

Roads

Master Specification

RD-ITS-S1 General Requirements for the Supply of ITS Equipment

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RD-ITS-S1 General Requirements for the Supply of ITS Equipment

1 General

1.1 This Part specifies the general requirements for the supply of Equipment for Intelligent Transport Systems (ITS). It shall be read in conjunction with the following Parts of the Department's Master Specification, as applicable to this contract:

- a) RD-ITS-D1 Design for Intelligent Transport System (ITS).
- b) RD-ITS-D2 TrafficNet Infrastructure Building ITS Design.
- c) RD-ITS-S2 Electrical Switchboards.
- d) RD-ITS-S3 ITS Enclosures.
- e) RD-ITS-S4 Supply of Electronic Signs.
- f) RD-ITS-S5 Imaging Equipment.
- g) RD-ITS-S6 Field Processors.
- h) RD-ITS-S7 Supply and Installation of Vehicle Detector Systems.
- i) RD-ITS-C2 Mains Power for Traffic Management Equipment.
- j) RD-ITS-C3 Telecommunications Cabling.

1.2 Further requirements for supply of Equipment may be included in these Parts.

Definitions

1.3 The following definitions apply to this Contract:

Term	Definition
Electrical Legislation	The Electricity Act 1994 and associated Amendments and Regulations and Electrical Safety Act 2002 and associated Amendments, Regulations and Codes of Practice.
Equipment	Electronic componentry, devices, hardware, associated systems and associated infrastructure that forms the Intelligent traffic System (ITS).
Handover	The stage at which the Contractor has satisfactorily commissioned all Equipment and systems and provided all records verifying the conformance with this Contract.
STREAMS	The proprietary traffic management control system comprising software and hardware (developed by Transmax Pty Ltd) and licensed by the Principal for the management of traffic signalling, incident response, motorway management and other traffic services from a single system across the State of South Australia.
TMC	Traffic Management Centre (Norwood unless stated otherwise)

2 Quality Requirements

2.1 The Contractor shall provide the samples, quality plans, specifications, drawings / diagrams, test results and other documentation specified in Clause 2 "Quality Requirements" of the Parts listed in Clause 1 above, as applicable to this Contract.

2.2 All supplied equipment shall be manufactured under a quality system certified to AS/NZS ISO 9001.

2.3 The Contractor shall prepare and implement a Quality Plan, in accordance with PC-QA1 "Quality Management Requirements" that includes or annexes the following documentation:

- a) design documentation in accordance with RD-ITS-D1 "Design for Intelligent Transport System (ITS)";

- b) manufacturer's specifications (catalogue extracts) of all major components detailing ratings and performance characteristics; and
- c) all layout, fabrication, interconnection and assembly drawings and diagrams necessary for this contract, including:
 - i) detailed "block diagrams" to indicate the logic and operation;
 - ii) interconnection drawings;
 - iii) design and model numbers;
 - iv) guarantee of compatibility between system components; and
 - v) a list of spare parts (including any critical parts, custom build parts or parts with long lead times) and recommended services.
- 2.4 The documentation and drawings shall be provided in hardcopy and electronic format (AutoCAD or other approved format).
- 2.5 The Contractor shall provide evidence of this compatibility in accordance with Clause 6 "STREAMS".
- 2.6 If not submitted beforehand, the provision of the documentation required by this Clause shall be submitted at least 20 working days prior to placing an order for the Equipment.
- 2.7 Provision of the samples and documentation listed in this Clause shall constitute a **Hold Point**.
- 2.8 Any engineering design drawings shall be certified to meet the requirements of relevant Australian and international standards by a suitably experienced and qualified designer.

3 Equipment Requirements

General

- 3.1 Equipment supplied under this Contract shall be fit for its intended purpose and meet all functional requirements when installed at the specified site.
- 3.2 Where multiple items of Equipment are required throughout the Contract, the same make and model of that Equipment shall be used in each instance.
- 3.3 Equipment shall comply with applicable Australian Standards, or where no appropriate Australian Standard exists, the Equipment shall comply with the appropriate British or international Standard.
- 3.4 Where Equipment is commercially available in a format compatible with the mounting arrangements provided within the intended housing enclosure, it shall be provided in that format. For example:
 - a) equipment designed to be mounted in a 19" rack shall be house in a 19" rack system; and
 - b) DIN rail mountable or fixed power supplies shall be used in preference to plug pack power supplies.
- 3.5 Equipment shall be protected against irreparable damage if any of the terminations are open circuited, short circuited or disconnected while energised.
- 3.6 Unless specified otherwise, all Equipment necessary for normal operations and maintenance provided under this Contract will become the property of the Principal.
- 3.7 The Contractor grants the Principal a royalty free, irrevocable, perpetual license to use any software necessary for normal operations and maintenance of the Equipment.
- 3.8 Equipment shall be designed to:
 - a) provide quick, easy and safe access for maintenance purposes (including vehicle access where required);
 - b) be securable and / or lockable; and
 - c) minimise, and wherever practicable eliminate, the need for traffic control during maintenance activities.

