

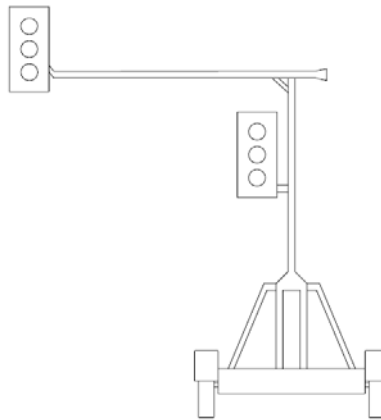
To: All HQ Directors: Operations, Planning and Major Projects
All Regional Directors
All Regional Traffic Engineers
All District Managers, Transportation

Subject: **Guidelines on the Use of Portable Traffic Signals (PTS)**

Purpose: This Technical Circular provides the guidelines on the use of independently powered portable traffic signals (PTS) for temporary traffic control.

Background:

A PTS is a mobile traffic control system where one or more signal heads are mounted on a self contained trailer as illustrated in the sketch below.



The primary application of PTS is to provide bidirectional traffic control in traffic management situations. Typically, a pair of PTS would be set up at the perimeter of a construction site where signal communication is provided by use of radio interface. The use of PTS in many instances can provide an effective alternative to Traffic Control Persons and are suitable for use in rural construction environments or for traffic control on single lane bridges.

Scope and Application:

The use of a portable traffic signal will be reviewed by the appropriate Regional Traffic Engineer. When used, portable traffic signals shall be implemented in conjunction with an appropriate traffic control plan according to the standards and guidelines set out in the [Traffic Control Manual for Work on Roadways](#).

Portable traffic signal units shall have as a minimum two signal heads for each approach direction and positioned so at least one is overhead and one is side mounted. The signal heads shall be three colour LED displays with 12 inch (300mm) lenses. The PTS units shall be powered by a reliable power source capable of operating the signal for the duration of the project. Examples of possible power systems include a gas powered generator, a solar panel array with battery overcharge protection, or a fuel cell system. The portable signals shall be in operation at all times unless traffic is controlled by Traffic Control Persons. Additional features to be included in a PTS system are:

- Manual override to hold signal in green
- A conflict monitor to ensure both signals in a pair cannot show green simultaneously
- The ability to revert to flashing red mode if a fault is detected (I.e. low battery, lamp defect, lost communication, etc)
- A vehicle presence detection system
- Low battery warning system, if applicable

Units may also be capable of remotely communicating information such as errors or low battery to traffic management personnel. Countdown displays shall not to be used with PTS, except when specified by the Regional Traffic Engineer.

Inspection of the PTS shall occur at least once daily and include, as a minimum, checking traffic operation (vehicle delay and throughput), signal alignment, power supply, and any signs of vandalism.

The TW-12 Traffic Signal Ahead sign shall be applied as per the requirements of the Traffic Control Manual for Work on Roadways, Section 2.1.7. Flexible drum delineators should be placed on the approach side of the PTS to provide notification and protection for road users including cyclists. Advance warning flashers will also be necessary in situations where one or more of the following criteria are met (Electrical and Traffic Engineering Manual, Section 402.6.9):

- When requested by a Regional Traffic Engineer (RTE)
- The posted speed limit for the highway is 70 km/h or greater. Note: When the posted speed limit is lowered below 70 km/h due to a temporary construction speed limit the need for advance warning flashers will be reviewed by the RTE.
- The view of the signals is obstructed due to vertical or horizontal alignment.
- The grade approaching the signal is sufficient to require more than normal braking effort.

Portable traffic signals require the following information:

- A signal timing sheet that indicates the signals' operation. The signal timing sheet shall be stamped by a Traffic Engineer.
- A site layout plan indicating the site location, position of the signals relative to the project site, distance between stop bars, distance between stop bars and advance warning sign (if applicable), and other relevant information such as location of vehicle detection system and devices used for the protection of the PTS.

