

Performance Analysis of Road Capacity for the Plan to Relocate On-Street Parking to off-Street Parking (Case Study on Jalan Panglima Sudirman, Bojonegoro Regency)

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Abstract: Increased economic activity in urban areas often creates new challenges in transportation management, especially regarding parking. On the Panglima Sudirman road section of Bojonegoro Regency, the existing condition is that there is a lot of on-street parking, this causes the level of service on the road to decline. This research aims to determine changes in road capacity, impacts on road performance with the transfer of on-street parking to off-street parking. The research method uses a quantitative approach with descriptive and comparative analysis methods to evaluate road performance before and after the transfer of on-street parking to off-street. The research results show that the plan to move on-street parking to off-street on Jalan Panglima Sudirman, Bojonegoro, resulted in an increase in road capacity of 290 pcu/hour, from 2,639 pcu/hour to 2,929 pcu/hour. Road performance, based on Level of Service (LOS), increased from 0.48 to 0.44, accompanied by an increase in average vehicle speed time from 35 km/hour to 43 km/hour. The findings highlight the significance of effective parking management strategies in enhancing urban road performance. Implementing off-street parking solutions can significantly improve road capacity, reduce congestion, and enhance travel efficiency. These results can serve as a reference for policymakers in formulating traffic management strategies to optimize urban mobility and minimize the negative impacts of on-street parking on road performance. Future research may explore the socioeconomic effects of parking policy changes on businesses and residents in the affected areas.

Keywords: off street parking, parking displacement, road performance.

INTRODUCTION

Transportation plays a key role in improving economic performance and equitable infrastructure development. Efficient infrastructure not only facilitates the movement of goods and people but also expands accessibility to key markets and services. As a result, productivity increases and investments tend to flow more heavily to regions with good transportation systems, positively impacting economic growth at the national and local levels (Banerjee et al., 2020). Infrastructure improvements, such as widening roads or building new facilities, also have an impact on reducing congestion and fuel consumption. These efficiencies contribute to improved industrial performance and reduced carbon emissions. Studies conducted in Zhejiang, China, show that regions with better transportation networks experience faster economic growth compared to those with inadequate infrastructure (Wagner et al., 2022).

The provision of adequate transportation facilities and infrastructure, such as roads, public transportation systems, and parking facilities, is an important step in meeting mobility challenges. Without improving the quality and quantity of infrastructure, the risk of congestion, reduced productivity, and increased greenhouse gas emissions will be higher (Wagner et al., 2022). Therefore, a safe, affordable and efficient transportation system not only plays a role in facilitating people's daily activities, but also directly contributes to inclusive economic growth (Banerjee et al., 2020). Increased mobility also results in increased roadway loads and the need for other supporting transportation

facilities, such as parking areas and public transport. When road space is over-utilized for on-street parking, traffic performance is compromised, reducing the efficiency of the transportation system and increasing the potential for congestion. Therefore, shifting parking from on-street to off-street, through the construction of parking lots, is one of the important solutions in improving road performance and reducing traffic load (Banerjee et al., 2020).

The construction of parking lots as off-street facilities not only relieves traffic, but also promotes city efficiency through better transportation management. This policy is in line with the concept of sustainable cities, which emphasizes the importance of optimal use of space and reduction of carbon emissions due to congestion (Wagner et al., 2022). It is important for local governments to consider the implementation of modern technologies in parking management, such as automated sensors and electronic payment systems. In addition to improving user convenience, these approaches also help improve accuracy in parking revenue monitoring and prevent potential leakages. In the long run, integrated transportation strategies, including parking policies, will contribute to improving people's mobility and the region's economic productivity (Liu & Xiong, 2021; Wagner et al., 2022).

