WAKA KOTAHI
NZ TRANSPORT AGENCY

MOBILE VARIABLE MESSAGE SIGNS

Intelligent transport systems (ITS) delivery specification

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More information about ITS is available on the NZTA website at https://www.nzta.govt.nz/its

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1 Overview

This section defines the purpose of the equipment within the operational system.

1.1 Scope

The scope of this specification is as follows:

i. Requirements for the procurement of MVMS.
ii. Physical installation and deployment of MVMS.

This delivery specification covers trailer-mounted MVMS that are designed to be mobile but are static in operation. This does not cover vehicle-mounted MVMS.

This document does not cover any form of electronic roadside signage other than MVMS.

1.2 Overview

The purpose of this document is to specify the minimum requirements for the procurement of MVMS by the Principal. In addition, this delivery specification details system integration requirements (such as installation protocols) to ensure compliance with the Principal's operational and asset management systems.

This delivery specification shall be read in conjunction with the latest version of ITS design standard: *Electronic signs – fixed variable message signs, mobile variable message signs, and lane and carriageway signs*.

1.2.1 NZTA ITS class

001 Signs. Equipment which provides visual messages or warnings to users of the transport network.
Class definitions

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2 Functional requirements

This section outlines what the equipment and systems need to do (functional), and how they need to do it (non-functional).

2.1 Display

Full-colour MVMS must display text and graphics as defined in the section titled 'Display matrix pixel control' in ITS delivery specification: *Variable message signs – fixed*. This is consistent with EN 12966:2014+A1:2018 *Road vertical signs – Variable message traffic signs* (EN 12966:2014+A1:2018).

2.1.1 Font visibility requirements

The display of the MVMS shall use and display the standard fonts as defined in the ITS core requirements standard: *Electronic message signage fonts*.

Table 1 provides requirements for the minimum character height, lines of text and pixel pitch. The Contractor shall understand the performance of the display that is set out by the Principal.

Road type, environment and conditions shall inform the sign's display dimensions and performance requirements. The Contractor must provide the Principal with an MVMS product specification which meets display requirements for sign functionality and procurement.

For information about requirements for messages being displayed, refer to section 5.5, titled 'Messages'.

	HVU and rural – side mount with <6m offset (from left hand side in the direction of travel)			**Motorway expressway – side mount with <6m offset (from left hand side in the direction of travel)**	
	Single lane in the direction of travel	**Double lane in the direction of travel**	**Double lane in the direction of travel**		
Speed environment	Four-line regional	Four-line regional	Three-line urban	Three-line motorway	Four-line regional
Up to 50km/h	200mm	200mm	200mm	-	-
51–70km/h	200mm	300mm	200mm	-	-
71–100km/h	300mm	300mm	-	400mm	300mm

Table 1: MVMS dimensions (Source: Table 1. Electronic signage – minimum character height in ITS core requirements standard: Electronic signage fonts)

Full matrix signs are standard for all applications where the flexibility to support graphics and/or text heights greater than the standard line height in the future is required.

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2.1.2 Speed detection and speed indicator function – if specified by the Principal

If MVMS is required to be used as a speed indicator device, the following requirements must be met.

2.1.2.1 Speed detection

The speed detector shall be activated by an approaching vehicle only, and not one travelling in the opposite direction. It shall have a normal operating range of approximately 200m. The detector must be mounted securely to resist vandalism.

Technical specifications of the detector and mounting arrangements are to be provided by the Contractor to the Principal.

2.1.2.2 Controller, threshold adjustments, and messages

When the MVMS is used as a speed indicator device, the display controller shall incorporate an adjustable lower threshold which, when it is not exceeded, results in the sign remaining blanked. This threshold shall typically be set 20km/h below the posted speed limit.

When the nominated lower threshold is not exceeded, the message 'CURRENT / SPEED LIMIT / IS XX KM/HR' shall be displayed.

When the nominated lower threshold is exceeded, the words 'YOUR SPEED' shall be displayed, and the approaching vehicle's speed shall be displayed as a figure in km/h below.

When the nominated upper threshold is exceeded, the words 'YOUR SPEED' and the speed figure shall be replaced by the message 'SLOW DOWN'.

2.2 Display uniformity

2.2.1 Luminous intensity (brightness)

Full-colour MVMS must be able to demonstrate no visible variation in brightness across the display. Refer to the section titled 'Display matrix pixel control' in ITS delivery specification: *Variable message signs – fixed*.

