CHAPTER 1
INTRODUCTION

1.1 An Overview

One of the major problems occurring in Malaysia is road accidents, and what makes it worse is that the rates of these accidents are increasing year by year. Road accidents are a critical problem because it involves high costs to the road users. There have been many policies that aim to reduce the number of motorcycle accidents drastically have been implemented because of this, and the situation has improved in the last 6 years. Nowadays, the road accidents are a critical problem because it involved high cost to the road users and the government.

From the Annual Report 2009 by Royal Malaysian Police, it was reported that 397,330 accidents occurred on Malaysian roads, which represented almost 1,089 cases per day. In addition, motorcyclists were contributed 60.3% of fatal accidents that occurred in Malaysia. Figure 1.1 shows the total road accidents (by type) for year 2009.

![Figure 1.1: Total Road Accidents in Year 2009](Source: 2009 Annual Report: Road Accidents Malaysia, Royal Malaysian Police)
On average, 17 cases of fatalities (defined as death within 30 days following an accident) per day with 18.5 people dead, with an average of 24.2 people injured over the same period [1]. There are many factors that contribute to this problem. One of the main factors is the numbers of the vehicles on the road. Besides that, other factors like the attitude of the road users themselves, the mechanical conditions of the vehicles, the conditioning and quality of the roads, and physical and climatic environment.

Table 1.1: General Road Accident Statistics in Malaysia

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Accident</th>
<th>Casualties</th>
<th>Total Vehicles Involved</th>
<th>Motorcycles Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Death</td>
<td>Serious Injuries</td>
<td>Slight Injuries</td>
</tr>
<tr>
<td>2000</td>
<td>250,429</td>
<td>6,035</td>
<td>9,790</td>
<td>34,375</td>
</tr>
<tr>
<td>2001</td>
<td>265,175</td>
<td>5,854</td>
<td>8,689</td>
<td>35,974</td>
</tr>
<tr>
<td>2002</td>
<td>279,711</td>
<td>5,891</td>
<td>8,425</td>
<td>35,236</td>
</tr>
<tr>
<td>2003</td>
<td>298,653</td>
<td>6,286</td>
<td>9,040</td>
<td>37,415</td>
</tr>
<tr>
<td>2004</td>
<td>326,814</td>
<td>6,228</td>
<td>9,229</td>
<td>38,631</td>
</tr>
<tr>
<td>2005</td>
<td>328,268</td>
<td>6,188</td>
<td>9,397</td>
<td>31,429</td>
</tr>
<tr>
<td>2006</td>
<td>341,232</td>
<td>6,287</td>
<td>9,254</td>
<td>19,884</td>
</tr>
<tr>
<td>2007</td>
<td>363,319</td>
<td>6,282</td>
<td>9,273</td>
<td>18,444</td>
</tr>
<tr>
<td>2008</td>
<td>373,047</td>
<td>6,527</td>
<td>8,866</td>
<td>16,901</td>
</tr>
<tr>
<td>2009</td>
<td>397,194</td>
<td>6,745</td>
<td>8,849</td>
<td>31,417</td>
</tr>
</tbody>
</table>

*(The data have been required until third quarter of 2009. (Source: Department of Statistics, Malaysia)*

Table 1.1 shows the general road accident statistics from year 2000 until year 2009. It is clear to see that the increase of total road accidents from 250,429 cases in year 2000 to 397,194 cases in year 2009 is contributed by the increase in the number of motorcycles that involved in road traffic accidents. It was shown that 79,816 motorcycles in year 2000 to 111,819 motorcycles in year 2008 [2].

From the statistic in year 2000 until year 2009, the number of casualties has decreased but the number of fatalities (defined as death within 30 days following an accident) still increasing.
This alarming figure warrants immediate road safety strategies targeted specifically at motorcyclists. An effective engineering approach to tackle this problem is by segregating these vulnerable road users from other motorized traffic through the provision of an exclusive motorcycle lane.

An exclusive motorcycle lane is defined as a roadway meant exclusively for use by motorcyclists. Motorcyclists are compelled by law to use it and other vehicles are prohibited by law from using it. Prior to constructing an exclusive motorcycle lane, there is a need to understand the parameters involved in capacity analysis used to assess the supply side, quality of flow and also the design life of this facility.

In order to comprehend the relative significance of these parameters, data were collected at the spots area along the existing motorcycle track of Federal Highway. In previous studies, the flow density relation is used for examining the qualitative signature [3].

The mathematical relationships that describing the traffic flow is used to scrutinize the data collected. There are many mathematical relationships related to the traffic flow and only four types of models used for this study such as Greenshields’ Model, Greenberg Model, Underwood Model and Drake et al. Model.

The analysis resulted with the preliminary models on the relationships between density on direct flow and mean speed on motorcycles lanes. Besides that, simple regression models that relate the optimum speed that can be used in motorcycles lanes were established.
1.2 Problem Statement

In highway and traffic engineering practices, there have been studies on the concept and systematic procedures that need to be taken into consideration before designing the road. The needs of some other “special” road user groups, especially pedestrians, bicyclists, trucks and buses are gradually being acknowledged and their needs reflected in mainstream traffic engineering and management but this has not yet been considered the case for motorcyclists.

Therefore, some study about it should be done as well because it provides engineering practitioners with a better understanding of motorcyclists’ safety needs and incorporate these needs in the upgrading and maintenance of existing roads and the planning, design and construction of new roads.

1.3 Objectives of Study

The main objectives that can be highlighted of this study are:

- To develop the traffic flow relationships between speed and density of direct flow on the exclusive motorcycle lane using Greenshields’ Model, Greenberg Model, Underwood Model and Drake et al. Model.

- To compare the traffic flow relationship in each models and then use it as guideline in the future design of exclusive motorcycle lanes.
1.4 Scope of Study

The first step was to determine a suitable location along the Federal Highway Route 2, where the location of the exclusive motorcycle lane as shown in figure 1.2. The final location will be selected based on a comfortable lane width of within 2.0m to 3.7m. The comfortable lane width has been proven by Radin et al. [4], which had conducted a study on determination of comfortable safe width in an exclusive motorcycle lane.

![Image](nanx665471 to nanx665624)

Figure 1.2 : The Exclusive Motorcycle Lane along Federal Highway Route 2

Besides that, the roadway conditions will be identified based on the geometrical factors, road furniture and existence of a straight road section of least 100m in length. This is because motorcyclists are able to overtake confidently. At the same time, the sample that will be collected had to be well-distributed to give a true representation of riders. In this study, the number of motorcycles that occupied these selected areas was determined.

The analysis of traffic flow on exclusive motorcycle lanes were done at 3 selected locations along Federal Highway Route 2. For each location, the data were recorded every 2 hours by using video recording technique. The data were measured during peak hours and non-peak hours. The flow rate and mean speed of motorcyclist at five minutes interval was collected continuously for five days. The data will be measured during peak hours and non-peak hours.
The study focused on the issues of the speed data and density of direct flow data that can be creating their linear relationship on exclusive motorcycle lane. This type of lane was based along Federal Highway Route 2. Besides that, the effectiveness of existing model like Greenshields’ Model, Greenberg Model, Underwood Model and Drake et al. Model those are applicable to be adopted in this study.

The final locations are KM15.8 at Batu Tiga from Shah Alam, Selangor to Kuala Lumpur, and KM30.7 at Sungai Way from Kuala Lumpur to Shah Alam, Selangor. The last location was KM31.5 at Batu Tiga from Shah Alam, Selangor to Kuala Lumpur.