Moving to off-street parking allows for better utilization of public space and reduces reliance on street use for parking. This is also in line with policy recommendations implemented in major cities such as São Paulo, Atlanta, and Beijing. Studies show that cities that improve parking management can reduce fuel consumption, improve environmental quality, and promote sustainable mobility by strengthening the use of public transportation and active modes such as cycling and walking (Thigpen, 2018). However, there is a need for careful planning of parking policies and adaptation to local needs. Parking reforms should also not only focus on adding capacity, but also on implementing dynamic parking tariffs, eliminating "parking minimums," and providing incentives for alternative transportation users. In doing so, it will create economic benefits through increased investment and efficiency in city operations (Thigpen, 2018).

Good parking policies can also increase investment in the area. Well-managed off-street parking facilities allow users to feel more comfortable leaving their vehicles, which in turn increases visits to shopping centers, public facilities, and tourist attractions. In addition, the use of technology such as parking sensors and electronic payment systems provides transparency and efficiency in parking management and prevents revenue leakage (Thigpen, 2018). The experience of several major cities, such as Beijing and São Paulo, shows that effective parking reforms can reduce carbon emissions and improve people's overall quality of life. This policy supports the concept of sustainable cities, with a focus on integrating public transportation and reducing dependence on private vehicles. It also opens up opportunities to create new public spaces, such as urban parks and pedestrian paths, which can strengthen social interaction and encourage the use of active modes of transportation (Wagner et al., 2022).

In addition, local governments need to pay attention to the social and economic aspects of parking policies. A good off-street parking policy should be balanced with improved access to affordable and accessible public transportation, especially for low-income communities. Integrated and local needs-based transportation management will ensure that these policies are effective and inclusive. Land use changes that lead to new activity centers are often accompanied by challenges related to transportation and infrastructure management. Growing activity centers, especially in urban areas, require transportation systems that can accommodate the increased volume of traffic generated. This creates greater pressure on existing transportation infrastructure, which may already be congested. Therefore, strategies such as shifting parking from on-street to off-street are becoming

increasingly relevant as an effort to reduce congestion and improve transportation efficiency (Jae, 2024; Ren et al., 2023).

Furthermore, these changes also provide opportunities for better development of green areas and public spaces, which not only improve the aesthetics of the city but also the quality of life of residents. Well-managed activity centers can provide convenient open spaces for people, encouraging social interaction and community engagement (AWAL et al., n.d.). Thus, integration between transportation policy and land use planning will be critical to achieving the goal of sustainable and inclusive urban development. Moving parking from on-street to off-street has the potential to have a significant positive impact on the environment. By reducing the number of vehicles parked on the roadside, congestion can be minimized, thereby reducing exhaust emissions from idling or slow-moving vehicles on the road. Research shows that reduced emissions of carbon dioxide and other pollutants can contribute to improved air quality, which is especially important in dense urban areas (Cheng et al., 2022; Feng et al., 2024). In addition, with more open space, the construction of off-street parking can be accompanied by the development of green spaces, which support biodiversity and improve environmental aesthetics (Bungau et al., 2022).

Studies show that areas with good parking facilities often attract more businesses, which in turn increases economic activity in the area (Sha et al., 2023). Involving the community in planning and decision-making related to parking removal is essential to ensure that the policies implemented meet their needs and expectations. Community involvement can increase acceptance and support for new policies, as well as provide valuable insights into problems and solutions that may not be apparent to decision makers (AWAL et al., n.d.). This participatory process creates a sense of belonging among citizens, which can strengthen social relations and commitment to the maintenance of public spaces. Moving parking from on-street to off-street should be seen as part of the integration between transportation systems and spatial planning. Development that considers this relationship can improve the efficiency and effectiveness of urban space use. With good spatial planning, the development of transportation infrastructure can be optimized, thereby reducing traffic problems and improving the comfort of road users (Chandra et al., 2021; Yigitcanlar et al., 2024).

