Technical Specification

Transport and Main Roads
MRTS216 Provision of Road Condition Information Signs

July 2020

Queensland
Government

Contents

SUPERSEDED

1   Introduction

This Technical Specification defines the design, supply, installation, testing & commissioning, performance, documentation, training, maintenance and handover requirements for Road Condition and Information Signs (RCIS) and associated control systems. RCIS is a Traveller Information Sign.

RCIS will:

- be used as part of an integrated traveller information system connected to STREAMS, and

- be capable of being used as a stand-alone device able to operate fully when local control is selected.

The RCIS shall consist of a static diagram depicting the road segments of interest at the location of sign installed. A single line tri-colour Variable Message Signs (VMS) shall be provided adjacent to each road segment on the static diagram. The maximum number of VMSs per RCIS is limited to four.

The VMS shall display colour coded messages in red, yellow or green text depending on the road condition to be conveyed to motorists. Typical messages will relate to whether the segment of the road is closed, open or limited by load restrictions that may be in force. The VMS may display the travel time.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other Technical Specifications as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2   Definition of terms

The terms defined in MRTS201 apply to this Technical Specification. Additional terminology relevant to this Technical Specification is defined in Table 2 below.

Table 2 – Definitions

Term	Definition
ACMA	Australian Communications and Media Authority
DU	Display Unit
FP	Field Processor
ELV	Extra Low Voltage
IP	Internet Protocol
IPxx	Ingress Protection rating, the level protection against the solids and water ingress denoted by "xx"
LED	Light emitting diode
NATA	National Association of Testing Authorities
PC	Personal Computer
PHCS	Product Host Control System. Diagnostic / Control / configuration software provided by the supplier of the sign.
QADF	Queensland Asset Data Format
RCIS	Road condition information sign

Term	Definition
RCM	Regulatory Compliance Mark
RGB	Red Green Blue
RMS	Road and Maritime Services New South Wales
SAT	System Acceptance Testing
STREAMS	Traffic Management System of TMR
TMS	Traffic Management System (STREAMS)
VMS	Tri-colour variable message sign(s) (single line)

3   Reference documents

The requirements of the referenced documents listed in Table 3 of MRTS201 and Table 3 below apply to this Technical Specification. Where there are inconsistencies between this Technical Specification and the referenced Technical Specification, the requirements specified in this Technical Specification shall take precedence.

Table 3 – Referenced documents

Document ID	Document Name / Description
AS 1744	*Forms of letters and numerals for road signs*
AS 4852.1	*Variable message signs, Part 1: Fixed signs*
AS 60529	*Degrees of protection provided by enclosures (IP Code)*
AS/NZS 1170.2	*Structural design actions - Wind actions*
AS/NZS 2144	*Traffic signal lanterns*
AGTM10-20	*Austroads Guide to Traffic Management Part 10*
IS18	*Queensland Government Information Security Policy*
MRTS01	*Introduction to Technical Specifications*
MRTS14	*Road Furniture*
MRTS50	*Specific Quality System Requirements*
MRTS51	*Environmental Management*
MRTS61	*Gantries and Support Structures for Road Signs, Tolling Systems and ITS Devices*
MRTS71	*Reinforcing Steel*
MRTS78	*Fabrication of Structural Steelwork*
MRTS91	*Conduits and Pits*
MRTS97	*Mounting Structures for Roadside Equipment*
MRTS201	*General Equipment Requirements*
MRTS210	*Provision of Mains Power*
MRTS226	*Telecommunication Field Cabinets*
MRTS245	*ITS Telecommunications Network (ITS TN)*
MRTS263	*Standalone Solar (PV) Power Systems*

Document ID	Document Name / Description
TC 1709	Department of Transport and Main Roads TC series drawing for *Traveller Information Sign*
TRUM Manual	Department of Transport and Main Roads *Traffic and Road Use Management Manual*
TRUM Vol 1 Part 10	*Traffic Control and Communication Devices*
TSI-SP-003	*RMS Communications Protocol for Roadside Devices*

4 Quality system requirements

4.1 Hold Points, Witness Points and Milestones

The quality system requirements defined in MRTS201 apply to this Technical Specification. There are no Milestones defined. Additional quality system requirements relevant to this Technical Specification are defined in Table 4.1 below.

