

OREGON

Portable Changeable Message Sign Handbook

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Oregon

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TO: Handbook Users

We are pleased to bring you the first edition of the *Oregon Portable Changeable Message Sign Handbook*. The purpose of this handbook is to provide basic information for the safe and effective use of a Portable Changeable Message Sign (PCMS). This handbook will illustrate proper setup and delineation for a PCMS, as well as provide users with a variety of example messages for a broad range of roadway activities.

Also known as a portable variable message sign (PVMS), this handbook may be used in Oregon for roadway maintenance activities, incident management, other short-term activities, and long-term construction projects on Oregon roadways.

While the *Oregon PCMS Handbook* is written following accepted traffic engineering practices and research, this handbook is not intended as an Oregon standard or policy. National and Oregon state standards, policies, and specifications that apply to PCMS are found in the Manual on Uniform Traffic Control Devices (MUTCD) and the Oregon Standard Specifications for Construction [1], respectively.

The contents of this handbook are based on guidance found in the following:

- 2009 *Manual on Uniform Traffic Control Devices* (MUTCD) [2]
- FHWA's *Portable Changeable Message Sign Handbook* [3]
- 2011 *Oregon Temporary Traffic Control Handbook* (OTTCH) [4]
- Texas Transportation Institute's (TTI) *Development of a Field Guide for Portable Changeable Message Sign Use in Work Zones* [5]

Other available studies, guidelines, and research were also referenced in the compilation of this handbook. A complete list of referred works is available in the References section. The *Oregon PCMS Handbook* is available on the ODOT Traffic Control Plans Unit website under Publications.

(Original Signed By)

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WHEN TO USE A PCMS

A PCMS is a proven effective tool in a variety of temporary traffic control conditions including situations where:

- The speed of vehicular traffic is expected to drop substantially or fluctuate regularly.
- Significant traffic queues and delays are expected.
- Adverse weather or environmental conditions exist (e.g. dust, smoke, fog, etc.).
- Changes have been made to alignment or roadway surfaces.
- Advance notification for ramp, lane, or roadway closures is needed.
- Changes in traffic patterns or lane usage occur (turning lane closures, loss of climbing/passing lane, etc.).
- Supplementing temporary signs and/or pavement markings would enhance road user safety.
- A permanent sign has failed (e.g. structural failure, collapse, blocked from view, etc.).
- A special event (e.g. sporting event, concert, parade) creates an impact on the normal flow of traffic.
- Emergency situations or response to a roadway incident create the need for dynamic advance warnings or detour information.

EQUIPMENT

A PCMS is a large electronic sign used to display programmable, dynamic messages to provide traffic with timely warnings, guidance or notification of approaching roadway conditions.

A PCMS can be mounted on either a trailer or a work vehicle; and, are capable of displaying two or three lines of text, depending on the PCMS size.

For mobile operations, a series of truck-mounted PCMS may be used to display warning messages or be set to “Caution” mode. Truck-mounted PCMS are recommended for mobile operations for all roads [4].

NOTE: Use of vehicle-mounted flashing warning lights placed in front or in the line of sight of the PCMS can affect the legibility of the PCMS message and blind drivers – particularly at night. Consider turning off flashing warning lights mounted between the PCMS and approaching traffic.

Operate the PCMS according to the manufacturer’s instructions, the temporary traffic control plan, and the project specifications, where applicable.



Trailer Mounted PCMS



Truck Mounted PCMS

For work activities on Oregon highways, use a PCMS listed on ODOT’s Qualified Products List (QPL). The ODOT fleet procurement process addresses specific needs for ODOT purchases.

PLACEMENT

Locate and align the PCMS to provide maximum legibility and time for public traffic to interpret and respond appropriately to the message.

Site Selection

Locate a suitable site for the PCMS and adjust for road conditions as follows:

1. Look for a straight, flat section of roadway.
2. Site should be safely accessible by maintenance/towing vehicle.
3. PCMS unit should be visible from ½ mile in daylight and nighttime conditions, when practical.
4. PCMS message should be legible from a minimum of 600 feet at night and 800 feet during daylight conditions.



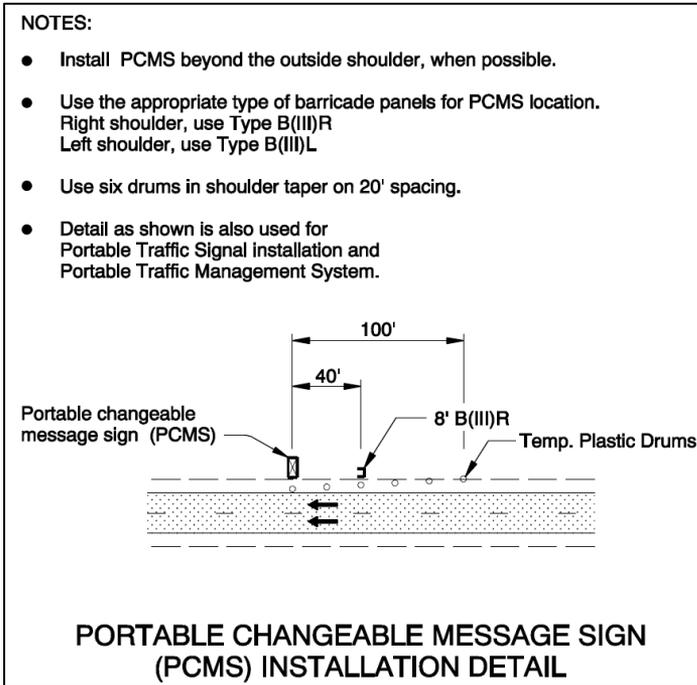
PCMS Located Near a Pullout for Accessibility

5. When not displaying messages, turn off PCMS and rotate panel away from traffic. When practical, and if not being used for a long period of time (e.g. more than 24 hours), move PCMS behind traffic barrier or to a location that minimizes exposure to live traffic.



PCMS Lowered and Turned Away from Traffic

6. If relocating or shielding the PCMS behind a traffic barrier is not practical, turn the PCMS panel away from traffic and delineate using the PCMS Installation Detail on ODOT Standard Drawing TM800, shown below, or as shown in the OTTCH [4], Chapter 4.



TM800 PCMS Installation Detail



Delineated PCMS using TM800 Detail

7. For detours, locate PCMS enough in advance of route decision points to allow road users to perform necessary lane changes or turns to access the alternate route.
8. Locate PCMS away from guide, warning or other critical signs as follows:
 - a. At least 1000 feet on freeways
 - b. At least 500 feet on non-freeways with posted speed of 45 mph or higher. Increase distance on multi-lane roadways.
 - c. At least 350 feet on multi-lane roads or arterials with posted speed of 40 mph or less
 - d. At least 100 feet on urban roads with posted speed of 25 mph or less
9. Locate PCMS away from high driver workload areas (busy intersections, ramps, freeway decision points, etc. [6]). If ideal sites are limited, place PCMS as far into driver's cone of vision, as practical, to optimize visibility of the messages.



High driver workload areas can affect PCMS visibility



PCMS too far beyond driver's cone of vision

10. When multiple PCMS are needed, place them on the same side of the roadway, and separate them by a minimum distance of:
- 1,000 feet on freeways and expressways
 - 500 feet on all other roadways

Do not install any temporary signing between the two PCMS to maintain the integrity of the complex message sequence.

See Message Content section below, for additional guidance in using two PCMS.

