Technical Circular T-16/06
Date: October 19, 2006

**TO**: All HQ Directors: Operations, Planning & Major Projects
All Regional Directors
All District Managers Transportation
Manager, Provincial Sign Shop

**Subject:** **Guidelines for the Operation of Changeable Message Signs (CMSs) and Portable Changeable Message Signs (PCMSs)**

## Purpose:

To amend the British Columbia Ministry of Transportation's *Policy on Messages for Changeable Message Signs*, June 1995.

## Background:

Permanent/Stationary Changeable Message Signs (CMS) and Portable Changeable Message Signs (PCMS) are part of the BCMoT's Traffic Management System. The purpose of these devices is to display words, numbers or symbols which can be changed on demand to communicate real-time roadway, traffic, or traveller information to road users, as conditions warrant. The advance communication of information to road users allows them to react to conditions in a safe and timely manner. CMSs and PCMSs also provide the opportunity to display Public Service Announcements and Public Safety Messages to road users.

## Policy:

The attached policy *Guidelines For The Operation Of Changeable Message Signs (CMSs) And Portable Changeable Message Signs (PCMSs)* provides specific guidelines for the operational use of CMSs and PCMSs used on the British Columbia Highway system. These guidelines ensure that messages displayed shall convey pertinent information to road users, and the design and location of these devices follow procedures that provide correct and consistent field deployments.

Attachment – BC MoT Guidelines for the Operation of Changeable Message Signs (CMSS) and Portable Changeable Message Signs (PCMS)

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# BC MoT Guidelines For The Operation Of Changeable Message Signs (CMSs) And Portable Changeable Message Signs (PCMSs)

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# SECTION I: *CHANGEABLE MESSAGE SIGNS (CMS)*

## 1.0 General

Changeable message signs (CMS), variable message signs (VMS) and dynamic message signs (DMS) are synonymous terms referring to permanent signs on MoT roads that electronically display travel and road condition information to road users. Control of CMS signs is coordinated through the Provincial Highway Conditions Centre (PHCC) 604.660.9770 in Burnaby BC.

There are two types of electronic message signs used on provincial roads: CMSs and open/closed signs. CMSs display the pre-programmed road user messages while open/closed signs only display an electronic "OPEN" or "CLOSED" message on a static sign to indicate the status of the road.

## 2.0 CMS Placement Guidelines

CMS placement will be site specific. Generally they should be placed to ensure maximum visibility and located in areas of minimal visual clutter. CMS signs should be visible at a distance of 1km and should not be placed in sag curves or beyond a crest curve. Consideration should be given to the CMS placement with respect to the sun. In the spring and fall, the low sun position can severely affect the sign visibility. Sign and site design details should be developed prior to field installation of a CMS. For locations requiring detailed complex messages more than one CMS may be required.

The presence of a CMS implies a possible change in upcoming travel conditions. Section 4.0 outlines the guidelines that should be followed in message design.

## 3.0 CMS Equipment Guidelines

3.1 Minimum character sizes:

3.1.1 450mm (18") when used in zones where the speed limit is 70km/h, or higher. (275m viewing distance).

3.1.2 250mm (12") for urban areas ≤60km/h providing the messaged can be read twice at the travel speed. (150m viewing distance).

3.2 CMS should automatically adjust brightness of the display relative to ambient light conditions to maintain visibility.

3.3 The characters displayed on a CMS should be yellow, orange or green using a light illuminating source against a black background. Messages in red should be limited to stop situations such as "STOP AHEAD." Messages using white LEDs should be restricted to regulatory messages. This policy does not preclude the use of new technologies that may emerge and prove effective for displaying characters other than what is mentioned above.

## 4.0 CMS Display Message Guidelines

4.1 Approximately 1 second is required for a road user to read 1 word or 1.5 to 2.0 seconds per phrase. CMS messages should convey a single thought and sequenced in the following hierarchy;

4.1.1 WHAT the event is. [e.g. Avalanche].
4.1.2 WHEN it occurred or WHAT the result is. [e.g. Road Closed].
4.1.3 HOW the road user is required to respond. [e.g. Detour via Hwy 3] This part may be optional depending on the nature of the message.

Words such as "WARNING," "CAUTION," or "EXTREME" should not be used if these words sacrifice better information.

