

Specification (Measurement)

**Transport and Main Roads Specifications
MRS218 Vehicle Activated Signs**

July 2017

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1 Introduction

This Specification applies to the supply and installation of Vehicle Activated Signs for ITS applications associated with the Principal's Traffic Management System.

This Specification shall be read in conjunction with MRS01 *Introduction to Specifications*, MRTS50 *Specific Quality System Requirements* and other Specifications as appropriate.

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

2 Measurement of Works

2.1 Standard Work Items

In accordance with the provisions of Clause 2 of MRS01 *Introduction to Specifications*, the Standard Work Items covered by this Specification are listed in Table 2.1.

Table 2.1 – Standard Work Items

Standard Item No.	Description	Unit of Measurement
Preparation of site		
62901	Survey of site to identify utilities below footpath	each
62902	Develop Site Establishment Plan for installation of Vehicle Activated Sign	each
62903	Design for supply and installation of Vehicle Activated Sign	each
Sign footings		
62931	Supply and Installation of footing for Vehicle Activated Sign pole	each
Guard rails		
62951	Supply and install [qty] metres steel beam guard rail, w beam	m
62952	Supply and install [qty] metres steel beam guard rail, thrie beam	m
62953	Supply and install steel beam guard rail, terminal type [number]	each
62954	Supply and install steel beam guard rail, transition type [number]	each
Sign poles and brackets		
62981	Supply of Vehicle Activated Sign Pole, [length] metres long, [with without] pole mounted cabinet brackets	each
62982	Installation of Vehicle Activated Sign hinge pole	each
62983	Supply and installation of [hinged] pole, [length] metres long	each
Signs		
63011	Supply of [Type 1 Type 2a Type 2b Type 2c Type 2d Type 2e Type 2f Type 2g Type 2h Type 2i Type 2j Type 2k] sign and ancillary components	each
63012	Installation of [Type 1 Type 2a Type 2b Type 2c Type 2d Type 2e Type 2f Type 2g Type 2h Type 2i Type 2j Type 2k] sign and ancillary components	each
63013	Supply and Installation of [Type 1 Type 2a Type 2b Type 2c Type 2d Type 2e Type 2f Type 2g Type 2h Type 2i Type 2j Type 2k] sign and ancillary components	each

Standard Item No.	Description	Unit of Measurement
Ancillary works		
63041	Supply of batteries and solar power system	each
63042	Installation of batteries and solar power system	each
63043	Supply and installation of batteries and solar power systems	each
Removal of existing equipment		
63091	Removal and salvage of road furniture, as listed in Clause 1.1 or Annexure MRTS14.1	lump sum
63092	Removal of Vehicle Activated Sign pole, [<i>including not including</i>] sign and batteries and solar system, [<i>for salvage for disposal</i>]	each
63093	Removal of Vehicle Activated Sign pole for footing	each

2.2 Work Operations

Item 62901 Survey of site to identify utilities below footpath

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) geographical survey work appropriate to the task
- c) all work associated with the provision of Vehicle Activated Sign including:
- d) Site survey details of the exact location, height and alignment of the Vehicle Activated Sign, including pits and ducts
- e) conduct a thorough visual inspection of the proposed School Zone Sign location that it is clear of obstructions that would prevent oncoming motorists from readily discerning the sign face contents at the required visual range
- f) conduct a solar survey to confirm the proposed location of the School Zone sign solar panels will be exposed to a sufficient level of solar irradiance required under the parent Technical Specification
- g) survey using a mechanism such as ground penetrating Radar to determine location of utilities
- h) all necessary soil tests, and
- i) all work associated with the provision of the Vehicle Activated Sign location details from the survey in the Vehicle Activated Sign Design Drawing, including additional detail such as Transport and Main Roads chainage.

Item 62902 Develop Site Establishment Plan for Vehicle Activated Sign

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01
- b) all work associated with the preparation, submission and amendment (where necessary) of a Site Establishment Plan including relevant management plans such as a project plan, workplace health and safety plan, and site acceptance plan, and
- c) specific safety plan allowance for any work left unattended while children may pass or be present.

Item 62903 Design for supply and Installation of Vehicle Activated Sign

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) design for all civil earth works and structural components
- c) all work associated with the preparation, submission and amendment (where necessary) of support structure design documentation and drawings for the Vehicle Activated Sign, including all relevant design calculations and certifications
- d) design all work associated with the preparation, submission and amendment (where necessary) of footing design documentation and Standard Drawings for the Vehicle Activated Sign support structure
- e) design the required electrical works
- f) design the required communications and control links, and
- g) design of ITS and associated ITS integration components.

Item 62931 Supply and Installation of footing for Vehicle Activated Sign pole

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) excavation for footing
- c) disposal of excavated material
- d) provision of formwork, where necessary
- e) supply and installation of anchor cage or rag-bolt assembly, as appropriate
- f) supply and installation of conduit to electrical and/or communications pit, as appropriate
- g) supply, placement, installed and tested and finishing of concrete
- h) stripping formwork and cleaning up, and
- i) disposal of excavated material.