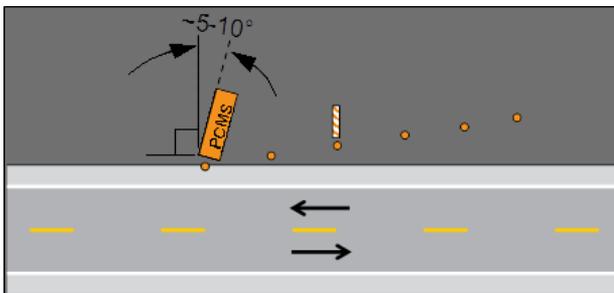
11. When possible, place PCMS so as to avoid visual clutter and roadside features affecting the PCMS messages.

On multi-lane roads with sufficient median width, PCMS may be placed in the median for additional visibility.



Roadside Clutter Affecting Message

12. Place PCMS on level ground, where practical. Use leveling jacks to plumb the PCMS. Rotate sign face 5-10 degrees toward the roadway to improve legibility [7]. See below:



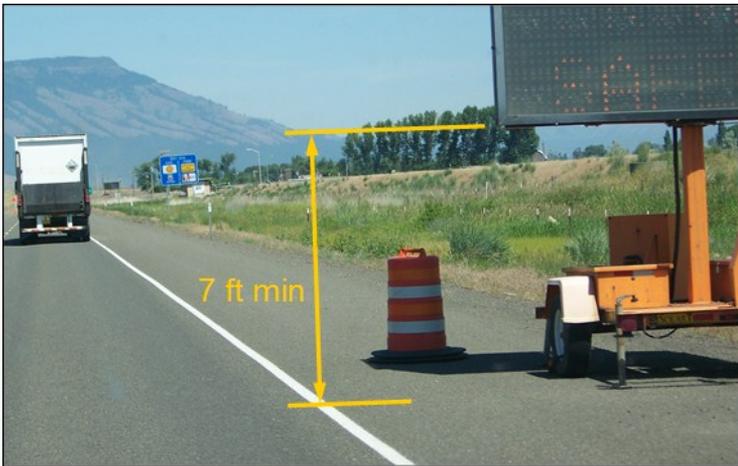
Rotate Sign to Improve Legibility

Sight Distance & Visibility

Horizontal or vertical curves, foliage, buildings, or other roadside features may hide a PCMS. The PCMS may need to be located further from the decision point to give motorists enough time to read the messages.

NOTE: PCMS should be visible from 1/2 mile; and, legible from 800 feet in daylight hours, 600 feet at night.

When displaying messages, raise the sign panel until the bottom of the panel is a minimum of 7 feet above the roadway.



Proper height provides maximum message visibility

After the PCMS has been positioned, with the panel at the proper height and rotated to face traffic, verify the PCMS is unobstructed and the messages can be read from the distances shown above.



Field verify PCMS visibility after installation

MESSAGES

The primary purpose of a PCMS is to provide traffic with timely information to facilitate safe movement through the area or work zone.

Display

A complete PCMS “Message” is made of two individual, alternating messages. Each individual message is known as a “Phase” or “Panel.”

Each phase should be displayed for at least 2 seconds. Complex phases may take longer to be understood [6]. The total display time for both phases should be no greater than 8 seconds.

Drivers traveling at the posted speed should be able to read the entire Message at least twice, allowing time to read and react to the message, and take the appropriate action.

A PCMS message should conform to the following:

- A maximum of 3 lines per phase.
- A maximum of 8 characters per line.
- A maximum of 2 phases (panels) per complete message.

In developing a Message for a PCMS, consider the following additional practices:

- Each phase contains an independent thought that is capable of being understood alone.
- If using only one phase, display the phase continuously. Avoid flashing the same phase repeatedly.
- Use all upper-case letters and center or left justify each line to improve legibility.
- Do not use animation, rapid flashing, dissolving, exploding, horizontal or vertical scrolling, or other techniques for displaying phases.
- A PCMS may be used to display arrows and chevrons to simulate a sequential arrow board. Do not combine arrows/chevrons and text on the same phase. Arrows and chevrons used on a PCMS must comply with the MUTCD.
- For a three-line PCMS, letters should be at least 18 inches tall. For a two-line PCMS, letter heights should be at least 10 inches tall.

Message Length

The key to an effective message is to provide adequate information to drivers. Ineffective messages can result in frustration, confusion, or even decreased safety.

Messages that are too short, too vague or too generic may cause drivers to:

- Become confused or misinterpret the message,
- Drive in a manner different than what was intended,
- Ignore the message, or
- Get angry, frustrated, even violent.

Too much information (e.g. overly complex message, 3 or more phases, etc.) may cause drivers to:

- Not be able to read entire message,
- Become overly distracted by the message trying to read it all, or
- Ignore the message.

Keep messages concise, as motorists can only process a limited amount of information at a given time. Research [8] suggests the maximum number of words in a message, including both phases, should be:

- 8 words on roads with a posted speed of 55 mph and less
- 7 words on freeways

Message Content

PCMS should only display traffic operational, warning, and guidance information. Do not display advertising messages on PCMS or its supports. A PCMS should be used to supplement conventional signing and pavement markings, not substitute for them.

A list of commonly or frequently used “Standardized Messages” can be found in Appendix A.

The message should be as brief as practical, and should contain three thoughts – with each thought preferably shown on its own line:

1. The problem or situation that the road user will encounter.
2. The location or distance to or the timing of occurrence.
3. The recommended driver action.

In some instances, a third phase may be needed to convey additional information. If a third phase is needed, a second PCMS should be used. See Message Exceptions, below, if using a second PCMS is not practical.

If two PCMS are needed, set up both PCMS, program the three desired panels and test the message sequence. Then, display the two PCMS to traffic, as timely as practical.

If a second PCMS is added to provide additional information to an existing operating PCMS, set up, program and test the second PCMS. Then, display the second PCMS message to traffic.

In choosing to use longer PCMS messages (including adding a second PCMS), it should be noted, research indicates motorists have difficulty comprehending long, complex messages, even when using two PCMS to display the message [8].

For Oregon State highways, limit displaying extended road or lane closure information to a maximum of two weeks before the closure takes place [6], unless otherwise directed by an ODOT Region Traffic Engineer, ODOT Project Manager, other ODOT representative, or within a project traffic control plan.

Avoid displaying messages that could adversely impact a facility operated or maintained by another jurisdiction. Contact the affected agency and have the agency approve the message.

If an emergency action plan or other interagency agreement exists regarding rerouting or detouring traffic, follow the procedures within that plan or agreement.

Do ***not*** display the following types of messages on a PCMS:

- Test messages
- Public Service Announcements (PSA)
- “Amber Alerts”
- Messages that conflict with Highway Advisory Radio (HAR) broadcasts in the area.

Avoid alternating-line messages – where a portion of the message (e.g. the first line, or first two lines) is held constant between the two phases, while the remaining line(s) alternates two different pieces of information. Research

[9] [10] has shown while driver comprehension may not be affected, reading time greatly increases with these types of messages.

When environmental conditions reduce visibility and legibility, or when legibility distances cannot be achieved, consider limiting the message to a single phase.



Rain, fog, smoke, or dust can reduce PCMS legibility

Message Exceptions

Under limited conditions, a message may be composed of three phases. The following represent cases where a third phase may be displayed on a single PCMS:

- Emergency situations
- Cases of inclement weather
- In regularly occurring snow zones
- Locations with limited right of way precluding placement of a second PCMS
- Lack of PCMS availability
- Other site restrictions or conditions, when approved by Supervisor or Engineer.

See Appendix A – Standardized Messages for example messages that may provide useful alternatives to using a third Phase.

Sight distance to the PCMS should be maximized under these conditions to provide drivers with the best chance of reading all three phases.

If used, the message on an additional PCMS does not need to repeat any part of the first PCMS message. If two PCMS are available, one static (unchanging) phase should be displayed on the first PCMS. The second PCMS should be used to display the second and third phases.