4.2 The number of characters and lines required on a CMS will vary depending on length and complexity of the message required and may require a custom sign. Generally MoT message boards have a minimum of 2 lines with 22 characters per line, resulting in a message size of 44 characters. Messages are displayed in 2 phases and cycled so the road user can read the messages twice at travel speed. Each phase represents a unit of information. See the example in Section 4.5.

4.3 If there are no road conditions or information to report to road users, the CMS should display the following messages[1]:

[1] Some CMS's may eventually be equipped with clocks and/or weather stations allowing for the display of Date, Time, and Temperature.

4.3.1 During winter months, if there are no incidents or road works the CMS may display the road condition. For example, if the road surface is known to be completely clear then the term "BARE" could be used. An ICBC or RCMP/Local police public service message may also be displayed on alternating phases.

4.3.2 During summer months, if there are no incidents to report then forest fire hazard messages followed by ICBC or RCMP/Local police public service messages may be displayed. CMSs may also be used as part of an optional **"Advance Information Zone"** for road works taking place on MoT roadways in the regional area. The CMS will notify road users of the activity from several kilometers to several hundred kilometers in advance of the work zone. The CMS should advise road users of location, type, and times of work activity. Contact the Provincial Highway Conditions Centre (PHCC), at 604.660.9770 for CMS sign locations and message programming.

4.4 The CMS message should use full words whenever possible, however abbreviations may be required to fit long messages on the sign. When abbreviations are used they should be limited to commonly known ones as shown in the Table 1 below:

**Table 1**

| Word | Abbr. | Word | Abbrev. |
|---|---|---|---|
| Ahead | AHD | Maintenance | MAINT |
| Alternating/Alternate | ALT | Motor Vehicle | MV |
| Boulevard | BLVD | Prepare | PREP |
| Bridge | BRDG | Pavement | PVMT |
| Cardinal Dir. | N, E, W, S | Parking | PKING |
| Construction | CONST | Required | REQ'D |
| Emergency | EMER | Route | RTE |
| Exit | EXT | Road | RD |
| Entrance | ENT | Right | RT |
| Freeway | FWY | Shoulder | SHLDR |
| Hazardous | HAZ | Slippery | SLIP |
| Highway | HWY | Speed | SPD |
| Information | INFO | Summit | SMT |
| Junction | JCT | Traffic | TRAF |
| Kilometre | KM | Warning | WARN |
| Lane | LN | Vehicle | VEH |
| Left | LFT | | |
| Minutes | MIN | | |
| Minor | MNR | | |

4.5 A long message may require 4 lines of text displayed in two phases. The message should be able to be read by the road user twice before passing the CMS while traveling at the speed limit. For locations where more than one CMS is used and visible to road users, only one sign shall display a sequential message at any given time. Refer to the following example:

Cycle 1:

| Phase 1 | Phase 2 |
|---|---|
| HWY 3 CLOSED 50KM AHD<br>USE HWY 5 OR HWY 1<br>View Time Approx. 6 Sec | HWY 5 HEAVY SNOWFALL<br>CHAINS REQUIRED<br>View Time Approx. 6sec |

Cycle 2:

| Phase 1 | Phase 2 |
|---|---|
| HWY 3 CLOSED 50KM AHD<br>USE HWY 5 OR HWY 1<br>View Time Approx. 6 Sec | HWY 5 HEAVY SNOWFALL<br>CHAINS REQUIRED<br>View Time Approx. 6sec |

Example:

- Speed Limit = 90 km/h = 25 m/s
- View time per Phrase or per individual line = 3 seconds per phrase/line displayed
- View time for 2 Phrases or 2 individual line displays = 2 phrases (X) 3 sec. = 6 sec view time per phase
- 2 Phases per cycle = 2 phases (X) 6 sec per phase = 12 sec per cycle
- 2 cycles of the display must be seen by road users before they pass under the sign. Therefore, 2 cycles (X) 12 seconds per cycle = 24 seconds to display two complete cycles of the message.
- Therefore for a 90 km/h (25 m/s) posted speed the sign must be visible for a minimum of 600 metres. 600 metres = 24 sec X 25 m/s

4.6 Messages Unique to Geographical Area

MoT Regional and District offices may develop incident specific message plans which identify unique situations or incidences relevant to a particular geographical area where the general messages in this policy may not be adequate. These messages would typically be used on specific CMSs under certain conditions. For instance, several CMS signs may be utilized as a Regional corridor wide traffic management strategy to facilitate response to incidents and help mitigate traffic congestion. For example, if Highway 1 were closed Highway 5 could be signed as the alternate route for access between the interior of BC and lower mainland.

