THE EFFECTIVENESS ANALYSIS OF FRONTAGE ROAD ON JALAN MARGONDA RAYA, DEPOK

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ABSTRACT

Highways are the central infrastructure that supports land transportation. Therefore, the highway strongly supports various activities and human needs in land mobilization so that it can achieve its goals both in economic and non-economic terms. In particular, on some highways, there is a system that divides the road into two special lanes: the frontage road and the fast lane. This study aimed to assess the effectiveness of the frontage road on Jalan Margonda Raya, Depok. The data retrieval method is to survey directly and retrieve data through CCTV during peak hours on the road. From the results of this study, the average speed of a motorcycle is 26.625 km / h, which is below the standard free current speed based on the 1997 MKJI of 32.64 km / h, while the average speed of light vehicles (angkot) is 9.9375 km / h, which is below the standard free current speed based on MKJI 1997 which is 41.48 km / h and also obtained a saturation degree value of 1.1105 which means that the frontage road on Jalan Margonda Raya has a Level of Service F value. Therefore, it can be concluded that the frontage road on Jalan Margonda Raya has conditions of forced current, low speed, volume above capacity, and long lines (traffic jams).

INTRODUCTION

Road users in Asian countries, especially in Indonesia, may have encountered the separation of one lane of the road into two special lanes, namely the frontage road and the fast lane. Usually, the two lanes are separated by a separator or road barrier. In many developing countries, the number of users of motorcycles and cars is growing dramatically, while opportunities to receive education on road safety and complete driving instructions are minimal. As a result, the low normative awareness of road users and lack of driving skills contribute to the large number of accidents that occur and increase traffic congestion. The Southeast Asian region (i.e., most low- to middle-income countries such as Malaysia, Thailand, and Myanmar) has the highest mortality rate of around 50%, compared to motorcycle deaths which are "only" 11% in high-income countries in the European region. The last Global Status Report, released in December 2018, revealed that approximately 1.3 million people die each year from traffic accidents, that 93% of the world's road deaths occur in low- and middle-income countries, and that road traffic injuries are the leading cause of death among children and young adults aged 5-29
years. In the last two decades, there have been growing concerns over motorcyclists' safety, mainly
due to the increased use of such two-wheeled vehicles (more than 50 cc) in urban areas. Almost
93% of high-speed-related motorcycle accidents occur on the dry road surface, and most collisions
occur at night. As one of the most affordable travel mode options, the number of motorcycles is
increasing every year. However, the number of motorcycles change tends to differ in many
developed countries, such as the United States, the United Kingdom, and Japan. It is increasing in
developing countries such as Thailand, Taiwan, and Indonesia. Because road safety for road users
is essential, it is necessary to separate the two lanes for safety, security, and comfort for road users
(Kitamura, 2018); (Manan, 2017); (WHO, 2022); (Papakostopoulos, 2020); (Das, 2022); (Jusuf,
2017).

In Indonesia, there are legal rules governing the separation of frontage roads and fast lanes,
which are contained in Law No. 22 of 2009 concerning Road Traffic and Transportation (LLAJ)
Article 108, motorcycles, motor vehicles with lower speeds, freight cars, and non-motorized
vehicles are on the frontage road. Meanwhile, the use of fast lanes is only intended for four-
wheeled vehicles or more at higher speeds, so the traffic flow in the fast lane is maintained with
the separation between the fast lane and the frontage road. In addition, with lane separation, the
travel time of motorcycles is shorter than that of passenger cars during traffic jams. Depok City is
one of the buffer cities and cities directly adjacent to the capital of Indonesia, DKI Jakarta.
Therefore, the traffic of Depok City will inevitably be filled by road users who will go to/from
DKI Jakarta, the city with the most populous population in Indonesia. In fact, according to the
Central Statistics Agency of West Java Province, data on the number of vehicles registered in
Depok City as of March 19, 2018, has reached (Asqool, 2021)1,144,311 units (BPS Provinsi Jawa
Barat, 2018). One of the main roads that road users pass to/from DKI Jakarta in the city of Depok
is Jalan Margonda Raya.

