

# TCS 072: 2022

Specification

## **Over height vehicle detection system**

Supply and Installation

Version: August 2022  
Revision: A



Department  
of Transport

## TCS 072: 2022

### Foreword

This specification has been developed by Department of Transport (DoT). 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 DoT.

DoT (Roads) Standard Drawings, Specifications and Guidelines are available for downloading from the VicRoads website:

<https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/electrical-and-intelligent-transport-systems>

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**Specification updates.** DoT 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 DoT specifications to ensure that they have the latest version and associated amendments.

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### Revision History

Version	Revision	Date	Author	Description
2022	A	August 2022	ITS	Update from TCG 001 to new specification

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## SECTION 1 SCOPE AND GENERAL

### 1.1 SCOPE

This document provides guidelines for the supply and installation of over height vehicle detection (OHVD) equipment and associated warning systems for use on main roads, highways and freeways throughout the State of Victoria.

### 1.2 GENERAL

1.2.1 Over Height Vehicle Detection and Warning Systems (OVDS) are used to monitor and alert road users of assets upstream of the detection point which have a reduced height clearance gauge and include the following components:

- Vehicle Detection and structure impact monitor device
- Controller
- Road User advisory system (consisting of either message signs, flashing lanterns, audible tones, physical barriers, traffic signals or any combination of these).

1.2.2 The over height system and associated signage are strategically placed so that when the height gauge is activated, it allows the driver of a vehicle to seek, or be directed to an alternate route around the structure.

1.2.3 The over height system is set at a predetermined height no greater than the advertised height displayed on the structure. When the height gauge is activated by the presence of an over height vehicle, a signal is transmitted to an advisory sign which activates a suitable warning message.

1.2.4 In addition to detecting over height vehicles, the OVDS is set to advise the DoT Traffic Operations Centre of any collisions with the structure.

1.2.5 The data collected from an OVDS is transmitted via a TCP/IP compatible network link back to DoT (Roads) ITS System.

1.2.6 The OVDS is to interface with the DoT (Roads) ITS System as detailed in Appendix A or Appendix B.

### 1.3 PHYSICAL REQUIREMENTS

1.3.1 The controller for the OVDS shall be designed to be housed within a roadside cabinet complying with DoT (Roads) specification TCS 061 ITS Field Cabinet or an enclosure as specified in individual tender documents.

1.3.2 Detection devices shall be housed in suitable IP65 rated supplier designed enclosures.

- 1.3.3 Static signs shall comply with the requirements for road signing, Traffic Engineering Manual Vol 2 Road Signs-Specifications and where traffic lanterns aspects or electronic signs are proposed shall comply with TCS 038-Traffic Signal Lanterns and TCS042- Internally Illuminated Message Signs Generic.
- 1.3.4 Each of the OVDS components shall have a design life of not less than 10 years. Support infrastructure shall be designed for a minimum 25 year design life.

## **1.4 INTELLECTUAL PROPERTY**

- 1.4.1 In relation to all Intellectual Property used in/or to operate the system, the manufacturer shall grant to DoT non-exclusive licence to use or provide to DoT authorised contractors any and all software, firmware or programs required to operate and maintain the OVDS and its components that without the licence, could be breach of the licensors Intellectual Property.
- 1.4.2 Intellectual Property shall include, but not be limited to, the following:
- Software
  - Source code(s)
  - Schematic diagrams
  - Circuit diagrams
  - Wiring diagrams
  - Listings of components and sub-components
  - Any and all operational and maintenance documentation

## **1.5 PRODUCT ACCEPTANCE**

- 1.5.1 The following equipment shall be accepted for use:
- height detector shall be accepted for use and listed in TCG 018
  - internally illuminated signs shall be supplied by and SOED pre-qualified contractor
  - flashing lanterns shall type approved traffic signal aspects
  - the over-height vehicle detector controller be accepted for use and listed in TCG 018
- 1.5.2 To obtain DoT (Roads) 'Product Acceptance' the supplier must submit evidence of compliance in accordance with Appendix E of this specification.
- 1.5.3 Compliance with this version of this specification and subsequent DoT (Roads) Acceptance does not constitute automatic approval against future versions of this specification.
- 1.5.4 Where it is considered necessary, Dot (Roads) may withdraw current Product Acceptance and request that the affected product be re-submitted for evaluation against future versions of this specification.

## 1.6 ACRONYMS

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

AC	Alternating Current
ACMA	Australian Communications and Media Authority
AS	Australian Standard
AS/NZS	Australian Standard / New Zealand Standard
ANSI	American National Standards Institute
ELV	Extra Low Voltage (42V AC)
EMC	Electromagnetic Compatibility
IP	Internet Protocol
ITS	Intelligent Transport Systems
LED	Light Emitting Diode
LV	Low Voltage (240V AC)
NATA	National Association of Testing Authorities
NEMA	National Electrical Manufacturers Association
NTP	Network Time Protocol
OHVD	Over height vehicle detector
OVDS	Over height vehicle detection and warning system
PE Cell	Photo Electric Cell



## SECTION 2 RELATED SPECIFICATIONS AND DRAWINGS

### 2.1 AUSTRALIAN STANDARDS

2.1.1 Subject to the following clauses, the fabrication and supply of all components for traffic signal lanterns shall fully comply with the most recent issue of the Australian Standards listed below, together with any amendments to these standards.