## 4.7 Message Familiarity

Message familiarity is a major factor in the ability for a road user to understand a message. When information displayed to road users is lengthy or unusual, longer comprehension time is required. Brief and common language is necessary on CMS signs.

## 5.0 Message Categories Table 2 (**This is not an exhaustive list and other categories may be added**)

### Table 2

**Incidents**
Avalanche
Bridge Wash Out
Blowing Snow
Collision
Debris on Road
Dust Storm
Forest Fire
Freeze Level X000m
High Winds
Hazardous Material Spill
Hydro Lines Down
Livestock on Road
Material Spill
Vehicle Crash
Mud Slide
Police Incident
Rock Slide
Traffic Signal Failure
Snow at Higher Elevations

Vehicle Fire
Vehicle Stall
Wash Out
Wildlife on Road
- Big Horn Sheep
- Elk
- Caribou

**Planned Events**
Avalanche Control
Bridge Construction
Bridge Maintenance
Construction
Garbage Pickup
Line Painting
Paint Crew
Mowing
Night Work
Paving Operations
Road Construction
Road Maintenance
Road Sweeping
Roadside Brushing
Rock Scaling
Seal Coating
Special Event
Tree Pruning
Traffic Signal Out
Travel Advisory
Utility Works

Location Descriptors:

HWY X Closed
Exit XX Closed
Use Hwy XX
XXX Ahead
Ahead
Single Lane Traffic
Single Lane Alternating
Right Lane Closed Ahead
Left Lane Closed
Centre Lane Closed
One Lane Bridge
Mon – Fri
XAM – YPM
NEXT XXX km

**Road / Climatic Conditions**
Bare
Bare & Dry
Bare & Wet
Black Ice
Blowing Snow
Compact Ice
Compact Snow
Compact Snow /Chains Required
Compact Snow /Plowing & Sanding
Compact Snow/ Slippery Sections
Compact Snow Sanded
Falling Ice
Falling Rock
Flooded
Freezing Rain
Frost Heaves
Heavy Snowfall
Caution - Reduce Speed - Snow
Heavy Snowfall / Plowing & Sanding
High Avalanche Hazard
Limited Visibility Blowing Snow
Limited Visibility/ Dense Fog
Limited Visibility Heavy Snowfall
Limited Visibility Smoke
Plowing & Sanding In Progress
Slippery Sections
Slushy Sections
Smoke
Traffic Congestion
Trucks Chains Required
All Vehicles Chains Required
All Vehicles Must Use Chains Or Snow Tires
Water Ponding

**Public Service Message**
ICBC Road Safety
ICBC and RCMP/Local police messages
"It's Back To School"
"Slow in School Zones"
See appendix

Forest Fire Prevention/Risk

"Extreme Fire Hazard Kootenays"
"Extreme Fire Danger Local Bans In Effect"
"Campfire Ban"

Provincial Emergency Program (PEP)
"Tsunami Warning"
Queen Charlotte Is.
Wed Nov 16 10pm–2am

Ministry of the Environment

"Report Poachers and Polluters"
Call 24/7 1-877-952-7277

Worksafe BC (WCB)
Worker Safety Campaign Messaging.

Commercial Vehicle Safety Enforcement (CVSE)
"Tire chain laws in effect October 1 to April 30."

## 6.0 Message Priorities

CMS messages shall be displayed based on potential severity of risk to the road user, therefore the message priority should be:

6.1 Amber Alerts, Public Emergencies/ Safety Broadcasts

These are rare but significant events that require immediate communication to road users. Public emergencies and safety broadcast can include, disaster response information, tsunami warnings, terrorism events or alerts. This information will be communicated to the PHCC from the Provincial Emergency centre.

6.2 Incidents and Road Conditions, Samples include:
- 6.2.1 Crashes
- 6.2.2 Traffic Diversion – Lane, Road, or Mountain Pass Closed due to Weather
- 6.2.3 Adverse Weather Conditions

6.3 Planned Events and Traffic Management, Samples include:
- 6.3.1 Notice of Road Construction Projects
- 6.3.2 Notice of Future Road Work

6.4 Public Service Messages, Samples include:
- 6.4.1 Fire Danger
- 6.4.2 Driver Safety Campaigns

6.5 “Good” road conditions, i.e. no operational incidents, normal conditions.