Jalan Margonda Raya has the function of a primary collector road with a road length of
4.895 km. Jalan Margonda Raya is one of the roads in Depok City with reasonably high traffic
activity, especially during peak traffic hours, so there are often traffic jams on Jalan Margonda
Raya. Traffic congestion can be very detrimental to road users, both in terms of driving comfort
and travel time, that can increase many times than it should. Physical fatigue, especially for two-
wheeled users, can also even affect the people's economy. In addition, high traffic congestion
implicitly increases the potential for accidents and increases air pollution and noise—road users
directly impact the entire community (Cipriani, 2019). For road users' safety, security, and
comfort, a two-lane division system was created, namely the frontage road and the fast lane on
Jalan Margonda Raya. The division of these two lanes is only found in the DKI Jakarta to Depok
direction lane with a length of ±1.9 km. The purpose of this study is to evaluate the effectiveness
of the existence of a frontage road on the Margonda Raya Road section by analyzing the suitability
of geometric road conditions on the frontage road to speed, volume, and density, as well as
analyzing the level of road service based on traffic flow, traffic density, and vehicle speed on the
frontage road.
LITERATURE REVIEW
Geometric Design of Roads

The geometric design of the road is part of road planning, whose primary focus is to plan the physical shape so that it can fulfill the essential functions of the road. The geometric design of the road consists of a horizontal and vertical alignment; both have their calculations. Geometric design standards should be prepared according to the road and driver characteristics there a country (Özinal, 2021). Geometric design on the road must have a concept that is effective, efficient, economical, safe, and insightful environment (DGH, 2021).

All roads must meet the technical requirements of the road, which include plan speed, road body width, road ability to channel traffic (road capacity), driveway (access), the intersection of plots, U-turn facilities (on highways), complementary road buildings (bangkapja) including geometric bridges and drainage, road equipment, road use (according to their function), and road disconnection. In addition, technical design criteria of the road must also be followed according to the applicable regulations, including design provisions on the stages of design, road function, road class, road sections (road space), dimensions (cross-section) of the road, traffic volume, road capacity related to road body design, geometric requirements of roads related to straight sections of the road, curves and climbs, road equipment (especially signs, markings, and safety fencing), and environmental sustainability (EIA) (DGH, 2021).

To meet the necessary road service, geometric shapes must be designed efficiently. Efficiency can be achieved by considering several things, including savings in vehicle operating costs (BOK). The geometric shape of the road affects the BOK. Alignment of straight and flat roads tends to produce a low BOK. On the contrary, an up-and-down and winding road has a high BOK. Straight and flat alignment generally require high construction costs, especially for land acquisition, excavation and heap work, and structural building (DGH, 2021).

To optimize the safety of road users, the initial stage of the design should be to establish design speed and design a vehicle that pays attention to the operational characteristics of the design vehicle (including the driver and the ratio of engine power to the weight of his vehicle) following the established design speed. The higher the design speed, the higher the technical requirements it must meet. In addition to the safety of road users, road building is also a process of opening space by changing an environmental condition before it is stabilized. The construction process will also involve construction vehicles and other tools. All these processes can affect the environment and the surrounding community. The result of such activities can provoke huge losses, both economically and socially. Therefore, the geometric design of the road needs to be aligned with the local environment and topography to produce an aesthetic and, at the same time, functional design (DGH, 2021).

Traffic Flow & Volume, Vehicle Speed, and Traffic Density

Traffic flow is an interaction between a motorist and a vehicle with the road and its environment. The parameter of traffic flow of vehicle volume represents the total number of vehicles on the road over a while. Traffic flow modeling and prediction also play an important role
in smart city transportation systems (Kashinath, 2021); (Alsolami, 2020). The primary traffic flow characteristics are flow, speed, and to the tan. This characterization can be observed in a macroscopic or microscopic way. Traffic flow is the number of vehicles crossing a point in a lane at a given time interval, measured in vehicles per specific unit of time.

Speed is the second main parameter that describes the state of traffic flow on the road. Speed is the change in motion of a vehicle within a distance per unit of time. In the movement of traffic flow, the speed of vehicles also changes randomly due to the influence of traffic conditions, weather, pedestrians, and other effects. In the calculation, the average speed is divided into two, Time Mean Speed (TMS), which is the average speed of all vehicles passing by a point from the road during a specific period (Yan, 2018). Space Mean Speed (SMS) is the average speed of all vehicles occupying a section of the road over a certain period. Traffic speed is often limited because it is closely related to traffic accidents, and higher average speeds are often associated with a higher frequency of accidents (Wang, 2018).

