

Analysis Of Accident Prone Areas Along Jenderal Ahmad Yani Road In Bekasi

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Abstract

Based on the results of the analysis of accident prone locations on Jenderal Ahmad Yani road in 2015-2018 using the Equivalent Accident Number (EAN) method, the location that are identified as accident prone is at coordinates 6.2444641- -6.2356937 (crossing area of the Jenderal Ahmad Yani road with the Burang Rang Raya road – Overpass that leads to the Summarecon Bekasi iconic roundabout), with as many as 40 accidents. The number of death caused by traffic accident are as many as 13 people, seriously injured as many as 7 people, minor injuries as many as 46 people, and experience material loss of 37 objects and a maximum of Rp 80.800.000.- . The most dominant cause of accidents on Ahmad Yani road Bekasi in 2015-2018 is human error with 74% percentage and 26% due to vehicle error with total of 40 accidents.

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1. Introduction

Transportation that utilizes road facilities is the most dominant type of transportation compared to other types of transportation. Therefore, the transportation problems faced by road users are almost the same, namely traffic jams and accidents [1]. Traffic accidents are actually the impact of transportation mobility. The balance between the driver, the advancement in vehicle technology and the provision of traffic infrastructure are the three combinations that determine transportation mobility. If one of these elements is left behind in its adaptation there will be a gap which will lead to an accident [2]. An accident can be defined as a rare and uncertain event when it occurs and is multi-factor which is always preceded by a situation where one or more road users have failed to anticipate their environment. The philosophy of accident research considers an accident as a random event, from two aspects namely location and time [3]. Many factors can affect the high accident rate. One important factor is traffic conditions, where traffic conditions are the accumulation of interactions of various characteristics of drivers, vehicles, road infrastructure, and environmental characteristics. In a developing country like Indonesia, the transportation sector greatly influences the pace of development. Transportation in various types and numbers supports economic, social and political aspects.

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Within a period of 10 years (2001-2011), it was known that the growth of motor vehicle ownership in Indonesia was $\pm 15.25\%$ every year [4] while the development of national road length was only $\pm 6.85\%$ annually [5]. From this analysis it is known that the growth of motor vehicle ownership is more rapid than the increase in the length of the existing road. Bekasi is a city in West Java, Indonesia, located on the eastern border of Jakarta in the Jakarta metropolitan area. The most densely populated and frequent accidents in the city of Bekasi one of which is Jenderal Ahmad Yani road, Bekasi. Jenderal Ahmad Yani road, Bekasi is connected to the Jakarta-Cikampek toll road, there is a toll exit access road, namely the West Bekasi toll gate. Jalan Raya Ahmad Yani with a road length of 4.8 km, is the connecting road of the city of Bekasi and the city of Jakarta, so that in various factors the development of development will follow the development of Jakarta's development directly or indirectly.

2. Methods

The research method is a scientific process in the form of ways to obtain data that can be used in scientific interests. The research method is used as a basis for sequential steps based on the research objectives and becomes a tool used to draw conclusions, so that the expected completion can be obtained to achieve research success. The research analysis was carried out on the Jalan Raya Jenderal Ahmad Yani Bekasi section. The time of this research was conducted in September 2019 - January 2020 using traffic accident data from January 2015 - December 2018.

2.1. Data collection

The data needed in this study are primary data and secondary data, which will be explained as follows :

a) Primary Data

Primary data that will be collected can be obtained from accident data from the Bekasi City Police and the results of the survey on the completeness of infrastructure data which includes inventory of roads related to accident handling efforts such as traffic signs, road markings, traffic signs, street lighting, and other equipment in Jalan Raya Ahmad Yani. The survey was conducted during the day and night.

b) Secondary Data

The secondary data collection was obtained from the Bekasi City Police Laka Unit. What is needed to support this research is the accident data including data on the location of the accident, the number of accidents, the cause of the accident, and accident victims on the General Ahmad Yani Highway during January 2015 - December 2018

2.2. Data Processing

The process of collecting accident data is the result of recording accident reports conducted during the period of January 2015 - December 2018 by the Laka Lantas Polresta of Bekasi City. This accident is a reported incident or incident that is known to police officers. After completing data collection, data processing is carried out, which is determining which roads have the highest accident rates, and the factors causing the accidents on the road.

