

EVALUATION OF ROAD MEDIAN CONSTRUCTION ON JALAN HAYAM WURUK KM JBR 3+825 - KM JBR 5+930 JEMBER

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Abstract

In 2013, the construction of road median on JalanHayamWuruk Km Jbr 3+825 – Km Jbr 5+930 Jember caused traffic jam. It was shown by the number of degree saturation increased (DS=92) than without a road median (DS=0.66). This research evaluate the comparison between the sections with median and without mediant, parameter, degree of saturation, fuel cost and safety evaluation. The data collection was carried out directly in rapidity survey, and volume vehicles. The analysing of fuel comparison resulted damage 26.12 %, the same as Rp.206.4,00/knd/km, or raised 2.23 Billion per year. It based on the results of evaluation road median SNI 03-2444-2002, the degree of safety in dimension and installation of road median on km Jbr 3+825 – km Jbr 5+930 was not standarized.

Keywords: road median, degree of saturation, and fuel cost.

Abstrak

Pada tahun 2013, pembangunan median jalan pada Jalan Hayam Wuruk Km Jbr 3+825 – Km Jbr 5+930 Kabupaten Jember menimbulkan kemacetan. Hal ini ditunjukkan dengan angka derajat kejenuhan meningkat (DS=0,92) dibanding dengan tanpa adanya median jalan (DS=0.66). Penelitian ini mengevaluasi perbandingan antara ruas jalan menggunakan median dengan ruas jalan tanpa median, dengan parameter derajat kejenuhan, biaya bahan bakar, dan evaluasi median terhadap keselamatan. Pengambilan data dilakukan secara langsung dengan metode survai untuk kecepatan, dan volume kendaraan. Analisa perbandingan biaya bahan bakar menghasilkan kerugian sebesar 26.12 %, setara dengan angka Rp.206.4,00/knd/km, atau mencapai 2.23 Milyar per tahun. Sedangkan berdasarkan hasil evaluasi median jalan menggunakan SNI 03-2444-2002, tingkat keselamatan dari segi dimensi dan pemasangan median jalan pada km Jbr 3+825 – km Jbr 5+930 tidak sesuai standart.

Kata Kunci: median jalan, derajat kejenuhan, dan biaya bahan bakar

INTRODUCTION

JalanHayamwuruk is an arterial collector road. It located on 3+825 kilometres - 5+930 kilometres in district of Kaliwates, Jember. In 2013, the road median was not constructed in average, hence it made traffic jam. The traffic jam point was caused by the inballance road median construction in the type of three-lanes, two lines, and two-ways. Whereas, there was no traffic jam in other because consisting of four-lanes, two-lines, and two-ways. This construction was quite affects the safety level. Based on the data of Satlantas (Unit of Traffic Accident) Jember, there were seven of nine accidents caused by the construction of road. Hence, it was analysed the damages occurred because of by the construction of road median. This was carried out to analyse the comparison of both median and with no it in terms of the degree of saturation, fuel costs and the level of safety of the road median.

