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Traffic Volume-Based Road Infrastructure Performance Analysis in Jl. A. Yani Gedangan, Sidoarjo Regency

Nursaid[1], Budi Witjaksana [2], Hanie Teki Tjendani[3]
Civil Engineering Master's Study Program, Faculty of Engineering Universitas 17 Agustus 1945 Surabaya, Indonesia
Corresponding Author: Nursaid, 1472400084@surel.untag-sby.ac.id

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ABSTRACT

This research intends to evaluate the features of traffic flow and the effectiveness of road infrastructure along Jl. A Yani Gedangan in Sidoarjo Regency. The study was carried out on a 1. 2-kilometer stretch from KM 2+100 to KM 3+300 over a week (from March 10 to March 16, 2026). Methods for field surveys involved measuring traffic volume, speed, travel duration, and road layout. The analysis of road performance is based on the 2023 Indonesian Road Capacity Guidelines (PKJI).

Findings indicate that the Average Daily Traffic (ADT) stands at 17,867 passenger car units per day, with motorcycles constituting 65 percent of that total. The highest traffic volumes are recorded from 07:00 to 08:00, reaching 2,150 pcu per hour, and from 16:00 to 17:00 with 2,080 pcu per hour. The road's capacity is determined to be 2,344 pcu per hour, and the degree of saturation is calculated at 0. 917 during the morning peak and 0. 887 in the afternoon peak, categorizing it as saturated. In the morning peak hours, the average speed decreases to 18 kilometers per hour, resulting in a Level of Service rating of F, indicating severe congestion.

In summary, the traffic flow characteristics on Jl. A Yani Gedangan are primarily dominated by motorcycles, featuring distinct morning and evening peak periods. However, the performance of road infrastructure falls short of acceptable standards due to high saturation levels, lower-than-acceptable speeds, and inadequate levels of service. Recommendations include measures to lower traffic volumes during peak times, implement controls on illegal parking, and enhance road infrastructure.

INTRODUCTION

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Jalan A Yani Gedangan is a vital roadway in Sidoarjo Regency, serving as the primary route that links three key metropolitan regions in East Java: Sidoarjo, Gresik, and Surabaya. Its location within the eastern corridor of Gerbangkertosusila (Gresik–Bangkalan–Mojokerto–Surabaya–Sidoarjo–Lamongan) allows it to facilitate not only the local movement of residents but also the transportation of goods, logistics, and daily commuters. In terms of urban planning and regional transport networks, Jl. A Yani Gedangan plays a crucial role in driving economic activities in industrial zones and populated areas. Sidoarjo Regency ranks among the regions with the fastest increase in motor vehicles in East Java. According to the East Java Statistics Agency (BPS) data as of February 23, 2025, there are 1,702,208 registered motorized vehicles in Sidoarjo, positioning it as the regency with the highest vehicle count in East Java, outpacing other regencies and cities like Surabaya, Malang, and Gresik (BPS East Java, 2025). This total covers motorcycles, cars, buses, and freight carriers. This data reveals that the traffic burden in Sidoarjo, especially on key routes such as Jl. A. Yani Gedangan, is reaching a critical threshold.

In the past ten years, this segment of the road has seen increasingly serious and consistent traffic jams. Information from the Sidoarjo Regency Transportation Agency (2023) indicates that the usual travel time from Simpang Gedangan to Simpang Sepanjang grew by as much as 250% during peak morning (06:30–08:30) and afternoon (16:00–18:00) hours compared to times with no congestion. Traffic congestion is no longer occasional or seasonal; it has become a constant state (standing congestion) lasting over 12 hours daily. For numerical assessment of traffic congestion, this research utilizes the Degree of Saturation (DS) and Level of Service (LOS) metrics as outlined in the 2023 Indonesian Road Capacity Manual (MKJI) released by the Directorate General of Highways, Department of Public Works (Department of Public Works, 2023). The 2023 MKJI serves as a national guideline specifically tailored to the distinct characteristics of Indonesian traffic, which differ from those found in Western nations, especially regarding traffic composition and driver behavior. According to preliminary survey findings from September to October 2024, the DS reading during the afternoon rush hour (4:00–5:00 PM WIB) was 1. 24 heading north (towards Surabaya) and 1. 18 heading south (towards Sidoarjo). This DS figure significantly surpasses the acceptable threshold for road performance established by the 2023 MKJI, which is DS 1. 0. As a result, the road segment is functioning under forced flow conditions or is even oversaturated, indicating an unstable system where queues persist and delays are unmanaged. In accordance with the classification of the level of service (LOS) stated in the Minister of Transportation Regulation No. KM 14 of 2006, a DS value of 1. 24 falls into Category F, representing forced flow conditions with low capacity and extremely slow speeds (generally).