On Oregon State highways, if a custom, non-standardized message is needed, the message should be approved by either the Region Traffic Manager or their representative, or by a representative of the ODOT Project Manager's office, where applicable.

Credibility

Message credibility is an extremely important consideration in properly operating a PCMS. Messages must provide timely, reliable, accurate, and relevant information.

Messages should avoid using generic 'signal' words – DANGER, WARNING, CAUTION, etc. Research [7] has shown these types of words may not be interpreted as intended, and often do not affect motorist driving patterns or behaviors.

Many factors can reduce PCMS credibility [11], including information that is:

- **Inaccurate** – Messages do not reflect current roadway conditions – e.g. PCMS message warns of Flaggers ahead when no flagging work is being conducted.
- **Outdated** – A poorly timed PCMS message will impair its effectiveness – e.g. A ramp closure warning for a ramp that reopened one week ago.
- **Irrelevant** – Avoid displaying messages from too distant of a location off the road being affected by the work – e.g. A PCMS on a freeway displaying information about paving activities on a local street that have no impact on freeway traffic.
- **Repetitive** – Displaying the same message continuously for 2 weeks or more in high-traffic, urban areas. Motorists are likely to ignore the message, thus rendering the PCMS ineffective or useless.
- **Poorly Designed** – Poorly structured, misspelled, overly-abbreviated, slang or local jargon used in messages often result in confusing, ineffective, even ignored messages.

- **Obvious** – Displaying messages that describe a condition already apparent to drivers – e.g. Displaying, “EXPECT DELAYS” to three lanes of bumper-to-bumper traffic.



- **Trivial** – Messages such as, “DRIVE CAREFULLY”, “USE CAUTION”, “SLOW” are quickly ignored by drivers and have little direct effect on driver behavior. Long-term use of these messages can condition drivers to ignore future messages, despite the importance of the messages.



Avoid displaying overly simplistic messages that add little value to other signs or devices used in the work zone. Provide drivers with a reason for being cautious or for slowing down – e.g. “WORKERS IN ROAD” or “LANE NARROWS”.

Standardized Messages

Generally, motorists need more time to read unusual or complex messages – messages with specific road names, dates, or times listed. Being able to quickly recognize and read a message can result in a faster understanding and response to the message. Standardized messages should be used when practical [7] [11]. A variety of Standardized Messages are available in Appendix A.

Custom Messages

If the Standardized Messages from Appendix A are not adequate for a given condition or application, a custom message may be developed.

Use the **PCMS Message Worksheet** in Appendix C to plan the message [12]. Following approval, store the Message Worksheet with the PCMS.

Consider the following factors when creating a custom message:

1. Keep the message simple, brief, legible, and clear.
2. Messages should address the following items:
 - a. **Problem** (e.g. the left lane is closed, and a detour is ahead)
 - b. **Location** (e.g. the lane closure is in 1 mile, and drivers should use Exit 214 for the detour); or,
 - c. **Time** (e.g. closures occur Tuesday-Friday, 8 p.m. – 6 a.m.)
 - d. **Action** (e.g. drivers must exit and be prepared to stop)

The above list is generally in order of importance. Choose the most important information to display – given the circumstances, message size limit, and desired driver response.

Add an attention statement if the message is being directed at a specific group of drivers or vehicle classification (e.g. Through-traffic; or, All trucks).

In the example of an approaching low bridge, a problem statement is needed, plus a height restriction announcement and the detour route(s). A PCMS message might look like the following:

HT LIMIT XXFT XIN 1 MILE	TRUCKS DETOUR NEXT RT
--------------------------------	-----------------------------

NOTE: If a height limit measurement includes 10” or 11”, the message may be rounded down to **9”** to save on character needs.

If the roadway is closed to all vehicles, the message may become:

ROAD CLOSED 1 MILE	DETOUR NEXT RIGHT
--------------------------	-------------------------

3. Avoid using unnecessary words – articles of speech (a, an, the) unless the intent of the message becomes unclear without them.

4. Avoid using abbreviations, when possible.
 - a. If necessary, use only abbreviations from Table 1, below.
 - b. For abbreviations not listed, create an abbreviation using the following techniques:
 - i. By removing one or more vowels – commonly near the end of the word:
 - “EXIT” may become, “EXT”
 - “CANYON” may become, “CANYN”
 - “SEASIDE” may become, “SEASID” or “SEASD”
 - ii. If necessary, a combination of vowels and extra consonants may be deleted:
 - “WILLAMETTE” might become, “WILLAMET”
 - iii. A combination of removing vowels and letters from the end of a word until it is the desired length.
 - “OVERWEIGHT” may become, “OVRWEIGH”

Research [7] shows truncated abbreviations are easier to recognize and comprehend than conventional or contracted abbreviations.

Example: *EMERGENCY*: “EMERGENC” may be more recognizable than, “EMERGN” or, “EMRGN”

Example: *SHOULDER*: “SHOULDR” may be more recognizable than, “SHLDR” or “SHLDR”

- c. Do not use a period with abbreviations.
5. Messages should be made of meaningful pieces of information understood as independent phases.
 - a. A single phase display is preferred.
 - b. Use no more than two phases for a given message.
 - c. Split message components where it makes the most sense.

FREEWAY	TRAFFIC
CLOSED	DETOUR
2 MILES	NEXT RT

- d. Reduce the message size for heavy traffic volumes, bad weather, or other demanding driving environments.
- e. Use two signs for complex or longer messages.

6. Do not display expected, unessential, or implied actions or information [7]. For example:
- Drivers will expect to have to merge right when they read:

LEFT LANE CLOSED

Displaying, “TRAFFIC MERGE RIGHT” on the second panel may be unnecessary. Instead, a description of the work activity, condition, or hazard may be displayed:

PAVING NEXT 2 MILES

- “FOLLOW DETOUR” uses fewer words than, “FOLLOW DETOUR ROUTE” to display the same critical information.
- “FLAGGER AHEAD” is more critical than, “EXPECT DELAYS”, and still implies potential delays.

Speeds

Speed messages on a PCMS should be limited to advisory or warning messages. Speed messages should be used to supplement regulatory posted speed signs, such as:

SLOW TO XX MPH	or	SPEED XX THRU WORKZONE
----------------------	----	------------------------------

When displaying speed reduction messages [6]:

- Provide a reason drivers should slow down, such as:

WORKERS IN ROAD	or	NARROW LANE AHEAD
-----------------------	----	-------------------------

- Do not display safety campaign messages on PCMS, such as, “CLICK IT OR TICKET”, “DONT DRINK & DRIVE”, or other public service messages.
- For extended work (i.e. 1 year or longer), use a PCMS during the first week or two of the project, and after any major condition changes. Use passive traffic controls at other times.
- Place the first PCMS 500 to 1000 feet upstream from the condition or hazard. The PCMS may be placed before or after the initial advance warning sign (e.g. ROAD WORK AHEAD), but should not block this critical sign, nor have the PCMS messages blocked by it.

Speed Detection Feature on PCMS

Speed detection devices can be fitted into a PCMS and used to provide vehicle speed information on the display. A PCMS used to display instantaneous vehicle speeds can be used for a wide range of conditions – roadside hazards, adverse weather conditions, traffic incidents, pavement condition, heavy congestion, etc. [13]. A PCMS with this feature can encourage speed limit compliance and reduce the speed of vehicles through a work zone. Speed zone compliance is increased when a reason for the reduced speed is displayed on the PCMS [14].