RESEARCH METHODOLOGY

Inventory of Hayam Wuruk Street

Layout of Jalan Hayam Wuruk per segmen

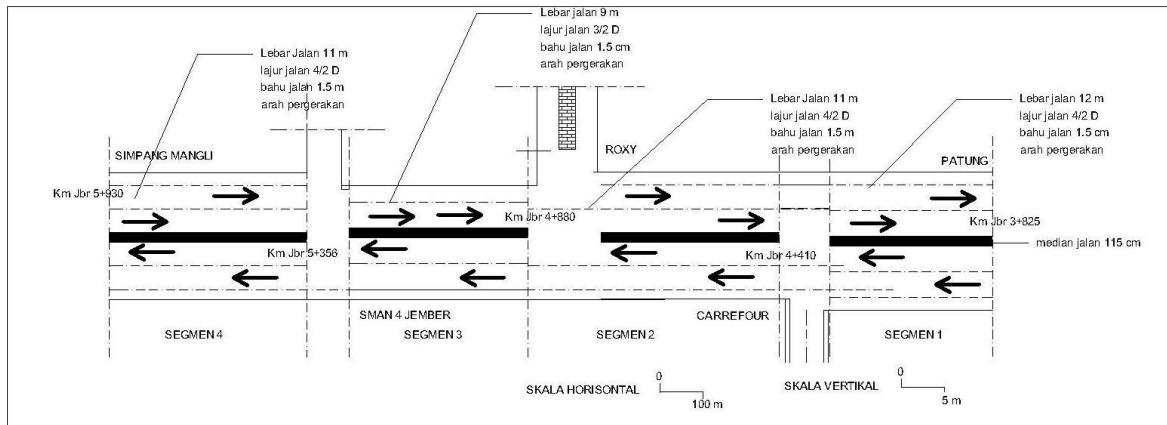


Figure 1 Layout of Jalan Hayam Wuruk

Segmen1, located at Km Jbr 3+825 – Km Jbr 4+310, with a length of 485 meters segmen. Having a road with of 12 meters, 1.5 meters and the road shoulder average volume of 2757 pcu/hour. Segment 2, located at Km Jbr 4+310 – Km Jbr 4+880 Jember, the length 570 meters. Consists dense of street 11 meters, the width of street 1.5 meters with average of volume 2350pcu/hour. Segmen 3 located at Km Jbr 4+880 – Km Jbr 5+356, length 476 meters. Width 9 meters, and shoulder 1.5 meters. The daily traffic in average 2251 pcu/hour, the type of section 3/2 D. The last is segmen 4. Located on Km Jbr 5+356 – Km Jbr 5+930. Consists the width 11 meters, shoulder 1.5 meters, section type 4/2D. Daily traffic 2251 pcu/jam.

Research Phases

Stages of research can be described as follows:

1. Collected primary and secondary data. The first was about street inventory and the vehicle rapidity as the main parameter of the determining operating cost. The secondary data was obtained from volume data traffic (Transportation Laboratory Jember University, 2013) and data of traffic accident 2013 (Satlantas Jember, 2013).
2. The process of determining degree of saturation, if the segmen section of Jalan Hayam Wuruk consisted of ≥ 0.8 , then the calculation will implemented without median. Next, this continued on the determining of median aperture and the checking of dimension concerning street safety.
3. Understanding all the dimension evaluation and degree of saturation ≥ 0.8 , then counted the operating cost in the segment. It was counted to set both median and with no it to compare the distinct among it.
4. The conclusion could be drawn from all of the results and percentage of research.

RESULTS AND DISCUSSION

Traffic Volume

The top volume percentage of vehicle of peak hour in the morning occurred on 06.15 a.m. 12.45 on the afternoon and 04.15 p.m on the afternoon, and the 07.15 p.m. in the night. The percentage of vehicle volume per segmen per peak hour.

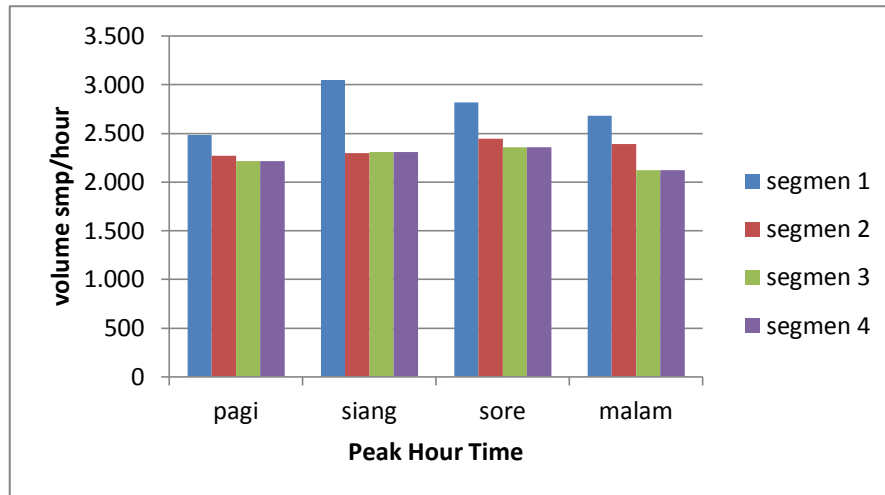


Figure 2 Traffic Volumes in the Peak Hour

The percentage of volume in each hour to the situation of peak hour are different, no dominating percentage in each time always in the top percentage.