2.1.2 The following related Australian Standards are referenced:

AS 2144	Traffic Signal Lanterns
AS 2339	Traffic Signal Posts, Mast Arms and Attachments
AS/NZS 3000	Wiring Rules
AS 60038	Standard Voltages
AS/NZS 1170.2	Structural design actions - Wind actions
AS 1743	Road signs – Specifications
AS 3100	Approval and test specification–General requirements for electrical equipment
AS 60038	Standard Voltages
AS 60529	Degrees of protection provided by enclosures (IP code)
AS/NZS 61000.6.1	Part 6.1: Generic Standards – Immunity for residential, commercial and light –industrial environments
AS/NZS 61000.6.3	Part 6.3 - Generic Standards – Emission Standard for residential, commercial and light-industrial environments.
AS 1742.2	Manual of uniform traffic control devices, Part 2: Traffic control devices for general use
AS/NZS 61000.6.1	General Standards – Immunity for residential, commercial and light industrial environments
AS/NZS 61000.6.3	General Standards – Emission standard for residential, commercial and light industrial environments
AS 4509	Stand-alone power systems safety and installation
AS 4086	Secondary batteries for use with stand-alone power systems

### 2.2 DOT (ROADS) SPECIFICATIONS

2.2.1 The fabrication and supply of all components shall conform to the relevant DoT (Roads) specifications, and related specifications and standards, as indicated throughout this document.

2.2.2 The following DoT (Roads) Specifications are referenced:

Contract Standard Section 732	ITS Devices Installation
Contract Standard Section 736	ITS device testing and integration.
Contract Standard Section 733	Conduits and pits for Underground Wiring and Cabling
TCS 042	Supply and Installation of Generic Internally Illuminated Message Signs
TCG 016	Product Compliance Process for ITS and Electrical Products
TCN 011	Modems for ITS devices
TCS 038	Traffic Signal Lanterns
TCS 061	ITS Field Cabinet

2.2.3 The following additional documents are referenced:

Transmax	STREAMS Modbus Interface for Simple Devices-Device Technical Guide
Transmax	STREAMS Modbus Interface for Simple Devices-Device Product Guide

## 2.3 DOT (ROADS) STANDARD DRAWINGS

The following DoT (Roads) Standard drawings are referenced:

TC-2230	Single type ITS field cabinet foundation
TC-1127	Visor Types and Dimensions

## 2.4 ADDITIONAL SPECIFICATIONS

2.4.1 The fabrication and supply of all components shall conform to the following specifications and drawings as indicated throughout this document.

2.4.2 The following specifications are referenced:

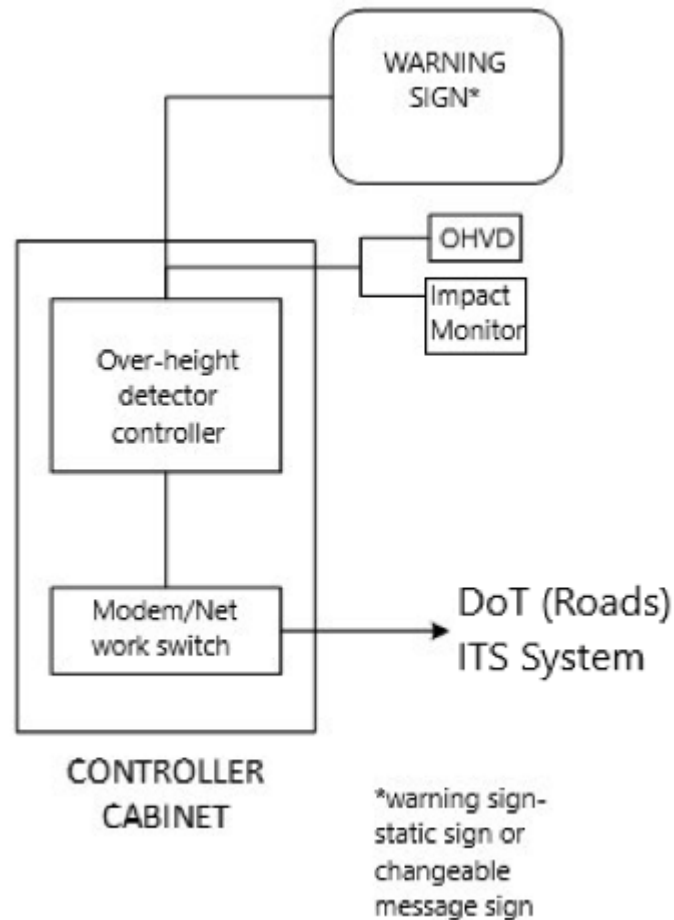
Austrroads	Guide to Traffic Management Part 10: Traffic Control and Communication Devices, Section 5 Electronic Signs
BTN 2010/001	DoT (Roads) Bridge Technical Note BTN 2010/001 November 2010 Design of Steel Cantilever and Portal Sign Structures and High Mast Light Poles
IEEE 802.3	IEEE Standard for Information Technology – Specific Requirements: Part 3

## SECTION 3 SYSTEM FUNCTIONAL OVERVIEW

### 3.1 GENERAL

- 3.1.1 The over-height detection system shall operate as an autonomous system.
- 3.1.2 Monitoring of the OVDS shall be via AMCS or STREAMS, as specified in each individual tender documents. Refer to Appendix A and Appendix B.
- 3.1.3 In addition to STREAMS or AMCS, all systems functionalities shall be accessible via web interface using a standard browser.
- 3.1.4 An OVDS, needs to comprise modular components which includes:
- Controller
  - Over Height Vehicle Detector
  - Warning sign to alert road users
  - Impact monitoring device

These components, illustrated in Figure 3.1, shall carry out the functionality described in this section.



**Figure 3.1 - Typical System Layout**

### 3.2 CONTROLLER

- 3.2.1 The controller shall support the connectivity of multiple detector inputs and support outputs to multiple warning signs.
- 3.2.2 The controller shall be capable of interfacing with traffic signal controller and/or boom gate barriers by the means of two dry contact outputs.
- 3.2.3 The controller shall be capable of connecting DoT (Roads) ITS System as detailed in Appendix A or Appendix B and specified in each tender document.
- 3.2.4 The controller shall be capable of having operating firmware upgraded remotely via the DoT (Roads) ITS System.

