TCS 061 - 2019

Specification for

The Supply and Installation

of

ITS Field Cabinets

April 2019
Revision: A

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TCS 056 – 2019

Foreword

This specification has been developed by VicRoads. It is one of a number of technical specifications, and associated standard drawings, which set out the requirements for roadside ITS devices, traffic signal equipment and other electrical equipment and associated devices and control systems.

This specification is intended for use in all relevant works undertaken by or on behalf of VicRoads.

VicRoads Standard Drawings, Specifications and Guidelines are available for downloading from VicRoads website at the following address under 'Tenders & Suppliers', http://www.vicroads.vic.gov.au/itsspecs

Specification updates. VicRoads specifications and associated standard drawings are subject to periodic review. To keep the specifications up to date, amendments or new editions are issued as necessary. It is therefore important for users of VicRoads specifications to ensure that they have the latest version and associated amendments.

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PREFACE

A. CHANGES TO THIS SPECIFICATION

A.1 The main changes to this specification from the previous version are listed below:

- Modification of headings and reorganisation of sections for greater consistency with Australian Standard.
- Additional details for post mounted cabinet.
- Addition of Installation Requirements.

Revision History

Version	Revision	Date	Author	Description
2008		April 2008	M1 - FMS	Developed for M1 Project - FMS
2008		May 2008	M1 - FMS	In review for M1 Project - FMS
2008		June 2008	M1 - FMS	In review for M1 Project - FMS
2008		November 2008	M1 - FMS	Altered locking and colour requirements
2009		January 2009	M1 - FMS	Altered locking requirements - removed specific requirement for Euro Half Profile Cylinder type
2009		March 2009	M1 - FMS	Clarified locking and key requirements regarding provision of Bi-Lock system. Modified min and max dimensions for pole mounted cabinets in section A.4
2011		May 2011	M1 - M80	Clarified requirements for gland plate Altered door stay requirements to be self latching. Added enclosure lights Mounting Cabinet Location clarified
2014		February 2014	SJS	Converted to TCS format Inclusion of Appendix B
2019	A	April 2019	SJS	Minor changes, expanded PMC section Inclusion of installation section

Contents

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This document specifies the requirements for the supply of ITS Field Cabinets for use by VicRoads within the state of Victoria.

1.2 GENERAL

1.2.1 ITS Field Cabinets are used for housing ITS electrical, electronic and communication equipment typically associated with freeway management systems.

1.2.2 Typical devices housed within an ITS Field cabinet would include such things as:

a) Ramp Signal Controllers.
b) STREAMS Field Processors.
c) LUMS controllers.
d) CCTV equipment.
e) Communications network equipment.
f) UPS batteries.

1.2.3 This specification also defines basic attributes of a small pole mounted cabinet for use where a large 19-inch rack cabinet would be unwarranted. The requirements for small post mounted cabinets are specified in Section 12 of this specification.

1.2.4 It is intended that cabinets from different manufacturers will be physically interchangeable.

SECTION 2 RELATED SPECIFICATIONS AND DRAWINGS

2.1 The fabrication and supply of all components shall conform with the latest version of all relevant Australian Standards.

2.2 All installation works shall conform to the relevant VicRoads specifications and related specifications and standards as indicated throughout this document.

2.3 Where no specific reference is made to an Australian Standard, the materials and processes used shall conform to the relevant Australian Standard or generally accepted practice.

2.4 The following related Australian Standards are referenced.

AS 1170.2	Structural design actions – Wind actions
AS 1319	Safety signs for the occupational environment
AS/NZS 1768	Lightning Protection
AS 2700	Colour standards for general purposes
AS/NZS 3000	Wiring Rules
AS/NZS 3100	Approval and test specification for definitions and general requirements for electrical materials and equipment
AS 4070	Recommended practices for protection of low-voltage electrical installations and equipment in MEN systems from transient voltages.
AS 60038	Standard Voltages
AS 60068.2.6	Environmental testing – Tests – Test Fc: Vibration (sinusoidal)
AS 60529	Degrees of protection provided by enclosures (IP code)
AS 62208	Empty enclosures for low-voltage switchgear and control gear assemblies – General requirements

2.5 The following VicRoads specifications are referenced.

Contract Standard Section 732	ITS Devices Installation
Contract Standard Section 733	Conduits and pits for underground wiring and cabling
Contract Standard Section 734	Electrical System and Equipment
Contract Standard Section 736	ITS device testing and integration

2.6 The following VicRoads standard drawings are referenced.

TC 2100	Standard Cabinet Label
TC-2105	Pedestal Controller Label
TC-2230	Typical single ITS field cabinet foundation
TC-2237	Site Layout for ITS field cabinets located on batters – Typical arrangement.
TC-2238	Pedestrian safety fence arrangements for ITS field cabinets – Typical arrangements
TC-2239	Typical double ITS field cabinet foundation
TC-2244	Typical ITS Field cabinets layout LUMS and VMS
TC-2245	Typical ITS Field cabinets layout FRS, VSLS and LUMS