While the removal of off-street parking has many benefits, there are challenges that need to be addressed, such as financing the construction of parking structures and setting fair pricing policies. Without a proper financing strategy, the construction of parking lots may be hindered, reducing the potential benefits (Dave et al., 2019). In addition, supportive policies are needed so that parking tariffs do not become a burden for the community, especially for those with economic limitations (Karpinski et al., 2022). The high level of economic activity along Jalan Panglima Sudirman has increased the demand for parking spaces. A study conducted by the Bojonegoro Regional Development Planning Agency in 2022 showed that the average daily parking volume on this road reached 1,200 vehicles, with an average parking duration of 2 hours (Bojonegoro Regional Development Planning Agency, 2022). Currently, on-street parking reduces road capacity by 30%, which has a significant impact on the performance of the road. Shifting parking from on-street to off-street is expected to increase land use efficiency and improve road performance in the area. On-street parking often causes constriction of traffic space, which contributes to congestion and degradation of road service quality. With a parking garage, it is expected that there will be a reduction in the traffic load on the main road, so that the smooth flow of traffic can be maintained and the safety of road users can be improved.

Overall, the transfer of parking from on-street to off-street on Jalan Panglima Sudirman is a strategic step in improving the quality of road services and traffic management in Bojonegoro Regency. The objectives of this study are to analyze the changes in road capacity on Jalan Panglima

Sudirman before and after the transfer of on-street parking to off-street parking and to evaluate the impact of parking transfer on road performance on Jalan Panglima Sudirman. The findings of this study will be beneficial for city planners, transportation policymakers, and local governments in designing more effective and sustainable urban infrastructure policies. Additionally, the study aims to provide empirical evidence supporting the broader discourse on integrating transportation and land-use planning for long-term urban development benefits.

MATERIALS AND METHOD

This study uses a quantitative approach with descriptive and comparative analysis methods to evaluate road performance before and after the transfer of on-street parking to off-street. Descriptive and comparative methods are carried out through research, humans can use the results, in general the data that has been obtained from research can be used to understand, solve and anticipate problems. The research was conducted on Panglima Sudirman Road Section, Bojonegoro Regency, East Java Province.



Figure 1. Study Area Boundaries

Source: Google Maps. 2024

Data source is a subject from which data is obtained. Data sources are needed to support the implementation of research and at the same time to ensure success (Febriani & Dewi, 2018). In this case, the data needed in the study were obtained from two sources, namely primary data obtained through direct field surveys, observations, and interviews with related parties at the research location, and secondary data obtained through official documents and historical data from relevant government agencies such as the Regional Revenue Office, the Transportation Office, and other related agencies.

RESULTS AND DISCUSSION

Regional Overview

Bojonegoro Regency is one of the regencies in East Java Province, Indonesia. Bojonegoro Regency is located in the northern part of East Java Province and has an important role in the agricultural sector and natural resources. With an area of 2,527.53 km², Bojonegoro Regency is divided into 28 sub-districts with Bojonegoro as its capital.

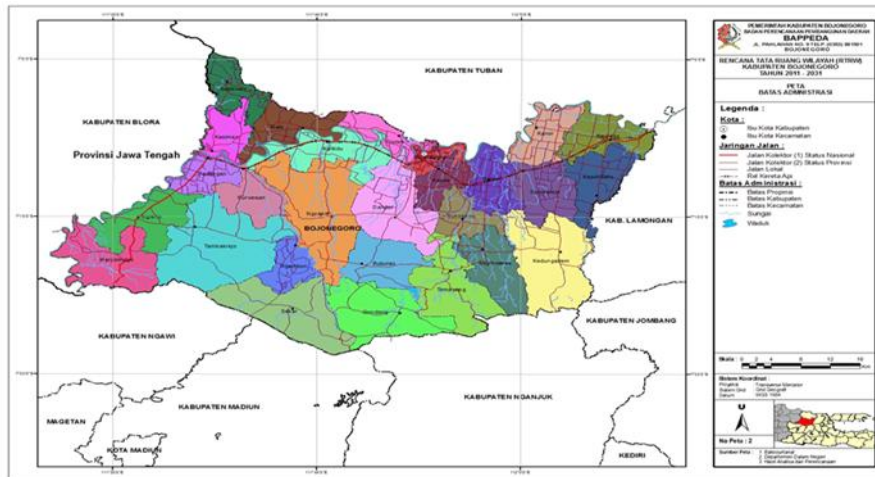


Figure 2. Bojonegoro Map
 Source: (Pemkab Bojonegoro, 2024)