### 3.3 OVER HEIGHT VEHICLE DETECTOR (OHVD)

The OHVD shall be capable of:

- a) being installed at site prescribed heights.
- b) reporting device faults as per table D1, Appendix D.
- c) determining the direction of travel of an over height vehicle.
- d) detecting a vehicle at speed between 5km/hr and 120km/hr in any of the traffic lanes in the direction of travel.
- e) detecting objects with a diameter of 25mm or an equivalent surface area of 429mm<sup>2</sup>

### 3.4 IMPACT MONITOR DEVICE

- 3.4.1 The impact monitor device shall be capable of detecting vehicle collisions with the structures protected by the OVDS.
- 3.4.2 The impact monitoring device shall be capable of reporting device faults as per table D1, Appendix D.
- 3.4.3 The impact monitoring device shall provide a calibration function to eliminate false activations caused by the dynamic vibrations of the protected structure.

### 3.5 WARNING SIGNS

#### 3.5.1 General

Warning signs shall comply with the following requirements:

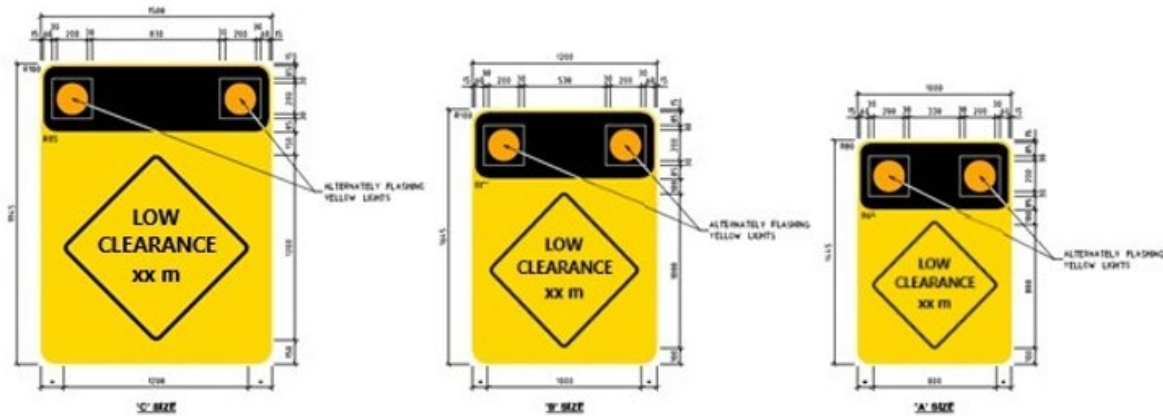
- a) Be located at a suitable distance downstream from the OHVD in order that the warning message and a suggested alternate route for over height vehicles can be clearly displayed in a timely manner.
- b) The sign shall be mounted in such way that it is clearly visible to approaching traffic. The sign may be mounted on a mast arm or other suitable structure.
- c) The communication between the over-height detector controller and warning sign can be either wired or wireless. Where wireless communication is used it shall be licence free.
- d) The warning message should be conveyed to drivers via one of the two methods described in clause 3.4.2. The requirements of the warning sign type shall be described in individual contract documents.

#### 3.5.2 Static signs

The static signs shall comply with the following requirements:

- a) The warning message can be displayed using a static sign active advance warning sign that complies with DoT (Roads) active advance warning sign (W3-V109) as shown in Figure 1 below.
- b) The size of the sign shall suit the posted approach speed.
- c) The yellow traffic signal displays shall flash alternately, the number of cycles per minute shall be between 50 and 60.

- d) Each sign shall include two yellow signal aspects with both lanterns with Type 1 “open” visors in accordance with DoT (Roads) standard drawing TC-1127.
- e) Lanterns and flasher operating voltage can be ELV or LV.
- f) The controller shall be capable of verifying the operation of the flasher and lanterns by current monitoring and report faults as per table D1.



**Figure 3.2: Typical Static “Over height” Warning Sign**

### 3.5.3 Changeable message signs

- 3.5.3.1 The warning message can be displayed using an internally illuminated electronic sign complying with TCS 042 – Supply and Installation of Generic Internally Illuminated Message Signs.
- 3.5.3.2 A CMS should comprise two separate displays that, when activated, flash alternately. A typical CMS display is shown in Figure 3.3 below.
- 3.5.3.3 A typical flash rate for a CMS would be as shown in Table 3.1 below.

Message 1	Blank	Message 2	Blank
1-1.5 seconds	0.1-0.5 seconds	1-1.5 seconds	0.1-0.5 seconds

**Table 3.1: Typical Message Flash Rate**



**Figure 3.3: Typical Messages**

The CMS sign shall be capable to confirm its activation with the over height detection controller, any sign related faults shall be reported as per Appendix D, table D1.

## SECTION 4 MECHANICAL REQUIREMENTS

### 4.1 GENERAL

- 4.1.1 The design and construction of all structural steel work shall ensure compliance with the required design life specified in AS4852.1, Clause 2.2.
- 4.1.2 Changeable Message Signs shall conform to the relevant requirements of DoT TCS 042 Internally Illuminated Message Signs Generic.

### 4.2 SIGN ENCLOSURE

- 4.2.1 The general construction requirements for the sign shall comply with AS 4852.1, Section 3.1.
- 4.2.2 The surface finish of the rear of the sign enclosure shall be matt grey in accordance with AS 4852.1, Clause 3.1.2.
- 4.2.3 Access doors shall be hinged left or right in accordance with AS 4852.1, Clause 3.1.4.
- 4.2.5 Where required by the sign manufacturer, facility to adjust the angle of the mounted sign shall be provided in accordance with AS 4852.1, Clause 3.1.6.
- 4.2.6 The sign enclosure is not required to be provided with a visor.

### 4.3 ROADSIDE CABINET

- 4.3.1 A roadside cabinet will typically be provided in accordance with AS 4852.1, Clause 3.2.
- 4.3.2 Preference is for a pole mounted cabinet on the support structure for termination of incoming mains power and communications (where required) and to provide a connection for local control. The pole mounted shall comply with the relevant of TCS 061 ITS Field Cabinet.
- 4.3.3 Where required, a ground mounted roadside cabinet shall be provided to comply with TCS 061 ITS Field Cabinet.
- 4.3.4 Ground mounted cabinets shall be installed on a foundation in accordance with standard drawing TC-2230.
- 4.3.5 A facility switch function shall be provided internally in the cabinet by manual switch or software switch. A physical facility switch accessible from the exterior of the cabinet shall not be provided.
- 4.3.6 A double socket outlet within the sign enclosure shall be provided for test equipment and other required sign use in accordance with AS 4852.1, Clause 3.1.5.

