

# Planning of School Safety Zone (Zoss) On The Education Road Of Merauke Regency

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**Abstract.** School Safety Zone (ZOSS) One of the efforts given by the government to children's schools is to implement facilities that support the safety of pedestrians. Jalan Pendidikan is a road that is used by many vehicles because several schools can cause problems, one of which is that it can cause school children to be prone to traffic accidents. The purpose of this study was to determine the level of road service, and the level of pedestrians, and to plan ZOSS on Jalan Pendidikan. The method used in this study is based on the 1997 Indonesian Road Capacity Manual (MKJI) and based on SK.3582/AJ.403/DRJD/2018. The data taken are pedestrian volume, traffic volume, vehicle speed, and side barriers. Based on the results that can be obtained from the level of road service on Jalan Pendidikan using the 1997 MKJI, the capacity (C) = 1462 smp/hour, with a degree of saturation (DS) = 0.29 with a service level of B. From the results of the analysis of the volume of pedestrians, it can be seen that pedestrian activity is 32% during school children's entry hours and after school hours, both set and crossing the road. Based on SK.3582/AJ.403/DRJD/2018 plural ZOSS can be applied which consists of road markings and traffic signs.

**Keywords.** School safety zone, Capacity, Transportation planning

## 1 Introduction

Transportation is an important means of moving from one place to another [1]. Transportation can be used for needs in everyday life which can make it easier to get to a destination [2]. Transportation can also provide comfort for its users if it is equipped with various facilities [3][4]. Transportation facilities are facilities and infrastructure built to improve or facilitate people's access to everyday life. The road equipment facilities include road markings, traffic signs, and road user safety devices [5].

Developments in the field of transportation that occur today want everything to run quickly [6][7]. This can cause problems, one of which can cause students or school children to be prone to traffic accidents. Traffic accidents that occur in school children can be caused by schools that are close to the highway and a lack of knowledge of traffic safety regarding the movement of school students to and from school [8]. Child safety is a shared responsibility, including the government and the community, so that they work hand in hand in providing and creating protection for children's safety.

One of the efforts given by the government to school children is to implement facilities that support the safety of pedestrians, one of which is the School Safety Zone (ZOSS) [9][10]. The School Safety Zone (ZOSS) is a zone facility consisting of road markings, red carpets, noise tapes, zebra crosses, the words SCHOOLSAFETY

ZONE, and traffic signs for certain roads in the school environment at a certain speed [11]. These facilities can meet the needs for the safety of pedestrians, especially for kindergarten/elementary/junior high school students who are still spontaneous and unpredictable in crossing [12][13]. These facilities, it is expected to create an orderly traffic environment, prevent accidents and ensure the safety of students crossing [14][15].

Pendidikan Road is a road that is used by many vehicles because there are several schools on the road, namely Junior High School and Kindergarten. Vehicles that pass through the road are still not effective because they cannot guarantee a reduction in vehicle speed and the safety of pedestrians/crosswalks as in the ZOSS planning target. On the road to the school, there are not yet complete safety support facilities for road users in the form of traffic signs and other road accessories that are in accordance with the needs of the school area.

## 2 Research Method

### 2.1 Location and time of research

This research was conducted on the Education road, especially in front of the Junior High School and Kindergarten. The map of the research location can be seen in Figure 1.

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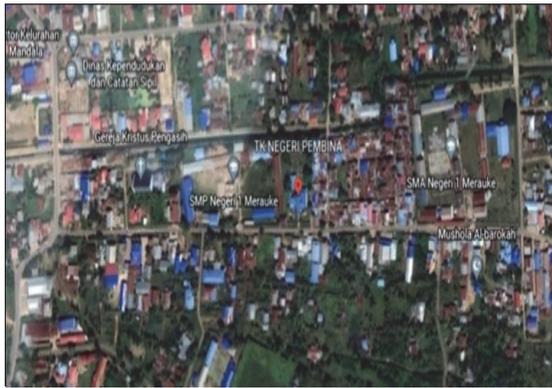


Fig. 1. Research location

## 2.2 Data collection techniques

Primary data retrieval was carried out by surveying the behavior data of school children who walked and crossed the road, vehicle speed data, vehicle volume data, side barriers data, and data on the completeness of ZOSS facilities. The survey road dimension survey is carried out to determine the size of the road surface, road center line, road shoulders, and road facilities.

Secondary data taken includes data on the number of students, teachers, and parties in the environment and the population of Merauke Regency.:

## 3 Results and Discussion

### 3.1 Road Inventory Survey

Based on the results of the road inventory survey that has been carried out, it can be seen that at the research location 3 schools have direct access to the road, namely Junior High School, Kindergarten, and High School. However, data collection was carried out in Junior High School and Kindergarten..

Table 1. Road Inventory Survey Data.

Road Inventory Survey Data	Information
Road segment	Urban Street
Traffic direction separator	Directional separator 50%-50%
Line Width	4 meters
Lane width	2 meters
Road shoulder width	Left 1.8 meters, right 2.7 meters
Road Type	2/2 UD (2 lanes undivided direction)

### 3.2 Capacity

The maximum current through a point on the road is maintained per unit hour under certain conditions. To determine the capacity can use the following basic equation.

$$C = C_o \times FC_w \times FC_{sp} \times FC_{sf} \times FC_{cs} \quad (1)$$

Based on the survey results, the capacity on Education road is 1,462 smp/hour.

### 3.3 Degree of Saturation (DS)

The total traffic flow is obtained from the highest total volume of vehicles found on Thursday at 09.30 - 10.30 WIT.

$$DS = C / (2)$$

The degree of saturation is calculated using current and capacity expressed in pcu/hour. The magnitude of the degree of saturation theoretically cannot be more than 1 (one), which means that if the value is close to the value of 1, then the traffic conditions are close to saturation, and it can be seen directly in the field that traffic conditions are approaching dense at low speeds.

