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NZ TRANSPORT AGENCY

Intersection Speed Zones

Intelligent transport systems (ITS) design standard

22 APRIL 2024
0.2

DOCUMENT STATUS: DRAFT

New Zealand Government

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

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

Template version
2.0, 02/02/2024

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1 Overview and outcomes

This section defines the operational outcomes for intelligent transport systems (ITS) with respect to the transport network.

1.1 Purpose

The purpose of this design standard is to define the system requirements and principles for the installation of Intersection Speed Zones (ISZ) used for operational purposes by New Zealand Transport Agency, (NZTA), formerly known as Rural Intersection Activated Warning Signs (RIAWS). This ISZ design standard ensures compliance with NZTA operational and asset management systems.

1.2 Overview

This design standard supersedes Traffic Note 62: Intersection Speed Zones – guidelines and requirements 2022 (Traffic Note 62) and provides guidance for, and is to be read in conjunction with, the latest version of ITS Delivery Specification: Intersection Speed Zones.

1.2.1 Definition

An ISZ is a system and series of devices which provides a regulatory speed reduction for motorists approaching an intersection at the major road. An ISZ system is typically installed at intersections in a rural environment.

1.2.2 NZTA ITS class

003 Signals - Equipment which provides visual instructions (often legally enforceable) to the users of the transport network

Class definitions

1.3 Scope

This design standard provides guidance for the use of and installation of the following ISZ types, in terms of:

i. ISZ system design
ii. Sign location
iii. Equipment selection criteria
iv. Vehicle detection
v. Power and communications
vi. Roadside cabinets
vii. LED signage
viii. Maintenance
ix. Security features

For the procurement of ISZ, refer to the latest version of ITS Delivery Specification: Intersection Speed Zones.

This list is representative but not exhaustive. Designers need to consult the TCD Rule for a comprehensive list of approved aspects. Any new signs, or a different layout of a sign illustrated in this delivery standard, must have their word/font/symbol/light-emitting diode (LED) layouts approved by gazette notice or the TCD Rule. In the first instance, contact tcd@nzta.govt.nz.

1.4 Outcomes

The intended outcome of the ITS system is to reduce the severity of turning crashes at intersections.
An ISZ design shall be completed in conjunction with a concept of operations (CoO) and are to be reviewed by relevant road safety subject matter experts.

This ITS design standard provides the minimum requirements to design the ISZ system which must be clearly defined at the outset of the design process.

1.4.1 Operational

The intended operational outcomes of this design standard are to:

- Ensure the installation is fit for purpose based on the physical layout.
- Ensure pre-defined safety requirements are appropriate for informing drivers of a lower speed limit when potential conflict situations exist ahead.
- Create a safer environment for road users turning or crossing into or out of the side roads.
- Actively improve safe system outcomes by reducing vehicle approach speeds by slowing motorists down in advance of the intersection.

This design standard for ISZ contributes to NZTA's strategic fit, operational services, safety, efficiency, and value for money.

All ISZ must:

i. Activate signs when motorists are approaching the intersection from the side roads.
ii. If applicable, activate signs when motorists are turning right into the side roads (refer to Section 2.1 for guidance).
iii. On sign activation, be able to display and maintain visible and legible regulatory speeds via AWS to road users, under all conditions.
iv. Be configured in a manner which allows road users to react and reduce speed on approach to the intersection, both optically (optimising height and viewing angles) and logically (preceding intersections). This is covered in the latest version of ITS design standard: Active Warning and Regulatory Signs and Traffic Control Devices Manual (TCD Manual).
v. Be in a known state at all times and report operational status and health through an appropriate non-proprietary monitoring product capable of interfacing with NZTA's monitoring system.

1.4.2 For users of the transport network

The ISZ system is intended to improve the safety of users of the road network. When activated, the signs at the major road present a lower regulatory speed limit. This allows adequate time for drivers to acknowledge their vehicle speed and allow sufficient time to slow down before reaching the intersection ahead, resulting in the reduction of severity and likelihood of crashes occurring from turning vehicles at the intersection.

1.4.3 For road controlling authorities

This standard can be used as guidance for road controlling authorities (RCAs) when reviewing and maintaining ISZ systems.

2 Design for operation

This section defines the functionality requirements to achieve successful operation of the ISZ system.

