



Ministry of
Transportation
and Infrastructure

ELECTRICAL AND TRAFFIC ENGINEERING MANUAL

Appendix 400.1

Traffic Engineering Check List – How to Complete

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Traffic Engineering Check Sheet – How to Complete

1. How to Complete the Form

This document should be used as a guideline for completing a Traffic Engineering Check Sheet (TEC) being submitted to the Ministry. Only qualified professional engineers familiar with the Ministry Traffic and Electrical Engineering Standards manual, associated **Technical Bulletins**, the Ministry Manual of Standard Traffic Signs & Pavement Markings, TAC geometric Design Guidelines for Canadian Roads and the B.C. Supplement to the TAC Guidelines should complete this form.

All new traffic signals or modifications to existing traffic signals including simple geometric improvements, paint marking modifications or signing changes at signals must be approved by the Ministry via a properly completed Traffic Engineering Check Sheet. TEC's submitted by consultants must be signed off by a Ministry **Traffic Engineer** prior to commencing electrical design for new or modification to an existing signal. Failure to obtain approval prior to commencing design may result in additional work to the designer due to **Traffic Engineer** design scope or detail changes; any additional costs for changes shall be borne by the design consultant.

The following sections correlate directly with the various sections of the Traffic Engineering Check Sheet. A sample completed TEC is included as an appendix to this document. The references in this document refer to the Traffic Engineering Check Sheet dated **March 2019**

1) Location

- a) Enter the location of the traffic signal in the format **MAJOR STREET NAME @ MINOR STREET NAME, CITY**. If the location is an on or off ramp, identify the intersection using the ramp direction and designation (e.g. *Route 1 E/B off-ramp @ Lickman Road, Chilliwack*). Location information should be included on all of the TEC sheets and any attached additional information.

2) Scope

- a) Identify the scope of the work being done at this location (i.e. new traffic signal, adding emergency pre-emption to an existing signal, adding an eastbound left turn to an existing signal, modifying the north/south phasing to split phase, etc.). Be specific, comprehensive and clear as to what is happening.

3) Civil Design Scope

- a) **Comments based on** – indicate what drawings are being used to

complete the rest of the TEC. If you are using an existing electrical drawing indicate what drawing and revision level you are using. If you are using a new or existing civil design drawing indicate the drawing number including revision and/or dates as necessary. You must **attach** a copy of the drawing you are using for this TEC. As a minimum the drawing must clearly show the proposed geometrics for the signal installation/modification in compliance with the TAC Geometric Design Guidelines for Canadian Roads and the B.C. Supplement to the TAC Guidelines. A qualified civil design engineer must sign the geometric drawing.

- b) **Crosswalk revisions required** – indicate whether any crosswalks need to be modified or installed as part of the signal installation. You may either mark-up the drawing or clearly describe in the field provided.
- c) **Stop Line revisions required** – indicate whether any stop bars need to be modified or installed as part of the signal installation. You may either mark-up the drawing or clearly describe in the field provided.
- d) **Lane Markings revisions required** – indicate whether any lane markings need to be modified or installed as part of the signal installation. You may either mark-up the drawing or clearly describe in the field provided. You should pay particular attention to guidelines, continuity lines and left turn arrows.
- e) **Turning Path Revision Required** – by checking yes in this box you indicate that you have verified all of the turning movement templates for the design vehicle for this intersection. You should indicate what design vehicle was used. You must pay particular attention to opposing left turn movements that have overlapping templates as this may require the use of split phasing or lagging left turn phasing with geometric constraint. If constraints exist, they must be listed in the description field.
- f) **Civil design prepared by** – the civil engineer must print their name, sign and date the form.

4) Traffic Design Scope

- a) **Road Classification** – Identify the classification of the roadway segment, as well as road AADT, and pedestrian volumes This information will be used for street lighting warrants and illumination levels (refer to Section 300 of the Traffic and Electrical Engineering Manual).
- b) **Signing Modifications** – you must attach a drawing showing the location of all existing signing for this signal installation.
- c) **Guide Signs** – identify any guide signs that need to be added or modified for this project. You may either describe the guide sign and identify its location in the field provided, or add it to the signing drawing above. Modifications to the existing drawings must be completed by a

professional engineer qualified in signing design. The Ministry Manual of Standard Traffic Signs & Pavement Markings shall be used for all signing requirements.

- d) **Lane Use Signs** – identify any lane use signs that need to be added or modified for this project. You may either describe the lane use sign and identify its location in the field provided, or add it to the signing drawing above. Modifications to the existing signing must be completed by a professional engineer qualified in signing design. The Ministry Manual of Standard Traffic Signs & Pavement Markings shall be used for signing requirements.
- e) **Turn Restriction Signs** – identify any turn restriction signs that need to be added or modified for this project. You may either describe the turn restriction sign and identify its location in the field provided, or add it to the signing drawing above. Modifications to the existing signing must be completed by a professional engineer qualified in signing design. The Ministry Manual of Standard Traffic Signs & Pavement Markings shall be used for signing requirements. Particular attention to turn restrictions shall be made at signals at on or off ramps.
- f) **Other Signs** – identify any signs that need to be added or modified for this project. You may either describe the sign and identify its location in the field provided, or add it to the signing drawing above. Modifications to the existing signing must be completed by a professional engineer qualified in signing design. The Ministry Manual of Standard Traffic Signs & Pavement Markings shall be used for signing requirements. Particular attention shall be made to the use of yield, restricted entry and hazard markers.
- g) **Advance Warning Signs** – complete the table showing the posted speed and grade of each approach including identification of road names and directions. Identify whether the signal requires advance warning signs as
 - i. per the warrants in the Traffic and Electrical Engineering Manual. Note those advance warning signs that are required in the field provided.
- h) **Island Flashers** – identify any island flashers that are required based on the warrants.
- i) **Emergency Pre-emption** – contact the local municipality and identify whether they wish to have emergency vehicle pre-emption included in the design. Emergency pre-emption costs are 100% the responsibility of the municipality. If emergency pre-emption is not required by the municipality– indicate “Municipality does not want at this time”; a letter should be included in the design folder indicating who was contacted at the municipality. If pre-emption is required, identify the type of pre-emption required and the directions of pre-emption requested as well as whether the municipality wants to use indicating lights. Refer to the Traffic and

Electrical Engineering manual for more details on emergency pre-emption options.

