TREATING HAZARDOUS LOCATIONS AT FEDERAL ROUTE 50

FAJARUDDIN BIN MUSTAKIM

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ABSTRACT

Total number of road accident in Malaysia exceeded 299,305 in year 2003 alone. Average person died from this road accident every single day were 16 persons. Lack of attention, reckless driving, lack of proper protection, speeding and bad personal habit are some of the problems that cause accident. Federal Route 50 from Batu Pahat – Ayer Hitam experience 3,937 road traffic accident from year 2000 to 2004, of these 1,160 were casualty accidents. These accidents killed 116 people and injuring 1,044 people. This research was undertaken to identify factors that may contribute to the cause of accidents and to propose improvement at the selected location in order to reduce the accident rate. In this study, Pintas Puding KM20 was selected as the study section based on the blackspot ranking. The road accident trends and blackspot ranking were established at Federal Route 50 (FT 50) Batu Pahat – Ayer Hitam. Statistical analysis, collision diagram, traffic studies and spot speed studies were carried out for greater understanding of the problem. Skid Resistance Test were also conducted at Section 19(KUiTTHO and Fujitsu factory), Section 20 (Pintas Puding) and Section 21 (Taman Maju and Taman Sri Raja). The result showed that only skid resistance value (SRV) obtained at KUiTTHO traffic light was less than minimum skid resistance requirement. Further more, this study manage to develop the accident prediction model for Federal Route 50 by using Multiple Linear Regression. It also revealed that increase of the accident rates can be explained by either the rise in traffic volume, speed or number or access points.

ABSTRAK

Jumlah keseluruhan kemalangan jalan di Malaysia telah mencecah kepada 299,305 dalam tahun 2003. Purata kematian bagi jalan ini untuk setiap hari adalah 16 orang. Faktor seperti kurang memberi perhatian semasa memandu, cuai semasa memandu, memandu dengan laju dan sifat buruk individu adalah sebahagian daripada punca berlakunya kemalangan. Didapati Jalan Persekutuan 50 dari Batu Pahat ke Ayer Hitam mengalami 3,937 kes kemalangan dari tahun 2000 hingga 2004. Daripada jumlah ini, 116 adalah kes menyebabkan kematian dan 1,044 orang mengalami cedera parah dan cedera ringan. Kajian ini dijalankan adalah untuk mengenalpasti faktor-faktor yang menyebabkan kemalangan dan cadangan untuk memperbaiki keadaan tempat kemalangan. Dalam kajian ini Pintas Puding KM20, telah dipilih sebagai kawasan kajian berdasarkan kedudukannya di dalam senarai hitam. Pada peringkat awal, bentuk kemalangan dikenalpasti dan menghasilkan kedudukan senarai hitam bagi setiap kilometer di FT 50 (KM 1 hingga KM 38). Analisis statistik, gambarajah kemalangan, kajian lalulintas, kajian halaju kenderaan dan ujian gelinciran dilaksanakan di dalam kajian bagi mendapatkan kefahaman yang lebih jelas. Kajian ini juga berjaya menghasilkan model jangkaan kemalangan untuk Jalan Persekutuan 50 dengan menggunakan kaedah " Multiple Linear Regression". Kajian ini mendapati bahawa dengan bertambahnya kadar kemalangan adalah disebabkan oleh pengaruh jumlah kenderaan, kelajuan kenderaan dan jumlah persempangan.

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INTRODUCTION

1.1 INTRODUCTION

In Asia alone, 400,000 people are killed on the roads annually and more than four million injured. According to World Health Organization, every year, nearly one million people are killed, three millions are severely disabled for life and thirty millions are injured in road traffic accidents. In 1990, death on road accident remained in 9^{th} rank and in the year 2020 road accident will be the third leading cause of death worldwide (1).

In Malaysia, Federal Traffic Police Chief Datuk Gingkoi Seman Pancras (2) said there was no guarantee that the number of road deaths could be reduced as there were 400,000 new drivers every year, leading to a 50 per cent increase in the number of vehicles on the roads. We hope to reduce the number of fatalities with the co-operation of road users. The total number of fatalities from road accident in the year 2004 dropped to 6,223 from 6,286 fatalities record in 2003 as a result of various road safety campaigns.

Growth in urbanization and in the number of vehicle in many developing countries has led to the increase in traffic accidents on road networks which were never designed for the volumes and types of traffic which they are now required to carry. In addition, unplanned urban growth has led to incompatible land uses, with high levels of pedestrians/vehicle conflicts. The drift from rural areas to urban centre often result in large numbers of new urban resident unused to such high traffic levels.

As a result, there has often been a severe deterioration in driving conditions and significant increase in hazards and competition between different class of road users of the road system. In addition, the inherent dangers have often been worsened by poor road maintenance, badly design intersections and inadequate provision for pedestrians. All of these have contributed to serious road safety problem now commonly found in developing countries.