Table 4.1 – Hold Points, Witness Points and Milestones

Clause	Hold Point	Witness Point	Milestone
4.2	1. Detailed designs 2. Optical performance certificate	1. STREAMS acceptance certificate	
7.3	3. Mounting Structure – Fabrication design 4. Mounting Structure – Footing design		
14	5. RCIS Placement		
16.2		2. Factory Acceptance Tests (FAT)	

4.2 Sample variable message sign

Requirements of MRTS201 apply to this standard. Detailed designs of the sign layout, fabrication and assembly drawings, mounting provisions, footing design, calculations and Specifications, certifications of the RCIS components (signed by the Contractor's RPEQ) shall be submitted to the Principal for acceptance prior to manufacture. These components include the VMS, ambient light sensors, power supply, control and communication devices, the sign face, mountings and footings. **Hold Point 1**

VMS of the type to be provided under the contract and associated sign controller shall be submitted to the Principal prior to full production. Samples of the following devices:

1. VMSs

2. associated sign controllers

3. maintenance / diagnostic software, and

4. operational software

shall be submitted to the Principal prior to full production.

The Contractor shall demonstrate as part of STREAMS Acceptance Tests (SAT) capability of the RCIS to be integrated into STREAMS. **Witness Point 1**

Optical performance test certificate from a NATA accredited laboratory confirming the VMS performance requirements specified in this Technical Specification shall be submitted before delivery to Site. **Hold Point 2**

4.3 Warranty

The Contractor installing the RCIS shall warrant the installation against defects for a minimum of five years in accordance with the requirements of MRTS201.

Minimum five year warranty provision is required for electronic signage as they fall under a category of products which are high cost, safety critical or high quantity.

5 Functional requirements

5.1 General

The functional requirements described in this Technical Specification are limited to the main components of the RCIS, the controller, VMSs and product host control system.

RCIS provide roadside information to motorists on status of roads such as closure or load restrictions under varying environmental conditions. RCIS may provide travel time information.

Each RCIS shall include a static sign face depicting a static diagrammatic layout of the road network, a number of VMSs embedded in the static sign assembly, controller, field processor, telecommunication devices, surge protection devices, local facility switch(es), support frames, mounting poles, telecommunications field cabinet, switchboard and associated infrastructure.

Each VMS shall be connected to a field processor which in turn is connected to the Traffic Management System (TMS).

The sign controller shall allow the TMS to control, monitor and program each VMS remotely from the Traffic Management Centre (TMC) and locally through the Product Host Control System (PHCS).

Sign controller communication with the TMS shall be through the communications port. Connection to the PHCS shall be through the maintenance communications port.

5.2 Control methods

The VMSs shall be able to be selected using the following methods by the sign controller:

1. Locally, when the controller has been selected for LOCAL operation using a local facility switch and/or hardwired inputs to select one of the pre-determined messages.

2. Locally, when the controller has been selected for MAINTENANCE operation via the PHCS, and

3. Remotely by the TMS when the controller has been selected for REMOTE operation. This shall be the normal mode of operation.

5.3 Sign controller

The sign controller shall have following capabilities as minimum:

1. monitor, log and support TMS requests and reports its own status

2. monitor and log system operations, including message changes, of each VMS connected to it individually, date and time stamp events to at least one second time resolution

3. have capacity for storing at least 500 event logs and 500 fault logs

4. allow retrieval of these events by the TMS as well as by the PHCS

5. allow confirmation of the message displayed by each VMS from the TMS

6. return upon request by the TMS the alarms or faults emanating from each VMS

7. be capable of dimming the VMS based on the average of the light sensor outputs of all signs at the Site

8. on power-up, blank the display of sign until instructed by the TMS or local control to display a message, and

9. blank the VMS after a set period, which shall be configurable, upon loss of communication with the TMS.

The sign controller shall monitor and log the following events as minimum:

1. sign(s) operations, message changes and faults

2. loss of communications with VMS and/or TMS

3. controller start

4. controller shutdown

5. processor fault

6. loss of power to the VMSs

7. low supply voltage to the VMSs

8. high VMS sign enclosure temperature

9. cooling device fault

10. ambient light sensor fault

11. LED faults, and

12. other faults related to the VMSs.

