Portable Temporary Traffic Signals Policy

POLICY NUMBER: 2008-03
Effective Date: May 1, 2008

Approved by: Gord Troughton, Manager
Manager’s Signature: 3rd April 2008
Date: 3rd April 2008

Traffic Office
Engineering Standards Branch
Ministry of Transportation
301 St. Paul Street, 2nd Floor
St. Catharines, ON L2R 7R4

General Inquiries: (905) 704-2940
Fax: (905) 704-2888
1.0 Background and Purpose

1.1 Background
Portable Temporary Traffic Signals (PTTS) were first approved for use on Ministry contracts in the mid 1990’s after a site review and evaluation was undertaken. At that time, no specific Justification Criteria (JC) was available for the use of PTTS. Therefore, a preliminary literature review was undertaken by the Ministry to obtain information on the use of these devices across North America. The literature review revealed that PTTS were being used in both short-term maintenance projects and long-term stationary work (e.g. bridge maintenance and rehabilitation projects).

Though the focus of the policy will be on PTTS, the following three options may be used to control traffic through a work zone, during construction activities:

Temporary Traffic Signals – typically consists of traffic signal heads positioned on span wire and temporary wood poles. H.T.A. 144(31)

Portable Temporary Traffic Signals – consists of traffic signal heads mounted on movable trailers to control single lane traffic. H.T.A. 144(31)

Portable Lane Control Signals – consists of a single “standard” vehicle traffic signal head normally mounted on a moveable pole at a minimum height of 2.75 m from the roadway surface to the bottom of the traffic signal head. Use of portable lane control signal is an alternative to controlling traffic by a traffic control person (TCP) and is not to be confused with a temporary traffic signal or portable temporary traffic signals. Regulation 606 H.T.A.

1.2 Purpose
The purpose of this policy is to provide direction for the use of PTTS on Ministry projects and provide guidelines for general use, qualification criteria, implementation and installation.

2.0 Approvals

For MTO projects, the Ministry’s Regional Traffic Office must approve the use of a Portable Temporary Traffic Signals (PTTS) system on a project-by-project basis.

The installation requires legal approval under Section 144(31) of the Highway Traffic Act. This requires a PH-M-125 drawing to be completed for each stage of construction having a unique location of the trailers, traffic signal heads, stop blocks, placement of barrier or detection devices.
The regional traffic section must approve all signal timing plans. Ontario Traffic Manual (OTM) Book 7 and OTM Book 12 provides a guide to cycle length and clearance times based on site criteria. Final timing parameters should be reviewed through field observations and any adjustments made.

3.0 Application Overview

There are two types of traffic signal operations that may be used on Ministry contracts: Fixed Timed Operation or Actuated Timed Operation. A PTTS in fixed-timed mode has a preset green time and clearance period for both approaching directions of traffic, whereas an Actuated Time Operation system uses detection technology to identify the presence of vehicles and automatically extends the green display duration, up to the maximum green time programmed, to accommodate the traffic demand.

PTTS may be used for short-term maintenance projects and long-term stationary work (e.g. bridge or culvert replacements) or situations where the use of temporary traffic control signals is preferable to other means of traffic control, such as the installation of Span Wire Temporary Traffic Signals (SWTTS).

These signals may be used to control one lane, two way traffic flow during construction activities that are considered under OTM Book 7 as “Very Short Duration Work” or “Short Duration Work” during hours of daylight. If these devices are to be used during night-time activities, proper illumination must be provided. Portable Temporary Traffic Signals must be installed in accordance with the requirements of Regulation 606 of the HTA, which covers the physical and signage requirements. Driver action is prescribed by HTA Section 146.

Portable Temporary Traffic Signals may also be used to control one lane two way operations during construction activities that are considered under OTM Book 7 as “Long Duration” work and must be installed to meet the requirements of Regulation 626 and Section 144 of the HTA. If used for “Long Duration” work, a cost comparison is recommended to show that it is more cost effective to use solar powered portable temporary traffic signals as opposed to regular temporary traffic signals (Note: In most cases full temporary traffic signals on span wire are more cost effective after four months of use). If time of day functions are required due to known variances in traffic patterns (i.e., different max green due to long weekend traffic patterns), a conventional temporary traffic signal is required. Portable Temporary Traffic Signals may not be used if a side street or access point is within the signalized intersection (temporary signals with multiple phasing must then be used). Approval from the road authority is required prior to use.

Other traffic control devices are required to supplement PTTS, including warning signs, regulatory signs, temporary pavement markings and/or channelizing devices as referenced in the Ontario Traffic Manuals.
4.0 Minimum Equipment Requirement

4.1 Policy Requirements
If the decision is made to use a PTTS, then the device must adhere to the following criteria:

- The PTTS must meet the physical display and operational criteria of conventional signals as specified in the Ontario Traffic Manual (OTM) Book 12.
- Be listed on the Ministry’s Designated Source of Materials List (DSM).
- Be programmable as either a fixed-timed or actuated-timed operation.
- If the system is an Actuated Time Operation Unit, then it must utilize one or more of the following detection devices:
  - Microwave detection technology;
  - Loop detection technology; or,
  - Video detection technology.

4.2 General Hardware Requirements

- Have a mounting height capability of 5.0 m for both the primary and secondary signal heads on each trailer.
- The unit can be used with one signal head mounted at a minimum of 5.0 m and the 2nd one at 2.75 m (if it is located adjacent to the roadway).
- The two signal heads shall be separated by a minimum of 3.0 metres laterally.
- All colour lenses must comply with the Institute of Transportation Engineers (ITE) interim/final specifications for incandescent or Light Emitting Diode (LED) lamps for chromaticity and luminous intensity.
- Signal heads must be reversible on the boom to allow the trailers to be mounted on the same side of the roadway protected by barriers.
- Signal supports must consist of sturdy brackets that may be attached to a trailer.