Astronomically, Bojonegoro Regency is located between 6.5°-7.3° N (South latitude) and between 111.4°-112.5° E (East longitude). Geographically, it is bordered by Tuban Regency to the north, Lamongan Regency to the west, Nganjuk Regency to the south, and Blora Regency to the east.

Capacity Analysis of On-Street Road Sections
 Vehicle Volume smp/h

Traffic volume observations were made on the existing conditions where there is still on-street parking with observation time intervals on Jalan Panglima Sudirman Bojonegoro. The total observation time was 6 hours per day. Observations were made at 06.00-09.00 a.m., and 15.00-18.00 p.m. The vehicle volume data is then converted in units of smp/hour. The calculation of vehicle volume uses the EMP method which is adjusted to the table. The following is the calculation of volume with EMP. The results of the calculation of traffic volume at Peak hour every day can be seen in Table 4.3 as follows:

Vehicle Type x Influence Weight as per Vehicle Type

$$LV = (\text{Number of Vehicles} \times 1.0)$$

$$HV = (\text{Number of Vehicles} \times 1.2)$$

$$MC = (\text{Number of Vehicles} \times 0.25)$$

$$UM = (\text{Number of Vehicles} \times 0.4)$$

Table 1. Vehicle Volume of EMP method in peak hour

Day	Period	Passenger Car Units (smp/hr)				Total
		MC	LV	HV	UM	
Sunday	08.00-09.00	379	488	66	312	1.245
Monday	06.45-07.45	404	532	69,6	322,8	1.328,4
Wednesday	07.00-08.00	382,75	506	66	331,2	1.285,95
Saturday	08.00-09.00	384,25	488	66	312	1.250,25
Total		1.550	2.014	267,6	1.278	5.109,6

Source: 2024 Analysis Results

From the table above we conducted research by taking samples on Mondays and Wednesdays which represent working days, while the data collection holidays were carried out on Saturdays and Sundays because the land use characteristics in the area are office areas, hotels, schools, hospitals, places of worship and shops.

Capacity of Panglima Sudirman Road

Calculate the capacity of the road section by multiplying the basic capacity by its 4 capacity factors, namely the road width factor, direction divider factor, side obstacle factor and the following city size factor:

$$C = CO \times FCLJ \times FCPA \times FCHS \times FCUK$$

Description:

- C : Capacity (smp/hr)
- Co : Specific condition base capacity (smp/hr)
- FCLJ : Traffic lane width capacity correction factor
- FCPA : Traffic direction separation capacity correction factor
- FCHS : Side obstacle capacity correction factor
- FCUK : City size capacity correction factor

Then the capacity of Panglima Sudirman on street section is:

$$C = CO \times FCLJ \times FCPA \times FCHS \times FCUK$$

$$= 2,900 \times 1.00 \times 1.00 \times 0.91 \times 1.00$$

$$= 2.639\text{smp/hour}$$

Analysis of Jalan Penglina Sudirman

Degree of Saturation

Saturation Degree can be calculated by dividing the traffic volume (smp/hr) by the capacity (smp/hr) can be seen in the following table:

Table 2. Saturation Degree

Day	Q	C	Q/C (Degree of Saturation)
Sunday	1.245	2.639	0,47
Monday	1.328,4		0,50
Wednesday	1.285,95		0,49
Saturday	1.250,25		0,47

Source: 2024 Analysis Results

From the table above, it can be concluded that the average degree of saturation during the days shows that in general, the traffic volume is high which is not proportional to the road capacity, which allows traffic congestion.

