NZTA Intelligent Transport Systems (ITS) Standards and Specifications (S&S)

Traffic Signals

Agenda

Part 1 – Background

1 min – Agenda and Introduction (James)

5 min - Background and ITS Delivery Framework (Russell)

5 min - Delivery Team and NZTA Drafting Principles (Alex)

Part 2 – Specification Document

15 min - Traffic Signal Delivery Specification (Alex, James, Steen and Russell)

10 min - Open Floor Discussion (All)

Part 3 – Design Document

15 min - Traffic Signal Design Standard and Guidance (Alex, James, Steen and Russell)

10 min - Open Floor Discussion (All)

NZ TRANSPORT AGENCY
WAKA KOTAHI

Introduction

As part of the NZ Transport Agency Waka Kotahi (NZTA) ITS S&S project Beca have collaborated with stakeholders to deliver the following documents:

- NZTA Delivery Specification
- NZTA Design Standard

The documents were previously prepared and produced by the Signals NZ User Group (SNUG).

Background

The ITS S&S documents provide assurance for delivering solutions and the necessary equipment and systems for NZTA projects.

- Design standards
- Delivery specifications
- Core requirements standards

The ITS S&S documents provide assurance for delivering solutions and the necessary equipment and systems for NZTA projects.

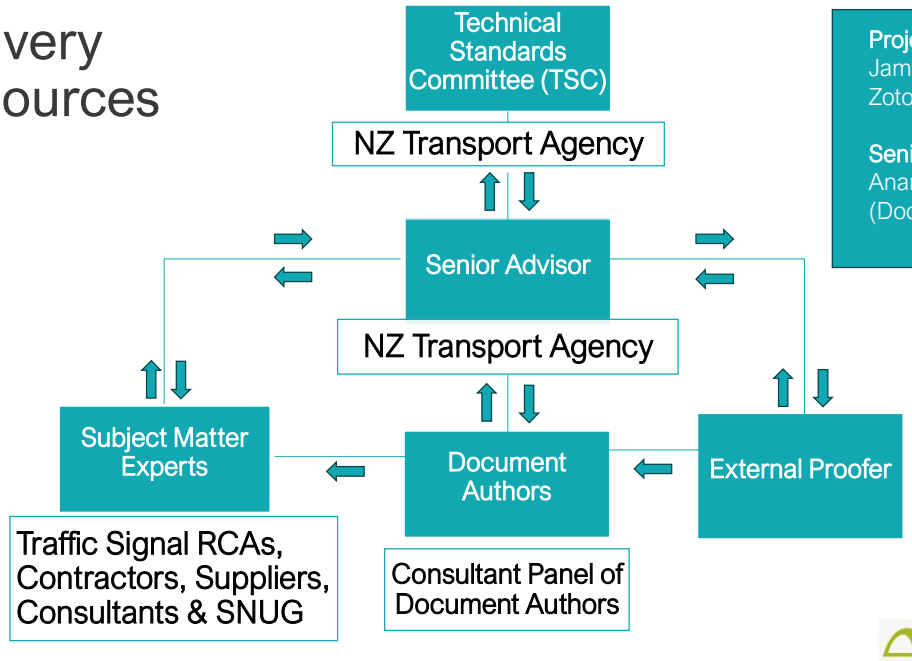
- **Design** is achieved through design standards that ensure operational outcomes, safety, security, and maintainability are considered in transport network solutions.
- **Delivery** is managed via delivery specifications, supporting procurement and systems integration to guarantee correct equipment and required functionality.
- **Core requirements** (standards and specifications) set out common conditions and obligations across all NZTA ITS design standards, helping manage duplication of requirements.

Overall, these documents ensure clarity, consistency, and fitness for purpose in ITS design and delivery.

The intelligent transport systems (ITS) design standard and delivery specification (S&S) framework is a collection of repeatable processes and capabilities to support the creation and ongoing maintenance of the ITS S&S documentation.
It provides an open and collaborative environment to develop best practice in the ITS industry and to ensure new or upgraded ITS S&S are easily accessible to all interested parties.