SECTION 3 ABBREVIATIONS AND ACRONYMS

3.1 ACRONYMS

The acronyms used in this document shall be interpreted as follows:

AS	Australian Standard
DIN	Deutsche Industrie Norm
CES	Certificate of Electrical Safety
FMS	Freeway Management System
FRS	Freeway Ramp Signals
FSL	Finished Surface Level
GNSS	Global Navigation Satellite System
IP	Ingress Protection
ITS	Intelligent Transport Systems
LED	Light Emitting Diode
LUMS	Lane Use Management Signs
NAP	Network Asset and Planning
NATA	National Association of Testing Authorities
NZS	New Zealand Standard
RU	Rack Unit (unit of height 1.RU = 1.75” or 44.45mm)
UPS	Uninterruptible Power Supply
VMS	Variable Message Sign
VSIR	Victorian Service and Installation Rules

SECTION 4 MECHANICAL AND PHYSICAL REQUIREMENTS

4.1 CABINET DESIGN AND CONSTRUCTION

4.1.1 The distribution cabinet shall be constructed from marine grade aluminium sheet A5052 H32 or A5251 H34, with a minimum thickness 2.5mm and treated to ensure optimum performance under prolonged exposure to atmospheric and site conditions prevalent in the State of Victoria. It is permissible for the base section of the cabinet to be cast, using an appropriate aluminium alloy or an approved alternative material.

4.1.2 The cabinet shall be rated to withstand the effects of solar radiation and the completed structure shall be rated to withstand wind forces for the region as defined in AS 1170.2 for a period not less than 20 years.

4.1.3 All bolts, screws, fixings etc. shall be of material suitable to provide a life of not less than 15 years.

4.1.4 Reinforcing shall be provided as necessary to produce a rigid cabinet structure. All materials shall be either inherently corrosion resistant or be treated and/or isolated against electrolytic and environmental corrosion.

4.1.5 Any jointing shall be carried out in accordance with any relevant Australian standards and generally accepted principles of sound practice.

4.1.6 All surfaces of the enclosure (including all structural supports and/or bracing components) are suitably treated (e.g. Polyester powder coated) to ensure prolonged operation within the intended application.

4.1.7 The exterior of the cabinet shall present a clean and attractive appearance and be free from fasteners such as bolts, screws and pop-rivets.

4.1.8 This life duration of 20 years does not include cabinet electrical components such as fans or cabinet components requiring routine maintenance/replacement such as dust filters.

4.1.9 All surfaces of the enclosure shall be free from sharp edges or protrusions.

4.1.10 All exterior corners of the enclosure and roof shall have a minimum external radius of 3 mm.

4.1.11 The exterior of the enclosure shall present a clean and attractive appearance and be free from fasteners such as bolts, screws and pop-rivets.

4.1.12 The effects of atmospheric and/or local environmental conditions shall have no detrimental effect on the structural integrity or visual appearance (including colour fading) of the finished product for a period not less than 15 years.

4.2 DIMENSIONS

4.2.1 The cabinet shall provide an internal racking system to suit 19-inch rack mountable equipment. The 19-inch racking system shall also support modular shelves (included as necessary for the specific installation). More detail on these mounting requirements is given in section 6 of this specification.

4.2.2 The dimensions of the cabinet shall conform to the following:

Description	Minimum dimension	Maximum dimension
19-inch Racking Chassis Height	30.RU (≈ 1333.5mm)	–
Overall Internal Height of Cabinet	1400mm	1600mm
Overall Internal Width of Cabinet	–	800mm
Overall Internal Depth of Cabinet	550mm	700mm
19-inch Racking Chassis Depth	480mm	–
Internal Depth of Cabinet with Doors Closed	580mm	–
External Depth of Cabinet with Doors Closed	600mm	750mm
Cabinet Base / Cable Zone	100mm	–
Gland Plate Aperture	250mm x 400mm	–

Note. RU = 1.75in or 44.45mm

Table 4.1 – Single Cabinet Dimensions

Description	Minimum dimension	Maximum dimension
19-inch Racking Chassis Height	30.RU (≈ 1333.5mm)	–
Overall Internal Height of Cabinet	1400mm	1600mm
Overall Internal Width of Cabinet	–	1650mm
Overall Internal Depth of Cabinet	550mm	700mm
19-inch Racking Chassis Depth	480mm	–
Internal Depth of Cabinet with Doors Closed	580mm	–
External Depth of Cabinet with Doors Closed	600mm	750mm
Cabinet Base / Cable Zone	100mm	–
Gland Plate Aperture	250mm x 400mm	–

Note. RU = 1.75in or 44.45mm

Table 4.2 – Double Cabinet Dimensions

4.2.3 A clearance of at least 50mm shall be provided between the inner surfaces of the front and rear doors when in the closed position and the 19-inch equipment mounting surface of the vertical racking rails.