A concept of operations (CoO) must be reviewed and approved by a road safety and ITS subject matter expert before commencing a design. The ISZ design shall be carried out in the context of the operational outcomes which are specific to the project. Careful consideration should be given to each individual site and the suitability for an ISZ system, including any environmental or geometric factors which may affect the operation.

2.1 ISZ System Design

The ISZ system is designed to reduce the speed of motorists approaching an intersection at the major road. This is achieved by using ITS vehicle detection devices and techniques at the side road when vehicles are approaching or waiting to turn out or across the side roads. This in turn, activates the electronic ISZ on the main approach to the intersection.

Appearance of right turn bay (RTB) infrastructure and associated pavement markings can vary at rural intersections. Some intersections may have right turn bay markings, some may not, or RTB's may be included in conjunction with the development of an ISZ design.

The designer shall consult the RCA regarding a RTB ISZ design. This is to ensure that the design allows for the most suitable and up-to-date practices and techniques for accurately detecting right turning vehicles from the major road into the side road.

2.1.1 Elements of an ISZ

The elements of an ISZ site shall typically consist of the following:

i. Electronic variable speed limit signs
ii. High-definition radar detectors, in-ground detector loops and/or other approved RCA detection device(s)
iii. Roadside control cabinet with a programme logic controller (PLC)
iv. If applicable, intersection CCTV monitoring camera (not to be used for detection)
v. Communications
vi. Power

The requirements listed above will vary from project to project, and a wider understanding of the project must be carried out before selecting each design element.

An ISZ concept layout example is presented below in **Figure 1** and **Figure 2** to provide typical design guidance on the layout of elements, including ISZ devices.

i. Side-road radar sensors (typically high-definition radars) to detect approaching side road traffic approximately 150m from the intersection. Activating the main road electronic signs.

ii. Side-road limit line sensor (typically in-ground detector loops) to detect waiting/queuing traffic and terminate the sign activation following a delay once a motorist has left the sensor detection zone.

iii. RTB sensors (refer to Section 2.1 if applicable) prior to and at the limit line, to activate the main road electronic signs.

iv. RTB limit line sensors (refer to Section 2.1 if applicable) to detect waiting/queuing traffic and terminate the sign activation following a delay once a motorist has left the sensor detection zone.

v. Variable speed limit signs approximately 200m from the intersection, in each direction. Road traffic signs often need to be located to the edge of the road or above the road to be visible and legible for approaching drivers.

vi. A central control system to manage the ISZ and data collection equipment.

