



# CABINETS

## Intelligent transport systems (ITS) design standard

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### **More information**

If you have further queries, contact the Intelligent Transport Systems Standards and Specifications (ITS S&S) team via email: [itsspec@nzta.govt.nz](mailto:itsspec@nzta.govt.nz)

More information about ITS is available on the NZTA website at <https://www.nzta.govt.nz/its>

This document is available on the NZTA website at <https://www.nzta.govt.nz/itsspecs>

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# 1 Overview and outcomes

*This section defines the operational outcomes for intelligent transport systems with respect to the transport network.*

## 1.1 Purpose

The purpose of this design standard is to specify the minimum requirements for the procurement of cabinets used for the operational purposes by NZ Transport Agency Waka Kotahi (Client). In addition, this design standard details site selection, installation, design for safety, maintenance, and security to ensure compliance with Clients operational and asset management systems.

Design assurance is delivered through a series of design standards. The standards ensure road network level operational outcomes and design for safety, security and maintainability are accounted for in solutions being delivered to the Client. Design standards address risks typically generated at the front end of roading or infrastructure projects. Their objective is to ensure solutions address the correct operational need and solutions are fit for purpose.

## 1.2 Overview

This design standard supersedes ITS Delivery Specification: Roadside Cabinets and provides guidance for, and is to be read in conjunction with, the latest version of the ITS Delivery Specification: Cabinets.

### 1.2.1 Definition

The purpose of a cabinet is to provide environmental protection of ITS equipment, backbone support services for power, communications, and telemetry rack, including GPS services for telemetry status monitoring.

The cabinets described in this Standard are enclosures complete with electricity supply, cabling facilities and mechanical supports for the accommodation and protection of traffic and transport related equipment which does not have its own standalone housing suitable for direct installation next to the road.

A typical roadside equipment cabinet and site may contain:

- i. Cabinet
- ii. Foundation (plinth)
- iii. Entry and exit ducts
- iv. Power supply and distribution
- v. Transformers / PSU
- vi. Network switch
- vii. Network modem
- viii. Splice tray
- ix. UPS
- x. Roadside controller equipment
- xi. Documentation

## 1.2.2 NZTA ITS class

011 Enclosures – cabinet and similar used to house roadside equipment.

[Class definitions](#)

## 1.3 Scope

This section sets out the requirements for the installation of the following cabinets:

- i. ITS node cabinet - dual door
- ii. Standard ground mounted cabinet
- iii. Small footprint cabinet
- iv. Post mounted cabinet

Traffic signal cabinets are not covered by this specification. These cabinets are covered by NZTA P43 Specification for Traffic Signals.

Roadside control cabinets shall provide the following functions:

- i. Provide suitable housing for mounting, environmental protection and security of roadside equipment;
- ii. Provide adequate conditions including a temperature-controlled environment to ensure the correct operation of the roadside communications equipment installed inside that connect to the ITS edge devices;
- iii. Provide secondary support services such as environmental monitoring and telemetry (for example, temperature, humidity, and power metering, ability to remotely cycle power supplies).
- iv. Provide backbone support services for installation of roadside ITS equipment such as the physical communications interface to the ITS network by the fibre optic cable network.

The network node cabinets shall provide the following functions:

- i. ITS fibre optic cable network Ethernet communications node equipment;
- ii. Provide emergency power by provision of UPS, as well as diverse connections for the ITSN Fibre Network.

## 1.4 Outcomes

### 1.4.1 Operational

The intended operational outcomes of this standard is to ensure the equipment is installed and maintained for use (the reliability of the equipment will ensure that the standardised cabinet assists in minimising any potential down time) and create a safer road environment by ensuring ITS equipment and systems are protected, and therefore are available for use.

### 1.4.2 For users of the transport network

ITS equipment being housed and protected appropriately by these cabinets enable ITS to function well and improve or maintain safety and functionality for users of the transport network.

### **1.4.3 For road controlling authorities and transport operations centres**

For clients, reliable, accessible, and continued delivery of supporting services to roadside equipment enables clients to remotely monitor and manage services (for example, environmental conditions, cycle power, measure and log power use, maintain services during degraded modes and so on).