## 7.0 Sample CMS Messages

HWY 5 & 97C
BARE & DRY

HWY 3 CLOSED DUE TO
AVALANCHE - USE HWY 5

BRIDGE MAINT 12KM
LEFT LANE CLOSED

FLAG PERSON 3KM
PREPARE TO STOP

VEHICLE CRASH AHEAD
DETOUR EXT 123

ROGERS PASS
CHAINS REQUIRED

WATCH FOR WILDLIFE
ON ROAD AHEAD

LINE PAINTING AHEAD
9AM – 3PM DAILY

BRIDGE WASHOUT 12KM
1 LANE ALT TRAFFIC

FOREST FIRE 30KM
LOW VISIBILTY – SMOKE

EXTREME FIRE HAZARD
CAMPFIRE BAN

BLOWING SNOW NEXT 10KM
LOW VISIBILTY

SLOW DOWN
KEEP YOUR DISTANCE

## 8.0 Authority

Emergency CMS message displays may be authorized by the MoT District Transportation Manager or delegate. Message displays are controlled by the Provincial Highways Condition Centre in accordance to this policy circular.

The MoT Chief Engineer approves the CMS policy and any revisions to the policy.

## 9.0 References

Dudek, C.L. *Guidelines for Changeable Message Sign Messages: A White Paper*
Report No. FHWA [Draft] Texas Transportation Institute, College Station, TX December 2002

North Carolina Department of Transportation, *Operational Guidelines for the use of Changeable Massage Sign*s, Raleigh North Carolina, July 1999

British Columbia Ministry of Transportation *Policy on Messages for Changeable Message Signs*, June 1995

## 10.0 Appendix

### 10.1 Sign Locations (Note: Contact BCMoT Electrical Services (604 660-8298) for information on what contractor provides maintenance on these signs).

**Table 3** Changeable Message Signs (CMS):[2]

| Sign # | Hwy # | Place | Location | Hwy Eng Ref |
|---|---|---|---|---|
| 11-1 | Hwy 1/99 | W. Vancouver | w/b Westmount Interchange | TE-88069 |
| 11-2 | Hwy 99 | Squamish | s/b 11 km south of Valley Drive | TE-88070 |
| 11-3 | Hwy 99 | Alice Lake | n/b 10.24 km north of Squamish | Na |
| 11-4[3] | Hwy 1 | W. Vancouver | e/b at 15th Street W. Vancouver | Na |
| 12-1 | Hwy 1 | Mill Bay | s/b at Mill Bay (Malahat) | Na |
| 12-2 | Hwy 1 | Colwood | n/b at Colwood (Malahat) | Na |
| 13-1[3] | Hwy 99 | Surrey | Hwy 99 s/b at 16th Ave., surrey | Na |
| 13-2[3] | Hwy 15 | Surrey | Hwy 15 s/b 0.5 km north of 8th Ave., Surrey | Na |
| 15-1 | Hwy 1 | Laidlaw | e/b 1.5 km west of Hunter Creek Weigh Scale | TE-85050 |
| 15-2 | Hwy 3 | Laidlaw | Hwy 1 e/b 1 km west of Hunter Creek Weigh Scale | TE-85050 |
| 15-3 | Hwys 5/97C | Laidlaw | Hwy 1 e/b 500m west of Hunter Creek Weigh Scale | TE-85050 |
| 15-5 | Hwy 1 | Hope | Hwy 7 e/b 1 km west of Haig interchange | TE-88043 |
| 15-7 | Hwy 5 | Coquihalla | Hwy 5 n/b 2 km west of Peerces Creek interchange | TE-84064 |
| 15-8 | Hwy 97C | Coquihalla | Hwy 5 n/b 3 km west of Jessica interchange | TE-87065 |
| 15-9 | Hwy 1 | Matsqui | 1.5 km west of McCallum Rd interchange | TE-91048 |
| 15-10 | Hwy 1 | Abbotsford | 1.5 km west of Whatcom Rd interchange | TE-91048 |
| 15-11 | Hwy 1 | Abbotsford | w/b 980m north of No. 3 rd U/P | TE-91048 |
| 15-12 | Hwy 1 | Chilliwack | w/b 1 km east of Lickman Rd interchange | TE-91048 |
| 21-1 | Hwy 1 | Kamloops | Hwy 1 w/b 500m west of Sagebrush interchange | TE-87069 |
| 21-2 | Hwy 1 | Kamloops | 1/97 e/b 500m east of Vicars Rd | TE-86028 |
| 21-4 | Hwys 5/97C | Kamloops | Hwy 1 w/b 500m west of Aberdeen interchange | TE-87069 |
| 24-1 | Hwy 3 | Princeton | w/b 1 km west of Vermillion Ave | na |
| 22-1 | Hwy 1 | Sicamous | Hwy 1 e/b km east of Rte 97A | TE-86003 |
| 25-2 | Hwy 5 | Coquihalla | s/b 2 km north of Coquihalla Lakes | TE-84067 |
| 25-3 | Hwy 5 | Coquihalla | s/b 3 km north of Kingsvale interchange | TE-84057 |
| 25-5 | Hwys 5/97C | Merritt | Hwy 5 s/b 4 km north of Nicola interchange | TE-87069 |
| 25-9 | Hwy 5 | Aspen Grove | Hwy 1 w/b 3 km east of Aspen Grove intersection | Na |
| 26-1 | Hwy 1 | Spences Brg | w/b 1 km north of Hwy 8 | Na |
| 29-1 | Hwy 97C | Westbank | Hwy 97 w/b 2 km east of HWY 97C Junction | Na |
| 29-2 | Hwy 97C | Peachland | Hwy o7 n/b 2 km south of Hwy 97C Junction | Na |
| 31-1 | Hwy 3 | Salmo | Hwy 3/6 Junction | na |
| 37-1 | Hwy 1 | Golden | w/b 500m west of Ottoson Rd | TE-90101 |
| 38-1 | Hwy 1 | Revelstoke | e/b 4.5 km east of Columbia River Bridge | TE-90075 |
| 38-2 | Hwy 1 | Revelstoke | w/b 700m W. of Columbia River Bridge – 3 Valley Gap | TE-90074 |
| 39-1 | Hwy 3 | Creston | w/b Jct of Hwy 21 | Na |
| 52-1 | Hwy 16 | Terrace | w/b 2 km west of Terrace | Na |
| 52-2 | Hwy 16 | Port Edward | 2 km east of Port Edward intersection | na |