Level of Service (LoS)

Level of service (LOS) is a method used to assess road performance as an indicator of congestion. A road is categorized as congested if the LOS calculation results in a value close to. Below is the Level of Service classification table. The following table is the result of Level of Service of Panglima Sudirman Road Section in existing condition or before on-street parking removal by calculating travel speed (vT) which is the actual speed of traffic flow whose amount is determined based on the degree of saturation (DJ) and free flow speed (vB). To find out the free flow speed (vB) by calculating as follows:

$$vB = (vBD + vBL) \times FVBHS \times FV(BUK)$$

$$vB = (44 + 6) \times 0.81 \times 1$$

$$vB = 40.5 \text{ km/h}$$

After knowing the values of vB and DS, the determination of the vT value for MP is carried out using the diagram in Figure 2.1 and the value is obtained as the following table:

Table 3. Level of Service Results

Day	Q	C	Q/C	vB) km/h	v km/h	Service Level
Sunday	1.245	2.639	0,47	40.5	36	E
Monday	1.328,4		0,50		33	E
Wednesday	1.285,95		0,49		34	E
Saturday	1.250,25		0,47		36	E
Average			0,48		35	E

Source: 2024 Analysis Results

Based on table 3, the Level of Service (LOS) results obtained from the degree of saturation classification for Jalan Panglima Sudirman have an average degree of saturation value of 0.48. This condition shows that the traffic flow on Jalan Panglima Sudirman is in the stable flow category but not completely free. The drivers start to feel the obstacles from other vehicles that affect their operational speed. Based on table 4.5 with the average speed still reaching 35 km/h, it is included in level of service E where traffic density is high because internal traffic barriers are high, drivers begin to feel short-duration congestion and the possibility of slowing down is still within acceptable limits. Traffic density at this level is higher than level of service A, but still tolerable given that the road is in the city and not yet in a critical condition that can cause congestion. Overall, this condition shows that the road capacity is still able to accommodate the existing traffic volume quite well, although there is potential for increased obstacles at certain peak hours.

Road Characteristics

Panglima Sudirman Road in Bojonegoro has characteristics that can be seen from several important aspects in traffic analysis. Based on observations made for 6 hours per day, namely at 06.00-09.00 WIB and 15.00-18.00 WIB, the traffic volume shows significant variations between days. The highest volume was recorded on Monday with a total of 1,328.4 smp/hr, while the lowest volume occurred on Sunday with 1,245 smp/hr. The composition of vehicles passing through this road consists of motorcycles (MC), light vehicles (LV), heavy vehicles (HV) and non-motorized vehicles (UM). In terms of capacity, Panglima Sudirman Road has a total capacity of 2,639 smp/hr. This figure is obtained from a calculation that considers several correction factors, where the basic capacity of 2,900 smp/hr is multiplied by a side obstacle correction factor of 0.91 k due to the high side obstacles with on-street parking, as well as other correction factors such as directional separation, lane width, and city size, each of which is 1.00.

The level of service (LoS) shows varying results, with an average degree of saturation of 0.48 with an average travel speed of 35 km/h which classifies this road into LoS E. This condition indicates that the traffic flow on Panglima Sudirman Road is stable although not completely free, with the possibility of slowing down and operational speeds starting to be hampered by the presence of other vehicles and high side obstacles. The daily variation shows that Monday during peak hour has the lowest average travel speed of 33 km/h, while Wednesday shows an average travel speed of 34 km/h,

while for Saturday and Sunday the average travel speed is 36 km/h. Overall, Panglima Sudirman Road can be categorized as an urban road with characteristics of a steady flow of traffic, but the speed and movement of vehicles are controlled, drivers are limited in choosing speed, although there is a significant increase in density on weekdays. The road condition is still able to accommodate the existing traffic volume well, which is reflected in the level of service that is still in the acceptable category.