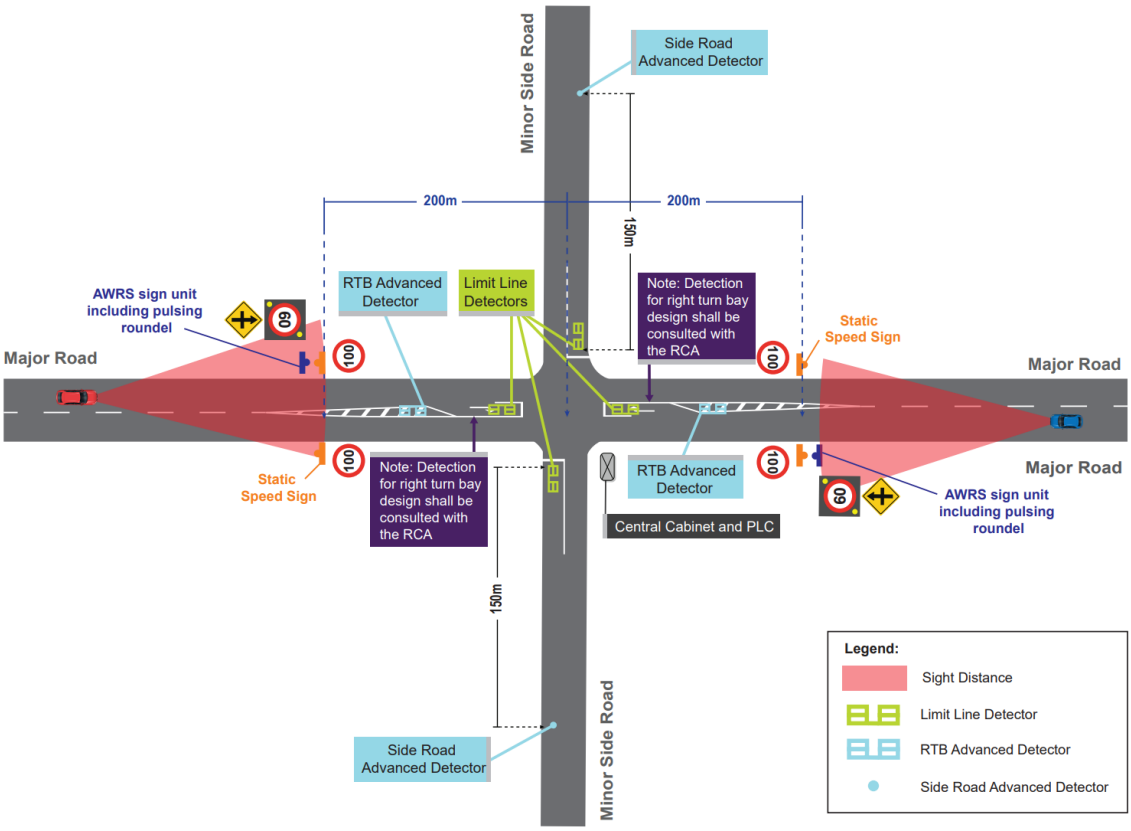

Figure 1 - Concept Layouts for a Crossroad Intersection

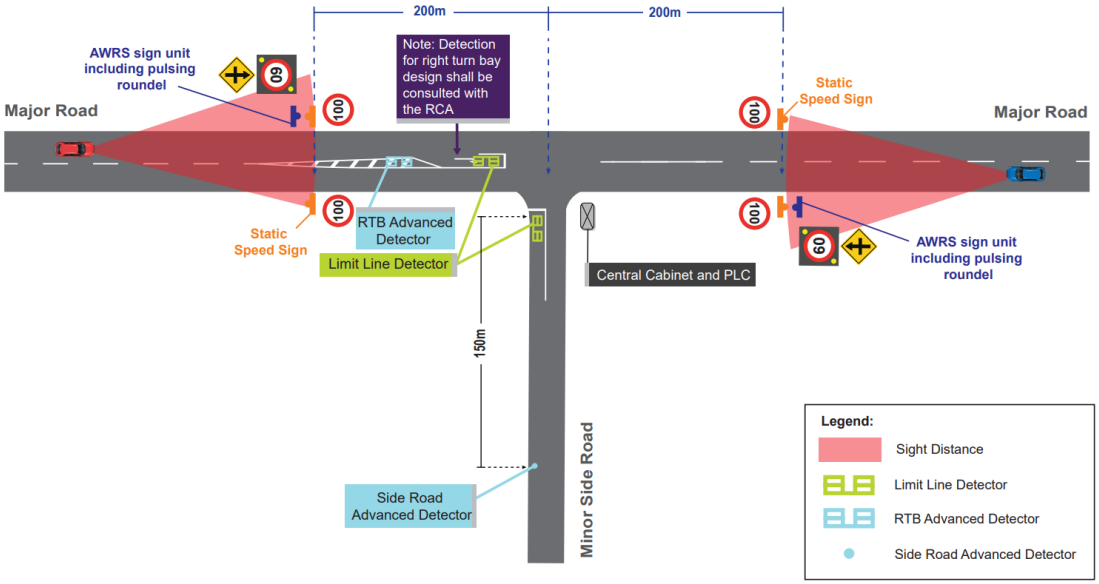

Figure 2 - Concept Layouts for a 'T' Intersection

2.1.1.1 Clear sight distance

ISZ signs should be visible by the road user for a minimum of 200m. This distance is determined at a 100km/hr speed limit. There may be sites where the posted speed limit is 80 or 90 km/hr. Refer to Section 4.2.1 of the ITS Design Standard: Active Warning and Regulatory Signs for calculation guidance. This ratio provides motorists driving at the legal speed limit with at least seven seconds to read the ISZ sign display, and those approaching at 50% above the legal speed limit with at least four seconds to read the ISZ sign display.

ISZ signs shall be gated where clear sight distance cannot be achieved.

If the site cannot provide adequate space for gated signs, a location further back at the major road and intersection may be considered. This may impact the typical location of the side road approach detectors and will require further investigation and reconfiguration for predefined sign activation timings. Please refer to Section 2.3 for location of side road detectors.

