Christchurch Transport Operations Centre

A partnership of Christchurch City Council, New Zealand Transport Agency and Environment Canterbury

*Keeping Christchurch Moving*

# MOBILE VARIABLE MESSAGE SIGN BEST PRACTICE GUIDE

TTM 005

Version Control

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| **Date** | 29 January 2021 |
| **Version** | 0.1 |
| **Purpose** | Guidance on operational application of Mobile Variable Message Signs (mVMS) used to the CTOC network |
| **Written by** | CTOC TTM Team |
| **Edited by** | Simon Hodges |
| **Approved by** | TTM Team |

## Purpose

The following information is intended to cover the operational application of mVMS trailers used to warn / advise of TTM activities within the CTOC network. AWVMS are not covered by this policy. Equipment capabilities and standard requirements must meet NZTA specifications unless noted otherwise.

## Appropriate Usage

mVMS must be reserved for operationally critical purposes only due to the risk of diminished impact caused by overuse of these devices. A critical purpose is defined as: “Significant TTM operations or where road user behaviour modification or awareness is essential”.

Devices may also be used for regionally critical messaging such as: water restrictions, testing of tsunami warning devices. CTOC approval is required for all mVMS messaging, on the CTOC network, and an approved TMP is required before deployment.

‘Significant’ means: delays greater than 5 minutes on Strategic Routes, and or where severe localised impacts have a high probability of occurring with high consequence for network, safety or onsite operations.

The focus of messages must generally be on Journey Management only. For mVMS to remain credible, messages must provide as far as possible timely, reliable, accurate and relevant information for that journey. Messages must be blanked or signs removed completely from site when messaging is no longer necessary. If there is a delay in deployment mVMS may display messaging informing public of cancelation of the works or informing of a new date.

For the above reasons, mVMSs should generally not be used to warn of Night works, for localised minor impacts e.g. carpark access changes, or as a ‘Contingency’ for missing static signage. The impact from these activities is usually minor and mVMS usage would be excessive.

Refer to the CTOC ‘Significant Works Identification Flowchart’ for further guidance on when mVMS use is appropriate.

Before displaying any message on a mVMS, the wording of the message, the dates/times it will be operational and blanked, and deployment location(s) (including TMP diagram showing mVMS location and method of installation), must be documented in a TMP and accepted following normal TMP authorisation process. Where more than one message phase is required, the operational details of each phase must be clearly documented.

If there is no approval granted for mVMS usage, in an accepted Traffic Management Plan, mVMS cannot be deployed on CTOC’s roading network, or any other such place that will vary the normal operating condition of the road. i.e. they cannot be deployed in the car park of a business to advertise a “Grand Opening” or “Massive Sale” (not operationally critical messaging) where they are visible to passing road users and are likely to distract drivers.

## mVMS Strategy Design

Site Specific consideration and design is required for all situations. Designers should keep the following questions in mind throughout the process:

What is the key message that needs to be conveyed for this phase of the TTM operation, to mitigate or warn of the effects created?

How do I make this message effective for the majority of approaching road users?

Solving the second question usually answers "How many signs will I need, and where do they need to be located?

## Message Phases

For planned TTM operations where mVMS use is justified, there are usually two phases required:

### Prewarning Phase:

Prewarning Phase occurs for (usually) 1 week prior to the full TMP deployment, to warn regular commuters of the upcoming impact. This encourages them to plan ahead and adjust behaviour (e.g. travel patterns) to accommodate the change. It also minimizes complaints by setting expectations ahead of time. mVMS must be located close to the point of impact (the future worksite) during this phase.

### During Deployment Phase:

During Deployment Phase occurs for (usually) 1 week after the date of full TMP deployment. The Prewarning mVMS must be relocated upstream of the worksite to a location that is effective to achieve the purpose of phase 2. E.g. this could be to provide either advance warning of the worksite to support the static signage, or to provide remote messaging to encourage rerouting onto alternative roads. Additional mVMS's may be needed to supplement the first mVMS and cover other key approach roads. After 1 week, if continued messaging is needed, the mVMS's should be replaced with static signage displaying appropriate messages.