#### **4.4 SIGN SUPPORT STRUCTURE AND ASSOCIATED FOOTING**

4.4.1 The sign support structure may be required to be supplied and installed as part of the works or may be provided by others.

4.4.2 Details of the requirements for supply and installation of the sign support structure shall be provided in individual contract documents.



## SECTION 5 ELECTRICAL REQUIREMENTS

### 5.1 GENERAL

- 5.1.1 The OVDS shall typically be designed to operate on Mains Supply. All wiring shall comply with AS/NZS 3000.
- 5.1.2 The mains supply voltage shall be deemed to be 230VAC +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 within  $\pm 15\%$  (percent).
- 5.1.3 The requirements for the power supply shall be detailed in individual tender documents.
- 5.1.4 All cables and wires shall be insulated with a material not inferior to V-90 grade PVC and shall be suitably labelled.
- 5.1.5 Where alternative power supply is required, such as solar power, details shall be specified in individual tender documents. Solar power systems shall be designed in accordance with AS 4509.2, AS 4086.1 and AS 4086.2. Standalone solar powered systems shall include battery backup capable of maintaining normal operation during periods of minimum solar irradiance for a minimum period of 5 days.

### 5.2 OVDS HOUSED WITHIN AN ITS CABINET

- 5.2.1 Where an OVDS is installed within an ITS field cabinet, it shall be designed to fit into a standard 19 inch rack mount system in accordance with TCS 061 ITS Field Cabinet.

### 5.3 STANDALONE ENCLOSURE

- 5.3.1 Where the OVDS is housed within a standalone enclosure (pole mount cabinet or roadside cabinet), the electrical system shall incorporate the following facilities:
  - a) A circuit-breaker board comprising appropriately rated mains isolation switch and circuit breaker(s) to operate and protect the expected load; and
  - b) The ability to isolate the OVDS from mains supply at ground level using a suitable isolator switch/circuit breaker system.
- 5.3.2 All socket outlets shall be hardwired to a dedicated residual current device (RCD) circuit breaker.
- 5.3.3 All electrical equipment circuitry and wiring shall comply with the safety requirements of applicable Australian Standards.

## 5.4 INTERNAL PROTECTION

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

- a) Lightning striking at or near installed equipment and structural support;
- b) Electrical transients on power and communication cabling;
- c) Radio frequency interference;
- d) Static electrical discharge; and
- e) Any harmonics by the above and any equipment in the cabinet.

5.4.2 Protection shall be provided on both the electrical and communications inputs to all equipment.

## 5.5 ELECTROMAGNETIC COMPLIANCE (EMC)

5.5.1 All equipment covered by this specification shall comply with EMC requirements as specified in AS 4852.1, Clause 4.5.

5.5.2 It should also comply with the relevant requirements of the Australian Communications and Media Authority (ACMA) for EMC and shall be labelled with a conforming RCM compliance label as shown in Figure 5.1.



Figure 5.1 - RCM compliance label

## 5.6 COMMUNICATIONS EQUIPMENT

5.6.1 Modems shall meet the requirements of Technical Notice TCN 011 and be 'accepted' for use by DoT.

5.6.2 The type of modem to be used shall be specified in individual contact documents.

5.7.3 Typical communication equipment types used for OVDS include 4G, ADSL and fibre-optic.

## SECTION 6 SYSTEM REQUIREMENTS

### 6.1 GENERAL

- 6.1.1 All new installations shall be connected to the DoT (Roads) ITS Platform as described in Appendix A or Appendix B.
- 6.1.2 The OVDS shall be covered by all relevant approvals required by the Australian Communications and Media Authority (ACMA) for telecommunications equipment. A copy of approval certifications shall be provided to VicRoads upon request.

### 6.2 ITS COMMUNICATIONS PLATFORM

All OVDS shall be fully compatible with DoT (Roads) ITS System (See Appendix A and Appendix B).

### 6.3 SECURITY

- 6.3.1 VicRoads communications network must conform to the DoT (Roads) Information Security Policy at all times.
- 6.3.2 All OVDS shall be fully compliant with DoT (Roads) communications security requirements.

### 6.4 DATA TRANSMISSION

In general, each OVDS shall be capable of transmitting data via a TCP/IP compatible network link, such as ADSL or Telstra NextG wireless or fibre optic cable connection to DoT (Roads) ITS System.

### 6.5 TIME ACCURACY

- 6.5.1 The OVDS controller shall be able to synchronise its internal clock with DoT (Roads) provided NTP server via NTP protocol.
- 6.5.2 All data shall be time stamped in milliseconds.

### 6.6 CONFIGURATION

- 6.6.1 Configuration tools/software shall be provided by the manufacturer.

6.6.2 The configuration tools/software shall enable configuration of device parameters and detection layout via IP network.

6.6.3 The configuration tools/software shall operate correctly on DoT (Roads) standard operating environment.

## **6.7 FAULT REPORTING`**

6.7.1 The OVDS shall monitor the fault status of the roadside data station including each warning sign and detection device and provide fault information to DoT (Roads) ITS System.

6.7.2 All faults shall be detected and logged for reporting within 3 seconds of the fault occurring.

## **6.8 PERFORMANCE REQUIREMENTS**

### **6.8.1 General**

Each OVDS shall:

- Provide continuous monitoring 24 hours a day;
- Operate in all light and weather conditions, including adverse weather conditions such as rain and fog;
- Operate in ambient temperature range of -15°C to +55°C; and
- Communicate using DoT (Roads) ITS System.