Degree of Saturation

The determining of street-section work seen from the number of degree of saturation factor. It is the primary parameter in determining circumstance of a street by ideal determinate $DS \leq 1$. This is explained in the figure 3. By average DS less than 0,8 and the variable width, third segmen has number of degree of saturation higher.

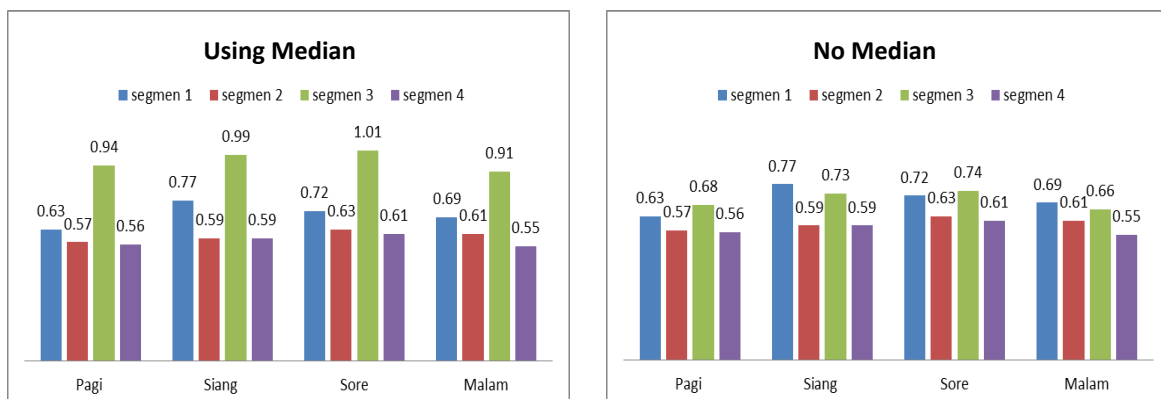


Figure 3 The Comparison of Degree of Saturation Both Road Median and With No It

The existing circumstance figures that the problem found on the percentage of degree of saturation in segmen 3 is closing to 1. This is not effective because giving dilapidated service degree to the work of street, the score is E. Hence, to increase the service degree then the evaluation of implementing calculation in segmen 3, with no road median. Afterwards, the number of saturation of this is decreasing, the score is $< 0,8$ with degree is

C. Therefore, the median construction in segmen 3 causes the degree of saturation increasing.

Fuel Cost

According to Pd T-15-2005-B, operating cost is totally required to operate vehicle in a traffic and street to a vehicle per kilometer distance. The fuel oil need is able to count by speed parameter outcome by the result of count MKJI (Manual KapasitasJalan Indonesia). The survey shown by the motorbike and minor vehicle. The rapidity data use the direct survey on the each where the vehicle in the top volume of traffic jam hour. It was located in segmen 3, which consists degree of saturation than other. The results of vehicle cost with median use equality 6 on the role of Pd T-15-2005-B, as follow:

$$KBBM_i = (\alpha + \beta_1/V_R + \beta_2 \times V_R^2 + \beta_3 \times R_R + \beta_4 \times F_R + \beta_5 \times F_R^2 + \beta_6 \times DT_R + \beta_7 \times A_R + \beta_8 \times SA + \beta_9 \times BK + \beta_{10} \times BK \times A_R + \beta_{11} \times BK \times SA)/1000 \dots \dots (1)$$

With:

- A = Constanta (Table 5, Pd T-15-2005-B)
- $\beta_1 \dots \beta_{12}$ = Coefisien Parameter (Table 5, Pd T-15-2005-B)
- V_R = Velocity rate
- R_R = Average of climb
- F_R = Average of derivative
- DT_R = Degree of twist rate
- A_R = Acceleration rate
- SA = Standard deviation of acceleration

In those equalities, the cost result can be concluded, the results of street-section calculation both of median and without it.