Item 62951 Supply and install [qty] metres steel beam guard rail, w beam

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of all materials
- c) fabrication of components
- d) galvanising of components
- e) installation of posts, and
- f) erection of guard-rail.

Item 62952 Supply and install [qty] metres steel beam guard rail, thrie beam

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of all materials
- c) fabrication of components
- d) galvanising of components
- e) installation of posts, and
- f) erection of guard-rail.

Item 62953 Supply and install steel beam guard rail, terminal type [number]

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of all materials
- c) fabrication of components
- d) galvanising of components
- e) installation of posts
- f) installation of anchor cable assembly
- g) erection of guardrail, and
- h) supply and installation of TC 1151 signs.

Item 62954 Supply and install steel beam guard rail, transition type [number]

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of all materials
- c) fabrication of components
- d) galvanising of components
- e) installation of connector brackets

- f) installation of posts, and
- g) erection of guardrail.

Item 62981 Supply of Vehicle Activated Sign pole, [*length*] metres long, [*with* | *without*] pole mounted cabinet brackets

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and fabrication of Vehicle Activated Sign pole and pole adaptor
- c) supply of all fixing bolts, nuts and washers as appropriate, and
- d) for a pole to be fitted with a pole mounted cabinet, include supply and fabrication of pole mounted cabinet brackets.

Item 62982 Installation of Vehicle Activated Sign hinge pole

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- a) supply and installation of spigot hatchway and ground access hatchway terminal strips, if applicable
- b) supply and installation of pole mounted surge/lightning protection equipment, if applicable
- c) for Vehicle Activated Sign poles with pole mounted cabinets, supply and installation of all internal cabling from pole mounted cabinet to spigot hatchway terminal strip and all connectors, bushings, lugs, bolts, nuts and washers as appropriate
- d) for Vehicle Activated Sign poles with ground mounted cabinets, supply and installation of all internal cabling from ground access hatchway terminal strip to spigot hatchway terminal strip and all connectors, bushings, lugs, bolts, nuts and washers as appropriate
- e) installation of pole including pole adaptor on footing
- f) mortar grouting of base plate
- g) flush finish and ground compaction of surrounding surface
- h) top dressing and turfing of the compacted surface
- i) supply of hinge pole operation instruction manuals, and
- j) testing of installation by raising and lowering the hinge pole when fitted with a test weight exceeding the maximum (moment) weight of the complete sign and solar system.

Item 62983 Supply and installation of [*hinged*] pole, [*length*] metres long

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and fabrication of vehicle activated sign pole and pole adaptor
- c) supply of all fixing bolts, nuts and washers as appropriate
- d) installation of pole on footing

- e) mortar grouting of base plate
- f) flush finish and ground compaction of surrounding surface
- g) top dressing and turfing of the compacted surface
- h) for a pole to be fitted with a pole mounted cabinet include the supply and fabrication of pole mounted cabinet brackets
- i) supply and installation of spigot hatchway and ground access hatchway terminal strips, if applicable
- j) supply and installation of pole mounted surge/lightning protection equipment, if applicable
- k) for Vehicle Activated Sign poles with pole mounted sign control assembly box, supply and installation of all internal cabling from pole mounted cabinet to spigot hatchway terminal strip and all connectors, bushings, lugs, bolts, nuts and washers, and cabling for batteries and solar system and as appropriate
- l) for Vehicle Activated Sign poles with ground mounted sign control assembly box, supply and installation of all internal cabling from ground access hatchway terminal strip to spigot hatchway terminal strip and all connectors, bushings, lugs, bolts, nuts and washers and cabling for batteries and solar system which is externally mounted from the sign as appropriate
- m) supply of hinge pole operation instruction manuals and supply of the cabling diagrams and test reports, and
- n) testing of installation by raising and lowering the hinge pole when fitted with a test weight exceeding the maximum moment) weight of the sign and solar system.

Item 63011 Supply of [Type 1 | Type 2a | Type 2b | Type 2c | Type 2d | Type 2e | Type 2f | Type 2g | Type 2h | Type 2i | Type 2j | Type 2k] sign and ancillary components

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) manufacture or supply of type approved [Type 1 | Type 2a | Type 2b | Type 2c | Type 2d | Type 2e | Type 2f | Type 2g | Type 2h | Type 2i | Type 2j | Type 2k] and ancillary components
- c) factory acceptance test as functional testing of the electrical supply system
- d) factory acceptance tests as functional testing of the sign operation
- e) factory acceptance tests as functional testing of the battery and solar system
- f) completion of the first maintenance performance records
- g) packaging and delivery of a type approved [Type 1 | Type 2a | Type 2b | Type 2c | Type 2d | Type 2e | Type 2f | Type 2g | Type 2h | Type 2i | Type 2j | Type 2k] and ancillary components including components for battery powered solar system to site, and
- h) handover of all documentation and records to the Principle.