2.3 Sign controller

2.3.1 Communications

The MVMS shall be able to be operated in the following control modes:

i. **local control mode** (standalone).
ii. **remote and local control mode** using an approved operating system agnostic software and the Contractor shall supply a router capable of operating in all locations as specified by the Principal, and a description of this shall be provided to the Principal.
iii. **remote control mode** as per the requirements stated in ITS core requirements standard: *Variable message signs (VMS) and lane and carriageway signs (LCS) system interface*.

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The MVMS shall be capable of operating in both local control mode (ie no external communications) and remote control mode (communicating with an external control system). Any communication – local or remote – will be made through a sign controller installed within the MVMS. Remote control will be through a cellular router.

2.3.2 Sign controller requirements

Refer to the section titled 'Sign controller' in ITS delivery specification: *Variable message signs – fixed.* The controller must meet all the requirements stated in ITS core requirements standard: *Variable message signs (VMS) and lane and carriageway signs (LCS) system interface*. The MVMS controller shall report sign location and orientation.

2.4 Trailers

The MVMS display shall be mounted on a trailer to allow it to be transported to and from deployment sites.

The display panel shall have two modes:

i. **Transportation mode** will be used both for transportation and for storage when non-operational.
ii. **Operation mode** will be used when MVMS are deployed and a message is displayed.

A single person shall be able to reconfigure the MVMS modes.

2.4.1 Transportation mode

The position of the display panel shall minimise wind resistance when being towed. This shall be achieved by ensuring that the narrowest part of the display panel faces the direction of travel or lies flat as part of trailer infrastructure.

In transportation mode, no part of the equipment (including the display panel, stabilisers, and ancillary items) shall extend beyond the main structure of the trailer.

2.4.2 Operation mode

This mode shall be used when the MVMS is stationary. Once in operation mode, the lower edge of the display panel enclosure shall be between 2.1m and 2.5m above local ground level. The rear of the trailer and the display panel shall face approaching traffic.

2.4.3 Trailer requirements

In operation mode, the MVMS shall be designed to withstand wind loadings of gusts of up to 180km/h.

Trailers shall be constructed to be road worthy and compliant with all the requirements of the New Zealand Road Code. The trailer should be reinforced to avoid breakage.

The trailer shall be fitted with a manufacturer's plate. This plate shall comply with the New Zealand Road Code and display as a minimum:

i. manufacturer's name and address

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ii. chassis or serial number and model number
iii. number of axles
iv. maximum weight per axle
v. nose weight of coupling
vi. maximum gross vehicle mass (GVM)
vii. date of manufacture.

The chassis or serial number shall also be covertly marked upon the trailer and solar panels to facilitate identification following recovery if stolen.

The trailer shall be provided complete with all necessary lamps, reflectors, and devices as per the Land Transport Rule: Vehicle Lighting 2004. The lighting equipment shall be mounted securely to prevent unauthorised removal whilst still allowing routine maintenance.

Protection shall be provided to limit accidental damage during transportation and manoeuvring.

The MVMS shall be deployed in all environments under both transportation and operation modes.

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3 Performance requirements

This section outlines the reliability and availability requirements of equipment, which may require independent certification and/or declarations of conformity.

Performance requirements in this delivery specification are consistent with the ITS delivery specification: *Variable message signs – fixed,* as referred to throughout this section.

3.1 Design life

The specified design life for an MVMS shall be 10 years. The asset shall operate effectively for this period.

The specific conditions for the which the MVMS must be capable of performing in for 24 hours per day, 7 days per week, is stated in the section titled 'Resistance to the effects of external conditions' in ITS delivery specification: *Variable message signs – fixed*.

3.2 Power

There shall be an onboard energy management system capable of:

i. switching between energy sources
ii. controlling incoming charging energy
iii. maintaining battery condition and longevity.

All onboard electrical equipment of the MVMS shall be capable of operating from mains power and onboard batteries.

All MVMS shall be able to operate without connection to mains electricity for 170 hours (one continuous week). A combination of onboard batteries plus onboard energy generation shall be used and the configuration shall be submitted by the Contractor to the Principal.

The MVMS shall be provided with an automatic changeover system between each required energy source.

The Contractor must obtain approval from the Principal when installing an MVMS connected to mains power.

The display panel and all ancillary equipment shall be supplied to minimise power consumption.

3.3 Batteries

Batteries shall meet the following requirements:

i. provide sufficient storage,
ii. operate the sign for at least 48 hours without recharging,
iii. have a minimum design life of 24 months.