Too many road projects could be the reason why road agencies responsible for the maintenance cannot keep pace with road building. The result is that roads are often badly in need of maintenance, traffic signing is often inadequate, facilities for pedestrians are poor and guidance to drivers via channelisation or other control measures is rarely available. These general deficiencies in the operational and control aspects of the road systems are worsened by the fact that drivers are rarely adequately trained and tested, traffic law enforcement is ineffective and drivers behavior in respect of compliance with the regulation is frequently very poor. The net result of these inadequacies is the very high incidence of road accident involving casualties and fatalities.

Gradual elimination of the most hazardous locations on road networks and the adoption of safety conscious approaches to the design and planning of new road networks have contributed greatly towards improving traffic safety. Even though the eventual solutions may differ, the approaches and systematic methods used in industrialized countries are readily applicable to the developing world.

In some respect developing countries are fortunate in that their road networks are usually still at an early stage of development. They also have the added advantage of being able to draw upon the experience of the developed countries which have already passed through similar stage development, albeit more slowly. Adoption of proven strategies from industrialized countries (such as ‘accident blacksport’ elimination and more safety conscious design and planning of road networks) offer unparalleled opportunities to make significant and lasting improvements to road safety. Many developing countries continue to repeat the mistakes of the industrialized countries , many still permit linear development with direct access from frontage properties along major roads even though this is know to lead to safety problems.

One thing that all industrialized countries have found to be of crucial importance in their effort to improve safety is the availability of accurate and comprehensive accident data, so that the problem can be properly defined and suitable remedial measures can be devised. Consequently, before developing countries can emulate industrialized countries, it is essential that good accident data system are established.

In order to maximize the impact which engineering can have upon safety problems, it is necessary to apply measures at various stages in the development of road networks. By incorporating good design principles from the start it is possible to avoid many problems simply by planning and designing new roads in a safety conscious manner. Even where this has not been done, it may still be possible (although more expensive) to improve existing road by subsequent introduction of safety or environment related measures, selective road closures or road humps to reduce speeds, or by prohibitions on heavy goods vehicles in residential areas.

It is possible to identify hazardous sections of the road network so that appropriate remedial measures can be undertaken to reduce the likelihood and severity of accidents at those locations. This has proven to be one of the most cost-effective ways of improving road safety in industrialized countries (3)

Accident prediction models have been developed through statistical analysis for this purpose. Accident models are typically of Poisson and generalized linear forms, but more recently, negative binomial models, a variant of the Poisson model, have been used in accident modeling.

An accident model is generally an algorithm pitting a dependent variable against several independent variables, each of which is assigned a constant. The dependent variable in an accident prediction model is the number of accidents, while the independent variables may be quantitative variables such as road cross-section dimensions, horizontal curvature and traffic volume, and of qualitative variable such as type of terrain, road shoulder and median.

The estimation of the number of accidents is not only performed to determine the effect of design elements, but may also be used in estimating accident reductions attributed to changes in the cross section of roads, assessing the potential safety impact of alternative cross sections when upgrading roads, predicting accident costs and as a measure of safety.

1.2 Background of Federal Route 50

The Government of Malaysia has appointed SP Setia Bhd (SPSB) to carry out engineering feasibility study, detail engineering design and construction for the project ' Menaiktaraf Jalan Persekutuan Laluan 50 Dari Batu Pahat – Ayer Hitam – Kluang, Johor Darul Takzim'. The location of the project is as shown in Figure 1.1. This project is made up of one continuous stretch of road about 47 km long from km Chainage 0.00 Batu Pahat to Chainage 47 Kluang, Johor (HPU Traffic Census Station – JR 111). The road has sixteen (16) hours traffic of 27,135 veh/day with motorcycles forming about 25% of the traffic composition).

The proposed road was an upgrading of the existing road with cross of two lane two way to four lanes undivided carriageway. The project used design and built concept . The project rewarded was on the September 8, 2001, the work on project started on February 15, 2002 and was completed on August 14, 2004. The total duration to complete this project was about 30 months while the total cost involved for this project was RM 313,314,506.00.

1.2.1 Project Particular

The study covers Federal Route 50 (FT 50) Batu Pahat – Ayer Hitam as shown in Figure 1.1. The total stretch of the road is 27 km and the speed design is 100km/hour if there are no obstacles. Almost every one kilometer along the stretch, there is one access at the left and right side of the road. Land use surrounding the road is comprised of industrial area, town, cemeteries, mosques, schools, residential areas, colleges, factories, villages and palm oil farm. This road needed to reduce the speed design to avoid effect for the building and cemetery area.

