

## SECTION 736 – TESTING AND INTEGRATION SYSTEMS

### 736.01 GENERAL

This specification provides details regarding the testing, integration and the maintenance handover that the Contractor shall complete.

The Testing, Integration and handover specification covers the following ITS devices;

- Freeway Ramp Signal Sites, including Freeway-to-Freeway Ramp Signals,
- Lane Use Management System;
- Variable Message Signs;
- Travel Time Signs;
- Freeway Data Stations and;
- CCTV Cameras.

Furthermore, certain ITS devices are considered a Major Traffic Control Device (MTCD), therefore, these devices are subjected to a **hold point** during the POP testing stage. This Hold Point is required to be released before the Contractor may continue.

### 736.02 ACRONYMS

AP	Access Point
CCTV	Closed Circuit Television
DGN	Microstation Drawing Format
DVMS	Digital Video Management System
FAT	Factory Acceptance Test
FDS	Freeway Data Station
FP	Field Processor
FRS	Freeway Ramp Signals
ITP	Inspection and Test Plan
ITS	Intelligent Transport Systems
LUMS	Lane Use Management System
LUS	Lane Use Sign
MTCD	Major Traffic Control Device
O&M	Operations and Maintenance
OPT	Operational Performance Testing
POP	Proof of Performance
RC1, RC2, RC3	Ramp Control Signs
RCB	Roadside Cabinet
ROI	Record of Inspection
SAT	System Acceptance Test
SIT	Subsystem Integration Test
TMC	Traffic Management Centre
VMS	Variable Message Sign

### 736.03 DEFINITIONS

Factory Acceptance Test (FAT)	Confirms that all functions that are required by VicRoads are delivered by the device or system in a standalone sample
Freeway Management Devices	Intelligent Transport Systems Devices and/or Freeway Management Devices.
STREAMS	VicRoads ITS platform
VicRoads O&M Contractor/Provider/ provider	Existing Operation and Maintenance Contractor for existing VicRoads Communications System

### 736.04 REFERENCED AND RELATED SPECIFICATIONS, STANDARDS AND DRAWING

All works associated with the Testing and Integration of all devices covered under this specification shall conform to all relevant VicRoads specifications, VicRoads Standard Contract Sections and Australian

Standards.

All works associated with the installation and commissioning of all devices covered under this specification shall conform to the general requirements of:

- (a) VicRoads 'TCS' series specifications
- (b) VicRoads 'TC' series standard drawings

The individual requirements of the Victorian Electricity Supply Industry (VESI) and the local electricity distribution business shall apply for matters relating to the provision of mains power.

Australian Standards referred to in this section are listed in Table 736.04.1 below.

**Table 736.04.1 List of Australian Standards**

Australian Standard	Title
AS/NZS 3000	Wiring Rules
ANS&G 2.2 Ed 1	First Edition – Replaces VicRoads Traffic Engineering Manual Volume 1 – Chapter 2 – Authorisation of Traffic Control Devices.

VicRoads Specifications and Technical Notes referred to in this section are listed in Table 736.04.2 below.

**Table 736.04.2 List of Specifications and Technical Notes**

Spec Number	Title
TCS 003	Supply of Ramp Control / Metering Signs
TCS 015	Variable Message Signs
TCS 037	Electronic Speed Limit Signs
TCS 048	Freeway Data Stations
TCS 056	Lane Use Signs
TCS 061	ITS Field Cabinet
TCS 063	Installation of Freeway Ramp Signals
TCS 067	Digital CCTV Camera
TCS 068	Over-height Detection System
TCS 069	Supply and Installation of Bluetooth Data Stations
TCS 070	Travel Time Signs

VicRoads Standard Sections referred to in this section are listed in Table 736.04.2 below.

**Table 736.04.3 List of Standard Sections**

Std Section	Title
730	Traffic Signal Installation
732	ITS Devices Installation
733	Conduits and Pits for Underground Wiring and Cabling
735	Communications Systems & Networks Installation

VicRoads Standard Drawings referred to in this section are listed in each device specific clause within this section.

*NOTE: VicRoads Standard Drawings, Specifications and Guidelines are available for downloading from*

VicRoads website.

### 736.05 Major Traffic Control Devices

Traffic control device (TCD) is a term that covers the traffic signs, road markings and traffic signals that are integral to the safe and efficient use of Victoria's roads. These devices establish and support the rules by which roads are used; conveying information to road users, making the roadway safe, and provide protection for vulnerable roads users.

Major traffic control devices (MTCD) place a significant and legally enforceable condition on what road users may do and/or can have a significant impact on the use of a road. For further information, refer to ANS&G 2.2 Ed 1 – First edition – replaces VicRoads Traffic Engineering Manual Volume 1 – Chapter 2 – Authorisation of Traffic Control Devices.