- It provides a way to manage duplication, ensure consistency, and capture feedback and learnings to support continuous improvement.
- The framework ensures that our ITS S&S documentation is produced to a high quality so that we can deliver a safer system for all users and provide certainty, consistency and clarity for our people and industry suppliers.
- The ITS S&S framework benefits all national transport network projects. By updating and ensuring the consistency and quality standard of our ITS S&S documentation, NZTA can realise the full benefit of our network upgrade and ensure a safer system for all users.

Delivery Resources



Project Sponsor
Jamie Lowe/ Tom Zotov

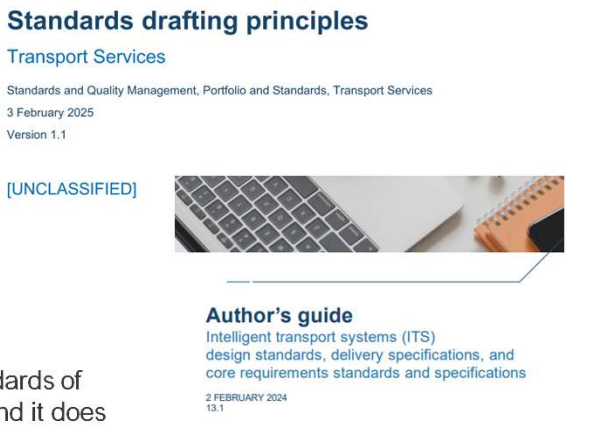
Senior Advisor
Anandita Pujara (Document Owner)

NZ TRANSPORT AGENCY
WAKA KOTAHI

NZTA Standard Drafting Principles

- Clarity and consistency
- Defined scope and flexibility
- Audience-focused content
- Avoid redundancy
- Professional language and structure
- Re-use industry standards where possible

The authors guide is also available for quality standards of each standard and specification documentation, and it does not define the content.



NZ TRANSPORT AGENCY
WAKA KOTAHI

Drafting Principles

Clarity and Consistency: Standards must be clear, concise, unambiguous, and consistent with established drafting principles, definitions, templates, and frameworks.

Defined Scope and Flexibility: Each Standard should have a well-defined scope and be flexible enough for use by all relevant authorities and organisations where practicable.

Audience-Focused Content: Content should be tailored to the primary audience's needs—focusing on what users need to do or understand —avoiding unnecessary background or justification.

Avoid Redundancy: Minimise cross-referencing or repeating information from other documents, especially if it may change frequently or lacks context.

Professional Language and Structure: Use appropriate contract terminology in commercial agreements and avoid naming specific organisational roles unless standardised; ensure version control and adherence to writing/brand guides.

Authors guide

NZ Transport Agency Waka Kotahi (NZTA) is creating repeatable and consistent practices for developing and maintaining the intelligent transport system (ITS) design standards, delivery specifications and core requirements standards and specifications (S&S).

As Russell mentioned earlier, NZTA is delivering this via a structured framework that is a foundation to:

- Provide alignment of the ITS S&S with the NZTA business and operational outcomes.
- Provide alignment with Traffic Control Devices and Austroads S&S, if available
- Manage NZTA risks through all stages of the delivery lifecycle
- Provide consistency and clarity for vendors, thereby reducing their risks through all stages of the delivery lifecycle
- Capture best practice and knowledge from which repeatable solutions can be built
- Manage departure requests and feedback as part of continuous improvement and knowledge
- Provide ITS S&S that support the design of systems, and for the supply of ITS equipment for the transport network.

Traffic Signal Change Process

NZTA would like to prepare a change process for traffic signal documents.