Figure 1.1: Location of Federal Route 50 Batu Pahat- Ayer Hitam- Kluang

1.3 Study Area

Federal Route 50 (FT 50) is a four lanes undivided road that runs from Batu Pahat to Ayer Hitam. The road has many access almost every kilometer and carries approximately 51,613 veh/day with 4,197 veh/hr at the peak hour and the normal growth of 7.7%. The road also has a high density of driveways and property access. This study will analyse accident data and concentrates on Parit Raja area only. Three sites were identified as the worst ranking weightage (1999-2001) at FT 50 and were blacklisted as blacksport site as shown in Table 1.1. The site that had been blacklisted were KM 20 (Pintas Puding), KM 21 (Taman Maju) and KM 22 (traffic light Parit Raja).

For this study, KM 20 (Pintas Puding) was selected as the study location. Meanwhile KM 19 (KUiTTHO and Fujitsu factory), KM 20 (Pintas Puding) and KM

21 (Taman Maju and Taman Raja) were included in this study for the Skid Resistance Test. For the purpose of development of an accident model , five section was selected which include KM 19 (KUiTTHO), KM 20 (Pintas Puding), KM 21 (Taman Maju), KM 22 (traffic light Parit Raja) and KM 23 (Taman Manis). Figure 1.2 shows the FT 50 from Batu Pahat to Ayer Hitam.

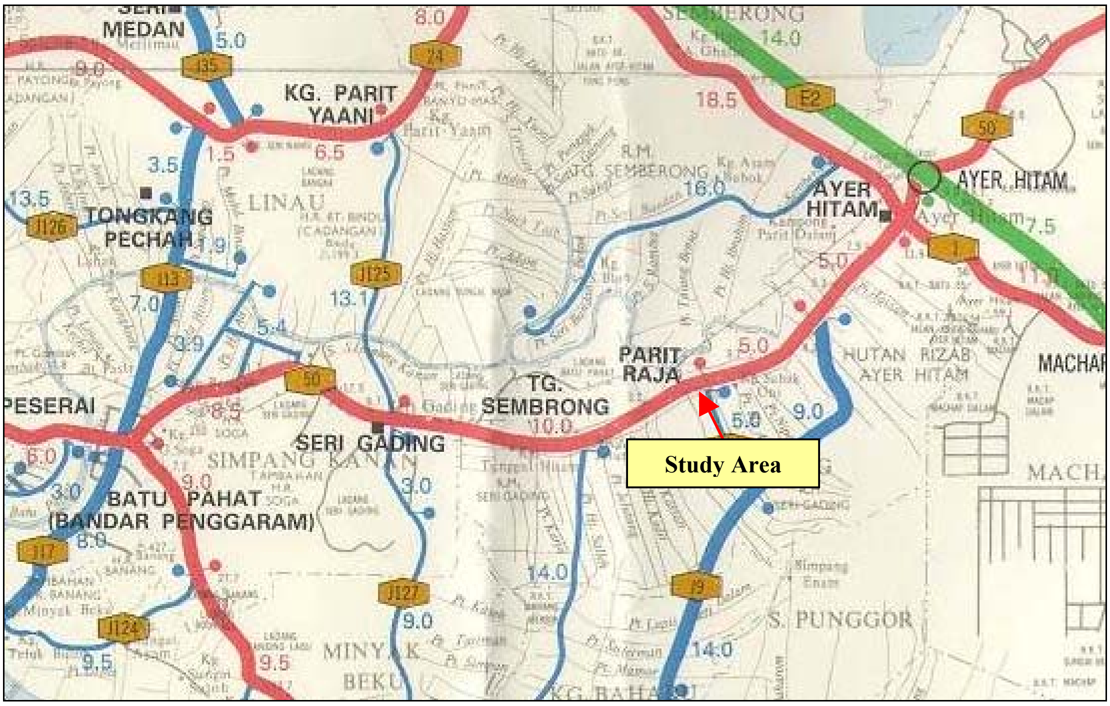

Figure 1.2: Location of Study Area

Table 1.1: Worst Ranking By Weightage (1999-2001)