4.3 Trailer and Controller

- Each trailer unit must be able to operate as either a master or local.
- Each trailer must be interconnected by either hardwire or radio.
- The controller must be capable of providing a variable all red clearance interval between 0 – 600 seconds.
- The controller has circuitry which must detect low voltage and prevent the occurrence of an unsafe signal indication.
- In the event of low voltage the signal must default to either a flashing all red or solid all red.
- The controller must provide a red flash cycle that is flashed continuously at a rate of 50 – 60 times per minute.
- If a radio interconnection is used then:
The system must have a mobile license from Industry Canada (if applicable); the frequency and radio equipment must be approved for use in Canada by Industry Canada; and the approval for the spread spectrum frequency band being used must meet Industry Canada requirements.

- The traffic signal controller must be equipped with a conflict monitor that monitors the following:
  - Master and local absence of display;
  - Master and local conflicting display on the same signal head or heads; and
  - Master and local conflicting displays on opposing heads.

- When a conflict is identified, or radio interference/failure occurs, the monitor must be able to place the master and local units in either a solid red or flashing red display as per the direction of the road authority.

- When a conflict is identified, or radio interference/failure occurs, the controller shall send out a message to the owner/operator via one or more of the following methods:
  - Cell phone technology;
  - Satellite technology; and/or
  - Email or blackberry technology.

- All conflicts must be recorded in an error log with the exact date and time of the occurrence.
- The error log must be retrievable by the road authority.
- The controller must be password protected or have other security devices in place to prevent program tampering.

### 4.4 Power Supply

- The generator/battery and other electronic controls must be completely inaccessible to unauthorized personnel and protected by a sturdy lockable metal enclosure.
- The unit must have a battery back-up and be alternatively powered by one or more of the following methods:
  - Generator;
  - Solar power; and/or
  - Electrical power;
- The battery capacity must be sufficient to operate the system without recharging for a minimum of 14 days.

### 4.5 Green Clearance Interval Requirements

- Maximum and minimum green time must be user selectable.
- All timing intervals are capable of being set in increments of one second.
- For Actuated Time Operations:
  - Vehicle extension time can be set in the signal controller.
  - If the detectors fail, the system places a constant call to the controller to ensure that it reaches the maximum green time every cycle.
4.6 **Yellow Clearance Interval Requirements**
- Yellow clearance interval must be user selectable and consistent with OTM Book 7 and OTM Book 12.

4.7 **Red Clearance Interval Requirements**
- Red clearance interval must be user selectable and consistent with OTM Book 7 and OTM Book 12.

5.0 **Implementation and Installation Criteria**

5.1 **Duration**
PTTS are only to be used for a maximum of 8 months duration (April – November), as maintenance and reliability concerns have been identified during the winter months. Outside of this period the operation should return to normal two way traffic flow. 
Note: Refer to OTM Book 7 for the definitions of Short, Very Short and Long duration closures.

5.2 **Site Considerations**
PTTS may be considered for locations that meet all of the following criteria:
- Single-lane two way maintenance work zones;
- Short, very short and long duration single lane closures;
- Cost effective Hydro/AC power supply is not readily available;
- There is adequate visibility/sight distance as per the requirements listed in the Ontario Traffic Manual (OTM) Book 12; without the use of auxiliary heads
- Non-intersection location; and
- There are no intersecting roads or driveways within the signalized zone.
- Illumination is available (required for night-time use);
  - Illumination must be provided in such a manner that as a minimum, the decision points on the approach to each end of the construction zone where the signal heads are located are illuminated. This maybe accomplished with portable generator powered lights that must be a minimum of 9.0 m in height from the road surface. The illumination provided by each light source shall be a minimum of 22,000 lumens, and must not produce glare to oncoming motorists.
Portable Temporary Traffic Signals Policy

PTTS trailers must be:
- Strategically located so that they are protected from moving traffic;
- Offer resistance to displacement or damage by moderate to severe weather, vehicle impact and vandalism; and
- Positioned in such a manner that the one signal head is adjacent to the roadway while the other signal head is at least 0.5 m to 1.75 m into the approach lane.

When two PTTS are used within the same work zone the maximum spacing recommended between the devices on a two-way, one-lane operation is 366 m.

Where pedestrian traffic is a concern, engineering judgment should be used to determine if pedestrian signals are needed for crossing or if an alternate route should be established.

When a PTTS is located within a work zone, but is not in use the unit should either be covered or removed.

The owner/operator shall operate the PTTS in accordance with the manufacturer’s recommendations.

5.3 Benefit/ Cost Considerations (compared to temporary span wire installations)
There are a few factors to consider when deciding whether to use PTTS rather than other means of temporary traffic signals. Each region will have different values associated with the benefit or cost of installing PTTS just as each location within those regions will have varying values. Some of the factors to initially compare are:
- Project duration;
- Material (purchase or rental) cost;
- Operation & maintenance costs; and
- Installation and removal costs.

5.3.1 Benefits
- In general, for short duration projects there may be a potential cost saving of using PTTS over the installation of Span Wire Temporary Traffic Signal (SWTTS).
- Maintenance work can be better coordinated with implementation of traffic signals.

5.3.2 Costs
The use of a PTTS at locations that meet minimum criteria as specified in this document for a project should be based on the results of a cost-benefit analysis performed on a project-by-project basis.

Sample PTTS and span wire drawings requiring legal approval as per the Highway Traffic Act are provided below. Use OTM Book 7 and Book 12 for specific layouts.