2.1.2 Presence of road signage

ISZ signage must not compete with the presence of other existing road signage. A reorganisation of signage may be required to ensure any new assets can fit.

An assessment of existing signage should be undertaken to understand if modifications or removal of existing signage is required.

In general, the minimum spacing distance between signs will be based on (0.6 x V85), where V85 is the 85th percentile speed of traffic, in Km/hr, at the sign location. Refer to the Traffic Control Devices Manual 2008 (TCD Manual).

2.2 ISZ Sign Requirements

ISZ signs must be Active Warning and Regulatory Sign (AWRS) with pulsing roundels as well as a PW-9 supplementary warning sign (refer to **Figure 3**). It is important to refer to the Traffic Control Devices Manual 2008 (TCD manual) for guidance on industry best practice.

Figure 3 - Example of an AWRS (with pulsing roundel) with supplementary warning sign (PW-9 intersection layout static panel) (Source: Section 8.2 of ITS Design Standard: Active warning and regulatory signs).

An ISZ sign must be connected to a control and monitoring system as described in Section 2.7.1 of this ISZ design standard.

2.2.1 Speed limit changes

ISZ must comply with the Land Transport Rule: Setting of Speed Limits (2022) (ref clause 4.9(1)(b)(iv)). This will also include the following:

i. Consultation
ii. Speed management plan certification.
iii. Submitting to the National Speed Limits Register
iv. Speed changes only on the major approaches - not the side roads.

ISZ's change the posted speed limit, whether 80, 90 or 100 km/hr, to 60 km/hr.

2.3 Vehicle Detection Criteria

There are several locations to consider when designing for the placement of vehicle detectors. An ISZ system has nodes which are deliberately located at the side roads to ensure the ISZ signs are activating at the appropriate time, i.e. when motorists are approaching the intersection at the major road.

These nodes are identified as:

i. **Advanced detectors** – detecting approaching side road motorists, and then activating the ISZ signs for a defined amount of time.

ii. **Limit line detectors** – detecting stationary motorists when drivers are waiting to turn out of the side road, and then activating the ISZ signs for a defined amount of time or until the driver leaves the side road.

The device chosen, is to be fully approved by NZTA. Locations of devices shall be indicated on the appropriate plan by the designer.

2.3.1 Location of side road advanced detection

The typical location and placement of the advanced detector is 150m away from the vehicle limit line. To determine if the 150m placement is suitable will depend on site and existing environmental factors. The designer must consider the following:

- Physical road layout and geometrical features.
- The legal speed limit, including the time it takes for a motorist to reach the intersection.
- Placement of the ISZ signs at the major road (typically 200m away from the intersection).

In the event of the ISZ signs being relocated further back (than the typical 200m) due to lack of sight distance, the designer must reconsider the placement of the advanced detector location at the side road. This is to ensure the advanced detector and predefined timing parameters for ISZ sign activation are adequate for approaching drivers on the major road.

2.3.2 Location of limit line detection

The location of the limit line detector shall be positioned so that a motorist, when stationary at the intersection, can be accurately detected. The ISZ signs will activate at the major road for a predefined time, until the motorist has left or turned out of the side road detection area.

This should also include any areas or detection zones where there are two vehicle turning lanes at the side road. Additional detectors may be considered to ensure that turning vehicles are reliably detected.

2.3.3 Location of RTB detection

The positioning of RTB detectors are typically located in two areas.

i. **Advanced detector** – positioned further away of the intersection. Typically, at the start of a hatched flush median, painted RTB or right turn lane entry point on the road.

ii. **Limit line detector** – positioned to detect stationary vehicles waiting to turn right at the intersection, typically, at the limit line of the right turn bay.

The designer shall consult the RCA regarding a RTB ISZ design. This is to ensure that the design allows for the most suitable and up-to-date practices and techniques to allow for adequate activations of the ISZ signs, and ensuring it meets the minimum requirements of the ISZ system.

2.3.4 High-definition radar detectors

High definition radar sensors are installed above ground and typically detect approaching motorists at the side road. The detector can be transmitted via a wireless connection between the detector and ISZ PLC.

This method of detection is a lower cost option for advanced detection when comparing against inductive loops. This is due to the long lengths of extensive ducting and loopfeeder cable required to be connected back to the PLC at the intersection.