**Table 4** Open/Closed Electronic Signs

[2] CMS signs on Hwy 99 approaching George Massey Tunnel are not controlled by the PHCC. They are part of the contra-flow operations, controlled by the maintenance contractor.

[3] Signs 11-4, 13-1, and 13-2 are part of an automated ATIS system. Information on these signs is provided from vehicle detection stations (VDS) located on their respective highways and indicate delays and border crossing wait times.

| Sign # | Hwy # | Place | Location | Hwy Eng Ref |
|---|---|---|---|---|
| 15-4 | 1, 3, 5, 97C | Hope | Hwy 1 e/b 900m west of Hope interchange | TE-85050 |
| 15-6 | 3, 5, 97C | Hope | Old Hwy 3 e/b west of Thacker interchange | TE-87069 |
| 21-3 | 1, 5, 97C | Kamloops | Hwy 1 w/b west of Pacific Way interchange | TE-87069 |
| 25-4 | 5, 97C | Merritt | Hwy 5 s/b 3 km north of Nicola interchange | na |
| 25-6 | 1, 5 | Merritt | Hwy 5 s/b 2 km south of Nicola interchange | na |
| 25-7 | 5, 97C | Merritt | Hwy 5A/97C e/b .5 km west of Coldwater interchange | na |
| 25-8 | 5, 97C | Merritt | Hwy 5A/8 1 km east of Coldwater interchange | na |
| O/C K1 | Hwy 3 | Nelson | Hwy 3A e/b west of Cottonwood interchange | E-7204 |
| O/C K2 | Hwy 3 | Nelson | Hwy 6 s/b south of Cottonwood interchange | E-7204 |
| O/C K3 | Hwy 3 | Creston | Hwy 21 n/b south of Hwy 3/21 Junction | TE-88005 |
| O/C K4 | Hwy 3A | Creston | Hwy 3A w/b south of Helen Rd | TE-88005 |
| O/C K5 | Hwy 3 | Nelway | Hwy 3 e/b east of Hwy 6 | E-7742 |
| O/C K6 | Hwy 3 | Castlegar | Hwy 3 e/b south of Ootichensia interchange | E-7839 |
| O/C K7 | Hwy 3 | Waneta | Hwy 3B e/b west of Waneta Junction | Na |
| O/C K8 | Hwy 3 | Creston | Hwy 3 w/b north of Hwy 3/21 Junction | TE-90016 |
| O/C K9 | Hwy 3 | Sparwood | Hwy 3 e/b east of Sparwood | na |

