

**PERFORMANCE ANALYSIS ON THE H. IKSAN PAMANUKAN ROAD SECTION
PAMANUKAN DISTRICT - SUBANG REGENCY****Adil Prayitno¹, Ryan Syahril²**

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Keywords	Abstract
H.Iksan Pamanukan Road, Obstacles Side, Degree Saturation, Road Capacity, Level of Occupancy	H. Iksan Road in Pamanukan, located in Subang Regency, serves as a vital urban route supporting economic, social, educational, and administrative activities. With the region's population reaching 1,624,386 in 2022, the growing number of residents has significantly increased traffic demands. The presence of roadside shops and street vendors has caused high side frictions, which directly affect traffic flow and road performance. This study aims to analyze the performance of H. Iksan Road using both primary and secondary data, including Subang's population statistics, road geometry, traffic volume, vehicle speeds, and the frequency of side obstacles. The Indonesian Road Capacity Manual (MKJI 1997) for urban roads was employed for analysis. Findings indicate that the peak traffic volume occurs in the afternoon, reaching 2,223.8 pcu/hour, with side obstacles peaking at 904.4 incidents/hour. The saturation degree was recorded at 0.851, placing the road's level of service at category E, where traffic is unstable, vehicle speeds are inconsistent, and demand nearly reaches the road's capacity. These findings suggest urgent improvements are needed to enhance road efficiency and reduce traffic congestion.

**INTRODUCTION**

Subang Regency is one of the Regency in West Java. In general Geographically , located between 1070 31'-1070 54' East Longitude and 60 11'-60 49' South Latitude. Subang Regency consists of from 30 Subdistricts with 245 villages and 8 sub-districts with The area is 2,051.76 km2. It is known amount resident Subang district in 2022 has a population of 1,624,386 people, the number This increase as much as 2.79 percent from 2020 which is only totaling 1,579,018 souls (BPS, 2023), and it is estimated amount This will Keep going increase every the year.

Improvement amount population in Subang Regency has an impact on increasing need various activity public Good activity trade, education, offices and others . The developments that have occurred in Subang Regency are certainly must balance with system Then good traffic and supporting infrastructure.

The road as one of infrastructure transportation which is tendon pulse life public in fulfil needs live, and as support development everywhere aspect life. So importance road as infrastructure transportation (Banerjee et al., 2020; Feng et al., 2023; Huang & Zhao, 2023; Tarigan et al., 2021), then Already as it should be road give comfort for its users , one that is

necessary be noticed is capacity section road in accommodate current Then cross (Nisumanti & Krisna, 2020; Raharjo, 2022; Rokhman et al., 2022; Yii et al., 2018).

Section performance road can defined as how far is the ability road operate function . Movement current Then enough cross tall can result in congestion as well as existence parking edge street , street vendors , pedestrians , vehicles stop also affects performance a road. Thing This need serious handling from agency related , the last alternative besides reduce obstacle side also can done improvement capacity road For increase performance section road (Cahyono et al., 2023; Hasyim et al., 2023; Isradi et al., 2021, 2022; Rosmantyo, 2018).

Iksan Highway is road Province located in the sub-district Pamanukan and located right under the Pantura National Road flyover , District Pamanukan is the most densely populated area second in Subang Regency with density The population in 2022 will be 1983 people per km².

H. Iksan Street is the path that plays a role as door enter Then cross from road North Coast towards Subang and the door go out Then cross from Subang to direction Pantura National Road , on the section H. Iksan Street Pamanukan there is center shopping , traditional markets, shops and many more very street vendors who sell on the side of the road , because height activity community followed by activities economy and activities others added Again obstacle side that appears consequence vehicle go out enter the market area and transactions sell buy in shops and street vendors, causing problem Then cross - affecting performance road the.

Condition This result in increasing density Then cross , slowing down speed and cause accumulation vehicle at point certain . There is a lack of balance between the last volume cross with capacity the path that exists in the end will cause traffic jam (Akbar et al., 2022; Eko Prasetyo et al., 2023; Mubarak et al., 2021; Murni & Haza, 2017; Prices et al., 2023). Based on background behind above , then required study Performance Analysis of H.Iksan Road Section Pamanukan Subang Regency.