2.3.4.1 Positioning of high-definition radar detectors

High-definition radar detectors shall be positioned 150m from the side road limit line.

The detector shall have adequate line of sight to the central cabinet positioned at the intersection. This is to ensure the wireless network for the device can be adequately connected to the ISZ PLC.

Vegetation shall be cleared where appropriate and the communications location shall not be on sloping verges to ensure a clear path. In the event of significant tree cover, wireless signal booster locations may be considered to achieve adequate connection to the ISZ PLC and above ground high-definition detector device.

The wireless network shall be compliant with NZ Radio Spectrum Management specs and operate within General User Radio License for Short Range Devices. Service Set Identifiers should be suppressed to reduce unwanted attention.

2.3.4.2 Installation – existing infrastructure

Radar sensors, if used, may be installed either on a freestanding pole or mounted to an existing structure such as a lighting column. For new poles, the placement must not obscure the view for road users of current infrastructure or street furniture, including signs.

With any methods of installation, the sensors should be pole-mounted to minimise vibration and sway.

ISZ signs must be legally based on the radio spectrum requirements by referring to New Zealand Radio Spectrum Management.

Permission to use any existing infrastructure shall be agreed in consultation with the NZTA and any other affected Road Controlling Authority (RCA). In cases where the existing infrastructure does not come under the jurisdiction of the RCA, the Contractor shall be responsible for identifying and seeking permission from the appropriate party(s) and shall provide clear advice on future maintenance obligations and responsibilities.

2.3.4.3 Installation – new infrastructure

The practicality and relative economics of utilising any existing power distribution poles should be considered where this would result in the overall minimum number of roadside poles exposed to traffic.

The adoption of joint use (or shared) traffic signal/road lighting poles and in some cases shared traffic sign support poles can provide advantages in terms of traffic safety and side road aesthetics.

2.3.5 In-ground vehicle loop detectors

In-ground inductive loops are single core polypropylene insulated cable that are double looped and inserted into the surface of road, typically in asphalt via saw cuts. The detector loop is then connected with a loopfeeder cable at the termination box, also known as a Toby Box. The loopfeeder cable is then thrusted back to the ISZ PLC via underground ducting.

Inductive loops are typically positioned at the vehicle limit lines or in locations which are closer to the ISZ PLC. This is to reduce the amount of loopfeeder cable and overall cost of cabling required to be connected back to the PLC.

2.3.5.1 Pavement condition for in-ground detector loops

The pavement condition is an important aspect for the performance of detector loops. This means that unsealed roads can cause further complexities for the suitability of in-ground detector loops.

In this instance, the designer should either provide suitable pavement for the area of the proposed loop detector or choose another type of detection method (such as above ground detection) that would perform better on unsealed roads or roads in poor disrepair.

In some instances, detector loops can be pre-formed within the asphalt surface, but this is only relevant when there is a new treatment of pavement asphalt at the intersection which will ensure the best performance of the detector.

2.3.6 In-ground vehicle wireless magnetometer or puc detectors

In-ground magnetometers or pucs are a new detector technology, typically installed within the wearing course of the road. The detector eliminates the need for it to be removed from the road when undertaking resurfacing.

Magnetometers or pucs are beneficial for their overall maintenance life cost when comparing against in-ground detector loops which can be typically affected when resurfacing or maintaining the road.

The detectors may be used at sites which carry higher volumes of traffic or where there are likely to be more intrusive installation/ maintenance cost for other detectors such as in-ground detector loops.

Any design incorporating this detector must be reviewed by subject matter ITS expert and approved by the RCA for use.

2.4 Power

PLC and central control cabinet shall be connected to a mains power where practically possible via underground ducting from the nearest available supply point.

In rural areas, access to power can be limited, therefore using solar power may be considered to support the system PLC and cabinet equipment.

ISZ signs shall be connected to solar power. In the event of extensive tree cover, the signs shall be connected to mains power.

Any power requirements for ISZ systems and equipment must meet the suppliers' specific requirements for adequate functionality on the NZTA network. For more information, refer to Section 4.2 Electrical Requirements of the most updated corresponding ISZ specification.

2.5 Communications

Communications to the site shall use commercial services such as Broadband or Cellular provided by a NZTA approved telecommunications provider.