## Example of Prewarning Phase message:

| Frame 1 | Frame 2 |
|---|---|
| MONTREAL ST<br>ONE LANE<br>FROM TUES | CONSIDER<br>ALTERNATE<br>ROUTE |

## Example of During Deployment Phase message:

| Frame 1 | Frame 2 |
|---|---|
| MONTREAL ST<br>ONE LANE<br>AT CASHEL | EXPECT<br>DELAYS |

The dates for each phase to be active must be clearly detailed in the TMP, and coordinated around the date for full TMP deployment. To maintain credibility of all parties and support Traveller Information and other Mitigation Strategies, this means that full TMP deployment dates must be certain at least 1 week prior and changes to **the full deployment date must be minimised.**

## Examples of During Deployment Phase Messages

| Frame 1 | Frame 2 |
|---|---|
| Message option 1 | |
| MAJOR<br>ROADWORKS<br>DURHAM ST | EXPECT<br>DELAYS<br>APR - JUN |
| Message option 2 | |
| NEW ROAD<br>LAYOUT<br>AHEAD | DRIVE<br>WITH<br>CARE |
| Message option 3 | |
| ST ASAPH ST<br>ONE LANE<br>FROM FRIDAY | USE<br>ALTERNATE<br>ROUTE |

### Days of the Week / Calendar Dates

Days of the week should be used in preference to calendar dates when the impact is less than 7 days away e.g.:

| Frame 1 |
| --- |
| OPAWA RD |
| CLOSED |
| WED – FRI |

For an impact greater than 7 days away a combination of days of the week and calendar dates should be used e.g.

| Frame 1 | Frame 2 |
| --- | --- |
| OPAWA | FROM WED |
| ROAD | 6 NOV TO |
| CLOSED | 1 DEC |

## Message Viability Check

Each trial message must be tested for viability against the capabilities of the mVMS equipment allocated for the site. To ensure message viability on any mVMS equipment, it is good practice to design messages assuming maximum 9 character width and 3 line depth being available per frame. This is the approach taken in the examples above and below. More complicated messages could be designed, and number of frames potentially reduced, if the equipment is capable of displaying additional characters per line, or numbers of lines, and that particular equipment can be guaranteed to be allocated to the site. Contractors must identify in the TMP what VMS board they intend using and what characters the board can display. Approved messaging must be able to be displayed on board.

## Message Format

Three lines of 300-350mm character height. (200mm character height may be considered in low speed environments, or where local requirements dictate).

Ability to display a minimum of 9 characters per line.

Upper case (capitals) to be used for all characters, except the abbreviation for kilometres (km).

Spacing, Font and Visual Performance to be as per NZTA ITS-06-04 Specification.

## Message Construction

Units of information can be identified by the following questions:

| QUESTION | ELEMENT | UNIT OF INFORMATION | CONDENSING |
|---|---|---|---|
| What happened / Is going to happen? | (Problem) | ROAD CLOSED | Usually included |
| Where? | (Location) | OPAWA ROAD | When needed |
| What is the Effect? | (Effect) | ROUTE CLOSED | Optional When needed |
| Who is Affected? | (Audience) | ALL TRAFFIC | |
| What Action is Advised? | (Action) | USE AN ALTERNATIVE ROUTE | Usually included |

The message must be condensed down to the most important elements only, ideally using four unit of information or less, and eight words or less, by eliminating non-critical information and information the traveller will reasonably infer. Core elements that are usually needed are the Problem and Action descriptors.