The following ITS devices are considered MTCD, and therefore;

#### THE HOLD POINT AT POP STAGE NEEDS TO BE RELEASED

**Table 736.05.1 List of ITS Devices that are Major Traffic Control Devices.**

ITS Devices	Description
Lane Use Signs	Device Number 7
RC1	Device Number 7
RC3	Device Number 7
Variable Message Sign	Device Number 7
FRS	Device Number 6

### 736.06 TESTING AND INTEGRATION PROCESS FOR DEVICES

In this section, the concept of Integration is describing the details regarding the VicRoads carries to support the Contractor during the Testing and Integration stage.

VicRoads manages the ITS Platform on which all ITS devices are configured and integrated in, to allow all authorised VicRoads Staff to access the devices where required.

The following section highlights each device and the process on how the device is tested and integrated highlighting the necessary inputs and outputs.

## 736.07 STAGES OF TESTING

### (a) General Testing Requirements

As a minimum the Contractor shall perform the testing specified in Section 736.07 for all devices. Tests that are not successfully completed shall require system modification and then retesting until all items are successfully tested. Electronic and hard copies of all testing and commissioning documents on freeway management devices installed by the Contractor shall be provided/delivered to the Superintendent.

### (b) Factory Acceptance Testing (FAT)

The purpose of FAT is to confirm that all functions that are required by VicRoads are delivered by the device or system in a standalone sample. FAT is completed in the factory before the equipment is shipped. FAT must be completed successfully before any material is delivered to the site and installed. FAT shall fully cover all requirements including those in all linked specifications.

- 1) *Applies to:*
  - All ITS Devices.
- 2) *Prerequisites:*
  - Superintendent approval of FAT Test Plans and Procedures
  - Appropriate notice of testing given
- 3) *Superintendent Responsibilities:*
  - Review Test Plans and Procedures
  - Witness FAT.
- 4) *VicRoads Responsibilities:*
  - Coordinate back-end system access
- 5) *Contractor Responsibilities:*
  - Develop Test Plans and Procedures
  - Perform FAT.
- 6) *Outputs:*
  - Completed FAT plan
  - Superintendent's confirmation of completed FAT plan.

#### **i. TIMEFRAMES**

Test Plans and Procedures shall be supplied at least six weeks before required testing. At least fifteen working days' notice shall be given with actual dates and times of the required testing.

### (c) Off-Site Proof of Performance Testing (Pre-POP)

This is completed for appropriate ITS devices prior to installation in the field. The purpose of the Pre-POP is to ensure that the equipment works locally prior to installation and that it continues to deliver the functionality that VicRoads requires. Pre-POP provides the opportunity for early identification of issues and to test a wide range of scenarios that may be difficult or time consuming to test in the field.

- i. Applies to:*
  - Primarily LUS, pre-mounted on a gantry
  - Potentially RC1
- ii. Prerequisites:*
  - FAT complete and confirmed complete by Superintendent (if applicable)
  - Superintendent approval of Pre-POP Test Plans and Procedures
  - Appropriate notice of testing given

- iii. *Superintendent Responsibilities:*
  - Review Pre-POP Test Plans and Procedures
  - Witness Pre-POP where appropriate
- iv. *Contractor Responsibilities:*
  - Develop Pre-POP Test Plans and Procedures
  - Perform Pre-POP
- v. *Outputs:*
  - Completed Pre-POP Test Plan
  - Superintendent confirmation of completed Pre-POP Test Plan
- vi. *Timeframes*

Test Plans and Procedures shall be supplied at least six weeks before required testing.  
 At least five working days' notice shall be given with rough times of the devices ready to be tested.  
 At least three working days' notice shall be given with actual dates and times of the required testing.

#### (d) Off-Site Subsystem Integration Testing (Pre-SIT)

This is performed once the Pre-POP is complete for appropriate ITS devices prior to installation in the field. The SIT is an end-to-end test from the central communications node out to the devices to confirm that the devices can be controlled from the central communications node. As the communication network used is not in its final state when off-site, this aspect is required to be verified in SIT. Pre-SIT provides the opportunity for early identification of issues and to test a wide range of scenarios that may be difficult or time consuming to test in the field.

- i. *Applies to:*
  - Primarily LUS, pre-mounted on a gantry
  - Potentially RC1
- ii. *Prerequisites:*
  - Pre-POP complete and confirmed complete by Superintendent
  - Device or system configured in VicRoads' back-end systems
  - Appropriate network configuration implemented
  - Appropriate notice of testing given
- iii. *Superintendent Responsibilities:*
  - Assist with Pre-SIT Test Plans and Procedures development
  - Assist with Pre-SIT
- iv. *VicRoads Responsibilities:*
  - Configure back-end systems
  - Assist with Pre-SIT
- v. *Contractor Responsibilities:*
  - Develop Pre-SIT Test Plans and Procedures
  - Timely provision of device and network configuration information
  - Lead Pre-SIT
- vi. *Outputs:*
  - Completed Pre-SIT Test Plan
  - Superintendent confirmation of completed Pre-SIT Test Plan
- vii. *Timeframes*

Test Plans and Procedures shall be supplied at least six weeks before required testing.  
 At least five working days' notice shall be given with rough times of the devices ready to be tested.  
 At least three working days' notice shall be given with actual dates and times of the required testing.