2.5.1 Wide-area network (WAN)

WAN is a large network of information that is not tied to a single location or site. NZTA facilitate communication, including the monitoring of assets through a WAN network.

The ISZ system must align with NZTA's WAN network requirements, including the ability for monitoring the site by NZTA's admin users.

2.6 Roadside Cabinets

2.6.1 Positioning

The ISZ system shall be housed in a single ground-mounted cabinet within road reserve, and be fully accessible for maintaining the ISZ system equipment.

The central control cabinet would normally be positioned beside the intersection to provide a suitable environment for the intersection detection equipment, radio frequency transmission equipment, central processing unit and backup power supply.

In areas or locations where vandalism may be prevalent, the use of structure or pole mounted cabinets may be used to avoid awareness of technology devices. Any pole or structure mounted cabinets and their locations must be approved by the RCA.

Where an existing roadside controller cabinet is situated in close proximity to the proposed ISZ system location, the contractor may consult with the RCA and seek agreement to house some or all of the ISZ system components within it.

Refer to the latest ITS Design Standard: Cabinets.

2.7 Monitoring

2.7.1 Programme Logic Controller (PLC)

The main PLC must be an off the shelf product from New Zealand with inductive automation and hardware, linking with NZTA approved software.

Requirements of a PLC, as aligned with IEC 61131 standard for PLC, shall include,

- Singular unit v modular
- Number of i/o
- Types of i/o

To be defined.

The ISZ system must be in a known state at all times.

Current status and availability will be collected at regular intervals. If it fails, the PLC will log and report to parties identified by the RCA and can temporarily disable the ISZ system where one or more signs are not responding or when instructed to, remotely.

Reporting/ monitoring system to be defined.

2.7.2 Closed-Circuit Television (CCTV) Camera for monitoring

CCTV can be installed on site for the monitoring of the site and ISZ assets. This helps improve the maintainability of the ISZ system and security of the site.

For CCTV requirements, refer to ITS Design Standard: Closed-Circuit Television and ITS Delivery Specification: Closed-Circuit Television - Operational cameras.

2.7.2.1 Positioning and installation

CCTV Cameras can be mounted on a new support pole or on RCA approved infrastructure such as streetlight poles. Streetlights, in particular, enable easy accessibility and improved visuals due to the dedicated light source.

Refer to Sections 2.3.4.2 and 2.3.4.3 for more information about installation.

3 Design 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 in accordance with the Health and Safety at Work Act 2015.

3.2 Safety outcomes

NZTA requires the following 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.

3.2.1 Site Access Design

The site must allow reasonable vehicle access for installation, and for future reactive and routine maintenance. It is important for both installation and maintenance accessibility shall not need temporary traffic management (TTM) to do so. The design should minimise the exposure to hazards posed between maintenance, vehicles and personnel, and traffic in the live lane(s), and facilitate effective traffic control for any maintenance work above the carriageway.

Where detectors and roadside cabinets are located in a high-speed environments, efforts should be made to try and access the site via a local road.

Sufficient space for manoeuvring 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.

3.2.2 Working at heights

If working at heights is applicable, refer to ITS Design Standard: Commissioning and Handover requirements.

3.2.3 Electrical safety

All ITS equipment must comply with and be installed in accordance with Electricity (Safety) Regulations 2010 (SR 2010/36), including Electrical Code of Compliance AS/NZS 3000:2018 (wiring rules).

3.3 Site assessment

A site visit shall be undertaken by the designer and subject matter expert to understand the project site and constraints (i.e. pavement and geometric conditions).

A safe stopping location should be identified for installation and maintenance vehicles of ISZ systems.

3.3.1 Below the ground

3.3.1.1 Before U Dig

A ‘beforeUdig’ process or testing with a Scala penetrometer shall be implemented as part of the site assessment before any works are undertaken to identify the location of cables, pipes and other utility assets (Before U Dig).

3.3.1.2 Potholing Investigations

Potholing investigations shall be considered if there is a risk of potential conflicts with underground services when installing ISZ system equipment and signs.

3.3.2 Above the ground

For adequate safe distances from low and high voltage power lines, refer to the latest version of the NZECP 34 New Zealand Electrical code of practice for electrical safe distances (NZECP34).

Ideally, sensors should not be located directly under or above any power lines. If unavoidable, this should be discussed with the RCA in charge of the ITS system and asset.