Traffic density is the number of vehicles per road unit (for example, per km). Some studies perform density calculations using a regression approach. However, only a select group of people use a collective regression approach to calculate the number of vehicles to measure traffic density in a road segment. However, this is much simpler than individually detecting, tracking, and classifying vehicles. Traffic density is also one of the factors that can increase the potential for road accidents. Traffic density is closely related to technological developments, especially in a country's transportation field. If the growth in the number of vehicles is not balanced with existing transportation facilities, this congestion issue will affect the productivity of road users passing through it. Therefore, improved transportation facilities are urgently needed to prevent traffic from experiencing excess traffic density values that can cause congestion (Zhang, 2017); (Chung, 2017).

**Relationship of Traffic Flow & Volume, Vehicle Speed, and Traffic Density**

The barrier between traffic flow, speed, and density, has been the basis of traffic flow theory and transportation engineering for many years (Zefreh, 2020). This relationship makes it possible to identify traffic states (jams, current currents, etc.) and events (in or out of a queue/bottleneck, etc.). Volume and speed are more representative of traffic state when used together. The fundamental relationship between volume and speed is that with the increase in traffic volume, the average speed of its space will decrease until the critical density (maximum volume) is reached. (Altintasi, 2017); (Suhas, 2017); (MKJI, 1997). The relationship between volume and speed is shown in figure 1 below.
Once the critical density is reached, the average speed of space and volume will decrease. So the curve above describes two different conditions. The upper arm indicates a stable condition, and the forearm indicates a stable current condition. Empirical estimates based on the speed-density relationship are more accurate when identifying traffic conditions (free-flow, solid-current, and mixed-current traffic conditions) and congestion density limits. The speed will decrease as the density increases. The speed of free current will occur when the density is equal to zero, and when the speed is equal to zero, there will be congestion. The relationship between velocity and density is shown in the following figure 2. (MKJI, 1997); (Yuan-Qing, 2017); (MKJI, 1997).

The maximum volume ($V_m$) occurs when the density reaches the point $D_m$ (the capacity of the path is already achieved). After getting this point, the volume will decrease even though the density increases until there is congestion at the $D_j$ point (MKJI, 1997). Mathematically, volume is the result of density multiplied by velocity. The relationship between volume and density is shown in figure 3 below.
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The mathematical relationship between current, velocity, and density is considered to meet certain boundary conditions, among others, equal to zero when the density is equal to zero. The current is equal to zero when the density is maximum. The average free velocity occurs when the density is equal to zero, the curve – the current density curve is convex. The three aspects are interrelated with each other and cannot be separated. These three aspects are also closely related to the level of service provided by the road.

**Level of Service (LOS)**

Level of Service (LOS) is a measure of assessing the quality of performance of a road section that is met with the value of road capacity, degree of saturation, and speed on each road section. Traffic performance can be represented by a level of service (LOS), a qualitative measure that reflects the driver's perception of the quality of driving a vehicle (MKJI, 1997). The Level of Service (LOS) can be known by comparing traffic volume and the primary road capacity (V/C). In the world of transportation, the ability of a system to maintain a service level or to improve that level of service within a specific time is defined as a resilient transportation system (Ganin, 2017). Therefore, by calculating the LOS value, the level of road classification or service on a particular road section can be known.

<table>
<thead>
<tr>
<th>Service Level</th>
<th>Traffic Characteristics</th>
<th>V/C Scope Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Conditions of free traffic flow with high speed and low traffic volume without obstacles</td>
<td>0,00 - 0,20</td>
</tr>
<tr>
<td>B</td>
<td>The current is stable, but the operating speed begins to be limited by traffic conditions</td>
<td>0,21 - 0,44</td>
</tr>
<tr>
<td>C</td>
<td>The current is stable, but the speed and motion of the vehicle are controlled</td>
<td>0,45 - 0,74</td>
</tr>
</tbody>
</table>

Figure 3. Volume Relationship – Density

Table 1. Road Service Level Based on US HCM 1985
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<table>
<thead>
<tr>
<th>Service Level</th>
<th>Traffic Characteristics</th>
<th>V/C Scope Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>The current is close to unstable, the speed is still controllable, and V/C is still tolerable</td>
<td>0.75 - 0.84</td>
</tr>
<tr>
<td>E</td>
<td>Unstable current speed sometimes stops; demand is already approaching capacity</td>
<td>0.85 - 1.00</td>
</tr>
<tr>
<td>F</td>
<td>Forced current, low speed, volume above capacity, long queue (jammed)</td>
<td>≥ 1.00</td>
</tr>
</tbody>
</table>

Source: US HCM 1985

In table 1, there are six levels of road service based on the 1985 US HCM. The value of the service level is obtained by dividing the value of volume/current by the value of road capacity, or in MKJI, and it is called the value of the degree of saturation. The higher the degree of saturation, the lower the level of service on the road. The level of road service based on the table above can be seen directly based on the characteristics of the road by looking at the aspects of traffic volume/flow, vehicle speed, vehicle volume compared to road capacity, and road queue length/congestion level.