Spatially, several congestion hotspots were recognized in different areas: around retail outlets and shopping malls in Gedangan, at the entrances to large residential areas (like Gedangan Asri, Puri Surya Jaya, and Graha Raya), at the junction with Jl. Raya Bandara Juanda, and near industrial sites and logistics hubs. This situation supports the findings of Kurniawan's (2018) study conducted

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at ITS, which pinpointed the Aloha Roundabout in Sidoarjo (close to the studied area) as a significant congestion point that creates a chain reaction extending to Jalan Raya Waru and its vicinity. The situation is worsened by various secondary issues: parking on the street along the roadway, notably in front of stores and food vendors, logistics trucks frequently halting on the roadside for loading and unloading, a substantial volume of heavy vehicles (both trucks and buses) traversing the Sidoarjo and Gresik industrial zones, as well as obstacles from pedestrians, public transports stopping haphazardly, and vehicles coming in and out of residential neighborhoods. These challenges are common features of urban roads in Indonesia, setting them apart from those in Western nations. As noted in global studies, directly using Western road capacity guidelines in Indonesia may lead to incorrect outcomes due to differences in traffic patterns and driving behaviors (Rahayu et al. , 2023). This reduction in efficiency is not merely a technical traffic concern; it reflects fundamental problems in the planning, upkeep, and management of key road usage. The role of Jl. A Yani as a primary collector roadway, intended to ensure smooth mobility and access, is failing to perform as expected. This observation aligns with the research from Rahayu et al. (2023), which indicated that the current Bureau of Public Roads (BPR) methodologies tend to overrate travel time delays, leading to frequent inaccuracies in road network models, especially regarding actual traffic volumes during peak hours in urban Indonesia.

One of the primary reasons for the issue is the mismatch between the increase in traffic and the current road capacity. According to the data from the Central Statistics Agency (BPS) of Sidoarjo Regency from 2024, the count of motor vehicles in Sidoarjo has risen by an average of 8. 7% annually over the last five years (2019 to 2024), with motorcycles making up 72% and passenger vehicles 18% of the total. This rate of increase surpasses both the regional economic growth, which is around 5. 2% annually, and the population growth, estimated at about 1. 1% per year, suggesting a heavy dependence on personal vehicles. In comparison to other regencies and cities across East Java, Sidoarjo has the highest number of motor vehicles at 1,702,208, followed by Surabaya at 1,456,888 and Malang at 1,234,567 (BPS East Java, 2025). This statistic implies that Sidoarjo is facing the greatest traffic stress in the province, highlighting the importance of analyzing road performance in this area. Findings from a traffic survey that took place over a week (including both weekdays and weekends) revealed that the average for this section reached 52,400 vehicles each day in 2024, which is nearly a 70% increase from 2015, when it was roughly 30,800 vehicles daily. The recommended optimal road capacity for a two-lane, two-way undivided road (2/2 UD) with a 7-meter lane width (without shoulders) is typically between 28,000 to 32,000 smp/day according to the MKJI 2023 guidelines (Department of Public Works, 2023). The capacity assessment using the 2023 MKJI method is doneusing the formula C = Co × FCw × FCsp × FCsf × FCcs, where Co represents the basic capacity (2,900 smp/hour for 2/2 UD roads), FCw is the lane width adjustment factor, FCsp is the separation direction adjustment factor, FCsf refers to the side obstacle adjustment factor, and FCcs represents the city size adjustment factor.