5.4   Communications timeout

The sign controller shall be capable of monitoring loss of communications with the TMS and timeout after a specified period. When the sign controller is in the REMOTE mode, expiry of this time shall cause the sgn controller to blank the entire VMSs. This period shall be a configurable parameter. Communications timeout check shall be performed periodically and shall be a configurable parameter. In LOCAL mode, the communications timeout check with the TMS shall be ignored. Configuration parameters are shown in Appendix A.

Default values and permissible range of values are listed in Appendix A to enable testing and configuration as required.

5.5   Configuration management

All settings in the sign controller shall be accessible using the PHCS.

5.6 Sign fault management

The sign controller shall monitor and log the following conditions:

- loss of communication with the FP and sign controller

- high enclosure temperature

- illumination faults, and

- other faults relating to the VMSs.

Sign controller shall reply for a request by the TMS for the fault log by providing not less than 20 entries.

5.7 Local event logging

The sign controller shall log in non-volatile memory, operational and fault events such as message changes, hardware resets, establishment or discontinuation of communications, local manual operations and clearance of faults. Each event shall be date and time stamped, accurate to at least one hundredth of a second. Once a fault has occurred and been logged, a recurrence of the same fault need not be logged again until after the fault has been cleared.

The event log shall have space for at least 500 entries. Where separate logs are used for operational and fault events, each log shall have space for at least 500 entries. The oldest event record shall be overwritten first when this allocated space has been exceeded.

All log entries shall be available for upload from all communication ports upon request from the TMC and/or PHCS. The log shall be uploaded in order of most recent to oldest record. A request by the TMS for the event log shall provide for no less than 20 entries at a time.

Events shall be retained in the log even after retrieval by the PHCS and/ or TMS.

5.8 Watchdog

The sign controller shall monitor the state of its respective processor and blank the respective display in accordance with the VMS Use and Operations Guidelines if processor failure occurs.

5.9 Time synchronisation

The sign controller shall be provided with an internal system clock in accordance with MRTS201 and allow synchronisation of the clock in response to a TMS and/or PHCS command.

6 Types of RCIS

RCIS may have different layouts designed to suit the location and application. The size of the VMS panels and character size of legends shall be complied with the requirements of this Technical Specification and other relevant Specifications referenced. TC 1709 depicts one such RCIS layout.

Figure 6 – Example of a RCIS – See TC 1709 for full details
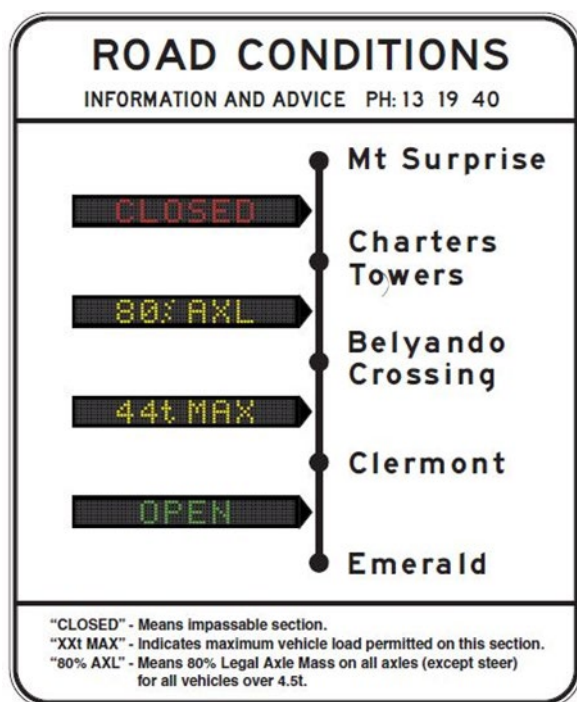
7 Mechanical and physical requirements

The mechanical and physical requirements of MRTS201 apply to this Technical Specification. Additional mechanical and physical requirements for equipment to be provided under this contract are described below.

7.1 Design life

Unless otherwise specified, the design life of the RCIS components shall be as follows:

- LEDs / pixels and electronics: a minimum of 10 years
- enclosures: a minimum of 20 years, and
- structures: a minimum of 50 years.