Research on urban road performance has been conducted by Prasetyo et al. (2020), who analyzed the influence of side obstacles on road service levels in Surakarta, concluding that side activities such as street vending and illegal parking significantly decrease road performance. Another study by Utomo and Santosa (2021) examined the application of the Indonesian Road Capacity Manual (MKJI) to assess urban road capacity in East Java, finding that peak-hour vehicle volume tends to exceed ideal road capacity. The novelty of this research lies in its specific focus on the H. Iksan Road section in Pamanukan, Subang Regency—an area located beneath a major flyover and experiencing compounded traffic challenges from mixed-use developments, high population density, and intense market activity. Unlike previous studies that broadly assessed urban congestion, this study provides localized insights that consider land use dynamics and roadside commercial density to better inform regional traffic management policies.

This study aims to assess the geometric characteristics, traffic volume, composition, speed, and density on the H. Iksan Road section in Pamanukan. It further evaluates road performance through parameters such as side obstacles, free-flow speed, capacity, degree of saturation, travel time, and level of service using the Indonesian Road Capacity Manual (1997). The benefits of this research are threefold: (1) it enhances the researcher's understanding and

application of traffic engineering principles; (2) it offers practical input for local government agencies in optimizing traffic flow and mitigating congestion on the H. Iksan Road section; and (3) it contributes to academic references for future research on urban road performance, particularly in semi-urban contexts with high economic activity and mixed land use.

RESEARCH METHODS

This study adopts a quantitative descriptive approach using field survey techniques to analyze the performance of the H. Iksan Road section in Pamanukan, Subang Regency. The population of the study comprises all traffic activity on the designated road section, and the sample includes vehicles observed at STA 0+170 to STA 0+370 during peak hours. The sampling technique used is purposive sampling, focusing on capturing the most congested time periods to ensure meaningful data collection. Research instruments include manual field measurements, the "Traffic Counter" mobile application, measuring tape for geometric data, and stopwatches to record vehicle speeds. Primary data collected include road geometry, traffic volume, vehicle speed, and roadside obstacles, while secondary data include demographic information from BPS, location maps, and MKJI 1997 as the analytical framework.

Data were collected through a two-phase procedure: (1) a preliminary survey to determine the study scope, peak traffic times, and observation points; and (2) the main data collection involving direct field observation. Traffic volume was recorded at 15-minute intervals and classified into four vehicle types: motorcycles (MC), light vehicles (LV), heavy vehicles (HV), and non-motorized vehicles (UMC). Speed measurements were taken over a 50-meter test segment using travel time calculations. Side obstacles such as illegal parking, street vendors, and pedestrian interference were observed and documented in parallel with traffic volume surveys.

The analysis was performed using Microsoft Excel and based on the Indonesian Road Capacity Manual (MKJI 1997). The performance indicators assessed included road capacity, free flow speed, saturation degree (DS), and level of service (LOS). Validity and reliability were ensured by cross-checking recorded observations across multiple surveyors. The data analysis aimed to draw conclusions about the road's operational efficiency and offer recommendations for performance improvement in high-density, mixed-use corridors like H. Iksan Road.

RESULTS AND DISCUSSION

Amount Resident

Quantity data resident Subang Regency was obtained from secondary data where this data is obtained from book Subang Regency in 2023 figures published by the Central Statistics Agency Subang Regency (BPS Subang Regency, 2023). From these data, it was obtained amount residents in Subang Regency has a population of 1,624,386 people. Meanwhile section H. Iksan Street located in the District Pamanukan which is subdistrict most populous second in Subang Regency with amount resident amounting to 59,510 people.

Road Section Geometric Data

Geometric Data Road is data about condition road That Alone in a way real in the field. Geometric data road This in the form of type area, type road, type pavement, width effective

road , wide path , width lanes , and road shoulder width . Geomeric drawing road to location study can see in figure 1 and geometric data can see in table 3 below This.

Table 1. Geometric Data of H. Iksan Road Section Pamanukan

Data	Kondisi Eksisting
Tipe jalan	2/2 UD
Lebar Jalur	8 meter
Lebar Lajur	4 meter
Bahu Jalan	1 meter
Panjang Ruas Jalan	400 meter
Fungsi Jalan	Jalan Perkotaan
Kondisi Jalan	Baik

Source: results field measurements

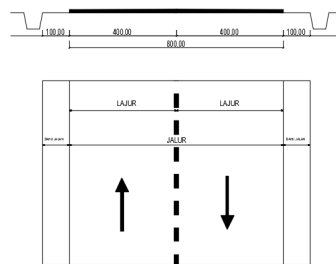


Figure 1. Geometric figure road H. Iksan Pamanukan

Source: results field measurements

Volume (Q)

From the results past volume survey data collection cross , then the data will determined peak hours based on largest volume during data collection is carried out with unit vehicles per hour (vehicle / hour) then the unit changed Again from vehicles per hour (veh./hour) becomes unit car passengers per hour (smp /hour) with method multiply it with equivalent car passengers (emp), except vehicle data not motorized (UM).