3. Result and Discussion

3.1. Primary data

Primary data were obtained from the results of the field survey on Jenderal Ahmad Yani road by using the checklist form and comparing the actual conditions in the field with minimum road service standards regarding the substance of safety at accident-prone locations in the 3rd segment namely coordinate points -6.2444641 to -6.2356937 (the crossing area of the Jenderal Ahmad Yani road with the Burang Rang Raya road - the overpass that leads to the Summarecon round about Bekasi Landmark) which contains the condition of the signs, the condition of the road

markings, the condition of the safety fence / pavement, the condition of the road damage, and the condition of the street lighting

- a. Jenderal Ahmad Yani road is a connecting road between the city of Bekasi and the city of Jakarta, causing a significant level of mobilization on the road due to the large number of residents who live in Bekasi but work in Jakarta. This condition is not balanced with adequate road and infrastructure and public transportation facilities and the lack of driver compliance with applicable regulations. This can be seen from the lack of traffic signs, some faded road markings, fence / sidewalk safety, road damage and driver compliance with applicable regulations.
- b. The existence of commercial areas, settlements, shopping centers, hospitals, shops, and Bekasi Patriot Stadium on Jalan Raya Jenderal Ahmad Yani so that many people passing by and crossing, until the opposite direction that causes it can trigger accidents.
- c. Jenderal Ahmad Yani road directly related to the road, including KH. Noer Ali road, Siliwangi road, Raya RA Kartini road, Pekayon road, Jenderal Sudirman road, and Ir. H. Juanda road. This caused a considerable mobilization on Jenderal Ahmad Yani road.

3.1.1. Accident Location Identification

The analysis of accident-prone areas in this study uses the Accident Equivalent Number method. This method determines accident-prone areas by ranking the Upper Control Limit of accident-prone areas based on the fatality of accident victims that occur on Jenderal Ahmad Yani road, Bekasi.

Table 1 Calculation of AEK and BKA Accident Prone Location Identification

No	Segment		Length of road (km)	Value		
	First	End		AEK	BKA	Deviation
1	-62.593.698	-62.528.893	1	166	50,5	-115,5
2	-62.528.905	-62.444.619	1	197	58,2	-138,8
3	-62.444.641	-62.356.937	1	352	95,6	-256,4
4	-62.356.921	-62.274.201	1	93	31,5	-61,5
5	-62.274.385	-62.242.407	0,8	44	17,7	-26,3

Source: Data in research, 2020

Note:

$$AEK = 12MD + 3LB + 3LR + 1K$$

$$AEK = 12(13) + 3(7) + 3(46) + 1(37)$$

$$AEK = 156 + 21 + 138 + 37$$

$$AEK = 352$$

$$C = \text{mean of AEK}$$

$$C = 352/5 \text{ (road segment)}$$

$$C = 70,4$$

$$BKA = C + 3\sqrt{C}$$

$$BKA = 70,4 + 3\sqrt{70,4} = 95,6$$

Based on table 1, it can be concluded that Jenderal Ahmad Yani road is prone to traffic accidents because the AEK value > BKA in each segment along Jenderal Ahmad Yani road. The highest deviation value is in the 3rd segment which is the coordinate point of -62,444,641- -62,356,937 so it needs to be given special treatment to reduce the level of traffic accident prone on the road.

3.1.2. Graph Analysis of AEK with BKA



Fig. 1 Graph of AEK analysis with BKA (In Indonesia)

Source: Data in research, 2020

3.1.3. Factors Causing Accidents



Fig. 2 Pie Chart of accident factor (in Indonesia)

Source: Data in research, 2020

Based on the results of calculations according to figure 2 that the most dominant accident factor on Jenderal Ahmad Yani road in 2015 - 2018 was the driver's hit factor of 74%, vehicle factor 26% and road / natural / environmental factors 0%.

3.1.4. Traffic Accident Type



Fig. 3 Pie chart of accident type (in Indonesia)
Source: Data in research, 2020

Based on the calculation results according to figure 3 that the most dominant types of accidents in 2015 - 2018 were front-back hit by 33%, front-side by 19% and side-by-side crashing by 18%.

3.2. Secondary Data

In the table is a recapitulation of the data on the fatalities of victims and accident losses on Jenderal Ahmad Yani road Bekasi 2015 - 2018.

