CJ Technical Updates

Cawangan Jalan

Bulletin on:
Conducting Traffic Survey at Road Intersection and Screen Line

Theme of the month:
TRAFFIC SURVEY

Issue No.
2
2/2016

JKR 20400- 0103-16 Website: http://www.jkr.gov.my ISSN 2231-7988

INTRODUCTION

Traffic data collection of traffic volumes are basic requirements for the planning of road development and management of road network schemes. Traffic data forms an integral part in the science of descriptive national economics and such knowledge is essential to develop rational transport policy for the movement of passengers. Traffic flow pattern appears to be random in distribution, as it reflects people's motivation in terms of the different composition of vehicles on different types of roads.

PROBLEMS STATEMENT

In Malaysia, traffic congestion or more commonly known as traffic jam has become a perennial issue long debated by citizen in urban areas, especially in big cities such as Kuala Lumpur, Penang and Johor Bharu. This situation has not only led to the high risk of getting involved in road accidents but also one of the causes that contribute to the high mortality rate in this country.

Picture 1:
Traffic Congestion in Kuala Lumpur.
Sinar Online, 1 April 2016

Picture 2:
Traffic Congestion in Penang.
KOSMO, 30 July 2016

Traffic congestions continue to remain a bane and major problem in most major cities around the world, especially in developing countries, thus resulting in massive delays, increased fuel wastage and monetary losses.

Table 1 – TRAFFIC VOLUME AND LEVEL OF SERVICE (LOS) IN KUALA LUMPUR

TRAFFIC VOLUME, 16-HOUR TRAFFIC COMPOSITION AND LOS

STATE : **W.P. KUALA LUMPUR** **AVERAGE** 2014

Census Station Number	16-hour Traffic	Peak Hour Traffic	Traffic Composition (%)						Level of Service (LOS)
			Cars & Taxis	Vans & Utilities	Medium Lorries	Heavy Lorries	Buses	Motorcyles	
WR101	132,401	10,197	68.4	7.7	2.5	0.3	0.7	20.4	E
WR102	214,760	16,128	67.5	6.5	6.1	1.0	0.6	18.2	F
WR103	192,223	14,459	73.4	6.3	4.9	0.6	0.5	14.3	F
WR105	219,336	17,531	78.7	6.6	3.5	0.9	0.8	9.6	F
WR106	155,777	14,706	79.0	4.8	0.9	0.1	0.2	15.0	F

(Road Traffic Volume Malaysia, 2014)

Rising population, rapid economic growth and increasing employment without a corresponding growth in the supply of public transport, are factors largely responsible for the major urban traffic issues in most cities of developing economy. The situation has worsened due to the following reasons:

Poorly planned cities: Road networks tend to be poorly planned and built. As cities grow in an ad-hoc manner, no provision is made towards scaling road capacities, eventually resulting into several bottleneck roads, which remain congested for extended periods of time. Furthermore, many developing countries have witnessed an explosive growth in their vehicular population, resulting in the failure of overcoming them (traffic woes) through conventional traffic management strategies.

Automobile oriented development: Countries with fast growing economies have witnessed a surge in the number of vehicles across major cities. These cities seldom have efficient mass transit transportation coupled with an integrated transport system, thus forcing people to operate private vehicles for convenience and mobility. This problem is compounded by the social stigma, where people view operating a private vehicle as a sign of prosperity, while public transport is viewed as being used by the lower echelons of society.

Poor discipline of drivers: Drivers often are not subjected to strictly follow road traffic rules and regulations before they can even be allowed to drive on the road. This especially has got far reaching implications when it comes to road lane discipline. The impact of poor lane discipline, especially at traffic junctions, further worsens the already overcrowded junction situation. Indiscipline and often inconsiderate drivers frequently jump or beat the red lights and block the intersection, causing further traffic congestion. These problems are compounded by the fact that traffic law enforcement is poor, thereby providing no incentive for drivers to follow the rules.