Table 2. Urban Road Service Level By Road Class

<table>
<thead>
<tr>
<th>City Street Type</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Limits (FFS)</td>
<td>90-70 km/h</td>
<td>70-55 km/h</td>
<td>55-50 km/h</td>
<td>55-40 km/h</td>
</tr>
<tr>
<td>Typical FFS</td>
<td>80 km/h</td>
<td>65 km/h</td>
<td>55 km/h</td>
<td>45 km/h</td>
</tr>
<tr>
<td>LOS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>&gt;72</td>
<td>&gt;59</td>
<td>&gt;50</td>
<td>&gt;41</td>
</tr>
<tr>
<td>B</td>
<td>&gt;56-72</td>
<td>&gt;46-59</td>
<td>&gt;39-50</td>
<td>&gt;32-41</td>
</tr>
<tr>
<td>C</td>
<td>&gt;40-56</td>
<td>&gt;33-46</td>
<td>&gt;28-39</td>
<td>&gt;23-32</td>
</tr>
<tr>
<td>D</td>
<td>&gt;32-40</td>
<td>&gt;26-33</td>
<td>&gt;22-28</td>
<td>&gt;18-23</td>
</tr>
<tr>
<td>E</td>
<td>&gt;26-32</td>
<td>&gt;21-26</td>
<td>&gt;17-22</td>
<td>&gt;14-18</td>
</tr>
<tr>
<td>F</td>
<td>≤ 26</td>
<td>≤ 21</td>
<td>≤ 17</td>
<td>≤ 14</td>
</tr>
</tbody>
</table>

Source: (Transportation Research Board, 2000)

In table 2, it can also be seen that there are six levels of road service under the Transportation Research Board, 2000. The value of the level of service is obtained by measuring the average speed of the vehicle based on the class of the road. Therefore, the lower the average speed of vehicles on the road, the lower the level of service provided by the road. Vehicle speed measurement can be obtained with a speed-measuring device on the vehicle (speedometer) or other speed-measuring devices such as a speed gun.
METHODS

The research was conducted to determine the effectiveness of the frontage road on Jalan Margonda Raya, Depok. This research method uses data collection methods, namely primary data collection and secondary data collection. There are two stages in data collection in this study according to the type and needs of these data. In detail, the two stages include primary and secondary data. Primary data collection or field data is collected directly through surveys in the field and monitoring through CCTV in Depok city. The types of surveys to collect preliminary data or field data are traffic volume surveys, road geometric state surveys, traffic flow surveys, traffic density surveys, vehicle speed surveys, traffic density surveys, and travel times. Secondary data collection is based on books, journals, and literature sources.

This research was conducted in Depok City, located on Jalan Margonda Raya. The picture of the location of Jalan Margonda Raya is in Figure 4.

![Figure 4. Research Location](image)

Analysis of vehicle speed during traffic jams and normal conditions based on the formula in IHCM 1997. Vehicle volume analysis determines the number of vehicles passing through the road. The calculation of vehicle volume is carried out every 15-minute interval and is divided into two categories, namely motorcycles and light vehicles (angkot). Road capacity analysis is used to determine the capacity the road can serve. Road capacity is determined using the formula based on MKJI 1997. Analysis of the level of road service is intended to assess the performance of the

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road. The saturation rate (DS) analysis was carried out by making conclusions with data on the flow/volume of vehicles and road capacity based on the formula in MKJI 1997 so that the LOS (Level of Service) value could be determined. Data collection will be carried out on Wednesday, November 23, 2022, starting at 06.00 – 08.00 WIB & 16.00 – 18.00 WIB.

