar Road Section, Palembang

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ABSTRACT

The availability of adequate road capacity is an important factor in supporting the smooth mobility of people in urban areas. Srijaya Negara Street in Ilir Barat I District, Palembang City, is one of the strategic roads serving educational, trade, and service activities, so it has a high traffic volume, especially during peak hours. This condition has the potential to affect the performance of the road section, so an analysis of the road service level is needed. This study aims to analyze the service level of Srijaya Negara Street based on the characteristics of traffic flow and road capacity. The research method was carried out through a field survey with primary data collection in the form of traffic volume, road geometric conditions, and side obstacles. Data were analyzed by calculating traffic volume, road capacity, and degree of saturation (DS) to determine the level of road service. The analysis results show that traffic flow is dominated by motorcycles, followed by light vehicles and heavy vehicles. The value of the Degree of Saturation (DS) obtained is 0.748, so Srijaya Negara Street is included in the Level of Service (LOS) is D. This condition indicates that traffic flow is still stable, but the freedom of drivers to choose speed and perform maneuvers is starting to be limited due to increased interaction between vehicles. The high level of activity in educational and commercial areas, as well as side obstacles, are the main factors affecting road performance. Therefore, traffic management and side obstacle control are necessary to maintain and improve the level of road service in the future.

Keywords: *Road Capacity; Degree of Saturation; Road Service Level; Traffic Volume; Srijaya Negara Street.*

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INTRODUCTION

Population growth, economic development, urbanization, and changes in land use increase travel demand and traffic volumes. Palembang is a large urban center whose demographic and transport characteristics place sustained pressure on its road network [1]. The relationship between built form and travel demand is widely associated with density, land-use diversity, street design, and accessibility [2]-[4]. The availability of adequate road capacity is therefore essential to support urban mobility. The Palembang population and vehicle statistics reported in this study were obtained from official municipal statistics [1].

Srijaya Negara Road is located in Ilir Barat I District, Palembang, and serves residential,

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educational, commercial, and service activities. The presence of Sriwijaya University and Sriwijaya State Polytechnic generates concentrated student and staff travel, especially during class-change and peak periods. University campuses function as special trip generators with travel patterns that differ from those of the general population [5]-[8]. Previous work by the authors developed a student origin-destination matrix using activity-system attributes, trip generation and attraction, interzonal travel time, and generalized travel cost. This study therefore evaluates the operational performance of the Srijaya Negara Road section to identify the traffic-management measures required during the analysis period.

METHOD

Research Location

Srijaya Negara Road is approximately 1.7 km long and extends from the Universitas Palembang intersection to the Padang Selasa Market intersection. The midpoint of the study corridor is located at approximately 2°59'12.7"S and 104°43'55.7"E. Figure 1 shows the study location.

Figure 1. Location of Srijaya Negara Road in Palembang.

Data Collection

Primary data was obtained from a traffic counting survey to collect traffic volume data. The traffic count survey was conducted at three points along Jalan Srijaya: the first at the Lunjuk intersection, and then at the entrance and exit gates of Sriwijaya University.

Vehicle counts were recorded at 15-minute intervals using traffic counters and standardized survey sheets. Short-duration classified counts are commonly used to identify peak-period demand and support roadway performance evaluation when survey procedures, observation periods, and vehicle classifications are documented consistently [9]. Secondary data were obtained from relevant agencies, including the Palembang road-network map.

The origin-destination matrix was obtained from a previous survey of 400 Sriwijaya State Polytechnic students. Campus travel surveys and university-specific demand models are appropriate because student schedules, residential location, parking availability, and access to alternative modes produce distinctive travel patterns [5]-[8].

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Data Analysis

Respondent	Age	Study Program	Origin Subdistrict	Travel Mode	Travel Time (min)
R-01	19	Civil Engineering (Diploma)	Solok	Private motorcycle	45
R-02	21	Civil Engineering (Diploma)	Along-Along Lawan	Private motorcycle	60
R-03	20	Civil Engineering (Diploma)	Kolaka	Private motorcycle	30
R-04	20	Road Design (Applied Bachelor)	Sekeang Jaya II	Motorcycle passenger	25
R-05	22	Civil Engineering (Diploma)	Gerotai	Private motorcycle	15
R-06	20	Road Design (Applied Bachelor)	Air Barat	Private motorcycle	5
R-07	20	Road Design (Applied Bachelor)	Air Tawar	Private motorcycle	10
R-08	21	Civil Engineering (Diploma)	Along-Along Lawan	Private motorcycle	20
R-09	21	Road Design (Applied Bachelor)	Air Tawar	Walking	15
R-10	21	Road Design (Applied Bachelor)	Air Barat	Walking	5

Figure 2. Anonymized sample of the student origin-destination survey database.