- 3.9 Unless approved otherwise, Equipment of different size, capacity, function shall be of the same make and model series.
- 3.10 Telecommunications equipment shall comply with relevant Australian Communications and Media Authority (ACMA) technical standards and requirements. Equipment requiring connection to telephone services shall be ACMA approved and be labelled with the appropriate approval number.
- 3.11 All radio communications equipment shall comply with the requirements of the Australian Department of Broadband, Communications and the Digital Economy.

Multiple Failures

- 3.12 The Contractor shall meet 1,000 hours defect free requirements in accordance with RD-ITS-D1 "Design for Intelligent Transport System (ITS)", Clause 15 "Handover".
- 3.13 Where a particular item of Equipment fails due to the same, similar or related fault 3 times or more in a 6 month period, that item of Equipment shall be replaced with a new item and shall not be reissued / reused or used as a spare part.
- 3.14 Where more than 10% of similar items of Equipment throughout the Works exhibit the same or similar fault within any 12 month period, the Contractor shall:
 - a) provide a written submission explaining the cause of the fault(s), how it may be prevented from occurring in future and proposed remedial works; and
 - b) undertake and complete remedial work within 3 months of the fault being identified.
- 3.15 The Contractor shall report the outcome(s) of the remedial work within 2 months after the completion of the remedial work.
- 3.16 Where more than 20% of similar items of Equipment throughout the Works exhibit the same or similar fault within any 12 month period, the Contractor shall provide a written submission explaining the cause of the fault(s). Unless approved otherwise, the Contractor shall replace all similar Equipment at its own expense.

Inspection

- 3.17 The Contractor shall provide adequate notice of delivery of the Equipment to the delivery point and ensure that adequate opportunity for inspection of the Equipment is provided prior to installation.

4 Environmental Requirements

- 4.1 Unless specified otherwise, the Equipment shall be capable of continuous, normal operation under the following conditions at a minimum without degradation to system performance or life expectancy:
 - a) installed directly in sunlight (unless to be installed in a permanently sheltered position);
 - b) ambient air temperature range between -15°C and 50°C ;
 - c) maximum wind conditions likely to occur at the installation site;
 - d) coastal environment;
 - e) varied light intensity due to moving or changing shadows;
 - f) a humidity of up to 90% non-condensing;
 - g) conditions, both permanent and temporary, that may be unique to the specified location, for example instances of thick smoke and electromagnetic interference;
 - h) vibrations reasonably expected in the installed location;
 - i) exposure to vandalism; and
 - j) exposure to infestation by vermin.
- 4.2 The Equipment operation shall cause minimal adverse effect (e.g. noise, light and heat during operation) on the surrounding environment in which it is installed.

5 Operational Requirements

- 5.1 Equipment shall be designed and selected to maximise mean time between failures and minimise time to repair. In the event of a defect occurring during the defects liability period, the Contractor shall provide the Principal with details on the course of action to be undertaken within 4 hours of notification of the defect.
- 5.2 In the event of a power, hardware or communications failure, the Equipment shall:
 - a) automatically enter a defined safe state; and
 - b) automatically restart in a defined safe manner after the restoration of power or communications.

6 STREAMS

- 6.1 The Equipment shall be STREAMS compatible. The submission of STREAMS compatibility evidence shall constitute a **Hold Point**.

7 Control System

Physical Interfaces

- 7.1 Physical interfaces shall:
 - a) utilise industry-standard connections;
 - b) be adequately protected against the environment where necessary; and
 - c) be captive, in the following order of precedence:
 - i) automatic “click” type (such as RJ-45);
 - ii) manual “click” type (such as retention clips); and
 - iii) screw-type.

Transmission Acknowledgement

- 7.2 Important message outputs (digital and serial) shall be acknowledged by the receiving device within a determined period. Failure to receive acknowledgement shall be recognised by the transmitting device which shall then initiate an “Output Communications Fail” alarm.