Based on traffic flow and capacity, the value of the degree of saturation is 0.29.

### 3.4 Service Level (Level of Service, Lof)

The level of road service can be determined by calculating the comparison between traffic flow and the basic capacity of the road (Q/C). With this formula, it can be said that the LoS value is the same as the degree of saturation. The value of the degree of saturation is 0.29, it can be seen that the LoS on the Education road is B, where the flow is stable, but the speed of operation is starting to be limited by traffic conditions. The driver has enough freedom to choose the speed.

### 3.5 Pedestrian volume

The volume of pedestrians on the Education road is taken for 6 days at school entry hours and after school hours. The volume of the crossing can be seen in the table below:

Table 2. Recapitulation of the Average Volume of Crossers for 6 days

Day	Crosser Volume (person)	Average
Monday	347	305
Tuesday	348	
Wednesday	348	
Thursday	352	
Friday	88	
Saturday	347	

Based on the results of the survey that has been conducted, it can be seen that there is a 32% pedestrian activity during school children's entry and return hours, both walking and crossing the road. Regarding pedestrians walking down the road, it is certain that they will not experience conflict with vehicles passing on the highway, so the risk of accidents is almost non-existent. However, for those who cross the road, there is a risk of having an accident if they are not careful when crossing.

### 3.6 Safety School Zone Implementation Plan

Based on the results of the education road investment survey, it is known that 2 schools are close together, namely Junior High School and Kindergarten. Merauke supervisor with a distance between schools of  $\pm 100$  m. Based on SK.3582/AJ.403/DRJD/2018 the location can be applied to multiple ZoSS. The plural ZOSS is the ZOSS assigned to two or more schools that are located close together.

The zebra cross is planned to be placed at the point closest to the school gate. The planned zebra cross measures 2.5 meters long and 4 meters wide and has white and black stripes that are 30 cm thick. The planned ZOSS sign has a height of 1.6 meters and is placed above the red road marking surface. The sign prohibiting parking on the road with a yellow line is planned to be 1 meter long and 10 meters wide with an angle of 45 degrees. This red road marking is planned to be installed at the beginning and the end of ZOSS at a distance of 100 meters and a stop line has a length of 1 meter. Longitudinal markings in the form of a dotted line are planned to be 3 meters long and 10 meters wide and have a distance between markers as far as 5 meters. Longitudinal markings in the form of a complete line are planned to have a width of 10 cm. The yellow Traffic Signaling Tool is planned to be placed 120 meters before the ZOSS as measured from the transverse marking in the form of a solid line.

No parking signs are installed at a distance of 30 meters from the transverse marking in the form of a solid line to prioritize pedestrians who will cross. Signs prohibiting overtaking of other vehicles are installed at a distance of 50 meters from transverse markings in the form of a solid line. Signs prohibiting driving a vehicle with a speed of more than 30 km/hour are installed at a distance of 100 meters from the transverse marking in the form of a solid line. The symbol at the end of the maximum speed limit of 30 km/h is placed at a distance of 70 meters from the transverse marking in the form of a solid line. Signs indicating the location of pedestrian crossing facilities are installed on the zebra cross. Signs indicating the location of stopping facilities and/or public transportation bases other than public buses and locations are installed at a distance of 50 meters from the transverse marking in the form of a solid line.

The picture of the ZOSS implementation plan can be seen in Figure 2

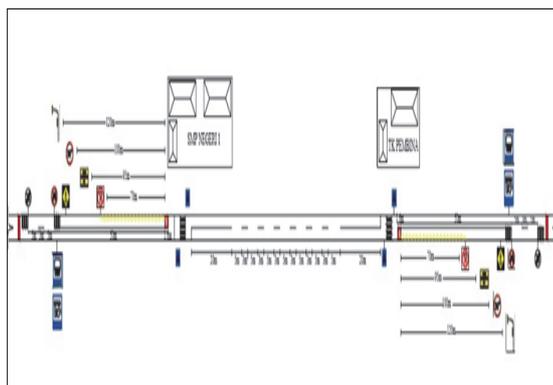


Fig. 2. School Safety Zone (ZOSS) Planning Plan

### 4 Conclusion

The level of road service carried out on Jalan Pendidikan using the Indonesian Road Capacity Manual (MKJI 1997) obtained a capacity (C) = 1,462 pcu/hour, with a degree of saturation (DS) = 0.29 with a service level of B. Based on the results of volume analysis of pedestrians, it can be seen that pedestrian activity is 32% at schoolchildren's entrance hours and school children's return hours, both walking and crossing the road. Based on the results of the road investment survey, it is known that there are 2 (two) adjacent schools, namely Junior High School and Kindergarten. Merauke supervisor with the distance between schools is  $\pm 100$  m. Based on SK.3582/AJ.403/DRJD/2018, plural ZOSS can be applied, which consists of road markings (transverse markings, longitudinal markings in the form of a solid line, longitudinal markings in the form of a dotted line, emblem markings in the form of the words "ZOSS", prohibition on parking and red road markings), traffic signs (signs indicating the location of crossing facilities, no parking signs, signs prohibiting overtaking of other vehicles, warning signs for a lot of pedestrian traffic using crossing facilities, warning signs with the words Zone Area) Happy School, signs prohibiting driving vehicles at speeds exceeding 30 km/hour, APILL signs (Traffic Signalling Devices), signs indicating the location of stops or general force bases other than public buses and taxis, signs indicating the location of bus stop facilities general, the final limit sign for the maximum speed prohibition is 30 km/h.

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