Specification (Measurement)

Transport and Main Roads Specification
MRS218 Vehicle Activated Signs

January 2016
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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 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

<table>
<thead>
<tr>
<th>Standard Item No.</th>
<th>Description</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Preparation of Site</strong></td>
<td></td>
</tr>
<tr>
<td>6925</td>
<td>Survey of site to identify utilities below footpath</td>
<td>each</td>
</tr>
<tr>
<td>6955</td>
<td>Develop Site Establishment Plan for installation of Vehicle Activated Sign</td>
<td>each</td>
</tr>
<tr>
<td>6956</td>
<td>Design for supply and installation of Vehicle Activated Sign</td>
<td>each</td>
</tr>
<tr>
<td></td>
<td><strong>Sign Footings</strong></td>
<td></td>
</tr>
<tr>
<td>6957</td>
<td>Supply and Installation of footing for Vehicle Activated Sign pole</td>
<td>each</td>
</tr>
<tr>
<td></td>
<td><strong>Guard Rail</strong></td>
<td></td>
</tr>
<tr>
<td>6929</td>
<td>Supply and install [qty] metres Guard rail (MRSD-1474)</td>
<td>meters</td>
</tr>
<tr>
<td></td>
<td><strong>Sign Poles and Brackets</strong></td>
<td></td>
</tr>
<tr>
<td>6958</td>
<td>Supply of Vehicle Activated Sign pole, [length] metres long, [with</td>
<td>without] pole mounted cabinet brackets</td>
</tr>
<tr>
<td>6959</td>
<td>Installation of Vehicle Activated Sign hinge pole.</td>
<td>each</td>
</tr>
<tr>
<td>6933</td>
<td>Supply and installation of [hinged] pole, [length] metres long</td>
<td>each</td>
</tr>
<tr>
<td></td>
<td><strong>Signs</strong></td>
<td></td>
</tr>
<tr>
<td>6961</td>
<td>Supply of [Type 1</td>
<td>Type 2a</td>
</tr>
<tr>
<td>6962</td>
<td>Installation of [Type 1</td>
<td>Type 2a</td>
</tr>
<tr>
<td>6963</td>
<td>Supply and Installation of [Type 1</td>
<td>Type 2a</td>
</tr>
<tr>
<td></td>
<td><strong>Ancillary Works</strong></td>
<td></td>
</tr>
<tr>
<td>6937</td>
<td>Supply of Batteries and Solar Power System</td>
<td>each</td>
</tr>
<tr>
<td>6938</td>
<td>Installation of Batteries and Solar Power System</td>
<td>each</td>
</tr>
</tbody>
</table>
### Standard Item No. Description Unit of Measurement

**Supply and installation of Batteries and Solar Power system**

<table>
<thead>
<tr>
<th>Standard Item No.</th>
<th>Description</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>6939</td>
<td>Supply and installation of Batteries and Solar Power system</td>
<td>each</td>
</tr>
</tbody>
</table>

**Removal of Existing Equipment**

<table>
<thead>
<tr>
<th>Standard Item No.</th>
<th>Description</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>6964</td>
<td>Removal of Vehicle Activated Sign pole, [including</td>
<td>not including] sign and Batteries and Solar System, [for salvage</td>
</tr>
<tr>
<td>6965</td>
<td>Removal of Vehicle Activated Sign pole footing</td>
<td>each</td>
</tr>
<tr>
<td>6943</td>
<td>Removal of [qty] metres Guard rail (MRSD-1474)</td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

### 2.2 Work Operations

**Item 6925 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 6955 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 6956  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 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 6957  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 6929  Supply and install [qty] metres Guard rail (MRSD 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 6958  Supply of Vehicle Activated Sign hinge 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 6959 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
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 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
e) 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
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 6933 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 6961 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 6962 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 6963  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 6937  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 PV solar panels, and

g) handover of Factory Acceptance Test reports of assembled solar power systems.

**Item 6938  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 PV panel and connection to the school zone sign

c) completion of commissioning tests

d) handover of all documents the test reports to the Principle
**Item 6939  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 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
j) handover of all documents the test reports to the Principle.

**Item 6964  Removal of Vehicle Activated Sign pole, [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 6965  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
e) top dressing and turfing of the compacted hole.
**Item 6943  Removal of [qty] metres Guard rail (MRSD 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
e) top dressing and turfing of the compacted holes to even stable surface.

### 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.