When displaying approach speeds:

- Display the PCMS in conjunction with a Speed Limit sign.
- Use the following message:

YOUR SPEED IS XX MPH

Consider the following before using a PCMS with speed detection capability:

- If used for more than 4 weeks, periodic police enforcement should be arranged to reinforce and maintain the effectiveness of the PCMS.
- Check the radar each time the PCMS is set up. Calibrate and adjust, as necessary, to ensure accuracy.
- The radar should be aimed to measure the speeds of vehicles traveling in the fastest moving lane, at no more than 10 seconds of distance upstream from the PCMS location.
- On roadways with posted speeds of 50 mph or greater, speeds of vehicles traveling more than 25 mph over the speed limit should not be displayed on the PCMS.
- In work zones, the first PCMS should be positioned 500 to 1000 feet upstream of the hazard, so drivers have time to read and interpret the message, and react before reaching the hazard.

Locations and Distances

Often times, using a specific distance to indicate an approaching condition or hazard provides better information than the more generic, “AHEAD”. If using distances in a message, use the following practices:

MILES

- For distances beyond 1/4 mile, it is more practical to use “MILES” to describe the distance. Drivers can struggle determining 1500, 2000 or more feet – and will likely try to convert it to miles anyway.
- Fractions – 1/4, 1/2, or 3/4 – may be used.
- A distance in miles may be written as, “MILE” (singular), “MILES”, or the abbreviation, “MI”
- Mile points (MP), while understood by truck drivers and law enforcement agencies, may not be clear to public traffic. Therefore, distances in miles to/from closure points, specific locations or other landmarks should be used in messages instead of references to mile points.

FEET

- Distances less than 1/4 mile should be shown in feet, and rounded to the nearest 100 feet – e.g. “USE DETOUR 1000 FT”
- A distance in feet may be written as, “FEET” or abbreviated as, “FT”
- If using feet to describe smaller dimensions (e.g. lane widths), it is most common to use the abbreviation, “FT”
- “11 FT / LANES / NEXT MI”, versus writing it out completely (e.g. “11 FOOT / LANES / NEXT MI”).

EXITS

If Exit numbers or proper names for places are shown on existing guide signs before a PCMS, or just beyond it, the Exit number or place name (e.g. Medford, Crater Lake, Mt. Hood) should be used, when practical.

- Use Exit numbers on interstate highways for consistency and to meet driver expectations.
- For multiple, consecutive exits less than 1 mile apart, or where multiple “Exit XXX” signs can be seen in the same field of vision, consider using, “NEXT EXIT”, “2ND EXIT”, etc. instead of distances or Exit numbers.
- If displaying place names, try to use the same name as shown on existing guide signs in the vicinity of the PCMS.
- Avoid using local nicknames or adjacent landmarks, unless the name is shown elsewhere on other existing guide signs in the area.

Unfamiliar motorists will have difficulty understanding local street and highway names (e.g. ‘McLaughlin Blvd.’, ‘Sunset Hwy’, etc.), and local landmarks or bridges (e.g. ‘The Waterfront’, ‘Marquam Bridge’, etc.).

Dates and Times

Research [8] [15] shows displaying time, day, and date information approaches driver information processing limits. Time and date messages should be used sparingly.

Regardless of the format used, over 25% of drivers viewing the time/date information will be unable to, or incorrectly, determine if the work activity will affect their trip.

Dates

For date ranges that are within the current week, or the following week:

- Days of the week may be displayed as, “TUE-THUR”, or “WED-SAT”, or “MON-TUES / NIGHTS / ONLY”, etc.
- Avoid using, “FOR 1 WEEK” or similar messages. The start and end dates are ambiguous, and explanatory text would have to be displayed on a second panel.
- “NITE” may be used in place of, “NIGHT”.
- A hyphen (–) may be used in place of, “THRU”.
- “WEEKEND” may be used if the event or condition begins on Saturday morning and ends Sunday evening.

Times

If time, days, or dates are needed in a PCMS message, consider the following:

- Use Time messages sparingly
- Use standard 12-hour format for time, using “AM” and “PM”.
- Do not display the Date, Day, and Time information in a two-panel message.
- Typically, only Month and Day are needed. Do not display the year in the date, unless condition spans multiple years.
- For date ranges within one week, in the same month:
 - Use three-letter month abbreviations – “APR”, “SEP”, “JAN”.
 - Use the Month only once in the message: “JUL 8-12”
- Avoid displaying the month as a number (e.g. April as, “04”), unless the date range spans multiple months, and no other options are available.
- If using numbers for Months, display without leading “0”. Example: July 30-Aug 9 becomes, “7/30-8/9”

Examples

1. A road is being closed next week. The following might be posted the weekend before and left in place until the end of the shift on Friday:

MAIN ST
CLOSED
MON-FRI

2. If the closure is two weeks away, the message might read:

MAIN ST
CLOSED
JUL12-14

NOTE: “JUL12-14” with no space between “JUL” and “12-14” is still legible on a PCMS due to the spacing between individual characters on the message board and the mix of alpha and numeric characters.

3. If the closure is within July and August, for a limited time, and uses a detour, the message may read:

MAIN ST	7/31-8/2
CLOSED	MAIN ST
7/31-8/2	DETOUR

This PCMS would be used to supplement other temporary closure and detour signing.

Symbols and Graphics

Newer technology allows a PCMS to display graphical duplicates of many standard signs or sign legends – including route shields and other common sign symbols with no apparent loss of resolution or recognition when compared with a static version of the same sign. PCMS that have this ability are known as, “full matrix” signs - and can also display messages/signs in full color. See Table 2A-5 in the MUTCD for a list of common uses of sign color.

Route shields and common sign symbols (e.g. Flagger Ahead symbol) should only be displayed if they can duplicate exactly the standard sign symbol in the correct color(s), as shown in the FHWA Standard Highway Signs (SHS) and ODOT Sign Policy and Guidelines. Information on displaying symbols on a PCMS is given in Chapter 2L of the MUTCD.

NOTE: A PCMS shall not display animation, rapid flashing, dissolving, exploding, scrolling, or other graphic elements that distracts road users.

Security

A high level of security should be exercised when operating a PCMS. Authorized personnel are responsible for the messages displayed and for the equipment itself.

Access to the control console and electronics must be controlled by authorized personnel only. The control console must include a locking lid and remain locked when not being serviced by authorized personnel.

Password protection should be utilized to avoid unauthorized access to the control panel. Any tampering or vandalism should be reported immediately to the authorities.

Standard Abbreviations

Due to limitations in the number of characters used in a line (8 characters) or phase (3 lines) of a PCMS message, abbreviations may be necessary.

If abbreviating, use the abbreviations in Table 1 – Standard Abbreviations, below. For additional abbreviations, see Section 1A.15 of the MUTCD.

If abbreviating word messages see Table 2, below, for a list of Prompt Words that should precede or follow the abbreviation.

Do not use the abbreviations shown in Table 3, below, as they are commonly misinterpreted by road users.

Table 1 – Standard Abbreviations

Word Message	Abbreviation
Access	ACCS
Afternoon/Evening	PM
Alternate	ALT
AM Radio	AM
Avenue	AVE, AV
Bicycle	BIKE
Boulevard	BLVD*
Cannot	CANT
CB Radio	CB
Circle	CIR*
Crossing (other than highway-rail)	XING
Crossing (Hwy-Rail Grade Crossing)	RR XING
Do Not	DONT
East	E
Eastbound	EB
Emergency	EMER
Entrance, Enter	ENT
Expressway	EXPWY
Feet	FT
FM Radio	FM
Freeway	FRWY, FWY
Friday	FRI
Highway	HWY
Hour(s)	HR, HRS
Information	INFO
Junction/Intersection	JCT
Lane	LN
Left	LFT
Maintenance	MAINT
Maximum	MAX
Mile(s)	MI
Miles Per Hour	MPH
Minimum	MIN
Minute(s)	MINS

Word Message	Abbreviation
Monday	MON
Morning/Late Night	AM
Motorcycles	CYCLES
North	N
Northbound	NB
Parking	PKING
Parkway	PKWY
Pedestrian	PED
Pounds	LBS
Right	RT
Road	RD*
Saturday	SAT
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	SB
Speed	SPD
Street	ST*
Sunday	SUN
Temporary	TEMP
Terrace	TER*
Thursday	THURS
Traffic	TRAF
Trail	TR*
Travelers	TRVLRs
Tuesday	TUES
Two-Way Intersection	2-WAY
2-Wheeled Vehicles	CYCLES
Vehicle(s)	VEH, VEHS
Warning	WARN
Wednesday	WED
West	W
Westbound	WB
Will Not	WONT

* This abbreviation **shall** not be used without the formal name of a roadway.