Worst By Weightage Rank (1999-2001)	Route No.	KM Post	State	District	Fatal	Hospitalised	Slight Injury	Demage Only	Frequency weightage	Location
1	F0023	23	JOHOR	Muar	8	24	0	0	48.6	KM 53 JLN SEGAMAT - KM 27, MUAR F0023)
2	F0023	24	JOHOR	Muar	7	23	0	0	47.5	KM 52 JLN SEGAMAT- KM 28 MUAR F0023
3	F0050	5	JOHOR	Batu Pahat	7	16	0	0	45.5	KM 154 JLN MERSING - KM 5 BATU PAHAT, F0050
4	F0003	41	JOHOR	Kota Tinggi	8	24	0	0	43	KM 288 JLN KUANTAN – KM 41 JOHOR BAHARU, F0003
5	F0018	8	PERAK	Manjung	2	28	0	0	42	KM 75 IPOH – KM 8 LUMUT, F0018
6	F0050	22	JOHOR	Batu Pahat	5	16	0	0	40.1	KM 137 JLN MERSING - KM 22 BT PAHAT, F0050
7	F0024	57	JOHOR	Muar	7	14	0	0	39.9	KM 169, J.BAHARU F0024
8	F0001	156	JOHOR	Segamat	3	24	0	0	39.7	KM 160 SEREMBAN - KM 156 J. BAHARU, F0001
9	F005	185	JOHOR	Muar	9	13	0	0	37.7	KM 41 MELAKA - KM 192 J.BAHARU, F0005
10	F0023	28	JOHOR	Muar	0	20	0	0	35.2	KM 48 JLN SEGAMAT - KM 32 MUAR, F0023
11	F0005	128	JOHOR	Batu Pahat	3	16	0	0	34.7	KM 98 MELAKA - KM 135 J.BAHARU, F0005
12	F0005	55	JOHOR	Pontian	2	16	0	0	34.2	KM 171 MELAKA – KM 62 J.BAHARU, F0005
13	F0001	184	JOHOR	Segamat	10	14	1	0	32.25	KM 132 SEREMBAN - KM 184 J. BAHARU, F0001
14	F0005	56	JOHOR	Pontian	4	18	0	0	31.8	KM 170 MELAKA – KM 61 J. BAHARU, F0005
15	F0001	137	JOHOR	Segamat	8	14	0	0	31.8	KM 179 SEREMBAN - KM 137 J.BAHARU, F0001
16	F0050	20	JOHOR	Batu Pahat	10	9	0	0	31.8	KM 139 JLN MERSING - KM 20 B.PAHAT, F0050
17	F0050	23	JOHOR	Batu Pahat	1	17	0	0	31.5	KM 136 JLN MERSING - KM 23 BT. PAHAT, F0050
18	F0001	185	JOHOR	Segamat	5	17	0	0	29.5	KM 131 SEREMBAN - KM 185 J.BAHARU, F0001
19	F0001	183	JOHOR	Segamat	5	14	1	0	28.35	KM 133 SEREMBAN - KM 183 J. BAHARU, F0001
20	F0005	184	JOHOR	Muar	7	17	1	0	28.3	KM 191 J.BAHARU , F0005
21	F0050	21	JOHOR	Batu pahat	5	10	0	0	28.1	KM 138 JLN MERSING - KM 21 B. PAHAT, F0050

Sources:PDRM

1.4 Objective of the Study

The primary objectives of the study are:

(i) to identify the engineering factors that may contribute to the cause of accident,

(ii) to propose improvements at the location, and

(iii) to develop accident prediction model for Federal Route 50.

1.5 Scope of Study

The scope of the project will cover stretches from KM1- KM38 Batu Pahat – Ayer Hitam by looking into accident trend. The data of accident record was collected from year 2000, 2001, 2003 and 2004 from the Batu Pahat Police Traffic. An appropriate statistical analysis is required to identify the hazardous location which cause the accident, thus propose the improvement at the selected site to reduce the accident rate. The study will concentrate on the KM 20 (Pintas Puding) and the skid resistance test will carried out at KM 19, KM 20 and KM 21. Meanwhile the study area for development of the accident prediction model will include KM 19, KM 20, KM 21, KM 22 and KM 23.

1.6 Methodology

Methodology applied for this study are as followed;

(i) A Data Collection

The statistical accident data was collected from Balai Polis Trafik Batu Pahat, JKR Daerah Batu Pahat, Road Safety Research Center (UPM), Road Transport Department of Malaysia, Polis Diraja Malaysia.

(ii) Analysis of Accident Data

Accident data is to determine the nature of the accident problem at the study area. The analysis of the accident needs to look for the accident pattern. Accident data analysis provides more detail to rank the blacksport sites such as:

a) Ranking accident point weightage at FT 50,
b) Ranking of the top ten accident section,
c) Kilometers post analysis, and
d) Refining the ranking by statistical techniques.

(iii) Field Investigation

Field investigation involve site, route and area inspection. These include traffic count, origin destination surveys, vehicle classification survey, spot speed studies, observation studies and skid resistance. Preceding analysis work may have enable to identify possible causal factors of the accident as well as countermeasures option.

The site route or area inspection should include both a drive over and walk over inspection. The drive over allows to correlate accident behaviour and driver perception while walk over inspection is a more detailed examination of the location and driver behaviour.

(iv) Countermeasures

After the process of identifying common features and contributory factors, the next process is to develop and apply countermeasures. These countermeasures have to be assessed and a number of countermeasures may appear both feasible and effective.

(v) Accident Prediction Model

The model consists of several independent or explanatory variables, encompassing elements from road geometry to traffic condition, all the variable which considerable effect are 85th percentile speed, volume study and number of access points per kilometer. The data was collected on the field work.

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