Paper 1: Functionality of Traffic Impact Assessment Study – REAM Guidelines for TIA

presented by:
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Main Topics Covered

i) Traffic Impact Assessment as decision making/planning tools,

ii) Use of traffic modeling/analytics
What is Traffic Engineering?

• A branch of civil engineering that uses engineering techniques to achieve the safe and efficient movement of people and goods on roadways. It focuses mainly on research for safe and efficient traffic flow, such as road geometry, sidewalks and crosswalks, segregated cycle facilities, shared lane marking, traffic signs, road surface markings and traffic lights.

• Traffic engineering deals with the functional part of transportation system, except the infrastructures provided. It is closely associated with other disciplines:
  • Transport engineering
  • Pavement engineering
  • Bicycle transportation engineering
  • Highway engineering
  • Transportation planning
  • Urban planning
  • Human factors engineering.

Typical Role of Traffic Engineer

• designs traffic control device installations and modifications, including traffic signals, signs, and pavement markings
• considers traffic safety by investigating locations with high crash rates and developing countermeasures to reduce crashes
• prepares short-term traffic flow management plans (e.g. construction traffic control plans, including detour plans for pedestrian and vehicular traffic)
• prepares long-term traffic flow management plans (estimating the impacts of proposed commercial developments on traffic patterns)
• develops systems for intelligent transportation systems
REAM GUIDELINES FOR TIA
Guidelines for Traffic Impact Assessment
FOREWORD

Road Engineering Association of Malaysia (REAM), through the cooperation and support of various road authorities and engineering institutions in Malaysia, publishes series of official documents on STANDARDS, SPECIFICATIONS, GUIDELINES, MANUALS and TECHNICAL NOTES which are related to road engineering. The aim of such publication is to achieve quality and consistency in the road and highway industry.

The cooperating bodies are:

Public Works Department, Malaysia
Malaysian Highway Authority
Institution of Engineers, Malaysia
The Chartered Institute of Highway & Transportation (Malaysian Branch)

The production of such documents is carried through several stages. The documents are initially compiled/drafted by the relevant Technical Committee and subsequently scrutinised by the relevant Standing Committee of REAM. They are finally endorsed by road authorities and practitioners of road engineering at a conference before publication.

The success of a Traffic Impact Assessment (TIA) study and the follow-up actions depend on the full cooperation of the Developer, Approving Authorities, as well as other professionals involved in the project. Guidelines are dynamic in nature. As more experience is gained through usage and more research done through time, appropriate modifications will be made to these GUIDELINES as and when necessary. Users of this document are most welcome to submit their views and suggestions for consideration.
ACKNOWLEDGEMENTS

The following persons are members of the committee which produced this document "Guidelines for Traffic Impact Assessment". Their contribution, singly and severally, are deeply appreciated.

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Traffic Impact Assessment

- decision making/planning tool
- Why?
- When?
- How?
- What?
<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Trigger Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peak Hour Trip Generation (commuter peak)</td>
<td>150 added veh/hr (2-way)</td>
</tr>
<tr>
<td>2</td>
<td>Off-peak Hour trip Generation (Generation peak occurs at the off-peak period)</td>
<td>200 added veh/hr (2-way)</td>
</tr>
<tr>
<td>3</td>
<td>Size of residential development</td>
<td>200 dwelling units</td>
</tr>
<tr>
<td>4</td>
<td>Size of commercial development</td>
<td>45,000 sq.ft (gross floor area)</td>
</tr>
</tbody>
</table>

Note: Trip generation rates shall be based on Malaysian Trip generation Manual, Highway Planning Unit, Ministry of Works, Malaysia.
TIA – Typical Contents (1/6)

i) Executive Summary
   • Brief description of proposed development
   • Summary of traffic impact analysis
   • Brief description of proposed mitigation measures

ii) Introduction
   • Description of proposed development
   • Traffic impact study methodology

iii) Defining the study area/boundary
   • Scope of study
   • Records of discussions and agreement with Developer and Approving Authority
   • Description of road network within the agreed area of study
   • Map of road network in area of study
Typical Site Layout Plan
iv) **Determining existing traffic**
- Description of major traffic generators in and around the study area
- Identification of developments with planning approval but not yet implemented
- Identification of committed transportation projects in the study area
- Identification of designated links and intersections
- Examination of historical data.
- Volume survey of current traffic flows in designated links and intersections within the study area
- Survey of pedestrian flows at critical locations if necessary
v) **Land Use study**

- Description of current planning policies of the Approving Authority for the site of the proposed development including parking standards
- Description of current usage of the site of proposed development
- Description of land use of the proposed development, including site area and development phasing
- Breakdown of types and units of building in the proposed development
- Site and layout plans
vi) **Trip Generation**

- Computation of trip generation (non-site traffic and site traffic)
- Estimation of projected modal split
- Estimation of trip generation for peak hours (with weekday and development peak if necessary)
- Justification of the values used
- Computation of peak traffic volume, i.e. combination of generated and network traffic
- Specification of trip generation by phase (if appropriate)
- Justification for methodology adopted for trip distribution and assignment
- Estimation of traffic growth rate over time for both Site and Non Site traffic
vii) Impact Analysis