The abbreviations for the words listed in Table 2 should not be used unless the prompt word listed in Table 2 either precedes or follows the abbreviation.

Table 2 - Abbreviations Acceptable with Prompt Words

Word Message	Abbreviation	Prompt Word
Ahead	AHD	Fog, Dust, Ice, Fire *
Blocked	BLKD	Lane, Road *
Bridge	BR	[Bridge Name]*
Center	CNTR	Lane**
Construction	CONST	Ahead**
County, or other non-US, non-Interstate, or non-Oregon numbered Route	[Abbreviation determined by Roadway Agency]***	[Route Number] **
Downtown	DWNTN	Traffic, Event **
Frontage	FRNTG	Road**
Interstate	I-	[Route Number] **
Lane	LN	[Roadway Name], Right, Left, Center *
Oregon Numbered Route	OR	[OR Route Number] **
Oversized	OVRSZ	Load**
Right	RT	Keep, Next *
Right	RT	Lane**, Turn
Roadwork	RDWK	AHD, [Distance] **
Route	RT, RTE	Best, Alt, Other*
US Numbered Route	US	[US Route Number] **

* Prompt Word should precede the abbreviation.

** Prompt Word should follow the abbreviation.

*** Use a space (no dash) between the abbreviation and the Route Number.

Table 3 - Unacceptable Abbreviations

Abbreviation	Intended Word	Common Misinterpretation
ACC	Accident	Access (Road)
CLRS	Clears	Colors
DLY	Delay	Daily
FDR	Feeder	Federal
L	Left	Lane (Merge)
LT	Light (Traffic)	Left
PARK	Parking	Park
POLL	Pollution (Index)	Polling Site
RED	Reduce	Red
WRNG	Warning	Wrong

REFERENCES

- [1] Oregon Department of Transportation, Oregon Standard Specifications for Construction, 2008 ed., vol. 2, Salem, Oregon: Oregon Department of Transportation, 2008.
- [2] Federal Highway Administration, Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 ed., Washington, D.C., 2009.
- [3] Federal Highway Administration, "Portable Changeable Message Sign Handbook," 2003. [Online]. Available: <http://www.fhwa.dot.gov/publications/research/>. [Accessed 13 July 2012].
- [4] Oregon Department of Transportation, "Oregon Temporary Traffic Control Handbook for Operations of Three Days or Less," 21 December 2011. [Online]. Available: http://www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/docs/pdf/2011_OTTCH.pdf. [Accessed 1 February 2013].
- [5] G. L. Ullman, C. L. Dudek and B. R. Ullman, "Development of a Field Guide for Portable Changeable Message Sign Use in Work Zones," Texas Department of Transportation, College Station, Texas, 2005.
- [6] J. L. Campbell, C. M. Richard, J. L. Brown, M. G. Lichty, J. Graham and M. O'Laughlin, "NCHRP Report 600: Human Factors Guidelines for Road Systems: Collection C: Chapter 19," 2008. [Online]. Available: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_600C.pdf. [Accessed 13 July 2012].
- [7] D. R. Proffitt and M. M. Wade, "Creating Effective Variable Message Signs: Human Factors Issues," Virginia Transportation Research Council, Charlottesville, Virginia, 1998.
- [8] J. L. Campbell and C. M. Richard, "NCHRP Report 600: Human Factors Guidelines for Road Systems: Collection A: Chapter 13," 2008. [Online]. Available: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_600A.pdf. [Accessed 14 August 2012].

- [9] C. L. Dudek and G. L. Ullman, "Flashing Messages, Flashing Lines, and Alternating One Line on Changeable Message Signs," *Transportation Research Record: Journal of the Transportation Research Board*, vol. 1803, pp. 94-101, 2002.
- [10] C. L. Dudek, S. D. Schrock and G. L. Ullman, "Impacts of Using Dynamic Features to Display Messages on Changeable Message Signs," Federal Highway Administration, Washington, D.C., 2005.
- [11] C. L. Dudek, "Changeable Message Sign Operation and Messaging Handbook," Federal Highway Administration, Washington, D.C., 2004.
- [12] Florida Department of Transportation, "Plans Preparation Manual," 1 January 2009. [Online]. Available: <http://www.dot.state.fl.us/rddesign/PPMManual/PPM.shtm> [Accessed 27 August 2012].
- [13] Maryland State Highway Administration, "Use of Portable Changeable Message Signs with Speed Display in Work Zones," Maryland State Highway Administration, Baltimore, Maryland, 2005.
- [14] J. L. Campbell, M. G. Lichty, J. L. Brown, C. M. Richard, J. S. Graving, J. Graham, M. O'Laughlin, D. Torbic and D. Harwood, "NCHRP Report 600: Human Factors Guidelines for Road Systems," 2012. [Online]. Available: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_600Second.pdf. [Accessed 23 October 2012].
- [15] G. L. Ullman, B. R. Ullman, C. L. Dudek, A. Williams and G. Pesti, "Advance Notification Messages and Use of Sequential Portable Changeable Message Signs in Work Zones," Texas Department of Transportation, Austin, Texas, 2005.
- [16] American Association of State Highway and Transportation Officials, Highway Safety Manual, 1st ed., Washington, D.C.: AASHTO, 2010.

APPENDIX A – STANDARDIZED MESSAGES

The following list of standardized messages may be used for a variety of temporary work zone activities, maintenance operations, traffic incidents, weather conditions, or special events. The list of messages below is not all-inclusive. Messages shown are meant as examples of possible panels and combinations of panels used to develop a complete, informational, and valuable PCMS message.

Message Details

- For the Message examples below, one or both Panels may be used in developing the PCMS message. Panels from different examples may be combined to meet specific needs.
- If using only one Panel for the message, DO NOT FLASH the message.
- For special events or specific activities, custom PCMS messages should be created using the guidelines in this document.
- The “/” (slashes) in each message indicates the separation between lines on the panel, and are not part of the message.
- Align each line of the message to the left edge.