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3.4 Display matrix finish

The finish of all MVMS surfaces shall be consistent with the section titled ‘Display matrix finish’ in ITS delivery specification: *Variable message signs – fixed.*

3.5 Visual performance

For details on LED colour palette, luminance and beam width, refer to the section titled ‘Visual performance’ in ITS delivery specification: *Variable message signs – fixed.*

The LED elements for MVMS shall meet Class B6 for EN 12966:2014+A1:2018; ie have a minimum of 30 degrees total beam width.

3.6 Environmental protection

3.6.1 Resistance to surface corrosion

The surface protection of MVMS enclosures against corrosion shall meet the requirements EN 12966:2014+A1:2018 in section 4.5.2.3.2, titled ‘Resistance to corrosion of discontinuous VMS’.

3.6.2 Ingress protection against water and dust

MVMS enclosures shall be protected against water and dust ingress in accordance with section 4.5.2.4, titled ‘Ingress protection against water and dust (IP) provided by enclosure’ in EN 12966:2014+A1:2018. All MVMS enclosures must meet a minimum International Protection (IP) rating of IP56 (P3 as per EN 12966:2014+A1:2018).

3.6.3 Protection against external mechanical impacts

The sensitive electrical equipment inside the MVMS shall be given adequate protection against mechanical impacts such that the enclosure does not deform, delaminate, lose its structural integrity, or suffer a reduction in ingress protection if struck. The MVMS must meet the rating as outlined in the latest version of EN 12966:2014+A1:2018.

3.7 Maintainability

The MVMS shall be supplied:

i. so that all internal components can be replaced on site
ii. to have a standard access from the rear for easy cleaning
iii. to minimise onsite cyclic maintenance
iv. so that no specialist tools are required outside of security requirements.

3.7.1 Site access

The arrangements to access the sign need to be fully reviewed by the Client and suitably qualified professional to ensure safe arrangements have been made available. The requirements for safe site access will vary depending on the road environment. Individuals that do access the site need to be suitably qualified.

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3.8 Testing requirements

Refer to the latest version of ITS core requirements standard: *Variable message signs (VMS) and lane and carriageway signs (LCS) system interface* for testing requirements.

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4 Technical requirements

This section outlines specific technical and physical constraints for the equipment.

4.1 Power supply

4.1.1 Batteries

Batteries shall:

i. be sealed and maintenance free
ii. incorporate control circuits to prevent deep-discharging of any batteries
iii. be easily maintained in a charged state from a mains supply, in readiness for deployment at short notice.

4.1.2 Onboard generation

The MVMS shall be provided with an onboard electricity generation source.

This source shall comprise photo-voltaic solar cells; however, other means, including a fuel-driven generator, shall be considered, subject to agreement with the Principal.

The onboard energy store and the onboard electricity generation source shall be housed in a secure, suitably weatherproof enclosure mounted upon the trailer.

If fuel is required for onboard electricity generation, the fuel and fuel store must comply with any relevant New Zealand legislation relating to dangerous goods.

Where applicable, the fuel store shall be bunded such that a failure of the fuel store when at full capacity will not result in a spillage of fuel.

The maximum noise level from any form of generation shall comply with NZS 6803:1999 *Acoustics – Construction noise*. Any onboard means of electricity generation requiring a fuel store shall be provided with an emergency fuel isolation facility.

The handle to the fuel valve shall be exposed for ready isolation. If there is no handle and the valve is concealed, the valve shall be isolated using a standard tool.

4.1.3 Mains power

The MVMS shall be provided with a connection point to allow it to operate from an external mains electricity power supply, and to recharge the batteries.

The connection point shall be rated at a minimum of IP44.

The external power supply shall operate the display panel and any onboard equipment and recharge the onboard energy store whenever connected and ‘live’.

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The Contractor shall supply the Principal with a declaration of conformity if the MVMS is to be connected to mains power. Due to the mobile nature of MVMS, it shall comply with AS/NZS3001:2018 Electrical Installations – Transportable structures and vehicles including their site supplies.

The MVMS shall be provided with a mains electrical isolation switch. This switch shall be located behind a panel fitted with a hasp and staple, and padlock. The arrangement shall allow the padlock to be easily cut in an emergency. The panel shall be labelled to indicate 'Emergency Isolation'.

The MVMS shall be provided with an external earth connection point to allow an external earth connection to be made.

For any mains power installation equipment, the electrical supply, including the provision of power and earthing cables, shall be installed by the Contractor as specified by the supplier of the MVMS.

4.1.4 Resistance of electrical/electronic components to the effects of pollution

The Contractor shall declare the degree of resistance in accordance with section 4.5.2.2, titled 'Resistance of electrical/electronic components to the effects of pollution' in EN 12966:2014+A1:2018.