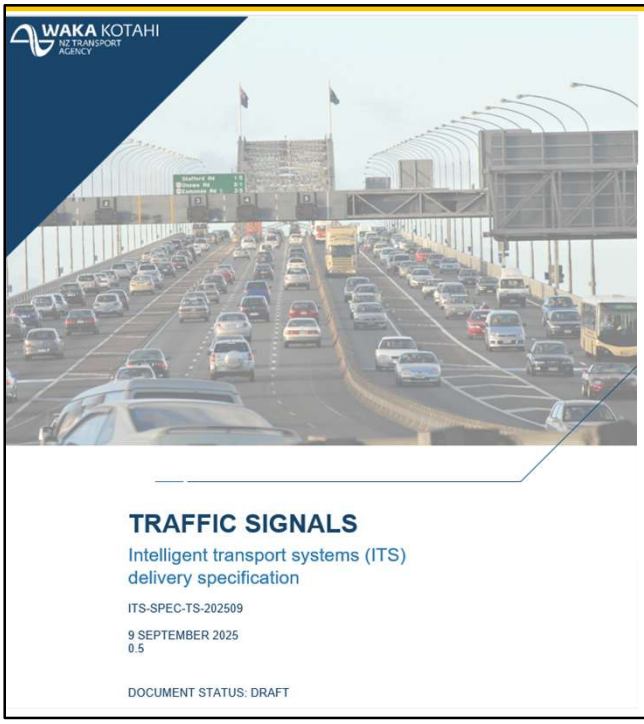
List of Future ITS S&S Documents

NZTA will be updating the list to the standards and specifications – refer to the link below.

For anyone in the room who would be interested in being a SME or would like to receive updates.

Please subscribe

https://nzta.govt.nz/roads-and-rail/intelligent-transport-systems/registration



Traffic Signal Delivery Specification

Expert Panel Comment

Document Structure

"The document doesn't feel like it flows now, with the rearranging of quite a few sections.

It used to be divided into separate sections for ***material requirements & selection, installation requirements, testing, and maintenance / warranty handover.***

Now it doesn't have a clean feel about what is selection, or installation."

Outcome

- Authors have avoided slicing sections of text and retained the existing structure where possible.
- Text has been allocated into the desired sections of the NZTA specification template.
- Technical and performance requirements sections have been generated to meet NZTA drafting principles.

Section 3 – Performance Requirements

This section outlines the reliability and availability requirements of equipment which may require independent certification and/or declarations of conformity for the core subject area.

3.1 General

Unless specified elsewhere in this specification, all equipment and hardware supplied or installed shall be guaranteed by the manufacturer against faulty materials and workmanship for a minimum period of [1] year from the date of commissioning.

The guarantee period commences from the date of commissioning and not the date of manufacture or installation. These are detailed in section 3.2.

Where there is a difference between the main contract's defects and liability requirements and this specification, the longer time period shall apply.

3.2 Traffic Signal Equipment

Table 1 below provides traffic signal equipment guarantee/warranty periods.

Table 1 Guarantee period of traffic signal equipment

Equipment	Guarantee period / warranty
Surface coatings	10 years (except if degradation occurs due to vandalism)
LED (lamp) modules	5 years
Lantern body construction	20 years
Traffic poles	50 years
Pole coatings/finish	10 years (till first maintenance)
Montrose box	10 years
Traffic signal controller components	As per manufacturer
UPS controller	As per manufacturer
UPS batteries	5 years
UPS system	Minimum load support time of 5 hours
Stand-by generator – indicator lights	At least 15 years

Expert Panel Comment

Discussions took place regarding the performance requirements for traffic signals at the Expert Panel Workshop.

To eliminate any misconception of signal guarantee's or warranty requirements, authors have prepared a tabled schedule providing clearer warranty and guarantee periods for Contractors and Suppliers.

⇐ Refer to Table 1.

NZ TRANSPORT AGENCY WAKA KOTAHI

Beca

Reinforce industry standards and consolidated.

Section 4 – Technical Requirements

Expert Panel Comment

This section outlines specific technical and physical constraints for the equipment.

Table 2 Technical requirements of traffic signal equipment

Item	Requirements	Reference
General-purpose and pedestrian signals	200mm or 300mm	Shall be compliant with AS2144
Extended range signals	300mm	Shall be compliant with AS2144
LED lanterns	Have an independent NATA certified laboratory report confirmed compliance	Shall be compliant with AS2144
Lantern body	As per 'Reference' column	Shall be compliant with AS2144
Visors (cowls)	Made from plastic	N/A
Pedestrian visor	200mm diameter shall be fitted with an approved rectangular visor	Shall be compliant with AS2144
Target boards (backing boards)	• Made of type 5005 aluminium alloy (minimum thickness of 1.6mm) • Surface border shall be baked enamel (black) • White border	Shall be compliant with AS2144
Lantern mounting equipment	Mounting brackets, bolts, nuts, and mounting hardware shall comply with section 6.	Shall be compliant with AS 2339:2017
Traffic poles	As per 'Reference' column	Shall be compliant with: • AS/NZS 4676 • AS/NZS 4677 • AS/NZS 1170.0 • AS/NZS 1170.1
Traffic poles – fixture and fittings	Drag coefficients are in accordance with Table E4	Shall be compliant with AS/NZS 4676
Traffic poles - JUSP and JUMA	• 10-degree upward tilt on	Shall be compliant with

Technical requirements for the supply and installation of traffic signals have been tabled to provide context to the related AS/NZS standard.