### **6.8.2 Data Accuracy**

Data accuracy shall be measured during testing and commissioning to demonstrate that no false detections are recorded.

## SECTION 7 OPERATION AND CONTROL

### 7.1 GENERAL

7.1.1 OVDS shall be operated and controlled locally via the OVDS controller.

7.1.2 The OVDS controller shall:

- Receive inputs from each warning sign, OHVD and impact monitoring device;
- Activate/deactivate the associated warning signs;
- Activate/deactivate outputs as required;
- Log all fault notifications;
- Create all required alarms as specified in Appendix D, Table D1; and
- Communicate with DoT's AMCS or STREAMS, as specified in each tender document.

7.1.3 The OVDS system operation shall be capable of remote monitoring via a secure web interface using a standard browser over DoT's VPN.

7.1.4 In addition to the above web-based monitoring, remote monitoring of the OVDS shall be via VicRoads AMCS or STREAMS as specified in each tender document.

7.1.5 The OVDS controller shall be capable of being "restarted" remotely using the web interface in the event of a controller failure.

7.1.6 In the event of a detector failure the output to the OVDS controller shall be in the off state and it shall flag a detector fault.

7.1.7 Should the over height detector be stuck on for a period of 30 to 300 seconds the controller shall report a detector alarm, the time period is to be configurable from the controller firmware.

### 7.2 WEB INTERFACE

7.2.1 The controller supplier /manufacturer shall provide a Web interface using a standard internet browser via a GUI for remote monitoring.

7.2.2 The Web interface shall enable the remote:

- a) Monitoring of the OHVD operation in real time;
- b) Monitoring of the activations warning sign, detection and impact monitoring in real time;  
and
- c) Access to view and download fault and operational logs.

7.2.3 Access though the Web interface shall meet all DoT security requirements and require a username and password for access.

### **7.3 MONITORING**

- 7.3.1 It shall be possible to monitor the live status and activation of the OVDS remotely via the web interface as detailed in Clause 7.2 above.
- 7.3.4 It shall be possible to monitor the live status and activation of the OVDS remotely via AMCS or STREAMS and the system shall operate according to the details in Appendix A or Appendix B.
- 7.3.5 The controller shall provide status information to the monitoring system for all devices as specified in Appendix D.

### **7.4 LOGGING**

- 7.4.1 The controller shall provide internal fault logging for all device failures, as specified in Appendix D, with a minimum history of 30 days.
- 7.4.2 Additionally, the controller shall provide event logging, including detections and activations in accordance with Appendix D, with a minimum history of 30 days.
- 7.4.3 The controller shall store all the historical logs. If the storage memory becomes full, the controller shall delete the oldest records to free up space for the new records as required.
- 7.4.4 The logs shall be capable of download via web browser either through a local or secure remote connection. The download of the logs shall be in CSV format.
- 7.4.5 The OVDS shall provide an ethernet interface whereby a laptop can be connected to allow as user access to the system status and logs.
- 7.4.6 Access to the device configuration, status and logs shall be secured with usernames and passwords.

## SECTION 8 DOCUMENTATION

### 8.1 DOCUMENTATION

The following shall be supplied with every VMS in both hard copy and soft copy:

- a) Overview of the sign design and layout.
- b) Overview of the sign software.
- c) Full documentation of the sign software and firmware.
- d) Structural drawings.
- e) Complete wiring diagrams.
- f) List of all major components and sub-components.
- g) Operation and maintenance manual including routine maintenance requirements and fault-finding methodology.
- h) Proposed maintenance plan.
- i) Recommended list of spare parts for maintenance.

## SECTION 9 INSTALLATION AND COMMISSIONING

### 9.1 GENERAL

All works associated with pre-installation testing, installation and commissioning shall be carried out in accordance with the requirements of individual contract documents, Standard Sections 732 and 736, and this specification.

### 9.2 PRE-INSTALLATION TESTING

9.2.1 Prior to installation of the OVDS in the field, all required pre-installation testing shall be carried out in accordance with Standard Section 736.

9.2.2 The above pre-installation tests shall include the following:

- a) Factory acceptance test (FAT) in accordance with 736.07(b).
- b) Off-site Proof of Performance Testing (Pre-POP) in accordance with 736.07(c).
- c) Off-site Subsystem Integration Testing (Pre-SIT) in accordance with 736.07(d).

### 9.3 INSTALLATION

The Contractor shall carry out all works necessary for the proper installation and operation of the OVDS in accordance with individual contract documents, this specification and Standard Section 732, including communication with the DoT (Roads) ITS platform.

### 9.4 MAINS POWER SUPPLY

The contractor shall submit all necessary paperwork to the appropriate electrical distribution company and provide copies to DoT (Roads).

### 9.5 COMMUNICATIONS

On receipt of clearance from the communication provider, the contractor shall connect the communication line to the OVDS.



## 9.6 PRE-COMMISSIONING

Following the installation of the system, the following pre-commissioning tests shall be carried out.

- a) Confirm all site setting parameters have been implemented and recorded.
- b) Electrical testing in accordance with AS/NZS 3000.
- c) Beam height measured and recorded.
- d) Tests on the detector beam to confirm correct operation with varying sizes of objects.

## 9.7 COMMISSIONING

9.7.1 The commissioning and post-installation tests in accordance with Standard Section 736 as follows:

- (a) Proof of Performance Testing (POP) in accordance with 736.07(f).
- (b) Subsystem Integration Testing (SIT) in accordance with 736.07(g).
- (c) System Acceptance Testing (SAT) in accordance with 736.07(h).
- (d) Integration Testing in accordance with 736.09.
- (e) Operational Performance Testing (OPT) in accordance with 736.07(i).

9.7.2 The contractor shall supply and install the cabinet label, conforming to standard drawing TC-2100 (complete with the site number as specified by DoT) to the roadside cabinet.

9.7.3 The contractor shall supply and install a pole label, conforming to standard drawing TC-2104 (complete with the site number as specified by DoT) to the sign support structure.



