Performance Evaluation Of Traffic Light Intersection Three Bhayangkara Street – Ahmad Yani Street – White Sand Road Nunukan Indonesia

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Abstract. Analyzing Road Service of Simpang Tiga Bhayangkara Street, Pembangunan Street, Pahlawan Street, Nunukan Sub-district, Nunukan District. Nunukan District is an area located on the border line between the Republic of Indonesia and Malaysia (Sabah and Serawak), the position of the strategy makes the region of Nunukan Regency as a mirror and the front page of various cross- border / inter-state economic activities, thus thereby needing special attention , Especially against the handling of various problems that arise related to the existence of border areas.

The research was conducted at Jalan Simpang Tiga Jl. Bhayangkara, Jl. Pembangunan, Jl. Pahlawan. Problems in this study is the capacity of the vehicle is still appropriate or not and how the level of performance intersection intersection three. This study aims to calculatethe traffic volume at the intersection of three, calculate the intersection capacity and find out whether it is still in accordance with the capacity of the passing vehicle. This research is expected to be useful for DPU and Dinas Perhubungan for consideration of future development. This research is a research that calculation and analysis using MKJI Method 1997. Observation time at peak hour. Based on the calculation data, it can be seen that the capacity of Simpang Tiga Bhayangkara Road, Jalan Pembangunan, Pahlawan Road, Nunukan Sub-district, Nunukan District is still able to serve the traffic transportation. The data obtained obtained DS value of
0.303 for North approach, 0.516 for East approach and
0.598 for Western approach.

These results indicate that the existing condition on the intersection of three Bhayangkara Road, Jalan Pembangunan, Jalan Pahlawan still meets the minimum standards required by MKJI 1997.

Keywords: Analysis, Capacity, Peak hour, Degree ofSaturation, Level of Service.

1. Introduction

Growth in all fields is marked by increasing development, both physical and non-

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physical development.Human resource growth has also increased very rapidly. It is characterized by a surge in the number of inhabitants from year to year. For this reason, the means of meeting human needs are also required to continue to grow. One of the means of meeting human needs is transportation which is now very vital for society. In big cities in Indonesia, there have been many transportation problems that require solutions so that people's transportation needs can be met.

The development of transportation in Nunukan is currently said to have begun to increase. This can be seen from the population on Nunukan Island of around 77,940 people (BPS Nunukan Regency), as well as the number of road intersections in Nunukan City which are increasinglydense. It is necessary and even if ignored there will often be congestion at most intersections. This condition is caused by the rapid increase in the number of road users.

The need for roads is increasing considering the increasing population growth and vehicle capacity that continues to increase every year, generally at crossroads, especially on main roads must serve a considerable trafficflow, because many vehicles are divided into and leave the road. Crossroads must be able to operate optimally. The lack of smoothness of this section will cause the transportation system to be less effective and less efficient.

The urban structure of the city of Nunukan is strategically located because it is directly adjacent to the State of Malaysia, the development of the city of Nunukan is quite high every year. This situation causes an imbalance between the number of vehicles on the road and the available road capacity, which results in traffic problems. As happened on the intersection of Jl. Bhayangkara, Jl. Ahmad Yani, Jl. Pasir Putih Nunukan District, Nunukan Regency, which on weekdays there is often congestion with a large volume of passing vehicles and road users who are not orderly traffic. That is what motivated me to take the Final Project "Performance Evaluation of Traffic Light Simpang Tiga Jl. Bhayangkara, Jl. Ahmad Yani, Jl. Pasir Putih Nunukan District, Nunukan Regency".

One of the problems that occurred on JalanSimpang Tiga Jl. Bhayangkara, Jl. Ahmad Yani, Jl. Pasir PutihNunukan District, Nunukan Regency was the disruption of slowing traffic flow, namely during rush hour.

2. Research Methodology

2.1. Location of Research

The location of this research area is in the city of Nunukan, precisely in the Simpang Tiga Road Service Analysis area, Jl. Bhayangkara, Jl. Ahmad Yani, Jl. Pasir Putih, Nunukan District, Nunukan Regency. Service Analysis of Simpang Tiga Road, Jl. Bhayangkara, Jl. Ahmad Yani, Jl. Pasir Putih Nunukan District, Nunukan Regency is one of the crossroads that has a big role in the city of Nunukan, because

it is one of the main routes to Offices, Schools and Regional General Hospitals of Nunukan Regency.

2.2. Data Analysis

The data needed as material for intersection analysis include intersection geometry, cycle timing, traffic flow asfollows:

2.3. Primary Data

a. Traffic geometry data

The required geometry data is as follows:

- Effective width (We) on each approach.
- Width (Wentry) on each approach.
- Width out (Wesit) on each approach.

b. Traffic flow data

Traffic flow data is vehicle flow data for each short which isdivided into three, namely:

- Straight vehicle flow (ST).
- Right turn vehicle flow (RT).
- The flow of vehicles turns left following the traffic light (LT).

Each approach there are various types of vehicles surveyed,namely:

- MC is a motorcycle
- LV is a light vehicle.
- HV is a heavy vehicle.
- UM is a non-motorized vehicle.