4.1.5 Charging

If required by the Principal, the MVMS shall have the capability to charge the equipment during towing.

4.1.6 Testing onboard generation

The onboard equipment shall be supplied to enable unattended operation without a permanent connection to the mains electricity supply. The Contractor shall undertake the following test requirements:

i. The onboard equipment shall operate continuously and be unattended for the test duration.
ii. The onboard equipment shall operate without a mains electricity supply or any replenishing of fuel supplies for the test duration.
iii. Onboard batteries shall be fully charged, and all fuel sources shall be full before testing commences.
iv. Any means of onboard electricity generation shall be operational.

To simulate field conditions, the output generated by any source which does not have onboard fuel supply (eg photo-voltaic solar cells or a wind-generator) shall be operated at a maximum of 50% efficiency.

4.2 Controller requirements

Refer to the section titled 'Sign controller' in the 'Technical requirements' chapter in ITS delivery specification: *Variable message signs – fixed*.

4.3 Sign physical characteristics

4.3.1 Global positioning system (GPS)

The MVMS must have a sign controller capable of reporting its' location and orientation A suitable GPS must be supplied in the sign and capable of reporting through the sign controller.

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4.3.2 Display matrix

For display matrix requirements, refer to the section titled ‘Display matrix’ in ITS delivery specification: *Variable message signs – fixed*.

4.3.3 Enclosure

The enclosure shall ensure that the sign display and control elements are easily accessible and removable for maintenance purposes.

Replacement and maintenance shall be completed through loosening the screw fixings via finger movement or other suitable fastening arrangement and disconnecting power or control connections.

The supplier shall provide the safety measures for the MVMS enclosure. The maintenance team shall access the enclosure to control the MVMS.

The sign enclosure shall be ‘safety orange’ as per section 15.3 in the latest version of NZTA M28 *Specification for colours for traffic control devices* (NZTA M28:2023).

4.3.4 Colour

Refer to the section titled ‘LED colour palette’ in ITS delivery specification: *Variable message signs – fixed*.

4.3.5 Font display

Refer to the section titled ‘Font visibility requirements’ in ITS delivery specification: *Variable message signs – fixed.*

For font descriptions, Refer to ITS core requirements standard: *Electronic message signage fonts*.

4.3.6 Ambient light sensor

Refer to the section titled ‘Contrast ratio’ in ITS delivery specification: *Variable message signs – fixed*.

4.3.7 Beam width

The LED elements for MVMS shall meet Class B6 for EN 12966:2014+A1:2018; ie have a minimum of 30 degrees total beam width.

4.3.8 LEDs

Refer to the section titled ‘Display matrix’ in ITS delivery specification: *Variable message signs – fixed*.

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4.3.9 Sign frame surfaces enclosure

Frame surfaces (internal and external) must be powder-coated as per AS 4506-2005 *Metal finishing – Thermoset powder coatings* (AS 4506-2005). The colour of the frame coating is to be as per BS4800:2011 *Colour chart* (matt black 00 E 53). The coating must facilitate the removal of graffiti.

4.4 Support trailer physical characteristics

4.4.1 Legal dimension requirements in Land Transport Rule: Vehicle Dimensions and Mass 2016

The dimensions of the MVMS, including trailer, shall comply with the maximums in Table 2 when in transportation mode. This is to allow for the trailer to be towed by a light vehicle, rather than requiring large specialist vehicle.

Length (mm)	Width (mm)	Height* (mm)	Mass** (kg)
6000	2300	3500	2400

Table 2: Trailer dimensions and weight requirements (Land Transport Rule: Vehicle Dimensions and Mass 2016)

* Height shall not exceed 1.7 times main axle wheel-track

** 'Wet weight', ie fully laden gross weight of the MVMS

4.4.2 Legal requirements and safety

The trailer shall be provided with a braking system that is compliant with the New Zealand vehicle regulations. It shall incorporate a manually operated handbrake which will hold the dismounted trailer on a slope of 1 in 5.

The trailer shall come with a New Zealand registration plate, 12 months registration, and a current warrant of fitness.

The trailer attachment shall be fitted with a coupling, tow ball and eye hitch that is fit for purpose and in a sound condition as per the Land Transport Rule: Light-vehicle Brakes 2002 and subsequent amendments.

The trailer shall come with a compliant safety chain or, where the trailer weight category requires it, a double safety chain that can be crossed over when attached to a towing vehicle.

