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THE UNDERSTANDING AND THE USE OF MOTORCYCLE SPECIAL STOPPING SPACE IN SIGNALIZED INTERSECTION

Leksmono Suryo Putranto[1)], Minggaza Suhindra[1)]

[1)]Civil Engineering Dept., Tarumanagara University, Jl.Let.Jen.S.Parman No.1, Jakarta 11440, Indonesia

e-mail:leksmonop@ft.untar.ac.id, lexy_putranto@yahoo.co.id

Abstract

The ownership and the use of motorcycle were increasing along with the worsening congestion in Indonesian cities. Indiscipline motorcycle riders will fill any space between vehicles whilet waiting the sign to turn green in a signalized intersection. Some motorcycle riders even wait in front of stopping line. This will endanger safety and interupt smooth discharging vehicles passing signalized intersection stopping line. Following the success story of other countries to solve this problem by introducing special stopping space right before the stopping line of an signalized intersection, Indonesian cities tried to implement this measure. The design guidelines were drafted by the Ministry of Public Work. It has no legal basis yet, but several cities have implemented this measure. Interestingly, Jakarta has not yet implemented the measure, but Greater Jakarta (Bodetabek/ Bogor, Depok, Tangerang, Bekasi) have implemented such measure in several spots. Since, this is a new measure, it was expected that the rate of understanding of the function of the special stopping space (as well as the rate of its use) were low. Observations were conducted in a signalized intersection in Bekasi to comprehent the rate of its use by motorcycles and their ilegal use by other vehicles (light and heavy vehicles). The field observation was carried out in hourly morning, noon and afternoon periods in two of the intersection approaches. Traffic flow of the observed intersection approaches was counted and capacity was predicted so that V/C can be calculated. Analysis of Pearson correlations between V/C and special stopping space use rates were then calculated. About 100 respondents were also asked to fill questionnaires regarding their understanding and the use of special stopping space.

Keywords: special stopping space, signalized intersection, understanding, use

INTRODUCTION

In Indonesian cities, there was increasing trend of motorcycle ownership and use to avoid congestion in the last decades. The severe congestion was due to uncontrolled land use development and unsatisfactory public transport system. Although both private cars and motorcycles keep growing significantly in the last two decades, the growth of motorcycles was more prominent. Some measures have been done to control motorcycle use from provision of motorcycle lane in several corridors (Sudirman, Thamrin, Pramuka in Jakarta) [1] to full prohibition of motorcycle use in future ERP corridor between 6 a.m. to 10 p.m. (Thamrin and Merdeka Barat also in Jakarta). Motorcycle lanes also applied in other cities such as Malang, Sragen and Surabaya

Apart from measures in road links, a measure specially applied in intersections such as special stopping space (in some references called as advance stopping line). As this measure is still new for Indonesian public and has not yet formalized in a national traffic regulation, this paper is intended to reveal the understanding and use of special stopping space in a signalized intersection.

SPECIAL STOPPING SPACE DESIGN

According to draft guideline of motorcycle special stopping space (SSS) in urban signalized intersection prepared by Center of Road and Bridge Research of Ministry of Public Work in Bandung [2], there are two types of SSS, namely box type and P type. A

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typical drawing of four legs signalized intersection which each leg installed with SSS is provided in Figure 1.

