

**Specification (Measurement)**

**Transport and Main Roads Specifications  
MRS222 Electronic School Zone Signs**

**July 2017**

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## 1 Introduction

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

This Specification shall be read in conjunction with MRS01 *Introduction to Specifications* 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* and Technical 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
<b>Preparation of site</b>		
63401	Survey of site to identify utilities below footpath	each
63402	Develop Site Establishment Plan for installation of Electronic School Zone Sign	each
63403	Design for supply and installation of Electronic School Zone Sign	each
<b>Sign footings</b>		
63431	Supply and installation of footing for Electronic School Zone Sign pole	each
<b>Guard rail</b>		
63451	Supply and install [qty] metres Guard rail (D-1474)	metres
<b>Sign poles and brackets</b>		
63471	Supply of Electronic School Zone Sign pole, [length] metres long, [with   without] polemounted cabinet brackets	each
63472	Installation of Electronic School Zone Sign hinge pole	each
63473	Supply and installation of [hinged] pole, [length] metres long	each
<b>Signs</b>		
63501	Supply of [Type 1   Type 2   Type 3] sign and ancillary components	each
63502	Installation of [Type 1   Type 2   Type 3] sign and ancillary components	each
63503	Supply and installation of [Type 1   Type 2   Type 3] sign and ancillary components	each
<b>Ancillary works</b>		
63531	Supply of batteries and solar power system	each
63532	Installation of batteries and solar power system	each
63533	Supply and installation of batteries and solar power system	each

Standard Item No.	Description	Unit of measurement
<b>Removal of existing equipment</b>		
63591	Removal of Electronic School Zone Sign pole, [ <i>including   not including</i> ] sign and batteries and solar system, [ <i>for salvage   for disposal</i> ]	each
63592	Removal of Electronic School Zone Sign pole footing	each
63593	Removal of [ <i>qty</i> ] metres Guard rail (D-1474)	lump sum

## 2.2 Work operations

### Item 63401 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 Electronic School Zone Sign, including site survey details of the exact location, height and alignment of the Electronic School Zone Sign, including pits and ducts
- d) 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
- e) 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
- f) survey using a mechanism such as ground penetrating Radar to determine location of utilities
- g) all necessary soil tests, and
- h) all work associated with the provision of the Electronic School Zone Sign location details from the survey in the Electronic School Zone Sign Design Drawing, including additional detail such as DMR chainage.

### Item 63402 Develop Site Establishment Plan for installation of Electronic School Zone Sign

Work operations incorporated in the above item include:

- a) Work operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- 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 63403 Design for supply and installation of Electronic School Zone 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 Electronic School Zone 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 drawings for the Electronic School Zone 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 63431      Supply and installation of footing for Electronic School Zone 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 63451      Supply and install [*qty*] metres Guard rail (D-1474)**

Work operations incorporated in the above item include:

- a) Work operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) supply and Install guard rail.

**Item 63471      Supply of Electronic School Zone 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 Electronic School Zone 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 63472 Installation of Electronic School Zone 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*
- b) supply and installation of spigot hatchway and ground access hatchway terminal strips if applicable
- c) supply and installation of pole-mounted surge/lightning protection equipment if applicable
- d) for Electronic School Zone 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
- e) for Electronic School Zone 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
- f) installation of pole, including pole adaptor on footing
- g) mortar grouting of base plate
- h) flush finish and ground compaction of surrounding surface
- i) top dressing and turfing of the compacted surface
- j) supply of hinge pole operation instruction manuals, and
- k) 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 63473 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 Electronic School Zone 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 Electronic School Zone 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 Electronic School Zone 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 63501      Supply of [Type 1 | Type 2 | Type 3] 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 2 | Type 3] 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 2 | Type 3] and ancillary components, including components for battery powered solar system to site, and
- h) handover of all documentation and records to the Principal.

**Item 63502      Installation of [Type 1 | Type 2 | Type 3] 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 2 | Type 3] 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 Principal.



**Item 63503      Supply and Installation of [Type 1 | Type 2 | Type 3] 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 2 | Type 3] 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 3 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 Principal.

**Item 63531      Supply of Battery 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 solar panels, and
- g) handover of Factory Acceptance Test reports of assembled solar power systems.

**Item 63532      Installation of Battery 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 panel and connection to the school zone sign
- c) completion of Commissioning tests, and
- d) handover of all documents the test reports to the Principal.

**Item 63533      Supply and installation of Battery 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 solar panels
- f) handover of Factory Acceptance Test results of assembled solar power system
- g) installation and alignment of all batteries, cabling and solar 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 Principal.

**Item 63591      Removal of Electronic School Zone 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 Electronic School Zone 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 63592      Removal of Electronic School Zone 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, and
- d) backfilling of hole and ground compaction, and
- e) top dressing and turfing of the compacted hole.

**Item 63593      Removal of [*qty*] metres Guard rail (D-1474)**

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 guard rail and supporting posts
- c) disposal of guard rail and supporting posts
- d) backfilling of hole and ground compaction, and
- e) top dressing and turfing of the compacted holes to even stable surface.

### **2.3 Method of measurement of Electronic School Zone Sign components**

This Specification provides Standard Work Items for:

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

of Electronic School Zone 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 Form C6827 Principal Supplied Material List. 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 Form C6827 Principal Supplied Material List. Transport to the Site of all other materials shall be the responsibility of the Contractor.