## 10.2 ICBC and/ or RCMP/Local Police Road Safety Messages.

**Table 5**

| DATES | EDUCATION AWARENESS |
|---|---|
| April | Seat Belts Save Lives |
| | Are You Clicking In? |
| May | Please Take Care |
| | Motorcycles Are There |
| June | Get Home Safe |
| | Don't Drink and Drive |
| July & August | Slow Down |
| | Keep Your Distance |
| September | Slow Down |
| | Stay Focused On The Road |
| October | October Is Zero Crash Month |
| | Drive Safely |
| November | Slow Down |
| | Keep Your Distance |
| December | Don't Drink and Drive |
| | Road Checks On Now |
| January to March | Slow Down |
| | Keep Your Distance |

# SECTION II: *PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)*

## 1.0 General

Portable[4] Changeable Message Signs (PCMS) are shoulder or vehicle mounted temporary traffic control devices that may be used in advance of a condition to supplement and enhance static temporary Traffic Control Devices (TCD). TCDs are used to warn and advise road user of hazards or temporary conditions that may affect the driving task or travel route. PCMSs are frequently specified for use on MoT construction projects. They are used to:

1.1 Identify emergency conditions that require road user to alter normal driving patterns.

1.2 Identify work zones and provide instruction/warning to road users regarding the nature of the works and required action.

1.3 Warn of hazards or abnormal road conditions due to weather, or other incidents that may require road users to proceed with caution.

1.4 Inform road users of alternate routes available to minimize travel delays.

1.5 Provide road users with advance information regarding the timing of events such as road closures, or traffic pattern changes related to special events that take place.

1.6 Reiterate work zone speed limits.

1.7 Advise of events that may affect traffic congestion or road closures.

[4] Permanent CMS signs are referred to as "CMS"

## 2.0 PCMS Placement

PCMSs should be placed:

2.1 Where the sign is visible to road users from 400 to 800m

2.2 Where the message is legible to road users at a minimum of 250m, and 150m to 300m in advance of point of action; (detour, work zone, etc) or for low speed locations (≤70km/h) and 300m to 1.5km for high speed locations (≥ 80km/h).

2.3 The PCMS should be placed with enough lateral clearance between the outside edge of the "raised" sign board and the shoulder fog line/lane edge line to ensure bicycle/pedestrian passage.

2.4 The minimum lateral clearance between the outside edge of the raised sign board and shoulder fog line/lane edge line stripe should be 300 mm (12 inches) otherwise the sign boards will likely be prone to being hit.

2.5 The traffic management strategy should note the locations where a project does not have sufficient shoulder width to allow for the 300 mm clearance between the fog line/lane edge line stripe and sign board. This lack of shoulder width should not forego the use of PCMSs as they are a great information tool for all road users. As such, Barrel/Flexible Drum delineators should be placed on the approach side of the PCMS device to provide notification and protection for road users including cyclist who might drive so close as to clip the sign board.

2.6 Place vertically a minimum of 2.0m from bottom of the sign to the road surface per Section 194.46 of the Standard Specifications for Highway Construction. This will allow "most" cyclist and pedestrians to ride/walk under the sign board.

2.7 PCMSs placed in the field should be checked periodically for legibility to ensure the sign face is correctly aimed for approaching road users. This should include a "time-of-day" review to check the impact of the sun, especially during the spring and fall months.

2.8 Two or more PCMSs may be used on the same approach. When used, they should be spaced approximately 300m apart.

2.9 PCMSs when placed on the road/highway right-of-way should be enhanced with retro-reflective sheeting or devices that delineate the PCMS when it is not in use.

2.10 A minimum of three Barrel/Flexible Drum delineators should always be used to shadow the PCMS when it is being used in the field. The Flexible Drums should be placed in front (on the approach side) of the PCMS device.

## 3.0 PCMS Message Guidelines:

Approximately 1 second is required for a road user to read 1 word or 1.5 to 2.0 seconds per phrase. PCMS messages should convey a single thought and address WHAT the event is, WHEN it occurs and WHAT the road user is required to do. Words such as “WARNING” or “CAUTION” should not be used if these words sacrifice better information. The presence of PCMS implies a change in upcoming travel conditions. The following guidelines should be followed in message design:

3.1 Typically PCMSs are limited to 3 lines with 8 characters per line resulting in a maximum message size of 24 characters. Some PCMS provide full matrix boards capable of displaying symbols to enhance the messaging. These symbols may be displayed with or without text.