For example, this includes compliance with the supply of LED lanterns and lantern body requirements, including any bracket or mounting hardware.

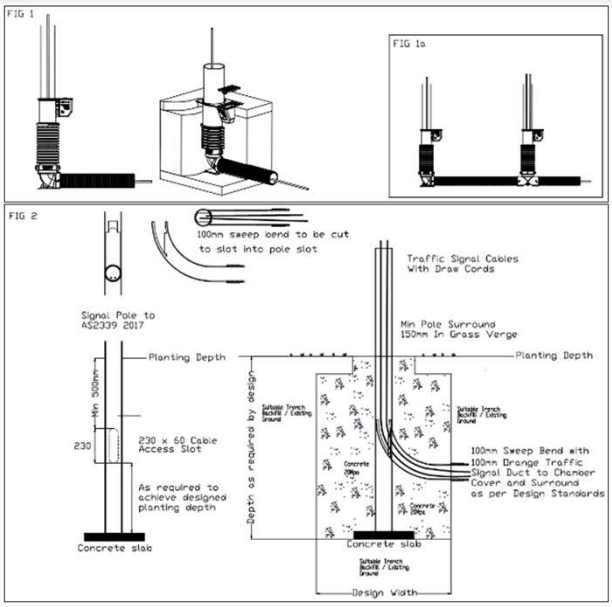
⟸ Refer to Table 2

NZ TRANSPORT AGENCY WAKA KOTAHI

Beca

Reinforce industry standards

Appendix E: Ground Plant Pole – Duct Access Details



SNUG Committee Improvement

Preferred method of installing a signal pole is using a retention socket that facilitates the signal cable to enter from the bottom of the pole **(refer to FIG 1a)**.

Where the preferred method above is impractical or if the existing pole is remaining and cannot be reused in a retention socket, the installation team are to **device a method to facilitate cable entry and removal without having to excavate around the pole during future works.**

FIG2 shows one option, using a long 90º bend 100 mm diameter, cut as appropriate, to facilitate the bend entering the signal pole and guiding the cable up into pole from the chamber.

NZ TRANSPORT AGENCY WAKA KOTAHI

Beca

Requirements

a) Cabling of the pole is to be able to be undertaken without disturbing the ground around the pole.
b) Additional cables are to be able to be pulled into the pole without disturbing the ground around the pole.
c) The installation team must minimise the entry of backfill/ concrete into the signal pole during installation – noting the preferred installation is to have a mass concrete base.

Section 2.3.7 - Extra Low Voltage (ELV)

Expert Panel Comment

2.3.7 ELV (Extra Low Voltage)

All new sites must be ELV sites. To clarify, this means that MEN Mains Voltage is only present in the signal controller cabinet, with all site cabling and equipment meeting the ELV requirements.

Where dimming is to be used, this must be done as 'dim by wire'.

Where 230v streetlighting is installed on JUSP's, ELV step-up transformers must be used at the Montrose box. Specific requirements for this can be found in the WK / NZTA 'Specification for Streetlights at ELV sites' (linked in Appendix P).

Consideration must be given to ensure voltage drop requirements are not exceeded at large ELV sites.

ELV for traffic signals is what we are trying to work towards within the industry.

There are obvious H&S benefits with ELV installations, however we acknowledge RCAs have challenges with installing ELV.

NZ TRANSPORT AGENCY WAKA KOTAHI

Beca

The industry are aware of the current challenges with stepping up/down of voltage of street light supply at JUSPs. Likely further iterations may be required to get this where it needs to be.