Table 2 - SUMMARY OF NEW PASSENGER & COMMERCIAL VEHICLES REGISTERED IN MALAYSIA FOR THE YEAR 1980 TO MARCH 2016

Year	Passenger Cars	Commercial Vehicles	4x4 Vehicles	Total Vehicles
1980	80,420	16,842	-	97,262
1985	63,857	26,742	4,400	94,999
1990	106,454	51,420	7,987	165,861
1995	224,991	47,235	13,566	285,792
2000	282,103	33,732	27,338	343,173
2005	416,692	97,820	37,804	552,316
2006	366,738	90,471	33,559	490,768
2007	442,885	44,291	-	487,176
2008	497,459	50,656	-	548,115
2009	486,342	50,563	-	536,905
2010	543,594	61,562	-	605,156
2011	535,113	65,010	-	600,123
2012	552,189	75,564	-	627,753
2013	576,657	79,136	-	655,793
2014	588,341	78,124	-	666,465
2015	591,298	75,376	-	666,674
YTD MARCH 2016	**117,373**	**13,894**	**-**	**131,267**

(Malaysia Automotive Association, 2016)

Archaic management: Traffic junctions are often unmanned, thereby allowing drivers to drive in a chaotic manner. Even if a junction is controlled by a cop or a traffic light, it is largely independent of any traffic management strategy, therefore only optimizing the respective junction traffic flow, in the direction of maximum traffic build up. Furthermore, approaches to the junction will enhance traffic mismanagement in already congested roads, thus accelerating collapse in traffic flow due to heavy congestion.

Tighter budgets: A significant amount of investment is required to set up a traffic management infrastructure which can scale in tandem with the increasing traffic. Such an infrastructure not only involves measuring and analyzing real-time traffic data but also focuses towards enhancing congestion detection, solving real time congestion and forecasting imminent congestion due to happen, thereby avoiding such unwanted scenarios.

TRAFFIC SURVEY

Traffic survey is conducted to obtain traffic volume data in order to analyze existing condition and impact analysis year in terms of traffic Level of Service (LOS).

Picture 3:
Traffic Survey,
Jalan Seriab, Kangar, Perlis
BKT, 24 Mei 2016

Picture 4:
Traffic Survey,
Port Dickson, Negeri Sembilan
BKT, 26 Mac 2016

Types of Traffic Counts Survey

Traffic counting falls into two main categories, namely; manual counts and automatic counts. There are no distinct differences between the two methods; however economic consideration will determine the selection of an appropriate method of traffic counting.

In general, the Road Branch of JKR has adopted a manual method when conducting a traffic survey. This method consists of assigning a person to count the traffic as it passes. At an intersection site, the traffic on each leg should be counted and recorded separately for each movement. It is of paramount importance that traffic with more than one lane are counted and classified by the different directions of traffic flow.

Method of Traffic Count Survey

The method of traffic counting has a bearing on the quality of data obtained. The traffic counts are conducted manually during peak hour at **15 minute** intervals and categorized into five (5) vehicle classifications:

Class 1: Cars/Small Vans/Utilities
Class 2: Lorries (with 2 axles)/ large vans
Class 3: Large lorry, trailers, heavy vehicles with 3 axles and more
Class 4: Buses
Class 5: Motorcycles

Traffic Count Survey at Intersection

Traffic counting where to be conducted for an intersection, the number of enumerators required is mainly a function of the type of intersection, the composition of traffic flow, the number of lanes and the anticipated traffic volume. Therefore it is essential that a proper and detailed site inspection is conducted prior to the start of any traffic survey.

Traffic Count Survey at Screen Line

Traffic counting on straight road is done by traffic enumerators who stand by the road side, counting and classifying the vehicles as they pass. The enumerator has to record every vehicle moving in one particular direction.

Analysis of Survey Data

Traffic data that has been collected will be analyzed and used to generate traffic study and traffic impact assessment reports.

CHALLENGES IN GATHERING TRAFFIC DATA

1. **Staff**
   - Undergo a training programme before being assigned to work alone in the field to collect data.
   - Lack of skill to set up equipment especially for automatic traffic count using electromagnetic spectra and wireless communication media.
   - The operation procedures should be clearly written and detailed for easy understanding on how to process data quality/accuracy

2. **Equipment**
   - Each enumerator must have his/her own traffic counting equipment like counter and tally sheet.
   - Sufficient lighting for enumerators and to be alert of local traffic at night and during rainy days.
   - Automatic traffic count such as the use of electromagnetic spectra and wireless communication media is not easy to handle and need proper on-site supervision.

