

Specification (Measurement)

**Transport and Main Roads Specifications
MRS231 Road Weather Monitor (RWM) Systems**

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1 Introduction

This Specification applies to the requirements for the supply, installation, testing, commissioning and maintenance handover documentation (including the provision for operator training) of Road Weather Monitoring (RWM) Systems.

This Specification should be read in conjunction with MRS01 *Introduction to Specifications*, MRS263 *Standalone Solar (PV) Power Systems* 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.

For Standard Work Items relating to Solar Power and Battery power, refer to MRS263 *Standalone Solar (PV) Power Systems*. For Standard Work Items for Mains Connection, refer to MRS210 *Provision of Mains Power*.

Table 2.1 – Standard Work Items

Standard Item No	Description	Unit of Measurement
Road Weather Monitor Systems		
64501	Supply of [tilt fixed] pole support structure with approved [fixed relocatable] footing assembly as detailed on referenced approved drawings.	each
64502	Installation of [tilt fixed] pole support structure with approved [fixed relocatable] footing assembly as detailed on referenced approved drawings.	each
64503	Supply and Installation of [tilt fixed] pole support structure with approved [fixed relocatable] footing assembly as detailed on referenced approved drawings.	each
64504	Supply of all-weather pole mounted equipment enclosure fixed to the support structure to house all relevant Road Weather Monitor Electronic equipment including routers, radio equipment, digital Input / output equipment, data logging and telecommunication equipment.	each
64505	Installation of all-weather pole mounted equipment enclosure fixed to the support structure to house all relevant Road Weather Monitor Electronic equipment including routers, radio equipment, digital Input/output equipment, data logging and telecommunication equipment.	each
64506	Supply and Installation of all-weather pole mounted equipment enclosure fixed to the support structure to house all relevant Road Weather Monitor Electronic equipment including routers, radio equipment, digital Input / output equipment, data logging and telecommunication equipment.	each
64510	Supply of [wind speed wind direction rainfall intensity visibility surface friction temperature humidity other type] sensor.	each

Standard Item No	Description	Unit of Measurement
64511	Installation of [<i>wind speed wind direction rainfall intensity visibility surface friction temperature humidity other type</i>] sensor.	each
64512	Supply and Installation of [<i>wind speed wind direction rainfall intensity visibility surface friction temperature humidity other type</i>] sensor.	each
64513	Supply of integrated Telecommunications link for backhaul of road weather data to head end monitoring site, as well as any pole mounted antenna systems.	each
64514	Installation of integrated Telecommunications link for backhaul of road weather data to head end monitoring site, as well as any pole mounted antenna systems.	each
64515	Supply and installation of integrated Telecommunications link for backhaul of road weather data to head end monitoring site, as well as any pole mounted antenna systems.	each
Removal of Existing Road Weather Monitor System		
64591	Removal of road weather monitoring equipment for re-use.	each
64592	Removal of road weather monitoring equipment for disposal.	each

2.2 Work Operations

Work Operations included in the Standard Work Items are specified in the relevant clause adjacent to each Standard Work Item listed in Table 2.1.

Item 64501 Supply of [*tilt | fixed*] pole support structure with approved [*fixed | relocatable*] footing assembly as detailed on referenced approved drawings

Work Operations incorporated in the above item include:

- Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- supply and fabrication of as appropriate
- for fixed base poles, supply and installation of eyebolt and bushing for aerial supply if appropriate
- for relocatable poles, supply of slip base mount, shear washer and clamping bolts, and
- supply of all fixing bolts, nuts and washers as appropriate.

Item 65402 Installation of [*tilt | fixed*] pole support structure with approved [*fixed | relocatable*] footing assembly as detailed on referenced approved drawings

Work Operations incorporated in the above item include:

- Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- excavation for footing
- disposal of excavated material
- provision of formwork, where necessary

- e) installation of base mounts, shear washer, clamping bolts and nuts and cable clamping blocks
- f) installation of cable clamping blocks as appropriate
- g) installation and termination of all internal cabling
- h) installation of pole, as appropriate
- i) installation and termination of cabling from base connectors to sensors including supply and installation of pit junction box, if applicable, and
- j) testing of installation.

Item 65403 Supply and Installation of [tilt | fixed] pole support structure with approved [fixed | relocatable] footing assembly as detailed on referenced approved drawings

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 as appropriate
- c) excavation for footing
- d) disposal of excavated material
- e) provision of formwork, where necessary
- f) supply and installation of eyebolt and bushing for aerial supply if appropriate
- g) supply and installation of slip base mount, shear washer and clamping bolts
- h) supply and installation of base mounts, shear washer, clamping bolts and nuts and cable clamping blocks
- i) supply and installation of cable clamping blocks as appropriate
- j) supply and installation and termination of all internal cabling
- k) supply and installation of pole, as appropriate
- l) supply and installation and termination of cabling from base connectors to sensors including supply and installation of pit junction box, if applicable
- m) supply and installation of all fixing bolts, nuts and washers as appropriate
- n) stripping formwork, reinstatement of soil cover and general making good on site, and
- o) testing of installation.