Off-Street Road Section Capacity Analysis

Vehicle Volume smp/h

Traffic volume observations were made during the existing conditions, and will be used as basic data to calculate the Level of Service of the road when the parking conditions have been moved off-street. Observations were made in the observation time interval on Jalan Panglima Sudirman Bojonegoro. The total observation time was 6 hours per day. Observations were conducted at 06.00-09.00 am, and 15.00-18.00 pm. The vehicle volume data is then converted in units of smp/hour. The calculation of vehicle volume uses the EMP method which is adjusted to the table. The following is the calculation of volume with EMP. The results of the calculation of traffic volume every day can be seen in Table 4.7 as follows:

Vehicle Type x Influence Weight as per Vehicle Type

LV = (Number of Vehicles x 1.0)

HV = (Number of Vehicles x 1.2)

MC = (Number of Vehicles x 0.25)

UM = (Number of Vehicles x 0.4)

Table 4. Sunday EMP method Vehicle Volume

Day	Period	Passenger Car Units (smp/hr)				Total
		MC	LV	HV	UM	
Sunday	08.00-09.00	379	488	66	312	1.245
Monday	06.45-07.45	404	532	69,6	322,8	1.328,4
Wednesday	07.00-08.00	382,75	506	66	331,2	1.285,95
Saturday	08.00-09.00	384,25	488	66	312	1.250,25
Total		1.550	2.014	267,6	1.278	5.109,6

Source: 2024 Analysis Results

The data used above is the same data as the existing conditions where there is still on-street parking.

Capacity of Panglima Sudirman Road

Calculating the capacity of road sections that have been simulated parking is done by multiplying the basic capacity by 4 capacity factors, namely the road width factor, direction divider factor, side obstacle factor and the following city size factor:

$$C = CO \times FCLJ \times FCPA \times FCHS \times FCUK$$

Description:

C : Capacity (smp/hr)

- Co : Specific condition base capacity (smp/hr)
- FCLJ : Traffic lane width capacity correction factor
- FCPA : Traffic direction separation capacity correction factor
- FCHS : Side obstacle capacity correction factor
- FCUK : City size capacity correction factor

Therefore, the capacity of the off street Panglima Sudirman road section is:

$$C1 = CO \times FCLJ \times FCPA \times FCHS \times FCUK$$

$$= 2,900 \times 1.0 \times 1.0 \times 1.01 \times 1.0$$

$$= 2,929 \text{ smp/hour}$$

Analysis of Jalan Penglina Sudirman

Degree of Saturation

Saturation Degree can be calculated by dividing the traffic volume (smp/hr) by the capacity (smp/hr).

Table 5. Saturation Degree

Day	Q	C	Q/C (Degree of Saturation)
Sunday	1.245	2.929	0,43
Monday	1.328,4		0,45
Wednesday	1.285,95		0,44
Saturday	1.250,25		0,43

Source: 2024 Analysis Results

Judging from the table above, the simulation results of the average degree of saturation during the observation days when parking has been moved or off-street parking shows that in general, the traffic volume looks very relaxed. This condition is reflected in the relatively low degree of saturation values on all observation days, with a range of values between 0.43 to 0.45. This relaxed traffic situation allows vehicle movements to proceed very smoothly, where drivers can choose the speed according to the specified limit without experiencing significant obstacles. The lack of traffic obstacles also causes very rare congestion on the road. This good road performance is supported by an adequate road capacity of 2,929 smp/h, which is much greater than the highest recorded traffic volume of 1,328.4 smp/h on Monday. This condition indicates that the road section has an optimal level of service in accommodating the existing traffic flow.