3.4 Site audit

It is the designer’s responsibility to ensure each site has a post construction site audit undertaken to match the requirements of each installation type. Refer to the ITS Design Standard: Commissioning and Handover requirements.
During site audits, RAMM data shall be collated, assessed and provided to the RCA for as-buit purposes.

3.5 Site Acceptance Testing (SAT)

SAT is performed after ISZ site has been commissioned and has run for a period of time gathering baseline data. The facility is connected to the communications system allowing monitoring of alarms and alerts from the remote-control system. The contractor shall produce a SAT test plan in consultation with the Principal.

For further information on SAT requirements, refer to ITS core requirements standard: Commissioning and handover requirements.

4 Design for maintainability

This section defines the requirements to ensure the ITS can be maintained.

4.1 Maintenance outcomes

The existing National Maintenance Contract shall be the go-to for maintenance outcomes. The contract includes details on:

- Traffic Management
- Monitoring Service
- Planned Preventative Maintenance (which may include cleaning of AWRS sign and solar panels)

- Spare Parts
- Reactive Maintenance and Unscheduled Work
- Any additional requirements

4.2 Commissioning

4.2.1 Asset numbering

All ITS assets must be numbered in accordance with the NZTA ITS numbering system and should be subsequently recorded appropriately in NZTA's ITS asset database, along with its' location, status and condition data etc. Refer to ITS Design Standard: Requirements for Intelligent Transport Systems.

4.2.2 Commissioning and handover

The project contractor must ensure Cabinet systems are handed over to NZTA maintenance. Refer to the ITS Design Standard: Commissioning and handover requirements.

4.3 Enforcement

To be effective, the ISZ must be enforceable. The length of the zone, visibility of the signs, proof of display (i.e. orange LED light displayed on the back of the ISZ sign when activated) and other issues are all matters the Police must take into account in determining whether they are able to proceed with enforcement and subsequent action. It is therefore imperative any associated variable speed limit considerations involve the District Road Policing Manager of NZ Police.

Refer to Section 8 in Austroads Guide to Road Safety Part 3: Safe Speed.

5 Design for security

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

5.1 Security outcomes

ISZ will most likely be left unattended on the roadside in various locations. So, security requirements prevent:

- Removal of the complete unit from site.
- Removal of major and minor components.
- Dismantling of the equipment.
- Operation of the equipment.

For physical and digital security measures, refer to Section 7 of ITS Design Standard: Variable message signs (VMS) and lane and carriageway signs (LCS) system interface standard. General countermeasures in Section 7.1.1 is applicable to digital security of the PLC and communications equipment and Section 7.2.2 is applicable to equipment within roadside cabinets' security.

5.1.1 Data Loss Prevention Policy

Data Loss Prevention (DLP) policy requirements are to be defined.

Maintenance during DLP shall be defined.

5.2 CCTV

If the site is using CCTV, refer to Section 6.4 in ITS Delivery Specification: Closed-Circuit Television - Operational cameras. CCTV is to be used for monitoring purposes for ISZs. This means that the RCA/ TOC operating the sites shall have authorised access to view CCTV footage. This shall be an aspect identified in the National Maintenance Contract.

6 References

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

6.1 Industry standards

Standard number/name	Source
NZECP 34 New Zealand Electrical code of practice for electrical safe distances	Transpower website
AS/NZS 3000:2018 Electrical Wiring Rules	

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 design standard: Intersection Speed Zones
ITS design standard: Requirements for Intelligent Transport Systems
ITS delivery specification: Roadside cabinets
ITS design standard: Commissioning and Handover requirements – ITS core requirements standard
ITS design standard: Active Warning and Regulatory Signs
ITS Design Standard: Closed-Circuit Television
ITS Delivery Specification: Closed-Circuit Television – Operational Cameras
P43 Specification for Traffic Signals

6.2.2 Resources

Document name/code	NZTA website link
Traffic Note 62: Intersection Speed Zones – guidelines and requirements 2022 (Traffic Note 62)	NZTA Traffic Notes website and Traffic Note 62 pdf here: https://www.nzta.govt.nz/assets/resources/traffic-notes/docs/traffic-note-62.pdf
Guide to Road Safety Part 3: Safe Speed	https://www.nzta.govt.nz/roads-and-rail/road-engineering/geometric-design/austroads-guides/
Traffic Control Devices Manual (TCD Manual)	https://www.nzta.govt.nz/resources/traffic-control-devices-manual/

6.3 Legislation

Name	Website link
Health and Safety at Work Act 2015	NZ Legislation website

6.4 Drawings

See NZTA website: https://www.nzta.govt.nz/roads-and-rail/intelligent-transport-systems/standards-and-specifications/current-standard-drawings/ for the latest versions of the ITS standard drawings listed below.