7.2 RCIS static sign face

The static sign shall comply with the requirements of MRTS14. The sign face material shall be aluminium and mounting of all the VMS shall not cause the sign face to warp. The retro-reflective material shall satisfy photometric requirements as specified in MRTS14. The materials and methods of construction of the materials, equipment and enclosures shall be such that they have the strength and durability to withstand expected conditions of transportation, installation, and operation when installed in the intended environment. The equipment and enclosures shall be of suitable materials and design to protect against vandalism and prevent infestation by vermin.

Layout of the RCIS sign shall be according to relevant TC sign. Specifics for each Site including the number of VMSs, road segments, shall be designed according to the relevant departmental standards, manuals and guidelines.

The VMS supplied for the specific RCIS shall be the same in every respect including aspect ratio and pixel arrangement to allow inter changeability with any other VMS.

The RCIS, enclosure and mountings shall be designed to withstand loading conditions set down in MRTS97 and AS/NZS 1170.2 for the respective location.

7.3   Mounting structure

The mounting structure shall comply with requirements of MRTS14, MRTS61, and MRTS78. The RCIS shall be installed on structures at a mounting height of at least 2.5 metres above ground level as measured from the lowest point of the sign. The mounting structure shall have holders such that the VMSs will be supported even if it is not yet fixed to the RCIS face.

All fabricated steel work shall be hot dip galvanised and comply with requirements of MRTS78. Final design documentation shall be submitted for consideration by the Principal as specified in this Technical Specification. **Hold Point 3**

Fabrication of all structural steel work shall be undertaken by a registered fabricator.

The location and type of mounting structure to be provided to mount each VMS shall be shown on the design documentation. The mounting structure shall comply with the requirements of MRTS61, MRTS71, MRTS78 and MRTS201.

> Particular attention needs to be given to the requirements in MRTS78 relating to the use of a registered fabricator when fabricating mounting structures for RCISs.

The final design documentation shall include details of the final footing design, location of the structure, and the heights. The Contractor shall not commence fabrication of the footing and support structure until that final design documentation has been accepted by Principal. **Hold Point 4**

7.4   Field cabinets

All enclosures associated with the RCIS shall comply with requirements of MRTS201 and MRTS226. In addition, the communications cabinet associated with the RCIS shall be made of 316 grade stainless steel or marine grade aluminium enclosure mounted at the back of the sign or on one of the mounting posts.

Components integral to each VMS shall be mounted in the respective VMS enclosure. It shall be arranged such that the access door does not obstruct vision of the carriageway.

7.5   Ducts and pits

Installation of ducts, pits and conduits to accommodate power and communication cables shall comply with the requirements of MRTS91.

Provision for conduits to service communication cabinet shall be made in the footing and the mounting post. The pits shall be clear of the access path used by maintenance personnel.

7.6   VMS panel mounting

The static sign shall allow individual VMS to be removed without affecting the other VMSs. If requested by the Principal, the static sign shall be provided with provision to allow static message plates to be fitted over the cut-out without the VMS in place.

Access to the VMSs for maintenance purposes shall be from the rear. A minimum vertical separation of 150 mm shall be provided between each VMS to allow easy removal. Removal of any covers for the VMS enclosure shall in no way interfere with the mounting structure members of the RCIS. Mounting of the VMSs shall be such that they seamlessly fit with the sign face.

Mounting of control boards and arrangement of equipment shall allow easy removal of component parts.

7.7   VMS and RCIS telecommunications enclosure

All surfaces shall be free from sharp corners and projections that may catch clothing, body parts and/or otherwise cause injury. The VMS enclosure and the RCIS telecommunications cabinet shall be made of suitable marine grade aluminium or stainless steel. Additional mechanical and physical requirements for these enclosures are described below.

A ripple finish is required to all painted surfaces. The front surface surrounding the active display and the interior surface shall be matte black. The remainder of the external surfaces shall have a solar reflective paint finish to further reduce effect of solar radiation on the VMS enclosures. The finish shall ensure that environmental conditions have no detrimental effect to structural integrity or visual appearance for a period of not less than ten years.

7.8   Weather resistance

RCIS shall withstand extreme weather conditions in Queensland.

Ingress protection of the sign shall be provided using either IP65 rated sign enclosure or modules that are rated to IP65 to enclose sensitive equipment such as electronics.