4.3 DOORS

4.3.1 Doors shall be provided at the front and rear and one side of the cabinet to give direct access to all internal equipment for installation and maintenance purposes.

4.3.2 The size of the door openings shall be as close as practicable to the external dimensions of the larger side of the single cabinet, consistent with mechanical strength requirements.

4.3.3 For double cabinets, the long sides of the cabinet shall include two doors hinged on the outside edges of the cabinet.

4.3.4 All doors shall be individually lockable and secured in the closed position by way of a multipoint securing system actuated via a single keyed lock.

4.3.5 The lock shall be the standard VicRoads Bi-Lock type with interchangeable cylinder.

4.3.6 The keying shall be set to match a standard VicRoads cabinet key code which shall be provided to the Contractor upon award of the contract.

4.3.7 Each door shall be stiffened and shall be hinged with a minimum of two hinges.

4.3.8 Hinge pins shall:

a) Be constructed of materials of a type that do not require lubrication to prevent seizing.
b) Not be removable.
c) Not protrude beyond the overall outside cabinet dimensions.
d) Be concealed.

4.3.9 All doors shall be capable of being opened through a minimum of 110 degrees from their closed position.

4.3.10 All doors shall be provided with a self latching door stay.

4.3.11 All doors shall be earthed in accordance with AS/NZS 3000.

4.3.12 A pocket shall be provided on the inside of all doors to provide space for the storage of items such as service cards and circuit diagrams.

4.3.13 The storage pockets shall have minimum dimensions of 220 mm high x 300 mm wide x 20 mm deep and shall be provided with a finger slot or other suitable means to facilitate removal of documents.

4.3.14 All doors shall be provided with a serviceable, durable and resilient weatherproof seal designed to last at least for the 20 year design life of the cabinet.

4.4 PLINTH

4.4.1 The cabinet’s plinth shall provide a frangible connection to the concrete foundation.

4.4.2 The plinth shall include a base return of not more than 100mm.

4.5 GLAND PLATE

The cabinet shall include a gland plate. The gland plate shall be easily removable for gland and cable installation.

4.6 FRANGIBILITY

The cabinet shall be fastened to the securing bolts by means of frangible plates or fittings so that, in the event of a severe impact (such as from an errant motor vehicle) the cabinet will be dislodged from its mountings without damage to the mounting bolts.

4.7 MOUNTING

4.7.1 The cabinet shall include four holes within the plinth base return for mounting onto a concrete foundation.

4.7.2 The holes shall provide oversize clearance for a 12mm mounting stud and suitable for the frangible plates or fittings.

4.7.3 Attachment to the foundation will be by either a rag bolt installed within the foundation or bolted down with suitable concrete bolts.

4.7.4 Sufficient access shall be provided to the securing bolts to facilitate ease of installation and removal of the cabinet and plinth from the base.

4.8 VENTILATION

4.8.1 Adequate ventilation shall be provided to prevent condensation and temperature rise inside the cabinet under all weather conditions.

4.8.2 Ventilation shall be provided near the top (between the roof and the body section) and near the base.

4.8.3 All ventilation openings shall be designed to prevent the ingress of dust and insects, by the provision of a suitable filtering medium or other effective means.

4.8.4 If stand-offs are used on modular parts of the cabinet, these shall be of non-corrosive material to prevent environmental corrosion of the stand-off and cabinet, and shall be sealed to prevent ingress of water.

4.9 EXTERIOR FINISH

4.9.1 All exterior surfaces of the enclosure shall have a durable gloss finish of an appropriate polyurethane, non-sacrificial, anti-graffiti pigmented coating applied in accordance with the manufacturer’s directions.

4.9.2 Other exterior finish types may be considered at the sole discretion of the Superintendent.

4.9.3 The enclosure is to be coloured Smoke Blue – T33, in accordance with AS 2700.

4.10 CABINET LIGHTS

4.10.1 A light for illuminating the interior of the cabinet shall be provided above or beside each cabinet door.

4.10.2 Lights shall be LED or other approved low power lighting source.

4.10.3 The lights shall be door activated.

4.11 LIFTING BOLTS

4.11.1 The cabinet shall be equipped with two a removable eye-bolts to enable it to be safely lifted for transportation and onto the concrete base on-site.

4.11.2 The eye-bolts shall be located on the roof of the cabinet.

4.11.3 Removal of the eye-bolt from its mounting point shall not compromise the IP rating nor affect the design life.

4.12 MARKINGS

4.12.1 All roadside cabinets shall be marked with an appropriate VicRoads standard cabinet label in accordance with VicRoads standard drawing number TC-2100 displaying associated site numbers.