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## 2 Designing for Operation

*This section defines the functionality required to achieve successful operation of the ITS equipment.*

### 2.1 Site Selection

#### 2.1.1 Power availability

Please refer to ITS Delivery Specification: General Electrical Requirements for details on designing new power supply connections and existing supply.

Please refer to Section 4 of ITS Design Standard: General Requirements for more details on availability requirements.

Please refer to Section 4.3.1.2 in ITS Design Standard: Requirements for Intelligent Transport Systems for obligations of power supply.

#### 2.1.2 Communication availability

Please refer to Section 4.3.4.1.3 of ITS Design Standard: Requirements of Intelligent Transport Systems for details about communications infrastructure and access.

Section 4.3.4.1.4 of ITS Design Standard: Requirements for Intelligent Transport Systems identifies mandatory actions for communication links in terms of reliability, efficiency and availability. This document should be referred to. Reliable and efficient communication links are required for Client network operators. This applies even if the corridor is operated by an external party.

#### 2.1.3 Environmental Conditions

Cabinets should be installed with alignment to ITS Delivery Specifications: Environmental Requirements and refer to ITS Delivery Specification: Cabinets for more details.

Drainage and stormwater pooling and run-off should be managed to minimise the negative impact on the cabinet and internal equipment, as well as the conservation values of roadsides or adjacent downslope/ downstream vegetation. Considering this, cabinets shall not be placed in low lying areas, adjacent to swales and in tidal areas.

If the risk of flooding medium-high and the cabinet cannot be located elsewhere or on a gantry, the cabinet should have a plinth area that prevents flooding.

*NOTE: This may cause cabinets to be inaccessible and/or dangerous in the event of flooding.*



## 2.2 Cabinet Installation

Electrical wiring/ switch board parts of the cabinet shall be installed by electrical technicians who shall provide AS/NZS 3000:2018 certification.

### 2.2.1 Positioning

#### 2.2.1.1 General principles

In general, roadside cabinets should be placed at required locations within the road reserve so the required electrical and communication services for roadside equipment and edge device can be contained and readily accessed for planned and reactive maintenance.

Existing or new cabinets should be placed in areas that:

- Minimises road safety hazards
- Avoids or minimises:
  - Damage or disruption to infrastructure on roads
  - Disruption to future development of road and non-road infrastructure
  - Disruption to traffic
  - Disruption to the effective and efficient delivery of utility services
  - The efficient use of resources of road agencies and infrastructure managers and the minimisation of cost to the community of infrastructure and services
- Considers all other available routing options (particularly in the vicinity of, or on, bridges)
- Have minimal damage to trees (including their root systems and remnant vegetation) along the street, and high conservation value roadside areas.
- Avoids the use of Temporary Traffic Management (TTM) to access the roadside cabinet for maintenance, and are readily accessible for maintenance.
- Allows maintenance vehicles to be parked within a reasonable distance, and for technicians to safely walk to their location. Preferably a parking bay or a barrier.
- Minimises maintenance activities.
- Optimises the locations with roadside ITS assets and other cabinets.
- Is located on the same roadside direction to the assets they serve, e.g. near Gantry access points or CCTV poles.
- Minimises the risk of vandalism, theft, or graffiti (such as people climbing onto the cabinets to tag ITS equipment).
- Allows working space for technicians with doors open.

The cabinet shall be orientated so that the personnel working at the front of the cabinet are facing oncoming traffic and so that doors can be fully opened without obstruction. The front of the cabinet is defined as the door behind which the control facia of internal equipment is accessible.

Where possible, the position of the cabinet should also consider where street lighting exists. This is for workers' visibility and safety on the road and access to the cabinet.

### **2.2.1.2 For particular road classifications**

Scheme drawings that decide cabinets positioning needs to be aligned with Section 4.3.4 of ITS Design Standard: Requirements for Intelligent Transport Systems.

### **2.2.2 Mounting**

The cabinet shall be mounted on a concrete plinth with a gas plate above.

The Contractor shall follow the manufacturer's recommendations for handling and installation of all equipment, including access considerations.

Where a gantry spans both carriageways, all gantry mounted ITS assets shall be connected to equipment located on the same side of the high as the transmission system cabling and access point to the gantry. The mounting of roadside cabinets on gantries shall be avoided where practicable.