IP rating shall be in accordance with AS 60529.

When the ingress protection provided at modular level, connections between the modules shall not compromise the degree of protection below IP65. This approach shall not degrade the performance and design life of the VMS.

Communication cabinet shall provide a degree of protection in normal service of not less than that required for the classification of IP55 as defined in AS 60529.

7.9   Front cover for VMS

If a front cover has been supplied to meet the ingress protection requirements of the sign enclosure, it shall meet the requirements below.

> Front cover is not a mandatory requirement if the sign design meets the ingress protection requirement specified in this Technical Specification without using a front cover.

Material

A protective front cover shall be fitted to the VMS display enclosure to form a viewing window. The front cover material shall be a single, clear Lexan® sheet, or equivalent, with a non-reflective finish. The sheeting shall be manufactured from sign-grade material SG300 with a thickness at least equal to that recommended by the manufacturer, and in all cases, at least 3 mm. The viewing window shall be such that when installed, the sides and bottom edges of the display face are fully visible at viewing angles of ± 45° (horizontal) and ± 30° (vertical) to the axis perpendicular to the front plane of the display.

Retention Method

The front cover retention and seal design shall allow for thermal expansion properties of the front cover material. The front cover surrounding framework and cover strips shall provide the required weather proofing and strength for both positive and negative wind pressures.

7.10 Ventilation / Cooling

VMS enclosure internal operating environment shall be maintained accordance with the requirements of the MRTS201. The ventilation / cooling system provided shall be in accordance with the requirements of MRTS201.

8 Variable message display requirements

8.1 General

Each VMS display shall be formed by arranging a series of pixels to form a matrix display. A full matrix configuration shall be used to allow the display of textual information.

Each alphanumeric character shall be formed by a matrix arrangement of horizontal and vertical pixels.

Each VMS display shall have minimum of seven characters in a single line.

8.2 Variable message display technology

The VMS displays shall be based on LED technology. The LED technology shall be such that luminous intensity degradation is minimal over the service life of the signs. The design shall be such that no flicker is visible.

8.3 Failures

Facilities shall be included to detect failures within the display control system. VMSs shall blank the display in the event of a sign processor fault. Time to blank shall be a configurable setting with ranges as given in Appendix A.

The VMSs shall monitor communications with the field processor and blank the displays if communication is lost for a period of time. This communications timeout period shall be a configurable parameter with ranges as given in Appendix A.

The sign controller shall be able to detect LED failure even if the LEDs are required to be at state of 'off' at the time of the periodic check. The display shall be blanked upon failure of four or more contiguous pixels in either horizontal or vertical direction or failure of more than 20% of LEDs.

On power restoration after loss of power, the VMSs shall become available for activation and remain blank until commanded by the sign controller or STREAMS. The power recovery delay time shall be a configurable setting with ranges as given in Appendix A. At no time shall partial or incomplete frames be displayed.

The sign controller shall allow the sign's display to remain blank for a minimum time once the display has been blanked irrespective of the cause. This minimum blank time shall be a configurable setting with ranges as given in Appendix A.

Single LED failure, provided that the cumulative LED loss remains below the thresholds described above or VMS light sensor failure, should not result in blanking of the display. The failure of any LED shall be reported in the log.

Facilities shall be included to detect failures within each VMS. On detection of a VMS display failure, the respective VMS shall be blanked off to prevent confusing displays to the motorist.

Each LED shall be driven with a continuous current with no peak currents exceeding 70% of the LED manufacturer's recommended maximum continuous current rating. Additionally, where LEDs are in 5 mm diameter packages, maximum current through each LED shall be no more than 20 mA.

8.4   Character and graphical display formats

The dimensional requirements of the VMSs shall be complied with the requirements of AS 4852.1 The minimum legibility distance shall be complied with the requirements of AS 4852.1 for both daytime and night-time viewing. These dimensions apply to message displays in all three colours.

The type of VMS proposed for RCIS installation shall depend on the maximum speed allowable in the adjacent roadway, legibility and placement requirements outlined in the *Austroads Guide to Traffic Management* Part 10. The Queensland specific requirements are supplemented as Queensland practice variations in the *Traffic and Road Use Management Manual* (TRUM) Volume 1, Part 10 *Traffic Control and Communication Devices.*

8.5   Display fonts

As a minimum, the variable message display shall generate single stroke (7x5 pixel) alphanumeric character fonts generally to the requirements of AS 1744 and AS 4852.1. VMSs shall not require displaying lower case characters.