4.12.2 The cabinet shall carry readily accessible identification markings (by securely affixed plate or other approved means) which shall include the following information:

a) name and address of the manufacturer;
b) batch number of the cabinet;
c) serial number of the cabinet;
d) month and year of manufacture and
e) provision for warning labels and/or plates.

4.12.3 In addition, a suitable label, secured to the inside of the front door, shall be available for the installing Contractor to annotate the installation date of the cabinet.

SECTION 5 FOUNDATION

5.1 MOUNTING

5.1.1 The assembled cabinet shall be designed to mount on a concrete foundation via the mounting holes detailed in clause 4.7.

5.1.2 For details of the foundation see VicRoads standard drawings TC-2230 and TC-2239.

5.1.3 The cabinet shall remain level once mounted on the base.

SECTION 6 ELECTRICAL REQUIREMENTS

6.1 GENERAL

6.1.1 The electrical design, switchboard and cabling within the cabinet shall comply with the relevant requirements of AS/NZS 3000.

6.1.2 The mains supply voltage shall be deemed to be 230 or 400VAC +10%, -6% in accordance with AS 60038, Section 2. The system and or sub-elements of the system shall be capable of operating satisfactorily from the same supply within ±15%.

6.1.3 All electrical equipment and associated wiring within the cabinet as supplied shall comply with the relevant requirements of AS 3100.

6.1.4 Transformers used within the cabinet shall comply with AS/NZS 61558.

6.1.5 All cables and wires shall be insulated with a material not inferior to V-90 grade PVC and shall be suitably labelled.

6.1.6 All external doors shall be earthed to the main body of the cabinet in accordance with AS/NZS 3000.

6.2 SWITCHBOARD

6.2.1 The cabinet shall be supplied with an 18 pole, 19-inch rack mounted modular switchboard (also referred to as a 'load centre') of a height no greater than 5RU (222.3mm).

6.2.2 The switchboard shall have a depth not greater than half of the cabinet's internal depth.

6.2.3 No part of the switchboard shall be below the level of the door opening.

6.2.4 The switchboard shall be supplied with a minimum of the following:

a) Suitably rated main switch
b) Suitably rated circuit breaker to protect the surge diverter
c) Surge diverter as per Clauses 6.5 and 6.6.
d) Suitably rated circuit breaker to protect the internal cabinet lighting.
e) Suitably rated circuit breaker to protect the internal cabinet fans.
f) Suitably rated circuit breaker to protect the power outlet boards (power boards).
g) A separate, suitably rated circuit breaker to protect each hardwired device housed within the cabinet.

6.3 POWER DISTRIBUTION PANEL

6.3.1 The cabinet shall include a power distribution panel (i.e. a terminal strip) to facilitate the hardwired connection to power for devices housed within the cabinet.

6.3.2 Single ITS Field Cabinets shall include a minimum of 1 power distribution panel and Double ITS Field cabinets shall include at least 2 power distribution panels.

6.4 SOCKET OUTLET PANELS (POWER BOARDS)

6.4.1 One socket outlet panel (power board) shall be installed within the single ITS Field cabinet and 2 socket outlet panels in the double ITS Field cabinet.

6.4.2 The socket outlet panel shall be used to supply power to sundry equipment mounted in the cabinet.

6.4.2 The socket outlet panel shall:

a. Be wired to an individual sub-circuit;
b. Provide not more than 5 socket outlets, arranged to allow plug-pack type transformers to be installed in all outlets concurrently;
c. Be mounted vertically on the rear side of the rack frame so as not interfere with equipment racking and cabling; and
d. Be easily accessible from both the front and rear of the cabinet.

6.5 TRANSIENT AND OVERVOLTAGE PROTECTION

All equipment including data lines shall be internally protected against damage resulting from:

a) Lightning strikes at or near the cabinet.
b) Electrical surges or transients on power cabling.
c) Electrical transients on communications wiring.
d) Radio frequency interference.
e) Static electrical discharge.
f) Any harmonics arising from the above and any equipment in the cabinet.

6.6 DANGER SIGN

A warning sign “DANGER 240 VOLTS” shall be clearly fastened to the inside of the door, in accordance with AS/NZS 3000 and comply with the following requirements:

a. For symbolic signs - Sign No A2.7 in Appendix A of AS 1319.
b. For text type signs - Appendix A of AS 1319

SECTION 7 ENVIRONMENTAL REQUIREMENTS

7.1 INTERNAL PROTECTION

7.1.1 The ITS cabinet shall have a degree of ingress protection of IP 55 in accordance with AS 60529.

7.1.2 The roof of the cabinet shall be designed to prevent the pooling of water.

7.1.3 The cabinet base shall be sealed to prevent the ingress of vermin or moisture.

7.2 TEMPERATURE AND HUMIDITY

All equipment provided with the cabinet shall be capable of operating continuously in an ambient with free air temperature in the range of -10ºC to +50ºC with a relative humidity of 90%.and with up to 1kW/m^2 insolation applied to the exterior surface.

