INVESTIGATION ON THE IMPACT OF SPEED HUMPS TOWARDS TRAVEL DELAYS IN RURAL ROADS

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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"In the name of ALLAH S.W.T, the Most Compassionate and Most Merciful"

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ABSTRAK

Peranti lalu lintas bukan sahaja dignakan di Malaysia malah diseluruh Negara bagi memastikan keselamatan penggunanya. Antara peranti lalu lintas ialah speed hump, speed bump, speed tables, roundabouts dan lain lain. Peranti lalu lintas adalah untuk memastikan pengawalan terhadap had kelajuan kenderaan. Speed hump adalah asphalt yang ditinggikanmerentasi jalan yang biasanya berbentuk parabola,separa bulat atau sinusoidal. Pemasangan speed hump ini biasanya meningkatkan masa perjalanan kerana pemandu terpaksa menjalani proses pengurangan ketika melintasi bongkah. Speed hump biasanya dibuat daripada getah, konkrit, plastik atau asphalt Berdasarkan Arahan Teknik Jalan JKR (18/97) ketinggian untuk speed hump untuk jenis 1 adalah antara 100 mm hingga 150 mm dengan panjang 3000mm dan jenis 2 adalah antara 80 mm hingga 150 mm dengan panjang 6000mm kepada 10000mm. 3 speed hump sinusoidal telah digunakan dalam kajian ini. Ia diukur dengan ketinggian 91mm dan lebar 2800mm. Sementara itu, speed hump 2 mempunyai ketinggian 52mm dengan ketinggian 3070mm dan ketinggian 59mm dan lebar 3020mm untuk ketinggian speed hump 3. Ketinggian dan panjang hump ditentukan oleh pembaris dan meter berjalan manakala jam randik digunakan ntuk mengambil masa perjalanan jalan 60m dengan atau tanpa speed hump. Perbezaan dari segi ketinggian dan lebar speed hump ini telah menyebabkan masa yang berbeza diambilJumlah masa perjalanan yang diambil untuk jalan raya 60m ini tanpa kehadiran speed hump ialah 3.11sec pada kelajuan 37km / j. Walau bagaimanapun, dengan adanya bonggol ini, jumlah masa perjalanan telah meningkat kepada 5.32sec pada kelajuan yang sama. Masa purata yang diambil untuk menyeberangi hump kelajuan 1 ialah 6.99 saat, 5.53 saat untuk speed hump 2 dan 6.51 saat untuk speed hump 3. Sebagai kesimpulan, ketinggian dan panjang speed hump menyebabkan kelewatan masa yang berlainan

ABSTRACT

Traffic calming device is widely used, not just in Malaysia to increase the safety of the road users including the motorcyclist, bicyclist and pedestrian but also in many countries around the world. Among the calming devices used are speed humps, speed bumps, speed tables, roundabouts, transverse rumble strips, optical speed bars, textured pavement and cat-eye reflectors. This traffic calming is designs or modifies to ensure the uniform speeds of vehicles are controlled. It tends to force the vehicle to slow down. Speed hump is a raised section of asphalt vertically crossing a road. They are usually parabolic, semi-circular or sinusoidal in shape. This speed hump installation usually increase travel times as drivers have to undergo a process of decelerations and accelerations while crossing the hump. Speed humps are usually made from rubber, concrete, plastic or asphalt. Based on Arahan Teknik Jalan JKR (18/97) the height for hump for type 1 is between 100 mm to 150 mm and type 2 is between 80 mm to 150 mm with a length of 3000mm for type 1 and 6000mm to 10000mm for type 2. 3 sinusoidal speed humps were used in this study. Speed hump 1 is measured as having 91mm height and 2800mm width. Meanwhile, speed hump 2 is having a height of 52mm with 3070mm width and 59mm height and 3020mm widths for speed hump 3. The height and length of the speed hump is determined by meter ruler and walking meter and the delay caused by the speed humps is observed by a 60m road without humps travel time and a 60m with humps travel time by stopwatch. The differences in terms of height and width of these speed humps have resulting different time taken and delay across the whole 60m road where these humps is located. Total travel time taken for this 60 m road without the presence of humps was calculated as 3.11sec at the speed of 37km/h. However, with a presence of these humps the total travel time was increased to 5.32sec at the same speed. The average time taken to cross speed hump 1 is 6.99 sec, 5.53 sec for speed hump 2 and 6.51 sec for speed hump 3. As a conclusion, the height and length of a speed humps do resulting different time delay as speed hump 1 is 91mm height and 2800mm width with longest time travel which is 14.35sec, speed hump 2 is 52mm and 3070mm width with longest time travel 11.59sec and speed hump 3 with height 59mm and 3020mm width with longest time travel 11.81sec.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction

Travel time is a basics measure in transportation. The total time to reach a place from a place is so significant and also been taken as a measuring tools to reach a destination. Delay is the time lost during travel causing by the traffic, control devices, speed or accident. Travel time and delay are often used to ensure the traffic condition such as to measure congestion that occurs in certain area. The result of travel and delay in traffic usually been used to improve the services and traffic devices.