Road Capacity

Road capacity (C) is the maximum hourly flow that a road section can accommodate under prevailing roadway, traffic, and environmental conditions. The Indonesian Road Capacity Guidelines provide the adjustment-factor framework used in this study [10], while the Highway Capacity Manual provides the broader concepts of capacity and quality of service [11]. Empirical Indonesian research also shows that urban-road capacity and speed are sensitive to geometry, traffic composition, and side-friction conditions [12].

$$C = C0 \times FCLJ \times FCPA \times FCHS \times FCUK \quad (1)$$

That is :
C = Capacity of the road segment being observed
C0 = Basic capacity of the ideal road segment condition
FCLJ = Lane Width Adjustment Factor
FCPA = Capacity Correction Factor Due to PA on Undivided Road Type
FCHS = Capacity Correction Factor Due to KHS on Road
FCUK = Capacity Correction Factor for City Size

Degree of Saturation

The degree of saturation (DS) is the ratio of traffic demand to road capacity and is a primary indicator of road-section performance. A low DS represents uncongested operation, whereas a value approaching 1.0 indicates that demand is nearing or exceeding the available capacity [10], [11]. The degree of saturation is calculated using the following equation:

$$DS = Q / C \quad (2)$$

That is :
DS = Degree of saturation
C = Road segment capacity, (smp/hour)
Q = Traffic volume, in (smp/hour)

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Road Service Level

Road-section performance was assessed using the Level of Service (LOS) concept. LOS summarizes operational conditions through measures such as volume-to-capacity ratio, speed, density, travel time, maneuverability, comfort, and traffic interruption [10], [11]. The classification used in this study follows the 2023 Indonesian Road Capacity Guidelines.

Table 1: Road Service Level (PKJI, 2023)

Level of service	Scope Limits Q/C
A	0,00-0,20
B	0,20-0,44
C	0,45-0,74
D	0,75-0,84
E	0,85-1,00
F	≥1,00

RESULTS AND DISCUSSION

Srijaya Negara Road serves commercial and educational land uses, with shops, food vendors, access points, pedestrian activity, public-transport stopping, and roadside parking along the corridor. These activities generate side friction and create local bottlenecks. Previous studies show that on-street parking, pedestrian movements, bus stopping, access activity, and other roadside interactions can reduce speed and effective roadway capacity [13]-[16].

Road Geometric Data

Road geometric data was collected directly on the Srijaya Negara Street section. The road section used for the study is constructed of concrete. The following table contains the road geometric data:

Table 2: Road Geometric Data

No	Level of Service	information
1	Road Name	Srijaya Negara
2	Road Network	Provincial Road
3	Road Type	One-Way Road
4	Traffic Lane Width	2 x 3,5 m
5	Effective Shoulder Width	2,0 m
6	Closest Distance from Curb to Barrier	2,0 m
7	Median	None
8	Direction Separator	None

Daily traffic volume was obtained through a classified traffic count conducted on May 13 and 15, 2024, representing weekday and weekend conditions. The survey covered 12 hours, from 06:00 to 18:00 WIB, and the observations were aggregated into 15-minute intervals in accordance with short-duration traffic-monitoring practice [9]. The highest 15-minute period occurred from 12:30 to 12:45, with a reported equivalent hourly flow of 1,031 pcu/h. Figure 3 presents the traffic-volume profile.