Section 2.9 – Uninterruptible Power Supply (UPS) for Traffic Signals

NZTA Drafting Principle

2.9.1 General

2.9.1.1 Purpose

An Uninterruptible Power Supply (UPS) system for traffic signals provides emergency auxiliary power to traffic signals during a power outage, providing both a safe and efficient journey for road users in these events. In addition, UPS systems have also proved to extend the life of the traffic controller by reducing the adverse effects of brownouts and maintaining a consistent flow of current to the traffic controller.

2.9.1.2 Factors for UPS Prioritisation

Appendix P: UPS Prioritisation Chart, serves as a guide when prioritising the installation of UPS systems at signalised intersections. The factors and weightings included in the appendix used as a reference to assist individual Contractor's in making an assessment when prioritising the installation of UPS systems at signalised intersections.

2.9.1.3 UPS Standard Baseline

UPS selection must comply with AS 5715:2015 Uninterruptible power systems (UPS) for roadside devices.

Where a Contractor proposes to install a new UPS type not previously installed in the area of the RCA, the Contractor is to seek approval from the RCA and follow the approval procedure below:

i. Written approval shall be obtained from the RCA;
ii. The Contractor shall offer to make a presentation on the equipment to the RCA,
iii. The Contractor shall provide a training course to the RCA's existing maintenance Contractor, at no charge to the engineer or the maintenance Contractor;

If the new equipment requires special configuration tools, the Contractor (or their agent) shall provide all equipment required to allow full operation. This may include computer hardware & software, as required by the RCA to integrate with the operations of the current maintenance Contractor;

This section of the specification has been added to the NZTA UPS Specification doc which provides specific details for traffic signal UPS installation.

No edits to this text have been undertaken by the authors or NZTA Senior Advisor.

NZ TRANSPORT AGENCY WAKA KOTAHI

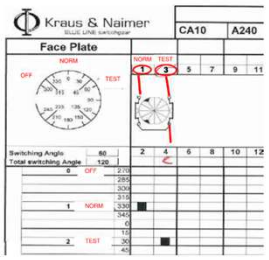
Beca

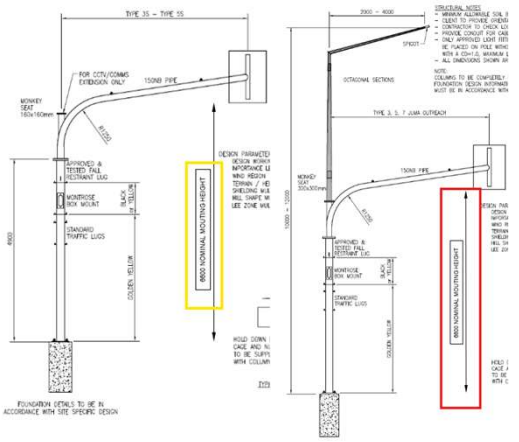
Industry Consultation Comment

Figure Improvements

Authors have undertaken improvements to the following Figures:

- **C13 and C14** – added minimum clearance from backing boards to ground level
- **Appendix J -** has been re-drawn for better clarity
- **Appendix L** – updates refer to the new NZTA 'Asset and Work Manager' Platform





17 Appendix L: Asset and Work Data (RAMM Asset Data Form)

Document Changes

To ensure alignment with P43 Specification for Traffic Signals and avoiding large amounts of change.

Authors and the NZTA Senior Advisor have not changed or altered any of the text, simply tailored the existing spec to align with the NZTA Delivery Specification Template.

TRAFFIC SIGNALS

Intelligent transport systems (ITS) delivery specification

NZ TRANSPORT AGENCY WAKA KOTAHI

Beca

Opportunity for Open Floor Discussion

Traffic Signal Design Standard

TRAFFIC SIGNALS

Intelligent transport systems (ITS) design standard

ITS-STND-TS-202509

9 SEPTEMBER 2025
0.6

DOCUMENT STATUS: DRAFT

Traffic Signal Design Requirements vs Traffic Signal Design Guidance

Expert Panel Comment

During the expert panel workshop, there were several comments made regarding the writing components of the design document.

Examples are provided below:

- Design requirements vs Design Guidance
- Shall vs may
- Will vs should
- Required vs recommended

The drafting principles and author handbook avoids using words such as 'may' or 'should.'