RESULTS & DISCUSSION
Free Current Speed Analysis

The vehicle speed that occurs is based on the results of data collection by researchers. Because the researchers only examined the frontage road, the vehicles reviewed were only motorcycles and city transportation (light vehicles) that passed through the frontage road. The following are the results of vehicle speed data collection carried out on Wednesday, November 23, 2022, starting at 06.00 – 08.00 WIB & 16.00 – 18.00 WIB.

The calculation of analysis of the free current can be calculated using the formula of equation 1.

\[ FV = (FV_O + FV_W) \times FFV_{SF} \times FFV_{CS} \]

Information:
- FV = K speed of free flow of light vehicles (km/h)
- FV_O = K speed of basic free flow of light vehicles (km/h)
- FV_W = P specific effective traffic lane width (km/h)
- FFV_{SF} = Factor adjustment side resistance condition
- FFV_{CS} = City size adjustment factor

Calculating the formula of equation 1 for the frontage road on Jalan Margonda Raya with the value of FV_O(LV) = 61, FV_O(MC) = 61, FV_W = 0, FFV_{SF} = 0.68, FFV_{CS} = 1. The data obtained can be entered into the formula FV = (FV_O + FV_W) \times FFV_{SF} \times FFV_{CS} and received the results of FV_LV = 41.48 km / h and FV_MC = 32.64 km / h

![Survey Kecepatan Arus](image)

Figure 1. Current Speed Survey

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Based on chart 1, the peak motorcycle speed on the Margonda Raya Road section occurs at 06.00 – 06.15 WIB with a maximum speed of 45 km/hour, and the speed of a late motorcycle on the Margonda Raya Road section occurs at 17.45 - 18.00 with the lowest speed of 17 km/hour, while for the peak light vehicle (angkot) speed on the Margonda Raya Road section occurred at 16.00 – 16.15 WIB with a maximum speed of 13 km/hour and the speed of late light vehicles (angkot) on the Margonda Raya Road section occurred at 17.30 - 18.00 with the lowest speed of 8 km/hour.

Analysis Volume & Road Capacity

The geometric condition of the Margonda Raya Road section where the study was conducted was an urban road type with a classification of 6/2 D. However, because the researcher only conducted research for the frontage road on the Margonda Raya Road section, the condition of the road classification taken was only 1/1 (because the frontage road only has one lane on the road towards Depok), with a lane width of 3.5 m, the distance of the Kerb barrier ≤ 0.5 m and also a high class of side obstacles and with a population of Depok City which amounts to ± 2 million people. The following are the results of traffic volume data collection carried out on Wednesday, November 23, 2022, starting at 06.00 – 08.00 WIB & 16.00 – 18.00 WIB. The calculation of capacity analysis can be calculated using equation 2.

\[ C = C_0 \times FC_W \times FC_{SP} \times FC_{SF} \times FC_{CS} \] ..................................................(2)

Information:

\( C = \) Kroad apasitas (pcu/h)

\( C_0 = \) Kbasic apasity (pcu/h)

\( FC_W = \) Fbasic capacity adjustment actor

\( FC_{SP} = \) Factor direction separator adjustment

\( FC_{SF} = \) Fside resistance adjustment actor

\( FC_{CS} = \) Fcity size adjustment actor

Calculate equation 2 for the frontage road on Jalan Margonda Raya with \( C_0 = 1650 \), \( FC_W = 1 \), \( FC_{SP} = 1 \), \( FC_{SF} = 0.68 \), and \( FC_{CS} = 1 \). The data obtained can be entered into the formula \( C = (C_0 \times FC_W \times FC_{SP} \times FC_{SF} \times FC_{CS}) \), and the result \( C = 1122 \) pcu / hour.

<table>
<thead>
<tr>
<th>Time</th>
<th>Motorcycle (vehc/h)</th>
<th>Light Vehicles (vehc/hour)</th>
<th>Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>06.00 - 06.15</td>
<td>453</td>
<td>17</td>
<td>Bright</td>
</tr>
<tr>
<td>06.15 - 06.30</td>
<td>587</td>
<td>22</td>
<td>Bright</td>
</tr>
<tr>
<td>06.30 - 06.45</td>
<td>782</td>
<td>25</td>
<td>Bright</td>
</tr>
<tr>
<td>06.45 - 07.00</td>
<td>1102</td>
<td>20</td>
<td>Bright</td>
</tr>
<tr>
<td>07.00 - 07.15</td>
<td>1201</td>
<td>24</td>
<td>Bright</td>
</tr>
<tr>
<td>07.15 - 07.30</td>
<td>1384</td>
<td>27</td>
<td>Bright</td>
</tr>
<tr>
<td>07.30 - 07.45</td>
<td>1286</td>
<td>28</td>
<td>Bright</td>
</tr>
<tr>
<td>07.45 - 08.00</td>
<td>1212</td>
<td>26</td>
<td>Bright</td>
</tr>
</tbody>
</table>
The Effectiveness Analysis of Frontage Road on Jalan Margonda Raya, Depok