• Description of capacity analysis technique

• Tabulate and discuss traffic impact analysis results

• Proposed mitigation works and determine the level of service ‘with improvement works’ scenario
HIGHWAY CAPACITY MANUAL
Special Report 209
TRANSPORTATION RESEARCH BOARD
National Research Council
Level of Service (LOS) based on HCM

- **A**: free flow. Traffic flows at or above the posted speed limit and motorists have complete mobility between lanes. The average spacing between vehicles is about 167m or 27 car lengths. Motorists have a high level of physical and psychological comfort. The effects of incidents or point breakdowns are easily absorbed. LOS A occurs late at night in urban areas, frequently in rural areas, and generally in car advertisements.
Level of Service (LOS)

- **B**: reasonably free flow. LOS A speeds are maintained, maneuverability within the traffic stream is slightly restricted. The lowest average vehicle spacing is about 100m or 16 car lengths. Motorists still have a high level of physical and psychological comfort.
Level of Service (LOS)

- **C**: stable flow, at or near free flow. Ability to maneuver through lanes is noticeably restricted and lane changes require more driver awareness. Minimum vehicle spacing is about 67m or 11 car lengths. Most experienced drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. Minor incidents may still have no effect but localized service will have noticeable effects and traffic delays will form behind the incident. This is the target LOS for some urban and most rural highways.
Level of Service (LOS)

- D: approaching unstable flow. Speeds slightly decrease as traffic volume slightly increase. Freedom to maneuver within the traffic stream is much more limited and driver comfort levels decrease. Vehicles are spaced about 50m or 8 car lengths. Minor incidents are expected to create delays. Examples are a busy shopping corridor in the middle of a weekday, or a functional urban highway during commuting hours. It is a common goal for urban streets during peak hours, as attaining LOS C would require prohibitive cost and societal impact in bypass roads and lane additions.
Level of Service (LOS)

• **E**: unstable flow, operating at capacity. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to maneuver in the traffic stream and speeds rarely reach the posted limit. Vehicle spacing is about 6 car lengths, but speeds are still at or above 80 km/h. Any disruption to traffic flow, such as merging ramp traffic or lane changes, will create a shock wave affecting traffic upstream. Any incident will create serious delays. Drivers' level of comfort become poor. This is a common standard in larger urban areas, where some roadway congestion is inevitable.
Level of Service (LOS)

- **F**: forced or breakdown flow. Every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. Travel time cannot be predicted, with generally more demand than capacity. A road in a constant traffic jam is at this LOS, because LOS is an average or typical service rather than a constant state.
## LOS at Junctions

<table>
<thead>
<tr>
<th>LOS</th>
<th>Signalized Intersection</th>
<th>Unsignalized Intersection</th>
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<tbody>
<tr>
<td>A</td>
<td>$\leq 10$ sec</td>
<td>$\leq 10$ sec</td>
</tr>
<tr>
<td>B</td>
<td>10-20 sec</td>
<td>10-15 sec</td>
</tr>
<tr>
<td>C</td>
<td>20-35 sec</td>
<td>15-25 sec</td>
</tr>
<tr>
<td>D</td>
<td>35-55 sec</td>
<td>25-35 sec</td>
</tr>
<tr>
<td>E</td>
<td>55-80 sec</td>
<td>35-50 sec</td>
</tr>
<tr>
<td>F</td>
<td>$\geq 80$ sec</td>
<td>$\geq 50$ sec</td>
</tr>
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TIA – Typical Contents (6/6)

viii) Mitigation Measures
   • Description of proposed mitigation measures
   • Preliminary plans of mitigation measures
   • Justification (with appropriate computations) of how negative impacts are mitigated

ix) Conclusions
Traffic Condition to be achieved:

<table>
<thead>
<tr>
<th>Baseline Traffic Condition in IAY (LOS)</th>
<th>Min Traffic Condition (LOS) After Mitigation Measures</th>
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<tbody>
<tr>
<td>A</td>
<td>D</td>
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<tr>
<td>B</td>
<td>D</td>
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<tr>
<td>C</td>
<td>D</td>
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<td>D</td>
<td>D</td>
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<tr>
<td>E</td>
<td>D (exception E)</td>
</tr>
<tr>
<td>F</td>
<td>D (exception E)</td>
</tr>
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USING TRAFFIC MODELLING TOOLS
Modelling a Regional Road Network
Strategy Urban Network Model
2D Micro Simulation (Network)
2D micro simulation (corridor)
Typical Example of 3D Model Output (with road surface layer only)
Nano-simulation in Car Park
1 DAY WORKSHOP ON URBAN TRANSPORTATION IN PJ
- Engaging Local Community Participation for Sustainable Urban Transport Solutions
3 December 2013 at MBPJ Banquet Hall, Petaling Jaya
Jointly organized by the Institution of Engineers Malaysia and Majlis Bandaraya Petaling Jaya

Thank You
for listening