3.2 The message should be able to be read by the road user twice before passing the PCMS while traveling at the speed limit.

3.3 PCMS minimum character size is shown in Table 6.

**Table 6** PCMS Character/Font Size

| Minimum Character Size | Speed Limit | Comments |
|---|---|---|
| 450mm (18") | ≥70km/h | Stationary trailer or large truck mounted PCMS. Based on 275m viewing distance. Message must be read 2X at speed limit. |
| 300mm (12") | ≥60 km/h[5] | Based on 150m viewing distance. Message must be read 2X at the speed limit. |
| 250mm (10") | All | Shadow vehicles for mobile operations only. Full matrix signs should display the largest characters possible-300mm is desirable. |

3.4 PCMS signs should only be used for transportation and/or safety related messages with the exception of the "Amber Alert" messages. Organizations such as ICBC, RCMP/ Local Police, BC Ferries, and "Special Event" organizers do on occasion use PCMSs on MoT right-of-way and would require the approval of the local BCMoT District Manager, Transportation (DMT), or delegate.

3.5 PCMS should display yellow, orange or green messages using a light illuminating source against a black background. Red messages should be restricted to stop control messages such as "STOP AHEAD." Note this does not preclude the use of new technologies that may emerge and prove effective for displaying characters other than what is mentioned above.

[5] PCMS displaying 300mm characters may be used in high speed areas on narrow winding highways where the use of the larger PCMSs may not be feasible due to space limitations. This variance must be approved by the Regional Traffic Engineer or Project Manager.

3.6 A longer message may be displayed in two phases providing the message can be read twice at the speed limit. Each message must be displayed for a minimum of 3 seconds. An example of the typical message sequence is shown below:

| Phase 1 | | | Phase 2 | |
|---|---|---|---|---|
| Display 1 | Display 2 | | Display 1 (repeated) | Display 2 (repeated) |
| ROAD | LEFT | | ROAD | LEFT |
| WORK | LANE | | WORK | LANE |
| 5 KM AHD | CLOSED | | 5 KM AHD | CLOSED |
| View Time 3 Sec | View Time 3 Sec | >REPEAT> | View Time 3sec | View Time 3 Sec |

3.7 Don't let the messages displayed for a work zone go stale as one of the most significant problems with PCMSs is credibility. Consider changing the displayed message every 2 – 4 days as this will command attention and help keep regular commuters through a work zone better aware of the operations taking place. Using slightly different phrases on a sign board can inform road users of the same operational issue; i.e. Construction Zone Ahead vs. Equipment and Workers Ahead, or Road Paving Ahead vs. Asphalt Paving Ahead etc., etc., etc.

3.8 If there is no work zone information, incidents or adverse road conditions to report the PCMS may display the local real time and air temperature, or may turned perpendicular to the flow of traffic so that road users do not see the screen.

## 4.0 PCMS Operational Guidelines

4.1 PCMS should be in operation continuously and have a back-up system to allow the unit to function if the primary energy source fails. While in operation, the PCMS shall be periodically inspected to ensure it is functioning correctly and displaying the appropriate message. PCMSs should have protection so that only authorized personal have control of message displayed. If the PCMS is not in use it should be positioned off the roadway as not to present a hazard, and be delineated with retro-reflective sheeting and/or other devices.

4.2 The PCMS unit should automatically adjust brightness relative to ambient light conditions to maintain visibility.

4.3 Additional Information on the set-up and use of Portable Changeable Message Signs (PCMSs) may be found on the FHWA's website. The site has a publication called *Portable Changeable Message Sign Handbook*.

http://www.tfhrc.gov/pavement/ltpp/reports/03066/

## 5.0 Message Types and Categories

Table 7 outlines the three major categories of messages and typical messages used on PCMSs. This is not a comprehensive list and other message types may be required to deal with the incident/condition at hand.