2.4. Secondary Data

Secondary data obtained from related agencies, the dataobtained are:

- Data on the population of Nunukan City
- Environmental condition data

The environmental condition data in question is the areaaround intersection three where these environmental conditions affect the level of side obstacles.*Prosedur Penelitian.*

The implementation of the research is to count all types of vehicles passing through intersections, record geometry data, phase time and cycle time of traffic control lights. All types of vehicles passing through the intersection are counted and recorded, differentiated by vehicle type

Tabel 1. Vehicle Type

No	Vehicle Type	Vehicle Type
1.	Non-motorized vehicles	Bicycles, tricycles
2.	UM)	Motorbike
3.	Motorcycles (MC)	Colt, Pick up,
4.	Light vehicle (LV)	station wagon

	Heavy vehicle (HV)	Bus, Truck

The equipment used for this research includes:

a. Stationery, which serves to record all research results.
b. Timekeeper (stop watch) to measure the change of vehicle observation period. Standard meters (Roll Meters), used in measuring road width, include effective width (We), inlet width (Win), and exit width (Wexit).
c. Observer officer, as an observer and recorder ofthe number of vehicles.
d. Research form, to record the number of vehicles, the type of vehicle passing through the intersection.
e. Watch, as a survey timepiece.
f. Laptop to enter data and calculate survey results.

3. Discussion Of Research Results

- In the SIG-I form shows the size of the city 1 million inhabitants, type of commercial environment, has high sideresistance, has 0% slope, three-arm intersection with 2 lanes, short of Win = 5.8 m North, 0 East, 5.7 m South, 5.8m West, Wexit = 5.8 m North, 0 East, 5.7 m South, 5.8 m West, has 3 phases, cycle time C = 219 seconds, total lost time LT1 = ΣIG = 54 seconds.
- In the SIG-II form, it shows that the total motor vehicle (MV) has a total = 1084 kend/hour for the northern approach (LT/RT), total = 565.8 smp/hour for sheltered, total = 695.8 smp/hour for the opponent, has a turning ratioPLTOR/LT = 0.47, PRT = 0.518. Total = 1800 kend/hour for southern defiance (ST/RT), total = 713.7 smp/hour for sheltered, total = 986.1 smp/hour for opponents, has a turning ratio PLTOR/LT = 0.273, PRT = 0.693. Total = 2020 kend/hour for western deductions (LT/ST), total = 791.1 smp/hour for sheltered, total = 1099.9 smp/hour for opponents, has a turning ratio PLTOR/LT = 0.304, PRT = 0.694.

- In the SIG-III form shows the red light time direction i.e. North departure-coming distance (m), Departure time coming (sec), with speed 10 km/s = 1.06,
South departure-coming distance (m), Departure time coming (sec), at a speed of 10 km/s = 1.15,
South of departure-coming distance (m), Departure time coming (sec), at a speed of 10 km/s = 1.15, Total yellow time = 9 (3 seconds/phase), lost time (LTI) = 13(sec/cycle).

In Form SIG-IV indicates the ratio of junction current (IFR) = 0.390. Cycle time = 50 seconds. Capacity (C), North = 1569 smp/hour, South = 1196 smp/hour, West = 1190 smp/hour, saturation degree (DS), North = 0.361, South =0.597, West = 0.665.

Based on the time of optimization that has been carried out the MKJI 1997

method can be delivered as follows:
- Rated capacity obtained 1569 smp/hour
- Queue length 23.67 meters on Ahmad Yani road
- Signal cycle time obtained 50 seconds
- Average delay of intersection 16.85 seconds

Level Of Service based on the average delay of theintersection obtained by LOS D (Near unstable: The effect of congestion becomes more noticeable, drivers may have to waitthrough more than one red signal sign).
In the form SIG-V indicates the total current = 2070.60. Vehicle stalled on average = 0.72666 smp. Maximum queue length (QL) = 50.94. Average delay of intersection = 16.41 seconds. The ideal saturation degree (DS) value according to MKJI 1997 is below or equal to 0.85.

4. Conclusion

Dari data yang telah diperoleh didapatkan nilai Derajat Kejenuhan (DS) sebesar 0,361 untuk pendekat Utara, Timur 0,0,597 untuk pendekat Selatan dan 0,665 untuk pendekat Barat.Hasil ini menunjukkan bahwa kondisi eksisting untuk The intersection of three Bhayangkara roads, Ahmad Yani road, Pasir Putih road still meets the minimum required standards and does not require replanning. If the degree of saturation (DS) obtained >0.85, replanning must be done to evaluate the intersection.
From this data, it is also known that the longest queue length on Monday was 23.67 meters on Ahmad Yani road (north), onPasir Putih road (south) 44.54 meters, and 50.94 meters on Bhayangkara road (west).
From the GIS calculation, the average intersection delay at this intersection is 14,191 sec/smp. If the average delay (DT)obtained >0.85 can be used as an indicator of the level of service of each shorthand as well as of an intersection as awhole.

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