The previous example would be condensed down to:

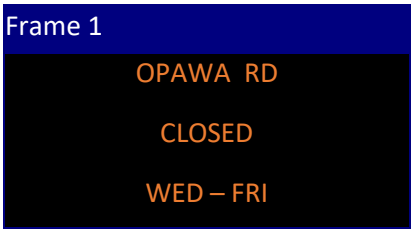
| Frame 1 | Frame 2 |
|---|---|
| OPAWA<br>ROAD<br>CLOSED | USE<br>ALTERNATE<br>ROUTE |

### "Chunking" Units of Information

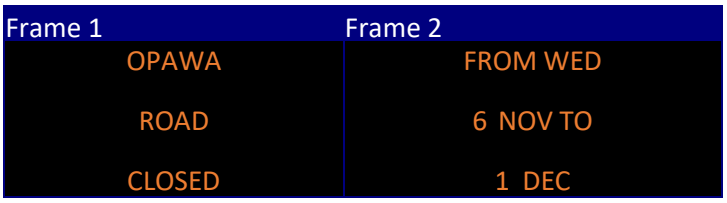
Each unit of information should be kept on the same line or frame display. Where portions of different units have to be displayed together, it is acceptable to place a hyphen between units

### Days of the Week / Calendar Dates

Days of the week should be used in preference to calendar dates when the impact is less than 7 days away e.g.:




For an impact greater than 7 days away a combination of days of the week and calendar dates should be used e.g.




## Message Viability Check

Each trial message must be tested for viability against the capabilities of the mVMS equipment allocated for the site. To ensure message viability on any mVMS equipment, it is good practice to design messages assuming maximum 9 character width and 3 line depth being available per frame. This is the approach taken in the examples above and below. More complicated messages could be designed, and number of frames potentially reduced, if the equipment is capable of displaying additional characters per line, or numbers of lines, and that particular equipment can be guaranteed to be allocated to the site. Contractors must identify in the TMP what VMS board they intend using and what characters the board can display. Approved messaging must be able to be displayed on board.

## Message Format

Three lines of 300-350mm character height. (200mm character height may be considered in low speed environments, or where local requirements dictate).

Ability to display a minimum of 9 characters per line.

Upper case (capitals) to be used for all characters, except the abbreviation for kilometres (km).

Spacing, Font and Visual Performance to be as per NZTA ITS-06-04 Specification.

Text to be centre justified.

If Pictograms are proposed instead of standardized text, CTOC will consider these applications on a case-by-case basis.

## LED Colour

The CTOC position is that for most warning or advisory messages, the standard orange LED colour is appropriate and this is therefore the default expectation for most mVMS deployments.

CTOC will accept colours other than orangeunder the following conditions:

A single colour must be used per Unit of Information (one colour per frame).

The colour(s) used in the message must be suitable and effective for the site (e.g. blue and green can be difficult to read in some situations).

The colour must logically match the Unit of Information (e.g. green could be used for a 'permissive' message, while red could be used for a 'restrictive' message).


The brightness and legibility of each colour in a mixed-colour message (one colour per frame) must be equal. This means that each message frame can only have one colour used.

The message must be understandable (self-explaining) on its own, and not rely on the colour to be understood. This enables colour-blind road users to still comprehend it.

Some examples of possible colour choice are provided above.

## Frames and Timing

Single, two and (only where absolutely necessary) three-frame message displays are permitted.
The minimum number of frames must be used to clearly convey the message.
Single frame messages must be displayed continuously. Two frame messages must use 2 second timing per frame. Three frame messages must use 1.6 second timing per frame.
Scrolling messages across/down, and flashing messages, are not permitted.

## Location

Location(s) must be chosen to best fit the road environment and be effective in achieving the purpose of the message. The key objectives are to select location(s) on the network that will be:

(i) effective in conveying the message to the main approaches flowing towards the worksite, and
(ii) enable the desired road user reaction to occur (e.g. rerouting).

The following factors must be considered:

Left Hand Side Preferred – mVMS' should be positioned on the left of the approaching road users.