Level of Service (LoS)

From the existing condition data of Panglima Sudirman Road Section or before the transfer of on-street parking, an analysis of the simulation for the transfer of parking to off-street will be carried out, so that the value of free flow speed (vB) is obtained as follows:

$$vB = (vBD + vBL) \times FVBHS \times FV(BUK)$$

$$vB = (44 + 6) \times 0.99 \times 1$$

$$vB = 49.5 \text{ km/hour}$$

Determination of the vT value for MP is carried out using the diagram in Figure 2.1 After knowing the vB and DS values, and the values are obtained as shown in the following table:

Table 6. Level of Service Results

Day	Q	C	Q/C	vB) km/h	v km/h	Service Level
Sunday	1.245	2.929	0,43	49.5	44	E
Monday	1.328,4		0,45		42	E
Wednesday	1.285,95		0,44		43	E
Saturday	1.250,25		0,43		44	E
Average			0,44		43	E

Source: 2024 Analysis Results

Based on table 4.9, the Level of Service (LoS) results obtained from the degree of saturation classification for Jalan Panglima Sudirman have an average degree of saturation value of 0.44. This condition shows that the traffic flow on Jalan Panglima Sudirman is in a stable flow category but not completely free. The drivers start to feel the obstacles from other vehicles that affect their operational speed. Based on table 4.5 with the average speed still reaching 43 km/h, it is included in level of service E which is high traffic density due to high internal traffic resistance, drivers begin to feel short-duration congestion and the possibility of slowing down is still within acceptable limits. With this low degree of saturation, the driver has full freedom in determining the speed according to the specified limit, because the interaction between vehicles is minimal. As the capacity increases and the degree of saturation decreases, the speed will increase, hence the traffic flow resistance decreases. This also indicates that the available road capacity is much greater than the existing traffic volume, so the potential for congestion or traffic flow disruption decreases. Overall, if we look at the average travel speed with the transfer of on-street parking to off-street parking, there is an increase even with the level of service category E.

Road Characteristics

Traffic volume observations on Jalan Panglima Sudirman Bojonegoro were conducted after the implementation of parking transfer, with a total observation period of 6 hours per day divided into two time intervals: morning (06.00-09.00 WIB) and afternoon (15.00-18.00 WIB). In this observation, vehicle volumes were converted into smp/h using the EMP method with different weights for each vehicle type: light vehicles (LV) with a weight of 1.0, motorcycles (MC) with a weight of 0.25, heavy vehicles (HV) with a weight of 1.2 and non-motorized vehicles (UM) with a weight of 0.4. The results of the traffic volume analysis show interesting variations between observation days. The highest volume was recorded on Monday with a total of 1,328.4 smp/hour, followed by Wednesday with 1,285.95 smp/hour, Saturday with 1,250.25 smp/hour, and the lowest volume on Sunday with 1,245 smp/hour. This pattern shows a trend of higher volumes on weekdays compared to weekends, indicating the characteristics of community activities in the area.

The capacity of Panglima Sudirman Road during simulation for off-street conditions was calculated by considering various correction factors. With a base capacity of 2,900 smp/hr, after multiplying by the lane width correction factor (1.0), direction divider factor (1.0), side obstacle factor (1.01), and city size factor (1.0), the total capacity is 2,929 smp/hr. The road level of service analysis showed excellent results, with low degrees of saturation on all observation days. The degree of saturation values ranged from 0.43 with an average travel speed of 44 km/h (Saturday and Sunday) to 0.45 with an average travel speed of 42 km/h (Monday), with an average of 0.44 which is at an average travel speed of 43 km/h. This classifies Panglima Sudirman Road into Level of Service (LoS) E which indicates a condition of high traffic density due to high internal traffic resistance, drivers begin to feel short-duration congestion, but in the analysis results can be seen an increase in the average travel

time speed and a decrease in the degree of saturation value due to the transfer of on-street parking to off-street parking eating road capacity will increase. This condition shows that the relocation of parking to off-street areas has had a positive impact on the smooth flow of traffic on Jalan Panglima Sudirman.