Outcomes

- To avoid any misconception of what is traffic signal design requirements and guidance…
- Design Requirements (e.g. TCD Rule related) have been kept in the main body of the document.
- Design guidance has been moved into the appendix sections and the language used has been aligned with guidance words (e.g. 'recommended,' 'may,' 'could' and 'should.'
- A disclaimer has also been provided in Section 1.1 which provides context.

> The content included within this design standard shall reflect the requirements set out in the Land Transport Rule: Traffic Control Devices 2004 (TCD Rule) and latest revision of ITS delivery specification: *Traffic Signals*.
>
> Design guidance has been provided in Appendix A to C of this document.

NZ TRANSPORT AGENCY WAKA KOTAHI

Beca

Expert Panel Comment

The Use of Product Names

During the expert panel workshop, there were several comments made regarding the use of vendor names.

Examples are provided below:

- Above Ground Detector (AGD)
- ATC Controllers
- VC5 and VC6
- SCATS Specific Controllers

Outcomes

- We acknowledge in the traffic signal industry that avoiding the use of supplier and vendor names can be challenging.
- There are some parts of the design standard which uses terms such as ‘in-ground’ and ‘overhead’ detection.

Expert Panel Comment

Overhead Detection

The use of overhead detection was discussed frequently at both expert panel workshops and at industry consultation.

For example:

- Should we be using 'Overhead Detection' as the device name
- Suitable locations for these devices
- Preferred mounting position and pole type
- Functionality – what are designers trying to achieve
- Limitations of such devices

Outcomes

- Authors have had to be descriptive on the guidance or usage of overhead devices at signalised intersections.
- It's important that the designer/ Consultant understands what the device capabilities are and what the detector is being used for (e.g. kerbside/ on-crossing detection or stop line detection).
- Avoid installing overhead detection at poles which move (i.e. hinged signal poles).

NZ TRANSPORT AGENCY WAKA KOTAHI Beca

Principles for the document – avoid using vendors and supplier names
Terminology and industry is changing and we want to leave this space open.
Detection methods are evolving.

Expert Panel Comment

Location of Junction Boxes

Positioning of junction boxes were discussed regularly at both expert panel and at Industry Consultation.

"They should be located at the back of the footpath away from live traffic lanes at least 2-3m behind the kerb line so they can be safely maintained"

"Located at least 2m? Shouldn't this be 1m?"

<u>Outcomes</u>

In recent years, the connection of in-ground detector loops has evolved across New Zealand.

The introduction of loop junction boxes has removed the need to saw-cut through concrete kerbs and channels.

The location of junction boxes has been challenging for both Consultants and Contractors to locate them in the best possible position.

The main drivers for this is to keep our contractor safe on site will maintaining or testing detector loops.

Therefore, positioning has been prescribed with at least 1m clearance from the kerb where possible. Confirm with regional RCAs prior to design.

NZ TRANSPORT AGENCY WAKA KOTAHI

Beca

Expert Panel Comment

Approach Phasing

"Do most regions want designer to label approaches?

I think this is a CIS writer's job. I always request detectors are split up to give each one a separate approach (1-4) wherever possible so that you have more flexibility re changing Gap times.

Useful if you want to set a broken detector's gap to 0s but not the adjacent detector's."

Outcomes

- Approach phasing was initially presented within the design standard.
- Following discussions at expert panel workshop and with SMEs this is a deign preference for Christchurch and some parts of the Central and Southern Regions.
- Typically driven by software developers.
- This was removed from the design document and will be redirected to the Christchurch and WTOC Regional Specifications for designer guidance.

Expert Panel Comment

What does this mean for Regional Specifications and Special Conditions?

Outcomes

- We still want regional RCAs to continue to develop their specifications.
- The purpose of this document is to provide better consistency for design across New Zealand.
- We acknowledge that there will be specific regional requirements for traffic signals and that's where our RCAs can drive good practice solutions and technology within the industry.

Opportunity for Open Floor Discussion

Thank you!

For anyone in the room who would be interested in being a SME or would like to receive updates.

Please subscribe
https://nzta.govt.nz/roads-and-rail/intelligent-transport-systems/registration

NZ TRANSPORT AGENCY
WAKA KOTAHI