GUIDELINES AND REQUIREMENTS OF TRAFFIC IMPACT ASSESSMENT FOR ROAD OPENING WORKS

1. Requirements for Traffic Impact Assessment

1.1 Traffic Impact Assessments (TIA) are required for all road opening works in the sensitive areas which will affect the vehicle movements. Highways Department will maintain and issue from time to time plans showing the extent of the sensitive areas for such purpose.

1.2 Emergency works are normally exempted.

2. Objectives of Traffic Impact Assessment for Road Opening Works

2.1 The main objectives of TIA are

   a) to assess the traffic implications of carrying road opening works in the sensitive areas;

   b) to devise appropriate temporary traffic management measures to ameliorate the traffic impacts of the road opening works.


3.1 The TIA report should contain at least the following information:

   a) the name of the Agency which the road opening work belongs to;

   b) a serial number of the work for reference;

   c) data of submission;

   d) the name of works agency, i.e. the contractor;

   e) the name and telephone number of the contact person for the TIA;

   f) description of the works including the proposed programme and phasing of the works;

   g) existing street inventory within the Study Area

The Study Area should be large enough to include all significant impacts of the proposal. At a minimum, the area should include the adjacent traffic
signal controlled intersections or the area of influence that the proposed road opening works may have an impact on the existing road networks.

The existing street inventory with the Study Area should be recorded in detail. This usually includes street name, number of lanes and lane widths, direction of traffic flows, road markings and traffic aids, geometric and characteristics at critical intersections, existing site access points, right of way and pedestrian facilities.

h) existing traffic conditions

Traffic counts should be carried out to obtain traffic flow figures for the TIA. The count should be carried out at the critical peak period. The signal phasing and timing at signalised intersections and the public transport services affected should be included. Pedestrian count should also be required if existing pedestrian facilities are severed. A sample traffic count sheet is in Annex 1.

i) forecast traffic conditions (if necessary) -

The existing traffic conditions can be used for the traffic analysis for road opening works which will be completed within six months from the submission date of the TIA report. For road opening works beyond such period, the future traffic conditions should be estimated by using growth factor method based on historic volume information and existing counts. The Annual Traffic Census Reports published by Transport Department can be used for such purpose. The forecast future traffic conditions can then be applied to the different stages of the implementation of the temporary traffic management measures.

j) proposed traffic management measures for each stage;

Appropriate temporary traffic management schemes should be devised for the implementation of the road opening works. The various aspects in Annex 2 should be followed in proposing traffic management measures.

k) traffic analysis for each stage;

The traffic analysis should be carried out for the most critical peak period and for different stages of the road opening works. The following items need to be assessed:

- volume/capacity ratios (v/c ratios) of the roads
- reserved capacities (R.C.) of the road junctions
- design flow/capacity ratio (DFC) of priority junctions and roundabouts

The calculation of the v/c ratios, reserve capacities and DFC should be carried out in accordance with the Transport Planning and Design Manual.
(TPDM) Volumes 2 and 4. The traffic signal calculation sheet (Annex 3) should be used for the calculation of the v/c ratios of the road junctions.

l) consultation (optional)

The parties which have been consulted on the proposal should be included here. Examples are the client departments, the Police, the public transport operators, District Office etc. Consultation with the Traffic and Transport Committee of the concerned District Boards is normally not needed for minor projects but maybe required at the request of Transport Department or the District Office.

m) recommendation.

Summery findings and recommendations of the TIA should be given. It should include a recommended traffic scheme and detailed plans showing the proposed road opening works and the traffic management measures for each stage of the works.

4. Procedures

4.1. One copy of the TIA report should be submitted to the regional office of Transport Department with copy sent to Commissioner of Police, and the Traffic Control and Surveillance Division of TD if the proposed work is within the Area Traffic Control areas.

4.2. Upon the receipt of the report, CE/TCS should forward their comments, if any, to the regional office of Transport Department within two weeks of the submission.

4.3. The regional office of Transport Department can reject the TIA or approve it with or without conditions. A copy of such notice will be sent to the applicants within reasonable period, say three weeks from the date of receiving the TIA report for simple cases. For complicated cases, Transport Department may need to liaise with the applicant or other parties and the process will take longer. Transport Department will notify the applicant if the process takes longer than six weeks.
Traffic Engineering Division Hong Kong

Location: QUEEN'S ROAD EAST / WONG NAI CHUNG ROAD

Date & Day: 31-5-1994 (Tue)

Weather: CLOUDY

Legend: Bus=Bus; GV=Goods Veh.; O=Others Veh.; Ped=Pedestrian

Observer: J.P.MARK

<table>
<thead>
<tr>
<th>FLOW</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASS</td>
<td></td>
</tr>
<tr>
<td>1700-1715</td>
<td></td>
</tr>
<tr>
<td>1715-1730</td>
<td></td>
</tr>
<tr>
<td>1730-1745</td>
<td></td>
</tr>
<tr>
<td>1745-1800</td>
<td></td>
</tr>
<tr>
<td>1800-1815</td>
<td></td>
</tr>
<tr>
<td>1815-1830</td>
<td></td>
</tr>
<tr>
<td>1715-1815</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>134</td>
</tr>
</tbody>
</table>
Issues to be taken into account in preparing traffic management measures:

1. Lighting signing and guarding of Road Works

The Code of Practice for the Lighting; Signing & Guarding of Road Works should be followed.