Tabel 1 The Cost of Jalan Hayam Wuruk Fuel Requirement

No	Time	Median		No Median	
		LV (Rp/Km)	MC (Rp/Km)	LV (Rp/Km)	MC (Rp/Km)
1	Morning	767.8210	358.0320	602.2850	293.8784548
2	Noon	848.1721	315.6997	553.2880	294.8061576
3	Afternoon	780.2275	336.6306	592.8104	300.8737031
4	Night	743.8907	326.8495	571.2358	295.5615892

The cost of fuel known by the percentage comparison between operating cost set both median and without it is 26.12 %:

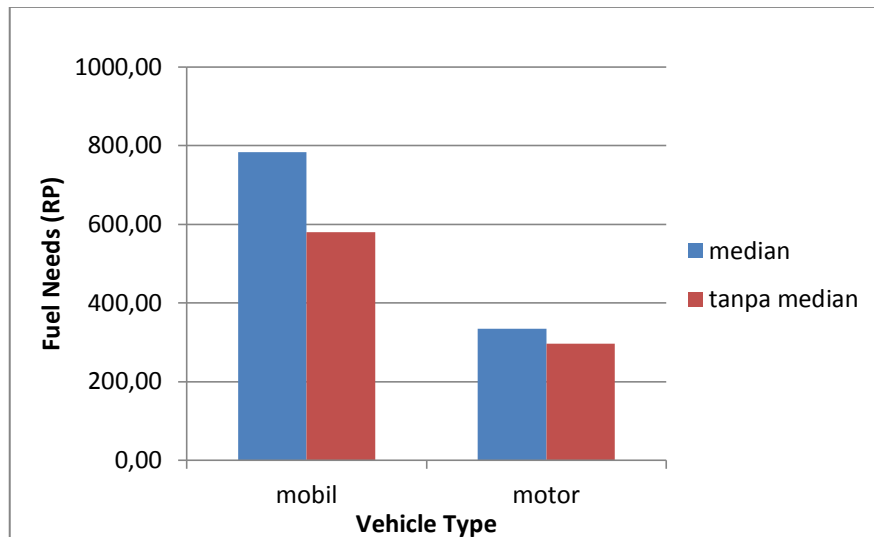


Figure 4 The Comparison of Cost Fuel Requirement

From figure 4 can be concluded that by median street in segmen 3 cause more expenditure come. It is 206.00 ruphias. This become unvaluable if viewed in one point of view of one vehicle. However, if we discern base on the existing circumstance, it will show the average number of vehicles are 30,000 in a day. This explains that the disadvantages of it are found periodically.

These are financial disadvantages

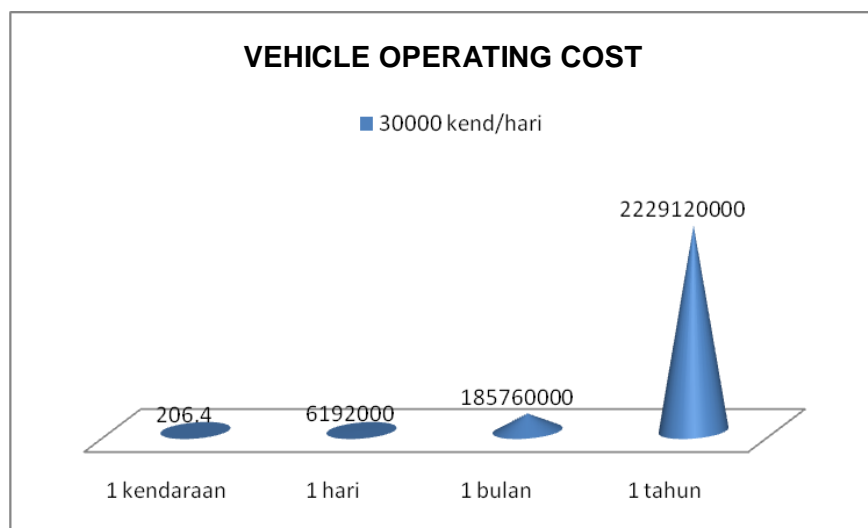


Figure 5 Financial Periodic Disadvantages

In figure 5, the disadvantage on segmen 3 is 206.4 ruphias,- per vehicle/kilometer. This has more than 30,000 vehicles accros it everyday. Therefore this can reach 185,760,000.00- rupiah in a month and 2,229,120,000.00- rupiah in a year.