7.3 SHOCK AND VIBRATION

7.3.1 The cabinet enclosure shall withstand a bump test in accordance with AS 60068.2.29.

7.3.2 The bump test shall be 1,000 bumps at an acceleration of 98 m/s^2 (10g).

7.3.3 The top of the cabinet, when mounted on the footing, shall not deflect more than 10mm when a force of 2kN is applied at the top of the cabinet in any direction. Furthermore, the mounting shall be sufficiently robust to withstand vandalism or minor impact from a motor vehicle.

7.3.4 The cabinet shall withstand a vibration test in accordance with AS 60068.2.6.

7.3.5 The amplitude for the vibration test shall be 0.75 mm up to the cross-over frequency (approximately 8.2 Hz), where the acceleration is 0.2 g, and for higher frequencies the acceleration shall be maintained constant at 0.2 g.

7.4 ELECTROMAGNETIC COMPATIBILITY (EMC)

All equipment provided with the cabinet shall comply with the relevant requirements of AS/NZS 61000.6.3.

SECTION 8 INTERNAL EQUIPMENT MOUNTING

8.1 INTERNAL MOUNTING SYSTEM

8.1.1 The cabinet shall be supplied with an adjustable internal racking system of vertical punched rails in each corner to the full height of the cabinet.

8.1.2 The racking system shall be capable of adjustment to accept standard 19-inch (482.6mm) and Euro Metric (535mm) equipment.

8.1.3 A minimum equipment mounting depth of 480mm shall be provided between the front and rear vertical racking rails as shown in table 4.1 of this document.

8.1.4 Two horizontal rails running the full depth of the cabinet shall be fixed to each side for the sturdy mounting of the vertical rails.

8.1.5 The cabinet internal mounting system shall have provision for mounting additional side vertical rails for equipment requiring extra support or for mounting of equipment that does not utilise the 19” mounting system.

8.1.6 It shall be possible to mount these additional vertical rails in a range of fore and aft positions.

8.2 INTERNAL SHELVES

8.2.1 The cabinet’s 19 inch rack mounting chassis shall allow shelves with a minimum depth of 300mm to be installed on the vertical rails within the cabinet.

8.2.2 The shelves shall be rigid and free of sharp edges.

8.2.3 The shelves shall be provided with mounting holes on the left and right sides with screws and nuts to allow location at any height on the vertical rails.

8.2.4 The shelf shall be capable of supporting a minimum static weight of 20kg without deformation.

8.2.5 Shelves shall be able to be installed and fixed in position from both the front and the rear of the cabinet.

8.3 MOUNTING MISCELLANEOUS EQUIPMENT

The internal design of the cabinet shall provide for the mounting of miscellaneous electrical and telecommunications equipment by the DIN rail mounting system.

8.4 CABLE MANAGMENT

8.4.1 The cabinet shall provide cable management hardware running the full height of the cabinet for the purpose of routing and securing of cables.

8.4.2 The internal design of the cabinet shall be such that the installed cable management hardware does not interfere with the internal racking system.

SECTION 9 MARKINGS

9.1 GENERAL

9.1.1 Each distribution cabinet shall be legibly and durably marked on the interior surface of the cabinet, in a readily accessible location, with the following information:

a) The name and address, trade name or trademark of the manufacturer.
b) Catalogue number or marking which shall distinguish the particular distribution cabinet from other similar items supplied and/or manufactured by the supplier.
c) Batch or serial number or other mark which will clearly identify the date of manufacture of the item, and the month and year of manufacture.
d) Other information required under AS/NZS 3100.

9.1.2 All information displayed on the cabinet shall be readily accessible and may be by a securely affixed plate or other approved means.

SECTION 10 MAINTAINABILITY

10.1 TOOLS

The design of the cabinet shall be such that any onsite assembly or maintenance activities to the cabinet itself can be carried out with the use of common hand tools.

10.2 ACCESSIBILITY

The design of the cabinet shall be such that maintenance personnel can access equipment or cabling installed in the cabinet or to make adjustments or additions to the racking or shelving without disassembling any part of the cabinet.

SECTION 11 DOCUMENTATION

11.1 GENERAL

11.1.1 The cabinet shall be supplied with the following documentation:

a) Detailed assembly drawings, including mounting details and dimensions, cabinet base and securing bolts details and dimension.
b) Detailed installation drawings, including cable entry details.
c) Parts list (including all optional structural and electrical components & modules).
d) Electrical interconnection diagrams.
e) Electrical Switch board drawings including electrical protection details, e.g. circuit breaker.
f) Recommendations and procedures for routine and corrective maintenance.
g) Recommendations on spare parts holdings (routine and corrective).

SECTION 12 POST MOUNTED CABINET

12.1 GENERAL

12.1.1 This section outlines the requirements for a small post mounted cabinet. Such cabinets are used to house electronic devices for ITS applications such as CCTV and Wireless Vehicle Detection in situations where the use of a full sized ITS Field cabinet is not warranted.