The trailer shall be provided with a connection as per Principal requirements to allow connection to the towing vehicle and to comply with road code requirements.

i. The trailer shall be able to connect to both 12V and 24V electrical systems.
ii. The mechanism for changing between electrical systems shall be clearly labelled.
iii. A facility shall be provided to 'house' connection leads when not in use. This shall comprise a connector of opposite gender into which it can be inserted to prevent damage.

The trailer shall provide means by which ancillary items can be securely locked to the unit such that they shall not be removed by unauthorised personnel but can be utilised as required.

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The trailer must comply with relevant requirements for a safe trailer on New Zealand roads. The trailer needs to meet the legal requirements independent of this delivery specification.

All items provided as part of the trailer shall be suitably robust and securely attached for operation. Items such as mud guards and other trailer equipment, shall allow for suitable loading (eg. operators climbing onto the trailer for access, installation, and maintenance).

4.4.3 Stability

The trailer shall be provided complete with telescopic stabilising legs. The legs shall be raised in transportation mode and lowered in operation mode. When lowered, the legs shall support the mass of the entire MVMS. Legs shall be provided to ensure the MVMS is stable in operation mode during all wind speeds.

The trailer shall have lashing down points. One lashing down point shall be provided in coincident with each stabiliser leg. The lashing down point shall allow the trailer to be secured to the parking area and ensure the unit is stable in operation mode during all wind speeds.

The trailer shall be provided with lashing down straps. A single strap shall be provided for each lashing down point. They shall be adjustable to allow the trailer to be securely lashed down in operation. They shall be designed for the maximum load exerted in all design wind speeds.

The MVMS shall be provided with at least one lifting eye. This facility will allow the entire unit to be raised up by a suitable lifting device and placed behind an existing safety barrier. The eye(s) shall be sited such that when lifted the MVMS is level and stable.

The MVMS shall include a number of enclosures with an IP rating of IP44. All enclosures shall be securely constructed and provided with a locking mechanism to prevent unauthorised access.

Enclosures shall be provided for the following items:

i. local controller (refer to section 4.2)
ii. power supply equipment (refer to section **Error! Reference source not found.**)
iii. storage of miscellaneous items to house the following and extra items as required:
    - wheel clamps
    - levelling pads
    - a complete set of lashing down straps
    - power cables
    - earth rods
    - all miscellaneous items supplied with the MVMS.

4.4.4 Trailer colours

Frame surfaces (internal and external) must be powder-coated as per AS 4506-2005. The external colour of the frame coating is to be ‘safety orange’ as per section 15.3 in the latest version of NZTA M28 specification. The coating must facilitate the removal of graffiti.

Trailer structural steel surfaces such as chassis and sign enclosure steel support structures shall be galvanised.

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All metallic items of the trailer and support mounts shall be provided with a suitable finish to ensure the unit meets the required design life (10 years) without the need for repair or repainting.

The main body of the trailer, including all enclosures, and the structural supports of the display panel shall also be painted safety orange as per the latest version of NZTA M28 specification. The finish shall be semi-gloss to reduce the effects of specular glare.

All finishes shall have a high-quality aesthetic appearance for the design life of the unit.

Non-metallic items shall be manufactured from a suitable material that meets the design life requirement and will not deteriorate when stored in an outdoor environment for the duration of the design life. They shall not be damaged by the effects of ultraviolet light or rain.

The following information shall be painted (or applied with computer cut lettering) on the front, or the right-hand side of the trailer, in 50mm high black lettering:

- '**Emergency contact:**' followed by the phone number of the relevant network Contractor, or Principal contact.

4.5 Documentation

For required documentation, refer to the section titled 'Certification and declarations of conformity' in ITS delivery specification: *Variable message signs – fixed*.

Ownership documents road registrations shall be provided so that the Principal is able to legally operate the MVMS.

4.5.1 Software and licensing

Refer to the section titled 'Software and licensing' in ITS delivery specification: *Variable message signs – fixed*.

4.6 General requirements

Refer to the section titled 'General requirements' in ITS delivery specification: *Variable message signs – fixed*.

4.7 Standard warranty

The MVMS shall be supplied with a 5-year warranty for the trailer element of the asset. The sign component of the MVMS shall be supplied with a 2-year warranty.

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5 Installation requirements

For installation of MVMS, the Contractor shall review the required positioning before deployment on site. This shall be outlined in the TMP. Please refer to the following sections for installation requirements.

The MVMS shall meet the following requirements:

i. be mobile and able to be deployed in the road environments as specified by the Principal
ii. be suitable for deployment in a range of environments, conditions and road types
iii. be deployable for a period of time for the required purposes
iv. be deployable in a timely fashion
v. be secure
vi. be safe
vii. be durable and reliable.