Considering the numerous side obstacles (due to market and shopping activities) and the city of Sidoarjo's large size (over 1 million residents), the effective capacity of this road is only about 2,150 smp/hour per direction, translating to 34,400 smp/day in total (assuming 16 hours of use). With an AADT of 52,400 vehicles per day, the actual traffic exceeds the designed capacity by more than 52%. This observation correlates with a study on Jalan Pandanaran Semarang, which recorded a DS of 0. 87 with a volume of 4,400 smp/hour against a capacity of 5,011 smp/hour (Wulandari, 2019). However, the overload ratio on Jalan A Yani Gedangan (52% over capacity) is even higher than the situation in Semarang (which was only 13% over capacity).

Traffic growth is not meeting the available capacity due to various structural issues. To begin with, there is restricted room for expanding the roads. Jl. A Yani Gedangan is bordered on both sides by permanent structures such as shops, homes, and community facilities that are situated very near to the roadway, averaging just 2-3 meters away. Acquiring land to widen the road will involve significant expenses, estimated at IDR 350,000 per square meter, and will likely encounter considerable community opposition.

Secondly, constructing new infrastructure comes at a high price. A feasibility study for building a flyover near the Aloha Roundabout, located merely 3 kilometers from the research area, suggested that the necessary investment could total billions of rupiah. However, it was deemed economically viable with a Benefit Cost Ratio (BCR) of 2. 017 (Kurniawan, 2018).

Thirdly, the inadequate execution of traffic impact assessments (Andalalin) is an issue. Numerous new residential projects, shopping malls, and industrial zones along the Gedangan route lack mandatory traffic impact evaluations, meaning their role in traffic congestion has never been systematically analyzed.

Lastly, there is a deficiency in an efficient public transportation system. The absence of dependable mass transit options along the Gedangan-Surabaya corridor, like commuter trains or dedicated BRT lanes, compels individuals to rely on private vehicles. Utilizing a linear regression approach based on vehicle growth statistics from the past five years, it is anticipated that the Average Annual Daily Traffic (AADT) on Jl. A Yani Gedangan will hit 76,800 vehicles per day by 2030, indicating a 47% rise from the 2024 levels. Without major policy changes, road capacity is expected to increase by only about 10%, assuming some shoulder enhancements and intersection improvements are made. Consequently, the Degree of Saturation (DS) is projected to reach between 1. 8 and 2. 0 by 2030, a scenario described as a total breakdown where vehicle movement is nearly halted during peak traffic times.

The inadequate state of the infrastructure on Jl. A Yani Gedangan represents more than just a technical traffic issue; it has led to considerable repercussions across the economy, society, and the local environment. From an economic standpoint, ongoing traffic jams lead to a substantial waste in Vehicle Operating Costs (VOC) and time value. The VOC is calculated using the PCI (Pacific Consultants International) approach tailored to the Indonesian context, which considers factors like fuel usage, oil expenses, tire deterioration,

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maintenance costs, depreciation, and interest on capital. For passenger vehicles (class 1), the additional VOC incurred due to reduced speeds (15 km/h as opposed to the ideal of 40 km/h) amounts to IDR 35,000 per hour for each vehicle. With around 5,200 smp/h in vehicle count during rush hours, the direct economic damages could exceed IDR 180 million per hour, translating to a staggering IDR 650 billion annually (based on 10 hours of severe congestion each day over 250 working days). Besides VOC, the lost time value is also notably substantial. If we consider a commuter's time valued at Rp 50,000 per hour (which corresponds to the Sidoarjo local minimum wage divided by an 8-hour workday), then the delays (averaging 2. 5 hours of round-trip delays daily) equate to Rp 125,000 lost each day for every commuter. With 50,000 commuters traversing this area every day, the total value of the time lost amounts to Rp 6. 25 billion daily or Rp 1. 56 trillion yearly. Economic losses extend beyond the BOK and time value. A study by Kurniawan (2018) concerning the Aloha flyover's construction indicates that alleviating congestion primarily benefits the economy by reducing BOK and cutting travel time, yielding a positive NPV of Rp 935. 59 billion in the economic feasibility assessment. This number underscores the extent of possible economic losses if traffic congestion remains unaddressed. Additionally, insufficient accessibility undermines the region's competitiveness. New investments are likely to steer clear of areas burdened with high logistics costs. Numerous small business owners along Jl. A Yani reported a 40% decrease in sales as customers hesitate to deal with traffic. Moreover, property values on routes that were once highly sought after have either stagnated or even fallen, negatively impacted by elevated noise and pollution levels.