2. Pedestrian arrangement

Adequate and safe pedestrian crossing facilities and temporary diversions should be provided.

3. Access arrangement

Existing ingress/egress and other vehicular rights of way which may be affected by the project may need to be maintained. Recommended temporary access designs may be required.

4. Parking

Extent of on street parking spaces or other off street parking facilities affected by the works should be identified and consideration should be given as to whether it is necessary to provide alternative parking spaces under the project to supplement the loss of existing provisions.

5. Public transport arrangements

Adequate public transport services should be maintained. Schemes of temporary routing and stops should be agreed with the concerned transport operators and the Transport Department in advance.

6. Servicing arrangement

Extent of existing loading/unloading provisions affected by the works should be identified and consideration should be given as to whether alternative provisions is required.
7. Special event arrangement

If there is any special event, such as Race Days, or concerts etc. Then the adequacy or otherwise the deficiencies of the road networks affected by the road opening works should be analysed and checked and taken into account.

8. Safety consideration

Due consideration should be given to the safety aspect of all the proposed temporary schemes and measures towards all road users and pedestrians.
### TRAFFIC SIGNAL CALCULATION SHEET

**DIAGRAM 2.4.10.1 (T.P.D.M. V. 4.2)**

<table>
<thead>
<tr>
<th>Movement/Phase</th>
<th>Width (m)</th>
<th>Sat Flow (p.c.u./h)</th>
<th>Site factors</th>
<th>Rev Sat Flow (p.c.u./h)</th>
<th>Flow (p.c.u./h)</th>
<th>Rev Flow (p.c.u./h)</th>
<th>y</th>
<th>(6) greater</th>
<th>(7)</th>
<th>L</th>
<th>(16) for sec</th>
<th>(19)</th>
<th>Leg. sat.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**P.C.U. factor =**

1. \( o_c = \frac{16L}{1 - L} \)
2. \( o_m = \frac{L}{1 - L} \)
3. \( Y_{ul} = 0.9 - 0.0075L \)
4. \( Y_{ul} = \frac{Y_{ul} - Y}{Y} \times 100\%
5. \( o_p = \frac{0.5L}{0.9 - L} \)
6. Assigned \( c \)
7. \( Y_{max} = \frac{1 - L}{c} \)
8. \( R.C. = 0.9Y_{max} - Y \times 100\%

**STAGE/PHASE SEQUENCE DIAGRAM**

(with flow in p.c.u.)

**SATURATION FLOW (p.c.u./h):**

<table>
<thead>
<tr>
<th>Width (m)</th>
<th>3.03</th>
<th>3.33</th>
<th>3.65</th>
<th>3.94</th>
<th>4.24</th>
<th>4.54</th>
<th>4.85</th>
<th>5.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (p.c.u./h)</td>
<td>1870</td>
<td>1875</td>
<td>1900</td>
<td>1950</td>
<td>2075</td>
<td>2250</td>
<td>2475</td>
<td>2700</td>
</tr>
</tbody>
</table>

(iii) **SAT FLOWS (p.c.u./h) for:**

- exclusive turning lane(s) and no opposing flow
- 1 lane = \( \frac{1800}{\sqrt{r}} \)
- 2 lane = \( \frac{3000}{\sqrt{r}} \)

where \( r = \) radius of turn

**Turning vehicles (shared lane):**

- left turn: adjust 125%
- right turn: adjust 175%

(assumes opposing flow)

Pedestrian crossing minimum green & flashing green times checked: [ ] Y [ ] N
Traffic Signal Calculation Sheet (Diagram 2.4.10.1)

Traffic Signal Calculation Sheet' has been devised for the convenience of performing signal computation. Most of the useful formula have been incorporated so that a designer may perform signal calculations without referring back to the Manual. The designer may also use his own discretion in using the worksheet in part only, or modifying it to suit his particular purpose.