The sign component of the MVMS shall meet the following requirements:

i. be able to display and maintain highly visible and legible messages to road users under all conditions
ii. be positioned in locations that maximise visibility both optically (optimising height and viewing angles) and logically (preceding important journey decision points); these graphics are covered in the latest version of ITS design standard: *Electronic signs – fixed variable message signs, mobile variable message signs, and lane and carriageway signs*
iii. not constrain the ability to deliver required messages (noting message configuration will change with operation requirements)
iv. provide operational status feedback to confirm that the MVMS is displaying the required message.

5.1 Site selection for MVMS

MVMS are to allow for the service user of the road to navigate the road ahead.

5.1.1 MVMS site examples

MVMS shall be installed at:

i. incident management sites
ii. special events sites
iii. sites with extreme weather or environmental events
iv. sites to provide route advisory
v. sites to provide travel time information
vi. sites to provide safety advisory notices.

These include both urban and rural environments.

5.2 Positioning

The positioning and installation requirements shall be developed in accordance with the following sections.

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5.2.1 Drainage clearance

MVMS must be positioned to avoid any obstruction to drainage or flow of water.

5.2.2 For approaching motorists

Unless there are operational requirements that necessitate variations, the MVMS must be positioned to the left of the approaching motorist. It is unsafe to position an MVMS on the right-hand side of approaching traffic.

5.2.3 Road types

The Contractor, prior to installing the MVMS, shall consult with the Principal regarding road type and shall meet the requirements of the TMP.

5.2.3.1 Motorways and expressways

When installing MVMS on motorways and expressways, the Contractor must consider:

i. the speed environment (for sufficient visibility for messages to be read)
ii. decision time ahead of interchanges (if providing route information).

5.2.3.2 Urban/arterial roadway

When installing MVMS on urban/arterial roads, the Contractor must consider:

i. the speed limit (for sufficient visibility for messages to be read)
ii. right-of-way provisions
iii. site constraints (such as the local environment).

5.2.3.3 Rural single-lane roadway

When installing MVMS on rural single-lane roads, the Contractor must consider the factors identified in section 5.2.3.2, Urban/arterial roadway.

The Contractor shall acknowledge the complexity of some decisions and the route choices undertaken by motorists.

5.2.4 Road alignment

MVMS shall be installed on straight alignments to ensure a clear sightline is maintained and the drivers are given enough time to view and react to the message (refer to section 2.3.3, titled ‘Road angle vertical and horizontal alignment’ in the latest version of ITS Design Standard: *Electronic Signs*).

5.2.5 Road geometry

Avoid positioning an MVMS immediately before a sharp bend, blind crest, or intersection, where the sign distracts driver attention at a critical moment.

Avoid positioning the MVMS where the display shall be seen from a neighbouring road, leading to motorists receiving confusing or conflicting information.

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5.2.6 Clear sight distance

The position of the MVMS shall not compete with other signage, structures and vegetation. The Contractor shall consider the speed of the road and locate accordingly.

For roadways with a speed environment of 100km/h, choose sites that allow motorists clear sight distance to the sign of at least 300m. In lower speed environments, the distances can be reduced proportionally.

5.2.7 Avoiding sunlight glare

If possible, avoid positioning the MVMS directly in front of a rising or setting sun as this may significantly reduce its effective visibility. Similarly, reflections of the sun on the display face may reduce its legibility.

Where these display visibility factors cannot be mitigated by positioning – for example, by taking advantage of a natural backdrop of a hill or trees, or a downhill slope – a hood or louvres must be used to shield the display.

5.2.8 Traffic volumes

For low traffic volumes (eg 2000 AADT) where the MVMS may display a message advising motorists to turn back, choose a site that has a suitable pull-over/turning area just after and within view of the sign for map reading/turning around.

With high traffic volumes and a high-speed environment, a level is reached where pulling over or turning around is unsafe. Therefore, consultation with a suitably qualified professional shall be undertaken to determine where the pull-over/turning areas are appropriate.

5.2.9 Route advisory messaging

If the MVMS is intended to advise route diversions, the sign should be located sufficiently in advance of the alternate route intersection to allow motorists to assimilate the message and respond accordingly, including changing lanes if necessary.

5.3 Presence of other signage

MVMS shall not compete with other existing signs and/or strong light-emitting sources or interfere with traffic control devices both preceding and beyond the site. For further details, refer to section 2.2.4 Prescence of other signage in the latest version of ITS design standard: Electronic Signs.