Programming Messages

- Each line can have up to 8 characters.
- For placement in the right, left, or center lane, only one location is shown. Use RIGHT, LEFT, CENTER or the appropriate abbreviation, as needed.
- “XXX” is commonly used to signify numbers that must be filled in at the time of placement and use.
- If an Exit number is known, the message, “USE / EXIT / XXX” may be substituted for, “USE / NEXT / EXIT” – especially if the PCMS is placed more than 2 miles from the exit.
- For posted speeds 45 MPH or higher, minimize wording to promote faster read/response times for drivers.
- Avoid using abbreviations. If necessary, use only those in Table 1 or Table 2.
- *Periods are not needed for abbreviations.*

Message Categories

- Advance Notification
- Flagging and Signals
- Bridge and Tunnel Work
- Road Surface Conditions
- Slow Moving Operations
- Rolling Slowdown Operations
- Snow and Ice – Regulatory Conditions
- Crash, Stalled Vehicle or Other Incident
- Detours and Road Closures
- Lane Closures, Traffic Pattern Changes
- Shoulder and Median Work
- Trucks
- Motorcycles
- Snow and Ice – Warnings
- Dust, Fog, Fire and Smoke
- Other General Warnings

Advance Notification

#	Panel 1	Panel 2
0100	WORKERS / IN ROAD / X MILE(S)	SLOW FOR / WORKERS / IN ROAD
0101	WORKERS / AHEAD / SLOW	WORKZONE / SLOW TO / XX MPH
0102	WORKERS / AHEAD IN / LFT LANE	SLOWDOWN / IN / WORKZONE
0103	REDUCE / SPEED IN / WORKZONE	WORKERS / X MILE(S) / AHEAD
0104	PAVING / NEXT / X MILE(S)	CAUTION / WORKERS / ON RIGHT
0105	OR XXX / CLOSED / JUL 15-18	TO COAST / USE / OR XXX
0106	ROADWORK / MON-THUR / NIGHTS	MON-THUR / DETOUR / 9PM- 6AM
0107	NIGHT / LANE / CLOSURES	EXPECT / DELAYS / XPM-XAM
0108	2 LANES / CLOSED / MON-THUR	EXPECT / DELAYS / XPM-XAM
0109	ROADWORK / PAST / OR XXX	THRU / TRAFFIC / USE I-XX
0110	USE / DETOUR / THUR-SUN	THUR-SUN / BAKER RD / CLOSED

Detours and Road Closures

#	Panel 1	Panel 2
0200	DETOUR / AHEAD / X MILE(S)	FOLLOW / DETOUR / SIGNS
0201	DETOUR / NEXT / LEFT	FOLLOW / SIGNS / TO ORXXX
0202	DETOUR / AHEAD / 1000 FT	USE / EXIT XXX / TO ORXXX
0203	DETOUR / X MILE(S) / AHEAD	FOLLOW / DETOUR / TO I-XXX
0204	FREEWAY / BLOCKED / AHEAD	PREPARE / TO / STOP
0205	FREEWAY / CLOSED / AHEAD	ALL VEH / MUST / EXIT
0206	FREEWAY / CLOSED / 2 MILES	USE / NEXT / EXIT
0207	I-XXX / CLOSED / AT EX(XXX)	DETOUR / USING / HWY XXX
0208	RAMP / CLOSED / XX MILES	DETOUR / NEXT / EXIT
0209	ROAD / CLOSED / AHEAD	LOCAL / TRAFFIC / ONLY
0210	ROAD / CLOSED / X MILE(S)	USE / DETOUR
0211	ROAD / CLOSED / AT MP XX	USE / CANYN RD / DETOUR
0212	ROAD / NARROWS / AHEAD	LANES / NARROW / 1/2 MILE
0213	ROADWORK / NEAR / DOWNTOWN	THRU / TRAF USE / I-XXX
0214	US XXX / CLOSED / XX MILES	US XXX / DETOUR / EXIT XX
0215	USE / DETOUR / ROUTE	FOLLOW / DETOUR / SIGNS
0216	USE / DETOUR / AHEAD	TURN / NEXT / RIGHT
0217	DETOUR / USE / I-XXX	TURN / RIGHT / 1/4 MILE

Flagging and Traffic Signals

#	Panel 1	Panel 2
0300	24 HOUR / FLAGGING / AHEAD	PREPARE / TO / STOP
0301	FLAGGER / AHEAD	PREPARE / TO / STOP
0302	FLAGGER / AHEAD / 1 MILE	BE / PREPARED / TO STOP
0303	PILOT / CAR / 1 MILE	BE / PREPARED / TO STOP
0304	PILOT / CAR / AHEAD	PREPARE / TO STOP / 1/2 MILE
0305	SIGNAL / AHEAD / 1/2 MILE	PREPARE / TO STOP
0306	TRAFFIC / SIGNAL / OUT	ALL-WAY / STOP / AHEAD
0307	SIGNAL / OUT	YIELD / RIGHT / OF WAY
0308	SIGNAL / WORK / AHEAD	PREPARE / TO / STOP
0309	SIGNAL / WORK / 1/2 MILE	LEFT / TURN LN / CLOSED
0310	SIGNAL / WORK / AHEAD	USE / RIGHT / LANE
0311	SIGNAL / OUT / AHEAD	FLAGGERS / IN / ROAD

Lane Closures or Traffic Pattern Changes

#	Panel 1	Panel 2
0400	CROSS / TRAFFIC / AHEAD	YIELD TO / CROSS / TRAFFIC
0401	DO / NOT / PASS	STAY / IN / LANE
0402	DO NOT / STOP ON / SHOULDER	NO / SHOULDER / PARKING
0403	EXIT (XXX) / CLOSED / AHEAD	USE / NEXT (THIS, SECOND) / EXIT
0404	HEAVY / TRAFFIC / AHEAD	PREPARE / TO / SLOW
0405	HEAVY / TRAFFIC / AHEAD	PREPARE / TO / STOP
0406	LFT LANE / ENDS / 1/2 MILE	SLOWED / TRAFFIC / AHEAD
0407	RT LANE / NARROWS / 1000 FT	SLOWED / TRAFFIC / AHEAD
0408	LANES / SHIFT / TO LEFT	STAY / IN (YOUR) / LANE
0409	LEFT / 2 LANES / CLOSED	MERGE / INTO (WITH) / RT LANE
0410	LEFT / LANE / CLOSED	RT LANE / FOR ALL / TURNS
0411	LEFT / LANE / NARROWS	TRUCKS / USE / RT LANE
0412	NARROW / LFT LANE / AHEAD	TRUCKS / RT LANE / ONLY
0413	LEFT LN / CLOSED / 1000 FT	RT LANE / SLOWED / AHEAD
0414	LEFT LN / CLOSED / AHEAD	EXPECT / SLOWED / TRAFFIC
0415	LEFT LN / CLOSED / 1(1/2) MILE	PREPARE / TO MERGE / RIGHT
0416	MERGING / TRAFFIC / AHEAD	TRAFFIC / ENTERS / ON RIGHT
0417	MERGE / INTO LFT / LANE(S)	RT LANE / MUST / TURN RT
0418	MERGE / RIGHT	LFT LANE / TURN LFT / ONLY
0419	RT LANE / CLOSED / X MILE(S)	NO RIGHT / TURN / AHEAD
0420	SHARP / CURVE / AHEAD	CURVE / SLOW TO / XX MPH
0421	SLOW / TRAFFIC / AHEAD	PREPARE / TO / SLOW
0422	STAY / IN / LANE	NO / LANE / CHANGES
0423	TRAFFIC / CONTROL / CHANGE	YIELD / AHEAD
0424	TRAFFIC / CONTROL / CHANGE	STOP / AHEAD
0425	TRAFFIC / CONTROL / CHANGE	SIGNAL / AHEAD
0426	TRAFFIC / DELAYS	PREPARE / TO / SLOW
0427	TRAFFIC / DELAYS	PREPARE / TO / STOP
0428	TWO-WAY / TRAFFIC / AHEAD	DO / NOT / PASS
0429	YIELD / AHEAD	YIELD / TO / ONCOMING

