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Analysis of Road Performance and the impact of Development in Pasar Minggu, Jakarta (Case Study of Jalan Lenteng Agung-Tanjung Barat)

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Abstract

The city of South Jakarta is a dense metropolitan city because it has a high population growth rate. Due to this population growth, the city of South Jakarta has experienced additions, expansion of social facilities and infrastructure as well as transportation to serve the needs of its residents, one of which is the Lenteng Agung-West Tanjung Flyover Development Project. The infrastructure built has an impact on traffic congestion on the performance of the Lenteng Agung-Tanjung Barat road and Pasar Minggu intersection. The purpose of this study is to determine road performance and to know strategies that can be used to overcome the impact of traffic congestion. The method used in this analysis and discussion is based on the Indonesian Road Capacity Manual (MKJI), 1997 and conducts a field survey for the performance of roads and intersections without signals.

The results of the research obtained on the performance of the Unmarked Intersection road are the largest traffic volume of the Unmarked Intersection which is obtained from the survey results on Friday 18 December 2020 and the peak hours are at 06.30-07.30 WIB With the degree of saturation DS = 0.66, the delay at the intersection is 10.85 sec / pcu and the chances of queuing are 36.97% -17.96%. In the analysis of the Lenteng Agung road section, the highest level of service was obtained on Monday, November 16 2020 in the morning at 07: 30-08.30, with a degree of saturation of 0.98 having a service level of E, which means the flow is unstable. Meanwhile, in the afternoon, 16: 00-18: 30 with a saturation degree of 0.53 and has a service level of B.

Keywords :
Degree of saturation, Delays and queuing opportunities, Flyover, South Jakarta city, Unmarked intersections

1. Preliminary

Population projections for the DKI Jakarta area are based on data from the Central Statistics Agency (BPS) in 2018, it was found that the total population of South Jakarta in 2018 was 2,296,977 people, including 2,198 people who were foreign nationals (WNA). (Jayani, 2019) Regional development has also led to the addition and expansion of social facilities and infrastructure as well as transportation to serve the needs of its population. If it is not anticipated with transportation facilities and infrastructure accompanied by good transportation regulations, it will have a bad impact on transportation, namely in the form of traffic jams and environmental impacts (pollution) which will affect the surrounding community. Congestion has become a common problem and many ways have been done to find a solution. Several solutions to solve the congestion problem have been proposed by several institutions as well as researchers. Among them are by widening roads, adding traffic lanes, engineering one-way traffic circulation, restricting through road medians or barricades that limit turning flows, building fly-over, developing road management through intelligent transportation systems, providing sanctions for violators, and others. etc. However, because congestion is a very complex problem, even though several solutions have been implemented, bottlenecks still occur (Harahap, Suryadi, Ridwan, Darmawan, & Ceha, 2017).Traffic congestion occurs due to high traffic volume caused by the mixing of through traffic, regional and local traffic. When the nature of traffic jams is a routine occurrence, the result will not only affect the inefficiency of resource use, but also disrupt activities in the existing environment. Traffic congestion that occurs on the Lenteng Agung-West Tanjung and Pasar Minggu Simpang roads is a problem that must be addressed immediately so that the impact it causes does not damage and harm the surrounding community. Efforts to prevent and reduce the occurrence of traffic jams must be carried out immediately. For this reason, the South Jakarta government decided to build a Flyover. The construction of the two flyovers is expected to help motorists avoid accidents and unravel the knot of congestion on the Lenteng Agung-Tanjung Barat railway crossing.

The main problem that arises at the fly over construction stage is the increasing level of congestion. The congestion that arises has an impact on increasing congestion and air pollution (Firmansyah & Tjahjani, 2012).