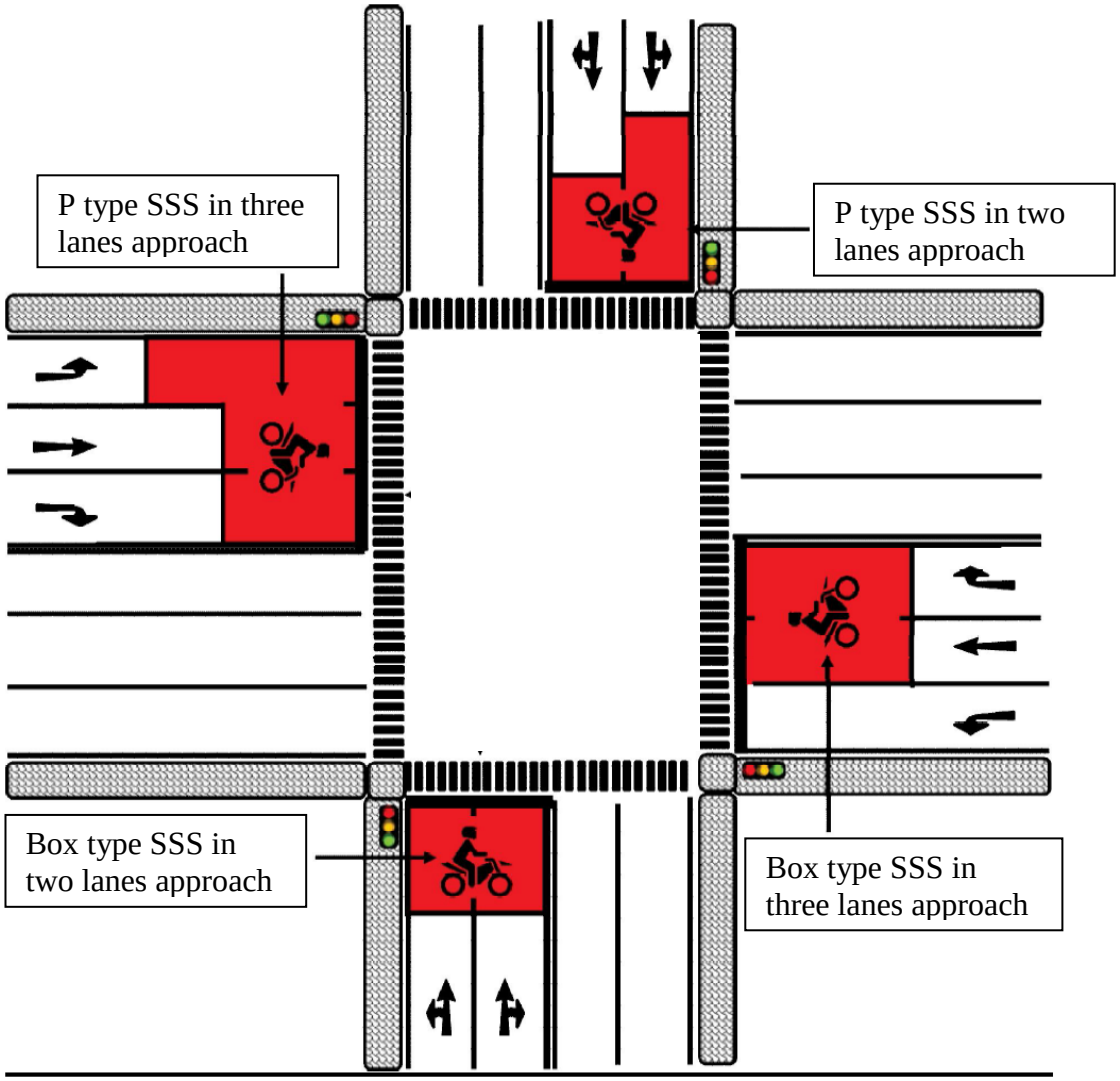

Figure 1. Typical Drawing of 4 Legs Signalized Intersection with SSS in Each Approach

The installation of SSS is justified if in two lanes approach at least there are 30 motorcycles waiting behind the stopline. In three lanes approach at least there are 45 motorcycles waiting behind the stopline to justify installation of SSS. For approaches with more than three lanes the treshold will be the multiples of 15 motorcycle per additional lane.

Box type SSS is recommended if motorcycle flow in each lane is same. In the two lanes approach, if 60% of the motorcycles using in the left lane, P type SSS should be chosen. In the three lanes approach, if 70% of the motorcycles using in the left and midle lanes, P type SSS should be chosen.

The dimension of the SSS depends of some parameters. The first consideration is the dimension of static motorcycle design vehicle. Figure 2 shows the design vehicle dimension using common Indonesian motorcycle with engine size between 110-125 cc.

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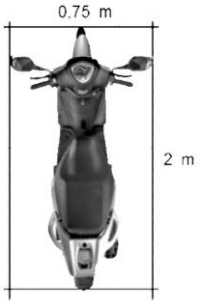

Figure 2. Static Motorcycle Design Vehicle Dimension

It is assumed that the average lane width of an approach is 3.5m and the length of SSS is the multiples of 4m (4m, 8m and 12m). The capacity depends on the length and type of SSS. The capacity of box type SSS is between 37 to 56 motorcycles (for two lanes approach) and between 56 to 84 motorcycles (for three lanes approach). The length of left lane of P type SSS is the multiples of 2m (12m, 14m, 16m). The capacity of P type SSS is between 46 to 65 motorcycles (for two lanes approach) and between 65 to 93 motorcycles (for three lanes approach).

METHODS

There were two types of survey conducted to reveal the understanding and the use of SSS in this research:

1. Interview using brief questionnaire regarding the unerstanding and the use of SSS by respondents from Tarumanagara University and small number of respondents interviewed nearby the location of field observation below.
2. Field observation in a signalized intersection between Ahmad Yani Street and Hasibuan Street in Bekasi to reveal the use of SSS.

