ROAD SAFETY AUDIT PRACTICE IN MALAYSIA

by

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ROAD DEATHS IN MALAYSIA

DEATH

Source: Dato Ir Foong Choy Chye
Consequences of Overloading
Interaction of road, vehicle and driver in road crash

External Factors are:
1. institutional policy
2. organisational administrative factors relating to safety management issue

PROBABLE CRASH

PROBABLE SEVERE CRASH

Source: Dato Ir Foong Choy Chye
Lakaran kejadian

Bas pensaran dua tingkat yang membawa seramai 35 pelancong Thailand menuruni Cameron Highlands pukul 11 pagi mengikut lauan Simpang Pulai.

Sebalik sahaja menuruni lauan selekoh curam di Kilometer 13, berdekatan Kampung Juang, bas tiba terpaksa gagal dikawal lau terbabas dimenempuh pembahagi jalan.

Bas terselubung terpelanting ke luar bertentangan sebelum berbalik dalam sebuah tongkang sedalam satu meter.

27 mangsa maut di tempat kejadian. Empat orang meninggal dunia dalam perjalanan ke Hospital Raja Permaisuri Bainun. Ipo manakali seorang lagi mati ketika dikeras di hospital.

25 penumpang Thailand serta 3 rakyat tempatan iaitu pemandu bas dan pemandu pelancong.
Brief History of Road Safety Audit

• 1994 – JKR or PWD Malaysia introduced Road Safety Audit in Road Project implementation
• Later was mandatory for all new road projects implemented under the Seventh Malaysia Plan (1996 - 2000)
• 1997 – Road Safety Audit Section was set up in JKR
There are 5 stages in the development of a road project when it is most appropriate to carry out a road safety audit (RSA). They are as follows:

- Stage 1 – Feasibility and Planning Stage
- Stage 2 – Draft (Preliminary) Design Stage
- Stage 3 – Detail Design Stage
- Stage 4 – TMP/During Construction/Pre-Opening Stage
- Stage 5 – After Construction/Operational Stage
OBJECTIVE

1) To determine whether the consulting engineer’s design from the planning to operational stage of the proposed road project is in accordance with the “Guidelines for the Safety Audit of Roads in Malaysia” published by the Jabatan Kerja Raya (JKR) Malaysia; the “Arahan Teknik Jalan” publications by JKR Malaysia; and also any other recognized publications such as Road Engineering Association of Malaysia (REAM), Austroads and IHT.

2) To identify road safety deficiencies at various stages in the development of the proposed road project.

3) Eliminate deficiencies at the most opportune time to reduce costs and minimize disruption to design and construction progress.
TECHNICAL GUIDELINE REFERENCES

- **Guidelines for the Safety Audit of Roads in Malaysia by JKR**
  - ATJ 1/85 – Manual on Design Guidelines of Longitudinal Traffic Barrier
  - ATJ 2B/85 – Manual on Traffic Control Devices, Traffic Sign Applications
  - ATJ 2C/85 (Pindaan 2017) – Manual on Traffic Control Devices, Temporary Signs and Work Zones Control
  - Nota Teknik Jalan 23/03 - Guidelines for Traffic Management During Construction
  - ATJ 2E/87 (2011) – Guide Signs Design and Application
TECHNICAL GUIDELINE REFERENCES (cont’d)

- ATJ 2D/85 – Manual on Traffic Control Devices, Road Marking and Delineation
- ATJ 11/87 – A Guide to the Design of At-Grade Intersections by JKR
- ATJ 12/87 – A Guide to the Design of Interchanges by JKR
- ATJ 13/87 – A Guide to the Design of Traffic Signals by JKR
- Nota Teknik Jalan 18/97 – Guidelines on Pedestrian Facilities
- References are also made to other nationally and internationally accepted engineering practices such as LLM, AASHTO and AUSTROADS.
Guidelines for the Safety Audit of Roads in Malaysia’ prepared by Road Branch of JKR Malaysia -1997
Guidelines – JKR (Latest)
Guidelines