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The Fly over Development Project caused traffic jams along the Lenteng Agung-West Tanjung road and Pasar Minggu intersection. The problem that will be caused in the construction of the Lenteng Agung-Tanjung Barat Flyover is the narrowing of the causeway

Figure 1. Location Of Road Lenteng Agung

Figure 2. Location Of unsigned intersections

2. literature Review

Fly over is a freeway equipment to overcome obstacles due to conflicts at intersections and avoid areas / areas that always face traffic congestion problems (Lubis, Samosir, & Mahda, 2020)**.** Development is a form so that the Indonesian state can be more advanced, in addition to being more advanced, development will also increase the productivity of the economy in a country or region. Development carried out by a region can reflect the progress of the regional economy, one of which is the improvement of facilities and infrastructure for the community. Infrastructure development is also a combination of population growth and technological progress, therefore infrastructure development, especially roads, greatly affects the productivity of activities within an area, because in addition to facilitating the distribution of road construction goods (Fly Over) it is also useful for breaking down congestion that occurs. (Akbar, 2017)**.** An unsigned intersection is an intersection which in its arrangement does not use signal lights. According to the Indonesian Road Capacity Manual (MKJI, 1997)**.** Road performance or service level according to the US-HCM is a qualitative measure used in America and describes the operational conditions in traffic flow and the assessment by road users. Expressed in terms of speed, travel time, freedom of movement, traffic interference, comfort, comfort and safety (MKJI, 1997)**.**

3. Research Methodology

In this research method, it can be carried out at Unmarked Intersections and Roads by survey. The observation method is a technique of collecting data by observing, recording the conditions on the target object. Literature method is a technique of activities in collecting library data, identifying, and processing the written data obtained. This data collection is the next step after the preparation stage before this research is carried out. The data obtained are in accordance with the plan in the study to be precise and appropriate. The data used as reference material in conducting research in preparing this final report is divided into two types of data, namely primary and secondary:

Figure 3. Location of Road Lenteng Agung

igure 4. Location of Road Lenteng Agung

3.1 Primary Data

Primary data can be directly surveyed in the field and some observations in research include :

1. Calculating the volume of traffic performance at unsigned intersections and roads
2. Calculating Delays and Queues at unsigned intersections and roads
3. Knowing the speed and travel time of unsigned intersections and roads

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3.2 Secondary Data

This secondary data is obtained from related institutions and itself, the data to be taken in the research are as follows:

1. Location map at Unmarked Intersection
2. Population Data
3. Vehicle Data

3.3. Time to collect data

At the time of data collection, it can be obtained for 3 days, namely; Monday, Friday, Sunday to be taken at 06.30 WIB & 18.30.00 WIB.

4. Results and Analysis

4.1 Survey results chart

A. Simpang Jl. Raya Pasar Minggu – Jl. Raya Ragunan

Based on the graph of the calculation of the Unmarked Intersection, the largest traffic volume is obtained from the survey results on Friday and the peak hours are at 06.30-07.30 WIB

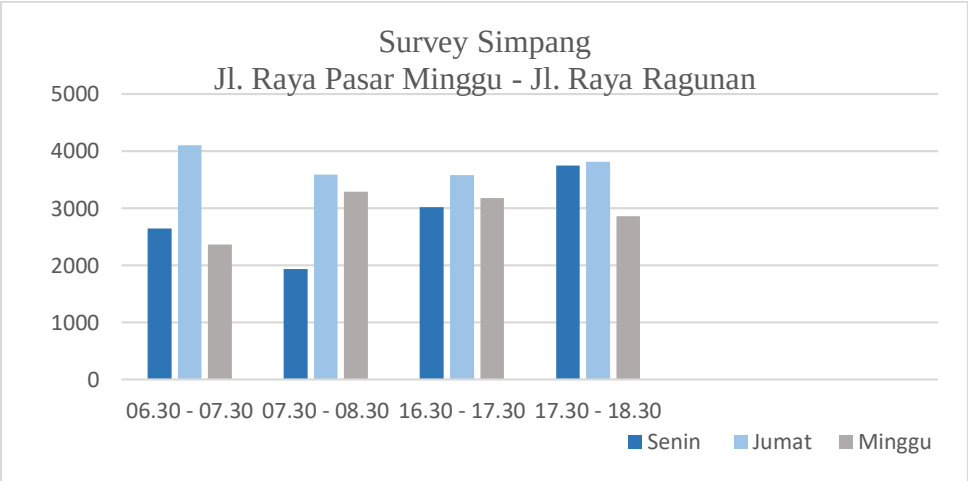

Figure 5. Graph of the calculation of the Unsigned Simapng Monday, Friday, Sunday.