Following is past volume graph cross vehicle in (smp /hour) based on Data Analysis Results

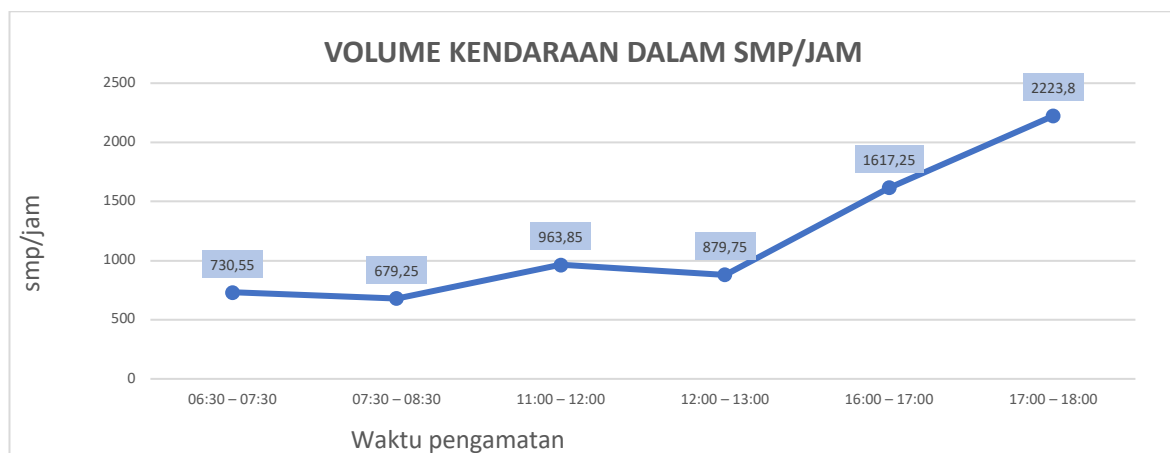


Figure 2. Traffic Volume in smp /hour

Source: results data analysis

From the data analysis results, it is known that the highest volume in smp / hour occurs in the afternoon specifically 17:00 to 18:00, namely as much as 2223.8 smp / hour while the volume in junior high school / lowest hour happened in the morning day at 07:30 to 08:30, namely as much as 679.25 smp / hour. The following is past volume graph cross vehicle in unit car passengers (smp /hour). Recapitulation results Volume calculation then cross highest and lowest can see in table 2.

Table 2. Recapitulation of vehicle volume on the route road H,Iksan Pamanukan

Waktu	Volume Lalu Lintas kendaraan (smp/jam)
06:30 - 07:30	730,55
07:30 - 08:30	679,25
11:00 - 12:00	963,85
12:00 - 13:00	879,75
16:00 - 17:00	1617,25
17:00 - 18:00	2223,8

Data source results analysis field

Calculation Speed Vehicle (V)

With got it distance travel and time travel vehicle so average speed can searching for with use formula :

$$V = L / TT$$

Where :

V = Speed (Km / hour)

L = Distance traveled (m)

TT = Travel Time Vehicle (det).

In the calculation This writer use average speed and number of samples that have been taken Then got speed vehicle in meters/sec and then converted in km/h.

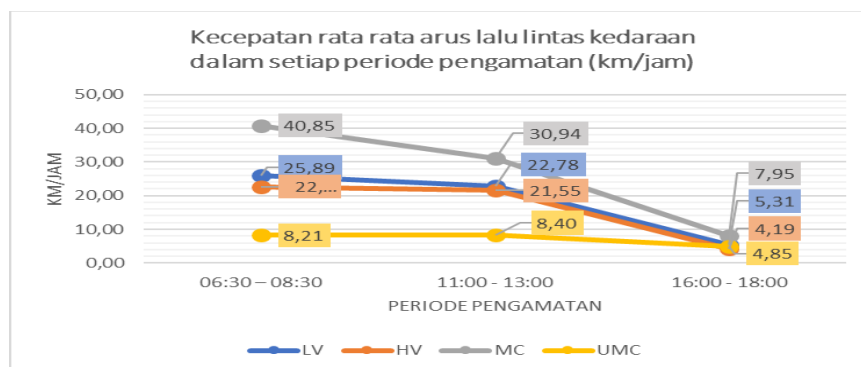


Figure 3. average current speed Then cross in every period observation

Data source results analysis field

Then after to obtain average speed results of each vehicle then make a graph, Graph Average current speed Then cross each vehicle. Graphics can see in figure 4.