Item 63012 Installation of [Type 1 | Type 2a | Type 2b | Type 2c | Type 2d | Type 2e | Type 2f | Type 2g | Type 2h | Type 2i | Type 2j | Type 2k] sign and ancillary components

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) Installation of a type approved [Type 1 | Type 2a | Type 2b | Type 2c | Type 2d | Type 2e | Type 2f | Type 2g | Type 2h | Type 2i | Type 2j | Type 2k] and ancillary components as per the accepted design for that site
- c) installation of the battery power system and solar recharging system
- d) maintenance testing of installation by raising and lowering the hinge pole when fitted with complete load weight of the sign and solar system
- e) functional testing of the electrical supply system
- f) functional testing of the sign operation
- g) completion of the first maintenance performance records, and
- h) handover of all documentation and records to the Principle.

Item 63013 Supply and Installation of [Type 1 | Type 2a | Type 2b | Type 2c | Type 2d | Type 2e | Type 2f | Type 2g | Type 2h | Type 2i | Type 2j | Type 2k] sign and ancillary components

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and installation of a type approved [Type 1 | Type 2a | Type 2b | Type 2c | Type 2d | Type 2e | Type 2f | Type 2g | Type 2h | Type 2i | Type 2j | Type 2k] School Zone Sign and ancillary components as per the accepted design for that site
- c) installation of the battery power system and solar recharging system
- d) maintenance testing of installation by raising and lowering the hinge pole when fitted with complete load weight of the sign and solar system
- e) for type three sign the installation and testing of the external radar unit
- f) functional testing of the electrical supply system
- g) functional testing of the sign operation
- h) completion of the first maintenance performance records, and
- i) handover of all documentation and records to the Principle.

Item 63041 Supply of batteries and solar power system

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of [qty] batteries and [qty] capacitors
- c) supply of the charge control system
- d) supply of [pole mounted | below ground mounted] battery enclosure

- e) supply of DC power distribution cabling
- f) supply of DC power PV solar panels, and
- g) handover of factory acceptance test reports of assembled solar power systems.

Item 63042 Installation of batteries and solar power system

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) installation and alignment of all batteries, cabling and solar PV panel and connection to the school zone sign
- c) completion of commissioning tests, and
- d) handover of all documents the test reports to the Principle

Item 63043 Supply and installation of batteries and solar power system

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of [qty] batteries and [qty] capacitors
- c) supply of [pole mounted | below ground mounted] battery enclosure
- d) supply of DC power distribution cabling
- e) supply of DC power PV Solar panels
- f) handover of Factory Acceptance Test results of assembled solar power system
- g) installation and alignment of all batteries, cabling and solar PV panel and connection to the school zone sign
- h) installation of the charge control system
- i) completion of commissioning tests, and
- j) handover of all documents the test reports to the Principle.

Item 63091 Removal and salvage of road furniture, as listed in Clause 1.1 of Annexure MRTS14.1

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) carrying out excavation where necessary
- c) careful dismantling and removal of existing road furniture as listed
- d) demolition of any agreed non-salvageable part of the existing installation
- e) utilising or disposing of excavated and demolished material
- f) transporting salvaged material to storage site
- g) safe storage of salvaged material at storage site, and
- h) backfilling and finishing resulting excavations.

Item 63092 Removal of Vehicle Activated Sign pole, [*including | not including*] sign and batteries and solar system, [*for salvage | for disposal*]

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) de-energisation and disconnection of cabling to pole
- c) removal of battery power system and solar charging system for including associated components and cabling, as appropriate
- d) removal of vehicle activated Sign for including associated components, as appropriate
- e) removal of pole, pole adaptor and all internal cabling and associated components, as appropriate
- f) for equipment to be salvaged:
 - i. dismantling of equipment, where appropriate, and
 - ii. transporting of all components to designated storage facility or another station for re-use.
- g) for equipment to be disposed:
 - i. disposal of components.

Item 63093 Removal of Vehicle Activated Sign pole footing

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) removal of footing
- c) disposal of footing
- d) backfilling of hole and ground compaction, and
- e) top dressing and turfing of the compacted hole.

2.3 Method of measurement of Vehicle Activated Sign components

This Specification provides Standard Work Items for:

- a) supply only, or
- b) installation only, or
- c) supply and installation

of Vehicle Activated Sign components.

Any combination of Standard Work Items relating to these methods of measurement may be used in the schedule of rates. However, where a Standard Work Item for supply and installation of a particular component or group of components is included in the schedule of rates, no supply only nor installation only Standard Work Item shall also apply to that component or group of components, as applicable.

2.4 Supply of Materials

Any materials to be supplied by the Principal will be as stated in the Principal Supplied Material List, Form C6827. All other material shall be supplied by the Contractor.

The responsibility for transport to the Site of materials supplied by the Principal shall be as stated in the principal supplied material list, Form C6827. Transport to the Site of all other materials shall be the responsibility of the Contractor.