- j) **Railway Pre-emption** – indicate whether railway pre-emption will be required and what leg of the intersection. **Signals within 200 meters of a railway crossing should be considered for interconnection and railway pre-emption.** Identify whether blank-out signs are required for the left turn and right turn movements; blank-out signs are typically required for permissive left turns. Contact the Ministry Rail/Navigable Waters Coordinator for contacts with rail authorities.
- k) **Pedestrian Accommodation** – indicate what pedestrian accommodations are required at the traffic signal. Accommodation could be audible signal heads, modified pedestrian heads, special pushbuttons or signage, etc. As a minimum, contact the municipality and identify whether audible signals will be required at this intersection; the municipality typically coordinates the requirement of audible signal heads with the Canadian National Institute of the Blind. If no audibles are required, indicate that “Municipality does not want at this time” in the field and ensure appropriate documentation is included in the design folder identifying who the contact was at the municipality.
- l) **Cyclist Accommodation** – **refer to the Interim Technical Bulletin on Cyclist Actuation at Traffic Signals.** Indicate how cyclists are to be accommodated at the signal (bicycle stencil, separate cyclist’s pushbutton, bicycle loop, etc.). **Cyclists must be accommodated as per the Technical Bulletin.**
- m) **Special Detector Requirements** – indicate any special detector requirements. Particular attention should be made with off-ramps on freeways. Queue loops that would facilitate clearing the ramp must be included; the designer must determine the location of the queue loops to enable no queuing on the freeway through lanes; documentation on calculations must be included in the design folder. Advance loops shall be included with all traffic signals that have advance warning signs.
- n) **Future Requirements** – identify any particular requirements that would be less expensive to consider now than in the future. Particular attention should be made to the need for future left turn arrows; pulling additional wiring now is cheaper than in the future, and the controller can be pre-configured to accommodate these movements.
- o) **Controller Requirements** – Identify whether the signal will use the existing controller cabinet or require a new one, and whether the controller cabinet will be a 4 phase M cabinet or 8 phase S cabinet or P6 Cabinet.
 - i. Contact the Ministry Traffic Engineer to confirm controller requirements.
 - ii. It is important to consider future requirements when deciding an M, S or P6 cabinet. Particular attention should be made to the current status of existing cabinets – older P and M-shelf mount cabinets are

not upgradeable and must be replaced. Contact the Manager, Electrical Services for information on existing equipment.

p) **UPS Installation**

Enter whether the existing or a new UPS will be required.

- q) **Other Items or Comments** – identify any other issues that need to be considered for the traffic signal design and which the Ministry Traffic Engineer or Electrical designer requires to approve/complete the design.

5) Signal Phasing

- a) **Attach a preliminary timing sheet** - you must attach a preliminary timing sheet conforming to Ministry standards; only phase assignments, advance warning times and resting/recall phases need to be shown on the preliminary timing sheet. A final timing sheet must be submitted once the electrical design is complete. Note that you must submit electronic versions of the traffic signal timing sheet, associated signal calculations and complete Synchro analysis. Refer to the Traffic and Electrical Engineering Design Manual Section 200 for further details.
- b) **Signal Phasing Layout** - complete the Signal Phasing Layout per the attached example and the Traffic and Electrical Engineering Standards manual. The Signal Phasing Layout shows all of the available phase movements applicable to the traffic signal operation. The north arrow and street names must be included on the diagram.
- c) **Signal Phasing Compatibility Diagram** - based on the above Signal Phasing Layout, identify all combinations of phases that can be on at the same time. If phasing is complex and cannot easily be displayed, include a separate document outlining in detail how the signal is to operate relative to the Signal Phasing Layout. You must also include all transit/HOV, emergency and railway pre-emption and clearance phases in the phasing compatibility boxes.
- d) **Traffic Engineering Prepared by** - the engineer preparing the traffic engineering information must print their name, sign and date the form. The engineer must be a registered professional engineer qualified in traffic signal design.

The TEC must be reviewed for quality assurance and signed off by another registered professional engineer qualified in traffic signal design.

6) MOTI Traffic Engineering Approval

- a) The TEC must be submitted to the ~~Regional~~ Traffic Engineer for approval.

The Traffic Engineer shall either tick the “recommend to proceed” field, or tick the

“Changes required” field and list the identified deficiencies. The form will then be signed and returned to the originator. Forms that require changes must be modified by the originator and resubmitted for approval prior to proceeding with the electrical design.

2. Summary of Requirements

Prior to submitting the Traffic Engineering Check Sheet to the Ministry for approval, the consultant shall ensure:

- 1) These guidelines have been followed in their entirety
- 2) A signed geometric plan showing proposed civil improvements is attached
- 3) A plan showing all existing signing is attached
- 4) A preliminary timing sheet is attached
- 5) An electronic copy of the Synchro file is attached
- 6) The Ministry Traffic Engineer may reject submissions that do not comply with the above requirements.