### **2.2.3 Support**

Attachment of supports to concrete foundations shall be made with power driven or 'Chemset' (hot dipped galvanised bolts with a minimum size of M12) studs as required, to provide structural stability. Attachments to masonry shall be using Dynabolts.

## **2.3 Cabinet Numbering**

### **2.3.1 Roadside control and network node cabinets**

Refer to Section 3.3.3 in ITS Design Standard: General Requirements.

There is an additional series of numbers for the cabinets on the State Highway, the number shall be Equipment-State Highway-Cab ID or series – Direction.

### **2.3.2 Name Plate**

Cabinets shall be provided with name plates. The name plate shall be installed near the top of the cabinet and located on the side viewable from the roadside lane / facing traffic. Refer to Appendix A and Section 4.7.3 of ITS Delivery Specification: Cabinets for more details.

## **2.4 ITS Network Change Control**

All changes for submission and approvals must strictly adhere to NZTA Change Process.

TOC Request for Change (RFC) template contains all information in relation to the change approvers and details as required by NZTA change management. Refer to NZTA Change Process document for the suitable procedure.

One of the following two key process are applicable based on specific circumstances:

- Informational Change – Any change of ITS devices without performance impact must go through the NZTA Change Management Team only.

- Operational Change - Any ITS devices change that affect the ability to manage the State Highway network operation must go through the NZTA Change Management Team, and in conjunction with Technical Change Approval Board (TCAB).

NZTA security team is to review any change request related to any ITS cabinet request.

#### **2.4.1 Auckland Regional Changes**

For Auckland region, Auckland Traffic Operations Centre (ATOC) should be consulted in conjunction with the RFC application.

#### **2.4.2 Other Regional Changes**

For other regions, Wellington Traffic Operations Centre (WTOC) should be consulted in conjunction with the RFC application.

Superseded

## 3 Designing for Safety

*This section defines the requirements to ensure the ITS can be operated and serviced safely.*

### 3.1 Health and safety

All ITS equipment must be designed to ensure installation and maintenance can be carried out in accordance with the Health and Safety at Work Act 2015.

A safety in design process must be undertaken.

### 3.2 Electrical Safety

All ITS equipment must comply with and be installed in accordance with Electricity (Safety) Regulations 2010 (SR 2010/36), and AS/NZS 3000:2018.

### 3.3 Safety outcomes

The Client requires the key outcomes to be met so ITS can be operated and serviced safely:

- Safety must be included and maintained within the design.
- Safe access for maintenance is provided.

#### 3.3.1 Accessibility

The site must allow reasonable vehicle access for installation of cabinets, and for future reactive and routine maintenance. The design should minimise the exposure to hazards posed between maintenance, vehicles and personnel, and traffic in the live lane(s).

Sufficient space for manoeuvring and parking shall be provided. If this is not applicable, a safe location to stop should be identified. For reversing vehicles, rubber wheel stops should be installed for protecting the cabinet equipment.

The cabinet shall be in areas that are well lit or staff accessing the cabinet shall be equipped with lights for safe access and visibility to the cabinet.

##### 3.3.1.1 Wiring

A means of local electrical isolation of the roadside cabinet shall be available and readily accessible, and be able to be locked off.

### 3.4 Site assessment

A site assessment must be undertaken to consider:

- Safe maintenance access to the site (without the need for TTM) and safe maintenance access within the site.
- Site safety regarding passing traffic.

The site auditor shall be provided with evidence that the Cabinet complies with this ITS Design Standard and the ITS Delivery Specification: Cabinets. A copy of the site acceptance test shall be included within the cabinet.

### **3.5 Site audit**

A site audit must be undertaken to ensure the site is both safe to operate and safe to maintain, and meets the design specification.

### **3.6 System-specific safety requirements**

All electrical installations are required to comply with the electrical regulations AS/NZS 3000:2018 or applicable regulations as required.

#### **3.6.1 Power Supply Safety Features**

As per section 3.6 above, electrical systems need to be designed and installed in accordance with AS/NZS 3000:2018. The live terminals at the switchboard, all terminal blocks, all relays, all contactors, and all transformers shall be protected against unintentional contact.

#### **3.6.2 Certification of Use**

Cabinet and contents owned and operated by NZTA. Access to be granted by application by the respective ITS Asset Manager or controlling TOC in case of emergency.