Minimise Hazard to Traffic – mVMS' must be positioned, or be protected, to minimise the risk of any vehicle strikes e.g. ideally located outside of clear zones, as far as practicable from edge of live lanes (while still remaining visible), behind TTM device protection, behind barrier protection, removed when not required etc.

Clear Sight Distance - in speed environments of 60kph or less, the desirable minimum CSD is 100m. A minimum CSD of 75m must be available. In higher speed environments, normal CSD requirements apply (usually 3 x Speed Limit). Management of parking areas may be required to guarantee CSD.

Road Geometry - avoid locating immediately before a sharp bend, blind crest, or intersection, where the sign may distract attention at a critical moment.

Glare - avoid positioning directly in front of a rising or setting sun, beneath bright lighting sources, and where sun reflection on the board may reduce legibility.

Distance from Key Intersection – where a mVMS is intended to advise of a travel route diversion, the sign must be located sufficiently in advance of the intersection to allow users to react in time, including changing lanes if necessary.

Presence of Other Signage and Traffic Control Devices – a mVMS must not compete with other signage, or interfere with traffic control devices both proceeding and beyond the site. Minimum spacings must therefore be achieved to these features.

Impact on Cyclists and Pedestrians – placement must not impede cycle lanes or footpath. In some situations, if allowed, VMS may be able to be positioned on a footpath if sufficient widths can be maintained.

Number of mVMS's – A sufficient number of mVMS's must be allocated to display the message to the main approach flow(s) towards the worksite.

Since two Message Phases will be required for most TTM operations, two mVMS Strategy Plans will usually be required within TMPs to explain the proposed messages and mVMS locations for each.

*If there is no approval granted for mVMS usage, in an Accepted Traffic Management Plan, mVMS cannot be deployed on CTOC's roading network, or any other such place that will vary the normal operating condition of the road. i.e they cannot be deployed in the car park of a business to advertise a "Grand Opening" or "Massive Sale" where they are visible to passing road users and are likely to distract drivers.*

## mVMS Used for Speed Management

Refer to 'Best Practice for Speed Management at worksites'

mVMS could be used to improve Speed Management through worksites or to treat severe issues at TTM worksites. In accordance with the principle of reserving mVMS for operationally critical purposes, these options must only be considered for worksites on strategic routes, and/or where severe localised risks / issues are occurring:

Additional Messaging: mVMS used to advise of a reason for reducing speed, to support the various speed treatments employed through the TTM site. CCC internal operations such as water restriction and testing of warning devices (Tsunami warning sirens).

Speed Feedback: mVMS used to display either nothing, the approaching vehicle's speed up to the posted or temporary speed limit, or a "SLOW DOWN" message as appropriate.

Where a mVMS is used for speed feedback, the display controller must incorporate an adjustable lower threshold which, when it is not exceeded, results in the sign remaining blanked. This threshold will typically be set 20kph below the posted or temporary speed limit.

Panel 1:


Panel 2:


OR


## Fixed VMS for TTM messages

CTOC controls a number of fixed VMSs in strategic locations on the network (11 VMS currently under CTOC control). Where practicable, messages could be displayed on these VMS to support roadworks in close proximity to the signs. Please contact a CTOC TMC to discuss possibilities if TMPs are located near to these locations. A reduced number of characters / lines may be available compared to mVMS equipment.

## Diagram for deployment of mVMS

Diagrams need to be provided within TMPs to indicate what traffic management measures will be deployed around mVMS during deployment. Diagrams must indicate offset from traffic lanes, safety zones, taper length and if any permanent roading facilities that are proposed to be compromised (cycle lanes, footpaths or permanent signage). If signs are intended to be used in a place where they are proposed to overhang a footpath or cycle lane, this must be clearly shown and mitigation measures of overhead hazards demonstrated.

| Date | Version | Prepared/Updated By | Authorised By | Detail of amendment/s |
|---|---|---|---|---|
| 18/09/2020 | 0.1 | Simon Hodges | TTM team | Draft version for consultation |
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