8.6   Display changes

The dynamic message display changes shall be affected by blanking the display, and then activating all required pixels or pixel elements depending on the colour of the message, simultaneously (as apparent to the eye). The displayed message shall remain the same unless a fault develops or a request for a change is made by the TMS or local control.

8.7   Display colour

Each pixel in the multicolour VMS shall be provided by red, green, and yellow high visibility LEDs on a matte black background. The ability to mix pixel colours shall not be provided.

The red, green, and yellow colours displayed by the VMS shall lie within regions specified by chromaticity coordinates defined in AS 4852.1.

> Red, green, and yellow pixels are required for compliance with road signage colours. RGB signs are not to be used as the blue colour is known for its poor contrast and legibility.

8.8   Fallback displays

Fall-back for RCIS shall be blanked display unless otherwise specified.

A VMS display shall automatically be blanked off if any of the following conditions has been detected, directly or indirectly:

- multiple LED failures as defined above, or

- scheduled VMS health status check has failed as a result of loss of communication or otherwise.

8.9   Optical performance

8.9.1   Luminance

The luminance and luminance ratio of the VMS sign shall be in accordance with the requirements of AS 4852.1.

8.9.2   VMS sign dimming

The LED intensity shall be controlled to provide maximum legibility distances for the complete range of ambient light under which the VMS shall operate.

A VMS shall have a minimum of 16 LED brightness levels. The brightness levels shall be in units of percentage of maximum brightness.

The transition between different brightness levels shall not cause sudden changes in brightness. The brightness level changes shall transition through all the intermediate levels. The transition time between two consequent brightness levels shall be configurable as given in Appendix A.

8.9.3   Luminance intensity half angle

The luminance intensity half angle shall be in accordance with the requirements of AS 4852.1.

8.9.4   Luminance intensity uniformity

The luminance intensity uniformity shall be in accordance with the requirements of AS 4852.1.

8.9.5   Sun phantom

The action of sunlight or other bright light sources on the optical elements shall be controlled such that inactive pixels shall not appear active.

9   Control system

Each RCIS shall be capable of operating standalone or by TMS. If required by the Principal as part of supply of RCIS, Contractor shall provide an economical communications connection, compliant with MRTS245, to connect the RCIS to the TMC.

Each VMS shall have provision for a direct RS422 serial link to the field processor.

9.1   General

The RCIS shall be provided with an integral local control system that allows the mode of control to be selected in the field to local or remote control and for each VMS to display a pre-programmed message.

9.2   Local facility switch(s)

The local facility switches shall be mounted on the telecommunications cabinet to facilitate access by authorised personnel without the need for elevated platforms.

The local facility switches shall enable selection of each VMS to remote control and when in local control, individual messages to be displayed on each VMS. The following four display functions shall be available:

- OFF – display blank; control via all communications ports inhibited; status and diagnostic commands via all communications ports shall remain functional.

- AUTO – normal mode of operation, RCIS controlled by TMS.

- Message 1, Message 2 – display selected message 1 or 2; control via all communications ports inhibited; status and diagnostic commands via all communications ports remain functional. The local facility switches shall be accessible from inside the communications cabinet of the RCIS. A label indicating the effect of each switch position shall be fixed adjacent the switch.

Where a two-switch solution has been devised, an intentional delay shall be introduced to allow manual selection of the correct display by the selected VMS.

9.3 Maintenance communications port

It shall be possible to control and interrogate the VMS via a maintenance communications port from field cabinet. The maintenance communications port shall also allow remote connection of a similar computer via Principal's communications network.

A change of operation mode between remote and local shall not require further interaction from the user, nor in anyway other than terminating the current PHCS session on the maintenance computer.

All the VMS programming software features or functions shall be possible when connection is made via the maintenance port.

9.4 Control communications port

The sign controller shall allow interrogation from the TMS of each VMS through the control communications port. Control and monitoring by the TMS shall be possible through the control communications port as determined by telecommunications infrastructure provided at each Site.