On Monday, Friday, Sunday for the highest vehicle accumulation at the Unmarked Simpak on Jalan Pasar Minggu - Jalan Raya Ragunan, South Jakarta is shown on Friday, 18 December 2020 at 06.30-07.30 with a total of 4103.8 pcu / hour.

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B. Ruas Jalan Lenteng Agung

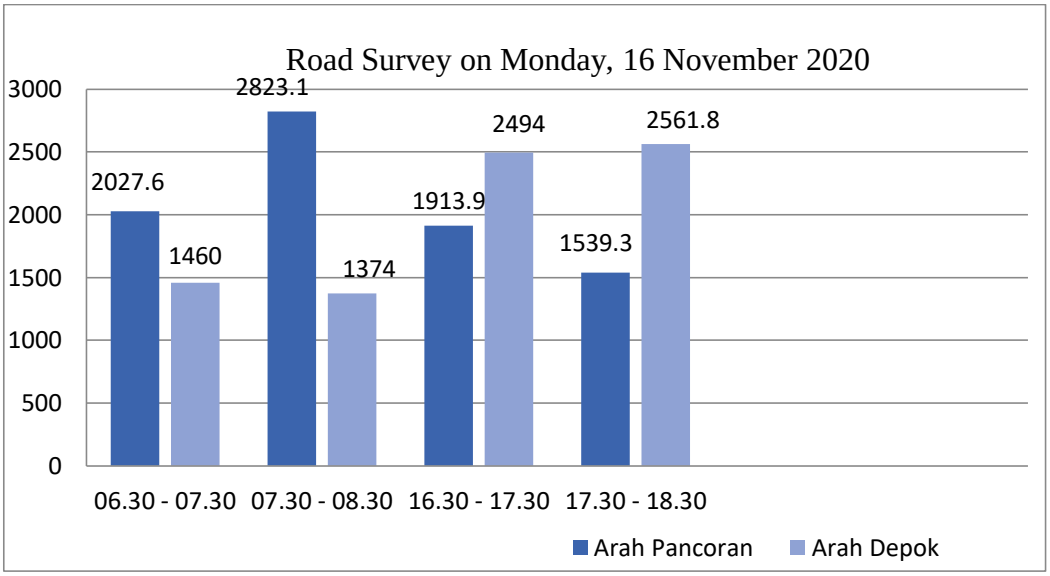

Figure 6. Survey of the Lenteng Agung Road Section
Monday, 16 November 2020

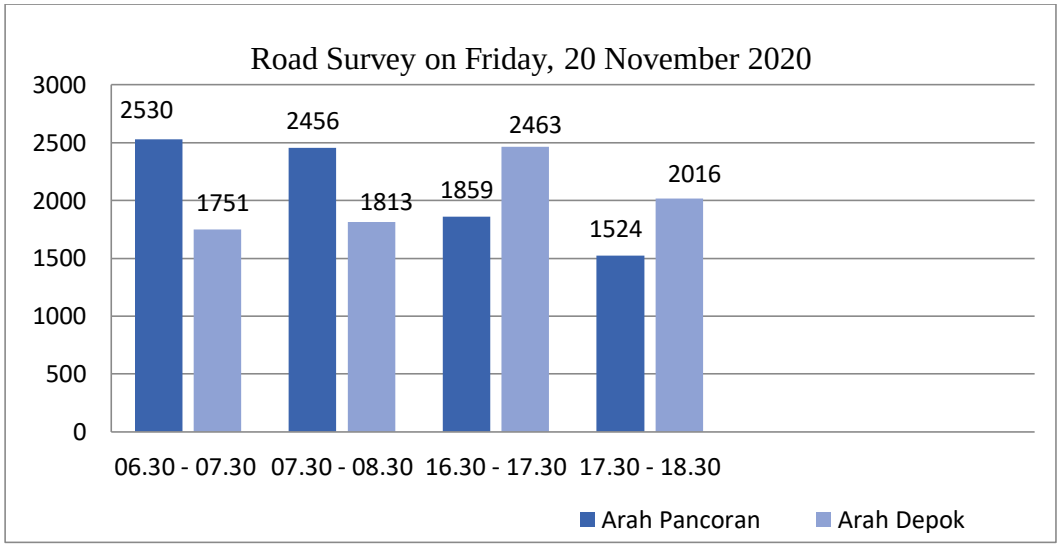

Figure 7. Survey of the Lenteng Agung Road Section
Friday, 20 November 2020