#### (e) Inspection Test

The purpose of inspection tests is to confirm the correctness of physical installation of devices and their

components complying to VicRoads design, functional and performance requirements. This test shall be done prior to POP test where applicable.

- i. Applies to:*
  - RCB
- ii. Prerequisites:*
  - Superintendent approval of ROI
  - Appropriate notice of testing given
- iii. Superintendent Responsibilities:*
  - Review Record of Inspection (ROI)
  - Witness inspection test where appropriate
- iv. Contractor Responsibilities:*
  - Develop ROI for physical installation
  - Conduct inspection test
- v. Outputs:*
  - Completed ROI
  - Superintendent confirmation of completed ROI
  
- vi. Timeframes*

ROI shall be supplied at least six weeks before required testing.

At least five working days' notice shall be given with rough times of the devices ready to be tested.

At least three working days' notice shall be given with actual dates and time of the required testing.

(f) Proof of Performance Testing (POP)

This is completed for each ITS device once it has been installed in the field. The purpose of the POP is to ensure that the equipment works locally once it has been installed and that it continues to deliver the functionality that VicRoads requires. POP shall fully cover all requirements that are testable without connection to the ITS LAN.

- i. Applies to:*
  - All ITS devices
- ii. Prerequisites:*
  - All applicable previous testing steps complete and confirmed complete by Superintendent
  - Superintendent approval of POP Test Plans and Procedures
  - Appropriate notice of testing given
- iii. Superintendent Responsibilities:*
  - Review POP Test Plans and Procedures
  - Witness POP where appropriate
  - Manage Hold Point for MTCD
- iv. Contractor Responsibilities:*
  - Develop POP Test Plans and Procedures
  - Perform POP
- v. Outputs:*
  - Completed POP Test Plan
  - Superintendent's confirmation of completed POP Test Plan
- vi. Timeframes*

Test Plans and Procedures shall be supplied at least six weeks before required testing.

At least five working days' notice shall be given with rough times of the devices ready to be tested.

At least three working days' notice shall be given with actual dates and times of the required testing.

## (g) Subsystem Integration Testing (SIT)

This needs to be completed for each ITS device once POP is complete. SIT is an end-to-end test from the central communications node out to the devices to confirm that the device control from the central communications node works as required. SIT shall fully cover all requirements at a device level that are testable with a connection to the ITS LAN.

- i. Applies to:*
  - All ITS devices
- ii. Prerequisites:*
  - All applicable previous testing steps complete and confirmed complete by Superintendent
  - Superintendent approval of POP Test Plans and Procedures
  - Device or system configured in VicRoads' back-end systems
  - Appropriate network configuration implemented
  - Appropriate notice of testing given
  - Approved Change Record
- iii. Superintendent Responsibilities:*
  - Assist with Test Plans and Procedures development
  - Assist with SIT
  - Release Hold Point
- iv. VicRoads Responsibilities:*
  - Configure back-end systems
  - Assist with SIT
- v. Contractor Responsibilities:*
  - Develop SIT Test Plans and Procedures
  - Timely provision of device and network Configuration Reports
  - Submit Change Record
  - Lead SIT
- vi. Outputs:*
  - Completed SIT Test Plan
  - Superintendent's confirmation of completed SIT Test Plan
  - Hold Point released
- vii. Timeframes*

Test Plans and Procedures shall be supplied at least six weeks before required testing.  
 At least five working days' notice shall be given with rough times of the devices ready to be tested.  
 At least three working days' notice shall be given with actual dates and times of the required testing.

## (h) System Acceptance Testing (SAT)

The System Acceptance Test (SAT) shall be completed by the Superintendent once all the field equipment SIT has been completed and devices integrated into the Control System. SAT is an end-to-end test that validates and verifies the functions of the software against the software requirements specified and demonstrates proper communication to each device.