Number of respondents in interview survey was 45 Tarumanagara University students, 25 Tarumanagara University emplyees, 14 Tarumanagara University lecturers and 15 motorcyclists nearby the location of the field survey. All together there were 99 respondents. There were 62 males and 37 females interviewed. 47 of the respondents ride motorcycle daily, 30 of them use public transport, 20 of them use car and 2 of them walk.

The followings were the content of the questionnaires:

1. General questions (gender, transport mode for daily activities, age, residential loacation).
2. Questions regarding:
   a. Their perception of level of annoyance of motorcycle rider behaviour in general traffic.
   b. Whether they have ever seen SSS
   c. Their understanding of the function of SSS
   d. Whether they ever been using SSS
   e. Reason for not using SSS
   f. Whether they believe that installation of SSS may improve road safety
   g. Their agreement on application of SSS in Jakarta

Field observation was conducted in a four leg signalized intersection between Ahmad Yani Street and Hasibuan Street. Traffic count was conducted to vehicles passing the stopping line and classified into light vehicle, motorcycle and heavy vehicle. Observation was conducted on North approach of Ahmad Yani Street and East Approach of Hasibuan street. Observation was done one hour in the morning, noon and afternoon every 15 minutes period. Number of motorcycles, light vehicles and heavy vehicles using SSS was also recorded. The data required to estimate intersection approaches capaacities

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were measured and/ or observed, i.e. approach width, side friction level, ratio of non-motorrized vehicles to motorized vehicles, sorrounding land use, signal timing/ phasing, etc.

Several mean difference t-tests were conducted to evaluate data from the questionnaires. The data were grouped based on gender, student/non-student, residence, mode of transport for daily use, age group. A 0.05 significant level was used.

Some Pearson correlation analyses were carried out to evaluate the relationship between Volume to Capacity ratio (V/C) and number of vehicles (motorcycles, light vehicles and heavy vehicles) in SSS per 15 minutes period. The analyses were done for three level of aggregation, i.e. all data, data classified by time period (morning, noon, afternoon) and data classified by approach (Ahmad Yani and Hasibuan).

RESULTS

Majority of respondents (56.5%) felt incovinient with recent motorcycle rider behaviours. The rest of the respondents were undecided (neutral). Only 35.5% of the respondents have ever seen SSS. More over, only 26.3% of the respondents understand the function of SSS. Only 23.2% have ever used SSS. The reasons for not using SSS were either the SSS was full or the access to reach SSS wa blocked. Although most of respondents have not ever seen SSS and did not understand the function of SSS, after provided with brief explanation of funcion of SSS, 62.6% felt that SSS will improve traffic safety and 59.6% agree if SSS is installed in Jakarta.

There were more proportion of male respondents who have ever seen SSS compare to proportion of female respondents (α=0.010). Female respondents might involve in more local travel compare to male respondents and therefore they were less likely to see SSS.

Non-student respondents were more likely to use SSS compare to student respondens (α=0.026). As non-student respondents usually more mature than student respondents, they were more likely to comply to traffic regulation.

There were more proportion of respondents living in Greater Jakarta who have ever seen SSS compre to proportion of respondents living in Jakarta (α=0.010). As SSS has not yet been installed in Jakarta, respondents living in Jakarta were less likely to see SSS. Respondents living in Greater Jakarta were more likely to understand the function of SSS compare to respondents living in Jakarta (α=0.010).

Respondents who ride motorcycles daily were more likely to understand the function of SSS compare to respondents who use other mode of transport daily (α=0.003). As SSS is more motorcycle related, the riders might have more concern about it.

Younger respondents (less than 40 year old) were more tolerant to motorcycle rider risky behaviour compare to older respondents (α=0.030). This might be explained by the fact that risky behaviour usually found in younger rider.

Older respondents (40 years old or older) were more likely to use SSS compare to younger respondents (α=0.040). More mature road users were more likely to comply traffic regulation.

Number of motorcycles in SSS is significantly correlated with V/C both in pooled data and data classified by observation period (morning, noon and afternoon). This implies that the higher the traffic level in terms of V/C, the higher the use of SSS by motorcycles. During the field observation, number of non-motorcycle vehicles using SSS was very limited and there were no siginificant correlation with V/C.

CONCLUSIONS AND RECOMMENDATIONS

In general the respondents were not familiar with SSS. However after brief explanation of SSS they felt that SSS might improve traffic safety and agree if SSS is

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installed in Jakarta. Although based on field observation the number of non-motorcycle vehicles using SSS was very limited, but further campaign on the function of SSS to general public is still required.

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