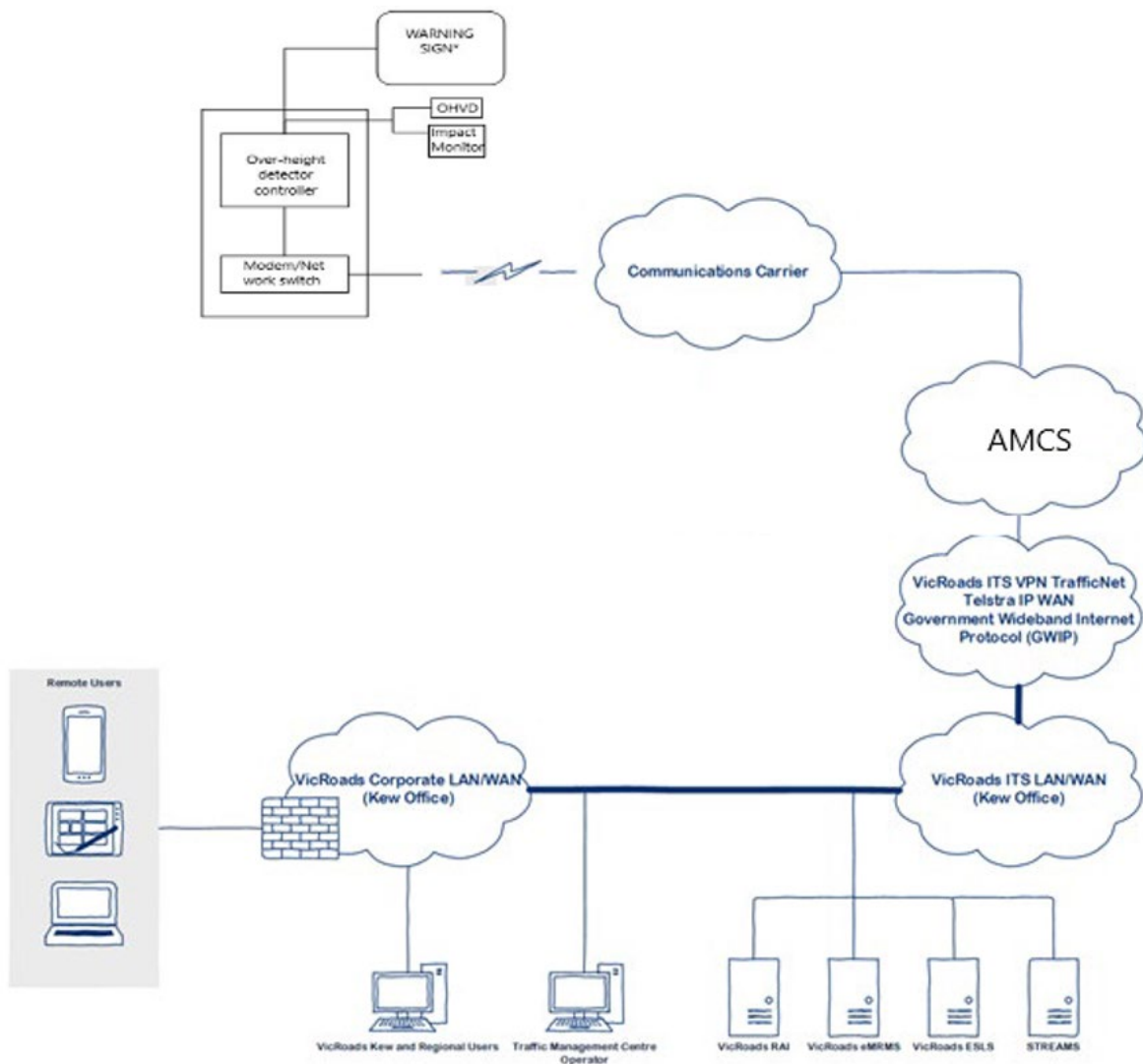
## APPENDIX A – DOT (ROADS) ITS PLATFORM -AMCS

(Informative)  
 (System not in use at time of publishing)

### A.1 General

A1.1 To enable the remote monitoring of the OVDS, the controller shall be fully compatible with VicRoads AMCS.

A1.2 VicRoads current AMCS platform is Traffic Technologies TST. See Figure A1 below.



**Figure A1 – OVDS AMCS System**

## **A2 OVDS Controller**

- A2.1 The over height detector controller shall be connected to VicRoads AMCS via a 4G modem or a network switch.
- A2.2 The OVDS controller will provide an output to AMCS via 4G modem or network switch/DoT (Roads) network.

## **A3 Monitoring Requirements**

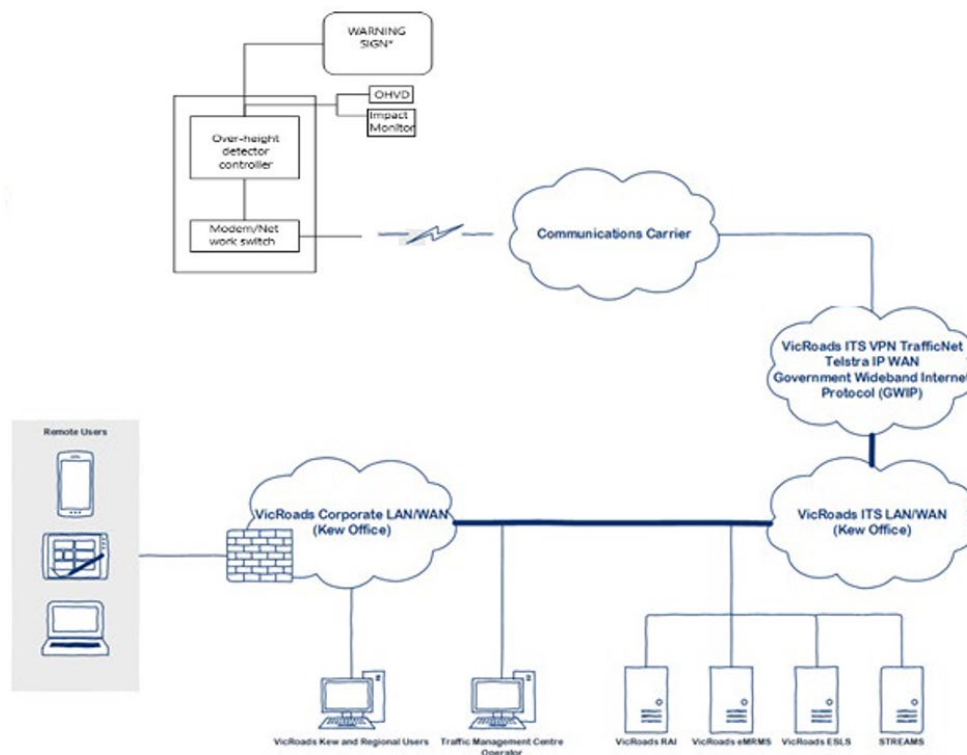
- A3.1 The over height system detector and impact monitoring device shall provide an input into the OVDS controller to indicate an over height vehicle.
- A3.2 The OVDS controller will then provide an event update to VicRoads AMCS via the 4G modem or network switch/DoT (Roads) network.