5.4 Avoid creating a hazard or hindrance

In the motorway context, MVMS will normally need to be positioned behind a barrier for protection.

In the HVU and rural context, for speed environments at or above 70km/h, MVMS shall be sited outside the clear zone or behind barrier protection.

For speeds below 70km/h, MVMS shall be located as far from the road edge as practicable.

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Consideration must be given to visibility, illumination, and safety under nighttime or adverse weather conditions.

Placement of MVMS must not impede pedestrian footpaths or cycle lanes.

5.5 Messages

Messages being displayed on MVMS shall be fit for purpose. In higher speed environments the employment of multiple pages must be avoided unless specifically determined to be a requirement. Refer to ITS core requirements standard: *Electronic message signage fonts* for font descriptions, which will guide Contractors on how this will affect the display requirements.

Messages posted on MVMS shall comply with the standard message design processes outlined in the NZTA Variable message signs operating policy and procedures, and where possible shall utilise the standard messages provided in this document.

Inconsistent or contradictory messages may arise between MVMS and fixed VMS. To ensure road users receive consistent information, the appropriate transport operations centre must be made aware of the proposed MVMS message before it is displayed.

5.6 Deployment

5.6.1 General requirements

When deploying an MVMS, Contractors shall ensure the following requirements:

i. the rear of the trailer faces oncoming traffic
ii. the handbrake is on
iii. the wheel clamps are fitted and locked
iv. the stabiliser legs are extended firmly to the ground
v. the battery is fitted and securely locked.

5.6.2 In windy conditions

The ‘sail area’ of the raised display will exert large overturning forces on the trailer in moderate to high winds. The Consultant must consider the design limits for any MVMS, which may limit the locations where an MVMS can be deployed.

In addition to the requirements listed in section 5.6.1, operators shall also employ some, or all, of the following measures if there is a risk of overturning in high wind:

i. Use the lash-down straps provided to anchor the trailer to the ground or some other fixed object. The most important lash-down points are those on the windward side.
ii. Only raise the display to the lowest operational configuration (however, it must be noted that a fully raised display provides better visibility in moderate to high traffic volumes).
iii. If very high winds are expected, the display shall be placed in transportation mode, or the MVMS moved to a position of safety until the winds abate.

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5.6.3 Security

MVMS will be left unattended on the roadside. Security requirements for MVMS shall prevent the following:

iv. removal of the complete unit from site
v. removal of major components (eg wheels, solar panels)
vi. dismantling of the equipment
vii. operation of the equipment.

5.7 Communications coverage

If messages for the MVMS are to be controlled remotely, the site must have the appropriate communication system coverage.

5.8 Electrical safety

All ITS equipment must comply with and be installed in accordance with the Electricity (Safety) Regulations 2010 (SR 2010/36).

Each installation will have an Electrical Certificate of Compliance (COC) & Electrical Safety Certificate and a Record of Inspection (ROI) of High-Risk Prescribed Electrical Work.

5.8.1 Equipment declaration of conformity

The Contractor shall supply a declaration of conformity for the MVMS in accordance sections 80(2) and 81 in SR 2010/36.

5.8.2 Installation of electrical equipment

The installer is required to supply a certificate to confirm the equipment complies with the relevant New Zealand electrical regulations and has been installed in accordance with these regulations. This includes acceptance of the declaration of conformity.

5.9 Commissioning and handover

Refer to the latest version of ITS core requirements standard: *Commissioning and handover requirements.*

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6 References

This section lists all external and NZTA references included in this document.

6.1 Industry standards

Standard number/name
AS 4506-2005 Metal finishing – Thermoset powder coatings
BS4800:2011 Colour chart
NZS 6803:1999 Acoustics – Construction noise
EN 12966:2014+A1:2018: Road vertical signs – Variable message traffic signs
AS/NZS3001:2018 Electrical Installations – Transportable structures and vehicles including their site supplies.

6.2 NZTA standards, specifications and resources

6.2.1 Standards and specifications

See the NZTA website for the latest versions of the ITS S&S listed below.

Document name
ITS core requirements standard: Commissioning and handover requirements
ITS core requirements standard: Electronic message signage fonts
ITS core requirements standard: Variable message signs (VMS) and lane and carriageway signs (LCS) system interface
ITS delivery specification: Variable message signs – fixed
ITS design standard: Electronic signs – fixed variable message signs, mobile variable message signs, and lane and carriageway signs

6.2.2 Resources

Document name/code
Land Transport Rule: Light-Vehicle Brakes 2002
Land Transport Rule: Vehicle Lighting 2004
Land Transport Rule: Vehicle Dimensions and Mass 2016
New Zealand Road Code
NZTA M28:2023 Specification for colours for traffic control devices
Variable message signs operating policy and procedures

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6.3 Legislation

Name
Electricity (Safety) Regulations 2010 (SR 2010/36)

6.4 Other resources

Name

6.5 ITS standard drawings

See the NZTA website for the latest versions of the ITS standard drawings listed below.