Failure Modes / Resilience

- 7.3 Alarms shall be flagged / latched. Alarm flags shall remain active / latched through power failure / restoration, even where the condition that raised the alarm is reset. The flag shall be able to be cleared / acknowledged by the Principal’s operator or maintenance staff.
- 7.4 The Equipment shall comply with any operational requirements for failure modes described elsewhere in this Contract.
- 7.5 Upon restoration of power, the control system, Equipment and / or associated systems shall inhibit any new alarms until steady-state is achieved.
- 7.6 Where Equipment is controlled via a remote connection and the telecommunications link fail, it shall automatically re-establish communications as soon as possible after the telecommunications link is restored.

Computers

- 7.7 Unless specified otherwise, the computers will use a current version of Microsoft Windows operating system and any software provided by the Contractor shall be capable of operating on this system.
- 7.8 The Contractor shall provide all devices required for configuring the device and / or system in the field. In addition, where specified, the Contractor shall provide each palm-held operator interface

device necessary to interrogate and / or operate the Equipment. Such devices shall be compatible with the ITS Equipment controller.

8 Battery Backup for Solar Power Supplies

- 8.1 This clause applies where solar and batteries are specified to provide power to the installed Equipment.
- 8.2 The batteries shall:
 - a) have no memory effect;
 - b) have a minimum lifetime of 3 years in the installed environment; and
 - c) be able to operate the connected load at the site continuously without recharge for 72 hours for solar.
- 8.3 The battery charging system shall include:
 - a) an automatic shutdown facility to protect the batteries;
 - b) uninterrupted power delivered to the device and / or system during failure and restoration of the primary power source; and
 - c) alarm output (to indicate an alarm at the specific site location) to TMC via STREAMS.
- 8.4 Where a mains-charged, battery power supply is provided, the connected load shall experience no interruption to the power supply during loss and restoration of the mains supply. Where the Contractor is supplying more than one type of battery powered Equipment, the battery systems shall be the same.

9 Mechanical and Physical Requirements

General

- 9.1 The materials and methods of construction of the Equipment shall be such that the Equipment has the strength and durability to withstand expected conditions of transportation, installation, and operation when installed in the intended environment.
- 9.2 The Equipment shall be of suitable materials and design to protect against vandalism, and prevent infestation by vermin.
- 9.3 Except for access prevention measures, all surfaces shall be free from sharp corners and projections that may catch clothing, body parts or otherwise cause injury.
- 9.4 Contact between dissimilar metals shall comply with the requirements of AS 1664. Suitable washers and fixings shall be used to prevent damage and corrosion to all surfaces and surface treatments applied to the enclosure.

Storage, Packaging and Transportation

- 9.5 All Equipment shall be securely packed and sealed to prevent damage prior to transportation.
- 9.6 The Contractor shall take all reasonable care to store Equipment and materials in a safe, dry and secure location until required for installation.
- 9.7 Equipment and materials shall not be stored directly on the ground. The Contractor shall ensure all materials, Equipment, electronic and hardcopy documents, as well other intellectual property, be secured against environmental damage, theft, vandalism, or unauthorised access.

10 Replacement Parts

- 10.1 The Contractor shall ensure that replacement Equipment and parts are available for a minimum of 7 years from the date of first delivery. The replacement parts shall be available within 14 days of placing an order for a part.

11 Operational and Maintenance Manual(s)

- 11.1 Unless specified otherwise, at the time of delivery of the Equipment, the Contractor shall supply 3 suitably bound hard copies and three electronic copies (e.g. USB stick, CD or DVD) of the Operational and Maintenance Manual(s).
- 11.2 Where the Contract includes the supply and / or installation of more than one type of Equipment, the manual(s) for each type of Equipment shall form an integral part of the overall ITS Operation and Maintenance Manual.
- 11.3 The manuals shall be clearly and logically set out and include the following as appropriate:
 - a) Equipment Specifications;
 - b) Operating procedures, including any safety requirements and relevant MSDS;
 - c) Diagnostics and troubleshooting procedures;
 - d) Recommended maintenance schedule and procedures;
 - e) Compliance / approval certificates;
 - f) Recommended spares;
 - g) Drawings and system schematics; and
 - h) Wiring and termination diagrams.
- 11.4 Where generic documents (such as the user manual for specific ITS Equipment) are relevant to more than one site installation, only one copy need be provided in each copy of the operations manuals.
- 11.5 The "Recommended Maintenance" section shall list activities recommended by the manufacturer and be supplemented by those additional activities which are recommended by the Contractor.
- 11.6 Cross-references to the site installation section in the operations manuals that contains the relevant documentation shall be provided in the other site installation sections.
- 11.7 Provision of the Operational and Maintenance manual(s) shall constitute a **Hold Point**.