12.1.2 The mechanical, materials and environmental requirements of the post mounted cabinet shall generally comply with all mechanical, materials and environmental requirements of the full roadside cabinet. However, attributes such as mounting methods and overall dimensions shall differ.

12.1.3 Examples of the kinds of devices suitable for installation in a post mounted cabinet would include but not be limited to:

- CCTV Power supplies
- Access Point Power Over Ethernet (PoE) injectors
- Digital video encoders for CCTV cameras
- Small IP communications switches
- Fibre-optic data transceivers
- Data radio modems
- Field Processor
- Sign controller

12.2 CABINET DESIGN AND CONSTRUCTION

Design and construction shall be in accordance with section 4.1 of this specification.

12.3 DIMENSIONS

The outside dimensions of the post mounted cabinet shall be within the dimensions indicated in Table 12.1 below.

	Minimum (mm)	Maximum (mm)
HEIGHT	400	650
WIDTH	300	450
DEPTH	200	400

Table 12.1 – Post Mounted Cabinet Dimensions

12.4 DOOR

12.4.1 A door shall be provided at the front of the cabinet to give direct access to all internal equipment for installation and maintenance purposes.

12.4.2 The size of the door openings shall be as close as practicable to the external dimensions of the larger side of the single cabinet, consistent with mechanical strength requirements.

12.4.3 The door shall be lockable and secured in the closed position by way of a multipoint securing system actuated via a single keyed lock.

12.4.4 The lock shall be the standard VicRoads Bi-Lock type with interchangeable cylinder.

12.4.5 The keying shall be set to match a standard VicRoads cabinet key code which shall be provided to the Contractor upon award of the contract.

12.4.6 Hinge pin(s) shall:

a) Be constructed of materials of a type that do not require lubrication to prevent seizing.
b) Not be removable.
c) Not protrude beyond the overall outside cabinet dimensions.
d) Be concealed.

12.4.7 The door shall be:

a) capable of being opened through a minimum of 110 degrees from the closed position.
b) provided with a self-latching door stay.
c) be earthed in accordance with AS/NZS 3000.
d) provided with a serviceable, durable and resilient weatherproof seal designed to last at least for the 20 year design life of the cabinet.

12.4.8 A pocket shall be provided on the inside of all doors to provide space for the storage of items such as service cards and circuit diagrams.

12.5 MOUNTING

12.5.1 The cabinet shall be mounted as specified in individual contract documents.

12.5.2 The acceptable mounting methods are:

a) Base mounted on a short post; or
b) Attached from the rear of the cabinet to an existing pole such as a CCTV pole.

12.6 VENTILATION

12.6.1 Adequate ventilation shall be provided to prevent condensation and temperature rise inside the cabinet under all weather conditions.

12.6.2 All ventilation openings shall be designed to prevent the ingress of dust and insects, by the provision of a suitable filtering medium or other effective means.

12.7 EXTERIOR FINISH

The exterior finish shall be in accordance with Section 4.9 of this specification.

12.8 MARKINGS

12.8.1 The cabinet shall carry readily accessible identification markings (by securely affixed plate or other approved means) which shall include the following information:

f) name and address of the manufacturer;
g) batch number of the cabinet;
h) serial number of the cabinet;
i) month and year of manufacture and
j) provision for warning labels and/or plates.

12.8.2 In addition, a suitable label, secured to the inside of the front door, shall be available for the installing Contractor to annotate the installation date of the cabinet.

12.9 RESISTANCE TO WEATHER

Resistance to weather shall be in accordance with Section 7.1 of this specification.

12.10 EXTERIOR FINISH

Exterior finish shall be in accordance with Section 4.9 of this specification.

12.11 PROVISION OF CONDUIT ENTRY

12.11.1 The provision of cable/conduit entry into the cabinet will depend on the mounting method used.

12.11.2 Cabinets base mounted on top of a short post will allow for cables to enter the cabinet through the post and a matching hole in the base of the cabinet.

12.11.3 Cabinets mounted onto an existing pole (e.g. a CCTV pole) shall allow entry of 2 x 32mm^2 cable conduits as a minimum.

12.12 INTERNAL MOUNTING SYSTEM

12.12.1 The cabinet shall provide an internal DIN rail mounting system. The quantity or rail installed in the cabinet will depend on the number of devices required for the intended application.

12.12.2 It is highly desirable that all devices installed in the post mounted cabinet be DIN rail mountable. Shelves may also be provided in order to support non-DIN rail mounted devices.

12.13 ELECTRICAL REQUIREMENTS

12.13.1 General

Electrical compliance shall be in accordance with relevant requirements on Section 6 of this specification.

12.13.2 Power Distribution

Mains power shall be distributed to devices installed inside the post mounted cabinet via suitably rated circuit breakers.