Item 64504 Supply of all-weather pole mounted equipment enclosure fixed to the support structure to house all relevant Road Weather Monitor Electronic equipment including routers, radio equipment, digital Input / output equipment, data logging and telecommunication equipment

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 of approved telecommunications enclosure.

Item 64505 Installation of all-weather pole mounted equipment enclosure fixed to the support structure to house all relevant Road Weather Monitor Electronic equipment including routers, radio equipment, digital Input / output equipment, data logging and telecommunication equipment

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 the approved telecommunications enclosure, and
- c) installation and termination of all internal cabling.

Item 64506 Supply and Installation of all-weather pole mounted equipment enclosure fixed to the support structure to house all relevant Road Weather Monitor Electronic equipment including routers, radio equipment, digital Input / output equipment, data logging and telecommunication equipment

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 approved telecommunications enclosure
- c) installation of the approved telecommunications enclosure, and
- d) installation and termination of all internal cabling.

Item 64510 Supply of [wind speed | wind direction | rainfall intensity | visibility | surface friction | temperature | humidity | other type] sensor

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 of RWM sensor as appropriate.

Item 64511 Installation of [wind speed | wind direction | rainfall intensity | visibility | surface friction | temperature | humidity | other type] sensor

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 RWM sensor to manufacturer's instructions and departmental guidelines, and
- c) testing of RWM sensor.

Item 64512 Supply and Installation of [wind speed | wind direction | rainfall intensity | visibility | surface friction | temperature | humidity | other type] sensor

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 RWM sensor to manufacturer's instructions and contract requirements, and
- c) testing of RWM sensor.

Item 64513 Supply of integrated Telecommunications link for backhaul of road weather data to head end monitoring site, as well as any pole mounted antenna systems

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 copper or fibre communication, as appropriate
- c) supply of 4G / 5G communication systems and accessories, as appropriate
- d) supply of satellite communication systems and accessories, as appropriate
- e) supply of repeater sites and accessories, as appropriate, and
- f) supply of pole mounted antenna systems, as appropriate.

Item 64514 Installation of integrated Telecommunications link for backhaul of road weather data to head end monitoring site, as well as any pole mounted antenna systems

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 copper or fibre communication, as appropriate
- c) installation of 4G / 5G communication systems and accessories as appropriate
- d) installation of satellite communication systems and accessories, as appropriate
- e) installation of repeater sites and accessories as appropriate
- f) installation of pole mounted antenna systems as appropriate, and
- g) testing of telecommunication link between head end monitoring site, RWM site and cameras, as appropriate.

Item 64515 Supply and installation of integrated Telecommunications link for backhaul of road weather data to head end monitoring site, as well as any pole mounted antenna systems

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 copper or fibre communication, as appropriate
- c) supply and installation of 4G / 5G communication systems and accessories, as appropriate
- d) supply and installation of satellite communication systems and accessories, as appropriate
- e) supply and installation of repeater sites and accessories, as appropriate
- f) supply and installation of pole mounted antenna systems as appropriate, and
- g) testing of telecommunication link between head end monitoring site, RWM site and cameras as appropriate.

Item 64591 Removal of road weather monitoring equipment for re-use

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) disconnection of Electrical Supply including termination and “making safe” of supply cable, as appropriate
- c) disconnection of Telecommunications connection, as appropriate
- d) removal of RWM equipment and supporting pole and associated cabinet enclosure, as appropriate
- e) reinstatement of soil cover and general making good on site, and
- f) transport of all components to Principal’s storage facility or designated site storage area for re-use.

Item 64592 Removal of road weather monitoring equipment 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) disconnection of Electrical Supply including termination and “making safe” of supply cable
- c) disconnection of Telecommunications connection
- d) removal of RWM equipment, supporting pole and associated cabinet enclosure
- e) reinstatement of soil cover and general making good on site, and
- f) transport of all components and disposal.

2.3 Method of Measurement of Road Weather Monitors

This Specification provides Standard Work Items for:

- a) supply only
- b) installation only, and
- c) supply and installation, or
- d) lease arrangements for hardware and / or related support, services and maintenance of RWM Systems.

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, neither 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 C7827.IC *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 C7827.IC *Principal Supplied Material List*. Transport to the Site of all other materials shall be the responsibility of the Contractor.