Median Road

The existing circumstance on the median of Jalan Hayam Wuruk is not appropriate to rule of SNI 03-2444-2002. The visual monitoring explains that the unexpediency of median installation is found. See Figure 6

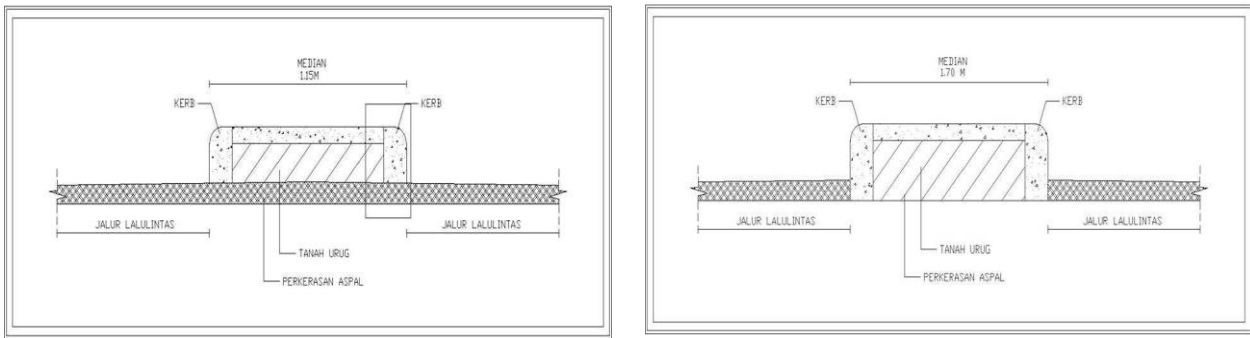


Figure 6 Existing Circumstance (left), Circumstance of Median Planning (right)

In figure 6, the existing circumstance of median installation only set on the surface of asphalt covering of the street, which the median should be stuck in 30 cm deep. This is quite risk of damage and endangering the safety of driver and rider. Several portions of road median have been eroded which is caused by the unadhesive and inappropriate installation of median. This causes the irregular piece on the street. As the damage, there were seven accidents occurred in 2013. The safety degree of road median is considered by dimension, aperture, and the width of street. To solve the problem in economical side, the implementing of aperture is carried out to minimize the damage on segment 3. The next is covering median by minimizing the movement of direction. The figure of planning and existing movement as follow:

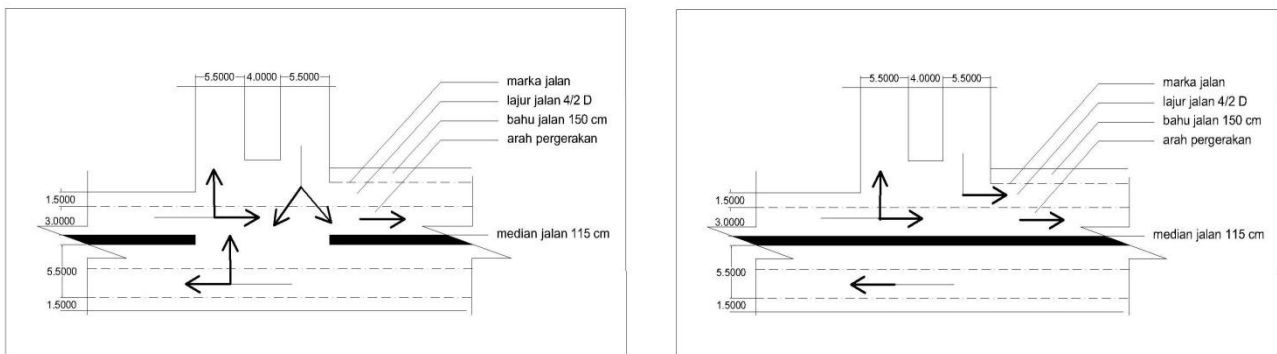


Figure 7 Existing Circumstance (left); Circumstance of Median Planning (Right)