- i. Applies to:*
  - LUS, VMS, FDS and FRS
- ii. Prerequisites:*
  - SIT testing of all devices under test complete and confirmed complete by Superintendent
  - Minimum allowed time since completion of SIT has elapsed
  - Approved Change Record
- iii. VicRoads Responsibilities:*
  - Develop SAT Test Plan and Cases
  - Prepare back-end systems

- Submit Change Record
  - Conduct SAT
- iv. *Superintendent Responsibilities:*
- Issue SAT Reports
- v. *Contractor Responsibilities:*
- Assist with SAT
- vi. *Outputs:*
- SAT reports
- vii. *Timeframes*

All associated SIT shall be completed at least five working days before respective SAT

(i) Operational Performance Testing (OPT)

For an installed device to pass Operational Performance Testing, the Contractor shall demonstrate that the installed device has been operational for 90 days without failure of any kind. If a fault does occur, the fault needs to be rectified, and the Operational performance Testing will restart from Day 1. The Contractor shall keep records, including the test plan and the commissioning date, which would support the Operational Performance Testing regime, for all installed devices. Operational Performance Testing shall not be completed and accepted until the Handover plan has been completed and accepted refer to clause 736.10(b)(iv).

- i. *Applies to:*
- All ITS devices
- ii. *Prerequisites:*
- SIT and SAT testing complete and confirmed complete by Superintendent
- iii. *Superintendent Responsibilities:*
- Review OPT Test Plans and Procedures
  - Assist with OPT
- iv. *VicRoads Responsibilities:*
- Prepare back-end systems (NMS)
  - Monitor OPT
  - Assist with OPT
- v. *Contractor Responsibilities:*
- Develop OPT Test Plans and Procedures
  - Complete OPT Reports
  - Complete and accepted Handover Plan (clause 736.10 (b) (iv))
- vi. *Outputs:*
- Completed OPT reports
  - Superintendent confirmation of completed OPT reports
- vii. *Timeframe*

Test Plans and Procedures shall be supplied at least six weeks before required testing.

### **736.08 SAT PLAN**

The Superintendent will develop a SAT Plan after understanding the detailed delivery strategy from the Contractor.

The Superintendent will issue a SAT report to the Contractor at the completion of testing to confirm all functionality and that the freeway management devices are ready. As it is noted that in some circumstances devices will be delivered to SAT stage at different dates and not as a complete package, this may require a SAT report for individual devices, or devices from a project section.

Successful passing of SAT shall require all tests to be passed to Superintendent's satisfaction.



## 736.09 INTEGRATION

Once the POP test and been completed and the associated hold point released for Major Traffic Control Devices, The Superintendent will organise for the devices to be integrated within the STREAMS system, which is the VicRoads ITS control platform. This Integration work is carried out Internally with VicRoads by Intelligent Transport Systems Operations Team.

The sections below show the process and works that VicRoads conducts to ensure seamless Integration of the device/s.

### (a) Variable Message Signs

The VMS process shown above starts with POP testing. During this Stage the contractor should test the VMS to ensure it is operational and that it meets the VicRoads standards.

#### *Inputs for Integration*

The inputs required for integration are as follows:

- i. Configuration Report for the Variable Message Sign.
- ii. Signed POP document with the signatures from the Contractor as well as the VicRoads Project Team.
- iii. A working and operational VMS which is connected the VicRoads Communication platform after the Network Access Switch or media converter has passed the SAT.

#### *Outputs for Integration*

- iv. A configured Variable Message Sign viewable within STREAMS.

#### *Timeframes*

Ten working days' notice is required with rough times of the devices is ready to be integrated.  
Three working days' notice with firm actual date and time of the required integration.

### (b) Closed Circuit Television

The CCTV process shown above starts with POP testing. During this stage the contractor should test the CCTV to ensure it is operational and that it meets the VicRoads Standards.

#### *Inputs for Integration*

The inputs required for integration are as follows:

- i. Configuration Report for the Closed-Circuit Television (CCTV)
- ii. Signed POP document with the signatures from the contractors as well as the VicRoads Project Team.
- iii. A working and operational CCTV which is connected the VicRoads Communication platform after the Network Access Switch or media converter has passed the SAT.

#### *Outputs of Integration*

- iv. A configured CCTV site controllable using PTZ commands (If not fixed), within STREAMS

#### *Timeframes*

Ten working days' notice is required with rough times of the devices is ready to be integrated.  
Three working days' notice with firm actual date and time of the required integration.

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(c) Freeway Data Station (SENSYS AND TIRTL)

The FDS process shown above starts with POP testing. During this stage the contractor should test the FDS to ensure it is operational and that it meets the VicRoads Standards.

*Inputs for Integration*

The inputs required for integration are as follows:

- i. Configuration Report for the Freeway Data Station (FDS)
- ii. Signed POP document with the signatures from the contractors as well as the VicRoads Project Team.
- iii. A working and operational FDS which is connected the VicRoads Communication platform after the Network Access Switch or media converter has passed the SAT.

*Outputs of Integration*

- iv. A configured FDS site data viewable within STREAMS

*Timeframes*

Ten working days' notice is required with rough times of the devices is ready to be integrated.  
Three working days' notice with firm actual date and time of the required integration.

(d) Lane Use Management Systems and Lane Use Signs

The LUMS process shown above starts with POP testing. During this stage the Contractor should test the LUMS to ensure it is operational and that it meets the VicRoads Standards.