## APPENDIX B – DOT (ROADS) ITS PLATFORM - STREAMS

(Informative)

### B.1 General

- B1.1 The DoT ITS platform currently uses the STREAMS system to monitor OHVD controllers connected to the DoT communication network. See Figure B1 below.



**Figure B1 – OVDS STREAMS System**

- B1.2 Communication between STREAMS and the OVDS controller shall be via Transmax “Modbus Interface for Simple Devices”.
- B1.3 Detail of device monitoring (both the Modbus Server and the connected system), sensor readings, discrete inputs and logging shall be provided by DoT
- B1.4 Modbus Interface for Simple Devices “Device Technical Guide” and “Device Product Guide” are available from Transmax for additional details.

## APPENDIX C - GENERAL REQUIREMENTS FOR TESTING

(Informative)

### C1 General

This Appendix is included to provide a summary of the testing that is required for OVDS and at what stage testing and test results are required.

For details of the tests see the references provided.

### C2 Tests required as part of type approval submission

The following tests and associated test reports are required to be submitted as part of any submission of a OVDS for evaluation for DoT (Roads) type approval.

Test Type	References
EMC	AS 4852.1, Section 6 Section 6.5 of this specification
Environmental	AS 4852.1, Section 6
VicRoads STREAMS or AMCS compatibility	Appendix A or Appendix B of this specification

### C3 Pre-installation integration testing

The following testing is required to be carried out as part of pre-installation integration testing.

Test Type	References
FAT	Standard Section 736.07(b)
Pre-POP	Standard Section 736.07(c)
Pre-SIT	Standard Section 736.07(d)

**C4 Post-installation integration testing**

The following testing is required to be carried out as part of the post-installation integration testing.

<b>Test Type</b>	<b>References</b>
POP	Standard Section 736.07(f)
SIT	Standard Section 736.07(g)
SAT	Standard Section 736.07(h)

**C5 Operational performance testing**

The following testing is required to be carried out during the first 90 days of operation as part of the post-installation operational performance test.

<b>Test Type</b>	<b>References</b>
OPT	Standard Section 736.07(i)

## APPENDIX D – FAULT NOTIFICATION AND LOGGING

### D1 OVDS Controller

D1.1 The controller module shall log:

- a) All warning sign fault notifications complete with the unique sign ID.
- b) All warning sign activations/deactivations complete with the unique sign ID.
- c) All over-height vehicle detector fault notifications complete with the unique sign ID.
- d) All over-height vehicle detector activation/deactivations complete with the unique detector ID.
- e) All faults reported by the impact monitor.
- f) All activations reported by the impact monitor.
- g) All faults reported by the controller.
- h) All event logs reported by the controller.

D1.2 All fault notifications and event logs shall be date/time stamped and stored internally by the OVDS controller.

D1.3 The controller shall send the fault notifications detailed in table D1 to DoT (Roads) ITS System.

D1.4 The controller shall send all event logs to DoT (Roads) ITS System.

### D2 Over height vehicle detector

D2.1 All over-height detector activations/deactivations and fault alarms shall be sent to the OVDS controller.

D2.2 The OVDS controller shall log all over-height activations/deactivations received for all detectors complete with a date/time stamp and unique detector ID.

D2.3 The OVDS controller shall log the “on-time” and “off time” for each detection.

### D3 Warning Sign

D3.1 All warning sign activations/deactivations and fault alarms shall be sent to the OVDS controller.

D3.2 The OVDS controller shall log all warning sign activations/deactivations received for all signs complete with a date/time stamp and unique sign ID.

D3.3 The OVDS controller shall log the “on-time” and “off time” for each warning sign.

### D4 Impact monitor device

D4.1 All impact monitor device activations and fault alarms shall be sent to the OVDS controller.

D4.2 The OVDS controller shall log all impact monitor activations received for all signs complete with a date/time stamp and unique device ID.

## D5 Fault Notifications

The OVDS controller shall provide the alarms detailed in Table D1 to DoT (Roads) ITS System (AMCS or STREAMS as applicable).

Entry	Description	AMCS Alarm
<b>Controller faults</b>		
Watchdog or processor fail	Sign has failed and/or sign has blanked	Controller fault
Door open	Controller door is open	Controller door open
Solar panel failure**	Solar panel has failed	Controller power fault
Battery low**	Battery has 24 hours charge left	Controller battery low
Battery failure**	Battery has failed	Controller battery fault
Solar panel tilt**	Solar panel has tilted	Solar tilt fault
<b>Warning Sign Alarms</b>		
Display shut down*	20% of the sign LEDs have failed and sign has shut down	Sign fault
Door Open*	Sign door is open	Sign door open
Sign post tilt*	Post has tilted	Sign tilt
Lantern failure (static signs only)	Lantern or flasher failed	Lanterns failed
<b>Detector Alarms</b>		
Over-height detector alarm	Detector has: -Stopped communicating with the controller -Has a permanent demand (more than 30 minutes on)	Over-height detector alarm
<b>Detector Alarms</b>		
Impact monitor device alarm	Impact monitor device failed	Impact monitor alarm

**Table D1- Alarms reported via DoT (Roads) ITS System**

\*- applicable for internally illuminated signs only

\*\*-applicable for OVDS controller solar supply only

## D6 Modbus Protocol Alarm Mapping – *STREAMS connection only*

The following clauses specify the ‘Alarm data format’ and ‘Alarm Formatting’ to be used for alarm reporting using the Modbus protocol.