12.13.3 Danger Sign

A Danger sign shall be in accordance with section 6.6 of this specification.

12.13.4 Socket Outlets

Where specified in individual tender documents, a double socket outlet shall be provided inside the post mounted cabinet. This outlet shall have a maximum continuous rated current load of 6A.

Note: Where the distance from the main distribution cabinet to the PMC necessitates the use of large conductors due to voltage drop, it is recommended that a socket outlet is not specified.

12.13.5 Documentation

Documentation for the post mounted cabinet shall be provided in accordance with Section 11 of this specification.

SECTION 13 - INSTALLATION AND COMMISSIONING

13.1 GENERAL

13.1.1 ITS Field Cabinets shall be installed in accordance with:

a) The manufacturers requirements;
b) The requirements of this specification;
c) Contract Standard Section 732; and
d) The requirements of individual contract documents.

13.1.2 All pits and conduits shall be installed in accordance with Contract Standard Section 733.

13.1.3 The type of ITS Field cabinet (i.e. a single or double) shall be detailed in individual contract documents.

13.1.4 Where an existing ITS Field cabinet does not have sufficient spare capacity for additional assets, a new cabinet with sufficient capacity shall **replace** the existing cabinet.

13.1.5 Where a new cabinet replaces an existing cabinet, the existing cabinet and foundation shall be decommissioned and removed from site.

Note: Two or more ITS Field cabinets at the same location shall not be installed or be allowed to remain installed.

13.1.6 A standard VicRoads cabinet label shall be supplied and attached to the rear of the cabinet (facing the roadway) in accordance with standard drawing TC-2100. The label shall include the site number of each separate site controlled from the cabinet.

13.1.7 A drawing indicating the point of supply for the cabinet and the conduit/cable route shall be provided in the cabinet.

13.2 CABINET LOCATION

13.2.1 ITS Field cabinet locations shall be specified in individual contract documents.

13.2.2 Each cabinet shall be located as near as practicable to the ITS assets connected to it.

13.2.3 Cabinets shall not be located at a distance from the connected assets that prevents visibility of the assets.

13.2.4 Cabinets shall be located such that the risk of impact from an errant vehicle is minimised as much as is practicable.

13.2.5 On roads with 100km/h speed limits, ITS Field cabinets shall be located not less than 5 metres from any carriageway, and where possible, beyond the clear zone.

13.2.6 Any ITS Field cabinet located within the clear zone on a freeway or in a high risk location, the contractor shall provide traffic barriers to protect the cabinet.

13.2.7 Cabinets shall be installed with the back of the cabinet parallel to the adjacent roadway and the main door(s) opening away from the roadway.

13.2.8 Cabinets shall be placed, as far as practicable, in an area that has no incline.

13.2.9 Where a cabinet is required to be located on a batter, it shall be installed in accordance with standard drawing TC-2237.

13.2.10 Clear and easy access to all ITS Field Cabinets shall be provided. Standard Drawing TC-2303 shows a typical arrangement at a gantry.

13.3 FOUNDATIONS

13.3.1 Foundations shall comply with the standard drawings detailed in Table 13.1 below.

13.3.2 All concrete works shall conform to VicRoads standard drawings and be undertaken in accordance with VicRoads Contract Sections 610, 611, and 614.

ITS Cabinet Type	Drawing
Single ITS Field Cabinet Foundation	TC-2230
Double ITS Field Cabinet Foundation	TC-2239

Table 13.1: Standard drawings for ITS Field cabinet foundations

13.4 EARTHING

13.4.1 ITS Field cabinets shall be and all connected circuits shall be earthed in accordance with the requirements of AS/NZS 3000.

13.4.2 The switchboard in an ITS Field cabinet will typically be a sub-board being fed from an Electrical Distribution cabinet. Therefore, the switchboard in the ITS Field cabinet shall not include an MEN point.

13.4.3 Where the distance between the Electrical Distribution cabinet and the ITS Field cabinet is considered excessive, consideration may be given to connecting the ITS Field cabinet switchboard as an MEN point. This would remove the need for a separate, large earth cable from the Electrical Distribution cabinet. This will require approval from the Superintendent.

13.4.4 The size of earth cable is to be designed to ensure a Fault Loop Impedance ‘low enough to allow sufficient current to flow in the fault loop to cause the protective device to operate within the disconnection time’ in accordance with AS/NZS 3000.

13.5 MAXIMUM DEMAND

13.5.1 When calculating the maximum demand for determining the size of the sub-main supply conductors, allowance shall be provided for any known future additions to the cabinet.

13.5.2 In addition to calculated maximum demand and allowances for known future additions, an extra 10% capacity in the mains supply conductors shall be provided for.

13.6 POLE MOUNTED ITS FIELD CABINET

13.6.1 General

13.6.1.1 Where specified in individual contract documents, a pole mounted ITS Field cabinet shall be supplied and installed.