**Table 7** PCMS Messages

| Incidents | Planned Events | Road /Climatic Conditions |
|---|---|---|
| Abandoned Vehicle | Avalanche Control | Bare |
| Avalanche | Bridge Construction | Bare & Dry |
| Bridge Wash Out | Bridge Maintenance | Bare & Wet |
| Collision | Construction Line Painting | Black Ice |
| Debris on Road | Wet Paint | Blowing Snow |
| Forest Fire | Mowing | Compact Ice |
| High Winds | Paving | Compact Snow |
| Hazardous Material Spill | No Shoulder | Compact Snow Chains Required |
| Hydro Lines Down | Do Not Pass | Compact Snow Plowing & Sanding |
| Livestock on Road | Detour | Compact Snow Slippery Sections |
| Material Spill | Road Construction | Compact Snow Sanded |
| Vehicle Crash | Road Maintenance | Falling Ice |
| Mud Slide | Trucks Crossing | Falling Rock |
| Police Incident | Rock Scaling | Flooding |
| Rock Slide | Seal Coating | Freezing Rain |
| Traffic Signal Failure | Special Event | Frost Heaves |
| Vehicle Fire | Exit XX Closed | Heavy Snowfall |
| Vehicle Stall | Use Hwy XX | Heavy Snowfall with Plowing & Sanding |
| Accident Ahead….Road Closed | XXX Ahead | High Avalanche Hazard |
| Wash Out | Ahead | Limited Visibility Blowing Snow |
| Wildlife on Road | Single Lane Traffic | Limited Visibility Fog |
| ■ Big Horn Sheep | Right Lane Closed | Limited Visibility Heavy Snowfall |
| ■ Elk | Left Lane Closed | Limited Visibility Smoke |
| ■ Caribou | Centre Lane Closed | Plowing & Sanding In Progress |
| | Exit Closed Ahead | Slippery Sections |
| | Ramp Closed Ahead | Slushy Sections |
| | Slow Near Equip | Smoke |
| | Const Speed Limit 60 km/hr | Traffic Congestion |
| | | All Trucks Chains Required |
| | | Water Ponding |
| | | Bump Ahead |

## 6.0 Message Abbreviations

The message may contain abbreviations but should be limited to commonly known ones as shown in the Table 8.

**Table 3** PCMS Message Abbreviations

| Word | Abbr. | Word | Abbrev. |
|---|---|---|---|
| Ahead | AHD | Maintenance | MAINT |
| Alternating/Alternate | ALT | Mountain Standard Time | MST |
| Boulevard | BLVD | Mountain Daylight Time | MDT |
| Bridge | BRDG | Pacific Standard Time | PST |
| Cardinal Dir. | N, E, W, S | Pacific Daylight Time | PDT |
| Construction | CONST | Prepare | PREP |
| Emergency | EMER | Pavement | PVMT |
| Entrance | ENT | Parking | PKING |
| Equipment | EQUIP | | |
| Exit | EXT | Route | RTE |
| Freeway | FWY | Road | RD |
| Hazardous | HAZ | Right | RT |
| Highway | HWY | Shoulder | SHLDR |
| Information | INFO | Slippery | SLIP |
| Junction | JCT | Speed | SPD |
| Kilometre | KM | Summit | SMT |
| Lane | LN | Traffic | TRAF |
| Left | LFT | Warning | WARN |
| Minutes | MIN | Vehicle | VEH |
| Minor | MNR | | |

## 7.0 Sample PCMS Messages:

HWY 3
CLOSED
AVALANCHE

BRIDGE
WORK AHD
1 LN OPEN

TCP AHD
PREPARE
TO STOP

ACCIDENT
AHD - USE
EXT 123

LT LANE
CLOSED
AHEAD

BIG HORN
SHEEP
NEXT 30KM

LINE
PAINTING
9–3 DAILY

SINGLE
LN TRAF
AHD

ROAD
CLOSED
FLOODING

10:30AM PST

## 8.0 Authority for PCMS use:

PCMSs units may be authorized for use on MoT roads by:

8.1 District Manager, Transportation (DMT) or delegate

8.2 Regional Traffic Engineer

8.3 Project Supervisor or delegate

8.4 Project Traffic Control Engineer

8.5 Traffic Control Supervisor

## 9.0 References

Federal Highway Administration (ND) *Portable Changeable Message Sign Handbook*. Report FHWA-RD-03-066, US Department of Transportation, Washington DC USA

American Traffic Safety Service Association (1994) *Guidelines for the Use of Portable Changeable Message Signs.*

Federal Highway Administration (2003) *Manual on Uniform Traffic Control Devices (MUTCD)* US Department of Transportation, Washington DC