Bridge or Tunnel Work

#	Panel 1	Panel 2
0500	CROSS / TRAFFIC / AHEAD	YIELD TO / CROSS / TRAFFIC
0501	DO / NOT / PASS	STAY / IN / LANE
0502	DO NOT / STOP ON / SHOULDER	NO / SHOULDER / PARKING
0503	EXIT (XXX) / CLOSED / AHEAD	USE / NEXT (THIS, SECOND) / EXIT
0504	HEAVY / TRAFFIC / AHEAD	PREPARE / TO / SLOW
0505	HEAVY / TRAFFIC / AHEAD	PREPARE / TO / STOP
0506	LFT LANE / ENDS / 1/2 MILE	SLOWED / TRAFFIC / AHEAD
0507	RT LANE / NARROWS / 1000 FT	SLOWED / TRAFFIC / AHEAD
0508	LANES / SHIFT / TO LEFT	STAY / IN (YOUR) / LANE
0509	LEFT / 2 LANES / CLOSED	MERGE / INTO (WITH) / RT LANE
0510	LEFT / LANE / CLOSED	RT LANE / FOR ALL / TURNS
0511	LEFT / LANE / NARROWS	TRUCKS / USE / RT LANE
0512	NARROW / LFT LANE / AHEAD	TRUCKS / RT LANE / ONLY
0513	LEFT LN / CLOSED / 1000 FT	RT LANE / SLOWED / AHEAD
0514	LEFT LN / CLOSED / AHEAD	EXPECT / SLOWED / TRAFFIC
0515	LEFT LN / CLOSED / 1(1/2) MILE	PREPARE / TO MERGE / RIGHT
0516	MERGING / TRAFFIC / AHEAD	TRAFFIC / ENTERS / ON RIGHT
0517	MERGE / INTO LFT / LANE(S)	RT LANE / MUST / TURN RT
0518	MERGE / RIGHT	LFT LANE / TURN LFT / ONLY
0519	RT LANE / CLOSED / X MILE(S)	NO RIGHT / TURN / AHEAD
0520	SHARP / CURVE / AHEAD	CURVE / SLOW TO / XX MPH
0521	SLOW / TRAFFIC / AHEAD	PREPARE / TO / SLOW
0522	STAY / IN / LANE	NO / LANE / CHANGES
0523	TRAFFIC / CONTROL / CHANGE	YIELD / AHEAD
0524	TRAFFIC / CONTROL / CHANGE	STOP / AHEAD
0525	TRAFFIC / CONTROL / CHANGE	SIGNAL / AHEAD
0526	TRAFFIC / DELAYS	PREPARE / TO / SLOW
0527	TRAFFIC / DELAYS	PREPARE / TO / STOP
0528	TWO-WAY / TRAFFIC / AHEAD	DO / NOT / PASS
0521	YIELD / AHEAD	YIELD / TO / ONCOMING

Shoulder or Median Work

#	Panel 1	Panel 2
0600	MEDIAN / WORK / KEEP RT	WORKERS / IN / MEDIAN
0601	MEDIAN / WORK / AHEAD	USE / RIGHT / LANE
0602	LEFT (RIGHT) / SHOULDER / WORK	CLOSED / SHOULDER / X MILE(S)
0603	LEFT (RIGHT) / SHOULDER / WORK	WORKERS / ON / SHOULDER
0604	SHOULDER / WORK / AHEAD	YIELD TO / WORKERS / ON LEFT
0605	SHOULDER / WORK / AHEAD	USE / LEFT / LANE
0606	SHOULDER / WORK / AHEAD	WORKERS / IN LEFT / SHOULDER

Road Surface Conditions (Rough, debris, oil, fresh paint, etc.)

#	Panel 1	Panel 2
0700	ABRUPT / EDGE / RIGHT	
0701	ACTIVE / SLIDES / AHEAD	REDUCE / SPEED
0702	DEBRIS / ON / ROAD	KEEP / LEFT
0703	DEBRIS / ON / ROAD	RIGHT / LANE / CLOSED
0704	DEBRIS / ON / ROAD	PREPARE / TO / STOP
0705	DEBRIS / ON / ROAD	EXPECT / DELAYS
0706	FRESH / OIL / ON ROAD	
0707	NO / CENTER / STRIPE	KEEP / RIGHT
0708	NO / LANE / LINES	
0709	NO / LANE / LINES	KEEP RT / EXCEPT / TO PASS
0710	NO / SHOULDER	DO / NOT / STOP
0711	ROAD / FLOODED / 1/2 MILE	
0712	ROCKS / ON / ROADWAY	
0713	ROUGH / PAVEMENT / AHEAD	PREPARE / TO / SLOW
0714	ROUGH / ROAD / AHEAD	
0715	ROUGH / ROAD / AHEAD	DIP / AHEAD / 1/2 MILE
0716	SLIDE / BLOCKS / ROAD	PREPARE / TO / STOP
0717	SLIDE / ON / ROAD	KEEP / RIGHT
0718	SOFT / SHOULDER	
0719	WATER / ACROSS / ROAD	
0720	WET / PAINT	STAY / IN / LANE
0721	WET / PAINT	PASS TO / LEFT

Trucks

#	Panel 1	Panel 2
0800	ALL / TRUCKS / EXIT	EXIT / ALL / TRUCKS
0801	ALL / TRUCKS / KEEP RT	TRUCKS / KEEP / RIGHT
0802	TRUCKS / USE / LOW GEAR	STEEP / DOWNHILL / X MILE(S)
0803	ESCAPE / RAMP / CLOSED	NEXT / ESCAPE / X MILE(S)
0804	OVERSIZE / MUST / EXIT	OVERSIZE / EXIT / X MILE(S)
0805	OVERSIZE / USE NEXT / EXIT	OVERSIZE / VEH EXIT / AHEAD
0806	STEEP / GRADE / AHEAD	TRUCKS / SLOW / DOWN
0807	ALL / TRUCKS / EXIT	EXIT / ALL / TRUCKS
0808	TRUCKS / OVER 80K / EXIT	TRUCKS / EXIT / ON RIGHT
0809	OVER 80K / TRUCKS / EXIT	TRUCKS / USE / RT LANE
0810	TRUCKS / XING / ROAD	WATCH / FOR XING / TRUCKS
0811	CAUTION / TRUCKS / ON RIGHT	TRUCKS / ENTERING / RIGHT
0812	XXFT XIN* / HT LIMIT/ 1 MILE	TRUCKS / DETOUR / NEXT RT
0813	EXIT XX / XX TON / LIMIT	OVER WT / DETOUR / EXIT XX

Slow Moving Operations

#	Panel 1	Panel 2
0900	MOWERS / IN / MEDIAN	WORK IN / MEDIAN / AHEAD
0901	MOWERS / IN / MEDIAN	MOWING / NEXT / X MILE(S)
0902	SLOW / MOVING / WORK	PREPARE / TO / SLOW
0903	SLOW / MOVING / WORK	LEFT / LANE / CLOSED
0904	SLOW / MOVING / WORK	KEEP / RIGHT
0905	SLOW / MOVING / WORK	(RIGHT) / SHOULDER / CLOSED
0906	SLOW / MOVING / WORK	MEDIAN / (SHOULDER) / CLOSED
0907	STRIPING / TRUCKS / AHEAD	CENTER / LANE / CLOSED
0908	STRIPING / CENTER / LANE	KEEP / RIGHT
0909	STRIPING / RIGHT / FOG LINE	USE / LEFT / LANE
0910	SWEEPER / AHEAD	USE / CAUTION
0911	SWEEPER / AHEAD	USE / LEFT / LANE

Motorcycles

#	Panel 1	Panel 2
1000	BUMP / AHEAD	CYCLES / STAY / IN LANE
1001	ROUGH / PAVEMENT / AHEAD	CYCLES / NO LANE / CHANGES
1002	ROUGH / PAVEMENT	CYCLES / USE CARE
1003	GROOVED / PAVEMENT / NEXT XMI	CYCLES / KEEP / RIGHT (LEFT)

Rolling Slowdowns

#	Panel 1	Panel 2
1100	SLOWED / TRAFFIC / AHEAD	XX MPH / NEXT / XX MILES
1101	XX MPH / TRAFFIC / AHEAD	XX MPH / NEXT / XX MILES
1102	SLOW / VEHICLES	DO / NOT / PASS
1103	SLOWED / TRAFFIC	DO NOT / PASS