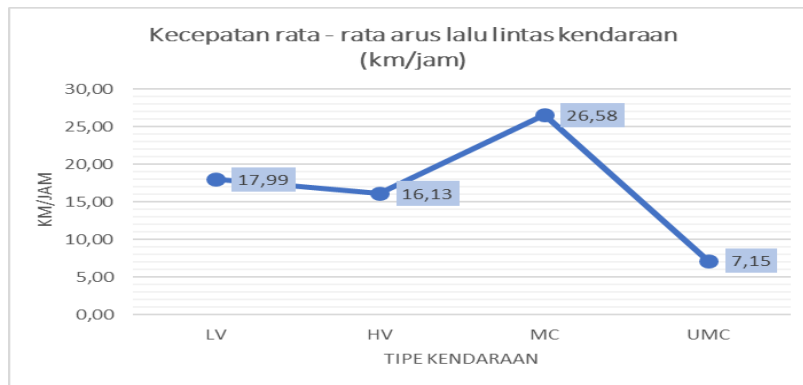


Figure 4. Average current speed Then cross vehicle
Data source results analysis field

Traffic Density

Density Then cross is amount vehicles occupying long section road certain or the general path stated as amount vehicles per kilometer. Density Then crossing on the H.Iksan Road Section Pamanukan can counted use equality following :

$$k = \frac{q}{s}$$

Where :

k = Density Then cross (Vehicle/km)

q = Amount Vehicles on the track (Vehicle/hour)

s = Speed Then traffic (Km/hour)

Count density Then cross For every type vehicles on the road road H. Iksan Pamanukan based on the data obtained through observation on Wednesday, April 19, 2023

- Vehicle Light (LV)

$$k = \frac{2724}{17,99} = 151.42 \text{ vehicles / hour}$$

- Vehicle (HV)

$$k = \frac{241}{16,13} = 14.94 \text{ vehicles / hour}$$

- Motorcycle (MC)

$$k = \frac{16325}{26,58} = 614.18 \text{ vehicles / hour}$$

- Non -Motorized Vehicles (UMC)

$$k = \frac{523}{7,15} = 73.15 \text{ vehicles/hour}$$

Obstacle Side

Based on Event data analysis results obstacle side obtained class obstacle beside each other period time observation is as as shown in figure 5.

waktu	Frekuensi bobot hambatan samping (kejadian/jam)	Kelas hambatan samping
06:30 - 07:30	289,2	Rendah (L)
07:30 - 08:30	241,8	Rendah (L)
11:00 - 12:00	569,2	Tinggi (H)
12:00 - 13:00	347,5	Sedang (M)
16:00 - 17:00	904,4	Sangat Tinggi (VH)
17:00 - 18:00	576,9	Tinggi (H)

Figure 5. Classes obstacle side

Data source results analysis field

Obstacle Side highest happened in the afternoon that is 16:00 – 17:00 with weight incident amounting to 904.4 events / hour and including into the class obstacle Very High (VH) side This is caused by the high activity shops and street vendors that make Lots vehicle go out enter road .

Calculation Capacity

Capacity on the section H. Iksan road is counted use guidelines capacity Indonesian roads (MKJI 1997) and. The following is calculation capacity road based on MKJI 1997 method .

Equality For capacity road in MKJI (1997) is as following :

$$C = Co \times FCw \times FCsp \times FCcs \text{ (pcu /hour)}$$

Where :

C = Capacity (smp /hour)

Co = Capacity basic (junior high school / hour)

FCw = Adjustment factor wide road

FCsp = Adjustment factor separator direction (only For road not divided)

FCsf = Adjustment factor obstacle side and shoulder of the road / curb

FCsf = Adjustment factor size city

So you can get it mark capacity below This :

$$C = Co \times FCw \times FCsp \times FCcs \text{ (pcu /hour)}$$

$$C = 2900 \times 1.14 \times 1.00 \times 0.79 \times 1.00$$

$$\text{Capacity (C)} = 2611.74 \text{ smp /hour}$$

Based on calculation on can seen that from results MKJI 1997 calculations obtained mark Capacity of H.Iksan Road Section Pamanukan for a total of 2 directions which is 2611.74 smp / hour.