Drawing number

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7 Terminology used in this document

Term	Definition
DRAFT	The document is being written and cannot be used outside of NZTA.
FINAL DRAFT (pending ratification)	The document has been finalised and is pending approval and ratification by NZTA. It can be used for procurement at this status.
RATIFIED	The document is an official NZTA document. NZTA projects and other road controlling authorities connected to NZTA back-end systems must include this document in the contracts. The obligation to follow the requirements in this document would come from the inclusion of the S&S document in the contract.
RETIRED	The document is obsolete, and/or superseded.
AS	Australian standard
BS	British standard
COC	Electrical Certificate of Compliance & Electrical Safety Certificate
Design wind speed	Ultimate wind speed at the site based on terrain and return period
Enclosure	The enclosure housing the display and the electronics systems immediately associated with the display
GPS	Global positioning system
GVM	Gross vehicle mass
IP	International Protection code (sometimes interpreted as Ingress Protection)
ITS	Intelligent transport system(s)
LCS	Lane and carriageway sign(s)
LED	Light emitting diode
MVMS	Mobile variable messaging sign(s)
NZS	New Zealand standard
NZTA	NZ Transport Agency Waka Kotahi
Pixel	Smallest controllable element of a display matrix for an electronic sign or signal
prEN	Proposed European standard
S&S	Standards and specifications
TTM	Temporary traffic management
VMS	Variable message sign(s)

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8 Content to be redirected

This section records any circumstances where content from this document will be reclassified and moved into future documents. This table is then updated with a reference to the new location.

Section reference	Section name	Future document	Class
2.1.1	Font visibility requirements	ITS core requirements standard: *Electronic message signage fonts*	001 Signs

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9 Document control

9.1 Document information

Document number	ITS-SPEC-MVMS-202409
Previous document number/s (if applicable)	
Document status DRAFT | FINAL DRAFT | RATIFIED | RETIRED	FINAL DRAFT
[IF RETIRED] New document details	
Online ISBN	
Document availability	The controlled version of this document can be accessed from https://www.nzta.govt.nz/roads-and-rail/intelligent-transport-systems/standards-and-specifications/its-current-interim-and-legacy-standards-and-specifications

9.2 Document owner

Role ITS S&S Steering Committee

Organisation NZTA

9.3 Document approvers

This table shows a record of the approvers for this document.

Approval date	Approver	Role	Organisation
DD/MM/YYYY			

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9.4 Full version history

This table shows the full history of changes made to this document, both minor and major, in chronological order, since the document was first authored.

Minor versions are numbered 0.1, 0.2 etc until such point as the document is approved and published, then it becomes 1.0 (major version). Subsequent edited versions become 1.1, 1.2 etc, or if it's a major update 2.0, and so on.

Version	Date	Author	Role and organisation	Reason
0.1	DD/MM/YYYY	James Ellison Allan Arora Alyssa Greaney	Principal Transport Engineer Transport Engineer Transport Planner	Initial Draft
0.2	08/05/2024	James Ellison Allan Arora Alyssa Greaney	Principal Transport Engineer Transport Engineer Transport Planner	Second Draft
0.3	27/05/2024	James Ellison Allan Arora Alyssa Greaney	Principal Transport Engineer Transport Engineer Transport Planner	Third Draft – Response to Expert Panel
0.4	25/06/2024	James Ellison Allan Arora Alyssa Greaney	Principal Transport Engineer Transport Engineer Transport Planner	Fourth Draft – prior to Proofer
0.5	08/07/2024	Matthew Bauer	Clear Edit NZ	Copyedit
0.6	09/07/2024	James Ellison Catherine Rochford	Principal Transport Engineer Senior Associate – Project Management	Fifth draft – post proofer comments
0.7	20/09/2024	James Ellison Alex Lumsdon Alyssa Greaney	Principal Transport Engineer Associate – Transportation Engineering Transport Planner	Sixth draft – post proofer comments to address Ratification Group feedback
0.8	09/10/2024	James Ellison Alex Lumsdon	Principal Transport Engineer Associate – Transportation Engineering	Seventh draft – updates after Technical Standards Comittee feedback

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