3. **Limited Seasons To Conduct Counts**
   - Not applicable during festive seasons such as Hari Raya, Chinese New Year, Deepavali and other major festivities.
   - School holidays / Public holidays

4. **Cost**
   - Enumerators/manpower may be based in the field for collecting raw data during off-time working period, (AM-Peak, PM Peak or 16 hours continuously)

- Specialized courses should be tailored for office enumerators/manpower in computing and the management of stored data.
- Pavement-based traffic detection data collection equipment
- Damage to equipment due to weather and its heavy usage.

5. **Safety**

- The location of the counting sites should be chosen with full consideration of overall safety for the installation, usage and maintenance of the site for staff/enumerators.
- Proper signals should be in place for safety of both enumerators and public.

OUTPUT/OUTCOME OF TRAFFIC SURVEY

Traffic Volume

From Traffic Survey that has been conducted, Current Traffic Volume in the existing road network will be obtained. It indicates the real traffic situation in the area. Data collected such as existing traffic volume will be used to establish the reliable baseline for the projected traffic network condition. Projection of traffic network condition can be divided into **two (2) time phases, i.e.**:

a) **Completion Year (CY)** – The calendar year in which the proposed development is fully completed and operational. If the project is divided into phases, CY refers to the year the final phase is completed and operational.

b) **Impact Analysis Year (IAY)** – Projection of future traffic network condition **10 years** from the Completion Year of the project.

Level of Service (LOS)

LOS provides an indication or measure of the operational condition of the facility concerned. A range from **"A"** to **"F"** is applicable; LOS "A" represents an excellent level of operational condition, while LOS "F" an undesirable, exceedingly congested and failed situation. LOS may be calculated based on per movement or per approach for any intersection configuration, but LOS for the intersection as a whole is defined for signalized and all-way stop configurations only.

- LOS for Segment/Approach – Performance of the segment will be measured by travel time from one point to another of the segment. Parameters like **Average Travel Speed** and **Percent Time-spent Following** will be measured.
- LOS for Intersection – Performance of the intersection will be measured by **Time Delay**, **Queue Length** (length of storage lane) and **Capacity**.

Mitigation Measure

Where the analysis shows that there will be negative impact, mitigation measures must be proposed to upgrade the road facilities at the particular location so as to fulfill the requirements set out below:

BASELINE TRAFFIC CONDITION IN IAY (LOS)	MINIMUM TRAFFIC CONDITION (LOS) AFTER MITIGATION MEASURES
A	D
B	D
C	D
D	D
E	D (*exception E*)
F	D (*exception E*)

In developing mitigation measures, possible improvements in relation to site access, geometry, traffic signal timing, new facility, traffic management and other operational issues should be carefully considered and investigated. When reasonable improvement cannot sufficiently mitigate the resulting impacts from the development, a review of the proposed development in terms of road alignment, project size, land use, development density or plot ratio should be carried out, with a view to lessen or reduce the level of such impacts to within reasonable and acceptable level.

REFERENCES

a. *Volume Studies and Characteristics. In Fundamentals of Traffic Engineering. Berkeley: Institute of Transportation Studies, University of California.*

b. *FHWA. 2001. Manual on Uniform Traffic Control Devices: Millennium Edition. Washington, D.C.: Federal Highway Administration, U.S. Department of Transportation.*

c. *Road Department, December 2002. Guideline No.4 Axle Load Surveys, Botswana.*

d. *TRL, July 1994, Review of Weighbridge Operation and Traffic Data Collection, Botswana Final Report (1994).*

e. *TRL, Road Note 11, UK 1993. Urban Road Traffic Surveys.*

f. *Highway Capacity Manual 2011, HPU, Ministry of Works Malaysia.*

g. *Guideline for Traffic Impact Assessment, Road Engineering Association of Malaysia – GL 10/2011*

h. *Riza Atiq bin O.K. Rahmat - Urban Transport Traffic Study. Traffic Impact Assessment*

i. *Prof. Tom V. Mathew, August 5, 2014 - Measurement along a Length of Road. Lecture notes in Traffic Engineering and Management.*

Rusdi Bin Rusli, Jabatan Kejuruteraan Awam, Politeknik Kota Kinabalu – Nota Kejuruteraan Jalanraya dan Pengangkutan

Prepared by:

Bahagian Penilaian Kesan Trafik
Pakar Kejuruteraan Jalan & Jambatan
Cawangan Jalan
JKR Malaysia.