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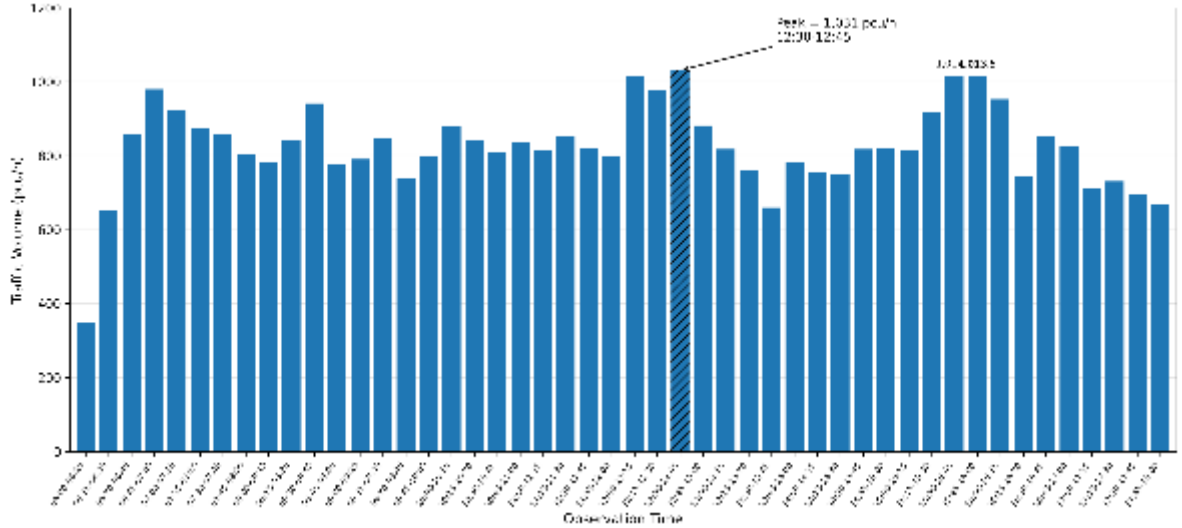

Figure 3. Fifteen-minute traffic volume profile on Srijaya Negara Road.

Capacity Analysis

Road capacity represents the maximum traffic flow that can be served by the section under prevailing conditions. The calculation used the geometric data and adjustment factors specified in PKJI 2023 [10]. Research on Indonesian and comparable heterogeneous urban traffic confirms that side friction, roadside access, parking, pedestrians, and public-transport stopping can materially reduce operational capacity [12]-[16]. The capacity parameters used in the calculation are presented in Table 3.

Table 3: Road Capacity Data

No	Variable	Information
1	C_0 (Basic Capacity) = 1700	One-Way Road
2	FCLJ : 1,00	Capacity correction factor due to the 3.5 m lane width difference for one-way roads
3	FCPA : 1,00	Capacity correction factor due to PA on an undivided road type, FCPA (50%-50%)
4	FCHS : 0,81	Side Obstacle Class: Medium (Industrial area, several shops along the side of the road). Capacity correction factor due to high KHS on the road. The curb is 0.81.
5	FCUK : 1,00	City Size: Palembang City's population of 1,801,367 (in 2025) is classified as a large city. The capacity correction factor for city size is 1.00.

Based on the road capacity parameters presented in the previous table, the road capacity was calculated. Subsequently, the degree of saturation (DS) was determined by comparing the traffic volume with the calculated road capacity.

$C = C_0 \times FC_{LJ} \times FC_{PA} \times FC_{HS} \times FC_{UK}$
C = 1700 x 1,00 x 1,00 x 0,81 x 1,00
C = 1377 pcu/hour

The calculation results indicate that the road has a capacity of 1377 pcu/h.

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Level of Service Analysis: Road Service Level

Following the estimation of the road capacity and the peak-hour traffic volume, the degree of saturation (DS) was evaluated using the ratio of traffic volume to road capacity (DS = Q/C). This parameter represents the operational performance of the roadway by indicating the extent to which the available capacity is utilized during peak traffic conditions. The final degree of saturation obtained from the analysis is presented as follows:

C = 1377 Pcu/hour
Q = 1031 Pcu/hour (Peak Hour)

So, DS = $\frac{1031}{1377}$

The calculated degree of saturation was 0.748. Under the PKJI 2023 classification, this value places the Srijaya Negara Road section at Level of Service D [10]. The result indicates operation near unstable conditions, with reduced freedom to select speed and maneuver as vehicle interactions increase. Although the calculated capacity remains higher than the observed peak-hour demand, the road has limited reserve capacity during busy periods [11].

During peak periods, queues may form near intersections and locations affected by roadside activity. The calculated capacity is still sufficient for the observed demand, but food-vendor activity, on-road stopping, parking, pedestrian movements, and passenger pick-up or drop-off can create short bottlenecks. Managing these side-friction sources is consistent with empirical evidence showing measurable losses in speed and capacity when roadside activity is uncontrolled [13]-[16]. Recommended measures include regulating stopping and parking, organizing vendor space, improving pedestrian facilities, and providing designated public-transport stopping areas.