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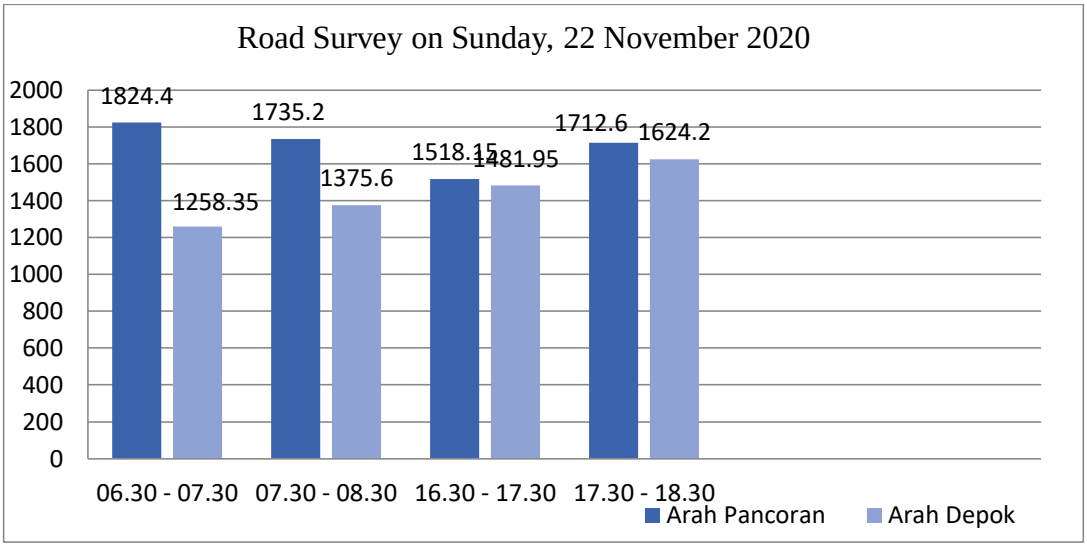

Figure 8. Survey of the Lenteng Agung Road Section
Sunday, 22 November 2020

Table 1. Road Section Volume Recapitulation

Waktu	Jl. Raya Pasar Minggu			
	Arah Pancoran		Arah Depok	
	kend/jam	smp/jam	kend/jam	smp/jam
Pagi	4885	2823.1	2492	1373.6
Sore	2647	15393	4391	2561.8

On Monday, Friday, Sunday, the highest vehicle accumulation occurred at Jalan Raya Lenteng Agung, South Jakarta, as shown on Monday, November 186 2020 at 06.30-07.30 with a total of 2823.1 pcu / hour.