## D6.1 OHVD Controller Alarms

Controller alarms shall be mapped in accordance with the Alarm Data format example below.

<b>Alarm Block Name:</b>	Controller Alarms
<b>Data Format:</b>	Alarm Block
<b>Read Address:</b>	1:l:0:1:120

<b>Alarm Mapping:</b>	<b>Bit Position</b>	<b>Alarm Text</b>
	0	Controller Fault
	1	Controller door open
	2	Controller power fault**
	3	Controller battery low**
	4	Controller battery fault**
	5	Solar panel tilt fault**

\*\*-applicable for OVDS controller solar supply only

## D6.2 Warning Sign Alarms

Warning Sign alarms shall be mapped in accordance with the Alarm Data format example below.

<b>Alarm Block Name:</b>	Warning Sign Alarms
<b>Data Format:</b>	Alarm Block
<b>Read Address:</b>	1:l:n*:1:120

<b>Alarm Mapping:</b>	<b>Bit Position</b>	<b>Alarm Text</b>
	0	Sign Fault
	1	Sign Door Open
	2	Sign Tilt
	3	Lanterns Failed

*n* – is the number assigned to the warning sign

### D6.3 Detector Alarms

Detector alarms shall be mapped in accordance with the Alarm Data format example below.

<b>Alarm Block Name:</b>	Detector Alarms
<b>Data Format:</b>	Alarm Block
<b>Read Address:</b>	1:l:m*:1:120

<b>Alarm Mapping:</b>	<b>Bit Position</b>	<b>Alarm Text</b>
	0	Detector 1 Alarm
	1	Detector 2 Alarm
	2	Detector 3 Alarm
	3	Detector 4 Alarm
	4	Detector 5 Alarm
	5	Detector 6 Alarm
	6	Detector 7 Alarm
	7	Detector 8 Alarm

*m – is the number assigned to the detector (overhead detector and impact monitoring device)*

## APPENDIX E - REQUIREMENTS FOR PRODUCT ACCEPTANCE

### E1 General

- E1.1 Internally Illuminated signs (CMS) and flashing lanterns are required to hold Type Approval, the OVHD Controllers for use on DoT projects are required to hold current DoT product acceptance.
- E1.2 The Product Compliance evaluation process shall be carried out in accordance with DoT Guideline TCG 016.
- E1.3 To enable assessment for the purpose of granting product acceptance, the manufacturer/supplier is to submit a formal request for each device type submitted, accompanied by the following:
- A complete working sample of the device.
  - An outline drawing showing the general presentation and overall dimensions of the complete device.
  - Documentation to demonstrate that the device has been manufactured and supplied under an approved quality assurance system.
  - Documentation to demonstrate that the sign conforms to the requirements of DoT Specification. This may be by means of submitting test results from approved and appropriately qualified independent testing organisations or providing the manufacturer's assurance that the product complies with each paragraph of the specification, as appropriate.
  - Copies of any and all maintenance tools (i.e. software programs) required to maintain the device in the field and written permission for such tools to be provided to any authorised DoT contractor for the purpose of maintaining the device.

### E2 Required NATA Accredited Testing

- E2.1 Notwithstanding D1, the manufacturer/supplier shall submit test results from a NATA accredited testing organisation to demonstrate compliance with the following:

Requirements	Evidence
Temperature and humidity	Test Report
EMC Compliance	Test Report

*NOTE: Temperature and humidity test - The equipment, while in operation, shall withstand continuously for 72 hours at an ambient temperature of 50°C, and with 90% relative humidity, and with 1 kW/m<sup>2</sup> insolation applied to the maximum exposed surface, without any adverse effect to its operation. Where it is not practical to provide the required insolation during testing, it is acceptable to increase the upper ambient temperature limit by 10°C as substitute.*

- E2.2 The supplier shall provide evidence of compatibility for the specified control system.

### E3 Compatibility with DoT (Roads) AMCS/STREAMS

The supplier shall provide evidence of compatibility with DoT (Roads) AMCS or STREAMS as specified in each individual tender documents.

**E4 Other required Information**

For the supply of Illuminated Signs (CMS) confirmation that the manufacturer is on the DoT Register for the Pre-qualification for Supply of On-Road Electronic Devices (SOED).

**E5 Assessment Procedure**

E5.1 The assessment procedure for the product may include, but not limited to, the following:

- (a) Assessment of construction, workmanship and critical dimensions;
- (b) Preliminary assessment of the device under operation; and
- (c) Evaluation of the submitted data against the requirements of the specification.

E5.2 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 of the product.

E5.3 The supplier is to state whether tests carried out prior to formal submission were carried out on an identical sample of the product.

E5.4 DoT may require a trial installation of the sign to be undertaken.

**E6 Type Approval and Product Acceptance**

E6.1 The decision to grant a Certificate of Type approval and Product Acceptance is at the sole discretion of DoT.

E6.2 DoT may require additional information or testing to be carried out as part of its evaluation of the product.

E6.3 If the product is accepted, a Certificate of Product Acceptance will be provided to the supplier. Until such time as this Certificate is issued, the product is not to be used for DoT works.

E6.4 The manufacturer shall advise DoT in writing of any changes in hardware or firmware in relation to the accepted product, DoT reserves the right to review and approve/reject the design changes at DoT discretion.