LLM

• Manual of Geometric Design Standards for the Interurban Toll Expressway System of Malaysia, MHA.
• Design Standards of Interurban Toll Expressway System of Malaysia, 1986, MHA.
• LLM/GP/T5-08 Guidelines for Malaysia Toll Expressway System – Design Standard.
• LLM/P/T5-09 A Guide for Determination On Level of Service (LOS) On Toll Highways.
• LLM/P/T6-09 Guide for the Traffic Forecasting Process.
• LLM/GP/T21-10 Guide on Expressway Road Marking.
Guidelines - LLM

Guidelines For Malaysia Toll Expressway System - Design Standards
First Edition

Guidelines and Design Application

ADDENDUM

Garis Panduan Pelaksanaan Pengurusan Trafik
Edisi Perdana

Guidelines On Expressway Road Marking
Second Edition

A Guide for Determination On Level of Service (LOS) On Toll Highways

Garis Panduan Penyediaan Tembok Penghadang Bunyi (Noise Barrier) Di Lebih Raya
Edisi Perdana

Design Guidelines For Motorway Rest & Service Area and Lay-by
Understanding Road Safety Audit (RSA)

Stage 1 Audit – Feasibility and Planning Stage

1) Identifies safety problems associated with the overall concept of the project.
2) Covers the road network, geometric standards, provision for other users such as motorcyclists & pedestrians, access control, environmental considerations such as high winds & scenic vistas and route options/alternatives.
Understanding Road Safety Audit (RSA)

Stage 2 Audit – Draft (Preliminary) Design Stage

At this stage, many of the traffic engineering features of the project should be established.

1. Identify the safety aspects and design requirements as per best international practice and the guidelines of the JKR “Arahan Teknik Jalan” and REAM publications.

2. We audit the design criteria, cross section, alignments, interchanges/junctions, access control, major land use developments (their implications such as entry and exits) and stage development of major projects
Stage 2 Audit – Draft (Preliminary) Design Stage (cont’d)

3. Also includes interchange layouts, lane and carriageway layouts, sight distances, ‘Right-of-Way’ requirements and provisions for other users such as motorcyclists and pedestrians.

4. The project development shall not proceed into the detail design stage before resolution of each of the road safety items identified in the Stage 2 Audit.
Understanding Road Safety Audit (RSA)

Stage 3 Audit – Detail Design Stage

1) Examine the design decisions made against road safety objectives and will identify aspects in which safety has not been given high enough weighting compared to other competing factors.

2) For areas where the design features can not be altered, for whatever reason, and road safety is being compromised, mitigating factors shall be recommended by the designer and agreed upon by the auditor.
Understanding Road Safety Audit (RSA)

Stage 3 Audit – Detail Design Stage (cont’d)

3) Audit features shall include sight distance, adverse combinations of vertical and horizontal alignment, gradients, interchanges/intersections, road markings, drainage, roadside safety, traffic signings and controls, street lighting, landscaping features and provisions for special road users.

4) The project shall not proceed to the construction stage until each of the road safety items identified in the Stage 3 Audit has been resolved.
Understanding Road Safety Audit (RSA)

Stage 4 Audit - During Construction/Pre-Opening Stage

1) Includes the Verification Audit and traffic management in and around the site during construction.

2) Viewed in three dimensions for both day and night. The actual placement of guardrails, traffic signs and poles, street lights and landscaping shall be looked at in detail.

3) Emphasis will be given to all road user groups to ensure that desirable road safety standards are met.

4) Auditing shall be done as early as possible during construction (about 50% completion), to cover any changes or modifications made during construction until its completion or pre-opening to traffic.
Understanding Road Safety Audit (RSA)

Stage 5 Audit – After Construction/Existing Stage

1) Identify safety problems developed due to normal ‘wear and tear’ from traffic operation.
2) Also identify safety hazards from the way the landscaping has matured, such as trees and foliage obstructing traffic signs or impairing sight distances.
3) Inspections shall be carried out for both day and night to check inadequacies in road delineation and visibility.
4) Emphasise the way each road user group views the road from their particular safety viewpoint. Example, a motorcyclist may view a safety hazard differently from a motorist.