*Inputs for Integration*

The inputs required for integration are as follows:

- i. Configuration Report for the LUS including the number of LUS on the gantry. Details about the field processor will be required. Details about the gantry whether it is a half carriage gantry, full carriageway gantry.
- ii. IFC design drawings. This is required to work out the lane arrangement for the TNS layer.
- iii. Signed POP document with the signatures from the contractors as well as the VicRoads Project Team.
- iv. A working and operational LUS which is connected the VicRoads Communication platform after the Network Access Switch or media converter has passed the SAT.

*Outputs of Integration Stage*

- v. A configured LUMS site within STREAMS

*Timeframes*

Fifteen working days' notice is required with rough times of the devices is ready to be integrated.  
Five working days' notice with firm actual date and time of the required integration as LUMS requires a large amount of complex configuration.

*Testing Requirements*

In addition to the testing requirements in Section 736.07 the Contractor shall incorporate the following items as a minimum:

- vi. POP
  - a. Display all frames stored in the sign as a minimum;

- b. Test all aspects of the Controller and communication with signs;
- c. Comprehensive testing from controller normally located in the field cabinet to signs on gantry or structure; and
- d. Ensure sign IDs are correct and signs centred over each lane.

#### vii. System Acceptance Testing (SAT)

The Contractor shall provide freeway closures as requested by the Superintendent to facilitate SAT testing. SAT testing shall only be conducted under full freeway closures. For POP and SIT, where MTCDs are being tested, the Contractor shall arrange for closures to facilitate the display of regulatory messages.

#### (e) Freeway Ramp Signals

A Freeway Ramp Signals site has a collection of ITS devices to come together to develop a unique system so that Freeway ramp signals can operation with intelligence. A freeway ramp signal measures, controls, and monitors the freeway traffic flow in order to operate the freeway in an optimal performance of traffic flow.

During this stage the Contractor should test the Freeway Ramp signals and all associated devices to ensure it is operational and that it meets the manufacturer and VicRoads Standards.

#### *Inputs for Integration stage*

The inputs required for integration are as follows:

- i. Configuration Report for the FRS which includes configuration details for the Field Processor, RC1 Signs, RC2 Signs, RC3 signs, Freeway Data Stations, CCTV cameras and any LUS and/or VSLs that may be applicable.
- ii. IFC design drawings. This is required to work out the lane arrangement for the TNS layer.
- iii. The Freeway Ramp signal plan.
- iv. Signed POP document with the signatures from the contractors as well as the VicRoads Project Team.
- v. A working and operational FRS which is connected the VicRoads Communication platform after the Network Access Switch or media converter has passed the SAT.

#### *The output of Integration Stage 2*

- vi. A fully configured Freeway Ramp Signal.

#### *Timeframes*

Fifteen working days' notice is required with rough times of the devices is ready to be integrated.

Ten working days' notice with firm actual date and time of the required integration as FRS requires a large amount of complex configuration.

#### *Testing Requirements*

In addition to the testing requirements of Section 736.07 the Contractor shall arrange for ramp closures to facilitate SAT testing of ramp signals. For POP and SIT, where MTCDs are being tested, the Contractor shall arrange for closures to facilitate the display of regulatory messages.

#### (f) Field Processors

Field Processors (FPs) provide a distributed processing capability and interface to connect other ITS devices to STREAMS.

##### i. Testing Requirements

The FP is implicitly and explicitly tested through the SIT, SAT and OPT of ITS devices that connect to STREAMS using an FP.

The Contractor is responsible for ensuring the FP is operational. VicRoads will provide reasonable assistance in configuring and testing the FPs as required by the Contractor.

## **736.10 MAINTENANCE REQUIREMENTS FOR HANDOVER TO VICROADS**

### **(a) General**

The maintenance handover process includes the documentation and VicRoads expectation during the end of testing, Integration and returning the new, upgraded and/or existing assets to VicRoads. The handover process is the final stage of the testing, integration and handover regime to ensure a seamless transition back to VicRoads.

### **(b) Handover Plan Acceptance**

- i. The Contractor will be required to provide to VicRoads a draft Handover plan at the time when Operational Performance Testing begins.
- ii. VicRoads will be given 30 days to review the draft handover plan and provide comments were required.
- iii. The Contractor will be required to update the draft Handover plan and provide a completed final version of the Handover plan at the end of Operational Performance Test (OPT).
- iv. OPT can be not completed and accepted until the Handover Plan is accepted by VicRoads.