12 Warranty

- 12.1 Notwithstanding the Defects Liability Period requirements, the Contractor warrants all Equipment and work under the Contract for a period not less than 12 months from:
 - a) the date of acceptance, if this Contract is for supply only; or
 - b) the date of handover, if this Contract includes installation.
- 12.2 The Contractor shall provide a Manufacturer's Warranty which at a minimum, warrants that:
 - a) the Equipment is manufactured to the quality and standard stipulated by this Contract and is fit for the purpose for which it is required; and
 - b) the Equipment will be replaced or repaired to the specified standard if the Equipment:
 - i) is found to be of a lower quality or standard than that specified in this Contract; or
 - ii) shows deterioration of such extent that the Equipment does not achieve fitness for the purpose for which it is required, whether on account of utility, performance or otherwise.
- 12.3 The Warrantor will bear the cost of any repair or replacement including all freight charges carried out under the Warranty.
- 12.4 The warrant shall include an acceptable strategy for repair of faulty equipment and specify the time that any repairs will be completed in. The Contractor shall ensure the benefit of any manufacturer's warranty is passed to the Principal, along with all warranty documentation.

13 Testing and Acceptance

- 13.1 The Contractor shall provide the test results in an acceptable format demonstrating compliance with RD-ITS-C1 "The Installation and Integration of its Equipment", Clause 8 "Testing and Commissioning".
- 13.2 All test documentation shall indicate clearly the date the test was conducted and identify the responsible personnel. The test reports shall be submitted within 7 days of completion of the test.
- 13.3 Provision of the test results shall constitute a **Hold Point**.

14 As-Built Documentation

- 14.1 Where the Equipment supplied or installed is at variance with that specified, the Contractor shall update all relevant documentation to reflect any variations from the original design, including manufacturer Equipment manuals, maintenance manuals, procedures, design documentation, engineering drawings, electrical schematics, network system diagrams and system specific software and hardware configurations.
- 14.2 The As-Built documentation shall be provided prior to Completion.

15 Training

- 15.1 The Contractor shall provide training to the Principal's employees, which shall include the operations, installation and maintenance of the Equipment. At a minimum, it shall include the diagnosis of faults and repair, or replacement of faulty modules.
- 15.2 Where specified, the Contractor shall develop and implement an Operations and Maintenance training plan to ensure that training is provided to the Principal's employees for all Equipment and / or systems provided, and submit a copy of the plan at least 14 days prior to delivery of the Equipment.
- 15.3 The Contractor shall offer training for up to 6 persons as soon as practicable after successful commissioning of individual Equipment and / or systems. The manuals shall be provided to the Principal at least 7 days prior to the proposed training session. At a minimum, the training shall provide instructions on:
 - a) complete functional description;
 - b) operations and operational capabilities of each item of Equipment;
 - c) failure mechanisms and repercussions for each item of Equipment;
 - d) operational capabilities of systems related to the Equipment;
 - e) performing routine maintenance on the Equipment and related systems;
 - f) failure mechanisms and repercussions of systems related to the Equipment; and
 - g) structure and relevant contents of the manuals.
- 15.4 Provision of the training plan shall constitute a **Hold Point**.
- 15.5 When undertaking any work on the Equipment and / or system on site, the Contractor shall offer the Principal's employees the opportunity to accompany each visit for facilitate knowledge transfer during such activities.

16 Hold Points

- 16.1 The following is a summary of Hold Points referenced in this Part:

Document Ref.	Hold Point	Response Time
2.7	Quality Plan and documentation	10 working days
2.7	Manufacturer's specifications, drawings, and diagrams	5 working days
6.1	Evidence of "STREAMS" compatibility	5 working days

Document Ref.	Hold Point	Response Time
11.7	Supply of manuals	10 working days
13.3	Provision of test results	5 working days
15.4	Training Plan (if specified)	5 working days

17 Verification Requirements

- 17.1 Refer to the Department's Master specification Parts listed in Clause 1 "General" for verification requirements.
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