From a societal standpoint, traffic congestion leads to ongoing stress for those using the roads, particularly for commuters who allocate 3 to 4 hours daily to travel (Sidoarjo–Surabaya). A survey conducted in September 2024 involving 300 individuals indicated that an overwhelming 87% felt both physically and mentally drained because of traffic jams, 74% noted a decline in quality family time, 62% encountered instances of traffic-related disputes (road rage) in the last six months, and 55% reported health issues like hypertension and sleep problems. Students relying on public transport also often arrive late, which negatively impacts their discipline and academic success. On a larger scale, the gap in access to healthcare, education, and job opportunities is increasing between those living along the Jl. A Yani corridor and residents in areas with more fluid traffic. The ecological consequences are equally alarming. Extended traffic congestion significantly raises greenhouse gas emissions (CO_2, NOx, HC) as vehicles operate at slower speeds, frequently stopping and starting. The methodology for calculating emission loads was developed by Aldy (2025) at ITERA, utilizing emission factors from the Regulation of the Minister of Environment and Forestry No. 20 of 2017 along with the Mobile-6 method for CO_2 calculations. The findings revealed that CO_2 emissions along Jl. A Yani hit
12. 4 tons daily during peak traffic hours (6 peak hours), translating to 4,526 tons over a year. This amount parallels the emissions produced by 1,000 private vehicles running continuously for 24 hours. Other pollutant emissions include CO at 51. 5 tons annually, HC at 37. 38 tons per year, NOx at 13. 82 tons yearly,

and PM10 at 0. 83 tons per year. In comparison to a similar assessment conducted in Surabaya on Jalan Dr. Ir. Soekarno (MERR), where the CO_2 emission load surged to 20,534 kg/hour at its busiest point (Aldy, 2025), a consistent trend emerges: heavily congested roads dominated by motorcycles yield a substantially high emission load.

In addition to the emissions, the noise from traffic along Jl. A Yani Gedangan reaches levels between 78 and 85 dBA during busy times, significantly surpassing the residential area limit of 55 dBA during day hours, as established by the Decree of the Minister of Environment No. 48 in 1996. Residents living close to the road experience sleep issues, high blood pressure, and difficulties with focus. Air quality has also worsened, with PM2. 5 particle counts exceeding the World Health Organization limit (15 $\mu g/m^3$ over 24 hours) for 65% of the days in a year. By applying the same linear regression technique used for estimating traffic volumes, it is anticipated that the CO_2 emissions will rise to 6,099 tons annually by 2030, marking a 35% increase from figures in 2024. This rise poses significant threats to public health and jeopardizes Indonesia's goals related to the Nationally Determined Contributions (NDC) under the Paris Agreement, aimed at reducing greenhouse gas outputs. Collectively, these three aspects of impact suggest that the traffic congestion issue on Jl. A Yani Gedangan is not just a negligible side effect, but a fundamental risk that endangers the sustainable growth of the region. Overlooking this challenge will result in a heavier financial load for the government in terms of public health expenses, infrastructure repairs, traffic management subsidies, and diminished economic output.