Off Street Parking Layout Plan

The plan to relocate the off street parking on Jl Panglima Sudirman will be done on the vacant land on the side of the road. The description of the parking lot is as follows:



Figure 2. Off Street Parking Location Plan

Source: (Google Maps, 2024)

The land is 112 meters long, 50 meters wide at the back, and 23 meters wide at the front. Overall this land has an area of 4,088 square meters. In the implementation, a calculation layout is made as follows:

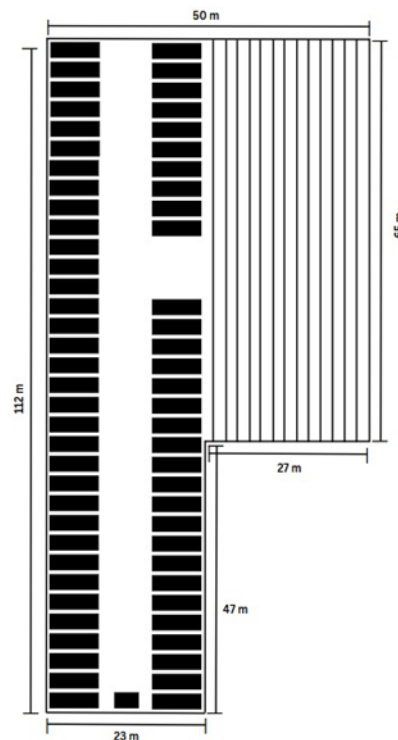


Figure 3. Off Street Parking Plan Layout

Source: Secondary Data

Through the picture above, it can be seen that the mapping plan is divided into the left side with a length of 112 meters and a width of 23 meters mapped specifically for cars. Each car plot is 6 meters long and 2.5 meters wide with a distance between cars of 60 - 80 cm. Overall, it is estimated that each car and its distance takes up 3.3 meters of space. So in a span of 112 meters there will be 34 four (4) wheel parking spaces. From both sides there are 68 spaces. In the middle there will be a distance of 3 cars as an access road to the 2-wheeled vehicle parking lot, so that the four-wheeled vehicle parking mapping can accommodate a maximum of 65 vehicles.

On the right side of the land, there is an area 27 meters wide and 65 meters long. This area is planned for parking two-wheeled vehicles, with an estimate that every 3 meters can accommodate 2 vehicles. With a length of 65 meters, parking space can be provided for around 43 to 44 motorcycles. Next, for a land width of 27 meters, it is estimated that each motorcycle requires 1 meter of space, plus 1 additional meter as an access point. Therefore, the 27-meter width can be used for about 13 rows of parking. Overall, the back right section of the 65-meter-long and 27-meter-wide lot can accommodate at least 563 two-wheeled vehicles

CONCLUSION

From the calculation of the traffic performance of Panglima Sudirman Bojonegoro road with the plan to move the on-street parking to off-street parking, the following research results were obtained, With the plan to transfer on-street parking to off-street parking, it can be seen from the increase in the capacity of the Panglima Sudirman Bojonegoro road section which has increased by 290 smp / hour from the existing condition of road capacity where there is on-street parking, namely 2,639 smp / hour after simulating the application of the parking transfer plan to 2,929 smp / hour. The impact of the plan to transfer on-street parking to off-street parking can be seen from the performance of the Panglima Sudirman Bojonegoro road section seen from the Level of Service (Los) has increased after the plan to transfer on-street parking to off-street parking with an average Level of Service (Los) in existing conditions with an average saturation degree value of 0.48 and an average travel speed of 35 km / h to 0.44 with an average travel speed of 43 km / h, so that the average speed on the Panglima Sudirman road section will automatically increase by 8 km / h even though it is at the same level of service classification E. The effect of the plan to move on-street parking to off-street parking on Panglima Sudirman Bojonegoro road section on parking PAD also increased by Rp 165,436,250.00 or 43% due to the number of parking spaces available in off-street parking lots more than off-street.

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