Brief notes on the columns and rows:
- Col 1 - width of approach or lane width applicable for movement
- Col 2 - corresponding saturation flow
- Col 3 - site factors for making adjustment to saturation flow
- Col 4 - revised saturation flow after adjusting for site factors
- Col 5 - design flow
- Col 6 - revised design flow after adjusting for left turners/right turners
- Col 7 - flow factors
- Col 8 - greater y value
- Col 9 - Summation of the greater y-value
- Col 10 - cycle lost time
- Row 11 - optimum cycle time
- Row 12 - minimum cycle time
- Row 13 - practical Y value for the ultimate situation i.e. 120 sec cycle time
- Row 14 - reserve junction capacity for the ultimate situation i.e. 120 sec cycle time
- Row 15 - practical cycle time
- Row/Col 16 - selected cycle time
- Row 17 - maximum Y value for the selected cycle time
- Row 18 - reserve capacity of junction operating at the selected cycle time
- Row 19 - effective green time
- Row 20 - degree of saturation for movement

Stage/Phase Sequence diagram

The method of signal control should be fully illustrated by the Stage/Phase Sequence diagram, complete with the following details:-
(i) Diagrammatic junction layout
(ii) Signals operation sequence
(iii) Design flows in p.c.u./hr.
(iv) factor, if necessary, for converting unclassified counts from p.c.u./hr to p.c.u./hr.
(v) Intergreen periods required
(vi) Actual green times (G= g -l)

Traffic signal design calculation should be treated as a starting point only. In practice further improvements can often be made after installation by incremental adjustments following on-site observations.
Flowchart on Estimate of Road Capacities under Roadworks Conditions

Is the Road Opening in the vicinity of a Junction?

No

Link Road

Yes

Is it a S-2 carriageway of <5.5m width?

No

1 lane 2-way traffic controlled by temporary traffic signal. The capacity depends on the method of control/length of closure

Follow Table 2 as attached to obtain base link capacity

Yes

Check Link Capacities at the beginning of the Roadworks Section making use of the approach as at the left hand side. (Note 2)

Priority Junction

Signalised Junction

Roundabout

Refer to TPDM Vol. 2 Chapter 4 Appendix 1

Refer to TPDM Vol. 4 & Table 1 as attached

Refer to TPDM Vol. 2 Chapter 4 Appendix 2

Reduction in Link Capacities for Physical & Operational Elements (Note 1)

<table>
<thead>
<tr>
<th>Element</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect of Heavy Vehicles</td>
<td>0%-20%</td>
</tr>
<tr>
<td>Bumpy Road</td>
<td>0%-30%</td>
</tr>
<tr>
<td>Windy Road or Sharp Bend</td>
<td>0%-30%</td>
</tr>
<tr>
<td>Gradient</td>
<td>-42pcu for 1% uphill (max 10% uphill)</td>
</tr>
<tr>
<td>Lane Merging Effect</td>
<td>0%-30%</td>
</tr>
<tr>
<td>Long Section of Roadworks</td>
<td>0%-30%</td>
</tr>
<tr>
<td>Kerb Side Activities (only applicable for frontage class 3)</td>
<td>0%-40%</td>
</tr>
</tbody>
</table>

Notes:
1. The percentages suggested are ranges for general roadworks conditions. Discretion are required for individual cases. It is suggested that utility undertakers should agree with the Regional Traffic Engineering Division of TD on the assumption at the early stage of TIA.
2. In case the roadworks is in the vicinity of a junction, both the link capacities and the junction performance should be checked.
### Table 1  Adjusted Nearside Lane Saturation Flows due to kerb side activities

<table>
<thead>
<tr>
<th>Lane Width (m)</th>
<th>Saturation Flow (pcu/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1530</td>
</tr>
<tr>
<td>3.4</td>
<td>1560</td>
</tr>
<tr>
<td>3.7</td>
<td>1590</td>
</tr>
<tr>
<td>4</td>
<td>1612</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Single Carriageway</th>
<th>Frontage type ** (pcu/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>lane</strong></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>3.0</td>
</tr>
<tr>
<td>1*</td>
<td>3.4</td>
</tr>
<tr>
<td>1*</td>
<td>3.7</td>
</tr>
<tr>
<td>1*</td>
<td>4.0</td>
</tr>
<tr>
<td>2</td>
<td>6.1</td>
</tr>
<tr>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>2</td>
<td>7.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dual Carriageway</th>
<th>Frontage type ** (pcu/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>lane</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3.4</td>
</tr>
<tr>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td>1</td>
<td>4.6</td>
</tr>
<tr>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>2</td>
<td>7.3</td>
</tr>
<tr>
<td>3</td>
<td>9.1</td>
</tr>
<tr>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>3</td>
<td>11.0</td>
</tr>
</tbody>
</table>

Notes:  
* This figure refers to one way single carriageway.  
** Frontage class 0 = clearway with grade separation and no frontage access

1 = roads with no frontage access, no standing vehicles, negligible cross-traffic.

2 = roads with junctions, pedestrian crossings, bus stops, but with waiting restrictions throughout the day and loading restrictions in peak hour.

3 = street with capacity limited by waiting vehicles and junction.