CONCLUSION

Based on the results of a study analyzing the level of service on Jalan Srijaya Negara in Ilir Barat I District, Palembang City, it can be concluded that the road's capacity is still sufficient to serve existing traffic flow, but is approaching saturation. The analysis shows a Degree of Saturation (DS) value of 0.748, indicating a fairly high level of road capacity utilization. Based on this value, Jalan Srijaya Negara falls within Level of Service (LOS) is D. In this condition, traffic flow remains relatively stable, but drivers' freedom to choose speeds and maneuver is starting to be limited due to increased interaction between vehicles. This condition is primarily influenced by the high activity of educational and commercial areas along the road, which causes increased traffic volume and side congestion, particularly during peak hours. Overall, Jalan Srijaya Negara's performance remains acceptable, but efforts to manage traffic and control side congestion are needed to prevent a decline in the level of service in the future. Steps such as regulating on-road parking, optimizing traffic management, improving facilities for pedestrians, and developing public transportation are expected to improve road performance and maintain a better level of service.

REFERENCE

[1] BPS-Statistics of Palembang Municipality, Palembang Municipality in Figures 2024. Palembang, Indonesia: BPS-Statistics Indonesia, 2024.

[2] R. Cervero and K. Kockelman, "Travel demand and the 3Ds: Density, diversity, and design," Transportation Research Part D: Transport and Environment, vol. 2, no. 3, pp. 199-219, 1997, doi: 10.1016/S1361-9209(97)00009-6.

[3] R. Ewing and R. Cervero, "Travel and the built environment: A meta-analysis," Journal of the American Planning Association, vol. 76, no. 3, pp. 265-294, 2010, doi: 10.1080/01944361003766766.

[4] K. T. Geurs and B. van Wee, "Accessibility evaluation of land-use and transport strategies: Review and research directions," Journal of Transport Geography, vol. 12, no. 2, pp. 127-140, 2004, doi: 10.1016/j.jtrangeo.2003.10.005.

[5] G. Akar, C. Flynn, and M. Namgung, "Travel choices and links to transportation demand management: Case study at Ohio State University," Transportation Research Record, vol. 2319, no. 1, pp. 77-85, 2012, doi: 10.3141/2319-09.

[6] V. M. Garikapati, D. You, R. M. Pendyala, T. Patel, J. Kottommannil, and A. Sussman, "Design, development, and implementation of a university travel demand modeling framework," Transportation Research Record, vol. 2563, no. 1, pp. 105-113, 2016, doi: 10.3141/2563-15.

[7] X. Wang, A. J. Khattak, and S. Son, "What can be learned from analyzing university student travel demand?" Transportation Research Record, vol. 2322, no. 1, pp. 129-137, 2012, doi: 10.3141/2322-14.

[8] X. Chen, "Statistical and activity-based modeling of university student travel behavior," Transportation Planning and Technology, vol. 35, no. 5, pp. 591-610, 2012, doi: 10.1080/03081060.2012.701818.

[9] Federal Highway Administration, Traffic Monitoring Guide. Washington, DC, USA: U.S. Department of Transportation, 2013.

[10] Directorate General of Highways, Pedoman Kapasitas Jalan Indonesia, 09/P/BM/2023. Jakarta, Indonesia: Ministry of Public Works and Housing, 2023.

[11] National Academies of Sciences, Engineering, and Medicine, Highway Capacity Manual 7th Edition: A Guide for Multimodal Mobility Analysis. Washington, DC, USA: The National Academies Press, 2022.

[12] A. Munawar, "Speed and capacity for urban roads, Indonesian experience," Procedia - Social and Behavioral Sciences, vol. 16, pp. 382-387, 2011, doi: 10.1016/j.sbspro.2011.04.459.

[13] S. Biswas, S. Chandra, and I. Ghosh, "Side friction parameters and their influences on capacity of Indian undivided urban streets," International Journal of Transportation Science and Technology, vol. 10, no. 1, pp. 1-19, 2021, doi: 10.1016/j.ijtst.2020.03.007.

[14] S. Salini, S. George, and R. Ashalatha, "Effect of side frictions on traffic characteristics of urban arterials," Transportation Research Procedia, vol. 17, pp. 636-643, 2016, doi: 10.1016/j.trpro.2016.11.118.

[15] S. Salini and R. Ashalatha, "Analysis of traffic characteristics of urban roads under the influence of roadside frictions," Case Studies on Transport Policy, vol. 8, no. 1, pp. 94-100, 2020, doi: 10.1016/j.cstp.2018.06.008.

[16] A. M. Rao, S. Velmurugan, and K. M. V. N. Lakshmi, "Evaluation of influence of roadside frictions on the capacity of roads in Delhi, India," Transportation Research Procedia, vol. 25, pp. 4771-4782, 2017, doi: 10.1016/j.trpro.2017.05.489.