13.6.1.2 The type of mounting, i.e. base mounted or rear mounted shall be specified in individual contract documents

13.6.1.3 A standard VicRoads cabinet label shall be supplied and attached to the door of the cabinet in accordance with standard drawing TC-2105.

13.6.1.4 The installation of pole mount cabinets shall comply with the relevant clauses of Section 13.1. of this specification.

13.6.1.5 Pole mount cabinets shall be earthed in accordance with the requirements of AS/NZS 3000.

13.6.2 Base Mounted on Frangible Pole

13.6.2.1 Cabinets mounted from the base shall be attached to the top of an approved pole.

13.6.2.2 Where the cabinet is installed in a location without additional protection (e.g. guard rail) the pole shall be an approved slip base pole

13.6.2.3 The pole height shall facilitate the base of the cabinet being xxmm above FSL.

13.6.3 Rear Mounted on Existing Pole

13.6.3.1 The mounting height of the cabinet shall be variable at installation time to suit the surrounding environment. This mounting height shall be fixed thereafter.

13.6.3.2 The cabinet shall be mounted in such a way as not to interfere with the functionality of the pole, ie. 10m mid hinged poles.

13.6.3.3 Conduits entry shall via the under-side of the cabinet.

13.6.3.4 The cabinet shall allow entry of 2 x 32mm^2 cable conduits as a minimum.

13.6.3.5 The conduits shall be flexible, fully weather proof, vandal proof (i.e. slash proof), and shall be made from:

a) Flexible stainless steel or;
b) A flexible polymer hose with internal or external braided stainless steel weave.

13.7 TESTING AND COMMISSIONING

13.7.1 Testing

13.7.1.1 The installed cabinet and all connected circuits shall be tested in accordance with the requirements of AS/NZS 3000, the requirements of the VSIR's and any other requirements of the local distribution business.

13.7.1.2 As a minimum, the contractor shall undertake the following tests:

a) The continuity of each circuit.
b) The continuity and resistance (fault loop impedance) of the earthing conductors.
c) Correct switching of each circuit.
d) Correct operation of each connected ITS device.

13.7.1.3 The contractor shall provide a CES for all electrical works.

13.7.1.4 The completed installation shall be inspected and tested by the contractor and a VicRoads representative as part of the site commissioning.

13.7.1.5 All ITS devices within the cabinet shall be tested in accordance with the relevant sections of Contract Standard Section 736.

13.8 INSTALLATION RECORDS

13.8.1 After installation of the cabinet, the Contractor shall provide the Superintendent with a GNSS record of the location of the installed cabinet.

13.8.2 All GNSS coordinates shall be given in electronic format in GDA94 coordinate projection.

13.8.3 All devices installed in a cabinet shall be associated with a site number provided by VicRoads.

13.8.4 All cabinet location GNSS records shall also contain the site number(s) of the system(s) that the cabinet services.

113.8.5 Electrical connections to Point of Supply and the Point of Supply details shall be included.

APPENDIX A

REQUIREMENTS FOR TYPE APPROVAL

(Normative)

A1. GENERAL

A1.1 To enable assessment for the purpose of granting Type Approval, the supplier is to submit a formal request for Type Approval accompanied by the following:

1. An outline drawing showing the general presentation and overall dimensions of the complete cabinet.
2. Where requested, a sample cabinet.

A1.2 Where the above information indicates that the cabinet may be suitable for VicRoads purposes, a Product Approval (PA) number will be issued. The supplier may then submit the product for formal evaluation to a VicRoads approved consultant.

A1.3 Where the cabinet has been approved by another State Road Authority, details should be provided and this approval will be considered.

A2. INFORMATION TO BE PROVIDED WITH SUBMISSION TO CONSULTANT

A2.1 The following documentation shall be provided with any submission:

- Evidence of compliance with each clause of this specification;

A2.2 The following test reports from a NATA or equivalent accredited test facility shall be provided with any submission:

- Ingress Protection in accordance with AS60529 (Clause 4.11);
- Vibration test in accordance with AS 600068.2.6 (SA/NZS TS 1158, Clause 5.4);

A3. OTHER REQUIRED TESTING

VicRoads may require additional information or testing to be carried out as part of its evaluation of the product.

A4. ASSESSMENT PROCEDURE

A4.1 The assessment procedure for an ITS Field cabinet will include, but not be limited to, the following:

a. Assessment of construction, workmanship and critical dimensions.
b. Evaluation of the submitted data against the requirements of the specification.

A4.2 Where some of these procedures have been completed prior to formal submission, the results will be considered in the evaluation, provided there is no relevant change in the design. The supplier is to state whether tests carried out prior to formal submission were carried out on an identical sample.

A4.3 If the product is approved, a Certificate of Type Approval will be provided to the supplier. Until such time as this Certificate is issued, the product is not to be used in the State of Victoria.