While a PC / laptop is connected to the sign controller via the maintenance communications port, control of the respective VMS from the communications control port shall be inhibited.

9.5 Control / diagnostics software

The RCIS integral control system shall fully implement all RCIS functions and implementation of all remote control and local control as specified in this Technical Specification.

The control software shall allow for each VMS to be interrogated by the TMS via a sign controller.

The computers shall use Microsoft Windows operating system environment, Windows 7, Windows 10, and those industry standards current at the time of delivery. Any software provided shall be capable of operating on all such operating systems. It shall be backward compatible with existing VMS purchased from the same manufacturer.

The PHCS shall allow:

1. configuration of the sign controller and each VMS

2. testing of all pixels of each VMS

3. display of messages from a menu of preconfigured messages

4. testing of dimming control

5. review of sign controller and VMS event logs, operational, alarms and fault events

6. confirmation of sign controller firmware version, and

7. confirmation of VMS status and all monitored conditions.

9.6 Message colour selection

VMS message shall be colour coded, red, green or yellow. Red, green and yellow colours shall represent road segment closed, road segment open and load restriction in force respectively.

9.7 Security and compatibility

The security requirements defined in MRTS201 apply to this Technical Specification.

In addition, the software shall:

- Request passwords as part of the access and configuration authorisation process. Passwords shall be in accordance with IS18, and

- Provide two access levels, namely, Administrator and Standard user, as a minimum.

The factory default user credentials shall not be used, and these shall be changed prior to any operation of the VMS sign(s).

9.8 Configuration settings and firmware

The VMS operator shall be able to configure its configuration parameters locally or remotely. When set up remotely, the sign control system shall provide a foolproof mechanism to avoid losing connection unintentionally. The VMS shall have sufficient storage capacity to accommodate future firmware upgrades during the lifetime of the Product. In addition, configuration parameters shall be completely protected against software / firmware upgrade.

> This requirement is necessary to ensure that software upgrades do not affect the existing configuration parameters or new software released by the manufacturer are compatible with existing VMS by the same manufacturer.

9.9 LED intensity control

The LED intensity shall be controlled to provide constant apparent brightness and maximum legibility distance, for the complete range of ambient light under which the RCIS shall operate.

Illumination shall be determined using light sensors integral to each VMS. Light sensors shall be mounted facing forward perpendicular to the sign face and rear of the sign enclosure. The light sensors shall be fixed in such a way that the effect of bright headlights on sensors are minimised. Each VMS shall support automatic control of brightness, and each sign controller determines the LED brightness level based on the average of the light sensor outputs of the all VMSs at RCIS Site. The sign controller shall have in-built logic to determine validity of light sensor output and discard use of an output deemed to be incorrect or out of limits.

The sign controller shall allow a configurable parameter to apply a bias such that signs connected to it appear to have the same brightness regardless of their age / condition of LEDs.

9.10 Temperature control

Each VMS shall be provided with at least one temperature sensor to measure temperature inside the VMS enclosure. The sensor shall not be mounted directly against the top face of the module enclosure. The temperature reading shall be available to TMS using a message via communication protocol.

The temperature shall be in units of degrees centigrade.

9.11 Communication protocol

Communication between the Field Processor and the RCIS shall comply with TSI-SP-003 Ver 2.1 and any extensions to that protocol approved by the Principal.

9.12 Bus arbitration

Each VMS shall act as a slave on the EIA RS-422 bus to the field processor when selected for remote control.

9.13 Door switch

The door switch shall be an industrial grade switch capable of 10,000 operations. The door switch shall be extended to TMC for remote monitoring via a controller available at RCIS Site.

9.14 Power reset facility

If requested the Contractor shall provide power reset facility through an independent controller. Principal shall be able to log into the controller remotely from the TMC to execute the power recycle of the sign controller and VMSs.

The controller shall be able to accept inputs from a door switch mounted inside the communication cabinet.

10 Numbering convention

Each RCIS shall have a Site designation and each VMS a unique number identifiable through the TMS and PHCS user interface.

11 Environmental

The environmental conditions defined in MRTS201 apply to this Technical Specification.

12 Electrical

The electrical requirements defined in MRTS201 and AS 4852.1 apply to work provided under this Technical Specification. Additional requirements are as described below.