Please refer to [Section 400: Signal Design](#) of the Electrical and Traffic Engineering Manual when preparing the signal timing sheet and supporting documentation. A sample signal timing sheet and supporting documentation are also included in this technical circular.

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Attachments

Attachment #1 PORTABLE TRAFFIC SIGNAL TIMING PLAN

DATE: MONTH DAY, YEAR	LOCATION :	PORTABLE SIGNAL ON SOMEWHERE ROAD SOMEWHERE CITY
	DRAWING:	TE-00000-0 PROJECT: 000/00000-1234

PHASE SETTINGS	DIRECTION A	CLEARANCE A	DIRECTION B	CLEARANCE B
	SOMEWHERE ROAD E/B		SOMEWHERE ROAD W/B	
MINIMUM GREEN	10.0	13.0	10.0	13.0
MAXIMUM GREEN	35.0	13.0	35.0	13.0
GREEN EXTENSION INTERVAL	13.0	---	13.0	---
YELLOW	4.0	---	4.0	---
ALL RED CLEARANCE	1.0	0.0	1.0	0.0
INTERSECTION FLASH	RED	---	RED	---
ADVANCED WARNING TIME	5.0	---	5.0	---

COMMENTS:

STOP-BAR TO STOP-BAR DISTANCE = 140 m

ASSUMED CLEARANCE SPEED = 40 km/hr

CLEARANCE TIME FOR DIRECTION A = 13 s

CLEARANCE TIME FOR DIRECTION B = 13 s

APPROACH SPEED = 60 km/hr

APPROACH GRADE IN DIRECTION A = 0%

APPROACH GRADE IN DIRECTION B = 0%

STOP-BAR TO ADVANCE WARNING SIGN DIRECTION A = 58 m

STOP-BAR TO ADVANCE WARNING SIGN DIRECTION B = 58 m

CONTROLLER RESTS IN RED WHEN NO CALLS EXIST

ATTACHMENT #2

SAMPLE CALCULATIONS PORTABLE TRAFFIC SIGNAL ON SOMEWHERE ROAD

Work Zone Characteristics:

Work zone length = 60 m
Approach speed = 60 km/h = 16.7 m/s
Assumed clearance speed = 40 km/h
Grade = 0% (both approach directions)

Stop bar distance from work zone (west side) = 40 m
Stop bar distance from work zone (east side) = 40 m

∴ stop bar to stop bar distance = 140 m

Portable Traffic Signal:

Select max green time of 35 s

★ 35 s is often a good starting point for max green time. However, based on traffic volumes and local knowledge, the traffic engineer may adjust max green time to ensure there isn't undo vehicle delay

$$\begin{aligned} \text{Clearance Time } R &= \frac{3.6D}{v} \\ &= \frac{3.6(140\text{m})}{40\text{km/h}} \\ &\square 13\text{s} \end{aligned}$$

Where: R = all red clearance time (s)
v = travel speed through work zone (km/h)
D = distance between stop bars (m)

Yellow time = 4 s

Advance Warning Flashers:

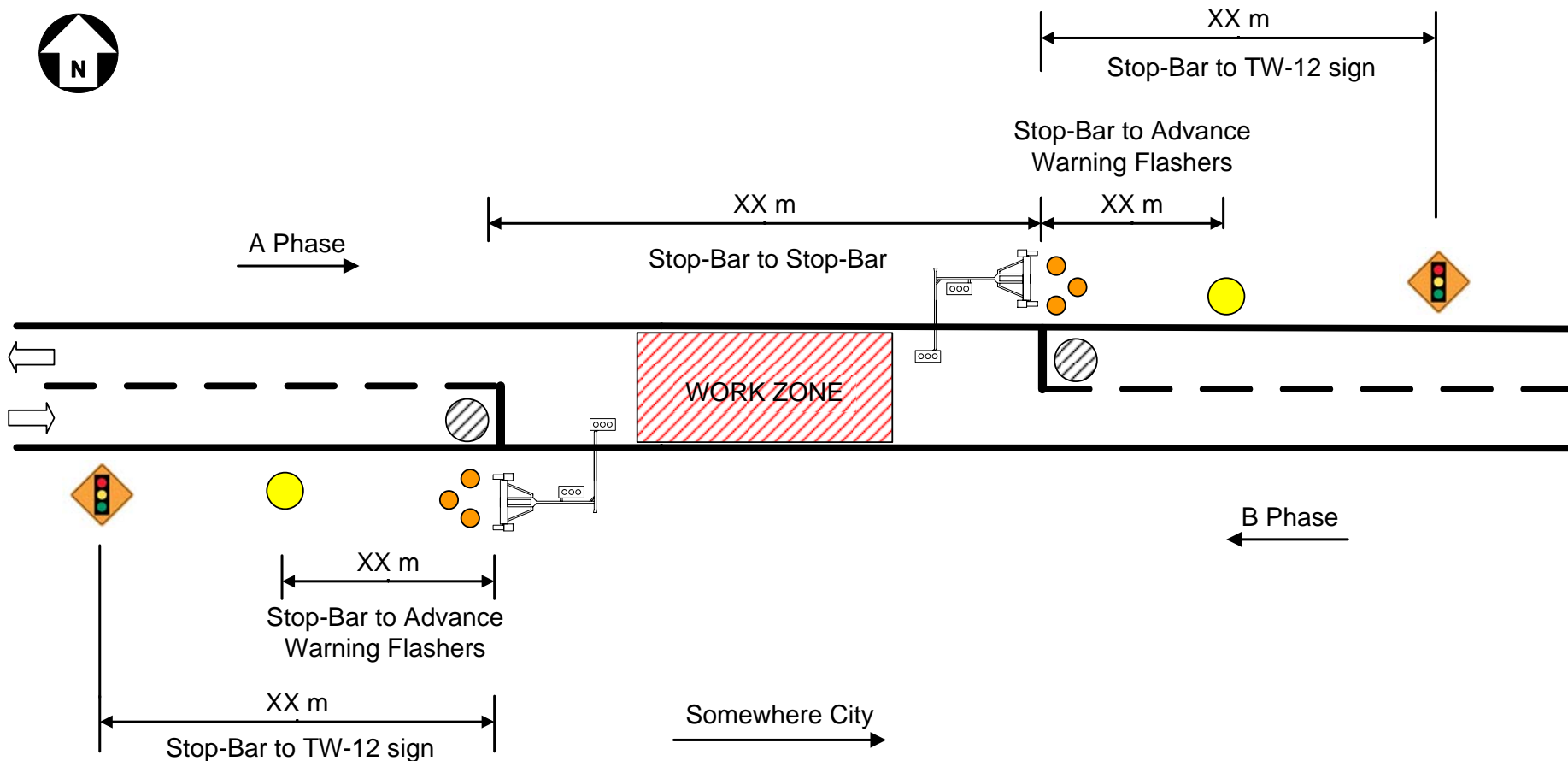
Distance (stop bar to advance warning flasher) = 58 m for 60 km/h approach speed and 0% grade

$$\begin{aligned}\text{Advance Warning Time} &= \frac{D + D_p}{v} \\ &= \frac{58\text{m} + 21.3\text{m}}{16.7\text{m/s}} \\ &\approx 5.0\text{s}\end{aligned}$$

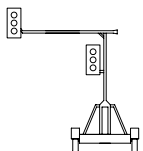
Where: D = distance of flasher to signal (m)
 D_p = minimum perception distance
= 21.3 m
 v = posted speed limit (m/s)

Sample Portable Traffic Signal Site Layout Diagram

Location: _____ Drawn By: _____ Date: _____



LEGEND



Portable Traffic Signal



Vehicle Detection System



Advance Warning Flashers



TW-12 Traffic Signal Ahead sign



Stop Bar



Flexible Drum Delineators

NOTES

This drawing illustrates the position of the portable traffic signals in relation to the work zone. For placement of other traffic control devices refer to the Traffic Control Manual for Work on Roadways.