Speed Current Free

Based on MKJI (1997) speed current free defined as speed at level current zero , that is the speed that will chosen driver If drive vehicle motorized without affected by vehicles other motorized vehicles on the road . It is known geometric section road H. Iksan Pamanukan is 2 lane 2 way type not divided (2/2 UD) with wide track Then cross is 8 meters and has shoulder width effective which is 1 meter. Calculation speed current free counted based on the Indonesian Road Capacity Manual (MKJI 1997) for road Urban . Calculated use equality following . Equation the is as following .

$$FV = (FVo + FVw) \times FFVsf \times FFVcs$$

Where :

FV = Velocity current free vehicle light on condition field (km/h)

Fvo = Speed current free base vehicle light on the observed road (km/h)

FVw = Adjustment speed For wide road (km/h)

FFVsf = Adjustment factor consequence obstacle side and shoulder width.

FFVcs = Adjustment Factor size city.

- Count speed current free vehicle light on the road road H. Iksan Pamanukan

It is known factor adjustment is as following :

Fvo = 44 km/h

FVw = 3.00

FFVsf = 0.79

FFVcs = 1.00

Solution :

$FV = (FVo + FVw) \times FFVsf \times FFVcs$

$FV = (44 + 3) \times 0.79 \times 1$

$FV = 37.13 \text{ km/h}$

Based on results calculation on can seen that speed current free vehicle light on the segment H. Iksan Pamanukan is 37.13 km/h.

Degree Value Analysis Saturation (DS)

Degrees saturation (DS) is defined as ratio current to capacity on the part road certain. Used as factor main in determination level performance intersection and segment road. (MKJI 1997).

Where :

DS = Degree saturation

Q = Current Then cross (smp / hour)

C = Capacity (smp /hour)

- Count Degrees Saturation 06:30 – 07:30

It is known :

Q = 730.55 smp /hour

C = 2611.74 cm³ /hour

Solution :

$DS = 730.55 / 2611.74$

$DS = 0.280$

- arithmetic degree saturation At 07:30 – 08:30

Known :

Q = 679.25 smp / hour

C = 2611.74 cm³ /hour

Solution :

$DS = 679.25 / 2611.74$

$DS = 0.260$

- arithmetic degree saturation 11:00 – 12:00

Known :

Q = 963.85 smp / hour

C = 2611.74 cm³ /hour

Solution :

$$DS = 963.85 / 2611.74$$

$$DS = 0.369$$

- arithmetic degree saturation 12:00 – 13:00

Known :

$$Q = 879.75 \text{ smp / hour}$$

$$C = 2611.74 \text{ cm}^3 \text{ /hour}$$

Solution :

$$DS = 879.75 / 2611.74$$

$$DS = 0.337$$

- arithmetic degree saturation 4:00 PM – 5:00 PM

Known :

$$Q = 1617.25 \text{ smp / hour}$$

$$C = 2611.74 \text{ cm}^3 \text{ /hour}$$

Solution :

$$DS = 1617.25 / 2611.74$$

$$DS = 0.619$$

- Count Degrees Saturation 17:00 – 18:00

It is known :

$$Q = 2223.80 \text{ smp /hour}$$

$$C = 2611.74 \text{ smp /hour}$$

Solution :

$$DJ = 2223.80 / 2611.74$$

$$DJ = 0.852$$

Road Service Level

Based on results analysis, level service road on the road H. Iksan Pamanukan can seen in Figure 6.

Waktu	Derajat Kejenuhan	Tingkat Pelayanan
06:30 - 07:30	0,280	B
07:30 - 08:30	0,260	B
11:00 - 12:00	0,369	B
12:00 - 13:00	0,337	B
16:00 - 17:00	0,619	C
17:00 - 18:00	0,851	E

Figure 6. Road Service Level
Data source results analysis field

CONCLUSION

Based on the results of data processing and analysis of the H. Iksan Road Section in Pamanukan, it can be concluded that the road segment is experiencing performance issues, particularly during peak hours. The peak traffic volume occurs in the afternoon between 17:00–18:00, reaching 2223.8 smp/hour due to high community activity during the end-of-work period. The traffic composition is categorized as "abnormal," with light vehicles reaching maximum speeds of 28.62 km/hour and minimum speeds of 4.39 km/hour. The calculated free

flow speed is 37.13 km/hour. The capacity of the road segment during peak periods is nearly exceeded, with a Degree of Saturation (DS) of 0.851. This indicates that the road is operating at an unstable level of service (LOS E), where traffic flow becomes unstable and vehicle speeds fluctuate or even come to a stop. This level of performance highlights the urgent need for traffic management strategies such as reducing roadside disturbances, improving road geometry, or increasing road capacity. For future research, it is recommended to conduct simulation modeling using transportation planning software to explore various alternatives for improving road performance, as well as to include environmental and pedestrian safety factors to create a more comprehensive urban mobility assessment.

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