### **(c) Handover Plan Documentation**

The Handover Plan Documentation should include but not limited to the following;

- i. Details of cabins and cabinets including function layouts and diagrams, internal electrical wiring details, communication details and a list of assets and IP addresses
- ii. Certificates of Electrical safety
- iii. List of Serial numbers of installed devices
- iv. Warranty information and installation dates for all equipment provided by the Contractor.
- v. FAT, Pre-POP, Pre-SIT, POP, SIT, SAT and OPT testing documentation. As part of POP testing documentation, The Contractor shall also include the following;
  - a. A completed devices commission report per-site
  - b. Screenshots of working site and network configuration page using the device management software
  - c. Configuration details.
- vi. Quality records, including details of the close out of non-conformances and corrective actions;
- vii. Completed details of all road safety audits, including details of the close out of issues identified;
- viii. OH&S audits;
- ix. Environment Audits
- x. A register detailing, memorandums of authorisation for permanent for permanent major traffic control items
- xi. All manuals and documentation required to be prepared by the Contractor;
- xii. In respect of each discrete part of the Utility Services Works, a copy of the written noticed from the relevant Authority, or determination of the Independent Reviewer;
- xiii. Technical details sheets of all material and products used, including details of relevant manufacture;
- xiv. A register containing, for each asset forming part of the returned works, details regarding ownership and maintenance responsibilities;
- xv. A register containing, for each asset component forming part of the Returned Works, inspection, maintenance and cleaning frequency, maintenance and cleaning instruction and any requirements for that asset component.

### **(d) Records and Documentation**

The information to be supplied by the Contractor in relation to the Major Traffic Control Devices elements of the Works shall including the following;

- i. The Contractor shall keep a record of the time and date of commencement of operation of Major Traffic Control Devices and any changes including commissioning, functional alternations or decommissioning.
- ii. A Certificate of Electrical safety for all Electrical Installation including road side cabinets, distribution cabinets, external and undergrounds conduits and pits in accordance with the Victorian Government Electrical Safety Act 1998 and Electrical safety (installations) regulations 1999, repairs or instatements works.
- iii. VicRoads will supply an Excel spreadsheet containing Road Asset Inventory (RAI) information for devices and cabinets that the Contractor shall be responsible for completing by supplying relevant details to the Superintendent. The unique RAI number shall be main identification used in all configuration documents, drawings and other associated records pertaining to that devices. Any changes to RAI numberings shall be only as per agreement with the superintendent, which agreement must be documented by the Contractor in the Approved Non-Conformance Register.

### 736.11 CHANGE AND INTEGRATION MANAGEMENT PLAN

In order to seek VicRoads' agreement to any proposal to interrupt the operation of any existing VicRoads freeway management system and/or device, including associated power and communications systems, the Contractor shall submit a Change and Integration Management Plan that describes, in detail, the Contractor's planned approach for the interruption. The plans shall be prepared and submitted to the Superintendent for review for each work package that will impact any existing operations.

#### (a) Business Impact

The following table outlines the proposed Maximum Acceptable Outage (MAO) and the Recovery Time Outage (RTO) for VicRoads critical business functions. All interruptions that do not meet the requirements of the MAO shall require a Change Request.

**Table 3160.11(a)**

Critical Business Function	Maximum Acceptable Outage*	Recovery Time Outage*	Change Approval Authority	Definition
VicRoads Central Communication System	0 hours	30 minutes (regardless of time of day)	Standard ITS Approvers	<p><b>Peak Period:</b> AM peak – 5:00 am to 10:00 am PM peak - 3:00 pm to 09:00 pm</p> <p>For MAO = 0 hours. The Service provided must not experience an outage. However this does not prevent the Contractor from proposing and providing alternate arrangements to maintain equivalent service during outages to service elements/assets.</p> <p><b>Standard ITS Approvers:</b> Team Leader Operations Management- ITS VicRoads Team Leader Project Delivery- ITS VicRoads Team Leader Traffic Management Centre- ITS VicRoads ITS Change Manager</p>
ITS software applications	0 hours	2 hours (regardless of time of day)		
Freeway Ramp Signal sites	0 hours during peak periods (AM/PM)	2 hours (regardless of time of day)		
VicRoads CCTV sites	1 to 2 cameras: 4 hours 3+ cameras: 0 hours	2 hours (regardless of time of day)		
EVSLs & LUS sites	0 hours during peak periods	2 hours (regardless of time of day)		
Traffic Management Centre	0 hours	30 minutes (regardless of time of day)	Manager-Traffic & Incident Management and Standard ITS Approvers	

\* Outages refer to disruptions to end user performance

#### (b) Change Requests

All changes planned by the Contractor that will or may impact on VicRoads ITS Services (including changes requested by VicRoads) must have a change request in the VicRoads Change Management System.