Addressing the complexity of the aforementioned issues necessitates a structured, numerical, and policy-focused analytical method. In Sidoarjo Regency, transportation policies have largely been reactive and disjointed. Some measures that have been undertaken consist of basic traffic management techniques, such as modifying intersections, placing traffic signs, controlling school arrival times, and establishing a one-way system during specific hours. Yet, these actions do not stem from a thorough understanding of how traffic volume correlates with the performance of road infrastructure. Consequently, many of these measures are misdirected and can even worsen congestion in other areas, a situation referred to as misdirected traffic evaporation. For instance, the introduction of a one-way system in various parts around Gedangan has transferred traffic to residential streets not meant for such high volumes, resulting in complaints from locals and potential safety issues. Thus, assessing road infrastructure performance in relation to traffic volume is urgently necessary. This evaluation extends beyond simple calculations of saturation levels or average speeds, encompassing: the modeling of spatial and temporal relationships among volume, speed, and density; recognizing patterns of breakdown and drops in capacity during peak hours (this requires adjustments to the 1964 BPR standard Volume Delay Function, which has been shown to overstate the conditions of roads in Indonesia); pinpointing critical congestion points or bottlenecks and evaluating the available capacity in each section while considering the effects of intersections, access points to properties, and obstacles

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nearby; forecasting medium-term traffic increases (over 5 to 10 years) through the application of regression analysis and time series methods while factoring in spatial development and planning; assessing various policy scenarios (such as expanding roads, constructing flyovers, limiting heavy vehicle access, enhancing public transport services, implementing road pricing, and designating car-free days) utilizing a cost-benefit analysis framework; and proposing adaptive traffic management systems driven by real-time data, which includes implementing traffic signal controls that respond to volume fluctuations. Employing this traffic volume-focused strategy is crucial because volume is the most variable element and can be measured continuously with ease (using tools like loop detectors, CCTV systems, GPS-equipped vehicles, or manual counts). By analyzing hourly, daily, and seasonal volume patterns and the composition of vehicles (type, size, driver behavior), more precise policies can be formulated.

The preceding background has been presented in several layers: initially, the significant issue of congestion on Jl. A Yani Gedangan, which serves as the primary regional route, exhibiting a delay score of 1. 24 (LOS F) and an increase in travel time by 250%; next, the imbalance in structure between traffic volume (AADT of 52,400 vehicles per day, rising at 8. 7% annually) and road capacity (34,400 pcu per day) leading to a 52% excess; third, the broader effects on the economy (an annual loss of IDR 650 billion solely from BOK), social aspects (stress among commuters, a decline in life quality), and environmental concerns (annual CO_2 emissions of 4,526 tons); and finally, the need for analyzing performance based on traffic volume to inform sustainable transportation policies, which requires an approach involving modeling, forecasts, scenario assessments, and policy suggestions. Without thorough and extensive research, this issue is likely to persist and burden future generations. At the same time, there exists a chance to harness potential regional income from the options of PKB and BBNKB (projected to be Rp 386 billion each year) to support sustainable transport initiatives. Thus, this thesis seeks to tackle this issue through a meticulous scientific methodology that aligns with the practical requirements observed in real-world settings.

METHODOLOGY

Basic Theoretical Concepts of Road Infrastructure Performance

Road infrastructure performance serves as a measurable factor that indicates how well a roadway can handle traffic in an effective, safe, and comfortable manner. Evaluating road performance has become essential due to the rising traffic volumes caused by a rapid increase in vehicles that outpaces infrastructure growth. In this thesis, which examines performance analysis based on traffic levels on Jalan A. Yani Gedangan in Sidoarjo Regency, it is crucial to grasp the fundamental concepts of road performance as a theoretical framework. Essentially, road performance indicates how efficiently a road segment facilitates vehicle travel from one location to another. A greater degree of efficiency translates to superior performance of the road infrastructure in question.

Road performance metrics have been established by numerous organizations and scholars globally, with two main references commonly cited in Indonesia: the

2023 Indonesian Road Capacity Manual (MKJI) and the Highway Capacity Manual (HCM) released by the Transportation Research Board (TRB) in the U. S. While these two resources have slightly different methods for defining and assessing road performance, they fundamentally aim to offer a benchmark for evaluating the quality of road service suitable for use by professionals and researchers in traffic engineering.

Road Performance Parameters

Road performance metrics are quantifiable factors that together represent the functional state of a section of roadway. Four primary metrics are frequently utilized in the assessment of road performance: saturation level, speed of travel, duration of travel, and waiting time. These four factors are connected and together create a thorough understanding of road service quality.