5) This audit shall be carried out within 3 to 6 months after the opening of the project to the public or generally during the defect liability period.
Looking from north (Solok Pandamaran) to the site on the left. Sight distance is good and alignment is straight and flat. Faded lane markings. Trees and posts near to travelled way.
Delineator Post Provided

Without Delineator Post
Rigid Delineator Post

Flexible Delineator Post
The Dura-Post Bollard Flexible Sign Post System has been designed and manufactured for situations where regulatory or directional signage may be positioned in an impact zone. Bollard Flexible Sign Post System comprises of HSEP (High Strength Engineered Polymer) Post fitted to the Dura-Post Flexible Joint. This combination of a strong polymer post and flexible joint gives the system unrivalled strength and flexibility for areas where standard sign posts will be bent, dented or destroyed by impacts from vehicles. While most signs will still need to be replaced after an impact, at least money can be saved by not needing to replace the post and possibly repairing damage to the traffic island or wherever the post was installed.
STAGE 4 – RSA Audit Design TMP

NOTE:
2. Pemakaian papan petunjuk amaran semestinya meletakkan fluoroscent orange prismatic retro-reflective sheeting (Solar reflect) dan 'high intensity prismatic sheeting' (Selasa biasa belakang).
3. 'Hard barrier' perlu dibuat semua berbentuk di tepi kawasan kerja.
4. 'Concrete barrier' haruslah dipasang di kawasan yang melibatkan kenderaan pelbagai. Im keadaan,
5. 'Concrete' hendaklah dipasang pada seluas jarak 8.0m (Taper) dan 30.0m (Besar).
6. 'Hard barrier' hendaklah dipasang di sepanjang kawasan kerja.
8. 'Concrete barrier' yang ditandai pada waktu malam, kontak kita haruslah memasang 'Road light' di kawasan kerja.
9. 'Plastic barrier' perlu ditambah dengan alkohol setiap masa.
STAGE 4 – RSA Audit Design TMP

2. Perkaraan sepanjang amalan semestari mesti menggunakan Fluorescent orange prismatic retro-reflective sheathing (agar belakang) dan High intensity prismatic sheathing (pelan bahagian belakang).
4. Concrete barrier' hendak ditambah di kawasan yang sebelumnya kerja-kerja pengetahuan mungkin dibentuk pada titik kedudukan,
5. Wilayah' hendaklah dipasang pada selang jarak 5.0m (Tapper) dan 30.0m (Buffer tua pasa).
7. Pengguna bomotesia hendaklah ditangkap di lepas kawasan kawan kerja,
8. Kerja-kerja yang ditugaskan pada waktu malam, kontrollin' hendaklah memasang ‘Flash light' di kawasan kerja.
Proposed New Temporary Signs During Construction For All Roads Other Than Expressways

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<td>Part of Lane Closed to Traffic (Middle Lane)</td>
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<td>TS.9a</td>
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<td>TS.10</td>
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<td>Warning Sign</td>
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<td>Typical Traffic Barrier (Plastic)</td>
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<td>TS.16</td>
<td>Typical Traffic Guidance Cone</td>
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</tbody>
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**NOTE:**
All distance indications are to be determined during design stage and in increments of 50m.
Temporary Signs (Expressways)

NOTE:
ALL DISTANCE INDICATIONS ARE TO BE DETERMINED DURING DESIGN STAGE AND IN INCREMENTS OF 10m.
Photo 1: NJBs are not interlocked; blinkers are not regularly spaced; string delineators are not continuous; pavement delineators are faded; directional pavement arrows are recommended.
Photo 2: At the abutment, concrete NJBs are recommended to close up the gap exposing a drop of more than 1 m.
Photo 3: Signs with distance markers; NJBs, if not interlocked, may drop and become disorganised.
Photo 4: Permanent delineation are mixed with temporary delineation; recommend a buffer zone; signs behind barriers should be on high posts; and provide a U-turn sign at the U-turn.
Photo 5: Lack of pavement delineation and road markings to guide motorists; NJBs not interlocked and disorganised; string delineators not continuous; blinkers not regularly spaced.
Study Approach

Stage 5 Audit

RW Consultancy

RSA Stage 5

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Parting Words

• While we Engineers, Contractors, Auditors, Authorities give our level best to have safety in mind in carrying out our duties, road environment and design contributes insignificantly to road accidents.

• The greatest contributor to road accidents is human behaviour & attitude.
SO....

1. DON’T DRINK AND DRIVE

2. DON’T PHONE, TEXT AND DRIVE

3. DON’T SPEED
THANK YOU

from
Ir. RICHARD WONG
Chairman
HTETD, IEM