Change requests submitted by the Contractor will not be dealt with if there are insufficient details about the change to allow full and proper assessment. Where applicable, the change request must address

the following aspects:

- (i) Priority / change type;
- (ii) Business Purpose;
- (iii) Services affected directly and/or indirectly;
- (iv) Change implementer contact details
- (v) Users affected directly or indirectly;
- (vi) Assets affected directly and indirectly;
- (vii) Expected implementation date and time and details of any system/component outages; - including outage start date/time & end date/time.
- (viii) Implementation plan including responsibilities, notifications and escalations (including contacts and Name & Contact Number of Contractor's personnel performing change), environment(s), hardware requirements and lead delivery times;
- (ix) Technical and Business Risk analysis and mitigation;
- (x) Test plan and acceptance testing requirements;
- (xi) Back-out Conditions and Plans including Business Continuity Plan;
- (xii) Business Impact assessment
- (xiii) Associated changes;
- (xiv) Package and program details (especially for VicRoads created Change Requests);
- (xv) VicRoads contact and approver; and
- (xvi) Software Release Notes (if applicable)

(c) Types of Change Requests

Change requests must be classified with one of the following Change Class types. The Class needs to reflect the risk and timing of implementing the change and will determine the level of control, scrutiny, detail and planning that will be required:

**Normal:** Meets lead times for review and approval. Does not require prioritised treatment. This is the default class for most changes.

**Standard:** Pre-approved and pre-authorised change created from a template. No outage or service degradation, no impact to business, repeatable with no deviation.

**Emergency:** Required immediately to resolve a high priority (Priority 1 or 2) Incident or Problem.

Emergency changes and their impact should always be communicated to Change Management and the Service Desk.

To avoid any imminent or potential failure or to fix or mitigate an existing critical issue, the contractor may conduct an emergency change to fix the identified issue or problem. The details pertaining to the emergency change conducted must be later added to the VicRoads' Change Management system by the Contractor.

All the artefacts such as implementation plan, roll back strategy, test plan and description of the issue (in case of an emergency change) will have to be submitted in the Emergency Change Request.

**Expedited:** Requested by the VicRoads business to meet an urgent business need, where normal lead times cannot be met. Urgent justification must be provided

The Contractor will submit change requests as listed below prior to the earliest expected implementation date unless prior agreement is obtained from the Superintendent or unless the change is an emergency change as stipulated below in emergency changes.

(d) Lead times

Change Requests must be raised within the following lead times to allow adequate time for review, approval and communication:

- **Low priority change requests:** raised five days prior to implementation
  - **Medium priority change requests:** raised ten days prior to implementation
  - **High or Critical change requests:** raised twenty business days prior to implementation \*
- outage refers to disruptions to both end user performance as well as to key elements

Priority Matrix		Impact			
		1.Extensive / Widespread	2.Significant / Large	3. Moderate / Limited	4. Minor / Localized
Urgency	1.Critical	1	1	2	3
	2. High	1	2	3	4
	3.Medium	2	2	3	4
	4. Low	2	2	3	4

Change requests must be submitted prior to 10:00am on a Business Day, if a change is submitted after 10:00 am, the 5-day count will be taken from the next Business day at 10:00 am. Business approvers have till 3:00 pm on the prior Business Day to approve the change and if not the change will need to be rescheduled.

The Contractor shall then update the plan based on feedback. The Contractor shall also periodically update Change Management Plans as the Contract progresses and circumstances change. The Contractor shall document the planned Change Management activities against the actual work achieved. All cases where work is delayed or modified due to unanticipated events, or due to lack of progress by the Contractor or by other contractors shall be noted. Situations where the ITS activities adversely impact on the TMC operations shall also be recorded.

(e) Impact of Change Assessment

VicRoads will coordinate the assessment and approval of change requests, including the involvement of VicRoads business units, VicRoads business partners, VicRoads service desk and other service providers.

The Contractor will provide further input to the assessment of any change request as reasonably requested by the Superintendent and in any time frame reasonable requested. This includes any change not initiated by the Contractor but which may impact on the services.

(f) Scheduling and Planning Change Requests

The Contractor will schedule and submit the Change Requests in VicRoads Change Management systems.

i. Change Planning

All Changes with planned service disruptions shall be discussed and agreed between the Contractor and VicRoads. If, at any point in the change implementation stage or planned service disruption, VicRoads considers that there is a risk to the VicRoads TMC operations not being available as required, the Superintendent will advise the Contractor and the Contractor shall not proceed with the change implementation or planned service disruption.

The Superintendent may request the Contractor to reschedule approved changes to meet the requirements of VicRoads. The Contractor will inform the Superintendent of any potential risks resulting from the change or rescheduling of other approved changes.

ii. Implementing Change Requests

The Contractor will implement approved changes as documented within the VicRoads Change Management System and update the Configuration Management Database (if applicable) when a change is successfully implemented.

Please refer to the attached ITS Change Management Scheduling guidelines

iii. ITS Changes - scheduling guidelines

All ITS changes on the production environment (unless it is an emergency change) should be scheduled during the off-peak times. Off peak times are as follows

Weekdays: Monday - Thursday

Morning off-peak time: 09:00 AM – 03:00 PM

Evening off-peak time: 09:00 PM– 04:00 AM.