Degree of Saturation (DS)

Since it clearly shows how much traffic load the given road capacity must sustain, the degree of saturation is the most essential metric in road performance analysis. The ratio of traffic volume (Q) to road capacity (C), or DS = Q/C, is the mathematical definition of the degree of saturation. In order to translate different vehicle categories (motorcycles, light vehicles, and heavy vehicles) into passenger car equivalents (pcu), traffic volume is often represented in passenger car units (pcu) per hour.

Finding the Degree of Saturation (DS).

$$\mathbf{DS} = \frac{\mathbf{Q}}{\mathbf{C}}$$

Where:

Q = Traffic volume (smp/hour)
C = Road capacity (smp/hour)

DS Value Category
$DS \leq 0.75$ Smooth (stable)
$0.75 < DS \leq 0.85$ Moderately stable
$0.85 < DS \leq 1.00$ Saturated (unstable)
$DS > 1.00$ Totally congested

Travel Speed

Travel speed refers to the average velocity of vehicles on a particular road segment, typically measured in kilometers per hour (km/h). This metric is crucial for road users as it impacts both comfort and efficiency during travel. Several factors influence travel speed, such as the volume of traffic, nearby obstacles, the geometric design of the road, and the behavior of drivers.

When traffic is flowing freely, vehicles can often reach speeds that are close to the road's designed limit. However, as the volume of traffic rises and saturation levels climb, travel speeds generally decline in a non-linear fashion. This reduction in speed is a natural result of the increased interactions among vehicles and the restricted maneuverability available.

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Studies on road performance in various cities across Indonesia indicate that when saturation levels exceed 0.85, travel speeds may decrease by 40-60%.

Road Service Level (Level of Service/LoS)

A road stretch or intersection's operating quality can be categorized using the Level of Service (LoS) classification system,which is based on previously defined performance requirements. The letters A through F are typically used to represent this classification, with LoS A denoting optimal free-flow circumstances and LoS F denoting total congestion conditions. The 2023 Indonesian Traffic Management Standard (MKJI) and the HCM (with its different editions, including as HCM 1994, HCM 2000, and HCM 2016) are the two primary recommendations used as references in defining LoS in Indonesia.

Service Level According to the Indonesian Road Capacity Manual (MKJI) 2023

The Ministry of Public Works' Directorate General of Highways published the 2023 Indonesian Road Capacity Manual (MKJI) as official guidelines for use in Indonesia. This recommendation is based on modifications of several worldwide techniques, accounting for Indonesian road design and traffic characteristics, such as the predominance of motorbikes in the composition of traffic flow.

The degree of saturation (DS) number in the 2023 MKJI is the main factor that determines the quality of road service on a road section. According to the 2023 MKJI, the LoS categorization is as follows:

1) LoS A (DS ≤ 0.20): High-speed, low-traffic conditions when drivers are free to pick the speed they choose. There are very few, if any, traffic barriers.
2) LoS B (0.20 < DS ≤ 0.44): Drivers still have enough room to maneuver, but the flow is stable and speeds are starting to get restricted. Although traffic volume starts to rise, there isn't yet any major impact.
3) LoS C (0.45 < DS ≤ 0.74): The flow is still steady, but other vehicles are starting to influence the pace and movement of the vehicles. There are restrictions on drivers' ability to choose the speed they want.
4) LoS D (0.75 < DS ≤ 0.84): With low speeds, heavy traffic, and notable flow oscillations, the flow is getting close to an unstable state. The level of comfort for drivers is significantly reduced. For urban road planning, a maximum DS value of 0.75 is advised.
5) LoS E (0.85 < DS ≤ 1.00): The flow is erratic, with low speeds, frequent stops, and traffic volume that is close to or equal to road capacity. Periodically, congestion starts to happen and persists for a long time.
6) LoS F (DS > 1.00): Forced flow with complete gridlock, extremely slow speeds (less than 10 km/h), lengthy lines, and extremely lengthy travel times. This situation frequently arises on urban roadways with insufficient capacity during rush hour.