Drawing number
000-0000-0-7104-03-R1 (Roadside control cabinet)
000-0000-0-7104-04-R1 (Roadside control cabinet apron details)
000-0000-0-7104-17-R1 (Advanced warning signs)
000-0000-0-7104-20-R1 (Advanced warning sign pole with shear base)
000-0000-0-7104-21-R1 (Advanced warning sign pole - ground plant)
000-0000-0-7104-22-R1 (Advanced warning sign pole - mounting brackets)
000-0000-0-7104-45-R2 (CCTV folding pole general layout)
000-0000-0-7104-46-R1 (CCTV fixed pole general layout)
000-0000-0-7104-47-R2 (CCTV pole foundation details)

To be defined

6.5 Other resources

Name	Website link

7 Terminology used in this document

Term	Definition
DRAFT	The document is being written and cannot be used outside of NZTA.
PENDING	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. Road controlling authorities are obliged to follow a document with this status.
RETIRED	The document is obsolete, and/or superseded.
ITS	Intelligent transport systems
RIAWS	Rural Intersection Activated Warning Signs
ISZ	Intersection speed zones
AWS	Advanced warning signs
CSV	Comma-separated values
AS/NZS	Australian/ New Zealand standard
EN	European standard
IP	International Protection code (sometimes interpreted as Ingress Protection code) classifies the degree of protection provided by mechanical casings and electrical enclosures against intrusion, dust, accidental contact and water.
IoT	Internet of Things-based communications device
Enclosure	Housing for electronics systems to protect against environmental conditions.
Frangible	Performance capability of structure, which are designed to shear or collapse when struck by a vehicle, minimising the impact hazard to the vehicle's occupants.
Hz	Hertz
Ohm	Unit of electric resistance between two points of a conductor (equivalent of one volt per one ampere (V/A).
km/hr	Kilometres per hour
LED	Light-emitting diode
LR	Luminance ratio
M	Metre
mm	Millimetres
m/s	Metres per second
ms	Milliseconds
NOC	Network outcomes contract
Pixel	Smallest controllable element of a display matrix for an electronic sign or signal.
RCA	Road controlling authority

Term	Definition
SAT	Site acceptance test
SID	Speed indicator device
SLA	Service level agreement
OEM	Original equipment manufacturer
TCD	Traffic control devices
TCD manual	Traffic control devices manual
TCD rule	Land Transport Rule: Traffic Control Devices 2004
TOC	Transport operations centre
TTM	Temporary traffic management
TUD	Total underground distribution system – power supply pit
AGD	Above ground detector
ASD	Approach sight distance
UHF	Ultra high Frequency
ISZ	Intersection Speed Zone
PLC	Programme logic controller
CoO	Concept of Operations
SSS	Safe system solutions
VSLS	Variable speed limit signs
SRS	Side-road radar sensor
SLL	Side-road limit line
RTBS	Right turn bay sensor
CCS	Central control system
GUI	Graphical user interface
AC	Alternating current
DC	Direct current

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

9 Document control

9.1 Document information

Document number	ITS-STND-ISZ-202404
Previous document number/s (if applicable)	
Document status DRAFT | FINAL DRAFT | RATIFIED | RETIRED	DRAFT
[IF RETIRED] New document details	
Online ISBN	TBC
Document availability	The controlled version of this document can be accessed from 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/

9.2 Document owner

Role Head of Technology Engineering

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	Alex Lumsdon Alyssa Greaney Allan Arora	Associate - Transportation Engineering Transport Planner Transportation Engineer	Initial draft for expert panel
0.2	22/04/2024	Alex Lumsdon Alyssa Greaney Allan Arora	Associate - Transportation Engineering Transport Planner Transportation Engineer	Revised draft for industry consultation
0.3	DD/MM/YYYY			