Snow and Ice – Warnings

#	Panel 1	Panel 2
1200	BLACK / ICE / LIKELY	ROAD / MAY BE / SLIPPERY
1201	BLOWING / SNOW / AHEAD	NEXT / X MILE(S)
1202	BLOWING / SNOW / AHEAD	TURN ON / LIGHTS
1203	ICE / ON / BRIDGE(S)	BRIDGE(S) / MAY / BE ICY
1204	ICE / ON ROAD / AHEAD	ROAD ICY / NEXT / XX MILE(S)
1205	SNOW / BLOWERS / AHEAD	DO NOT / PASS / ON RIGHT
1206	SNOW / BLOWERS / AHEAD	DO / NOT / PASS
1207	SNOW / PLOWS / AHEAD	USE / LEFT (RIGHT) / LANE
1208	SNOW / PLOW / AHEAD	DO NOT / PASS / ON RIGHT (LEFT)
1209	WATCH / FOR / ICE	ICY / NEXT / XX MILE(S)

Snow and Ice – Regulatory Conditions

#	Panel 1	Panel 2	Panel 3
1250	CARRY / CHAINS	OR / TRACTION / TIRES	
1251	SNOW / ZONE	CHAINS / REQUIRED / ALL VEH	
1252	SNOW / ZONE	CARRY / CHAINS	OR / TRACTION / TIRES
1253	SNOW / ZONE	CHAINS / REQ'D ON / VEHICLES	TOWING / OR OVER / 10000
1254	SNOW / ZONE	CHAINS / REQ'D ON / VEHICLES	TOWING / OR OVER / 10K GVW
1255	SNOW / ZONE	CHAINS / REQ WHEN / TOWING	OR SINGL / AXLE OVR / 10000
1256	CHAINS / REQ WHEN / TOWING	OR / SINGLE / DRIVE	OVER / 10000 / GVW
1257	SNOW / ZONE	CHAINS / REQUIRED	UND 10K / TRACTION / TIRES OK
1258	CHAINS / REQUIRED	TRACTION / TIRES / ALLOWED	VEHICLES / UNDER / 10K GVW

* Messages shown above are based on messages in OAR 734-017-0025 intended for use on permanent signs or variable message signs (VMS).

** For regulatory snow and ice conditions, a third panel may be added.

Dust, Fog, Fire, or Smoke

#	Panel 1	Panel 2
1300	BLOWING / DUST / AHEAD	NEXT / X MILE(S)
1301	BLOWING / DUST / AHEAD	TURN ON / LIGHTS
1302	DENSE / FOG / AHEAD	TURN ON / LIGHTS
1303	DENSE / FOG / AHEAD	REDUCED VISION
1304	FREEZING / FOG / AHEAD	TURN ON / LIGHTS
1305	FREEZING / FOG / LIKELY	IF FOGGY / ROAD MAY / BE ICY
1306	BURN / AREA / AHEAD	SLOW / TURN ON / LIGHTS
1307	DENSE / SMOKE / AHEAD	STOP ON / SHOULDER / ONLY
1308	DENSE / SMOKE / AHEAD	SLOW / TURN ON / LIGHTS
1309	DENSE / SMOKE / AHEAD	PREPARE / TO / SLOW (STOP)
1310	FIRE / AHEAD	PREPARE / TO / SLOW (STOP)
1311	FIRE / AHEAD	STOP ON / SHOULDER / ONLY

Crash, Stalled Vehicle, or Other Incidents

#	Panel 1	Panel 2
1400	WRECK / AHEAD	CENTER / LANE / CLOSED
1401	TRAFFIC / CRASH / AHEAD	EXPECT / DELAYS
1402	WRECK / AHEAD	LEFT / LANE / CLOSED
1403	TRAFFIC / CRASH / AHEAD	LEFT / 2 LANES / BLOCKED
1404	WRECK / AHEAD	PREPARE / TO / STOP
1405	CRASH / AHEAD / LFT LANE	USE / RIGHT / 2 LANES
1406	CRASH / RT LANE / 1 MILE	MERGE / LEFT
1407	STALLED / VEHICLE	PREPARE / TO / SLOW
1408	STALLED / VEHICLE / AHEAD	SHOULDER CLOSED
1409	STALLED / VEHICLE / 1/2 MILE	RIGHT / LANE / CLOSED
1410	STALLED / VEHICLE / ON RAMP	TRAFFIC / ON RAMP / KEEP LFT
1411	DEBRIS / IN ROAD / KEEP RT	KEEP RT / WORKERS / IN LANE
1412	YIELD TO / EMERGENCY / WORKERS	CRASH / IN LEFT / LANE
1413	YIELD TO / EMERGENCY / CREWS	RESCUE / WORKERS / AHEAD
1414	MOVE LFT / FOR FIRE / FIGHTERS	CRASH / AHEAD / ON RIGHT

Other General Warnings

#	Panel 1	Panel 2
1500	CHILDREN / XING / HIGHWAY	CHILDREN / XXX FT / AHEAD
1501	CHILDREN / X/X MILE / AHEAD	WATCH / FOR / CHILDREN
1502	HEAVY / MERGING / TRAFFIC	THRU / TRAFFIC / LFT LANE
1503	BICYCLES / IN LANE / AHEAD	SHARE / THE / ROAD
1504	STOP / AHEAD / 1/2 MILE	PEDSTRN / EVENT / AHEAD
1505	TRAFFIC / ADVISORY / XXX.X AM	XXX.X AM / FOR ROAD / INFO
1506	BICYCLE / EVENT / NEXT XMI	WATCH / FOR / BICYCLES
1507	TRAFFIC / SLOW AT / STADIUM	STADIUM / EVENT / APR 30
1508	SLOW FOR / EXPO CTR / TRAFFIC	EXPO CTR / EVENT / SATURDAY
1509	FAIRGRND / TRAFFIC / AHEAD	THRU / TRAFFIC / USE ALT
1510	CO FAIR / TRAFFIC / KEEP LFT	THRU / TRAFFIC / RT LANE

APPENDIX B – SETUP CHECKLIST

Need

- Could a static sign be used to send the same message?
- Is the static sign readily available?

Placement

- Is the PCMS visible from at least ½ mile away?
- Can the message be read from at least 800 feet away during the day?
At least 600 feet away during the night?
- If two PCMS are used, they are separated by at least 1000 feet and on the same side of the road?

Message

- Is each Phase understandable by itself?
- Does the PCMS Message give drivers new information or add clarity?
- Does the PCMS warn the motorist of a problem ahead?
- Have standard abbreviations been used?
- Are there no more than 2 phases on each PCMS?
- Is each phase displayed for at least 2 seconds?
- Is the total display time for both phases less than 8 seconds?
- Is the message free of animation (scrolling or flashing)?
- Are correct lanes, highways, exit numbers, days, dates, and/or times displayed?
- Are messages, display characterizes, and dates and times of display are documented in the project diary?
- When work is to begin within seven days, replace calendar dates (e.g. MAY 25-27) with days of the week (e.g. TUE-THUR).
- Turn PCMS off and rotate display away from traffic when not in use.

PCMS MESSAGE WORKSHEET

LOCATION: _____

USED: From: ____/____/____ at ____:____ am/pm

To: ____/____/____ at ____:____ am/pm

Message Programed By: _____

PANEL 1

PANEL 1 will run for _____ sec. (2.0 sec minimum)

PANEL 2

PANEL 2 will run for _____ sec. (2.0 sec. minimum)

Total Display Time = _____ sec. (8.0 sec. maximum)

(Total Display Time includes two blank times between Panels)