12.1 Power source

RCIS shall be supplied with mains power compliance with MRTS210 or with a standalone power system compliance with MRTS263. The sign except the display shall operate for 12 hours using a backup power system during a failure of mains power supply for TMS to monitor, log and diagnose the fault.

The signs that are powered through the standalone power systems shall have alarms set up for backup battery system to provide advance warnings to the TMS.

12.2 Power consumption

Power consumption details of the RCIS shall be supplied.

13 Installation requirements

Installation requirements defined in MRTS201 apply to this Technical Specification. Additional requirements that apply to this Technical Specification are defined below.

The supply for each VMS from the field cabinet shall be ELV (12V or 24V dc) supply and equipped with surge suppression devices to protect the electronics from transients caused by switching or lightning or other anomalies in the power supply.

Each VMS shall be able to be connected / disconnected safely independent of the other VMS. Power supply and control wiring connection / disconnection shall be done without the requirement for personnel to be holders of an electrical licence to perform this task.

13.1 Cable management

Cabling shall be concealed from public view as much as practicable and system of conduits to achieve this shall be devised. Cables may run within hollow structural supports through flexible steel conduit. Penetrations to the supports shall prevent damage to both the supports and conduit. Cable entry to enclosures shall be bottom entry using appropriate glands, captive sockets and/or plugs.

Provision shall be made to protect all disconnected / unplugged cables, plugs and sockets from damage, dust, water and vermin. Cable management shall allow easy removal and/or installation of cables.

All cabling shall be clearly and indelibly labelled at each end.

14 RCIS Placement

The RCIS shall be mounted on the verge at a location nominated by the Principal.

The exact sign position shall be determined by the Contractor in discussion with the Principal.
Hold Point 5

15 Telecommunications requirements

The telecommunications requirements defined in MRTS201 and MRTS245 apply to work provided under this Technical Specification.

16 Testing and commissioning

16.1 General

The testing and commissioning requirements defined in MRTS201 apply to work provided under this Technical Specification. The minimum additional testing and commissioning requirements for equipment provided under this Technical Specification are described below.

16.2 Factory Acceptance Tests (FAT)

In addition to requirements of MRTS201, optical performance tests to be conducted as part of factory acceptance tests shall be determined by measurement under laboratory conditions of the minimum luminance ratio and minimum and maximum luminance levels listed in AS 4852.1. These tests shall be conducted at NATA accredited testing laboratory. **Witness Point 2**

16.3 Installation Acceptance Tests (IAT)

The Installation acceptance testing requirements defined in MRTS201 apply to work provided under this Technical Specification.

16.4 Commissioning Tests (CT)

The commissioning requirements defined in MRTS201 apply to work provided under this Technical Specification.

17 Documentation

The documentation requirements defined in MRTS201 apply to work provided under this Technical Specification.

18 Training

The training requirements defined in MRTS201 apply to work provided under this Technical Specification.

19 Maintenance

The maintenance requirements defined in MRTS201 apply to work provided under this Technical Specification.

20 Handover

The handover requirements defined in MRTS201 apply to work provided under this Technical Specification. Further requirements are as described below. The Contractor shall provide asset data for the installed RCIS in the format prescribed in the QADF document. The Contractor will need to contact the Principal with regards to data requirements such as asset attributes specific to the project, as these requirements may change from project to project.

Appendix A: Configuration Parameters

Reference Clause	Description	Range of values	Factory default	Device(s), systems affected
5.4	TMS Communications Session Time-Out (STO)	1 – 600 seconds	300 seconds	Control unit / Configuration software
5.4	Communication Timeout Setting (TMS to sign controller)	0 – 30 seconds	5 seconds	TMS / Sign display
7.3	Sign Processor Fault Blank time (PFBT)	0.5 – 3 seconds	1 second	Sign display
7.3	Power Recovery Delay Time (PRDT)	1 – 600 seconds	60 seconds	Control unit / Sign display
7.3	Minimum Blank Time (MBT)	1 – 120 seconds	30 seconds	Control unit / Sign display
7.10.2	LED brightness level transition time	1 – 60 seconds	15 seconds	Control unit / Sign
9.9	VMS Panel Ageing Compensation Parameter	1-10 years	1 year	Sign display

SUPERSEDED