In with the planning, then the aperture based on Pd T 2004-B is required. The design of aperture as follow:

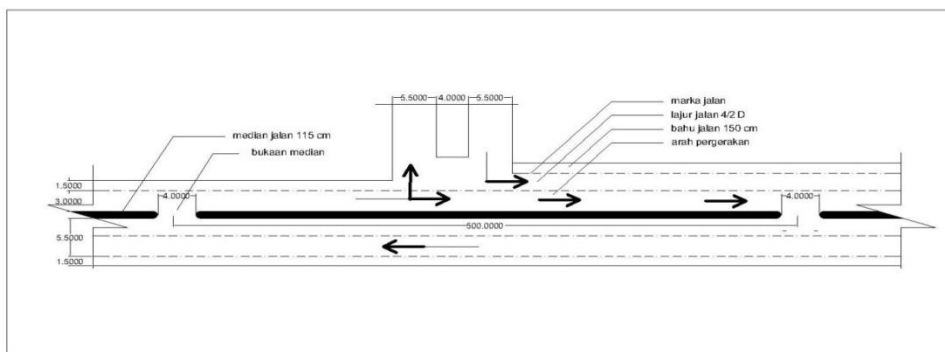


Figure 8 Perencanaan Bukan Median

The length among the aperture is adapted by SNI with length is 500 meter. By width of arterial aperture urban is 4.00. Hence, to understand the compatibility of this, then it is calculated the work aperture by using USIG. With results as follow in table 2:

Table 2 the Works of Aperture in the Workday

No	Time	Capacity (C)	Volume Arus (Q)	Degree of saturation (DS)	Probability of queue (m)
1	Morning	2877	3854	1.34	75 – 155
2	Noon	2889	3387	1.17	56 - 113
3	Afternoon	3001	2577	0.86	30 – 59
4	Night	2891	3697	1.28	67 – 139

In the calculation of aperture work, the average of a queue is about 50 – 110 meters. This explains that the number of queue is still compatible with SNI Pd T-17-2004-B. However, from the results of DS obtained, this cannot be realized because not compatible with MKJI 1997. Therefore, to determine the compatibility road median construction, the dimension of median need to be checked based on SNI Pd T-17-2004-B dan SNI 03-2444-2002. These are compatibility parameter of road median which is considered to the safety point of view.

Table 3 Median Evaluation Between Existing and Ideal

No	Parameter	Standart	Standard Percentage(m)	Field Mark	Compatibility
1	Median width	Pd T-17-2004 B	2.0	1.20	Rejected
2	Median width	SNI 03-2444-2002	1.6	1.20	Rejected
3	Distance between opening	Pd T-17-2004 B	500	500	Accepted
4	Opening Width	Pd T-17-2004 B	4.00	4.00	Accepted
5	Shoulder	Pd T-17-2004 B	0.5	1.5	Accepted
6	Side Lane	Pd T-17-2004 B	0.25	NA	Rejected
7.	Road Type	Pd T-17-2004 B	4/2 D	3/2 D	Rejected
8.	Road Width	Pd T-17-2004 B	7.00	5.50	Rejected

By comparing between field mark and ideal, then the result of this median indeed should be constructed. The incompatible width of median and road type found, it causes median aperture cannot be detailed.

CONCLUSION

The percentage of saturation degree of Jalanhayam Wuruk on segmen 3 using median is 0.92. Whereas, the percentage of degree of saturation in the previous without median was 0.66. The results of cost analyzing is increased 26.12 %. In setting minor vehicles median reach 785.02, ruphias-/km, motorbike 334.30 ruphias,-/km compared by with no median is 579.62 ruphias,-/km for minor vehicles, and 296.21 ruphias,-/km for motorbike. After, the evaluation of median have been carried out, then this is stated unsecure. The safety degree on this median is not appropriate to the rule of median planning in the dimension sector or median installation. Therefore, the median of this street causes damage to the rider and

driver of Jalan Hayam Wuruk in the sector of time-distance, the operating cost and degree of safety.

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