Level of Service According to Highway Capacity Manual (HCM)

An international resource for evaluating road capacity and service quality is the Highway Capacity Manual (HCM), which is issued by the Transportation Research Board (TRB) in the United States. The 1994 HCM, the 2000 HCM, and most recently the 2016 HCM are just a few of the adjustments made to the HCM over time. The criteria and methodology were improved with each iteration.
The HCM takes a more multifaceted approach to assessing the level of service, in contrast to the 2023 MKJI, which emphasizes the degree of saturation. The HCM's main criteria for urban streets and highways is traffic density, which is measured in vehicles per kilometer per lane (vehicles/km/lane) or pcu/km/lane.

Road Capacity and Adjustment Factors

The greatest traffic flow that can be sustained on a road segment under specific circumstances is known as road capacity (MKJI, 2023). The real physical, environmental, and traffic circumstances must be taken into account while determining basic capacity.

General Formula and Basic Capacity

Capacity (C) is determined using the following formula, which is based on the Indonesian Road Capacity Manual (MKJI, 2023), which is still the major source of information in Indonesia:

$$C = C_0 \times F_{CLJ} \times F_{CUK} \times F_{CHS} \times F_{CKL}$$

Where:
C_0 is the basic capacity (smp/hour).
Lane width adjustment factor, or F_CLJ
F_CUK =
Adjustment factor for city size
Lane slope adjustment factor (F_CKL) and side obstacle adjustment factor (F_CHS)

RESULTS AND DISCUSSION

1) Features of Traffic Volume

Three key conclusions from the investigation indicate that Jl. A. Yani Gedangan has unique traffic volume characteristics:
a. High volume: Considerable congestion is indicated by the LHR of 17,867 smp/day. Mondays have the largest volume, which suggests that there is a lot of activity early in the week.
b. Motorcycle dominance (65%): This percentage is quite high and poses a problem because motorcyclists have a propensity for being irresponsible, such as entering and exiting lanes without signaling and defying traffic.
c. Bimodal pattern: This road supports commuter traffic from the Gedangan residential region to the economic district, as evidenced by two peaks in volume in the morning and evening.

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2) Performance of Road Infrastructure
The following is a summary of Jl. A. Yani Gedangan's infrastructure performance:
a. Limited capacity: The capacity is only 2,344 pcu/hour due to high side friction and a width of 7 meters (2 lanes, 2 directions).
b. Critical saturation level: The road is functioning at a saturated level during peak hours if the DS is more than 0.85. The traffic volume has reached 91.7% of capacity, according to the morning DS value (0.917), making it extremely prone to congestion.
c. Substandard speed: 18 km/h in the morning is much less than the required minimum speed of 30 km/h for minor arterial routes.
d. Poor quality of service: LoS F (complete congestion) in the morning and LoS E (unstable) in the afternoon show extremely low quality road service that falls short of expectations.

3) The Connection Between Performance and Volume
Road performance is directly impacted by high traffic volume, particularly during peak hours. The degree of saturation rises as volume approaches or surpasses capacity, resulting in slower speeds, longer travel times, and a lower quality of service. This scenario is made worse by side barriers from Gedangan Market activity (parking, pedestrians) and irresponsible driving.

CONCLUSION

The following conclusions can be made in light of the analysis and debate.
1. The average daily traffic (ADR) on Jl. A. Yani Gedangan is 17,867 smp per day, with Mondays having the highest volume and Sundays having the lowest. Motorcycles account for 65% of all vehicles, with passenger cars coming in second at 20%, light vehicles at 8%, trucks at 5%, and buses at 2%. Peak hours take place between 7:00 and 8:00 a.m. Western Indonesian Time (WIB), with a volume of
2. Road capacity is 2,344 smp per hour, according to road infrastructure performance. The degree of saturation hits 0.917 during the morning peak hour and 0.887 during the afternoon peak hour, both of which fall into the saturated group since they are higher than the 0.85 threshold. Travel time delays can exceed 150%, and the average speed during morning peak hour falls to 18 km/h, well below the minimum need of 30 km/h. Road service is at LoS F (complete congestion) in the morning and LoS E (unstable) in the afternoon.

REFERENCES