## 4 Designing for Maintainability

*This section defines the requirements to ensure the intelligent transport system can be maintained.*

### 4.1 Maintenance outcomes

Refer to ITS Design Standard: Requirements for Intelligent Transport Systems for maintenance conditions and obligations.

#### 4.1.1 As Built Drawings

As built drawings shall be supplied by contractors and will include:

- i. Electrical schematics - Circuit identification charts (as-builts) for all distribution boards with full circuit information, and identification in line with the drawings.
- ii. Systems schematics - A chart showing the cabinet power source and route.
- iii. Network design.
- iv. Cabinet site layout.
- v. Site acceptance test documentation.
- vi. Site log book.
- vii. Details for local boundary or isolation point (incl. ICP number and details).

These designs shall be provided in an editable format.

#### 4.1.2 Cable Management

Cables shall be labelled.

A 19-inch rack shall be installed and used to assemble the cables in the cabinet. A dedicated cable management system shall be installed to prevent the use of zip ties or cable ties around/ through mounting holes.

#### 4.1.3 Vermin and Insect protection

The cabinet shall be installed flush to the plinth and gas plate to reduce vermin from accessing the cabinet.

Cable entry points, plugs and gas plate should be sealed as designed and not compromised by the installation method.

The cabinet's location shall minimise the proximity of vegetation or other environmental issues that encourage insects such as ants.

#### 4.1.4 Vegetation

There shall be a one metre horizontal and vertical clearance where possible on all edges from the cabinet to be clear of vegetation.

- For more details, refer to the ITS Design Standard: Requirements for Intelligent Transport Systems.

#### 4.1.5 Graffiti

Cabinets shall be coated with a suitable anti-graffiti coating.

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## 5 Designing for Security

*This section defines the requirements to ensure the ITS can be secured and maintain integrity.*

### 5.1 Security outcomes

Cabinets are used in various locations and conditions, and therefore specific consideration for application shall be considered to prevent:

- Removal of the complete unit from site.
- Dismantling of the equipment.
- Operation of the equipment.
- Any form of vandalism and tampering of cabinets.

#### 5.1.1 Security Features

All ITS assets are to be tamper-proofed. This can be achieved by a commercially readily available collar to provide an extra level of security.

Refer to the ITS Delivery Specification: Cabinets, regarding the locking system.

Designing for security mitigation shall be considered by the Client, and shall include the following:

- Internal door hinges.
- Three-point locking.
- Door alarms.
- Mounting.
- Sighted to avoid.

#### 5.1.2 Access

The following security-related measures must be considered for ITS asset physical access:

- Assets are to only be accessible to approved users, maintainers and operators. All accesses and gates are to be locked.
- Access doors and panels are to be fitted with locks designed for outdoor conditions, with a Client approved regional pin code number and when used, regional identical keys to the specified locks.
- When the cabinet is opened, an alarm/notification (as per ITS Delivery Specification: Cabinets) shall alert cabinet monitors regarding unauthorised persons' accessing the cabinet.



## 6 References

This section lists all external and NZTA references included in this document.

### 6.1 Industry standards

Standard number/name	Source
Health and Safety at Work Act 2015	NZ Legislation <a href="#">website</a>
AS/NZS 3000:2018 - Electrical installations	<a href="https://www.standards.govt.nz/shop/asnzs-30002018/">https://www.standards.govt.nz/shop/asnzs-30002018/</a>

### 6.2 NZTA standards, specifications and resources

#### 6.2.1 Standards and specifications

See the [NZTA website](#) for the latest versions of the ITS S&S listed below.

Document name
ITS Delivery Specification: General Requirements
ITS Delivery Specification: Environmental Requirements
ITS Delivery Specification: General Electrical Requirements
ITS Delivery Specification: Cabinets (being developed)
ITS Design Standard: Requirements for Intelligent Transport Systems
ITS Design Standard: Commissioning and Handover requirements draft

#### 6.2.2 Resources

Document name/code	NZTA website link

### 6.3 Legislation

Name	Website link
Health and Safety at Work Act 2015	<a href="https://www.legislation.govt.nz/act/public/2015/0070/latest/DLM5976660.html">https://www.legislation.govt.nz/act/public/2015/0070/latest/DLM5976660.html</a>