Table 2 Recapitulation of Victims and accident losses in 2015 – 2018

Year	Victim			Number of victims	Losses
	Fatalities	Seriously Injured	Slightly Injured		Material (IDR)
2015	3	8	34	45	251,800,000
2016	9	2	37	48	128,450,000
2017	10	0	25	35	75,100,000
2018	9	4	13	26	25,300,000
Total	31	14	109	154	480,650,000

Source: Bekasi City Police Department

Based on Table 2, the victims and accident losses above found that the total accident victims on Jalan Raya Ahmad Yani in 2015 – 2018, reached 154 victims with 31 fatalities, 14 seriously injured and 109 slightly injured. With a loss of Rp.480,650,000.

From the accident data sourced from the Bekasi City Police Department, a total of 117 accidents occurred on Jalan Raya Ahmad Yani Bekasi in the period 2015 - 2018. Following is the recapitulation of the number of accidents, the number of victims, the number of vehicles, the factors causing the accident.

Table 4.9 Recapitulation of accident data on Jenderal Ahmad Yani road in 2015 - 2018

No.	Description	Year				Total
		2015	2016	2017	2018	
1	Number of Accidents					
	a. Number of Accidents	38	32	27	20	117

No.	Description	Year				Total
		2015	2016	2017	2018	
	b. Number of Injury Injuries	42	39	25	17	123
	c. Number of Accidents Causing Death	3	9	10	9	31
	Total	83	80	62	46	271
2	Number of victims (People)					
	a. Number of death victims	3	9	10	9	31
	b. Number of victims of serious injuries	8	2	0	4	14
	c. Number of victims of minor injuries	34	37	25	13	109
	Total	45	48	35	26	154
3	Number of vehicle involved					
	a. One vehicle accident	7	4	3	4	18
	b. Two vehicle accident	31	27	24	15	97
	c. Three or more vehicle accidents	0	1	0	1	2
	Total	38	32	27	20	117
4	Factors causing accidents					
	a. Driver Factor	32	22	20	12	86
	b. Vehicle Factor	6	10	7	8	31
	c. Road and Nature Factors	0	0	0	0	0
	Total	38	32	27	20	117

Source: Bekasi City Police Department

4. Conclusion and Recommendations

- (1) Based on the results of the analysis of accident-prone locations on Jenderal Ahmad Yani road in 2015 - 2018 using the Accident Equivalent Number (AEK) method, and the Upper Control Limit obtained the locations identified accident-prone on the General Ahmad Yani Highway, because each segment of the road has AEK value > BKA. The location that has the highest accident-prone value is at the coordinate point -6.2444641 - 6.2356937 (Jenderal Ahmad Yani crossing area with the Burang Rang Raya road - the overpass that leads to the Summarecon Bekasi round about) with an AEK value of 352, an accident of 40 time. With the number of victims 13 dead, 7 seriously injured, and 46 minor injuries and 37 loss of objects. The most dominant types of accidents on Jenderal Ahmad Yani road in 2015 - 2018 were 33% front-and-back crashes, 19% front-side crash and 19% side-crashing.
- (2) Factors causing the accidents at Jenderal Ahmad Yani road in 2015-2018 include:
 - (a) The driver factor is the dominant factor causing accidents with a percentage of 74%, and vehicle factors of 26%.
 - (b) Lack of public awareness of driving regulations and driving skills as well as incomplete traffic signs, faded road markings, no guard rails / pavements, street lighting that is covered by trees, no banners will be important in driving safety and damage road so that it can trigger an accident.
 - (c) There are many centers of community activity around it, which makes the level of mobility of vehicles and walking is quite high.

Some recommendations for handling that can be given to Jenderal Ahmad Yani road, Bekasi are:

- (a) There is a need for safety riding counseling and the need for clear law enforcement as well as conducting special police operations including: Sympathetic Operations, Obedient Operations, Zebra Operations.

- (b) Improvements in terms of inventory and completeness of roads include: installation of traffic signs, repainting road markings, making sidewalks or repainting sidewalks, Installing street lighting and trimming tree branches blocking road lighting, installing driving safety signs, repairing road that damaged and added banners about driving safety.
- (c) Suggestions for further research are to be more complete for secondary data, such as the time of the incident, the weather at the time of the incident, the sex of the victim, the age of the victim, the vehicle involved or for inventory data and other methods. Evaluate community compliance regarding obedience when driving.

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