<table>
<thead>
<tr>
<th>Time</th>
<th>Types of Vehicles</th>
<th>Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Motorcycle (vehc/h) Light Vehicles (vehc/hour)</td>
<td></td>
</tr>
<tr>
<td>16.00 - 16.15</td>
<td>1265</td>
<td>29</td>
</tr>
<tr>
<td>16.15 - 16.30</td>
<td>1385</td>
<td>32</td>
</tr>
<tr>
<td>16.30 - 16.45</td>
<td>1354</td>
<td>35</td>
</tr>
<tr>
<td>16.45 - 17.00</td>
<td>1395</td>
<td>37</td>
</tr>
<tr>
<td>17.00 - 17.15</td>
<td>1498</td>
<td>32</td>
</tr>
<tr>
<td>17.15 - 17.30</td>
<td>1508</td>
<td>32</td>
</tr>
<tr>
<td>17.30 - 17.45</td>
<td>1587</td>
<td>32</td>
</tr>
<tr>
<td>17.45 - 18.00</td>
<td>1601</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 3 shows a survey of the number of vehicles passing through the frontage road on Jalan Margonda Raya at 06.00 – 08.00 WIB & 16.00 – 18.00 WIB. The data is still in vehicle/hour values and needs to be converted to pcu/hour values for motorcycles multiplied by 0.25 and light vehicles multiplied by 1.

**Table 4. Traffic Volume Survey Data After Conversion to PCU/Hour**

<table>
<thead>
<tr>
<th>Time</th>
<th>Types of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Motorcycle (pcu/h) Light vehicle (pcu/h) Total (pcu/h)</td>
</tr>
<tr>
<td>06.00 - 07.00</td>
<td>731</td>
</tr>
<tr>
<td>07.00 - 08.00</td>
<td>1270,75</td>
</tr>
<tr>
<td>16.00 - 17.00</td>
<td>1349,75</td>
</tr>
<tr>
<td>17.00 - 18.00</td>
<td>1548,5</td>
</tr>
<tr>
<td>Average traffic volume</td>
<td>1225</td>
</tr>
</tbody>
</table>

Based on Table 4, it is known that the peak traffic flow on the Margonda Raya Road section occurred at 17 o’clock. 00 – 18.00 with a traffic flow volume (Q) of 1568.5 pcu/hour.

**Level of Service (LOS) Analysis**

*Level of Service (LOS) analysis is calculated* to determine the quality and effectiveness of frontage roads on the Margonda Raya Road section. The saturation degree analysis (DS) can be calculated using the formula of equation 3.

\[
DS = \frac{Q}{C}
\]

Information:

DS = degree of saturation
Q = Average number of vehicles (pcu/h)
C = Road Capacity (pcu/h)

The assessment of the level of road service (Level of Service) can be known by calculating the value of the degree of saturation, which is a comparison between the volume of traffic flow (Q) and the capacity of the road (C). Based on the data that has been obtained, then:

\[
DS = \frac{Q}{C}
\]

DS = 1246/1122
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\[ DS = 1.1105 \]

Based on the results of the calculation of the degree of saturation, referring to table 3, the LOS (Level of Service) value of the frontage road on the Margonda Raya road is categorized at level F with conditions of forced current, low speed, volume above capacity, and long lines (jams).

CONCLUSION

From the results of this study, the average speed of a motorcycle is 26.625 km/h, which is below the standard free current speed based on the ICHM 1997 of 32.64 km/h, while the average speed of light vehicles (angkor) is 9.93 km/h, which is below the standard free-flow speed based on IHCM 1997 which is 41.48 km/h and also obtained a saturation degree value of 1.1105 which means that the frontage road on Jalan Margonda Raya has a value Level of Service F. It can be concluded that the frontage road on Jalan Margonda Raya has conditions of forced current, low speed, volume above capacity, and traffic jams.

REFERENCE


The Effectiveness Analysis of Frontage Road on Jalan Margonda Raya, Depok


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