## 6.4 Other resources

Name	Website link

Superseded

## 7 Terminology used in this document

Term	Definition
DRAFT	The document is being written and cannot be used outside of NZTA.
FINAL DRAFT (pending ratification)	The document has been finalised and is pending approval and ratification by NZTA. It can be used for procurement at this status.
RATIFIED	The document is an official NZTA document. NZTA projects and other road controlling authorities connected to NZTA back-end systems must include this document in the contracts. The obligation to follow the requirements in this document would come from the inclusion of the S&S document in the contract.
RETIRED	The document is obsolete, and/or superseded.
Amp	Ampere (unit of electrical current)
AC	Alternative Current
AS/NZS	Australian and New Zealand Standard
ATMS	Advanced Traffic Management System
ATOC	Auckland Traffic Operations Centre
CCTV	Closed-circuit television
DNO	Distribution Network Operator
EI	Electricity Interface
Ethernet Protocol	Industry standard network Broadcast technology.
HRC	To be defined
IP	Degree of protection as per AS 60529
ITS	Intelligent transport system(s)
MICC	Mineral insulated copper clad
MIMS	Mineral insulated metal sheathed
NS	Neutral Screened
NZTA	NZ Transport Agency Waka Kotahi
PLSWAS	Paper insulated, Lead covered, Steel Wire Armoured, Served (typically tarred hessian exterior covering)
PLY	Paper insulated lead covered
PVC	Polyvinyl Chloride (plastic) insulation
RFC	Request for Change
S&S	Standards and specifications
SCATS	Sydney Coordinated Adaptive Traffic System
SDP	Service delivery point

Term	Definition
STI	Service type instances
SWA	Steel Wire Armoured
TOC	Transport Operation Centre
TTM	Temporary Traffic Management
TSP	Telecommunications Service Provider
UPS	Uninterrupted Power Supply
V	Volts
VAC	Volts Alternating Current
VDS	To be defined
VMS	To be defined
WTOC	Wellington Traffic Operations Centre
XLPE	Cross-Linked Polyethylene insulation
A	Ampere (unit of electrical current)
AC	Alternative Current
AS/NZS	Australian and New Zealand Standard

Superseded

## 8 Content to be redirected

*This section records any circumstances where content from this document will be reclassified and moved into future documents. This table is then updated with a reference to the new location.*

Section reference	Section name	Future document	Class

Superseded

## 9 Document control

### 9.1 Document information

Document number	ITS-STND-CAB-202405
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Document status DRAFT   FINAL DRAFT   RATIFIED   RETIRED	DRAFT
[IF RETIRED] New document details	
Online ISBN	
Document availability	The controlled version of this document can be accessed from <a href="https://www.nzta.govt.nz/roads-and-rail/intelligent-transport-systems/standards-and-specifications/its-current-interim-and-legacy-standards-and-specifications/https://www.nzta.govt.nz/resources/intelligent-transport-systems/its-standards-and-specifications/">https://www.nzta.govt.nz/roads-and-rail/intelligent-transport-systems/standards-and-specifications/its-current-interim-and-legacy-standards-and-specifications/https://www.nzta.govt.nz/resources/intelligent-transport-systems/its-standards-and-specifications/</a>

### 9.2 Document owner

**Role** ITS S&S Steering Committee

**Organisation** NZTA

### 9.3 Document approvers

*This table shows a record of the approvers for this document.*

Approval date	Approver	Role	Organisation
DD/MM/YYYY			

## 9.4 Full version history

*This table shows the full history of changes made to this document, both minor and major, in chronological order, since the document was first authored.*

Minor versions are numbered 0.1, 0.2 etc until such point as the document is approved and published, then it becomes 1.0 (major version). Subsequent edited versions become 1.1, 1.2 etc, or if it's a major update 2.0, and so on.

Version	Date	Author	Role and organisation	Reason
0.1	23/02/2024	Mark Gregory Allan Arora Alyssa Greaney	Senior Principle Transport Engineer Transport Planner	Initial Drafts for expert panel
0.2	15/04/2024	Mark Gregory Allan Arora Alyssa Greaney	Senior Principle Transport Engineer Transport Planner	Draft for expert panel review
0.3	10/05/2024	Mark Gregory Alex Lumsdon  Allan Arora Alyssa Greaney	Senior Principle Associate Transport Engineer  Transport Engineer Transport Planner	Revised version after the expert panel review