Friday

Morning off peak-time – 09:00 AM – 03:00 PM

Friday after hours change which will have an outage is not allowed.

Weekends

Changes request planned for weekends will be reviewed and approved case by case depending on the impact to business, stakeholder approval, any major events scheduled around the same time, availability of support staff to carry out any pre and post implementation testing, etc.

If the change will result in an outage to an ITS application or ITS devices following process should be followed.

The approval needs to be sought from relevant stakeholders including TMC.

On the day of implementing the change, the change implementer/owner should contact TMC and seek approval for go-ahead prior to commencement of change. Scheduled start time may vary if TMC require continued access to the impacted application/device for incident response/to assist emergency services.

For all ITS Change Request related enquiries contact: [ITSChangeCoordinator@roads.vic.gov.au](mailto:ITSChangeCoordinator@roads.vic.gov.au)

iv. Contractor should be a part of the VR ITS CAB meeting for project changes.



The Contractor shall be responsible for and incorporate into the Change Management Plan all liaisons with other contractors that may have an impact on the timing of when the integration may occur or the nature of the integration. The Contractor shall outline any risks (known and potential) and all impacts (known and potential) to proceed with the successful change implementation as defined in the plan. The Contractor shall clearly outline the start and end time of all work and operational impacts.

The Contractor shall be responsible for liaising with VicRoads Traffic Management Centre (TMC) to determine if there are any planned closures, special events or any activity occurring during the off-peak periods that will require use of any of the system functions.

Any unsuccessful change shall be backed out and tested according to the pre-planned Back-out Plan.

(g) Roll Back Strategy

Each Change Management Plan shall include a rollback strategy as follows:

- (i) For the new field equipment, backbone communications and power supply, a rollback strategy shall be provided following the first delivery phase (prior to that date, the VicRoads TMC will not be using any of the new field devices, communications backbone or power supply so no rollback strategy is required); and
- (ii) For existing communications to the CCTV that are to be integrated into the Streams System, existing leased communications shall be kept live for a period of time (minimum one month) after the main communications system has passed sub-system integration testing (SIT) as a backup.

(h) Post Change Review and Verification

The Contractor will review and test (provision of a certificate of completion of test or notification of completion indicates that the Contractor certifies the testing) each change as soon as practicable after successful implementation and include any issues in the change request, including any unsuccessful attempts and the reasons for failure.

The Contractor will notify VicRoads once the change has been implemented for VicRoads to test and verify the success of the change. If any errors are detected with a change, VicRoads will immediately notify the Contractor of the error(s). The Contractor shall, in cooperation with VicRoads, provide a resolution which will be either to back-out the change or reapply the change (with or without alteration).

VicRoads may also conduct a post-change review of any change. The Contractor will participate in such post change reviews as reasonably requested by VicRoads. This includes changes that are not initiated by the Contractor.

Should a change fail or not go to plan, the Contractor shall complete a Post Implementation Review document within 5 business days and attach it to the change request.

Change Request Closure

(i) Post Change Review and Verification

Contractor should update the change request with comments and appropriate closure code within two business days of scheduled end date/time.

VicRoads will close change requests once all of the above requirements have been fulfilled.

(j) Annual VicRoads Change Freeze

Support staff and Vendors will be discouraged from undertaking changes approximately between third week of December to second week of January, with the exception of:

- (i) Standard/pre-approved change requests
- (ii) An Emergency change to resolve a critical incident

The exact dates of Annual Change Freeze is announced in September each year.

(k) Change Management Process

*The Contractor will provide details of the change management process agreed with VicRoads in the*

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*Change and Integration Management Plan.*

- (i) Contractor must ensure that a change should not result in a major incident (P1 or P2). In the event a major incident occurs the contractor must be accountable and must take immediate action to resolve it. The contractor must ensure the number of failed changes does not exceed 10% of all changes implemented by the contractor per month irrespective of the change classification.

The following criteria's can be used to define a Failed change.

- (ii) Change that has a direct impact on VicRoads service being impacted within 7 days of change implementation or
- (iii) Change that has not met the original goal or its expected result.

**736.12 PRACTICAL COMPLETION REQUIREMENTS**

- (a) The Superintendent will not provide Practical Completion to The Contractor until the following requirements have be satisfied;
  - (i) Successful completion of all testing. This means, that all test cases have passed, and all defect/issues has been resolved at the end of each test stage (FAT, Pre-POP, Pre-SIT, POP, SIT, SAT) before proceeding to the next stage (Pre-POP, Pre-SIT, POP, SIT, SAT, OPT)
  - (ii) Successful completion of the Operational Performance Test (OPT)
  - (iii) Completion of the final version of the Handover Plan as per clause 736.10(c) Handover Plan Documentation.