C. Side Barries

The Jalan Raya Lenteng Agung section is a commercial area, due to the Flyover Development and several shops. There are high side barriers due to vehicles coming in and out of the side of the road, as well as many pedestrians

D. Actual Speed of Roads

Table 2. Sample vehicle speed

Side friction event type	symbol	Weight factor	Occurrence factor	Frequency weights	class side barriers
Pedestrian	PED	0,5	123	61,5	Tinggi
Parking, the vehicle stopped	PSV	1	112	112	
Vehicle in + out	EEV	0,7	40	28	
Slow vehicle	SMV	0,4	60	23,2	
	Total			**224,7**	

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E. Speed of Free Flow of Vehicles

Table 3. Speed of Free Flow of Roads

Variabel	Jalan Raya Lenteng Agung Adjustment Factor	
C0	Split Road (2 Lane) / 1 Way	3300
FCw	WC = 6 m	0.92
FCsp	One way	1
FCsf	Side Barriers Height, Effective Shoulder Width 4 m	0,95
FCcs	Population of South Jakarta City = 2,296,977 people	1,00
C	smp/jam	**2884,2**

F. Tingkat Pelayanan/ LOS (Level Of Service)

Table 4. Level of Service

Time	Road to Lenteng Agung			
	Q Smp/jam	C Smp/jam	DS	LOS
Morning	2823.1	2884.2	0.98	E
Afternoon	1539.3	2884.2	0.53	B

Based on the table above, the service level on Monday 16 November 2020 found the highest service level on Monday 16 November 2020 morning at 07: 30-08.30, with a saturation degree of 0.98 having a service level of E, which means that the flow is not stable. Meanwhile, in the afternoon, 16: 00-18: 30 with a saturation degree of 0.53 and has a service level of

5. Conslucion

Based on the results of data analysis that has been carried out in this study, the conclusions obtained are as follows:

1. Jl. Raya Pasar Minggu Direction of Pancoran (north) and U-turn to Jalan Raya Lenteng Agung-West Tanjung has the highest level of service occurring on 3 days of research time with the characteristics of forced currents / jams with an average speed of 10 km / hour. This happens. due to the closure of the railway crossing to Lenteng agung-tanjung barat and Depok due to the construction of the Lenteng Agung-West Tanjung Flyover.
2. Jl. Raya Ragunan Depok and Pancoran directions have stable current characteristics, with controlled speeds occurring at 3 days during the study time with an average speed of 29-32 km / hour
3. Jalan Raya Pasar Minggu in the direction of Depok and turning towards Pancoran has a stable service level, however, not many vehicles pass Jalan Raya Pasar Minggu at this intersection because the community prefers to pass through the Pasar Minggu underpass

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Biografi

Andri Irfan is a Senior Lecturer in Civil Engineering and Planning. He completed his PhD at the University of Indonesia & Universidade do Minho with a Sandwich Program scholarship from the Directorate General of Higher Education and an LPDP scholarship. He has taught for more than 19 years and has been actively applying his knowledge in project development in Indonesia. His research interests range from pavement management systems to advanced data mining techniques to transportation engineering. He has published more than 50 papers in journals and 2 books.

Yurika Anggreini Surgiarti, born in Jakarta on October 13, 1999. She was an Assistant Lecturer in Engineering Mechanics II and now, she is still continuing her studies until she earned a bachelor's degree at Mercu Buana University.

Muhammad Isradi., Was born in Kandangan on August 18 1972. He is the secretary of the Civil Engineering study program at Mercu Buana University. He earned a Bachelor's degree in Civil Engineering from the University of Muhammadiyah Malang in 1998 with his thesis title One Way Flat Plate Planning at Ratu Plaza Madiun. Then obtained a Masters in Civil Engineering Concentration of Transportation from Brawijaya University in 2001 with a thesis title, Analysis of the Model of Family Movement Awakening in the Sawojajar Malang Housing Area. He also teaches several subjects such as Pavement Planning, Road Geometric Planning, Transportation Planning and Environmental Engineering.

Amar Mufhidin, born in Majalengka on June 16, 1991. Lecturer in several study programs: pavement planning, road geometry planning, and transportation planning. Obtained a Bachelor's degree in Civil Engineering from the Indonesian Education University, and a Masters in Civil Engineering with a concentration in the field of transportation from the Bandung Institute of Technology. He has a pavement expertise certificate from the Construction Services Regulatory Agency. And he is still active in road planning projects in Indonesia.