As the result of time delaying yet to reach the destination on time, the road users tend to speeding. Speeding contributes to, with a particular set of circumstances, an accident might be avoided (or its consequences might be less severe) if drivers' speeds had been lower (Stone, 2004). Speeding has been recorded to be a top two cause of accident in Malaysia after the driver's risky driving skills, according from statistic by Malaysian Institute of Road Safety Research (MIROS). As to reduce the speed and ensure the safety and reducing motor-vehicle speed, the calming device is created.

Calming device is widely used, not just in Malaysia to increase the road safety for the users including the motorcyclist, bicyclist and pedestrian. Among the calming device are speed humps, speed bumps, speed tables, roundabouts, transverse rumble strips, optical speed bars, and textured pavement and cat-eye reflectors. This traffic calming is design or modifies to ensure the uniform speed of vehicle. It tends to force the vehicle to slow down until 30 miles per hour (mph) or lesser (Berthod, 2011).

Speed hump is a raised section of asphalt across a road. They are usually parabolic, semi-circular or sinusoidal in shape. Based on Arahan Teknik Jalan JKR (18/97) Basic Guidelines on Pedestrian Facilities, there are 2 type of hump. First, type

A will be consider if the road reserve is at least 4.88m(16 feet) While type B will be consider if the road reserve is 20.12m (66 feet).

Table 1.1 Types of humps

	Type A	Type B
Road reserve	4.88m (16 feet)	20.12m (66 feet)
Max height	100mm to 150mm	80mm to 150mm with slope 1:15 to 1:20
Width	3000mm	6000mm to 10000mm

Sources : Arahan Teknik Jalan

Table 1.0 shows comparison of hump types. According to the Spanish road safety annual report (Gobierno, 2009) with the usage of speed hump, the number of accidents on road and urban areas has been decreased by 52% and 36% respectively, in the last 6 years.

Speed hump are one of the most effective and most widely used traffic calming measures in Quebec, North America and in Europe in last decades (Berthod, 2011). They have been installed long enough to establish a fairly precise definition of the conditions in which these measures can reduce speed and increasing time travel while minimizing potential disadvantages (Berthod, 2011).

Speed hump installation caused increasing in time and delaying travel. A speed humps is design to make the driver feels discomfort as they are self-enforcing, but are often opposed by fire and rescue due to concerns of increasing the emergency response time (Ewing, Brown, Ewing, & Brown, 2018).

1.2 Background of Study

Upon reaching a destination by road, people use various types of way including driving themselves. As to reach the destination without delay or on time, the road users tend to speed up. Travel time reaching a destination is emphasized and being stressed as the delay would be disturbing. Delays are caused by traffic signals, stop signs, and yield

signs, among others. The operational delay on the other hand are influenced by other vehicle ineffectiveness as in the case of breakdowns, accidents, parking and manoeuvring problems (Ogunsanya,1983). They can also result from pedestrian crossings, high volume of flow, lack of capacity merging and weaving traffic (Adedimila, 1981).

Delay is at least cause by traffic controller (warden), accident, parking problems, pedestrian crossing, road side hawking and retailing, vehicle breakdown, vehicle turning and manoeuvring problems (Atomode, 2013). In a case study carried at studied intersections, traffic controller or warden cause the delay at highest (Atomode, 2013). Traffic controller is including calming devices such as speed humps, speed bumps, speed tables, roundabouts, transverse rumble strips, optical speed bars and cat-eye reflectors. This traffic calming is design or modifies to ensure the uniform speed of vehicle. It tends to force the vehicle to slow down until 30 miles per hour (mph) or lesser(Atomode, 2013).

Speed humps are usually made from rubber, concrete, plastic or asphalt. Commonly asphalt humps are being used in Malaysia. Reported in Institute of Transportation Engineers, speed humps are the most widely used traffic calming device in the United States as they are able to reduce speeding and cut-through traffic in residential areas. This speed humps also have been reported reducing struck accident involving children in neighbourhood area (Tester, Rutherford, Wald, & Rutherford, 2004).

1.3 Problem Statement

Although speed humps have been proven to reduce speed and make neighbourhoods safer, some claim that they can cause damage to vehicles, increase emergency response time, increase traffic noise and delaying (Jaeger, n.d.). Delaying caused by the speed hump indicate that the aim of the constructing the device is accomplished yet there is no data recorded about how much time the delay caused and is the height and width of the speed hump affect the travel delay.

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